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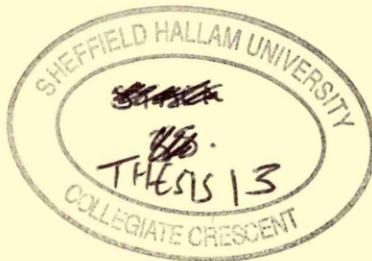
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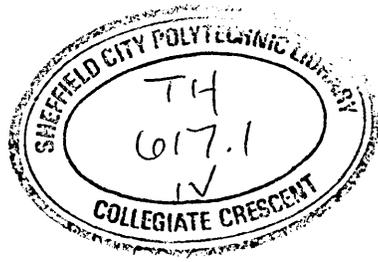
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THE DEVELOPMENT AND DIFFUSION OF WOUND HEALING THEORY AND
PRACTICE: A SOCIOLOGICAL CASE-STUDY

OLGA IVETIĆ B.A.(Hons)

A thesis submitted in partial fulfilment of the requirements
of the Council for National Academic Awards for the degree
of Doctor of Philosophy

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ABSTRACT

TITLE: The Development and Diffusion of Wound Healing Theory and Practice: A Sociological Case-Study

AUTHOR: Olga Ivetic

The initial aim of this study was to tap the knowledge and experience of doctors and nurses caring for patients with fungating and ulcerating malignant lesions, and in recognition of the scant information available on the nature and treatment of this condition, to make this information available to the wider medical and nursing communities.

The discovery that experimental studies conducted in the 1960's on the physiological processes of wound healing contradicted the previously held dominant view that a 'dry' environment promoted healing, resulted in the researcher widening the remit of the study. This enabled its original focus on the management of patients with malignant lesions to be extended to encompass the extent and sources of clinicians' knowledge about wound healing matters in general and innovations in the wound care field in particular.

It became apparent that, in order to understand the factors which influence clinicians' adoption of innovations, it is not sufficient just to focus on the 'adopters' of new practices; one must also investigate the role which the 'suppliers' of new knowledge and technologies play in affecting the rate of adoption.

Investigation of these issues led to a wide-ranging study based on in-depth interviews with samples of nurses and doctors, research scientists and commercial personnel. The findings from this study indicate that various parts of the body can be a potential site for the development of malignant lesions, which may affect both sexes of all ages, although lesions in certain areas are particularly common, and sex and age-specific. Various conventional and unconventional treatments are used on these lesions, although there was little evidence that doctors and nurses operated on the basis of some clinical consensus when assessing wounds and deciding on the management regimes to employ. The finding that the choice of treatment for malignant and non-malignant wounds is governed by a whole host of social, institutional, psychological and economic factors dispels the myth that wound management is based on objective clinical criteria alone.

The education and socialisation of scientists and the settings in which they work were found to influence their practice, in much the same way as these factors influence clinicians' practice. Moreover, scientists and people working in the commercial world, like clinicians, often employ tacit and experientially based knowledge to inform their practice, frequently informally and often haphazardly acquired, as opposed to via formal learning.

The findings also indicate that the development, diffusion and adoption of medical innovations are influenced by various socio-economic, institutional, individual and political factors. Moreover, that as radical as an innovation may appear, it more often represents a continuation of that which it supercedes than a totally radical departure from it.

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INTRODUCTION

The initial aim of this study was to investigate the extent and sources of nursing knowledge about the nature and management of cancer patients with fungating (1) and ulcerating (2) lesions. The impetus for this investigation arose from a preliminary study conducted in the Health Studies Department at the Sheffield City Polytechnic, of the nursing care of patients with such lesions. This area had been considered worthy of study because little information seemed to be available regarding the nature and treatment of this distressing but not uncommon condition. The care of the physical symptoms and the associated psychological problems presented by such patients have become mainly a nursing responsibility, yet nurses have to rely largely on intuitive or experientially acquired knowledge to deal with them. Even where the experience on which this knowledge is based is extensive, this situation was seen as unsatisfactory by many practitioners in the field. This situation provided the original impetus for the study.

This study developed out of an investigation which was originally directed towards a practical outcome, that of formalising the informal knowledge that currently exists about this condition and its management. It was hoped that by providing carers with a resource on how this condition is dealt with by 'other' health care professionals effective and consistent management of such patients may develop. However, as the study progressed interest was generated in certain theoretical areas which will be discussed shortly. Thus a process of evolution from the initial empirical investigation took place.

-
1. Fungating malignant lesions are those which form a raised nodular mass, which ultimately becomes necrotic.
 2. Ulcerating malignant lesions are those where there is a breakdown of tissue and the development of a 'crater-like' wound.

The author became involved with this study as research assistant in 1985. It could be argued that the researcher's social science as opposed to medical or nursing background, affected not only the course of the research but also its nature. The direction in which she took the research, the questions she regarded as important to ask and the interpretations she gave of the answers, clearly reflected the conceptual frameworks of her discipline. Had she come from a medical or nursing background the resulting research may have been of a totally different order.

It could be claimed that the researcher's background made her 'objective', in terms of the initial research project, because unlike a researcher from a medical or nursing background she neither possessed, nor operated within, pre-set assumptions about issues relating to wound healing theories and wound care practice. However, as far as the researcher is concerned, claims to 'objectivity' on such accounts have been of infinitely less significance in shaping the resultant research than the points discussed immediately above.

The researcher's first task was to undertake a review of the literature on malignant lesions. This led her to an awareness that although malignant lesions represent a specific type of wound, they are nevertheless wounds, and as with any form of wound management, it is generally considered desirable that nurses should base their treatment on a sound understanding of the normal physiological processes of wound healing. This recognition led to the introduction of a second element to the study, namely an exploration of firstly, the extent and sources of nurses' knowledge about the general principles of wound healing, and secondly, how far their management of malignant lesions is based on an understanding of these processes.

Two factors, then, influenced the direction of the study. Firstly, a review of the literature on wound healing revealed that experimental studies conducted in the 1960's on the physiological processes of wound healing appeared to run counter to previous thinking about how wounds heal. A senior technician, by the name of George D. Winter, working in the Institute of Orthopaedics at the Royal National Orthopaedic Hospital

at Stanmore, discovered that a moist rather than a dry environment provided the optimum conditions for healing to take place. This innovation in wound healing has become generally known as the moist wound healing theory (MWHT).

Secondly, the search for a theoretical framework for the study led the researcher to trace the development of the nursing profession. In so doing she became aware of the historical relationship between doctors and nurses, and particularly the medical profession's involvement in nurse education. Several writers consider that nursing knowledge in the 19th century was controlled by the medical profession in a bid to monopolise all aspects of medical knowledge, thereby consolidating their monopoly over medical practice. It was this apparent monopolisation of medical knowledge which the researcher thought worthy of further investigation - particularly as it related to nursing knowledge about wound management matters.

Additional literature searches were then conducted in the areas of the historical development of the medical and nursing professions and nurse education. Many of the arguments proposed in this literature appeared to relate to the significance of social influences in the development of medicine and nursing. A review of the literature relating to the sociology of medicine and nursing then followed. This confirmed the researcher's growing awareness of the important influences which socio-political, cultural and economic factors bring to bear on health care practice and the constitution of medical knowledge.

Tracing the historical antecedents of the MWHT and the synthetic dressings which later became associated with it, through the scientific and medical literature and into nursing literature, revealed a complex picture. It became apparent that socio-economic and political factors, such as the experiences of war and the shifting industrial base of certain European countries, played a significant part in these developments.

It was at this point that the researcher decided to locate the empirical data provided by the development of the MWHT and associated dressings in

the context of a wider theoretical framework relating to medical knowledge and practice, provided by medical and nursing sociologists. This raised the following issues for analysis.

1. How far those involved in wound management, principally nurses and physicians,
 - a) are aware of recent changes in wound healing theories and techniques;
 - and
 - b) adopt innovations in the field of wound care.

2. How do those health care professionals routinely involved in wound management keep abreast of innovations in the wound care field.

Investigation of the above issues led to a wide-ranging study based on interviews with samples of nurses drawn from the total population of those employed in three units of one Health Authority. These areas were chosen because nurses with appropriate experience (3) were likely to be concentrated there.

A further dimension was added to the study in order to reflect its refined theoretical focus. The researcher decided that selected members of the medical staff from the above areas should also be included in the study. It was hoped that this would provide insights into the individual and collective roles which these doctors and nurses play in treating patients with malignant lesions, and enable the processes of knowledge dissemination between medical and nursing domains to be explored.

This is not the first time that a study of the nature and management of patients with malignant lesions or that of the development, diffusion and adoption of medical innovations has been undertaken. It must

-
3. 'Experience' is taken here to mean nurses who are qualified in oncology and/or have cared for patients with malignant lesions.

however, be said that these two areas have been unequally investigated and reported upon.

The nature of malignant lesions, the causes of them and of their associated symptoms, such as bleeding, pain and malodour, and their prevention, have received scant attention from either the scientific or the medical world. This may be due to the way in which certain areas of medical knowledge are considered worthy of scientific enquiry while others are not. For example, the physiological processes of wound healing are amenable to controlled experimental studies and, as such, they appear to be acceptable as an area of interest within the domain of 'scientific' medicine. The nature and treatment of malignant lesions, in contrast, are very difficult areas to study. They are not amenable to controlled scientific investigation given their non-uniformity. Thus they appear to fall outside the scientific medical domain and have come to be considered the province of nurses (who may be regarded as a relatively 'non-scientific' group by their medical colleagues, in terms of the knowledge base which informs their practice).

The reason for the lack of research into the causes of this condition has perhaps less to do with its rarity (indeed we do not know the incidence of this condition precisely because of this lack of research; certain conditions have attracted to them much research despite the fact that they may only affect a relatively small proportion of the population), and more to do with various socio-political and economic factors, as the following discussion will hopefully demonstrate.

The development of fungating and ulcerating malignant lesions are inextricably linked with the underlying malignant condition, although the relationship between them is not a simple one. Cancer is now regarded as a major cause of death in Britain and its total mortality rate is increasing. The disease kills about one in five of all people dying in Britain. It is the major cause of death among men and women of all ages and according to Doyal et al (1983):

"..... twenty percent of people now alive in Britain can expect to die from cancer" (p8).

So what do we currently understand to be the causes of cancer more generally? The causes of cancer are increasingly being seen by those propounding the 'radical' approach as social in origin, from exposure to carcinogens in the workplace, in consumer products and the environment more generally. However, the relationship between the onset of cancer and exposure to certain carcinogens is usually not a simple one, according to Doyal et al (op.cit.):

"..most cases are related to several different elements in a victim's physical, social and economic environment which interact with his/her own genetic make-up to produce a cancer" (p1-2).

Nevertheless, the fact that the majority of cancers are largely environmental in origin is evidenced by the marked differences found in cancer rates between different social groups, particularly different social classes. In Britain, for example, most of the major cancers are more common among semi-skilled and unskilled workers than among the skilled and professional classes (Occupational Mortality: Registrar General's Decennial Supplement (1982-83). These class differences are important because they serve to demonstrate that the causes of cancer cannot be explained simply in natural or genetic terms.

Many forms of cancer are thought to be preventable but that changes in the way we live are an essential first step towards prevention. However, there appears to be considerable disagreement about what these changes should be and how they can be brought about, although there is a general recognition that they depend in large part on political will and the allocation of necessary funds with which to institute them.

Thus if some cancers are preventable so too, one could argue, are malignant lesions. Moreover, that the medical and scientific professions' lack of interest in the causes and prevention of this condition may be due to various social and political factors. One reason could be related to the type of patients generally affected by this condition, namely women, especially older women. One could argue that many of the diseases which affect women tend not to attract to them as much research interest or resources as other conditions. Moreover, malignant lesions tend to be managed by nurses through palliative care. One could cynically argue

that if this was a condition which fell predominantly within the doctors' domain and was affected by curative treatments then the picture presented would be somewhat different.

If the causes and prevention of this condition have been under-researched, the management of these lesions, as a specific area of investigation, has fared little better. Indeed, the link between the two areas seems particularly pertinent to nurses, for after all, how effective can their management of the symptoms be if they do not know or understand their causes? Even when studies have been conducted into the management of these lesions, perhaps not surprisingly, they have emanated from those with the major responsibility for caring for them, namely the nurses, and not from those within the scientific or medical community. However, these studies tend, on the whole, to be anecdotal, dealing with specific cases and presenting lists of local and topical therapies employed on these lesions and on occasion, the systemic treatments that are used to treat the general malignant condition and directly or indirectly to stem the spread of the lesions or heal it.

As far as those supporting the quantitative approach to research are concerned, such single case-studies or those using small samples of patients, are inadequate as they do not allow for wider generalisations to be made from the findings and suffer from the additional problems of reliability and validity. However, this researcher does not share such views. As far as she is concerned, previous studies of this condition are deficient for many reasons but they are unrelated to the methodologies employed, for she holds the view that single-case studies and small sampled studies can produce extremely rich and valuable data. The researcher believes that in the first place there are too few studies dealing with this condition, and in the second place, the scope of their investigations is often far too limited. For example, by focusing on those sites of the body where these lesions most frequently develop, such as the female breast, a distorted picture of their presentation is offered with little indication that they can develop on virtually any part of the body. Moreover, by reporting mainly on the development of these lesions on the female breast, which are thought to

present as the 'classic' type of fungating lesion - a nodular protruberance - there is little indication of the variability of their appearance, which may lead to mis-diagnosis.

The task-orientated nature of nursing, which tends to stress **what** is used and **how** it is used, is reflected in the studies conducted on these lesions. They tend to focus on the management of these lesions, in terms of what local and topical agents are employed, with little attention being given to the psychological aspects associated with this condition, such as the tendency for such patients to conceal the existence of these lesions. However, even in terms of discussing the practical management of these lesions many of the studies are deficient, for apart from reporting the general actions of certain agents used on these lesions, for example, that they clean, debride or deal with infection, they fail to address the underlying rationales for their usage. The underlying assumption, of course, is that patient care represents the application of clinical criteria, if not scientific knowledge. This whole idea conforms to the principles of the dominant bio-medical model of health and illness. Critics of this model, however, claim that the treatments given to patients in general are not based on the level of scientific knowledge and doctor expertise (Mishler, 1981) or clinical criteria (Ehrenreich and English, 1973; Ilza, 1965), but on doctors' values and social attitudes (Zola, 1972), their integration or isolation from professional and social networks (Coleman et al, 1966), commercial influences (Kerr, 1980) or the social worth (Sudnow, 1984) and socio-economic position of the patient (Myers and Schaffer, 1954).

Many of these studies, however, focus on the various sociological factors which influence and shape medical practice; little research has been conducted on what influences and what constitutes nursing practice. Previous studies of the care of patients with malignant lesions certainly do not address themselves to these issues. The role of the medical profession vis-a-vis nursing practice and nursing knowledge is not investigated, despite the fact that this subject has been (Darbyshire, 1987; Davies, 1980; Prince, 1984) and indeed continues to be (Akinsanya, 1984) at the centre of much debate. Moreover, the question of whether nurses should be seen primarily in terms of their mastery of practical

skills (Bendall, 1973; Holford, 1981) or their theoretical knowledge and understanding (UKCC, 1986; Wilson, 1975) is not addressed. The management-orientated nature of many of the studies of malignant lesions by implication gives primacy to practice as opposed to theory.

The implicit view arising from the studies of fungating and ulcerating malignant lesions is that this is a relatively rare condition. Indeed, the paucity of information on it does little to dispute this view. In order for us to be able to judge just how 'rare' it is we need to have more information on its incidence than is currently available. Moreover, the studies currently available tell us very little about the epidemiology of this condition, apart from the fact that post-menopausal women, particularly those over 60 years of age, are the group most commonly affected. If more large-scale statistically based studies were conducted they may well show this to be true. However, such studies may also demonstrate more surprising facts that such lesions also develop in younger women. The discovery of such facts may serve as a warning to younger women should they be lulled into a false sense of security, believing this to be an 'old woman's' condition. Such studies would also hopefully demonstrate that although this condition is apparently more common in women it is also to be found in men.

Furthermore, there is nothing in the current studies about the occupational and class status of the people affected. Information such as this has important implications in terms of allowing future researchers to study the possible links between the development of these lesions and the occupation or class position of those affected. It could be that people from certain classes, perhaps because of the type of job they do or area they live in, makes them more prone to the development of these lesions than people from other classes. The link between social factors such as these and illness is a well researched area (Black, 1980; Osmond, Baker and Slattery, 1990; Paffenbarger and Hale, 1975) and certainly the association between the development of various cancers and the variables discussed above has received much attention in recent years (Doyal et al, 1983; Robinson, 1981). Linking social factors with illness in this way clearly conflicts with the dominant bio-medical model of health and illness, which assumes both states to be fully

accounted for by deviations from or conformance to certain biological norms (Doyal, 1979; Ehrenreich, 1978) without recognising that health and illness are social as well as biological facts (Wright and Treacher, 1982).

Thus from the above discussion it is obvious that the care of patients with malignant lesions is an area which has been seriously neglected as a focus of inquiry, and that as a result, there are major gaps in current understanding of this condition and its management, and much scope for future research.

Innovation is one of the major mechanisms of social and technical change and economic growth. The necessity to keep on investing and innovating in the form of launching new products is an example of this technological regeneration and is evident in a number of fields, particularly medicine. Interest in this subject of change has increased over the years. One aspect in particular which has received considerable attention is the diffusion process, by which a new idea spreads "from its source of invention or creation to its ultimate adopters or users" (Rogers, 1962).

The traditional and most completely developed approach to the study of the diffusion of innovations, and one which has dominated academic thinking, is the 'adoption' perspective (Rogers and Shoemaker, 1971). This perspective focuses on the factors which influence the rate of adoption, particularly emphasising the role of social 'inter-personal' networks, information flows and psychological variables such as innovativeness and resistance to adoption. Innovators, opinion leaders and gate keepers of information receive particular attention, as they are seen to be of prime importance to the functioning of the inter-personal network and thus are influential in persuading others to adopt a given innovation. However, it is not true to say that the adoption perspective only focuses on the adopter unit's characteristics in order to identify the factors which affect the diffusion and adoption of innovations. It also looks at the innovation itself, in the belief that the characteristics of certain innovations can in themselves affect their adoption.

Because the above paradigm tends to be concerned with the adoption side of the diffusion process it tends to be referred to as the 'demand' perspective. There are, however, alternative perspectives which deal with the 'supply' side of the diffusion process, focussing as they do on the point of production and distribution of an innovation. They have not, however, received much attention, nor do they represent a coherent school of thought (Brown, 1981). According to one of these perspectives, the 'market-infrastructure' perspective, supply and access considerations account for an extremely high percentage of differences in the rate and patterns of diffusion. This perspective is mainly concerned with the way innovations are made available to potential adopters. It argues that the organisation diffusing the innovation determines in many ways the potential adopters' ability to adopt, thus shifting the responsibility for adoption away from the adoption unit and onto the diffusion agency itself. More specifically, the price of the innovation, promotional and marketing campaigns and the market selection and segmentation are all thought to influence in very important ways the speed of adoption.

Another perspective utilising the 'supply side' argument is to be found in the economic historical school of thought. Whereas the market-infrastructure perspective looks at the problem of logistics, distribution and promotion, it says virtually nothing about the innovation itself. It is precisely this feature which occupies one school of economic historical thought. It is concerned with the impact that changes in the innovation itself have on adoption. More specifically, it examines the way in which the innovation is continually being perfected and adapted to new uses and new markets, thereby increasing its adoption rates. Many innovations are relatively crude and inefficient at the time they are first launched and are not suited to many of the uses to which they will eventually be put. As such they may offer relatively little advantage over existing products and so adoption may be slow. Moreover, the need to learn new skills and adopt different frames of reference to deal with the new innovation may also take time, which may account for slow adoption. In order to understand the rate of adoption of any innovation this school of thought also regards it as important to look at the complementaries, that is the other innovations

which need to be developed before the first innovation can be successfully adopted, and the products which this innovation is replacing, in terms of any improvements which are made to them.

Research into the development and diffusion of innovations has been conducted in numerous fields (see section 4.1). However, research into what constitutes nursing knowledge and practice has received scant attention from academics and clinicians alike. Much has been written on medical knowledge and practice and the influences on the development and diffusion of drugs, but the whole area of the diffusion and adoption of innovations by nurses and the sources of their knowledge has hardly been addressed.

The MWHT and its associated dressings are still regarded by many clinicians as new even though the theory was developed in the 1960's and the first dressing associated with it, named OpSite, was developed in the 1970's by Smith and Nephew Ltd. Apart from studies conducted to compare the effectiveness of the various synthetic and semi-synthetic dressings based on the MWHT with traditional wound management practices, little work has been done to ascertain nurses' and doctors' awareness, and the extent of their knowledge and understanding of this theory and its associated dressings. How clinicians learn about innovatory research findings and practices pertinent to their every-day work and the factors which influence whether or not they adopt them, have been neglected.

Conversations in clinical circles and discussions in many studies tend to raise the point that it is not research per se which nursing is lacking, but that nurses appear to be particularly bad at applying research findings, even those which may improve their management of certain types of patients or conditions. The continued existence of pressure sores is, for example, constantly bemoaned, yet many clinicians feel that they could be prevented from developing and indeed a great deal of research has been focused on precisely this issue. Is the problem therefore one of availability and accessability, in that nurses are not aware of the existence of such studies, or are the reasons for nurses not applying research recommendations to be found in the nature of nursing itself?

Despite the well-acknowledged contradiction between the existence of nursing research and nurses' application of its findings, very little work has been done on researching this phenomenon - namely why nurses appear not to adopt research findings. Thus before nurses or others engage in research aimed at affecting nursing practice, and to prevent it becoming absorbed into the existing stockpile of research which remains unknown to the majority of nurses, more research needs to be done on identifying and understanding the factors which determine why nurses do or do not adopt innovations in clinical practice. Then, perhaps, more effective use could be made of future research, it could be more rationalised, and scarce resources be put to better use.

As the methodology chapter will discuss in more detail, a qualitative as opposed to a quantitative methodological approach was adopted by the researcher to investigate the various areas related to wound healing theory and practice. The samples of respondents used in this study were relatively small and issues surrounding the MWHT and associated dressings, in terms of their development, diffusion and adoption, were investigated using the case-study approach. In this respect, this study has much in common with those which have previously dealt with these areas (see section 4.1), although it is hoped that the material is richer in both breadth and depth.

Previous studies of malignant lesions and wound healing theory and wound management have, in the main, been conducted by clinicians with highly pragmatic concerns. It is hoped that one of the contributions of this study is to demonstrate that social scientists can and should penetrate scientific and medical specialisms. Indeed, that they have a valuable contribution to make to understanding modern scientific medicine. Their neutrality, in terms of a lack of vested interest within the arena of professional health care between competing occupational groups, enables them to be dispassionate and informed, detached observers and analysts.

Another distinctive aspect of this study is that, although it is hoped that some of the findings will have a practical outcome and, for example, can help inform the management of both malignant and non-malignant wounds by increasing clinicians' awareness of what treatments are used and why,

it has another dimension. Its aim is to develop theoretical understanding of firstly, the various sociological factors which influence the production, diffusion and adoption of innovations in the health care field; and secondly, the types of knowledge possessed by health care professionals and the sources of their knowledge.

In investigating the development, diffusion and adoption of the MWHT and its associated dressings the researcher has sought to tackle an area which has been under-researched, namely the adoption of innovations by the nursing profession. Research into the development and diffusion of innovations in general has tended in the past, to focus on the 'demand' and 'adopter' side of this process. However, this study, in moving the research away from the 'adopters' of new practices and onto the 'suppliers' of new knowledge and technologies, has in effect followed the recent trend towards investigating the 'supply-side' of innovation development and diffusion. More specifically, it is the intention of this study to analyse the ways in which the 'demand' and 'supply' side of the diffusion process interact and influence the adoption of innovations in health care practice. In practical terms, this means that both the nurses and the doctors, at whom this new theory and associated dressings have been directed, the research scientists who were involved in the development of the MWHT, and the company who pioneered the first dressing based on this theory, are the focus of this study. Thus it is hoped that this study will make the case for studying the adoption of innovations by nurses to the level of importance that it deserves, and will demonstrate the extent to which the nursing profession has been neglected in this respect.

The findings from this study on the nature and management of fungating and ulcerating malignant lesions, the nurses' and doctors' knowledge and understanding of the general principles of wound healing and, in particular, that of the MWHT and associated dressings, forms part of what may be termed the 'demand' side of the study. This term, as mentioned above, is used in innovation literature to denote the 'adoption' stage of the diffusion process. In this sense, the findings mentioned above represent the 'adoption' by practitioners of various knowledge and techniques. The final part of this study forms part of what may be termed

the 'supply' side of the study. It investigates the origins of the innovations under study, and the knowledge and techniques emanating from the scientific and commercial communities responsible for the development of the MWHT and the dressing first associated with it.

With respect to the nature and management of malignant lesions, this study aimed to investigate the doctors' and nurses' perceptions of the causes of these lesions and their associated symptoms. Their different sites of presentation and different types of presentation, in terms of the characteristics they present, and possible methods of prevention are also investigated. However, not all the emphasis of this study is on the respondents' knowledge about the lesions per se. The researcher thought it appropriate to also inquire from the respondents about the types of patients affected by this condition, in terms of their age and sex, so as to make a tentative start at filling some of the gaps identified in previous research in this area. It would not have been possible to obtain any accurate information about such patients' social class and occupational status from the clinicians interviewed in this study. This would have only been possible if the researcher had had direct access to a sample of such patients themselves or their records, which certain ethical considerations and the limited remit of the study precluded her from doing. This is certainly an area for future research.

Studying the nature and management of malignant lesions as well as the development, diffusion and adoption of innovations into nursing practice may sound incongruous. However, in many respects they are highly complimentary, for through them the researcher hopes to discover whether differences in the way scientific knowledge (in terms of the MWHT and associated dressings) and non-scientific knowledge (with respect to malignant lesions) is acquired by clinicians and whether they are able to understand and make use of any one of them better than the other.

However, there are limitations to this study. The methodological approach adopted, in terms of the case-study and small sample size, does not allow for wide generalisations to be made from the findings. What it is able to do, however, is to generate ideas and explore many issues which can subsequently be investigated in more breadth and depth.

The very nature of the researcher's educational background precluded her from directing the study into more scientific and clinical areas, such as investigating the nature of malignant lesions histologically or assessing the effectiveness of the local and general treatments used on them. The researcher also fully recognised the value of presenting the patients' perspective, but for reasons discussed elsewhere was not able to pursue this area of inquiry. Thus in discussing the case of malignant lesions it is only the clinicians' side of the story which is presented. There are a number of reasons for this. Firstly, because health care professionals provide a crucial role in the care and treatment of such cancer patients, and because their knowledge and understanding can make a difference to the quality of life of individual patients, it was regarded as important to direct this study towards them as a first step. Moreover, apart from the general implications arising from existing studies in this area virtually no research has sought to establish the level and extent of knowledge which those involved in caring for such patients possess and which, one may suppose, informs their day-to-day management of them.

A second reason for studying clinicians, namely nurses, with regard to malignant lesions, is because of the very nature of the type of care that they provide to such patients. When one reads literature on the care of cancer patients a great deal of emphasis is placed on the improved ability of present day medicine to cure them. However, there is much evidence to support the claim made by Doyal et al (1983):

" that western medicine has so far proved remarkably ineffective in helping cancer patients - survival rates for most of the common cancers have improved very little over the past 30 years" (p1).

Indeed, cancer treatments are increasingly coming under attack for reducing the quality of life of many cancer patients as well as failing to provide a cure. Many people can live with cancer for many years and through appropriate and sensitive palliative care can have qualitatively rich lives, but very little research has formally been conducted on the role and importance of palliative care. Indeed, in the action plan adopted by 'The Council of the European Communities and the Representatives of the Governments of the Member States Meeting within

the Council' in their 1990 programme "Europe against Cancer", it is clearly stated that:

"Whereas it is the view of the World Health Organisation that palliative care can provide extremely valuable support both for patients for whom all treatment has failed and for their families ...such care should therefore be given recognition and assistance" (p31).

The care of patients with malignant lesions is an area where palliative care can perform such an important role. It is therefore certainly of importance to study not only the type of palliative care given to such patients, but also to investigate the rationales underlying its use, which this study attempts to do.

The limited resources and narrow initial scope of the study meant that the investigation of the diffusion and adoption of the MWHT and associated dressings was not treated in the manner of other diffusion studies. Thus the factors identified in the literature on this area as significant in affecting the diffusion and adoption process were not tested, nor were the various models and diffusion networks explored in great depth, although the whole study of the MWHT and associated dressings has enormous potential as a wide-ranging and interesting diffusion study. Although this study may have its limitations, they are not in terms of ideas. Indeed, it seems abundant with ideas which can be developed at a later date.

The natural evolution of the study and the theoretical ideas which underpinned it determined the rationale for the architecture of the thesis. The first chapter presents a detailed discussion of the various methodological approaches employed to obtain data from the relevant clinical, scientific and commercial personnel. The data collection techniques used are described and the methods by which they were operationalised to suit each particular area and group of respondents are also discussed in detail.

Chapter Two begins that part of the thesis devoted to a presentation of the various findings. It begins with a literature review (as do the subsequent two chapters) on the nature and management of fungating and

ulcerating malignant lesions, before proceeding with a discussion of the findings from the nurses and doctors on their knowledge and understanding of this condition, and the sources of their knowledge. At the end of this, as with all the chapters, a detailed conclusion will be presented containing an analysis of the preceding data and its relationship with the overall theoretical framework of the thesis.

Taking the issue of wounds from the specific to the general, Chapter Three is devoted to presenting the data from the clinicians about their knowledge and understanding of the general principles of wound healing, especially the MWHT and associated dressings. As with the previous chapter, the sources of the respondents' knowledge are investigated, as this has important implications for the manner in which knowledge of innovations in the health care field is diffused.

Much of the evidence presented in Chapters Two and Three demonstrate the empiricism of modern medicine, where there appears at times to be no more to wound healing than what is 'visible' and 'observable'. Yet there is much to suggest that the nurses' 'gaze' is not trained to give them the meaning with which to inform their clinical practice. What this emphasis on the 'gaze' does, however, do is bestow primacy to perception and experience while subordinating theory, with the result that theory occupies either a marginal position vis-a-vis clinical practice or is totally alienated from it. Moreover, while this tacit and experientially based knowledge appears to be taken for granted and often considered unquestionable, knowledge theoretically and scientifically constituted is regarded with suspicion until it has been proved to work in practice.

The findings from this part of the study also demonstrate that nurses' and doctors' experiences, both social and occupational, determine what they see and the meanings they attach to their observations, and that their 'knowledge' base is in large part thus constituted. This is particularly the case where formal knowledge does not exist, as in the case of fungating and ulcerating malignant lesions, but it is also evident where formal knowledge does exist, as in the case of wound healing theory and general wound care practice. What this finding does is dispel the myth that doctors, and more particularly nurses, operate on

some clinical consensus when assessing wounds, whether malignant or non-malignant, and deciding on the management regime to employ. The finding that the choice of treatment for malignant and non-malignant wounds is governed by a whole host of social, institutional, psychological and economic factors and not on objective clinical criteria alone, dispels yet another myth concerning clinicians' assessments of wounds. This is in contrast to the bio-medical model of health and illness which regards patient care and medical practice as the application of clinical and scientific principles.

The data suggest that numerous misconceptions abound between health care professionals concerning the doctor - nurse relationship, the knowledge that doctors and nurses possess, and the ways in which knowledge is diffused into practice. For example, despite the fact that wound management is generally viewed as nursing territory there is much in this study which suggests that doctors often 'indirectly' still maintain power and control over nurses' wound management practices, although less so over nurses' knowledge about wound matters, even though this control is not always consciously acknowledged or overtly practiced. Furthermore, doctors were found to be as pragmatic as their nursing colleagues, and much less innovative or interested in matters theoretical than nurses, and those in the commercial world assume.

Chapter Four begins that part of the study which focuses on the 'supply-side' of the innovation process. In other words, it looks at the origins and development of the MWHT and OpSite and the mechanisms by which they were diffused into health care practice. In particular, it examines the socio-economic, institutional, individual and political factors which influenced their development and acceptance by those in the scientific and clinical communities.

One of the fundamental questions existing in the innovation theory literature is whether innovations arise as a result of 'science' and 'technology push' or 'demand pull'. The accounts presented of the MWHT and OpSite do not allow for such clear distinctions to be made. One perspective, for example, portrays OpSite as developing in response to a market need, while another judges it to have arisen from 'technology

push', in that it arose partially, if not totally, albeit not in any mechanistic way, from existing technology. What the findings in this final chapter indicate is that the determinants of innovative activity are complex and that there is rarely a single factor causality. Moreover, that as radical as an innovation may appear, it more often represents a continuation of that which it supercedes than a totally radical departure from it.

This final chapter will also demonstrate that the speed of adoption of new technology is a similarly complex matter. The importance of supply factors to the adoption of innovations can be seen in the way that the marketing strategy adopted by a given company promoting the innovation, and changes in the actual product itself, can significantly affect adoption of it.

Through the case of the MWHT and OpSite the researcher will attempt to show that scientific and medical knowledge are both influenced by the social context in which they are produced, representing one possible version of reality and not the ultimate truth of how things are. The MWHT may be regarded in the scientific community, and to some extent in the clinical community, as the 'true' way by which wounds heal. However, the development of this theory and its ultimate diffusion and adoption by the scientific and clinical communities has been influenced by numerous socio-economic, political and institutional variables.

Some of the findings in this final chapter concur with those discussed in previous chapters. For example, the education and socialisation of scientists and the settings in which they work influence their practice in much the same way as they do clinicians' practice. Also, that scientists and people working in the commercial world, like clinicians, employ every-day common-sense types of knowledge, frequently informally and often haphazardly acquired, as opposed to formally, to inform their practice. This is in contrast to the often 'idealised' way in which each of these groups believe such things occur or indeed ought to occur.

CHAPTER ONE: METHODOLOGY

1.1 THE SELECTION OF APPROPRIATE RESEARCH INSTRUMENTS

INTRODUCTION

This section introduces the chapter on methodological issues, which will both describe the various data collecting instruments which were used in the study and explain, by way of reference to the social research literature, the rationales for their use. The nature and structures of the instruments employed are discussed and justified, as is the choice of method for recording the data and choosing the samples of respondents from the scientific, clinical and commercial fields who were to take part in the study.

1.1.1 The Interview Versus the Questionnaire

The researcher was interested in obtaining individual self-reports from the respondents about wound healing and innovation matters. According to Selltiz et al (1976) this can be done via either a questionnaire or an interview, or both. The person-to-person interview as opposed to the self-completion questionnaire was chosen as the most appropriate tool for collecting the substantive data for this study. The interview was preferred for many reasons. The areas under question were extensive and technically complex, which would make a questionnaire long and complicated to complete. Interviews are also considered by Selltiz et al (1976) to be the more appropriate technique for revealing information about "emotionally laden subjects" than are questionnaires. This is clearly important in relation to the possibly distressing nature of one of the research areas, that of eliciting information from doctors and nurses about their care of terminally ill patients.

Sudman and Bradburn (1982) believe that when researchers are attempting to determine respondents' level of knowledge, which was the case with respect to the clinicians in the study, personal interviews are preferable to self-administered forms such as mail surveys or

questionnaires, as the latter allow respondents to look things up or to consult with others.

For Benney and Hughes (1977) the interview is the art of sociological sociability. Interviews are viewed as social interaction and as such are more than just about obtaining verbal reports. The interview is potentially a much more sensitive tool for recording the non-verbal communication of interviewees and indeed spatial considerations, than is possible if using a questionnaire. This point is endorsed by Selltiz et al (1976):

"The interviewer has the opportunity to observe both the subject and the total situation to which he or she is responding." (p294)

The interviewer is in a position to pick up non-verbal signals from the respondents, such as uneasiness, boredom, embarrassment and impatience, and to identify points which seem to cause resistance or difficulty in answering. At the same time he or she is in a prime position to act on the situation, either by preventing misunderstandings or offering clarification of questions (Open University, B4, P2) and verbal or non-verbal signs of assurance, encouragement and interest in what they are saying. Such advantages reinforced the researcher's resolve to employ this data collection tool.

The other advantages of the interview over the questionnaire also relate to the validity of data collected by this method. As Selltiz et al (1976) comment:

"In a questionnaire the information one obtains is limited to the written responses of subjects to pre-arranged questions. In an interview, since the interviewer and the person being interviewed are both present as the questions are asked and answered, there is opportunity for greater care in communicating questions and in eliciting information." (p294)

In addition, interviews allow the interviewer to maintain control over the order and sequence of questions asked (Open University, B4, P2), unlike questionnaires, where no such control can be exercised, nor collusion or the skipping of questions prevented (Hyman, 1975).

The researcher did recognise that one of the most frequently cited disadvantages of the interview method is interviewer bias, related to his or her general appearance, attitude, behaviour, sex or age (Hyman, 1975; Open University, B4, P2; Selltitz et al, 1976). However, there seems to be no consensus of opinion regarding this matter nor indeed on the effects that the presence of an interviewer may have (Hyman, 1975; Open University, B4, P2). Authors such as Fay and Middleton (1931), Kelly (1938) and Hyman (1975) appear not to be convinced of the interviewer bias accusation. As Hyman stated:

"We do know that subjects filling out questionnaires take account of the prospective readers of their replies. Thus qualitative data support the notion that there may be present an interviewer effect even when there is no interviewer." (p139)

A similar point has been made more graphically elsewhere:

"In a sense a somewhat ghostly interviewer is still present because the respondent may conjure up an image or a stereotype of the kind of person who might be asking these questions, complete with manner and intonation... in other words, the respondent will interact with the questionnaire and may project some kind of person 'behind' the questions." (Open University, B4, P2; pg 53).

Finally, there is a higher response rate for interviews than questionnaires (Orenstein and Phillips, 1978; Open University, B4, P2; Selltitz et al, 1976). This was an important consideration for this study given the relatively small samples that were chosen.

Most of this section has been devoted to a justification of the use of interviews as the main data collecting instrument for the study. However, it was considered appropriate that a questionnaire be used to collect factual information about the respondents, with respect to their qualifications and career histories, for reasons which are discussed in detail in 1.2.3, 1.2.6 and 1.3.5.

As already touched upon, one of the most serious problems of using questionnaires is the low response rate. This problem was anticipated and steps were taken in an attempt to achieve as high a rate of response as possible. For example, the questionnaires were made short, clear and easy to complete and simple methods for their return were devised (see sections 1.2.3, 1.2.6, 1.3.5). However, despite all these precautions

and the provision of deadlines for the return of all the questionnaires, and the sending of reminders in some cases, several respondents did not return them (see sections 1.2.3 and 1.3.5), which bears out the point made by Selltiz et al (1976) that:

"Even under the best of circumstances a sizeable proportion of respondents do not return questionnaires". (p297)

1.1.2 The Use of the Semi-Structured Interview Schedule

It was envisaged that the data collected from the clinical settings would be amenable to both qualitative and quantitative analysis. Thus it was decided that the interviews conducted with the nurses and the doctors be of a semi-structured type, combining both closed and open-ended questions. This method is considered an efficient way of investigating complex issues (Selltiz et al, 1976), allowing both researcher and respondent a degree of freedom (in asking and responding to questions) not possible under the constraints of a structured interview. The closed questions were used essentially for securing specific and factual information and for eliciting expressions of opinion about issues which it was believed respondents held clear opinions (Selltiz et al, 1976). Probes were necessary for certain closed questions in order to ascertain the respondents' thoughts when answering them, to identify their frames of reference and determine if their interpretation of the question was what was anticipated by the researcher (Selltiz et al, 1974).

Fixed alternative questions were not generally used because they force respondents to choose from given alternatives, which may not actually reflect their particular point of view. They were, however, used on one occasion to ascertain which of the two methods used to elicit knowledge about the healing process, the standard open-ended interview questions or the use of a projective technique the nurses found most useful. In this instance, the fixed alternative question was used for eliciting agreement or disagreement on this particular issue, a situation which Nachmias and Nachmias (1976) consider appropriate to this style of question. In retrospect, fixed alternative questions could have been employed on another occasion. For example, the difficulty which some

respondents experienced in estimating the number of patients with fungating and ulcerating malignant lesions they had cared for was resolved to a certain extent through probes, but the provision of alternative replies may have made the meaning of the questions clearer and the answers more usable.

Open-ended questions were used in the interview schedules and with the projective technique because they lend themselves to deeper probing of complex issues. They are also useful when the relevant dimensions of responses are not known, or when explanations or descriptions of behaviour are sought.

A relatively structured interview schedule was chosen for the sample of clinicians, as opposed to a less structured type, such as the focused interview, because the flexibility of the latter does not allow for comparability between interviews, which the researcher desired, and makes analysis more complex. The researcher wanted the questions to be asked of the clinicians to be phrased in standardised terminology and follow a set order so that the resultant data would be comparable and to some extent quantifiable, as differences in wording and question order can influence the meaning and implications of a given question or subsequent questions (Selltiz et al, 1976).

In contrast, a relatively unstructured, focused type of interview schedule was devised for the sample of research scientists and commercial personnel. The decision to adopt this method of data collection arose because of the complexity and exploratory nature of the subject areas under consideration, and because the researcher did not wish to generate comparative data but allow the respondents to tell their 'own story' about the development and diffusion of the innovations under study.

There are, of course, both advantages and disadvantages to using unstructured interviews (Brenner et al, 1985; Selltiz et al, 1976). One of the advantages is that lines of questioning may emerge which have not been anticipated by the researcher but which may be relevant to the study. Some of the disadvantages concern the lack of control that the

interviewer can exert over the encounter and the problems of analysing large amounts of diffuse information. The unstructured interview thus requires particular skills and expertise from the interviewer both in its operationalisation, to balance the advantages and disadvantages of using this kind of data collecting device, and in the analysis of the resultant data. The researcher's choice of a more focused type of interview allowed her some degree of control over the interviews, in that she could ensure that topics pertinent to the study were covered as far as possible, while the relatively unstructured nature of the interviews allowed the respondents the freedom to tell their 'own story'.

The opinions and attitudes of the respondents were sought on a variety of issues. A range of approaches could have been used, for example, fixed alternative questions or various scaling techniques such as ranking or rating. Instead, open-ended questions were used for a number of reasons. Selltitz et al (1976) believe that through giving respondents freedom of self-expression, the use of open-ended questions provides a much better indication of whether respondents have any information about a particular issue, and indeed, whether they have a clearly formulated opinion about it. The other types of questions and techniques cited above may force a statement of opinion onto a respondent which is not his or her own or try and fit it into pre-determined categories (Open University, B4, P2) which do not adequately represent it. Moreover, such structured questions do not allow for probing in the context of the answer (Selltitz et al, 1976).

Furthermore, many authors question the validity of using scaling techniques. As far as Hoinville et al (1983) is concerned, such techniques do not actually tell you anything:

"A rating scale is not an absolute measurement of attitude but a way of placing people in relative positions on a dimension." (p35)

Similarly:

"Rating is often applied to muddled dimensions with intervals of unknown size and... uncertain meanings." (Open University, B4, P2; pg 68).

Hoinville et al also believe that scaling techniques can actually hide and/or lose information because people are not asked why they hold the views that they do.

The number of questions incorporated into the clinicians' interview schedules, in order to ascertain their level of knowledge about wound healing theories and wound management practices, led the researcher to consider the most appropriate way of eliciting the necessary information, particularly as Sudman and Bradburn (1982) feel that knowledge questions raise:

"issues of social presentation.....as the respondent does not wish to appear foolish or ill informed by giving obviously incorrect answers or admitting to not knowing."
(p112)

Such potentially threatening situations can be avoided, say Sudman and Bradburn (1982), by using introductory phrases or presenting 'knowledge questions' as opinions. The psychological, as opposed to the merely logical, ordering of questions was also taken into account by the researcher, particularly in respect to the 'knowledge questions'. Selltitz et al (1976) are of the opinion that it is more appropriate to start with objective (factual) questions, which people are more willing to answer, before going onto ask more subjective ones. Thus questions on knowledge were asked before questions on attitudes. Sudman and Bradburn (1982) believe this approach to be appropriate because:

"Respondents will be less likely to over-claim knowledge and more likely to state that they do not know or are undecided in their attitudes, if knowledge questions are asked first." (p108)

Funnel and inverted funnel questions were also employed in the various interview schedules. The funnel sequence of questions was considered appropriate in instances where the interviewer assumed the respondent to have some idea about the particular topic under question (Kahn and Cannell, 1957). Thus the most general questions were asked first, followed by more restricted questions. In this way the focus of the series of questions was gradually narrowed to the precise objectives (Nachmias and Nachmias, 1976). In contrast, when respondents were thought not to have clearly formulated opinions about certain issues and

thus perhaps could not answer general questions first, an inverted funnel sequence was used (Kahn and Cannell, 1957; Nachmias and Nachmias, 1976).

1.1.3 The Use of Projective Techniques

It was decided that certain types of questions could be addressed using projective techniques, which are a range of methods designed to encourage respondents to express their views indirectly (Hoinville et al, 1983). Two projective methods were employed, using both stimulus material in the form of pictures and indirect questioning (Selltiz et al, 1976). The pictorial projective method was used in an attempt to deal with the problems encountered in eliciting respondents' knowledge about the physiological processes of wound healing (see the more detailed discussion in 1.2.1). Apart from the considerations discussed above for using such a method, it was thought that the presentation of such visual images would induce respondents to discuss matters about which they may feel awkward and embarrassed, or to help them depict things which are difficult to describe or perhaps remember.

There are, however, disadvantages to using such methods regarding reliability and validity, which is why a series of standardised questions accompanied these pictures, both of an open and closed type. According to Sudman and Bradburn (1982), this is the appropriate way to use such techniques:

"The use of non-verbal apparatus (eg pictures) should always be considered along with standard questions". (p116)

A further reason for using this projective technique was that it allowed the issue of wound healing to be approached from two dimensions, thereby producing an interesting comparative element. Comparing the effectiveness of pictorial projective techniques to that of the standardised question/answer format of the interview schedule has been tried by other authors, such as Collier (1957). The use of pictures was also considered in order to change the pace of the interviews from the routine question/answer format. It was thought that both respondents and interviewer may appreciate and enjoy this (Sudman and Bradburn, 1982).

This projective technique, unlike some (Selltiz et al, 1976), was not intended to deceive the respondents. On the contrary, an explanation of their purpose was clearly stated via a written statement which was memorised and repeated by the researcher to each respondent (see Appendix 1).

The other projective technique used in the interviews was that of indirect questioning. This took the form of asking about other people's views. The assumption here was that respondents may hesitate to express their own lack of knowledge or opinion on a certain subject, but may find it easier to express them if they can be attributable to other people (Hoinville et al, 1983; Selltiz et al, 1976). Thus respondents were not asked to, for example, say directly whether they felt they were up-to-date on advances in wound healing theories and wound care techniques; instead they were asked whether they thought nurses in general were. It was hoped that this may provide them with a certain measure of security in not having to say in so many words that this is how they themselves think (Selltiz et al, 1976). However, their responses were taken as reflecting their particular attitudes because, according to Hoinville et al (1983):

"they probably have little concrete information about other people's feelings, they are likely to arrive at an answer mainly from their own attitudes'. (p14)

1.1.4 The Data Recording Instrument

All but one of the 62 interviews conducted with the various clinical, commercial and scientific personnel were tape-recorded. Legal considerations were cited by the one respondent for not wishing to be tape-recorded. There were a number of reasons for employing this method of recording the interviews. The interviewer is able to obtain a full record of the interview in the respondents' own words which can be analysed in detail at a later date. It also gives the interviewer more opportunity to concentrate on the respondent and what she or he is saying, as well as maintaining eye-contact and other forms of positive verbal and non-verbal signals. As far as Hoinville et al (1983) are concerned, making eye contact is an important aspect of attempting to make the respondent feel at ease:

"It is helpful if the interviewer looks at the respondent often, especially just after asking a question, to pick up and deal with signs of worry and bewilderment immediately and to take simple steps to promote informality and co-operation. Too little eye contact may make the interviewer appear uninterested and withdrawn: too much, however, can be embarrassing for the respondent." (p98)

Tape-recording interviews also reduces recording time as compared to writing down verbatim what people say, which is particularly tiring and difficult when recording answers to open-ended questions such as the ones included in the various interview schedules used in this study. It is also a much more accurate data recording system than, for example, taking notes (Hoinville et al, 1983). Manually recording semi-structured or relatively unstructured interviews is not satisfactory as it has the tendency to impose artificial constraints on the speed of the interview, which can affect the respondents' spontaneity and flow, and limit the breadth and depth of the topics covered.

1.1.5 Ethical Considerations

Ethical considerations, such as confidentiality and anonymity, were taken into account by the researcher when conducting the interviews. The clinicians who took part in the study were assured that in the reports and documents ultimately released, their identities and those of the three settings would not be revealed. However, their anonymity was not total as far as the interviewer was concerned. It was considered necessary for the interviewer to know the identities of the respondents in order to ascertain who had not returned their completed questionnaires so that she could follow them up with reminders and so increase the overall response rate.

Assurances of confidentiality and anonymity were also offered to the respondents from the scientific and commercial settings, and while the company and the product under investigation are named in the thesis the identities of the personnel who agreed to be interviewed remain anonymous. This is in contrast to the research scientists who agreed to be named.

The respondents' voluntary involvement in the study and their permission for the tape recorder to be used in the interviews formed part of these ethical considerations, as indeed did the fulfilment of certain obligations following the interviews. The researcher has, for example, followed through the commitments made to the participants when soliciting their co-operation that the results of the study would be available to those who took part and to any other interested parties, and that they were welcome to contact the researcher regarding any aspect of the research.

1.1.6 The Sampling Framework

In deciding on the sampling framework to use for the study, cluster sampling and systematic sampling were considered and rejected because the study was essentially dealing with small and spatially concentrated populations. The researcher decided therefore to employ two types of sampling frameworks with the clinicians - stratified and simple random sampling.

The researcher found it difficult to operationalise certain criteria, such as clinical experience (as is discussed in more detail in section 1.2.2) or to control or match for some others, such as sex and age. The numbers involved were not large enough to make any generalisations from the strata selected. Thus it was thought appropriate to stratify the nursing sampling frames according to staff grades, in order to investigate whether differences in knowledge base and practice exist between different grades of nurse. A simple random sample was then used in order to select subjects for inclusion in the study. This method was employed because each subject has an equal chance of being included in the sample (Orenstein and Phillips, 1978; Selltiz et al, 1976).

The method for randomly selecting the clinicians was conducted through picking numbers out of a well shaken box. The appropriateness of using this and similar types of techniques have been discussed by a number of authors including Orenstein and Phillips (1978) and Rose (1982). This method was used because of the small numbers involved and because it is a quick and uncomplicated procedure. Random sampling without replacement

was used, where a number once chosen from the box was not put back into the population. This seemed more appropriate than sampling with replacement where there is a chance that numbers may be re-selected (Open University, B3b, P4).

With respect to some of the participants, practical considerations such as the actual size of the populations and sampling frames determined the number of respondents that were to take part in the study. For example, the entire population of doctors in two settings was chosen because the numbers were small. This was similarly true of the research scientists, as only three people had been directly involved in working with George Winter at the time of his discovery of the MWHT. The researcher's choice of participants from Smith and Nephew Ltd was also somewhat constrained. She was only able to interview those considered by certain staff at the company as appropriate, in terms of their knowledge of the development and marketing of OpSite, and those willing to take part in the study - thus a 'purposive' sampling method was employed in this instance.

1.1.7 Analysis of the Data

Different methods exist for analysing qualitative data (Buss, Monk and Ogborn, 1983; Silverman, 1985; Taylor and Bogdan, 1982). However, the desire to apply a rigorous approach to the raw material, thus giving it more meaning and usefulness, persuaded the researcher to employ qualitative content analysis (Holsti, 1969; Krippendorff, 1980; Mostyn, 1985). According to Mostyn (1985):

"Content analysis is the "diagnostic tool" of qualitative researchers, which they use when faced with a mass of open-ended material to make sense of." (p117)

The researcher subjects the raw material to scrutiny in order to:

".....see if any regularities occur in terms of single words, themes or concepts. He/she then attempts to set up conceptual categories; this process then leads to hypothesis testing or reformulation due to the discovery of new relationships among the data." (Mostyn, 1985, p118).

The nature of qualitative data analysis, being an essentially creative process (Jones, 1985) involving intuition and interpretation, makes it,

at times, a difficult one to identify and make explicit. Nevertheless, it is important that qualitative researchers attempt to identify and describe these processes in order to de-mystify them, at least for the benefit of future researchers (Hyatt, 1986).

Due to various practical difficulties, principally cost and time, full transcription of the sixty two tapes was not possible. This was only done for approximately a third of them. Preliminary analysis of the data was carried out during the course of the field work. These tentative 'results' were progressively revised in the course of the data analysis.

Analysis of the data was carried out through careful reading of each transcript or listening to each interview on tape and initially organising the data according to the various topics under study. The semi-structured nature of the clinicians' interviews made this a less problematic activity than was the case with the largely unstructured interviews conducted with members of the scientific and commercial community.

Each topic covered in the interviews with the clinicians was broken down into sections. Thus, separate sections dealing with, for example, the characteristics, types and management of malignant lesions were created. Each clinician was given a number (eg. R1,R2,R3.....) and their comments logged alongside their allotted number according to each section heading. On completing this essentially organising exercise for all the respondents in each of the settings, the responses were then grouped together so that the comments from all the clinicians in all three units were catalogued collectively. Thus the researcher was able to analyse not only the comments made by individual respondents on each topic, she was also able to compare the responses inter-institutionally and intra-institutionally. The data was then subjected to further refinement and organisation according to, for example, certain words, themes and concepts. This somewhat over-simplified account of the analytical process belies the time and effort expended in what was on occasion an extremely laborious and complex process.

The analysis of the unstructured interviews conducted with the scientific and commercial personnel was particularly complicated, although the researcher was able to organise the data around specific topics, issues, concepts and themes. Full transcription of these interviews was made to assist in their analysis. The Smith and Nephew data was organised according to the specialist area of the respondent being interviewed. Thus issues concerning the development of OpSite were discussed with respondents from the Research and Development and Technical departments, while those dealing with the marketing of OpSite were covered with the Marketing and Sales staff. As with the responses elicited from the research scientists, most of the researcher's time and effort was expended in trying to piece together and develop a clear and logical account of the development of the MWHT and OpSite and the marketing of the latter innovation. This was by no means a simple proposition because of the amount of information generated and the lack of consensus that existed between some of the informants' accounts.

Throughout the analysis of the empirical data special notice was taken of data which did not fit the general findings. The researcher was also conscious of the need to critically evaluate the content of the interviews and not merely report what was said by the interviewees. As the researcher read through the transcripts or listened to the tapes, quotes which she considered interesting, typical or atypical were recorded on index cards, catalogued according to subject headings and stored for use when writing up the results.

It is hoped that this section has demonstrated that the researcher's awareness of social research methods was sufficient as to enable her to make a critical and informed selection of appropriate research instruments and techniques to use to elicit the necessary information. This section also aimed to show that careful consideration was given, not only to the choice of instruments to employ in the study, but also to the kind of recording instrument, sampling frames and analytical methods judged most appropriate.

The four sections that follow in this chapter on methodology present more detailed accounts of how these instruments and techniques were

operationalised with the various respondents involved in the study. The first two sections focus on the methodological approaches used for the clinicians, while the final two sections concentrate on those employed for members of the scientific and commercial personnel respectively.

1.2 METHODOLOGICAL APPROACHES EMPLOYED FOR THE CLINICIANS' STUDY

The previous section introduced and justified, on a general level, the research instruments which were employed in the study. This section discusses in a more detailed and specific way, the instruments which were employed to elicit information from the nurses and doctors who took part in the study and the manner in which they were operationalised. It begins with a discussion of the methods employed to elicit information from the nurses before going on to examine those used for the doctors.

This section is divided into five parts. The first two parts examine the reasons for and outcomes of the pre-pilot and pilot interviews which were conducted with the nurses. The respondents who took part in these interviews are described and the processes by which the interview schedules were developed and refined are examined in detail. The lessons which the researcher learned during this period are described and presented in a manner which shows how they, together with the issues raised by the pilot studies, helped inform the development of the research instruments.

The second part of this section discusses the rationale underlying the introduction and use of stimulus material and its method of application. The third part examines in detail the different stages involved in the development and refinement of the final interview schedule which was used in the study and the factors which influenced this process. The fourth and final part of this section discusses the criteria which were employed in choosing the samples of nurses who took part in the study and the processes by which selection was made.

1.2.1 Development of the Nurses' Interview Schedule

Pre-Pilot Interviews

A decision was taken that a series of pre-pilot interviews be conducted with qualified nurses (State Registered Nurses, now referred to as Registered General Nurses) who had some relevant knowledge or experience of caring for patients with malignant lesions. There were essentially three reasons for conducting a pre-pilot study. Firstly, the pre-pilot work was to be a learning exercise for the researcher. There was a need for the researcher, who came from a non-nursing background, to acquire an understanding of and familiarity with the relevant subject areas - namely the theories of wound healing and wound care practice and the nature and management of fungating and ulcerating malignant lesions - and to learn about nurses and the nursing profession from personal contact with individual nurses themselves and not just from literature about them.

Although the researcher had a basic grasp of the theory of social research methods, she had no previous research experience. There was, therefore, much for her to learn regarding the application of the theories of social research to the practical situation of conducting social research, such as defining your role as an interviewer, mastering the techniques of asking questions and the mechanics of tape-recording.

Secondly, the pre-pilot study aimed to investigate the nature and management of malignant lesions and determine the boundaries of the areas to be studied; the range of probable responses; the issues considered relevant by the nurses to their day-to-day management of patients; the terminology used by the respondents and their conceptualisation of the topic(s) under discussion. Thirdly, the pre-pilot aimed to test the appropriateness of the chosen research method.

The interview schedule for the pre-pilot study was of an unstructured, albeit focussed type, where neither the exact questions nor the range of responses were predetermined. However, the focussed nature of the

schedule allowed the researcher to cover the relevant issues while at the same time giving the respondents the opportunity to express themselves in their own frames of reference and language.

Many issues were raised by the pre-pilot interviews which led to the refinement and improvement of the data collecting instrument. The first issue concerned the respondents' reactions to the interview situation - both on an interpersonal level (to do with the researcher) and personal level (the experience of being interviewed and tape-recorded). Several respondents wanted to know more about the researcher - how and why she had become involved in this study - a particularly intriguing matter, it seemed, given the incongruity between the specialist nature of fungating malignant lesions and the researcher's non-medical/nursing background. Several respondents appeared uneasy about being tape-recorded and about what was going to be done with the tape once the interview had finished. Although the researcher had spoken briefly about her background and that of the research before commencing the interviews, these issues convinced her of the need to prepare a more formal statement which gave amongst other things: a clear rationale for undertaking the study; a brief exposition of the general parameters of the study; background information about the researcher; an explanation of why the tape-recorder was being used and reassurances on the confidentiality of the taped interview; and a statement that the respondent's knowledge and experience was not being judged by the researcher.

The second issue which arose out of the pre-pilot study was the researcher's own reaction to the interview situation. She gained insights into both the practicalities of conducting interviews and the psychological aspects of interpersonal dynamics. The researcher recognised that there was a need to create (via both verbal and non-verbal means) a relaxed and informal atmosphere so as to make the occasion more conversational than interrogational; to keep the dialogue flowing as naturally as possible; and to maintain eye contact with the respondent so as to be aware of his or her non-verbal signs of communication and to convey the interviewer's interest in their responses. Such observations led the researcher, almost subconsciously to begin with, but later intentionally, to memorise many of the

questions and their sequence so as to reduce the number of times she had to read directly from the schedule, thereby breaking eye contact and the flow of the dialogue.

Furthermore, the researcher learned to recognise and react according to the different ways in which people react to the interview situation and to being asked questions. For example,

- a) the "ramblers" - how and when to control their verbal flow without damaging rapport.
- b) to strike a balance between giving respondents sufficient time to think out their thoughts and perpetuating embarrassing silences.
- c) to recognise the 'conformists' amongst the respondents, who adhere to the orthodox hierarchical view of the situation by always waiting for and taking cues from the interviewer.
- d) to identify those who interpreted the researcher's non-medical/nursing background as implying that she knew little or nothing about the particular subject areas, and so avoided answering the questions by either blinding the researcher with medical jargon (often said in a mechanical 'shopping list' manner) or expressing an inability to explain certain things in the simplistic, non-medical manner thought necessary for lay people such as the researcher.

Finally, the researcher recorded her own observations concerning, for example, which points seemed to cause embarrassment, resistance or difficulty in answering, whether the order or sequence of questions was satisfactory and whether the respondents became bored or impatient.

Tape recording the pre-pilot interviews (and indeed the subsequent pilot interviews) was important in introducing and familiarising the interviewer with the instrument which was to be used in the field. Thus any potential operating problems could be ironed out beforehand. Additionally, the quality of the recording and the range of pick-up could be ascertained and problems such as extraneous noise could be foreseen and forestalled.

Furthermore, tape recording these interviews ensured that all the verbal information elicited was available to the interviewer to replay at a time and place removed from the actual interview situation. It also allowed her to note, amongst other things, how she asked the questions, how she prompted or probed or gave verbal utterings of encouragement or interest (and what they were), whether the respondents had difficulty in comprehending or responding to the questions and what language and conceptual frameworks they used.

Pilot Interviews and Use of Projective Techniques

Following the refinement of the research topic described in the introduction, in the direction of the sociology of medical knowledge (taking the MWHT as a case study through which to analyse the sociological processes and factors involved in the dissemination of medical knowledge), it was thought advisable for another pilot study to be conducted. Seven pilot interviews were conducted with qualified nurses who had previously worked in one of the three units under study.

The aims of the pilot interviews were as follows. Firstly, to incorporate the second area of interest into the main structure of the study and to explore the related issues. Secondly, to discover whether similar or different issues were raised in the pilot interviews (with nurses chosen because of their previous work in one of the three units under study) as compared to the pre-pilot interviews (with nurses chosen because they had cared for patients with fungating malignant lesions albeit in settings other than the ones under study). Thirdly, to refine the wording, order and layout of the interview schedule and to prune it to a manageable length.

The issues raised by the pre-pilot and pilot work were used to inform the construction of the final interview schedule and the substance of the subject areas. For example, questions were eliminated if the answers given repeated those given to earlier or other questions. Questions were added either to take account of comments made by respondents which were interesting and/or relevant, or to help focus respondents' attention more closely on a particular issue or 'trigger off' certain thought

processes. Finally, certain questions were re-phrased or individual words altered in order to clarify the question, to simplify or medicalise the terminology used, or to prevent respondents going off on different tangents.

The structure and sequence of questions about wound healing and fungating malignant lesions were revised essentially for psychological reasons, vis-a-vis the respondent and the interview situation. In the pre-pilot, the questions concerning the general principles of wound healing were at the beginning of the interview schedule, reflecting the researcher's judgement at that time of linking the two areas of wound healing and fungating malignant lesions by moving from the general to the specific. However, the pre-pilot demonstrated the inappropriateness of this structure, which was reversed for the pilot and the final interview schedule with the questions about wound healing following on from those about fungating malignant lesions. This change occurred because the researcher observed that the respondents appeared embarrassed and uncomfortable at having to admit, especially to a non-nurse, that their knowledge about wound healing was not what it perhaps ought to be. Such a situation set a negative tone for the rest of the interview in some instances and erected psychological barriers between the researcher and the respondent, causing the latter to feel that his/her knowledge and competence as a nurse was being tested.

Therefore it was thought more appropriate to begin the interview by asking the nurses questions on a subject they would know something about and on which they could talk with confidence, namely caring for patients with fungating malignant lesions. It was felt that this approach would set a positive tone to the interview situation and perhaps enable the respondents to admit to lack of knowledge on another subject later on without feeling overly threatened in doing so.

The researcher also noted that when nurses talked about their knowledge of wound healing, it was frequently in the context of what they had been taught in their basic training. Therefore, it was thought appropriate to actually build this into the interview schedule as a starting point, in the hope that asking them to recall what they were taught in their basic

training would trigger off some thought processes on what they actually knew.

In addition to the realisation that changes had to be made to the sequencing of subject sections, the researcher also came to the conclusion that the method adopted to elicit answers to certain questions had to also be reappraised. Her experiences in the pre-pilot and pilot interviews demonstrated to her the difficulty which many nurses had in explaining the physiological aspects of the wound healing process. The reasons given by many respondents for this seemed to imply that the knowledge was there but the recall (ie. memory) was somewhat faulty. The dilemma confronting the researcher was to decide whether the questions on wound healing were addressing the respondents' actual knowledge on this subject or merely testing their memory.

Moreover, the researcher wondered whether asking respondents to describe the physiological processes of wound healing (which is a highly complex process) in an interview situation (which is an essentially artificially induced situation) in a fairly short space of time was perhaps testing more their familiarity or ability to cope in such situations, or their ability to articulate their thoughts or think quickly, rather than their actual knowledge.

It was with such concerns in mind that the researcher decided to change the data collecting instrument for eliciting information from the nurses about the physiological processes of wound healing. The questionnaire was the alternative method initially chosen by the researcher. The idea to use a questionnaire first arose from a comment made by one respondent in the pre-pilot who thought it would be easier to write down what she knew about the wound healing process than to articulate her thoughts in an interview situation.

However, the researcher experienced several problems in her attempt to operationalise the questionnaire approach. The first problem concerned the actual administration of the questionnaires. How and where were the respondents to complete the questionnaires? Secondly, sitting down and answering questions about wound healing in this manner may, it was

thought, remind the nurses of their student days, with tests and examinations on anatomy and physiology, and as such, may arouse negative feelings in them, which may prove counter-productive for the study in the long run. Thirdly, the manner in which the questionnaire was to be constructed (with detailed and multi-choice questions) may provide unreliable data, given that it would be difficult to discern whether the answers given reflected the respondents' actual knowledge and understanding of the wound healing process or were merely educated guesses.

Finally, it was decided that an alternative method be used - that of a projective technique using pictures. The idea for using such a technique arose following the pre-pilot but was shelved in favour of the more conventional method of using the questionnaire. The inappropriateness of the questionnaire and the appeal of the projective technique eventually led to the adoption of the latter. The idea to use pictures originally developed in the early stages of the study when the researcher herself was learning about the wound healing process. Of all the literature she read, it was a particular set of pictures which she came across in a nursing journal which helped her the most to understand this complex process. Also, many nurses spoke of having drawn pictures of the subcutaneous layers of wounds as students or having seen them while reading the nursing press. Therefore presenting such pictures to them would not, it was thought, be too unfamiliar or threatening. This was a point which the researcher took into careful consideration before deciding to use this method of data collection.

This projective technique was employed with essentially two aims in mind. Firstly, it was designed to investigate nurses' knowledge and understanding of the wound healing process through presenting them with colourful, visual images of the various stages of healing. It was hoped that these pictures would act as cues to help the respondents remember (especially those who rationalised lack of knowledge in terms of bad recall) and describe the various features of the wound healing process. Secondly, it was intended to investigate the manner in which knowledge about wound healing is disseminated to nurses, by exploring their familiarity or otherwise with such pictures, taken as they were from a popular nursing journal.

There were a number of reasons for choosing to use the particular set of pictures (see fig.1) for the task in hand. Firstly, they were in colour, and therefore more stimulating to the eye than black and white pictures. Secondly, significant details of the wound healing process were presented in a clear and sequential way; and finally, they were of an appropriate size - neither too big to be understood by the respondents in a relatively short space of time nor too small as to be incomprehensible.

The four pictures which the researcher decided to use were cut out and pasted onto small white square pieces of card, so as to accentuate the colours of the pictures. The labels on the pictures, which served to identify the different features of the healing process, were either removed or retained, depending on their significance to the questions that were to be asked. A series of questions were developed to elicit the respondents' understanding of each of these pictures. As each series of questions were asked the relevant picture was put on to a larger white card until all four were in place in front of the respondent. A final few questions were then asked which focussed on the pictures collectively. The reason why the pictures were presented in this manner was because the researcher wanted to focus the respondents' attention on one picture at a time and then collectively, rather than confusing and distracting them by presenting them all at once. It was decided that the pictures should be introduced at the end of the interview rather than at any other juncture, in order to prevent the possible disruption or shift in focus of the interview as well as to provide a bit of light relief to conclude the interview.

At the end of both the pre-pilot and the pilot interviews, the interviewer sought the opinion of the respondents on a whole range of issues, including, what difficulties (if any) they had in understanding or responding to any of the questions; whether there were any questions which they considered important but were not asked; whether they were happy with the way the interview had been conducted and if they were, what particularly pleased them, and if they were not, what did they consider to be the problem.

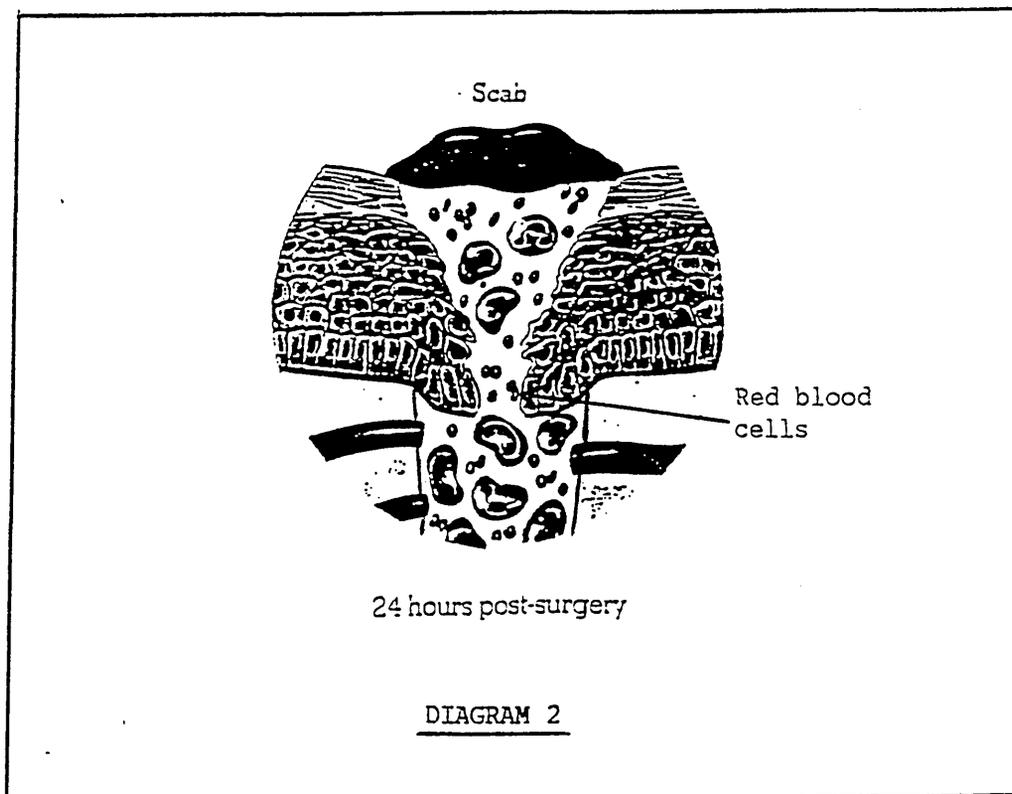
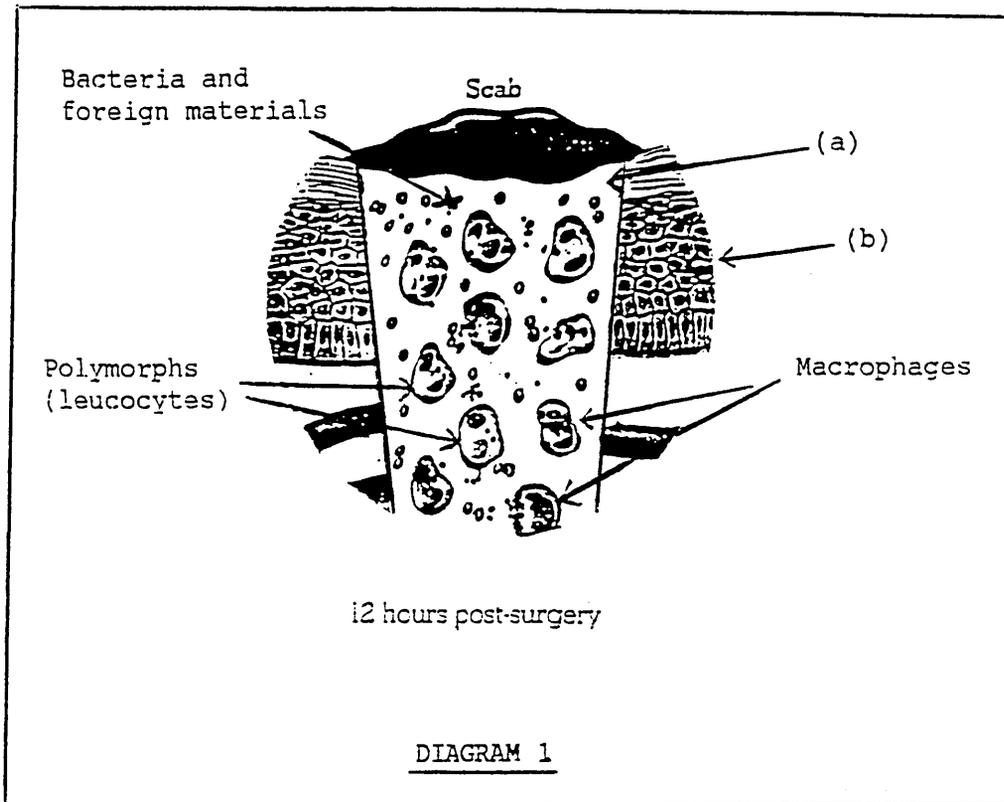
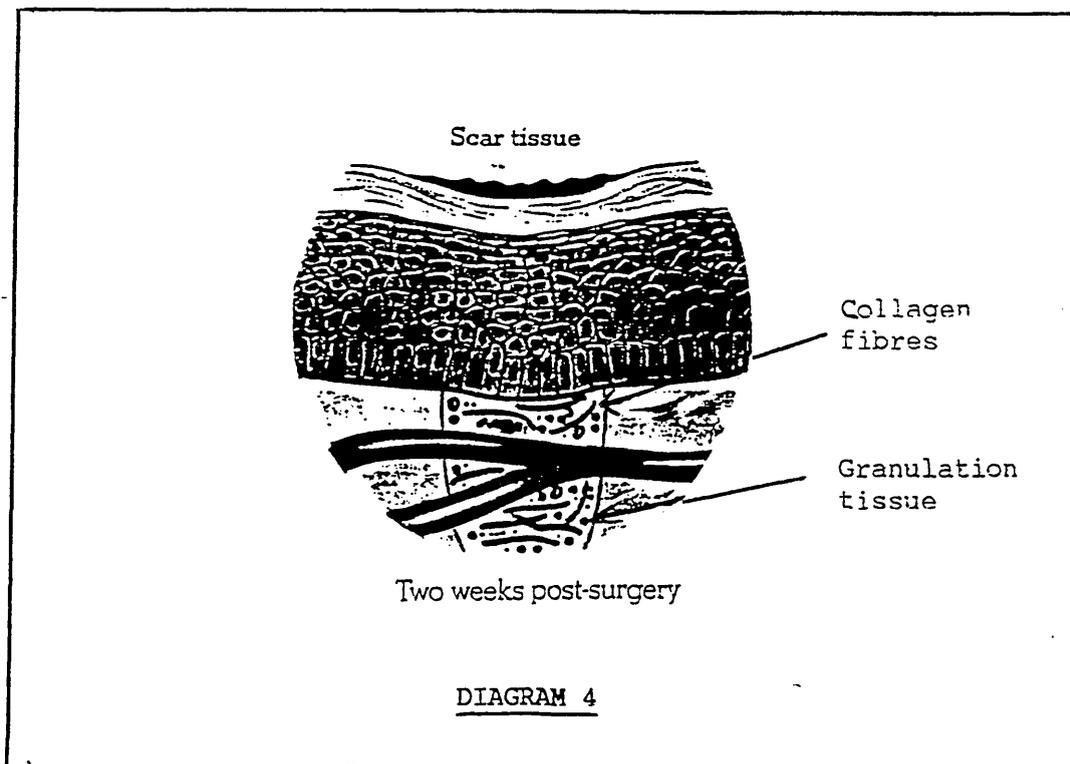
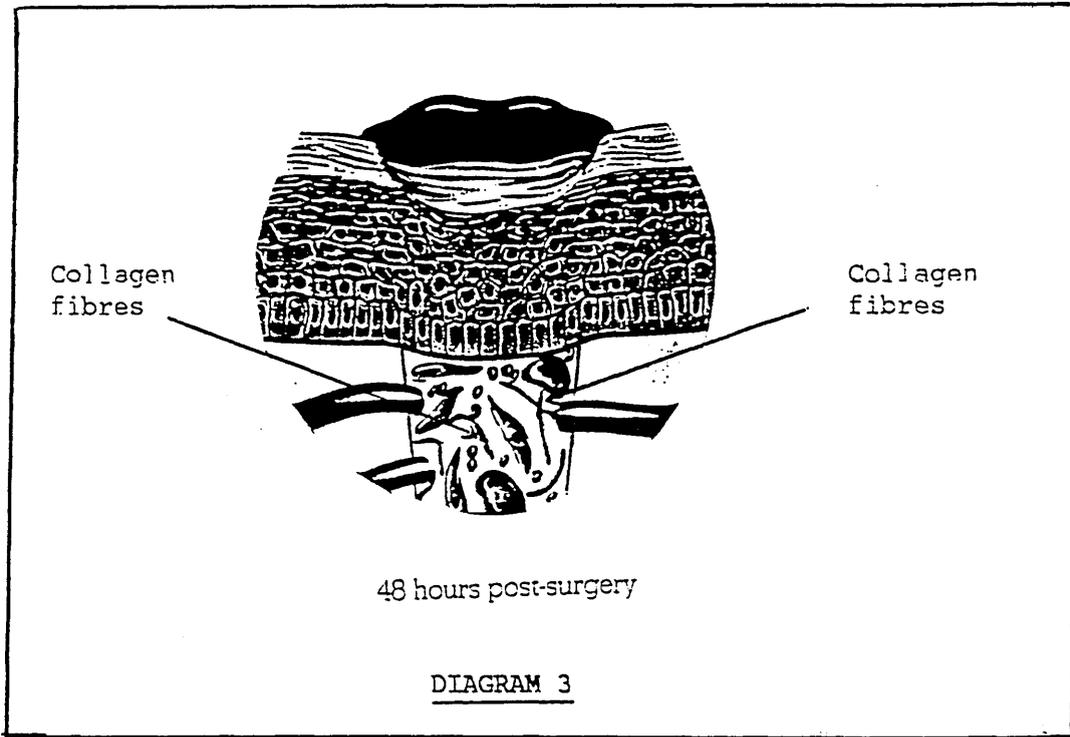


Fig. 1. The Pictorial Projective Technique Used for the Nurses
in the Study (Cont.)



The Interview Schedule

The final interview schedule underwent many changes. At different stages of its preparation it was tested and appropriate adjustments made. However, before the researcher began refining the instrument she considered it necessary to prioritise general areas and specific questions. During this process those sections and questions considered most relevant were retained while others were modified or eliminated. Certain sections and questions were eliminated, for example, if, in the light of experience, they appeared to be inappropriate, or failed to add anything to the substance of the interview, or were considered too important to be dealt with as a sub-category of the study.

There were occasions when sections were added to the schedule to introduce new and relevant issues. A number of nurses distinguished between fungating and ulcerating malignant lesions. However, just as many failed to recognise or to acknowledge such a distinction. To take account of such a variance of opinion and experience a separate section on ulcerating malignant lesions was introduced, replacing the earlier method of combining the two issues, which focussed on both the similarities and differences of these two types of wounds.

Conversely, issues which began as separate sections were later subsumed within other sections. For example, the sex and age of patients suffering from fungating or ulcerating malignant lesions were initially taken as separate variables to be investigated. However, the discovery that nurses tend to relate their experiences in terms of individual patients they had cared for and not in terms of their collective ages or sex led the researcher to incorporate the section on types of malignant lesions with questions on the sex and age of patients suffering from them.

New questions were also introduced into the schedule if, for example, the researcher thought that several questions were needed to explore certain important and/or interesting issues and in order to turn prompts, which were frequently used with certain questions, into standard questions so as to introduce some degree of structure and

consistency to the stimulus given to each respondent. The most frequent source of new questions came from comments made by the nurses in the pilot studies but on a few occasions, their omissions were considered important enough to warrant inclusion in the schedule. This was the case with respect to the role that doctors play in the management of patients with malignant lesions.

Apart from the alterations to the schedule outlined above, there were others which sought to link certain sections and questions so that they would flow more naturally from one to another, not just in terms of logical but also psychological sequence, from the standpoint of the respondent. Does a nurse, for example, remember the malignant lesion before she remembers the sex of the patient affected by it or vice-versa?

Questions were restructured if they were considered repetitive, too detailed or verbose, and re-worded in order to medicalise the terminology or to simplify it; to incorporate the ideas and conceptual frameworks of the nurses being interviewed and to eliminate ambiguity, bias or emotionally loaded terms. There were instances when the language used in the questions was altered to introduce precision and structure into respondents' answers. There were other times when word changes aimed to do the exact opposite, for example, when structure and precision appeared too constraining and perhaps inhibited the respondents from expanding on their comments or expressing themselves more fully.

To avoid confusion and a shift in the respondents' train of thought, topics were changed only when all the questions about an earlier topic had been asked. Furthermore, an introductory phrase was used to alert the respondents to each change of topic.

1.2.2 Criteria Used for Selecting the Sample of Nurses

It was decided that 12 nurses be chosen from each of the three health care settings selected for study, namely a terminal care unit (Unit T), a specialist cancer hospital (Unit S) and the community (Unit C). A

sample of this size was considered sufficiently large for a qualitative in-depth study to be conducted, which aimed to describe and analyse individuals' experiences and not to make wider generalisations from the data. Permission to involve nurses in the study was requested from the service managers of the above three units, in writing from two of them and verbally in the case of Unit T. This permission was granted in all three cases.

Preliminary findings from the two pilot studies revealed experience and level of training to be important variables as far as nurses' knowledge was concerned. However, the researcher experienced difficulties in matching the groups of nurses for these variables; in controlling for them given the relatively small sample size; and in operationalising a term such as 'experience'. The researcher therefore decided to employ the stratified and simple random sample methods for selecting the participants, for the reasons discussed in section 1.1.6.

The names of nurses currently employed in these units were received from the directors of all three units. Only in Unit T were part-time and unqualified nurses (nursing auxiliaries) selected to take part in the study; the rest of the nurses were qualified and employed full-time. The nursing auxiliaries from Unit T were chosen to take part in the study because one of the supervisory team, who had worked closely with them, considered their involvement in managing patients with malignant lesions to be almost as significant as that of their qualified counterparts.

The names of the nurses received from the three units were listed in alphabetical and staff grade categories. In order to give every nurse on each of the five lists an equal probability of being chosen to take part in the study, each one was given a number which was randomly picked out of a box by the researcher. Once each nurse had been allocated a number, the same process was used to pick twelve nurses for the study. The names of the twelve nurses having been selected, the staff in charge of the units where the nurses worked were informed and arrangements made for the nurses concerned to be contacted. Only in the case of one of the units was the researcher not able to speak personally to the nurses concerned. The purpose of this contact was for the researcher to

introduce herself and the research and seek their permission to take part in the study.

The 36 nurses who took part in the study were chosen from a total of 182 nurses. Broken down into each unit, 12 were chosen from each unit, from a total of 53 from Unit T, 46 from Unit S and 83 from Unit C. The staff grades of the 36 nurses chosen were: Sister (5), Senior Nurse (1), State Registered Nurse (21), Liaison Nurse (1), State Enrolled Nurse (3) and Nursing Auxiliary (5). The characteristics of the nurses in the study are presented in Tables 1-2e (see Appendix 10).

1.2.3 Administration of the Data Collection Instruments

A strategy adopted by the researcher in both the pre-pilot and the pilot interviews was to begin the interview with a few introductory remarks from both the researcher, about herself and the research, and from the respondent about his/her nursing background and education. Although the researcher continued to believe that, in principle, such introductions were worthwhile, in practice two problems arose. Firstly, they tended to take up more time than was anticipated, inevitably leaving less time for the actual interview. This was particularly pertinent given the time constraints within which the researcher had to work in interviewing nurses during their work time. Secondly, the researcher recognised that to ask such personal questions at the onset of the interview may be construed as too intrusive and thus may set a negative tone for the rest of the interview.

In order to deal with this dilemma, it was decided that the background information about the research and researcher be separated from the collection of background information about the respondent and treated in totally different ways. To take the former issue first: it was decided that a typed letter (see Appendix 2), providing information about the research and the researcher, be given to the nurses at the beginning of the interview. However, it was thought that the impersonal (ie. the letter) should not wholly replace the personal touch of the researcher in providing a verbal account of her background and that of the research. Thus the aim of the letter, as it contained fairly detailed

information, was to enable the researcher to be brief with her introductory comments.

The letter was typed on 'Sheffield City Polytechnic' letter-headed paper. The researcher's telephone extension was included in the letter and each respondent was informed that they were welcome to ring her, should they wish to discuss anything about the research. The aim of this was to allow the respondent to follow the progress of the research and not to feel that the researcher's responsibility to them ended once the relevant information had been elicited (an accusation which a few nurses had levelled at previous studies in which they had taken part).

Another statement was prepared (which was memorised and verbalised by the researcher) which sought not only to explain the rationale for the proposed use of the tape recorder and to ask the nurses' permission to use it, but also to emphasise the confidential nature of comments made. However, the researcher noticed (both in the pilots and in some of the early interviews) that a few respondents appeared somewhat uneasy about the tape recorder being used, while others tentatively expressed their misgivings. The researcher's instinctive offers of reassurance were later formalised into an introductory covering statement, in order to pre-empt such situations in the future, which both acknowledged their uneasiness and attempted to allay their fears.

No respondent objected outright to the tape recorder being used, although the researcher was always prepared for such an eventuality with pen and paper at the ready. The researcher nevertheless felt that her explanations for using the tape recorder could be improved by stating that other methods of recording the interviews had been tried, but that problems had been experienced. It was thought that using such concepts as 'experience' and 'trial and error' more closely reflected the nurses' pragmatic approach to their work and so made the researcher's reasons for using the tape recorder fit into their frames of reference.

The researcher not only attempted to take into account the social and psychological aspects of the interview situation, she also regarded it as important that spatial considerations be taken into account. Each

interview was conducted with one respondent at a time and lasted approximately one to one-and-a-half hours. No other person was present in the room apart from the interviewer and respondent (unless interrupted) so as to eliminate any embarrassment or intimidation that the presence of colleagues may engender. If any person entered the room while the interview was in progress, the tape recorder was switched off and the interview temporarily suspended until the person(s) left. This was to ensure that the confidentiality promised to the respondent was seen to be adhered to and respected. It was hoped that such a response from the interviewer would also allow her to take control of the situation, by making the person(s) interrupting aware of the situation and in their desire not to delay proceedings further, to leave swiftly.

A further point taken into account by the researcher was the psychological effect of the seating arrangements for the interviewer and interviewee. Whenever possible (unless the interview room was the respondent's personal office in which case s/he would determine the seating arrangements), the interviewer sat away from the door so that the interviewee was actually the one nearest the door. This was done in order to make the respondent feel that if s/he should wish to conclude the interview (for whatever reason), then s/he could. The interviewer would neither be physically nor psychologically blocking his or her exit.

The issue of how to investigate the respondents' nursing backgrounds cited earlier was finally resolved with the decision to use a questionnaire. Much of the information about the respondents' education and career history was of a factual kind which could be collected via a self-administering questionnaire (see Appendix 3). The information collected in the pilots was used to inform the construction of this questionnaire. A combination of closed (for factual information) and open-ended questions (for opinions and attitudes) was employed. The questionnaire underwent a number of changes, for example, its structure and sequence of questions were altered in order to establish some logical continuity, and the wording of questions was changed to refine and clarify meanings and to use language and concepts familiar to nurses.

The design and construction of the nurses' questionnaire provided valuable lessons to the researcher which she later applied when constructing the doctors' questionnaire. The two examples which follow are evidence of this. In order to avoid any omissions on the nurses' part (accidental or otherwise) of writing their name and date of birth on the questionnaire, the researcher wrote in those details at the beginning of the interview. However, when the questionnaires were returned, it was noticed that two respondents had deleted their date of birth from the questionnaires. No other respondents had tampered with their questionnaires. The fact that two respondents felt sufficiently sensitive and uneasy about revealing their ages convinced the researcher of the inappropriateness of using such a device. Thus it was decided that the whole issue of identifying respondents through the questionnaires be reappraised when constructing the doctors' questionnaires.

The final question on the questionnaire was intended to find out what the respondents thought about the questionnaire itself - their opinion of its format, the appropriateness of the questions asked, and so on. However, a number of respondents interpreted this as an invitation to comment on the actual interview and promptly expressed their opinion of it. Had the researcher foreseen the possibility of this happening then she would have taken steps to extend the scope of the question. This change was instituted when the doctors' questionnaire was constructed.

It was initially thought that the questionnaire could be sent to the respondents before the interview and then collected on the day of the interview. However, this idea was rejected because of administrative problems and because the researcher did not wish the participants to know of their involvement in the study too far in advance, thereby avoiding the possibility of respondents 'reading up' on the subject areas under question or consulting others. Indeed, some respondents admitted that they would have done, had they had the time, which supported the appropriateness of the researcher's action in this regard. It was therefore decided that the questionnaires be given personally to each respondent at the beginning of each interview, accompanied by an attached note (see Appendix 4) explaining why they were being asked to

complete the questionnaire and what to do with it once completed. In handing these two items to the respondent the researcher took the opportunity of explaining her actions.

There were essentially three reasons why such a note was used. Firstly, it was intended to save time by releasing the researcher from having to give detailed verbal instructions about the questionnaire. Secondly, it was thought that as many of the nurses were unfamiliar with being interviewed, even if verbal instructions were given, the anxiety felt at the beginning of such an encounter could result in the respondent forgetting such instructions. This note was something which they could read in their own time and keep as a reminder of what they had to do. Finally, the note served as a vehicle for stipulating a return by date for the questionnaires (the approximate time given was between 2 and 3 weeks). It was hoped that this strategy would increase the rate of return.

A box was left in a prominent and convenient position in each of the units, one which the respondents were most likely to visit or pass, such as the sister's office, into which to place the completed questionnaires. The box was clearly marked 'SHEFFIELD CITY POLYTECHNIC - Research Project'. As each respondent was interviewed s/he was informed of the location of the box and the date when the box was to be collected, which was another way of ensuring the deadline dates were heeded. Provisions were made for the questionnaires to be collected by the researcher. This was designed to avoid inconvenience for the respondents associated with having to remember to post them outside their working time, and to ensure their return by the researcher's visits to the units concerned to collect them and to remind any respondents who had not yet returned the completed questionnaires to do so. It was also convenient for the researcher to collect the questionnaires in this way, as she was returning regularly to interview other respondents and so could combine both tasks.

In order to ensure confidentiality of the questionnaires each respondent was provided with a clearly labelled 'Sheffield City Polytechnic' envelope, with both the name of the project and the researcher marked on

it. A 'Sheffield City Polytechnic' envelope was used to guard against envelope substitution should there be any tampering with any of the questionnaires. As each nurse was interviewed, the researcher made a note of the completion date assigned to that individual, the setting and date of box collection. This was in order firstly, to know when to collect the box and secondly, to see whether the strategy of deadlines was taken heed of or not.

Dates of when the questionnaires were received were documented by the researcher, as indeed were details regarding the need for reminders, to whom and by what method - in person, via letter(s) or telephone. It transpired that all the respondents from Unit T handed them in before or on the dates given. Only five from Unit C were collected on the dates given, the rest being collected between two weeks and two months later. In total, six trips were made to the three settings of Unit C in order to collect the questionnaires. In Unit S, six respondents handed them in by the date given. Three followed two to three weeks later, while two were never received, despite five visits to the Unit concerned and four occasions when the researcher spoke to the individuals concerned. One could interpret such actions either as demonstrations of indifference to the research or begrudging involvement, even though the respondents' participation was of a voluntary nature.

Fieldnotes were taken following each interview in order to record the general circumstances of the encounter, such as whether and what the interviewees knew about the research, in order to ascertain whether any of the senior nurses had communicated information to the nurses about the study; the length of time taken to conduct the interview; if any interruptions occurred - how many, by whom and why; what points seemed to cause resistance or problems in answering; and any comments made by the respondents.

This section has described the various data collection instruments which were used in the study to elicit information from the selected nurses on a wide range of issues. It is hoped that it has demonstrated the sensitivity and care with which the researcher chose the instruments and meticulously refined them over time. The manner in which each successive

stage of the research project helped inform the development and refinement of the research instruments, the problems that were encountered and the mistakes that were made, have all been documented and discussed. It is hoped that implicit, if not explicit, in this section is evidence of the researcher's concern both with the objective of collecting rich material for the study and with the subjective experiences of interviewing and being interviewed. The researcher wished to approach a social encounter such as interviewing in a responsible and sensitive manner. Thus much consideration was given to spatial, linguistic and psychological factors.

1.2.4 Development of the Doctors' Interview Schedule

The preceding section gave a detailed account of the various stages involved in the selection and development of the research instruments used to elicit information from the nurses in the study. This section looks at the processes and factors involved in the development of the instruments used for the doctors. It is divided into three parts. The first part explains how the data collection instruments used for the nurses were adapted and used to elicit information from the doctors. It also chronicles the specific changes which were made in order to refine the doctors' instruments and make them more appropriate to their particular levels of knowledge and experience. Part two of this section describes how the involvement of the doctors was secured and the samples chosen. The final part explains how the knowledge and experience gained in developing and administering the nurses' questionnaire was used to help improve the construction of the doctors' questionnaire.

The Interview Schedule

Pilot studies were not conducted with the doctors as time constraints and the unavailability of appropriate participants surplus to the needs of the study made it impracticable. However, the developed interview schedule was pre-tested for clarity and length with research colleagues, and changes to the instrument would have been instituted if the first few interviews had shown this to be necessary.

The design and construction of the doctors' interview schedule was informed by the development of the nurses' instrument, although some changes were made to make it more appropriate to the doctors' particular level of knowledge and experience. Thus certain questions and sections found in the nurses' schedule were eliminated when designing the doctors' schedule, while others were added in order, for example, to investigate certain issues at greater depth or to establish doctors' level of knowledge or experience, instead of taking it for granted. The language used in certain questions was also altered in order to medicalise the terminology used in accordance with the doctors' frames of reference. Indirect questioning was used to elicit the doctors' knowledge and understanding of certain issues, by ostensibly investigating the knowledge and understanding they thought nurses had or should have. This technique also proved useful in exploring their roles vis-a-vis the nurses as sources and disseminators of medical/nursing knowledge and techniques.

1.2.5 Selection of the Research Sample of Doctors

The doctors were chosen from the same three units as the nurses. Three doctors, who comprised the total population of doctors in the terminal care unit (Unit T) took part in the study. Their involvement was secured through the interest and support of the matron and follow-up meetings with the Unit (medical) Manager and individual doctors concerned.

Permission to involve doctors from the specialist cancer hospital (Unit S) was gained from the Unit Manager and via verbal confirmation from the Director of Nursing Services and subsequent consent from each individual doctor. A list of 6 doctors was received, all of whom agreed to take part in the study. They included: 2 senior registrars (female), 3 registrars (male) and 1 house officer (male). A letter was sent to each of the doctors for the purpose of providing them and the researcher with a written record of their meeting and its outcome, and reiterating the purpose of the study and their involvement in it.

Before access to the doctors in the community (Unit C) could be secured, negotiations with the appropriate Family Practitioner Committee and

Medical Committee had to be conducted. The small numbers of doctors in the other two settings essentially dictated the size of the sampling frames, whereas the large number of doctors in Unit C and their geographical diffuseness demanded that the researcher select a sampling frame in order to choose a sample of general practitioners. The researcher decided to employ the random sample technique to select eight general practitioners from the three hundred and seven listed in the November 1985 issue of the appropriate Family Practitioners Committee medical list. The sample was chosen by marking numbers 0-9 on three sets of paper, so that at any one time three numbers would be picked out with the first doctor listed (001) having as much chance of being chosen as the last (307). The only exemption was that only one doctor would be chosen from a group practice because of the possibility of them reporting on the same patient.

A letter of introduction was sent to each doctor chosen (see Appendix 5). Four of the eight doctors chose not to take part in the study. The reasons given varied from not having any patients with malignant lesions registered in their practice (2 doctors said this), to not being interested in taking part in the study (2) or lacking the time to take part (1). A further four doctors were then randomly selected and the procedure outlined above was repeated. Only two of these doctors chose to be involved. Time precluded any further doctors being chosen. Therefore the final number of general practitioners taking part in the study was six. The busy working schedules of many of these doctors meant that the interviews had to be short. Indeed, many of them only agreed to be involved because the researcher was able to assure them of this.

1.2.6 Administration of the Data Collection Instruments

The method of introducing the researcher and the research (both verbally and in writing) used with the nurses was adapted for the doctors, with an appropriate change in content and style of the letter (see Appendix 6). The introductory letter was given to the doctors at the start of the interview, as with the nurses, and for the same reasons as previously outlined.

The knowledge and experience gained in developing the nurses' instrument was used to inform the development of the doctors'. However, the learning process was not uni-directional. In retrospect, the two elements of the study - the nature and management of fungating malignant lesions and knowledge and understanding of the wound healing process - should have been mentioned in the introductory letter to the nurses (instead of only being mentioned to them verbally) as it was clearly emphasised in the letter to the doctors.

The questionnaire was once again used as a tool with which to collect personal, career and educational details. The first questionnaire developed for the doctors (adapted from the nurses) was discarded (see Appendix 7). A more refined version (see Appendix 8) was introduced in its place which incorporated the lessons learned from the development of and responses given in the nurses' questionnaire as well as changes in terminology aimed to fit more appropriately into a doctor's frame of reference. As with the nurses, a note was enclosed with the questionnaire which briefly explained its purpose and method of collection (see Appendix 9). Deadline dates were used, as with the nurses, and for the same reasons. A stamped, self-addressed envelope was given to each doctor in order for them to post the completed questionnaire. This method of collection was chosen as it seemed the most appropriate, given the small number of doctors involved (15) and their varied locations. The tape recorder was used to record the interviews and the reasons given for its use were the same as those used for the nurses. Fieldnotes were taken at the end of each interview for the same reasons as outlined for the nurses.

This section has explained how access to the doctors was negotiated and the samples chosen. It has described the processes by which the nurses' interview schedules and questionnaires and their method of administration were modified and used to elicit information from the doctors in the study. It has also detailed the changes which were made to the structures of the doctors' interview schedules and questionnaires. The experience and the lessons learned by the researcher in developing the nurses' data collection instruments and conducting interviews with them were invaluable and helped to inform her encounters

with the doctors. However, various instances have been cited in this section which hopefully demonstrated that the learning process was not uni-directional and that the researcher's encounters with the nurses could have been enriched as a result of the experiences gained in developing, for example, the questionnaires used to elicit information from the doctors.

1.3 METHODOLOGICAL APPROACHES EMPLOYED FOR THE COMMERCIAL AND SCIENTIFIC PARTICIPANTS IN THE STUDY

The preceding section concludes the two sections detailing the methodological approaches used for the clinicians taking part in this study. The following two sections focus on the techniques employed to gather data from the commercial and scientific participants. A discussion of the methods employed to elicit information from the staff at Smith and Nephew Ltd is presented, before going on to examine those used for the research scientists at the Department of Research in Plastic Surgery at the Mount Vernon Hospital Middlesex. Several new interview schedules were developed from the clinicians' stage of the study, to reflect the different areas of expertise of the various personnel - both between the commercial and scientific communities as well as within them.

1.3.1 Negotiation of Access to Smith and Nephew Ltd

Following the decision described in the introduction to extend the study to investigate the development and diffusion of an innovation in the health care field, namely OpSite, access to Smith and Nephew Ltd had to first be negotiated. A letter was sent in the first instance (March 1987) to the Secretary to the Trustees of the Smith and Nephew Foundation. It gave a brief outline of the research study and the findings arising from it which were thought likely to be of interest to them. The proposed extension of the study was discussed and their collaboration in this regard was sought. A reply to the above letter was received several months later from the medical advisor to Smith and Nephew Ltd, requesting a meeting with the researcher to discuss in more detail her research and the precise nature of the requested

collaboration. This meeting took place in May 1987 and although he was interested in and supportive of the study in principle, he envisaged problems in trying to convince the company's senior management of the value of such involvement.

Subsequent telephone conversations with the medical advisor demonstrated that gaining access to Smith and Nephew Ltd was indeed going to be problematic. The company's general inexperience in collaborative research of this kind made their senior management nervous of involvement. They voiced economic and political concerns with respect to the cost to the company of such an exercise and in particular the researcher's nationality and background. They were highly suspicious of her motives for wishing to investigate the development and marketing of their product OpSite. Her East-European name had alerted certain members of Smith and Nephew's senior management to the possibility of industrial espionage. They appeared afraid of her uncovering information which she could pass on to the communist bloc. They even went so far as suggesting that her role as a PhD student at the Sheffield City Polytechnic was a fabrication, despite the fact that they had telephoned her there and had received 'Sheffield City Polytechnic' headed letters from her.

Reassurances from the researcher regarding her motivations and a discussion of her family background failed to allay their fears. The matter was finally resolved (from the researcher's point of view) by two letters, one from one of her supervisory team which essentially confirmed her status in the Department of Health Studies at the Sheffield City Polytechnic and the background to her research and proposed area of work with Smith and Nephew Ltd. The second letter was sent a few days later by the researcher herself essentially reiterating her earlier comments made to the medical advisor.

A letter from the company's medical advisor to the researcher and their subsequent meeting, where the study was discussed in more detail and departments and individuals who could help were identified, led the researcher to believe that access had finally been granted. It was clear that the medical advisor had been given the role of 'contact man' and the responsibility of keeping a close eye on the researcher and her

activities within the company. The researcher was introduced to a number of staff members during her initial visits to the company, contacts which were to prove vital to the continuation of the study as subsequent events unfolded.

Further introductions and visits had to, however, be postponed with the sudden and unexpected departure from the company of the medical advisor. For a time it seemed that this part of the project was in jeopardy. His departure had come at a very crucial and sensitive juncture in the negotiation process. The medical advisor had been the researcher's main contact within the company and certainly the only one who was familiar with and supportive of the project. Fortunately, instructions had been issued (the researcher never found out from whom) for certain other individuals to now act as the researcher's contact points. A meeting was arranged between these individuals and the researcher in March 1988 where it was agreed that a memo be circulated to all those identified as possible participants in the study. Its aim was to introduce both the researcher and her work to the individuals concerned and explain that she would be contacting them shortly. However, before this process could begin the researcher was informed of the need for her to sign a secrecy agreement which would prevent her from discussing in public any issues deemed sensitive by Smith and Nephew Ltd for the next four to five years and to prevent anyone from the company reproducing any part of her work without her permission. This latter point arose from an incident where a member of Smith and Nephew's marketing team circulated an internal memo suggesting that certain parts of a report sent by the researcher to Smith and Nephew Ltd for information only should be reproduced for use in one of their OpSite promotional campaigns.

A number of other important issues were also discussed at this meeting, including ethical issues such as anonymity. Did they, for example, wish OpSite to be named or given anonymity through the use of a pseudonym? They tended to be against anonymity because they wanted, as they put it, "the OpSite story to be known". They also maintained that certain facts are so specific to OpSite that anyone working in the field, particularly their competitors, would know which company, and therefore which dressing, was being discussing, even without it being mentioned by name.

The initial position of the individuals the researcher was in contact with concerning the research was that they wanted to have the right of veto over any written work prepared by the researcher. However, when she challenged them on this matter, they modified their stand and a compromise was reached. It was decided that they could comment on the researcher's work and offer suggestions but they could not control what she could or could not say.

Their apprehension over what the researcher may uncover and thus report, led them to request that an embargo of two to three years be placed on her completed PhD thesis. A meeting between the individuals concerned and the researcher and her supervisory team was subsequently held, but the issues of anonymity and embargoment of the completed PhD thesis were not formalised but left open for future discussions. The issue of anonymity has now been resolved. It has been agreed that the researcher may cite the company and product under investigation by name, although none of the respondents are to be identified. However, the matter concerning the embargoment of the researcher's completed PhD thesis has yet to be finally resolved, although the researcher is of the opinion that it will not be enforced.

Thus, after what had been a long and rather protracted and often uncertain period of negotiation of access to Smith and Nephew Ltd, the researcher was in April 1988 finally allowed to make contact with the key individuals who were to take part in the study.

1.3.2 Pilot Study

It was fairly obvious to the researcher at the outset that it would not be possible to conduct a large number of pilot interviews with Smith and Nephew personnel, given the small sample of potential interviewees and the need to take up as little of the staff's time as possible. However, informal conversations with a number of staff members provided the researcher with some background information regarding the origins and subsequent development of OpSite.

A wide range of archival material from a variety of sources, internal

and external to the company, were used to provide a profile of the company and specifically, information on the development and diffusion of OpSite. This material included in-house literature, such as clinical papers, numbering over three hundred at the time of this study, published nationally and internationally and dating from the 1940's to the present day on the MWHT and OpSite; promotional material on OpSite, from its first launch as an incise drape (see section 4.5.1 page 217, 219) for a definition of an incise drape) in the early 1970's to its use on various indications in the 1980's; and in-house journals dating from the early 1950's and literature sent to their stock-holders. Various books and journal articles written on the MWHT and OpSite by various authors, including Smith and Nephew staff, were also reviewed and visits to the local library were made for the specific files and documentation held there on Smith and Nephew to be perused. However, the researcher did not restrict herself to merely reviewing the promotional literature pertaining to OpSite, but widened her focus of inquiry to include that used for earlier Smith and Nephew products. The aim of this was to provide the researcher with an understanding of the company's history in the dressing field and so enable her to trace, on a general level, the extent to which the development of OpSite represented a technical continuum or a sharp departure from Smith and Nephew's earlier dressing range.

These verbal and written sources of information contributed to the development of the data collection instruments, by helping to inform and familiarise the researcher with the subject areas under inquiry and the different linguistic styles used by those in the commercial world.

1.3.3 The Interview Schedules

Staff from four different departments were approached to take part in the study: those from Research and Development; Technical; Marketing; and Sales. The researcher prepared essentially four distinct interview schedules, although there were similarities in the topics covered and questions asked of staff in the Research and Development and Technical departments, and the Marketing and Sales personnel because of the overlap in knowledge and expertise found between staff in these

different departments. Thus, for example, many of the topics relating to the origins of the concept of OpSite and its operationalisation to end product were covered in the interview schedules used for staff in both the Research and Development and Technical departments. In the same way, questions concerning the different marketing strategies used to promote OpSite and the factors which have influenced its adoption were covered with both Marketing and Sales personnel.

The variability in the questions asked of staff from the different departments reflected their different specialisms, varying lengths of service with the company, and their possession of specific knowledge and experience of OpSite. Thus more emphasis was put on the technical and engineering side of producing a product such as OpSite and the problems encountered, in interviews with staff from the Technical department.

The interview schedules were of a relatively unstructured, albeit focused type, where neither the precise wording of the questions nor the range of responses were predetermined. However, the focused nature of the schedules allowed the researcher to cover the relevant issues and ask specific questions considered important to the study. There was no specific order in which the questions were asked apart from the researcher beginning the interviews with questions about the antecedents of OpSite. From there on in, if the respondent took the interview into a particular direction the researcher followed with related questions. Thus the researcher allowed the respondent to guide the direction of the interview while ensuring that the topics she wished to see covered or specific questions she wished to ask were adequately dealt with.

1.3.4 Selection of the Research Sample for Smith and Nephew's Personnel

In consultation with various Smith and Nephew staff, the researcher was able to identify individuals who were thought able to provide the information necessary to the study. Thus a 'purposive' sampling method was used to choose the interviewees. The aim was to interview as many people from the different departments as was both necessary, in terms of the remit of the study, and possible in terms of what the company would

allow and what was practical. For example, the number of people who could provide the researcher with information about the early development work on OpSite, which was conducted in the 1960's, and the early marketing of the product, was by definition limited as few of the people who knew of or had been directly involved with the product at that time were still employed by Smith and Nephew Ltd.

The very nature of the organisation made the sample of respondents almost self-selecting as did the nature of the project itself, as discussed above. The complexity and diffuseness of Smith and Nephew's operation means that no one person or group of people possess specific knowledge or expertise on one particular product, rather they tend to know a 'little bit about a lot of them'. The existence of this kind of situation further added to the researcher's problems concerning sample selection. The researcher was, of course, aware of the threats to validity and possible bias, that allowing staff within the company to choose the sample may introduce. This awareness led the researcher to try and minimise the biasing elements in a number of ways, such as critically evaluating what the respondents said rather than accepting their comments uncritically; minimising the company's control over the research findings and guarding against the possibility of respondents manipulating the interview situation.

The informal nature of the sample selection process can be illustrated by the occasions when the researcher was called upon, often at very short notice, to interview substitute personnel, because the particular interviewee was unavailable, or to interview additional individuals until the scheduled interviewee was free. The consideration shown by Smith and Nephew's personnel, and desire to help in these instances was greatly appreciated. These particular individuals did in fact make useful and interesting contributions to the study, although there were occasions when the perceptions of certain staff members, vis-a-vis their colleagues' knowledge and expertise in certain fields, did not in reality prove to be as substantial or useful to the researcher as was anticipated.

Only one person from each of the Research and Development and Technical departments was interviewed for reasons already discussed in the above paragraphs. Both of the respondents concerned were described by other Smith and Nephew staff members as having intimate knowledge of the early development of OpSite. The researcher later discovered the existence of other individuals who could have also provided her with such information but who she had been unable to see - either because they were said to be too busy to see her or because they would have furnished her with material already provided by others. The remaining respondents who took part in the study came from the Marketing and Sales departments. The final number of Smith and Nephew personnel interviewed was twelve, three of whom were only interviewed informally and in an exploratory way. Nine respondents' interviews were actually used for the main study.

1.3.5 Administration of the Data Collection Instruments

The researcher intended to tape-record all the interviews using a small hand-sized tape recorder. The size of the machine was important given that she did not anticipate being in a position to choose the setting for the interview or have the time to set up any cumbersome or complex equipment. She recognised the need to be as flexible and inconspicuous as possible in this regard. Given the relatively unstructured nature of the interviews, the complexity of the subject matter and the researcher's unfamiliarity with it, it was important that the researcher be able to concentrate fully on the conversation between herself and the respondent and not to be distracted by having to write down the responses. Time was also of the essence in many of the interviews and so in order to cover the areas relevant to the research as quickly as possible it was important that the technique adopted to record the interviews did not impose artificial constraints on the speed at which they were conducted.

The researcher contacted and spoke to each individual selected to take part in the study. In addition to using this occasion to seek their permission to be involved in the study, the researcher also used it to provide them with some background information about herself and the research. This was in addition to an internal memo which had already

been circulated to all the individuals concerned, about the researcher and her research, and the various correspondence and reports (exchanged between the researcher and various people within Smith and Nephew Ltd from first contact), to which they had access. However, despite all this, the researcher still considered it important to speak for a few minutes about her background and that of the research at the beginning of each interview. She also recognised the importance of being honest and willing to answer any questions put to her by the respondents, particularly given the company's general suspicion towards this 'outsider' and their fear of her revealing company secrets to outside sources.

All but one of the respondents interviewed agreed to be tape-recorded. Many did not even wait for an explanation to be given before agreeing, apparently recognising the appropriateness of recording such an encounter in this way. The reluctance of the one respondent to be tape-recorded (said to be because of certain legal considerations) was, however, unfortunate because the person concerned was a senior staff member and well informed about the development of OpSite. The need to take notes not only slowed down the pace of the interview; more importantly, it limited the range of areas and questions which the researcher was able to cover. On a more positive level, this incident provided the researcher with valuable experience in learning how to cope with the situation of having to record interviews by hand.

For a number of logical as well as strategic reasons the researcher chose to interview the respondent from the Research and Development department first. Firstly, his knowledge and expertise relating to the early development of OpSite made him a natural choice as far as tracing the evolution of the product was concerned. Moreover, the researcher also considered the possibility that certain issues may arise in conversation with this person which may be important and interesting to pursue with others in later interviews.

Secondly, the researcher calculated that she could use this person's senior position in the company to 'open other doors'. In other words, if it became known that this person had agreed to be interviewed by the

researcher then others may feel less inhibited about being involved. The researcher's hunch proved to be accurate. Many respondents asked the researcher at the beginning of their interview who she had already interviewed and it was particularly gratifying that she was able to cite this particular person, at which point all resistance seemed to melt away. Had they perhaps probed deeper and discovered that this person had not agreed to his interview being tape recorded, then the researcher felt that many of them may have followed suit!

The interviews with staff from Smith and Nephew Ltd took place between mid May and the end of June 1988. The length of the interviews varied from one to two hours, depending on the time that the interviewee had allocated to the researcher. The majority of them lasted approximately one and a half hours. Some of the interviewees were extremely attentive and the interviews were completed without interruption. However, with others, the researcher had to 'fit' the interview into their busy working schedules, 'snatching' moments with them while spending long periods of time waiting around.

At the end of each interview each respondent was asked if s/he would oblige by completing a questionnaire (see Appendix 11). A stamped and self-addressed envelope was attached to each questionnaire, in order for the respondent to post the completed form. The aims of the questionnaire were twofold. Firstly, to obtain a personal profile of the respondents holding certain positions within the company, in terms of their ages and educational levels. Secondly, to discover the extent of mobility (within and between the different departments) and in-service training to keep the staff's specialist knowledge and expertise up-to-date. The characteristics of the respondents from Smith and Nephew Ltd who took part in the study are presented in Appendix 12.

Literature reviews conducted on the characteristics of innovating firms and the individual's working within them, as well as experience previously gained in constructing questionnaires (for the doctors and nurses), helped inform the development of the questionnaire in this particular instance. Of the seven questionnaires handed out (two of the respondents were not given questionnaires as they were introduced to the

interviewer at the last minute as substitutes and conversations with them were very brief), only four were returned. The researcher sent a letter to each person who had taken part in the study thanking them for their contribution. This letter also served as a vehicle to remind those who had not, as yet, returned their questionnaires, to do so.

1.3.6 Interviews with the Research Scientists Associated with Winter and the MWHT

The preceding section gave a detailed account of the processes by which access to Smith and Nephew Ltd was negotiated; the sample of respondents chosen and the data collecting instruments developed and operationalised. This section provides a similar sequential account of how the researcher interviewed the research scientists associated with George Winter, the scientist accredited with developing the MWHT.

1.3.7 Negotiation of Access to the Research Scientists

Dr George Winter, the research scientist accredited with the discovery that faster and more effective wound healing takes place in a moist as opposed to a dry wound environment, died in 1981. Fortunately, his colleague and superior during the 1960's and 1970's, when he was conducting experiments on the wound healing process in the Institute of Orthopaedics at the Royal National Orthopaedic Hospital at Stanmore, Dr J.T. Scales (now known as Professor Scales), is still alive. However, much investigative work had to be conducted before their relationship was established, more still to locate this person's present whereabouts. The researcher finally discovered his address and a letter was dispatched to him in the Department of Research in Plastic Surgery at the Mount Vernon Hospital Middlesex providing information on the research and the researcher and requesting a meeting.

A reply to the researcher's letter was received and a date for an interview fixed for the middle of June 1988. An interview with such a key person would, the researcher believed, enrich the study in terms of providing the final chapter to the supply side of the MWHT case-study.

Prior to commencing the interview the respondent introduced the researcher to Mrs S.E. Barnett and Ms S.J. Varley, both of whom had worked with George Winter. Indeed, Mrs S.E. Barnett had been intimately involved with his wound healing work. Both of them were very interested in the researcher's work and agreed to be interviewed. Prior to commencement of the interviews, the researcher gave a preamble to the study and her own particular involvement with it.

1.3.8 The Interview Schedule

The researcher used the literature reviews she had conducted on the MWHT and George Winter, as well as the verbal accounts and archival material obtained from staff at Smith and Nephew Ltd, to develop the data collection instruments to be used for these respondents. As with the Smith and Nephew interviews, an unstructured interview technique was used, albeit focused on specific issues and questions pertinent to the study.

1.3.9 Administration of the Data Collection Instruments

The interviews lasted approximately one and a half hours. The researcher's preparedness, flexibility of mind and ability to cope with being suddenly thrust into certain situations (where on arrival to interview one of the respondents, she was told she could also interview two other people) was once again tested. This situation also demonstrated the appropriateness of using an unstructured data collection instrument.

The interview with Mrs S.E. Barnett and Ms S.J. Varley was conducted with them both together. This was the first occasion that the researcher had interviewed more than one person at a time. She found the encounter challenging and the information arising from it both interesting and informative - perhaps more so than if two separate interviews had been conducted, as each respondent tended, on occasion, to remind the other of certain events and incidents. However, there were also disadvantages to this arrangement. The researcher discovered that skill was needed to prevent one of the respondents dominating the entire conversation. The

degree of concentration and raised awareness needed to keep such an encounter going was also found to be more acute and heightened than in a one to one situation. Note taking in such a situation would have been fraught with difficulties. Thus it was much to the researcher's relief that the respondents agreed for the interview to be tape-recorded.

Part of the skill in conducting such interviews is the researcher's ability to think ahead, not just in terms of minutes and what the next question is going to be, but in terms of days, perhaps weeks and months, to the time when she is transcribing the tape(s). Thus she had to ensure that whenever possible only one person spoke at any one time, so as to avoid an indecipherable babble of too many people speaking at once being recorded. When such a situation seemed almost unavoidable (as in many ordinary conversations), the researcher made sure that the tape-recorder was in a good position to pick up all the voices and if a particularly salient point was made by one or both of the respondents she asked them to either repeat it or expand on it in a little more depth.

As a matter of courtesy (as with all the interviews the researcher conducted), a letter of thanks and appreciation for taking part in the study was sent to the above individuals.

1.4 CONCLUSION

This section concludes a comprehensive and detailed discussion of the various methodological approaches used to collect data from the clinical, commercial and scientific personnel involved in the study. The rationales underlying their employment and their operationalisation was presented.

The chapter that follows opens the part of the thesis devoted to the presentation of the findings from the study. It will be divided into various sections concerning the nature and management of patients with fungating and ulcerating malignant lesions.

CHAPTER TWO: THE STARTING POINT - THE NATURE AND MANAGEMENT OF
FUNGATING AND ULCERATING MALIGNANT LESIONS

2.1 FUNGATING AND ULCERATING MALIGNANT LESIONS - A REVIEW OF THE
LITERATURE

INTRODUCTION

This section begins the chapter on the nature and management of malignant lesions with a literature review which investigates the nature and incidence of these lesions, as well as their most common sites of presentation, their prognosis and the different therapeutic modalities employed. The characteristics of the patients typically affected are also discussed.

2.1.1 The Nature of Fungating and Ulcerating Malignant Lesions

The care of patients with intractable wounds, such as fungating and ulcerating malignant lesions, has increasingly become a nursing province, yet little information is available in the nursing literature regarding their nature and management. This has been noted by Foltz (1980), Sims and Fitzgerald (1985) and Wells (1986) who, in his review of Westaby's (1985) definitive work on wound care says:

"The book questions a great number of current practices and examines the management of the majority of wounds seen in hospitals. Sadly, there is a notable exception, malignant wounds are hardly mentioned." (p 15)

This lack of information about malignant lesions leaves nurses reliant on their intuition and experience, however varied that may be, to care for such patients. This situation is regarded as highly unsatisfactory, given the seriousness and acutely distressing nature of this condition (Ashford et al, 1980; Bennett, 1985; Foltz, 1980; Sims and Fitzgerald, 1985) which is graphically described by Doyle (1980):

"Can we begin to imagine what it must feel like for a patient to see part of his body rotting and to have to live with the offensive smell from it, see the reaction of his visitors

(including doctors and nurses) and know that it signifies lingering death." (p 310)

One possible reason for the scarcity of published work on this condition may be due to the fact that it is regarded as uncommon (Rosen, 1980). However, the exact incidence is unknown, and the same author suggests that these lesions do not always figure in a patient's records.

The Incidence of Malignant Lesions

There appear to be conflicting reports regarding the incidence of these lesions and the extent to which their prevalence has declined in recent years. Any accurate measurement of their incidence may be further confounded by the fact that many people delay seeking medical treatment (Bell, 1983; Bloom et al, 1962; Sims and Fitzgerald, 1985). Such concealment may be due to physical reasons, because the lesion causes no pain to the patient (Bennett, 1985) or to psychological reasons highlighted by Sims and Fitzgerald (1985). Bloom et al (1962), investigating cases of untreated breast cancer, write of one woman who had delayed seeking help for sixteen years:

"by which time the whole breast was replaced by a fungating tumour with satellite nodules in the surrounding skin. Ulceration had been present for twelve years." (p 217)

The Nature of these Lesions

Malignant lesions are products of cancerous infiltration of the epithelium (Foltz, 1980; Sims and Fitzgerald, 1985) which develop as a fungating mass or ulceration with subsequent local infection, offensive (malodorous) exudate and capillary bleeding (Charles-Edwards, 1983). There appears to be some confusion in the literature over the definitions of the terms fungating and ulcerating malignant lesions. Some authors use the two terms interchangeably (Bale and Harding, 1987; Bell, 1983; Foltz, 1980; Sims and Fitzgerald, 1985) to describe a fungating mass and an open, crater-type wound. Petrek et al (1983) however, appear to distinguish between these two types of lesions when they say:

"It is unclear why in one patient the breast cancer mass can grow to a large size and merely elevate the overlying uninvolved skin, while in another patient a mass of equal size will invade and destroy the skin causing ulceration." (p 187)

Most authors regard fungating skin lesions as being most commonly associated with carcinoma of the female breast (Charles-Edwards, 1983; Foltz, 1980; Rosenberg, 1977; Saunders, 1978; Sims and Fitzgerald, 1985), although Rosen (1980) considers that virtually any internal malignancy can give rise to cutaneous metastases. The range of sites from which they can arise includes: the oral cavity, lung, colon, kidney, ovary, stomach (Rosen, 1980; Rosenberg, 1977) head and neck, uterus, bladder, (Foltz, 1980) cervix, vagina, vulva, (Charles-Edwards, 1983; Saunders, 1978), and thumbs (Panebianco and Kaupp, 1968).

Ulcerating and fungating lesions may develop at the site of the primary neoplasm (Bell, 1983; Bennett, 1985) or away from it at a secondary site due to metastases (McCorkle, 1973; Petrek et al, 1983; Rosenberg, 1977). Such lesions may be the first manifestation of an unsuspected neoplasm (Rosen, 1980; Sims and Fitzgerald, 1985) or a secondary sign (McCorkle, 1973; Rosen, 1980; Rosenberg, 1977).

There appears to be a general consensus that patients with fungating or ulcerating malignant lesions invariably have a poor medical prognosis (McGovern et al, 1982; Rosen 1980; Rosenberg, 1977; Wood, 1980), particularly if they have delayed seeking medical treatment (Wilcox et al, 1982). Whilst Foltz (1980) and Rosen (1980) share this general perspective, they feel that no hard and fast rules can be applied to survival time. Sims and Fitzgerald (1985) note that some patients in their study survived for longer than two years, despite extensive lesions. There are also documented cases, such as the one previously described by Bloom et al, where patients have survived for many years.

2.1.2 The Treatment of Fungating and Ulcerating Malignant Lesions

A variety of treatments have been reported for either localised or disseminated disease, in isolation or as part of a combination therapy programme. For example, surgical extirpation (Rosenberg, 1977; Saunders,

1978; Wood, 1980), chemotherapy (Foltz, 1980; Sims and Fitzgerald, 1985), radiotherapy (Bell, 1983; Gribbons and Aliapoulios, 1972; Lyon, 1982), hormonal manipulation (Bell, 1983; McCorkle, 1973; Petrek et al, 1983; Saunders, 1978) and immuno-therapy (Sims and Fitzgerald, 1985).

However, when medical treatment is no longer appropriate or has proved to be ineffective, then management becomes increasingly a nursing province and palliative rather than curative treatments are employed. These are directed at alleviating the distressing symptoms associated with the lesions such as minimisation of pain, infection, bleeding and discharge (Bale and Harding, 1987; Foltz, 1980; Gribbons and Aliapoulios, 1972; Petrek et al, 1983; Sims and Fitzgerald, 1985) and particularly the more noticeable and personally and socially objectionable malodour (Ashford et al, 1980; Bennett, 1985; Butcher et al, 1976; Welch, 1982).

Topical Agents

An analysis of the treatments currently used by nurses on fungating and ulcerating malignant lesions (Foltz, 1980; Pugh 1983; Sims and Fitzgerald, 1985) reveals the use of a number of agents and solutions which have in recent years received much criticism. This relates particularly to the physiological effects of the use of topical antiseptics.

The offensive smell of some fungating tumours is thought to be caused by the invasion of bacteria (Ashford et al, 1980; Gribbons and Aliapoulios, 1972; Sims and Fitzgerald, 1985). Cleaning the wound with appropriate antiseptics, it is believed, will inhibit further bacterial proliferation. Therefore cleansing agents such as hypochlorites (eg. Eusol, Milton), aqueous antiseptics (eg Povidone-Iodine, Chlorhexidine and Cetrimide) and hydrogen peroxide are used. However, the wisdom of using agents such as these on wounds in general has been the subject of much recent debate. Povidone-Iodine and Chlorhexidine have been found to be effective antibacterial agents but, like hypochlorites, are inactivated by body fluids, blood, pus and slough (Butler, 1985; Leaper, 1986) although not as rapidly as hypochlorites

are (Leaper et al, 1987). This review of the literature has not yielded any references to the effectiveness or otherwise of these agents on the wounds being studied, but since they are noted for the amount of discharge present it is reasonable to assume that these cleansing agents will be rapidly inactivated in the same way as has been found for wounds in general.

More seriously, some of these commonly used agents have been found to inhibit wound healing in general. This inhibition is due to damage to new tissue (Brennan and Leaper, 1985; Leaper, 1986) and suppression of the normal lymphocytic response (Ninneman and Stein, 1981). Wider systemic effects may be produced. Eusol has been shown to cause irreversible damage to the microcirculation and can produce a range of side effects from mild uraemic toxæmia to acute renal failure (Johnson, 1987) as can Povidone-Iodine (Barton and Barton, 1981). Cetrimide is thought to be toxic to wound tissues at low concentrations (Leaper et al 1987). Sleigh and Linter (1985) present two case reports illustrating the hazards of using hydrogen peroxide in certain circumstances. Such evidence suggests that the practice of using topical antiseptics should be reappraised. The implications of this are as pertinent to the management of malignant lesions as they are to other types of wounds.

Non-Conventional Topical Agents.

Non-conventional treatments such as natural live yoghurt and buttermilk (used systemically or topically) are used on fungating and ulcerating malignant lesions (Barckley, 1964; Gribbons and Aliapoulios, 1972; Welch, 1981 and 1982), as is baking soda (Foltz, 1980) as anti-bacterial agents for reducing odour (Bennett, 1985; Sims and Fitzgerald, 1985), and icing sugar as a debriding agent (Sims and Fitzgerald, 1985). However, little information about their mode of action or effectiveness is available.

Dressings

There is now a large body of literature relating to the general principles of wound dressing but again very little reference is made to

the specific needs of the patient with a fungating or ulcerating malignant lesion, although a few authors discuss the various types of dressings used on such lesions, particularly fungating breast lesions (Bale and Harding, 1987; Foltz, 1980; Sims and Fitzgerald, 1985; Warrender, 1982).

It is clear that local care of the wound will not heal the underlying disease. Nevertheless, many authors are of the opinion (Doyle, 1980; Foltz, 1980; Sims and Fitzgerald, 1985) that appropriate nursing intervention can help improve the quality of life of such patients and the lives of their families (Wood, 1980).

2.1.3 Psycho-Social Factors Associated with this Condition

Caring for patients with fungating and ulcerating malignant lesions is, of course, not solely a matter of controlling physical symptoms. It includes awareness of and ability to cope with the psychological problems such patients may present such as embarrassment, shame and guilt. This is an issue which a few authors have addressed (Bennett, 1985; Charles-Edwards, 1983; Petrek et al, 1983; Saunders, 1978; Sims and Fitzgerald, 1985), but their prevailing tenor can be illustrated by the following quote from Charles-Edwards:

"Much can be done to keep the lesions comfortable and odourless, but the attitude with which the dressing is performed will do more to alleviate the patient's feelings of shame, disgust and alienation, than any of the many potions." (p 148)

This highlights the need to treat not only the malignant lesion but the patient as a whole.

Little is known about the characteristics of the patients who suffer from this complication of their malignant disease, other than the range of their ages and, here again, there is lack of consensus. Some authors consider that fungating and ulcerating malignant breast lesions appear mainly in women over 40 years of age, with those between the ages of 60 and 70 most affected (Petrek et al, 1983; Sims and Fitzgerald, 1985). However Townell (1983) considers ulcerated breast lesions to be less common in the elderly patient.

Apart from data relating to the age of patients with breast lesions there is little information about the characteristics of patients affected by this condition, such as their sex, occupational status and social class. Information such as this could lead to a deeper understanding, sociologically and medically, of this condition and the people it affects and may also shed some light on the reasons for their occasional tendency to conceal their wounds from others.

This review of the literature confirms that there is a lack of published information and research which deals specifically with fungating and ulcerating malignant lesions. Accurate data on the incidence and prevalence of this condition is lacking, although it is seen as being uncommon. The reports which are available give little indication of the knowledge base and rationale on which nursing management is founded. Indeed, there is much to suggest that a poor knowledge base underpins nurses' and doctors' clinical practice. Critical appraisal of the treatments used on these lesions had to be sought in the literature on wound healing in general. However, it can be said that an informed and considered choice regarding the use of conventional and non-conventional topical agents and dressings is as pertinent to the nursing management of malignant lesions as it is to other wound types. Moreover, that awareness of and sensitivity to the psychological problems that such patients often present, is as important as controlling the physical symptoms of this condition.

The findings of the present study on aspects of the nature and management of fungating and ulcerating malignant lesions are presented in the following sections.

2.2 THE CAUSES AND INCIDENCE OF FUNGATING AND ULCERATING MALIGNANT LESIONS

This section begins the presentation of the findings from the clinical part of the study. The data presented summarise the comments which the sample of 36 nurses and 15 doctors made about the nature and management of patients with fungating and ulcerating malignant lesions. The preceding literature review on this condition clearly demonstrated that

little is, as yet, known about the causes of this condition. Even less information is available to answer the question why certain cancer patients develop these lesions while others do not, and why some of these lesions fungate while others ulcerate. The doctors in this study were asked for their opinions on these issues so that a medical perspective could be obtained. The nurses in the study were not questioned on this matter because the findings from the pilot studies convinced the researcher that any discussions with them, concerning the medical causes of this condition, would yield no useful data.

It was evident from the responses given by the doctors in this study that there is much uncertainty concerning the causes of this condition. There was also a lack of consensus over whether certain types of cancers are more prone to the development of these lesions than others. A third of the doctors believed that the longer a tumour is left undetected, the more chance there is for fungation or ulceration to develop. However, others felt that this may have more to do with the histology of the tumour and its superficiality (its proximity to the skin's surface) (9 doctors), than the length of time it goes undetected. In contrast, other doctors argued that theoretically all cancers have the potential to fungate or ulcerate given the right conditions, often in spite of their specific histologies, rather than because of them.

However, it was not just the disease process which was held responsible for the development of these lesions; human intervention was also cited. The treatment given to arrest the spread of the malignant condition or to control its associated symptoms were frequently held responsible for the development of a fungating or ulcerating lesion. For example, some doctors thought that fungating lesions can result from recurrence following treatment (2 doctors), either from "insufficient surgery" (where not enough of the tumour has been removed) or from the implantation of cancerous cells in the scar. According to one doctor, cancer of the bowel and bladder are well recognised for developing lesions on the surgical site because of the tendency for the track of the needle used to suture the wound to move the tumour cells from inside the body to the skin surface.

One of the reasons for undertaking a study of these lesions was to shed some light on their frequency of occurrence. Are they very rare or fairly common? There are no reliable figures to provide answers to this question. Some people think they are less common than they used to be; others think they may be on the increase. In order to get some indirect evidence about their incidence the respondents were asked for their opinions on this issue in general and specifically, the numbers of patients they had cared for.

Many of the respondents found it difficult to recall exactly or even to estimate how many such patients they had cared for. There was considerable variation in the figures given by the nurses, ranging from those who reported having cared for between 1 and 3 patients a month (10 nurses) to 10-12 a month (2 nurses) and 16 per month (1 nurse). Some nurses, although finding it difficult to be specific, wished to convey that their experience of caring for patients with fungating lesions was extensive, through using terms such as "a lot" (3 nurses), "loads" (1 nurse) and "many" (1 nurse). This was in contrast to the doctors, for whom patients with malignant lesions appear to constitute a less frequent feature of their practice.

There was little consensus amongst the doctors as to whether the incidence of malignant lesions has increased or decreased over the years, although the collective evidence from the doctors' and nurses' comments suggests that fungating lesions occur more regularly in normal practice than may be supposed and certainly more frequently than ulcerating lesions.

It would, of course, be entirely inappropriate to rely on such self-reported estimates as evidence of the incidence of these lesions and whether it is increasing or decreasing. The most that they can do is provide an overview of these clinicians' highly subjective perceptions and experiences of caring for patients of this kind. The generalisability of these findings is limited for a number of reasons. Firstly, such self-reported estimates may be subject to under-reporting or over-reporting. Some respondents may have answered these questions in terms of their own selected criteria, for example, counting perhaps only

the "very bad ones", "fatal ones" or specific types which they remember for whatever reason. Secondly, there are problems of reliability with the figures given because of the uncertain and often speculative nature of some of the responses and problems of recall. Finally, there are problems with the definitions of fungating and ulcerating lesions which the respondents used and the distinctions they made between them.

2.3 THE CHARACTERISTICS OF FUNGATING AND ULCERATING MALIGNANT LESIONS

The aim of this section of the study is to describe the characteristics of these lesions. It thus represents a move from a general discussion of the incidence of this condition and its causes, to a more detailed examination of its symptomology. Questions were asked about the visual appearance of the lesions and other noticeable features, such as odour, which appears to be a major problem for some patients and their carers. Analysis of the responses shows how variable the characteristics of these lesions and the nurses' and doctors' knowledge and experience of them can be.

2.3.1 An Irregular Shaped Protruberance or an Infiltrative Concavity?

It appears from the comments made by the nurses and doctors interviewed that fungating malignant lesions are not easy things to describe or categorise. However, the extensive and often contradictory range of terms used by the respondents may be more of a reflection of the clinicians' different perceptions and experiences of these lesions than evidence of their highly variable form of presentation. There appears to be no commonly shared understanding of the term 'fungating'. Indeed the actual meanings given to this term seem to differ from person to person. For example, just under half of the nurses and a third of the doctors believed that fungating malignant lesions were best described in terms of an "overgrowth" or "mass" growing in excess of the skin. Just over one third of the nurses described the characteristics in terms of the "nodular", "bubbly" effect they have on the skin.

Sixteen nurses and eight doctors used metaphors either to illustrate their comments or as the main descriptive tool. Five respondents thought

these lesions resembled "fungus", with one doctor and one nurse more precisely likening it to "fungus on a tree", which, according to this nurse, is probably how these lesions get their name. However, of all the different types of metaphors that were used, the food metaphor was by far the most popular, particularly amongst the nurses. Over one third of the nurses likened fungating malignant lesions to a "cauliflower", while only two doctors used this term. Other nurses thought they resembled a "mushroom" (as did one doctor), "lump of bad liver" and a "bunch of grapes".

However, just under a half of the nurses and a third of the doctors defined a fungating lesion not in terms of a mass growing out from the skin but one where the tumour infiltrates through the skin "breaching", it and "eating" the flesh, creating a "crater" or "volcano" type wound. A third of the nurses and almost a third of the doctors said that fungating malignant lesions can have areas which are both masses and cavities, at one and the same time. What is clear from all these examples is that there is a problem of definition, more evident amongst the nurses than the doctors, as more doctors than nurses differentiated between the two types of lesion. A quote from one nurse in Unit S illustrates the institutional influences on the use of terminology. She suggests that the way these lesions are described may depend on the convention which exists in a particular Unit:

"I wouldn't know what the difference was between them, to be honest. I mean they just call them fungating lesions here, whereas where I trained.....they called them ulcerating....you get hard, dry and crusty ones....here they call them fungating, (where I trained)....they called them ulcerating."

There was an implicit recognition in some responses, made more explicit in others, that the existence of such contrasting characteristics implied that there are two different types of fungating malignant lesions. However, rather than presenting fungating malignant lesions simply as polymorphic entities, one could argue that what is actually being demonstrated is the existence of two different types of malignant lesions - one which fungates and one which ulcerates. It must be said that some respondents clearly recognised this distinction, and in other sections of the study certainly made it explicit. Nevertheless, there

were many who did not and for whom such a distinction represented neither a theoretical nor a practical reality and thus they tended to use the two terms synonymously and interchangeably.

2.3.2 Symptoms Associated With This Condition and Their Causes

It seems that not only do these lesions vary in their appearance, there are also physiological differences between them, or is this perhaps once again a reflection of the differences between fungating and ulcerating malignant lesions? For example, three quarters of the nurses and two thirds of the doctors believed that fungating malignant lesions have a tendency to bleed, although there were doctors and nurses who said that it was not common for them to bleed or that this varied, in that "some do" (5 nurses) and "sometimes"(6 nurses) or "occasionally"(1 doctor, 2 nurses) they do. There were similar disagreements over the extent to which these lesions discharge. A third of the nurses and a half of the doctors said that they did discharge. The remainder indicated that this was not common to all lesions nor persistent in all cases or indeed, according to one doctor, the major feature of this condition.

The disagreements encountered over the tendency and extent to which malignant lesions bleed or discharge were not evident when discussing the malodour of these lesions, for no respondent denied that these lesions were malodourous, although their comments did suggest its variability. The malodour was regarded by most of the respondents as one of the most distressing characteristics of these lesions for both the patient to live with and their families and carers to deal with.

When asked whether or not these lesions are painful to the patients and by what criteria clinicians judge them to be so, the respondents gave a number of varied and conflicting answers. The majority of respondents felt that it is not usual for these lesions to be painful but recognised that there are occasions when some of them are. Some of the respondents also thought that the lesions often look more painful than they actually are (6 nurses, 1 doctor).

The characteristics of these lesions discussed above can be detected using three of our senses, those of sight, touch and smell, whereas the detection of pain relies as much on the development of communication skills as it does on observation. Observing whether a patient is or is not in pain requires the carer to interpret the body language used by the patient. A third of the nurses cited observing patients' reactions and body language as important indicators of whether they are in pain, although no doctor did. A high proportion of both doctors and nurses relied on patients "complaining" if they are in pain or on how much medication they are receiving. It was evident from the comments made by some of the respondents that the medication given is not necessarily governed by the patient's expression of pain but by the nurses' or medical staff's judgement of the amount of pain they think the patient is experiencing.

Pain is, of course, a highly problematic issue. Carers need to be aware that patients with such conditions may be too ill or distressed to explain that they are in pain. Moreover, there are certain social and cultural factors which influence whether and how individuals publicly express pain, which may have little to do with the biologically implied 'pain threshold' (Zborowski, 1952). Furthermore, judgement of the level of pain that another person is experiencing may have more to do with a carer's sensitivity and awareness of the psycho-social and cultural factors influencing patients' experiences and less to do with a biological measure of the degree of pain a patient is suffering. Thus, relying on the level of medication a patient is receiving or on the perceptions of others as determinants of the extent of pain a patient is experiencing, is not only inappropriate, as it serves to alienate the patient from the effects of the disease process affecting him/her; it also subordinates his/her subjective experiences of it to the perceptions of others of their own bodily state. Employing such indicators may also produce incorrect diagnoses, particularly if the carer is ignorant of or insensitive to the patient's non-verbal patterns of communication.

Caring for patients with such a condition has become predominantly a nursing matter, yet many of the nurses interviewed had little idea about

the causes of the various symptoms associated with it. This is despite the fact that such knowledge has important nursing management implications. Their comments suggest that some of them have never actually thought about the causes and have been reluctant to inquire about them from medical or nursing colleagues. Many of the comments made by the respondents appear to have arisen from observations in clinical practice and informed guesswork rather than from any theoretically grounded knowledge base. A range of highly variable and at times contradictory opinions were given, which can be taken to indicate either the multi-causal nature of these symptoms or the lack of consensus that exists both between and within the medical and nursing professions concerning this matter.

By far the most common reason given to account for the bleeding of these lesions was the erosion of blood vessels, either by the tumour (7 doctors, 9 nurses) or the lesion (2 doctors). The extreme vascularity of certain areas of the body (5 nurses) or the malignant area (2 nurses) and tumour (2 doctors) more specifically, and traumatisation of the lesion (5 doctors, 16 nurses) were also blamed.

The majority of doctors and a quarter of the nurses believed that one of the main causes of the malodour associated with these lesions was infection, although there was little agreement, even amongst the doctors, as to the strain of bacteria thought particularly responsible. The importance of isolating the offending micro-organism is important when we go on to consider the various management regimes employed to deal with the smell, as some of the topical or systemic antibiotics commonly used may be inadvisable or ineffective. Some of the nurses held nursing management techniques partially responsible for the malodour, in that dressings (soaked with exudate) are not changed as regularly as they ought to be.

Nearly half of the nurses and a couple of doctors attributed the pain of these lesions to the involvement of nerve endings, either because they are exposed (6 nurses, 1 doctor), as with superficial wounds, or due to the tumour pressing on them (2 nurses). In contrast, a number of respondents thought that these lesions were not painful because the

nerve endings have been destroyed by the tumour (6 doctors). Pain was also thought likely to arise if the tumour spreads into "confined" areas causing pressure (3 nurses) or involving other structures (3 nurses). Some of the nurses blamed nurses' lack of care in dressing these lesions and their choice of agents for the pain experienced by patients with malignant lesions.

2.4 TYPES OF FUNGATING AND ULCERATING MALIGNANT LESIONS CARED FOR AND THE CHARACTERISTICS OF THE PATIENTS AFFECTED

This section moves us on from the general characteristics associated with these lesions to a more specific investigation of their reported sites of presentation and the types of patients typically affected. The aim of this part of the study is to ascertain whether certain types of cancer are more frequently associated with the development of these lesions than others, whether there are certain areas of the body, certain sexes and particular age groups which appear more likely to be affected by this condition than others.

Most of the doctors and nurses regarded fungating breast lesions as the major and most common kind of lesion, and for some, the classic type of fungating lesion in terms of the characteristics it presents. The face (24 nurses,8 doctors), genitalia (25 nurses,8 doctors), anal region (6 nurses,7 doctors) and rectum (5 nurses) were other major areas where fungating and ulcerating lesions develop, although they have also been known to develop on, for example, the finger-tips, perineum and legs.

Nurses from Units T and S appear to have cared for a larger number and greater variety of fungating and ulcerating malignant lesions than nurses from Unit C. This is not particularly surprising given the varying types of patients that they have to care for and the specialist nature of both units S and T. The extent of the respondents' experiences with different types of lesions invariably influenced their perceptions of the general incidence of these lesions.

2.4.1 Sex of the Patients with Fungating and Ulcerating Malignant Lesions

The responses indicate that both sexes are likely to develop these lesions. However, the sex-specific nature of certain cancers means that fungating or ulcerating lesions in the genitalia will develop in the vagina and vulva in women and the penis and scrotum in men, although overall, men appear to develop malignant lesions in the genitalia less frequently than women. Women are also more likely to develop fungating breast lesions than men, although men are on occasion affected, albeit less extensively and severely. However, based on respondents' observations men appear more likely to develop malignant lesions of the face and the anal/rectal region than women, at a ratio of 2:1 in the latter case.

The reasons given for the prevalence of such lesions in men and women were varied and at times ambiguous and confusing. A number of respondents admitted to not knowing why women seem to be more prone to develop breast lesions. Many nurses and a number of doctors in fact addressed the question of why women, as opposed to men, are more prone to develop breast cancer, as opposed to tackling the specific issue of why they then go on to develop fungating breast lesions.

The comments made by the respondents to explain the predominance of breast lesions in women can be located on a biologically-deterministic and a socio-psychological level. Amongst the various anatomical and physiological features specific to the female, which were blamed for the development of these lesions, were the ubiquitous female hormones. The oestrogen in women's bodies was held responsible by some respondents for the development of breast cancer, and by implication breast lesions, because of the tendency of this hormone to stimulate the growth of the hormone-dependent breast tumour. Thus the very nature of women's bodies seems to make them more prone to the development of this condition. In contrast, when men become affected the cause is located at some hormonal dysfunction, as the following quote from a nurse illustrates:

"...male hormones usually are not in the category that would cause a breast tumour. It's usually when there's something wrong with the.... male hormones.... that the male would get a breast lesion. That's as much as I understand."

The above example is illustrative of the general tendency in the medical world (adopted by other health care professionals and indeed the lay public) to blame women's hormones or their reproductive organs or menstrual cycle for many physical ailments (Ehrenreich and English, 1973; 1979), in other words anything which is intrinsic to the female sex. This is notwithstanding the tendency in the medical profession to label what are essentially physical problems as psychological disturbances when they affect women (Barrett and Roberts, 1979). The researcher does not wish to dismiss the important role which the female reproductive function plays in the health and ill health of women, but what she does condemn is the misplaced preoccupation of the medical profession with it.

The tendency by many in the medical profession to frequently look to, for example, women's hormones as the cause of women's ill health belies the ignorance which exists about what are euphemistically called, 'women's problems'. The reason for this ignorance, one could argue, is due to the little interest which is shown by the male-dominated scientific and medical community in issues concerning many aspects of women's health. The lack of research conducted into the nature and management of malignant lesions, in other words, the very topic of this research project, is a clear example of the ignorance which exists in the medical world about a condition which predominantly affects women, and older women in particular, whose complaints appear to attract even less research interest than other women's health problems.

But is the scientific and medical world per se to blame for this state of affairs or is the reason more socially derived? If more financial resources were given to researching the causes of many of the problems pertaining to women's ill health it may well be found that the causes are more social than purely biological (Barrett and Roberts, 1979).

However, by medicalising what are ostensibly social problems the medical profession are not only providing medical solutions in the short term, they are preserving the status-quo in the long term (Kennedy, 1983;

Zola, 1972). To recognise women's 'physical' complaints as manifestations of their dissatisfaction with their status and position would thus call for major social changes.

Concealing the existence of a cancer, and thus delaying its treatment, was also given as a reason for women being more affected by malignant lesions of the breast, although concealment did not appear to be something peculiar to women, as some doctors also cited this as a possible reason for the development of malignant lesions of the penis. There was little criticism of factors such as the lack of primary health care and screening facilities to explain delays in women seeking medical help for suspected breast lumps. Instead, we can observe more of a tendency to apportion blame, albeit indirectly, to the individuals affected by these lesions and in particular to their psycho-social state which leads them to delay seeking medical help.

Several respondents speculated as to the reasons for the disproportionately high incidence of malignant facial lesions amongst men. Three nurses believed that men are more prone to develop such lesions because of the higher incidence of head, mouth and neck cancers in men than in women. What these respondents did not explain, but which others did, was that men are more likely to develop cancers of the face and oral cavity because they are smoking- and drinking-related and men have, on the whole, tended to smoke and drink more than women (General Household Survey, 1988). However, two doctors from Unit S intimated that this trend may be changing as an increasing number of women are now adopting these habits. What these kinds of arguments do is to shift the emphasis from essentially biologically-deterministic arguments of sex-specific cancers to the social habits of individuals.

2.4.2 Ages of the Patients with Fungating and Ulcerating Malignant Lesions

It appears that people from all adult age groups can develop fungating and ulcerating malignant lesions on any site of their bodies, although those between the ages of 50 and 70, particularly those in their 60's, appear especially prone. It could of course be argued that such findings

are not particularly remarkable as increasing age is associated with increasing cancer rates of all kinds (Frank-Stromberg, 1986). However, such an argument supposes a direct link between the development of cancer and the development of these lesions, whereas in fact, such a relationship has yet to be clearly established. Indeed, the question of whether the development of such lesions is linked to certain types of people (genetically) or certain types of cancers (histologically) or certain types of life-styles (socially) or results from a complex interaction of all three, awaits the work of future researchers to answer.

2.5 THE TREATMENT OF FUNGATING AND ULCERATING MALIGNANT LESIONS

It is hoped that the preceding sections have enabled the reader to gain an understanding of this condition and its typical sites of presentation. The sections that follow will hopefully further increase this understanding by examining the various treatments used on these lesions and the reasons for their use. This particular section deals both with the general and the palliative treatments frequently employed on them. Palliative treatments are those used to control local symptoms when the other more general treatments have failed or are inappropriate. This section also examines the types of agents and dressings used by the nurses in the sample and the rationales underlying their usage, and demonstrates the conflicting opinions which exist concerning the appropriateness and effectiveness of some of them.

2.5.1 General and Systemic Treatments

By far the most popular form of treatment reported by the doctors for fungating and ulcerating malignant lesions is radiotherapy (14 doctors), often in conjunction with chemotherapy (9 doctors). Hormonal drugs are also used (6 doctors) to reduce the speed of growth of hormone-dependent tumours, and surgery (4 doctors) is employed to remove the malignant tumour.

The choice of treatments depend on a number of things, such as the primary site of the tumour (2 doctors), its pathology (2 doctors), the

extent of the disease (2 doctors) and the condition of the patient (2 doctors), in terms of their age and general health (1 doctor). However, when the disease fails to respond to such treatments, and fungation or ulceration develops or recurs, then palliative treatment is needed to control such local symptoms as odour, discharge and pain.

2.5.2 Palliative Treatments

A whole gamut of agents were used to clean malignant lesions, but by far the most frequently used were normal saline (34 nurses), eusol and paraffin (20 nurses) and hydrogen peroxide (28 nurses). Despite the fact that hydrogen peroxide and eusol and paraffin were popular forms of treatment, their usage received much criticism, not only in terms of their frequent ineffectiveness, but also because of their unpleasant and often harmful side effects, such as destroying healthy skin (7 nurses) and causing pain to the patient (7 nurses). Literature on wound healing suggests (see section 2.1) that these agents not only hinder healing, but that they also cause systemic damage to the patient. It is therefore necessary to ask if their use as cleansers is sufficiently effective to outweigh their damage to healthy tissue.

Charcoal pads (31 nurses) and live yoghurt (23 nurses) were the treatments most frequently used to deal with the malodour of fungating and ulcerating malignant lesions, both separately and at times together. Metronidazole (or Flagyl, as some nurses referred to it) was also a popular form of treatment for the malodour of these lesions, used both orally (6 nurses) and/or in the form of a gel or solution applied topically (8 nurses). Fourteen nurses reported using artificial deodorisers, such as air fresheners, deoderising machines and perfumes in order to mask the smell.

An extensive range of dressings were used by the nurses on these lesions and, as with the various agents discussed above, some were more popular in certain units than others. Various non-adherent dressings such as Jelonet (20 nurses) and Melolin (11 nurses) were used, as were dressings impregnated with various medicaments, such as Sofratulle (8 nurses), and Bactigras (4 nurses). More 'modern' style dressings were also cited

by nurses from Unit S, such as Lyofoam (2 nurses), Scherisorb (2 nurses) and Seaweed dressings (1 nurse). By far the most favoured type of dressing was gauze. Twenty nine nurses spoke of using it - either in a dry state or soaked in certain solutions such as eusol and Paraffin (15 nurses), Metronidazole/Flagyl (3 nurses), hydrogen peroxide (1 nurse) and saline (1 nurse).

There were many differences of opinion regarding the effectiveness of the various agents and dressings used on these lesions, and a general vagueness and lack of consensus regarding their mode of action and rationales for their use. It could, of course, be that little is actually known about the mode of action of certain agents, yoghurt being a particular case in point. Hence, the uncertainty, discordant and at times confused nature of many of the comments, as respondents attempted to formulate their own theories based on their personal observations and experiences in clinical practice.

2.6 THE RATIONALES UNDERLYING THE MANAGEMENT OF FUNGATING AND ULCERATING MALIGNANT LESIONS

Having looked at the various therapies used to treat malignant lesions, this section will investigate the factors which influence the way they are treated. It will also discuss whether and to what extent nurses involved in the care of such patients understand the reasons for their actions.

The findings indicate that the nursing management of fungating and ulcerating malignant lesions is not based on a sound understanding of the physiological processes of wound healing. Indeed, when the nurses were asked what informs a nurse's decision to deal with a fungating or ulcerating lesion in a particular way, a whole range of factors were cited (see Table 1), but no mention was made of the relationship between the treatments used and the healing process. This is despite the fact that the majority of the nurses interviewed thought it important that nurses caring for such patients should have an understanding of the general principles of wound healing and a third of them thought they ought to know everything about the healing process. (A fuller discussion

of their understanding of the wound healing process and related issues will be presented in 3.2, 3.3 and 3.4).

FACTORS DETERMINING THE NURSING MANAGEMENT OF MALIGNANT LESIONS

TABLE 1

Factors described by respondents	Number of nurses mentioning each factor (N=36)
Characteristics of the patient (age, lifestyle, comfort)	11
Previous treatment	11
State of the wound (size, odour, extent of discharge and bleeding)	10
Experience	5
Trial and error	4
Advice from other nurses	3
Effectiveness	3
Favourite and personal preferences	2
Availability (e.g. from pharmacists)	2
Consultants' preferences	1
Cost	1
Information from literature	1
Ease or difficulty of application	1
Don't know	1
No response	6

The responses given by the nurses indicate that the choice of treatment is influenced by a complex interaction of various factors, many deriving from psycho-social, institutional and economic considerations as opposed to purely scientific and clinical ones. For example, the issue of availability (on wards and in the community) and low cost (as certain expensive forms of treatment may not be available in all settings), may be extremely important factors in helping us understand why certain agents and dressings are used more than others.

Yoghurt was more frequently used by nurses from Unit T than nurses from the other two units. This may be because it is relatively cheap and has no known deleterious side effects to add to a terminal patient's already distressed condition. On the other hand, its somewhat 'folk-medicine' image and non-scientific nature may be a reason why it is not very popular in the technologically-orientated Unit S. Thus the ethos and

philosophy of a given unit can significantly influence clinicians' perceptions of certain treatments and, in turn, their usage of them, which may have very little to do with the actual agents' properties or effectiveness.

Nurses from Unit C tended to use artificial deodorisers such as perfumes and deodorants more frequently than nurses from the other units to mask the malodour. This may be significant in that the patients cared for by these nurses live in their own homes and so in order to mitigate the distress the malodour may cause to immediate family members sharing the house with the patient, or visiting friends, its elimination becomes more pressing.

Personal experience and the opinions of experienced others appear as important determinants of the treatments used on these lesions. However, experience can mean different things to different people. According to one nurse from Unit C, it is not the number of years that a nurse has been qualified which constitutes experience but in which setting she has actually worked. To quote:

".... nurses at specialist institutionsare far more experienced than I am, in as much as somebody perhaps who's only been qualified for a year, I would consider to be more experienced, although I've been qualified for a lot longer than that."

Personal preferences and favourites also seem to play a part in influencing the treatments to be employed on these lesions. For example, hydrogen peroxide and eusol and paraffin appear to be used because they are "old favourites", treatments which have been "tried and trusted".

However, when the nurses were asked to describe the various stages of wound management and asked which factors specifically influenced their choice of treatment, factors previously not mentioned were cited. Four nurses spoke of the patient influencing what is used, in the sense that nurses decide to use agents and dressings which ensure patient comfort, are "pleasing as well as effective" and do not alter the patient's physical appearance and thus possibly their psychological self-image.

Following the dictate of others did not feature in the responses given to the general question about why certain management regimes are employed on these lesions, although this factor featured quite highly in this section of the interviews which focused the respondents' attention on specific instances when they had dealt with such wounds. Issues regarding the alienation that many nurses feel to their job were also raised. Some of the responses provided valuable insights into the freedom individual nurses felt they possessed in terms of choosing how to manage these lesions. Over half of the nurses said that the choice of treatment was determined by senior medical and/or nursing staff members based on varying levels of liaison and consultation with the nurses directly involved in the care of these patients. Some nurses accepted that they had little if any input into such decisions and simply followed orders, doing "what others tell you ". The above discussion illustrates the general lack of communication between nurses and their medical and nursing colleagues regarding fundamental management concerns and is an indictment of the present state of affairs.

However, some nurses seem to exert significant influence over the management of these patients, even with respect to the traditional prescribing role of the doctor, as the following quote from one doctor illustrates:

"... if it starts smelling then I am the one that prescribes the antibiotics and the nurses will know which antibiotic they'll want me to prescribe."

This view was supported by comments made by another doctor, suggesting that the prescribing role of doctors is at times little more than a 'rubber stamping' exercise, as opposed to one in which medical judgement and expertise is employed in assessing the appropriateness of certain therapies.

However, the nurses' influential role in determining the management of these lesions, suggested by the comments made by some of the doctors and nurses, is often mediated in the practical situation by adherence to the 'hidden' rules of the doctor-nurse game. The comments made by a number

of nurses illustrated the implicit rules by which doctor-nurse encounters are governed. These are that nurses can make suggestions regarding, for example, the types of cleansers they may think appropriate to use, but they do not undermine the doctor's authority by taking charge of the situation and asserting what they want.

" We don't decide anything. What we use as far as cleaning wounds, in....a bad case like that, we....talk with our GPs....and discuss that patient's care....and he might sort of say, 'well, what would you suggest'....but you don't say, 'well, I want this' or 'I want that,' it's not the done thing, you know."

Thus despite the doctors' limited role in the management of these wounds, the authority invested in their medical status at times means that nurses directly involved in the care of these patients have to follow their orders without always fully understanding the reasons for their decisions.

The descriptions given of the various stages of the nursing management of malignant lesions revealed much more clearly the often conflicting institutional influences on the choice of treatment. According to several nurses and doctors, the decision to use certain agents and dressings is influenced by routine and custom and practice, namely, what individuals and institutions have been used to using, and what has been used in the past on similar lesions or what has worked in the past. It was evident from some of the responses given that ward policy and the authority of certain doctors and senior nurses can at times be used to dissipate any challenge to traditional practices and thus prevent disruption of the status-quo and any possible change. One nurse from Unit S, critical of the way tradition binds current nursing practices, when challenging the use of eusol and paraffin, was told:

"We've done it this way for a long time so we'll carry on doing it this way."

An institutional ethos which encourages innovative practices can significantly affect what is used on these lesions. A number of nurses from Unit S said that choice of treatment may depend on what is the "in thing" at any particular time. This was one of the few occasions when mention was made of the willingness of nurses to move away from

tradition and try new products. The tendency for nurses to always use "the same old stuff", as one nurse put it, is not due to their innately conservative nature or simply lack of knowledge about what is currently available on the market. The data suggest that many nurses would like to use new products, if only because this would increase their choice of treatments, but are precluded from doing so because of financial constraints and the reluctance of those controlling supplies, such as pharmacists, to buy them.

What the preceding discussion has revealed is that the nursing management of these lesions is influenced by a number of factors. However, employing a particular agent because of its known bio-chemical composition and thus anticipated reaction was not one of them. Nurses do not appear interested in the way agents achieve particular effects but only in the outcome. On a general level the nurses interviewed had a low understanding of the composition of many of the products they use and their mode of action. They were even less knowledgeable about what properties these products should contain in order to be effective. This is perhaps because they are not trained to think in such conceptual frameworks or to be concerned about such issues. Most of the nurses tended to speak in terms of brand names and what specific tasks particular agents were used for, rather than the properties they contained. Even when nurses said that they would choose cleansers which would, for example, get rid of slough (3 nurses) and odour (1 nurse) and cause minimum trauma to the wound (1 nurse), they were not implying that they would choose a particular agent because they knew it contained the necessary properties to produce these desired effects. On the contrary, they chose them because experience had shown that certain brand-named agents produce certain effects.

It appears that a nurse's expectation as to whether and what type of improvement, if any, she may expect in a malignant lesion can influence her attitude and ultimate management of a patient with such a condition. In fact it could be argued that if a nurse does not expect a malignant lesion to heal, then the very management technique adopted may in itself hinder its chance of healing, and thus result in the development of a self-fulfilling prophesy. The management of malignant lesions was

alternatively thought to depend on whether they (the nurses) considered it "worthwhile" (1 nurse) or expected it to heal (3 nurses), although it was clear that nurses employed very different definitions of healing. If nurses judged it to be "worthwhile", in terms of there being some improvement in the wound, then it is treated aseptically (1 nurse), so as not to introduce infection (1 nurse), and more radically (2 nurses).

The notion that the nursing care of a malignant lesion may at times be dependent on a particular nurse's subjective judgement as to whether it is likely to improve and thus whether it is "worthwhile" employing more radical management therapies, is not one perhaps readily acknowledged by many professionals involved in the care of these patients. Indeed, some of the nurses clearly felt that to admit that their management is affected by their judgement of the situation (using non-clinical and subjective criteria), is to be regarded as unprofessional and somewhat unethical. One of the reasons for this uneasiness is because the prevailing view of medical and nursing practice is that it is, and indeed ought to be, based on objective clinical criteria and that if subjective non-clinical criteria are allowed to influence treatment then it will be to the detriment of the patient concerned, although the precise nature of this relationship is not always clearly articulated. One could argue that unless the care of these patients is highly atypical, the care of patients with other conditions will likewise be determined by clinical as well as non-clinical factors.

However, there is much in this study to indicate that the care of patients with malignant lesions is determined by both objective and subjective criteria, whether recognised or not, and that in practice carers make judgements and assumptions all the time about the care of such patients, as this quote from a nurse clearly demonstrates:

"....if you've got an abdominal wound which after 10 days hasn't healed you want to get someone to look at that - you've probably got a secondary infection. If you've got a breast lesion which isn't healed after 10 days, then that isn't something which is going to worry you, or amaze you - or send for help."

2.6.1 Nurses' Understanding of the Treatments Used on Malignant Lesions

Fourteen of the 36 nurses believed that nurses caring for cancer patients with fungating and ulcerating malignant lesions have neither sufficient knowledge nor understanding of why certain treatments are used. Many others were uncertain. Nurses attributed their lack of understanding over such matters to a number of causes, ranging from general criticisms of the lack of literature and information about this condition and its management, to more damning self-criticism. They held themselves and their profession at least partly responsible for this state of affairs. This criticism was directed at individual nurses with regard not only to their problems of attitude, motivation and lack of commitment to their work, but also to their reluctance to question their practice or the orders given to them by their superiors.

Some nurses rationalised this tendency within their occupation towards a lack of questioning of their practice to their busy work schedules (3 nurses) and the perhaps mistaken belief that they do know and fully understand what they are doing. However, rather than locating the failure of nurses to question their practice in these terms, one could hold their socialization into the nursing profession partly responsible. Together with receiving training in matters clinical, nurses are also implicitly taught by example deference and obedience to authority, in terms of obedience to rules and the following of orders given by their medical and nursing superiors (Davies, 1980; Savage, 1987; Stein, 1978). Thus to question these orders is not only to question the authority vested in them, but also to question the very basis of modern medicine from which their practice is derived (Cox, 1982; Smith, 1976).

Some respondents also extended their criticism to the nursing profession collectively in terms similar to those discussed above. Firstly, they levelled criticism at the manner in which nurses are socialised into deference and the task-orientated nature of nursing, which emphasises the what and the how in the dutiful carrying out of orders, but rarely addresses the why. Secondly, the tradition-bound nature of nursing, which justifies doing something by virtue of it always having been done that way, came under attack, as did the experiential nature of

present-day nursing. All of these orientations, one could argue, promote a distrust of theory and militate against the rational introduction of new ideas. Along with this criticism of the current situation was an openness and willingness to learn and try new things, demonstrating both a willingness to change and an acknowledgement of the need for change, for nurses' personal and professional benefit and that of the patients in their care.

The doctors showed a marked ignorance of nurses' knowledge and understanding of the management of malignant lesions. Many of the doctors "hoped" that the nurses understood such things, although the majority of them did not think that they did. This surely calls into question doctors' reliance on nurses' knowledge and expertise with respect to malignant lesions specifically and wound management matters more generally. As will be demonstrated in the chapter which follows, doctors are equally ignorant of what nurses know about the general principles of wound healing and wound care, and the extent to which nurses, and even their medical colleagues, are up-to-date on innovations in the wound care field and the sources of their knowledge.

Several doctors (from all three units) attempted to explain the nurses' apparent lack of knowledge not in terms of any shortcomings on the nurses' part, or their own, but in terms of the lack of knowledge and understanding which prevails in the medical world in general about this condition and its management.

2.7 CLINICIANS' SOURCES OF KNOWLEDGE ABOUT THE MANAGEMENT OF MALIGNANT LESIONS

One of the main themes of this study is knowledge: the type and level of knowledge which informs clinicians' practice and the sources from which it emanates. The preceding sections have looked at the various treatments used on malignant lesions, the rationales underlying their usage and whether clinicians understand the reasons for their actions. Thus having addressed the question why clinicians treat malignant lesions in the way that they do, what remains to be asked is how they

acquire such knowledge and expertise? It is precisely this question which this section hopes to address.

The nurses' and doctors' early training or previous experience appear to have contributed little to their ability to manage fungating and ulcerating malignant lesions. Their exposure to this condition during their training varied extensively. Over three quarters of the nurses said that they had received no instruction about it in their basic training. Most of the doctors repeated a similar story. It was evident from the comments made by a third of the doctors that they, like the majority of the nurses, knew "nothing" about this condition before they had to care for a patient with such a condition for the first time. "Damn all" was how one doctor put it. Many respondents voiced dissatisfaction with this state of affairs.

Given that the majority of nurses and many doctors seemed inadequately prepared, both theoretically and clinically, to deal with such lesions how then did they acquire the necessary expertise? Their responses indicate that there are two ways through which this is done, the formal and the informal modes of knowledge diffusion. The most significant way that the respondents learnt how to manage patients with these lesions was informally, from their own experience (30 nurses, 9 doctors) and from experienced others (17 nurses, 9 doctors), trial and error (2 doctors) or 'on the job', as one nurse put it, through word of mouth and observing nursing colleagues in different settings. It was clear from the comments made by some of the nurses and the doctors that nurses did not learn a great deal from the medical staff regarding the management of this condition. One nurse vividly described the first time she had to deal with a patient with a malignant lesion:

"So I had to say to somebody "how do I do this?"...."can you come and show me?"...they (senior nurses) just say "Oh, you put such and such and such on - go and do it". That's what happens. That's how you learn!"

It is clear that through extensive experience, many nurses develop their own criteria for choosing how to clean and dress a malignant lesion. They say they can tell what to do " just from the look of it". But do all nurses see the same things and is there a consensus of shared

meanings which they attach to their observations? The evidence from this study indicates that there is not in all cases.

The above discussion indicates that knowledge about this condition is mainly informally and experientially gained, yet the majority of suggestions made by the nurses, when asked what improvements should be made to the way nurses learn about this condition, referred to a desire for more formal and structured learning experiences.

The formal and structured ways of learning which were mentioned included reading (7 nurses, 1 doctor), lectures (4 nurses, 2 doctors), study/orientation days (2 nurses), in-service training, oncology courses and seminars (1 nurse each). Several doctors, however, were rather disparaging about knowledge acquired formally through lectures and reading and thought experience to be the better teacher. To quote one of these doctors on this issue:

"The gut sense of what's appropriate in what situation I think you can only gain in hands-on experience really."

However, through employing the technique of indirect questioning, the researcher discovered somewhat different responses to those cited above. When the nurses were asked how 'other' nurses acquire such knowledge only 16 of them thought that 'other' nurses learn about the management of malignant lesions through personal experience, as opposed to the 30 who spoke of themselves having learned in this way. Moreover, twice the number of nurses thought that 'other' nurses learned about the care of these lesions through reading than had been reported when speaking of their own experience.

The doctors were asked how they think nurses acquire knowledge about this condition and its management, so as to ascertain whether doctors are familiar with or possess an understanding of how nurses learn and what constitutes nursing knowledge. As far as the doctors were concerned, after experience, the second most significant way that post-registration nurses acquire knowledge about this condition and its management is through their professional training (6 doctors), although they seemed to know little about what nurse training comprises and

particularly what, if anything, is taught to nurses about this condition and its management.

When the nurses in the sample were asked what improvements should be made to nurses' present state of knowledge about this condition and its management, they expressed a desire to learn about the theoretical and pharmacological aspects of this condition and not just about the practical management of fungating lesions. They spoke of wanting to learn about, for example, the causes and histology of the condition, the complications which may develop and their prevention. Some doctors, however, did not consider it important or relevant for nurses to be concerned with such theoretical matters, because, in the words of one doctor, " I don't think that any of us are that aware."

The above discussion is illustrative of the way in which nurses' perceptions of and aspirations for themselves conflict fundamentally with those of the medical profession. This finding is also echoed in the chapter which follows. Thus despite the rhetoric that wound care is a nursing province, ostensibly free from too much control by the medical profession, the researcher would argue that this study has provided examples which demonstrate the illusory nature of much of this freedom. She would contend that doctors control, sometimes covertly sometimes overtly, important areas of nurses' wound care practice and influence, to varying degrees, nursing knowledge of this area by defining what is important and what is not important for nurses to know.

2.8 THE PREVENTION OF FUNGATING AND ULCERATING MALIGNANT LESIONS

Having begun this section of the study with a discussion of the causes and incidence of malignant lesions and proceeding, through the sections that followed, to present an overview of the nature and management of this condition and characteristics of the patients typically affected, it seems appropriate, for completeness, to conclude this chapter with a discussion of what, if anything, can be done to prevent these lesions from developing.

Many respondents were clearly uncertain of the possibility of prevention (14 nurses, 4 doctors), although two thirds of the doctors (10 in all) and over half of the nurses believed in the value of early diagnosis and early treatment in preventing the development of these lesions. However, almost a quarter of the nurses and a third of the doctors judged the situation less optimistically and did not think that early diagnosis or treatment can prevent these lesions from developing, either because the lack of symptoms with certain cancers makes early diagnosis impossible or because fungation can develop or recurr or continue spreading despite the fact that some patients have had all the treatments. Indeed, some respondents suggested that in some instances the treatment itself may be the cause of the actual lesion, as in the case of radiotherapy.

Most of the respondents spoke of the prevention of these lesions in general terms, in other words, they did little to direct their answers towards those predominantly affected by this condition, namely women. Thus very few of the respondents spoke of the provision of screening facilities for women (and older women in particular, as they are the ones mainly affected by these lesions) in any preventative capacity. The limited nature of many of the ideas concerning the prevention of these lesions is perhaps indicative of the lack of interest which prevails in the health care community regarding this condition.

2.9 CONCLUSIONS

This section concludes the chapter on the findings from that part of the study concerning the nature and management of fungating and ulcerating malignant lesions. It is hoped that the reader has gained insights into the nature of this condition, its management and the effects it has on the patients and their carers.

This study confirms many of the research findings and observations discussed in the literature on malignant lesions. For example, that the female breast is the most common site for fungating and ulcerating malignant lesions to develop, although they can develop on virtually any body site. Moreover, malignant lesions are more prevalent amongst women, particularly older women, although both sexes can be affected, with the

predominance of certain cancers in one sex rather than the other.

The incidence of fungating and ulcerating lesions amongst the population of cancer sufferers has not been systematically documented and thus remains relatively unknown. This study was not developed with the explicit aim of redressing this imbalance. Nevertheless, there is some evidence that their occurrence is perhaps more frequent than may be supposed, although there was little consensus amongst the doctors and nurses as to whether their incidence has increased or decreased in recent years.

The findings from this study confirm other research, indicating that a person's perceptions and experiences determine what they see and the meanings they attach to their observations. The clinicians' own life experiences - social and cultural - pre-dispose them to pay more attention to certain things in their occupational environment than others. Likewise, their occupational experience, in terms of the setting they work in, can shape in very significant ways how clinicians perceive things, as does the very nature of their actual work and its goals - macro as well as micro level factors. Institutional influences have been seen to influence not only the extent of clinicians' exposure to certain experiences, for example, their frequency of contact with certain types of wounds, but also the terminology they use, as an expression of the different conventions which exist in certain units. Thus the different definitions used by clinicians to describe the characteristics of fungating and ulcerating malignant lesions may be less of a reflection of these wounds' complex clinical presentation and their non-uniformity and more an example of the above proposition. Indeed, the reported variability in the nature and extent of these lesions' associated symptoms and their perceived causes can also be attributed to the clinicians' differential perceptions and experiences in clinical practice, and not merely argued in terms of the wounds' variable clinical presentation or multi-causal nature.

A person's perceptions and experiences also shape, in very significant ways, his/her subjective responses. The extent to which respondents' comments varied regarding the tendency for malignant lesions to have a

malodour or be painful may not be too surprising, given the subjective nature of the sense of smell and the assessment of pain another person is thought to be experiencing. Thus what is revolting to one nurse, for whom her encounter with such lesions is a rare occurrence, is not for another, who deals with them on a regular basis and has become somewhat de-sensitised to them.

The different reactions observed amongst the clinicians, concerning the malodour of these lesions, may also be related to the settings in which they work. Thus, for example, a nurse from Unit C whose work practice takes place in the private sphere of a person's own home with all the variable smells that people's homes contain, may not find the malodour of these lesions distinctive or too distressing, mingling as it probably would with other household smells. In contrast, for a clinician working in a hospital environment the smell of a malignant lesion would be quickly noticed and probably regarded as offensive because of the contrast of its smell with that of the highly sanitised surrounding environment. Indeed, a G.P. at the turn of the century, although speaking on a different issue, made a cryptic observation about the association of environment and the attributes of certain nurses. He thought it impossible to keep up a supply of district nurses "because they would have to be women absolutely without any sense of smell" (Loane, 1910).

The argument that clinicians bring to their occupational environment an accumulation of all kinds of influences, which in turn influence what they see in clinical practice and how they conceptualise their observations, is evident in the way clinicians define and order their observations and experiences using familiar categories, in order to make them meaningful. Such was the case with malignant lesions, where they were frequently described by way of reference to various food metaphors. The repeated use of food metaphors by the nurses, such as those of meat, fruit and vegetables, needs to perhaps be understood in terms of the gender divisions within nursing and the socialisation of women in our society more generally. Firstly, nursing is well recognised as being a predominantly female occupation (DHSS, 1986). The majority of nurses who took part in the study were female (34:2). Secondly, nurses as women are

frequently responsible for the purchase and preparation of food. Thus it is not altogether surprising to find the nurses in this study conceptualising and using language to describe certain realities in their occupational environment by way of reference to the social roles and domestic duties which they, as women, frequently have to perform outside the work setting.

There exists an illusion amongst the lay public, and even within the medical and nursing professions, that nursing (and for that matter medicine), is based on consensus, in that nurses possess 'shared' understandings and meanings with respect to their clinical practice. The findings from this study reveal that this belief is in fact more assumed than actual. The extent to which it is common for a malignant lesion to bleed or to exude discharge could be seen as a matter of clinical judgement on which nurses would agree, if only so as to be able to determine when a wound is deteriorating and when alternative action is called for. The fact that this is not the case does little to engender confidence in nurses' ability to assess the situation and to institute appropriate action. Moreover, if each nurse assesses the situation differently, s/he is likely to employ different treatment regimes, with resultant inconsistent patient care. However, this illusion of consensus is perpetuated through the hierarchical structure of nursing, where disagreement over, for example, choice of treatment, is resolved through senior nursing and medical staff exerting their authority and their definition of the situation. This effectively dissipates any challenge to traditional practices and disruption of the status-quo by "closing" any discordant views of the world.

The general uncertainty, level of clinical ignorance and lack of consensus over the causes of the various symptoms associated with malignant lesions may not appear to be a matter of paramount importance to some clinicians, as long as the particular treatment regime adopted has the desired effect. However, one could argue that without understanding the cause of a particular symptom such as malodour, bleeding or pain, the carers are unable to make an informed decision about which treatments to employ. Furthermore, without having a better understanding of the treatments used, informed by general principles and

theories, they will never understand why certain effects occur. This is particularly the case when harmful effects occur, either locally at the wound site or more systemically.

When discussing what influenced their choice of treatment for malignant lesions the nurses did not mention factors such as understanding the causes of the various symptoms associated with these lesions, or their knowledge of the general principles of wound healing. Nevertheless, taking the first issue first, it could be argued that nurses' beliefs about the cause of certain symptoms determines their choice of treatments in very significant ways. Thus, if bleeding is thought to be caused by the extreme vascularity of the affected area or the very nature of the malignant condition itself, then the treatment or management regime adopted may differ to that employed if incorrect or inappropriate wound management procedures are thought to be to blame. Similarly, if the malodour is thought to be caused by the natural decomposition of body tissue or infection, then this may determine whether antibiotics are used or 'masking' agents such as perfumes and deodorisers. Do nurses need to know about the general principles of wound healing in order to treat a malignant lesion effectively? Malignant lesions are frequently characterised by blood and discharge, so just how effective will the use of systemic or topical antibiotics be, given that some are totally inactivated in the presence of blood and discharge?

Another factor not explicitly mentioned by the respondents when discussing the influences on their management of these lesions was the need to establish goals and objectives before commencing treatment. In other words, what do they want to achieve by the employment of a given treatment? Depending on a nurse's goals the same action may produce contradictory effects. For example, if a nurse's aim is the short term alleviation of discharge then s/he may choose to dry the wound, but if his/her long term goal is healing (whatever definition is employed), then drying will in fact retard healing, according to the prevailing paradigm on wound healing that a moist and warm environment promotes healing better than a dry one does.

However, the researcher is fully aware that although it may seem reasonable to argue that clinicians' choice of treatment ought to be informed by general principles and theories, empiricism is common-place in medicine and is vigorously defended. Indeed, the evidence from this and other chapters of the study demonstrate the primacy of empirical and informal types of knowledge over the theoretical and formal in informing clinicians' understanding of this condition, as well as of wound healing theory and practice more generally. However, these distinctions are not always so clearly discerned. There are instances where the complex inter-linking of both play an important role in informing clinical practice. The causes of malignant lesions and their associated symptoms are a case in point, where what is known theoretically, or at least postulated as generalisable theoretical knowledge, is presented alongside clinical observation and experience. Through their failure to explain adequately the development of malignant lesions in theoretical terms (whether because the clinicians, as individuals, lack such knowledge, or because there is a general lack of information about this condition, or because clinicians find such explanations inadequate), they turn to empiricism to furnish them with the necessary understanding.

Given the predominantly theoretical orientation of medical training it is perhaps not surprising to discover that doctors are more likely than nurses to locate the causes of the various symptoms associated with these lesions, such as bleeding and pain, in a theoretical framework, in terms of the disease process itself. However, their highly variable and often conflicting understanding of this whole area demonstrates the limited value of this type of knowledge. In contrast, nurses are more likely to blame dressing procedures and their own negligence for the existence of certain problems associated with malignant lesions. Their readiness to look to themselves as a contributory cause of certain problems is an example of the low self-image that nurses have. The literature on wound management does, however, indicate that the nurses are correct in their assumptions about the deleterious effects that certain dressing procedures have on wounds.

It is clear from the study that the clinicians hold various theories concerning the causes of malignant lesions and their associated symptoms, derived from scientific and non-scientific sources. However, the variability in the explanations given does not reflect, the researcher would argue, the lack of currently available scientific research on this condition, for even if this condition was an area of scientific inquiry, which it is not, the same argument would still hold true. For the production of scientifically validated theory does not guarantee its wholesale and immediate adoption, not least because the adopters will frequently adapt it to suit their observations and experiences, as will be demonstrated later in the section on the diffusion and adoption of the MWHT and associated dressings. Implicit in the attitudes of many of the practitioners is that scientific theory offers one version of reality, but one that is open to interpretation and is judged alongside other empirical evidence. This is in contrast to the orthodox view of the scientific paradigm, which posits it as the one most able to answer medical questions.

Although when discussing malignant lesions, we are referring to a malignant condition which is normally regarded as a medical matter over which doctors are seen as the experts, the external manifestation of an internal malignancy in the form of lesions seems to render it a nursing matter, over which nurses are regarded as the experts. This perhaps confirms some of the arguments put forward by certain sociologists and social anthropologists, that one of the distinctions between doctoring and nursing is that the former possesses knowledge of the 'invisible' inner world of the body while the latter deals with the 'visible' elements (Foucault, 1973).

A superficial reading of some of the data in this chapter would confirm the view that wound care is a nursing province free from too much control by the medical profession. In fact, there is evidence to suggest that doctors frequently rely on nurses for advice on wound care issues. Yet, a more careful reading of the data indicates that doctors still control, to a lesser or greater extent, nurses' actions and attitudes - sometimes covertly and informally and sometimes overtly. For example, a nurse from Unit C can only visit a patient if referred to by a doctor

and needs a doctor to prescribe many of the treatments required, even though there is some evidence in this chapter to suggest that the prescribing role of some doctors is merely a 'rubber-stamping' exercise.

Moreover, doctors appear to have more rigid and stereotypical ideas about what ought to constitute nursing knowledge than the nurses do themselves. Of course the doctors' views, that practice and not theory is what nurses ought to be concerned with, should not be immediately taken as illustrative of their patronising attitudes towards nurses. For there is evidence in this chapter, as in the one which follows, which demonstrates that doctors perceive themselves in much the same way as they do nurses, essentially as pragmatists, for whom scientific and theoretical knowledge is virtually irrelevant as far as their everyday clinical practice is concerned. However, implicit in the comments made by some of the doctors is the idea that the predominantly practical nature of nursing, in the final analysis, makes a nurse more of a pragmatist than a doctor and so renders theoretical knowledge even more irrelevant to nurses than doctors.

It is clear that doctors have little idea of how nurses learn about wound care issues and what constitutes nursing knowledge. Nurses also tended to present a somewhat idealised view of how 'other' nurses acquire knowledge about the nature and management of malignant lesions. The reasons for the prevalence of these kinds of attitudes ought not to be sought simply in the ignorance of these two professions about one another or about colleagues in the same profession, notwithstanding the strength of this kind of argument, but in the different hierarchies of knowledge that exist and the status given to pure and applied knowledge - theory and practice.

The nurses and doctors in the study agreed that formal and structured channels of knowledge diffusion are the most appropriate for clinicians to learn about malignant lesions and their management. However, the clinicians are not merely attributing differential status to different channels of knowledge diffusion - the formal being of a higher order while the informal of a lower order, for implicit in their comments is the belief that a superior type of knowledge is disseminated via formal

and structured channels. Abstract theory has the image of a superior form of knowledge because of its association with science, whereas applied knowledge acquired through practice has tended to be regarded as lower in status because of its association with 'manual' forms of labour.

In various sections of this chapter the clinicians have spoken of their dissatisfaction with their current state of knowledge and demanded more theoretical understanding about the nature and management of malignant lesions. Such discussions one could take as indicative of the clinicians' poor opinion of pragmatic knowledge and the way it dominates their clinical practice. Yet elsewhere in this chapter the clinicians have demonstrated their dislike of theory. Thus what we appear to have here is, on the one hand, an abstract view of theory as irrelevant to clinical practice and, on the other, a view which recognises the value of theory when synchronised with practice. Or is all this merely an attempt by the clinicians to have themselves and their work regarded as professional, by saying what they think they ought to be saying?

The evidence clearly demonstrates that in reality clinicians gain most of their knowledge about malignant lesions by experience, 'on the job', rather than by formal training, and even when formal learning does occur, it is often inadequate as far as informing them about the nature and management of this condition. One of the reasons for this situation is the lack of both information and opportunity for formal structured learning. The result is that the only method available for learning is through experience. This being the case, it could be said that experience is the only option available rather than regarding it as the chosen learning method. This kind of learning is, however, a slow and often haphazard process of knowledge diffusion and one which produces an accumulation of a certain type of pragmatic task-orientated knowledge which is concerned more with what is done, and how, rather than why.

The evidence from this study indicates that both nursing and medical knowledge, as well as being experientially based, is often tacit and taken-for-granted, and as such, is rarely questioned by the clinicians. Indeed, experience is itself often considered unquestionable. The

clinicians never appear to be confronted with the need to explain their actions, which is possibly why they found it so difficult to explain to the researcher their rationales for the various management regimes employed on malignant lesions and the thought processes underlying them.

It could be argued that heavy reliance on custom and practice also precludes questioning of ones practice. Asking questions may be regarded as a challenge to the authority vested in tradition and knowledge gained over time and through experience. It could also carry more serious implications - that nurses have been doing it wrong all these years! Tradition is also a convenient cover for lack of knowledge and understanding of ones practice. The retort that "we've done it this way for a long time, so we'll carry on doing it this way " was typical. Thus one does not need to question or understand why one is doing something; the fact that it has been done in the past and has worked is sufficient justification for doing it again.

The scant knowledge and understanding that prevails in the medical and nursing world concerning this condition and its management is partly responsible for the nurses' lack of knowledge concerning the rationales for employing various management regimes on malignant lesions. However, there are other reasons for nurses' lacking knowledge in this area. One is that senior nursing and medical staff do not explain adequately why treatment regimes are employed, perhaps because they do not themselves know, and instead rely on authoritarian rule and dictate to enforce certain actions, with nurses often being left simply to follow orders.

Another possible explanation of the nurses' lack of understanding of the treatments they use may be located in the historical development of the nursing profession vis-a-vis the medical profession. It has been said that nurses are increasingly undertaking medically-related tasks previously performed by doctors, yet the medical knowledge relating to these tasks remain monopolised by the medical profession (Savage, 1987). For example, some nurses may administer intravenous infusions but one could question whether their knowledge about biology and chemistry is adequate for them fully to understand their actions.

Applying the same arguments to malignant lesions, the findings indicate that it is not unusual for nurses in Unit C to decide when and which type of antibiotic is needed for a particular patient. However, these nurses are not sufficiently knowledgeable about bacteriology, physiology or chemistry to understand that certain agents or combination of agents can cause adverse reactions, nor are they sufficiently informed about the various types of bacteria and their modes of behaviour, types of antibiotics and their modes of action to know which is the most suitable to use at any given time, and which is totally ineffective, if not dangerous. Thus, it is clear that the confidence displayed by many doctors in a nurse's ability to make 'objective' clinical wound assessments and informed choices about appropriate wound management products is at times seriously misplaced.

The discordant and confused nature of nurses' understanding of the rationales for employing certain management regimes is a reflection of the nature of the training which nurses receive before and post registration, and the ethos this inculcates which is essentially a task orientated one. Thus it is not surprising to find that much in the treatment of malignant lesions is based on trial and error with little understanding of the effects that their treatments and wound management practices have, either on the malignant lesions themselves, or on the wound healing process more generally. The variability of the wound management techniques used on malignant lesions is not just a reflection of the variability of knowledge possessed by nurses on the management of this condition; it is also a reflection of the lack of known superiority of any given product, which leads to all types of agents being tried in order to find one that works. This is a criticism of the treatments currently available for use on these lesions and an indictment of the insufficient attention which has been given to this condition and its specific requirements.

The chapter that follows represents a move from investigating nurses' and doctors' understanding of a specific condition to a wider investigation of their knowledge and understanding of the general principles of wound healing and wound care practice, and their awareness and understanding of recent developments in the field of wound care.

CHAPTER THREE: THE SECOND STAGE - ISSUES RELATING TO WOUND CARE IN
GENERAL - THEORY AND PRACTICE.

3.1 THE GENERAL PRINCIPLES OF WOUND HEALING AND WOUND CARE PRACTICE
- A REVIEW OF THE LITERATURE

INTRODUCTION

The previous chapter explored the initial area of interest of the study, focussing on a specific type of wound. One of its aims was to describe the knowledge and understanding which doctors and nurses involved in the care of cancer patients with fungating and ulcerating lesions possess, about the nature and management of this condition, and the sources of their knowledge. Another aim was to place this empirical evidence in a theoretical framework, so as to discover what factors influence clinical practice, how and why they do so.

This chapter reflects the second focus of the study, namely what the clinicians studied knew about the general principles of wound healing and wound care practice, and about innovations in this field. Its aim was to explore the extent and up-to-date nature of their knowledge in this area.

As a precursor to this, a literature review of the principles of wound healing and wound management, as they apply to wounds in general, is presented. The researcher considered it important to include this material to enable the reader to understand the clinicians' discussion of wound healing theories and wound management practices which follows.

Wound healing, like other bodily functions, has undergone biological evolution and humans have inherited a pattern of repair suited to their skin type (Winter, 1971). The body is naturally equipped to heal itself and it begins to do so almost automatically as soon as an injury occurs (Senter and Pringle, 1985). Wound healing is a complex process (Draper, 1985; Scales, 1971) and one which is not yet fully understood (Barton and Barton, 1982; Scales, 1963). It proceeds through a series of well-ordered cellular and biochemical events (Goode, 1984; Johnson,

1987; Westaby, 1981a). The normal sequence of wound repair may be broken down into stages, although in reality the boundaries between the stages are not clear cut (Draper, 1985; Westaby 1981a). Opinion seems to be divided over the number of stages involved in the healing process (Draper, 1985; Johnson, 1987; Leaper et al, 1987; Stewart, 1985a) and different terminology is used by various authors to describe them. Nevertheless, there does appear to be a degree of consensus over the general processes involved.

The complex and finely balanced cellular and biochemical interaction of the healing process can be affected by many factors, both general and local (Goode, 1984; Gould, 1984; Stewart, 1985b). Senter and Pringle (1985) list 48 different influencing factors. For example, the nutritional state of the patient is considered vital to healing (Goode, 1984; Johnson, 1987; Stewart, 1985b; Westaby, 1981b) as is a healthy vascular system (Barton and Barton, 1982; Stewart, 1985b; Westaby, 1981b). Infection (Torrance, 1983; Senter and Pringle, 1985; Westaby, 1981b) and the use of certain medicaments (whether systemically or topically) such as steroids and cortico-steroids (Barton and Barton, 1982; Goode, 1984) are believed to delay wound healing, although there does not appear to be a consensus of opinion regarding the use of such anti-inflammatory drugs and their effect on healing tissue (Stewart, 1985b; Senter and Pringle, 1985; Westaby, 1981b).

There is a growing body of literature which criticises the time-honoured practice of using topical antiseptics - particularly sodium hypochlorites - to deal with infection. The belief that they destroy tissue as well as organisms is not a recent discovery. Even Alexander Fleming was aware of this possibility (Leaper, 1986).

A healing wound is very active and requires a good supply of oxygen (Gould 1984; Torrance, 1983). The belief in the necessity of oxygen has resulted in the development of certain wound care techniques designed to promote wound healing. Winter and Perrins (1970) reported that epidermal regeneration in animals was enhanced following sessions in hyperbaric oxygen chambers. This kind of therapy has been used and reported to accelerate healing in humans (Senter and Pringle, 1985; Torrance, 1983).

Blowing oxygen or air over wounds is a popular method of treatment among nurses (Torrance, 1983) as is using hairdryers and fans (Ellsworth and Harvey, 1974). Exposing wounds to the air (Hall, 1978; Westaby, 1983) appears to date back to the time of Hippocrates (400 BC) who in describing the treatment of a head wound advised:

"It should not be moistened, nor should it be bandaged: after cleaning the wound as soon as possible, one should dry the woundfor what is soonest dried up.... thereby most readily separates from the rest of the tissue which is full of blood and life." (Scales, 1963) (p 83).

A study conducted by Winter (1962) on young domestic pigs found that exposing wounds to the air retarded wound healing because it dried the wound and encouraged the formation of a scab. A further study by Winter and Scales (1963) on pigs not only confirmed Winter's previous findings but demonstrated that healing was retarded even further, resulting in more tissue loss and scarring, if air was actually blown over the wound as is traditionally practised:

"If a wound surface is artificially dried more extensively than by mere exposure to the atmosphere, then more of the dermis is incorporated into the scab." (p 91-92).

Winter (1962) found that if the scab is prevented from forming, by covering the wound with a synthetic material, such as a polythene film, which is highly permeable to oxygen, then the wound remains bathed in serous exudate and does not become dehydrated. The result is that healing is accelerated, wounds contract more rapidly and scarring is reduced (Winter 1963).

The human studies of Hinman and Maibach (1963) confirmed the work of Winter with young domestic pigs, as did the experiments by Rovee et al (1972), Rovee and Miller (1968), and Bothwell and Rovee (1971) on humans and animals, using different types of wounds to those reported by Winter (1962; 1963) and Hinman and Maibach (1963). Other studies have shown that healing is enhanced if wound temperature is maintained at a level close to body core temperature (Barton and Barton, 1981; Senter and Pringle, 1985; Turner, 1979).

Winter's work with film dressings and his now classic discovery that wounds heal faster and more effectively in moist conditions, ostensibly overturns previous understanding of the healing process. This needs to be put into context. The following account is an attempt to do so, by placing Winter's work in its historical and socio-political context. It is perhaps no coincidence that there was a proliferation of new cotton-based wound dressings from the 19th century into the twentieth century - an era which represented the zenith of the textile industry. The replacement of cotton dressings by paper and cellulose wadding was begun in Germany from the mid 1930s. As far as Scales (1963) was concerned:

"Research along these lines was undoubtedly influenced by the flourishing cellulose industry and a desire to be independent of cotton supplies which were largely controlled by Britain and America." (p 84).

The development of the rayon industry and the search for new fibre and film-forming polymers (Scales, 1963), in conjunction with the experience of dealing with wounds gained in the Second World War, resulted in a variety of polymers in fabric and film form becoming available for use in wound treatment from the early 1940's.

The first time that a synthetic film was used as a porous wound covering was reported by Bloom (1945), who as a prisoner of war had used the cellophane wrapping from the blood transfusion equipment in the treatment of burns (Scales, 1963). Although initially used as a preventative measure against secondary infection, Bloom was surprised to discover that the transparent semi-permeable membrane covering encouraged rapid regeneration of skin and immediate relief from pain.

By 1944 a variety of polymer films were available (Scales, 1963) and although waterproof, many of them suffered the disadvantage of rendering the underlying skin sodden and macerated. However, in search of suitable clothing for tropical warfare, a new principle was established:

"A material can be proof against liquid water (and so keep off tropical rain) and yet be pervious to water vapour, thus allowing the sweat to evaporate under the clothing and pass through in vapour form." Bull et al (1948) (p 213).

Applied to dressings, this principle implied that a dressing can keep out liquids and prevent maceration of the underlying skin by allowing evaporation. Experiments conducted by Bull and his colleagues (1948) found that a nylon derivative film dressing based on the above principles was both impermeable to liquids and bacteria, yet was water vapour permeable and appeared to facilitate wound healing. A controlled clinical trial carried out by Schilling et al (1950) in a Manchester engineering firm confirmed the findings of Bull and his colleagues (1948).

The observations of Bull (1948), Schilling (1950) and their colleagues, that their film dressings enhanced wound healing were, according to Lawrence (1985), neither confirmed nor explained until the publication of Winter's paper in 1962. His work was to provide the theoretical explanations which these earlier empirical studies lacked. However, careful reading of it appears to suggest that the experiments he conducted were not aimed at achieving a deeper understanding of the healing process per se but were mainly directed towards finding a solution to the 'adhesion' problem associated with traditional wound dressings, as the following quote from Winter (1971) illustrates:

"As well as circumventing the adhesion problem therefore, there is an unexpected bonus in using occlusive dressings in that they encourage accelerated, indeed supernormal healing." (p 57).

When Winter discovered that moist conditions promoted wound healing he was contradicting the prevailing view which held that moist conditions retarded rather than promoted healing, by providing the environment thought conducive for bacterial growth and the development of infection (Ellsworth and Harvey, 1974). In reading Winter's work, one can observe that he was aware of the contradictory nature of his findings. A quote from Winter and Scales (1963) is particularly pertinent in this regard:

"Under the favourable conditions of animal experimentation a moist wound heals most rapidly: but in human clinical practice a moist wound surface may not be desirable because of the risk of infection." (p 92).

Hinman and Maibach (1963), who confirmed Winter's findings in a parallel study on humans, were clearly uncertain about the significance of their

findings when they say:

"We do not know whether these observations will fall in the realm of biological curiosity or if they will have practical importance in the treatment of cutaneous wounds and burns in man." (p 378).

They were similarly concerned over the potential bacterial proliferation under occlusive dressings but believed the problem not to be insurmountable:

"In the past, infection precluded the practical use of such occlusion as these dressings provided the moisture necessary for the multiplication of pathogenic organisms. With the introduction of potent anti-bacterial agents for the skin, it may now be practical to take advantage of such an occlusive dressing as was used in this study." (p 378).

Before the 1970's the majority of films available were completely occlusive and practically impermeable to gases or water vapour, usually causing rapid proliferation of bacteria and the consequential retardation rather than acceleration of healing (Lawrence, 1985). Winter (1971) himself voiced serious objections to the use of fully occlusive dressings, as indeed do Bothwell and Rovee (1971) who, reporting on their experiments using a range of dressings comment:

"bacterial proliferation and tissue maceration obviates the use of occlusive dressings in most clinical practice" (p 78).

concluding that:

"Until the role of the microbiological environment on repair is better understood, a semi-occlusive cover appears to be a suitable compromise." (p 95-96).

The complexity of developing a polymer film free of such bacterial problems was matched by the problems encountered in developing an appropriate adhesive for plastic film dressings. Problems such as these were perhaps partly responsible for the earlier experiments failing to lead to commercially or clinically viable products (Schilling, 1950).

A major breakthrough occurred in the mid 1970's with the development of a semi-occlusive polyurethane gas- and water-vapour permeable, water- and bacteria-impermeable film, marketed as OpSite by Smith and Nephew Ltd. OpSite underwent changes during its development and marketing not

only in material type (Groves, 1985; Lawrence, 1985) but also in clinical usage: for burns (Groves, 1985; Neal et al, 1981), skin graft donor sites (James and Watson, 1975) and pressure sores (Crisp, 1977; Hammond 1979).

However, the appearance of wound exudate underneath the transparent OpSite was noted as disquieting to both surgeon and patient (Groves, 1982) and also to doctors and nurses, who often regarded it as being an infected or at least potentially infected inoculum, which should be removed at all costs (Leaper, 1986). Experimental studies conducted by Buchan et al on human (1980) and pig wound exudate (1981) found that wound exudate under OpSite was both rich in nutrients and contains large numbers of white blood cells (mainly neutrophils) which are actively anti-bactericidal, in that they ingest and subsequently kill bacteria, something which Winter (1978) was certainly aware of:

"The numerous white cells present in the exudate of the wound surface can be relied upon to sterilise the wound. This is a better way to combat infection, using the body's own defensive system, than is the addition of bacteriostatic or bacteriocidal chemicals to the dressing." (p vii-viii).

The work of Buchan and his colleagues succeeded in fuelling a long standing debate over a patient's innate ability to combat infection versus the use of topical or systemic antibiotics. Indeed as far as Leaper (1986) was concerned, the introduction of the moist wound environment for healing offered by occlusive dressings, "probably obviate the need for antiseptic use."

The work of Buchan et al also demonstrates the link which appears to exist between such research findings and commercial interests. At the time of publishing their findings, Buchan and his colleagues worked for Smith and Nephew Research Ltd and one interpretation of their writing suggests that they were attempting to allay the apprehension which users of OpSite had regarding its appearance (thereby increasing its adoption and sales), rather than attempting to expand the boundaries of knowledge relating to exudate per se. A quote from Buchan et al (1980) may illustrate this point:

"This exudate sometimes has a turbid appearance and it has been suggested that this may be a likely site for infection and hence the use of this type of dressing might be hazardous." (p 326).

Their findings that the exudate under OpSite is bactericidal lead them to conclude:

"that the risk of clinical infection under Op-Site should be minimal." (Buchan et al, 1980) (p 332).

The continuing emphasis on the uniqueness of every individual patient and their wound has led to the belief that each type of wound requires a special optimal environment, to be provided by a functionally specific dressing (Stevens, 1982). By definition, such dressings cannot in theory be used on all types of wounds. Thus from the early 1980's we have seen an upsurge in commercial interest in wound care, with the development of not only whole families of products based on the moist wound healing theory, such as semi-permeable adhesive films, hydrocolloids, hydrogels, polysaccharide dextranomers and polyurethane foams (Johnson, 1987; Meggison, 1986; Senter and Pringle, 1985; Stewart, 1986; Turner, 1982 and 1985), but also the development of the adhesives necessary to attach these new products to the skin, which according to Stevens (1982) is yet another entirely separate technology and another avenue for commercial involvement.

This section has attempted to locate recent innovations in wound healing theory and practice in their historical and socio-political context, showing how developments in these areas owe as much to circumstantial and serendipitous research findings and commercial involvement, as they do to purely scientific research-based knowledge.

The section which follows develops that part of the study concerned with the clinicians' knowledge and understanding of the general principles of wound healing. The findings from the interviews and projective techniques employed to elicit this information are presented and discussed.

3.2 NURSES' AND DOCTORS' UNDERSTANDING OF THE GENERAL PRINCIPLES OF WOUND HEALING

This section of the study deals with a number of issues: firstly, nurses' understanding of the general principles of wound healing and the sources of their knowledge; and secondly, doctors' perceptions of nurses' knowledge of this area and the extent of their own knowledge and understanding. One of the aims of this section is to establish the extent of clinicians' knowledge and understanding of an important area of their practice. Another aim is to ascertain the extent to which clinicians' knowledge and understanding about wound care issues are consistent with or conflict with current scientific theories of the healing process, and changes in wound care practice.

3.2.1 The Extent of Nurses' Understanding of the General Principles of Wound Healing

Only a quarter of the thirty six nurses, from specialist and non-specialist units, felt that nurses in general do possess an understanding of the wound healing process. Three quarters of them were less certain, and the nursing auxiliaries in the sample said that untrained nurses like themselves certainly do not.

Nurses were said to "generally" (2 nurses) or "basically" (4 nurses) know how wounds heal but not to understand the whole process (1 nurse), particularly not on any detailed technical level (1 nurse) in the way that doctors were thought to (1 nurse). The kind of attitude underlying the latter two comments has its roots in the stereotypical view of doctors as being more knowledgeable about theoretical matters than nurses. However, as various parts of this study demonstrate, it is an illusion to suppose that doctors are more knowledgeable about wound healing theory or wound care practice than nurses. Their medical education may cover the healing process in a more theoretical and detailed way than nurse training; nevertheless, doctors, like nurses, do not appear to use this knowledge to inform their clinical practice.

Various reasons were given by the nurses to explain their lack of knowledge of the healing process. The limited availability and accessibility of information on this subject was blamed, as was the insufficient time or emphasis given to teaching nurses about wound healing during their basic training or in their work situations once qualified. Some thought that nurses understand such things at the time they are taught them, but soon forget them once they enter practice (5 nurses). The implication of this is that issues relating to wound healing are academic and theoretical in nature and as such are irrelevant to the day-to-day nursing management of wounds, as the following quote illustrates:

"... you forget, you know - it's awful - when you're not using it every day. You've got to sit and read it and think 'oh yes, that's right.'"

The motivation to learn, and indeed to continue learning about such matters, was not generally regarded as the sole responsibility of individual nurses. 'Others', such as institutions (through, for example, in-service training) and colleagues were thought to have an equal responsibility to stimulate nurses' interest in this direction. As far as one nurse was concerned:

" (nurses)..... need stimulus to be able to go home and look things up ...I think too often that stimulation is not there for you to go home and read a textbook and to keep revising things like that and keep afresh..."

3.2.2 Should Nurses Understand the General Principles of Wound Healing?

The majority of nurses answered in the affirmative, giving a range of responses to explain why the possession of such knowledge was considered important. The responses varied from the belief that understanding the general principles of wound healing would allow nurses to make more sense of their observations (4 nurses) and to make more informed decisions regarding what treatments to use (4 nurses), to it being "handy" and "interesting" to know such things (3 nurses).

The important role which nurses play with respect to wound management

was highlighted by a number of nurses, further underlining the importance of their understanding the healing process. As far as one nurse was concerned:

"because in terms of wounds, district nurses ... are very influential in what happens to a wound... most GPs, if we say we want something will just give us it. They won't argue with us....."

However, there were nurses who took the view that nurses "can get by without it" or that such knowledge is only relevant for certain nurses (4 nurses), such as those dealing with wounds on a regular basis (1 nurses). What was clear from the comments made by some of the nurses, illustrated by this last one, was that they frequently failed to recognise themselves in the descriptions they gave. What this kind of attitude reflects is the tendency to shift responsibility for being knowledgeable about such matters onto 'others' thereby avoiding any implied criticism.

3.2.3 Sources of Nurses' Knowledge about the General Principles of Wound Healing

Three quarters of the nurses interviewed said that they had learned about wound healing in their basic training, taught by a variety of staff such as nurse tutors (14 nurses), clinical tutors (4 nurses) and surgeons (5 nurses), in formal classroom situations. Others felt that they had learnt "little" this way, citing practical experience in ward situations as the most significant method by which they had acquired such knowledge. This was particularly true for both pupil nurses, who receive less formal tuition than student nurses on such matters, and nursing auxiliaries, who receive no formal training, despite the fact that in certain units some of them are frequently as involved in the day-to-day wound management of patients as qualified staff.

Over three quarters of the nurses spoke of having learned about wound healing in informal clinical situations through observation (5 nurses) and contact with nursing colleagues, such as ward sisters (6 nurses) and clinical tutors (2 nurses). The following quote is typical of the comments made by these nurses.

"...I did a little in my initial nurse training... but mostly I've just learned little bits as I've gone along in my career... by experience, by doing and by asking questions..."

3.3 NURSES' KNOWLEDGE OF THE PHYSIOLOGICAL ASPECTS OF THE WOUND HEALING PROCESS

Most nurses found it difficult to discuss issues concerning the physiology of wound healing unaided, although this varied from unit to unit. For many this was "anatomy and physiology", which they had not "done" for years. It had been covered in some part of their academic training but was clearly not used to inform their day-to-day practice.

Although a few nurses attempted to discuss the wound healing process in some detail and describe a sequential order of stages of healing, they were the exception. At times there seemed little difference in the abilities of the nursing auxiliaries and the qualified nurses to explain the physiological processes of wound healing. Overall, there was much hesitation, speculation, confusion and contradiction in the comments made. Those who attempted to describe the physiological processes of wound healing did not seem to have an understanding of the processes or stages involved, but tended to recite a list of appropriate terms or to give disjointed accounts of the processes involved. In many instances the nurses appeared to be making deductions from their observations in clinical practice to explain how wounds heal in theory, and not vice-versa. Many and varied terms were used by the nurses to describe essentially the same thing. It was also evident that they often remembered only certain aspects of the wound healing process and then in a very superficial and arbitrary way.

The discovery that the majority of nurses were unable to talk unaided about the wound healing process in any great detail supported the findings from the pilot studies. The use of aided recall was then instituted in order to provide them with conceptual "pegs" on which to hang their knowledge of the healing process. Several aspects of the healing process were chosen to perform this function, although for the purpose of this discussion, only a few will receive mention.

Granulation is one aspect of the wound healing process most frequently mentioned by nurses when discussing how wounds heal. Indeed, one could be forgiven for thinking that granulation constitutes the only or the most important feature of the healing process, whereas in fact it is only one aspect of this very complex process, applying mainly to deep wounds healing by secondary intention, and less to shallow wounds or incisions which tend to heal by epithelialisation. However, despite the nurses' apparent familiarity with the concept of granulation their understanding of it was in fact very superficial. There was little consensus over precisely what it is and even less understanding of the mechanisms by which granulation tissue is formed or promoted. This knowledge has important management implications, for if nurses do not know how granulation is formed or promoted, then their claims that wound management techniques are employed to encourage granulation are contestable. Instead, an alternative perspective may be posited, that nurse' actions and choice of treatment are actually based on little else than trial and error, with granulation often occurring in spite of what nurses do, rather than because of it.

Nurses' limited understanding and lack of shared meanings over granulation could be compensated for by agreement over its appearance, given nurses' frequent reliance on observation rather than theoretically constructed knowledge to inform their practice. However, it soon became apparent that even over this issue nurses do not see the same things nor attribute the same meanings to their observations. Some nurses spoke of granulation tissue as "pink" (3 nurses) and "pink and healthy looking" (2 nurses), while others saw it in less positive terms describing it as "abnormal" and "unsightly scar tissue".

Current scientific understanding of the healing process, through the moist wound healing theory, stresses the importance of epithelialisation with respect to all types of wounds, including deep ulcerating wounds. However, this was not a term which the nurses readily used when discussing the wound healing process. Despite a number of them being familiar with it (21 nurses), their level of knowledge about it was poor. As far as one nurse was concerned, epithelialisation sounds like a "sociological word". By far the most popular understanding of

epithelialisation was its association with granulation. For example, it was regarded as the same (3 nurses) or similar to (1 nurse) granulation, or a more technical term for granulation (1 nurse). The tendency of some nurses to attribute various physiological actions to granulation, including epithelialisation and wound contraction, seems to confirm their limited knowledge of the wound healing process. The fact that epithelialisation does not seem to be endowed with the same importance as granulation may tell us something about the type of wounds that these nurses predominantly have to deal with, namely deep cavity ulcerative type wounds, such as pressure sores, which are believed to heal mainly by granulation. If these nurses were more involved with incisional and superficial wounds, where primary healing and epithelialisation are the predominant methods of healing, then perhaps an increased level of understanding may have been observed in this study.

However, the researcher would contend that the argument posited above can only go so far in explaining the nurses' lack of knowledge in this area. Another, perhaps more likely argument is suggested by the data, that no matter how limited nurse training on the healing process may be, or however extensive nurses' experience, if they do not consider certain types of knowledge relevant to their day-to-day nursing management of wounds they will not endeavour to learn or to keep themselves informed about them. This being the case, when nurses speak of the importance for clinicians like themselves of being knowledgeable about the healing process, and blame 'others' for the fact that they are not, what we are actually observing is an attempt by nurses at rationalisation and a desire to present themselves in a better light, rather than a true statement of their opinions.

Healing wounds are often characterised by redness, swelling and heat. However, these characteristics can also be taken to indicate the presence of infection. Some nurses attributed the existence of redness, swelling and heat to infection (17 nurses), while others thought these symptoms to be associated either with the normal healing process (17 nurses) or the existence of infection (13 nurses), depending on, for example, the existence of other symptoms (6 nurses), the "look" of the wound (5 nurses) or length of time that they persist (4 nurses).

Despite the nurses' seeming obsession with infection and their claimed familiarity with it, the previous chapter and various sections of this chapter (see 3.3.2) clearly demonstrate that their knowledge of it is meagre, in terms of its causes and treatment. Even in terms of appearance, nurses could not agree on what an infected and a normally healing wound look like, which (as with the above example of granulation) has important management implications. There was much confusion, contradiction and uncertainty regarding the symptoms which differentiate an infected wound from one healing normally, although there was more consensus over the characteristics of the former than the latter. In fact nurses seem rarely to describe the characteristics of a wound which is healing well without comparing it to an infected wound. This may be because the characteristics of an infected wound are more observable than those of a normally healing wound and are detectable through various checks, or it may be that nurses are more preoccupied with infected wounds because they require more nursing care.

Some nurses found the distinction between an infected wound and one healing normally a difficult one to make and similar explanations were given to account for very different wound states. A whole range of characteristics were given to describe these two wound states, for example, should a wound which is healing well be "pink", "pinky red" "red", "slightly red" or not red at all? Is the presence of discharge acceptable or not? Should the wound site be "moist" or "dry", "cool" or "warm" or "hot"? Current scientific thinking on the wound healing process indicates that to promote healing wounds should be moist as opposed to dry and kept at body temperature. Therefore a cool or a hot wound would certainly not be displaying the characteristics of a wound which is healing in the optimum conditions. As one nurse put it:

"You don't think about these things, do you? You just take it for granted...."

Moreover, can infected and normally healing wounds differ so much, or is the way nurses define and conceptualise various aspects of the healing process influenced more by social than by purely clinical factors? One could argue that clinicians' different perceptions and experiences colour what they see and the meanings they attach to their observations.

Thus the tacit and experiential basis of the clinicians' knowledge of wound healing could be held to account for the variable descriptions offered of an infected wound and one healing normally, as different nurses experience different things.

3.3.1 What Nurses Should Know about the Healing Process: The Medical Perspective

Given that doctors often rely on nurses to advise them on wound management issues, what aspects of the healing process do they consider it important for nurses to know about? There was little consensus over this issue and overall, their expectations were low, although this did vary between doctors. They did not expect nurses to know a great deal (5 doctors), particularly with respect to the physiological aspects of this process (6 doctors).

The doctors were at times very vague, ambiguous and evasive about what they considered important for nurses to know. Could it be that their own knowledge of this area was somewhat limited? Certainly some of them admitted that the reason why they did not expect nurses to know too much about the healing process was because they did not know or had forgotten about it themselves (2 doctors). The implication of this is that if they as doctors lack such knowledge (and they are taught more about it than nurses), then ipso facto nurses will be even less knowledgeable. This kind of attitude does not, however, acknowledge the fact that wound management is predominantly a nursing responsibility and thus nurses may be, and indeed, should be, better informed on such matters.

This somewhat patronising attitude was evident elsewhere in the interviews with some doctors, where theoretical knowledge pertaining to certain aspects of the healing process was considered specifically medical, while the practicalities of wound management and "very basic" elements of the healing process necessary to it were considered appropriate for nurses to know.

The outcome of the discussions held with the nurses about their knowledge and understanding of the general principles of wound healing

would not surprise many of the doctors, in terms of the poverty of their knowledge. Yet unlike many of them, who thought such knowledge was neither important nor relevant to the day-to-day nursing management of wounds, almost half of the nurses said that they ought to know everything about the healing process. As one nurse put it, "the whole thing is very important". Their underlying assumption was that the more a nurse knows, the better.

3.3.2 Factors which Promote and Hinder the Wound Healing Process

A whole range of general and local factors were thought by the nurses and the doctors to promote healing. Most of the examples given point to the important role which carers, particularly nurses, can play in this regard. The comments given provide us with indirect evidence about the extent to which the doctors and the nurses are up-to-date with changes in wound healing theories and wound care practice. These issues will be addressed in greater depth in the sections 3.5 and 3.6.

Both doctors and nurses considered a good and well-balanced diet as the most important factor (36 nurses, 8 doctors), although apart from making statements about the need for patients to be well nourished, both doctors and nurses found it difficult to define exactly what constitutes a "good diet". Most of their comments appear to reflect not their theoretical understanding of the dietetic side of wound healing, but their experiences and observations that, for example, malnourished patients heal slowly and poorly. Indeed, when asked to discuss which dietary factors were particularly significant and why, few were able to discuss such matters unaided (ie. without being prompted) and the explanations given were often rather vague and illustrative of their general lack of understanding.

Like the nurses (12 nurses), the doctors considered the general condition of the patient the second most important factor in influencing healing (7 doctors). A good blood supply was also regarded as important to a healing wound (10 nurses, 6 doctors).

Only one nurse from Unit C (and no doctor) spoke of the importance of wound temperature to the healing process, believing that it should be kept at body temperature and that a drop in temperature retards the healing process. However, she then went on to contend (incorrectly according to contemporary beliefs about the healing process) that the formation of a crusty scab keeps the wound moist and "at a reasonable temperature", and that dressing a wound (although no specific type of dressing was cited) allows the wound to stay at body temperature. According to various manufacturers, only synthetic occlusive and semi-occlusive dressings allow wounds to remain at an optimum temperature for wound healing to proceed. Conventional dressings made from cotton and wool have been found to cause a drop in wound temperature (Lock, 1979).

Is oxygen important to a healing wound (1 nurse), or is an anoxic or hypoxic environment preferable (1 nurse)? Is it important to keep a wound dry (6 nurses) or moist (2 nurses), to expose it to the air (3 nurses), or to cover it with a dressing (5 nurses)? Is rest (5 nurses) or mobility (6 nurses), exercise or immobilisation (2 nurses), likely to encourage healing, and what does rest mean? Is it merely a physical contrast to mobility or does it carry connotations of a more psychological kind, such as relaxation and freedom from stress? As can be observed from the above examples, there were contradictions within many of the responses made on the subject of what promotes healing. This is perhaps not altogether surprising given the various theories currently abounding, although the clinicians' differences of opinion on this issue may be due more to their differential perceptions and experiences than to the existence of different theories. Clinicians are often neither aware of changes in wound healing theories (as the sections on the MWHT and associated dressings that follow will demonstrate), nor use them to inform their practice.

Institutional influences seem to play a part in shaping clinicians' understanding of factors considered important to the healing process. What a nurse or doctor knows about the factors which help or hinder wound healing is significantly influenced by where they have worked or work currently, because of, for example, the types of patients they

predominantly deal with. Thus, three times the number of nurses from Unit C (9 nurses) considered cleanliness of the wound and the patient's social environment important in promoting healing, than nurses from either of the two other units, particularly Unit T. However, over three times the number of nurses from Unit T cited general good health as a contributing factor, as did those from Units C and S. Such divergent perceptions arise from the fact that for nurses in Unit T, and to a lesser extent Unit S, who have to care for seriously ill patients, ill health appears to influence all other things. Nurses from Unit C, on the other hand, care for patients who may not be seriously ill but who may live in what the nurses consider to be squalid or unhygienic conditions, and so for them, the social environment seems particularly significant, as opposed to purely biological or psychological factors.

However, by emphasising the importance of cleanliness and hygiene to a healing wound, nurses from Unit C are implying that patients with intractable wounds can help their wounds to heal by maintaining a clean body and house. Likewise, nurses can assist this process by being thorough in their cleaning of wounds. What this kind of argument does is emphasise the important role which people play in influencing the healing process, a factor which has been significantly neglected for a number of reasons. Firstly, nurses' and doctors' perceptions of the healing process as 'natural' have tended to lead them to regard it as something over which they have (or indeed can have) very little, if any, influence. Secondly, the technologically-orientated nature of our present society, which de-personalises many aspects of our lives; has resulted in nurses believing that it is the actions of the agents they employ which determine whether or not healing takes place, and not their own actions.

There are, however, positive as well as negative implications arising from this kind of argument. On the positive side, the introduction of the human agency into the issue of healing serves to 'de-mystify' the healing process. It is no longer a purely bio-chemical process, which is difficult to understand and control, but one in which people have a very influential role to play, such that healing does or does not occur because of the actions of certain people. However, the negative side of

the argument is that a moral dimension is added to the issue of healing, such that individuals are blamed for causing their own (or others') ill health through neglect or failure of one kind or another.

Fewer examples were cited of factors which were thought to hinder healing as compared to those thought to promote this process. In most instances the opposite of what was considered helpful to healing was cited. There were, however, as many contradictions and lack of consensus concerning such issues as were observed in the above discussion. Infection was considered by both the doctors (7 doctors) and the nurses (17 nurses) to be the most significant factor to hinder healing, although few respondents were able to explain why.

Articles abound in the nursing and medical literature on the deleterious effects that many systemic and topical agents have on wound healing (see sections 2.1.2 and 3.1). In order to ascertain the extent of the respondents' knowledge of such current issues, they were asked whether they thought any treatments may hinder the wound healing process. The vast majority of the respondents (29 nurses, 11 doctors) believed that there were. Once again institutional factors, such as where a clinician worked, determined their knowledge of such issues because of varied local practices. Radiotherapy (14 nurses, 5 doctors) and chemotherapy (9 nurses, 3 doctors) were the most frequently cited treatments for hindering healing, reported in the main by nurses from Unit S, where they are in common use. Nurses from Units C and T citing these treatments seemed much less knowledgeable about them and their possible effects, and seemed more likely to speak of topical agents and dressing procedures as being possible causes of problems in healing.

This whole issue of treatments hindering the healing process was regarded by one doctor from Unit S as "a bit controversial". He believed that, perhaps with one or two exceptions, the majority of people would agree that radiotherapy delays healing. However, because he was not "aware of any documented sources" which discuss this issue, he regarded such judgements as entirely subjective and personal. This is despite the fact that it is well acknowledged in medical circles that cancer treatments such as radiotherapy and chemotherapy are

indiscriminate in their actions and so kill off normal as well as malignant cells. Indeed, this was one of the arguments put forward by a number of nurses and doctors to explain why these treatments hinder the healing process. As we saw in the preceding chapter, radiotherapy was also held responsible by some of the clinicians for the development of fungating and ulcerating lesions in cancer patients.

Given that nurses seem at times to employ practices considered inappropriate in certain scientific and clinical circles, the question of whether nurses themselves considered some of their actions as potentially hindering the healing process was answered in the affirmative by the majority of them (30 nurses). A variety of examples were cited, most of which blamed nurses for their carelessness, neglect and incorrect actions, defined by one nurse as "bad nursing". For example, half of the nurses believed that not using a strict or good aseptic technique may hinder wound healing, as would bad or careless dressing (12 nurses) or cleaning techniques (8 nurses). There were clearly differences of opinion over some issues, in that some nurses thought that the failure to dress wounds regularly (2 nurses) or daily (2 nurses) can delay healing, whereas three other respondents thought that frequent dressing changes can have this effect.

3.4 FINDINGS FROM THE STIMULUS MATERIAL CONCERNING NURSES' KNOWLEDGE OF THE WOUND HEALING PROCESS

The use of aided recall, in terms of verbal prompts and visual aids, was employed with the aim of investigating the nurses' knowledge and understanding of the wound healing process in more depth. However, the employment of these techniques did little to help the recall of those nurses who could not remember or who simply did not know about the healing process. In other words, they merely confirmed the limited nature of their knowledge in this area. For example, when discussing collagen fibres (the main structural protein of the body, whose synthesis is of vital importance if wounds are to heal properly and their tensile strength maintained), the majority of the nurses did not know what it is (18 nurses), how it is produced (17 nurses) or what its function is (12 nurses).

The use of the visual aids (see section 1.2.1 pages 44-45) further confirmed that nurses do not see the same things and that their different perceptions and experiences colour what they see and lead them to posit different interpretations of their observations of the same thing. The power of suggestion was also evident in the comments made by some of the nurses. Two nurses spoke of the wound in diagram 2 (see page 44) now looking "healthier", although there was no substantial difference between diagrams 1 and 2 (see page 44) to suggest this.

Opinion varied as to the usefulness of these diagrams in demonstrating the healing process. Some regarded them as good illustrations while others did not. Many in this latter category blamed their own lack of knowledge for this, saying that they would be good if they were more knowledgeable. There were further disagreements over the extent to which these diagrams corresponded to their particular picture of the healing process and whether they helped them to describe it. For example, with respect to the above issue, 14 nurses said that they had not helped, although more said that they had, either because they were not used to this approach (having not been taught about the healing process through the use of diagrams) or they could not remember being taught this way (5 nurses), or they simply lacked the necessary level of knowledge to make sense of the pictures (7 nurses). Nevertheless, a number of them did say that discussing such issues had stimulated them to learn more about the healing process.

SUMMARY

The findings in this section have demonstrated that nurses have a limited knowledge base of the general principles of wound healing. The use of different methods to elicit this information only served to confirm this. The day-to-day management of wounds was little informed by clinicians' knowledge and understanding of the healing process. It was also evident that a whole range of non-clinical factors influence the way in which clinicians define and conceptualise various aspects of the healing process and decide which wound management regimes to employ.

3.5 NURSES' AND DOCTORS' KNOWLEDGE AND UNDERSTANDING OF THE MOIST WOUND HEALING THEORY AND ASSOCIATED DRESSINGS

The aim of this section of the study was to investigate whether nurses and doctors involved in the management of various types of wounds are aware of recent developments in theories about wound healing, as this may have important implications for their wound care practice. To explore this issue a relatively new theory about wound healing - namely the moist wound healing theory (MWHT) - was used. Their knowledge and understanding of the MWHT and their usage of occlusive and semi-occlusive dressings (which represent the application of the MWHT in wound care practice) were explored. In addition to ascertaining what respondents knew about the MWHT and associated dressings, the sources of their knowledge were also investigated. How they acquire such knowledge gives important insights into the ways in which new knowledge and practices are disseminated within the health care system.

3.5.1 The Extent of Clinicians' Knowledge regarding Innovations in Wound Care

The findings indicate that both doctors and nurses are more up-to-date with developments in new treatments than they are with changes in wound healing theories. Less than half of the nurses (15) and doctors (7) interviewed had heard of the MWHT, as compared to over three quarters of the nurses and all of the doctors who said they had heard of and used certain dressings associated with this theory. Moreover, clinicians appear more likely to accept new products than new knowledge. In other words, it is easier to institute changes in wound care practice than to alter clinicians' understanding of the wound healing process. This may be because pure knowledge is an intangible thing and appears divorced from practice.

Three times the number of nurses from Unit C had heard of the MWHT (9 nurses) as those from the other two units. This suggests either that they are more up-to-date on such issues or are more aware of the association between the theory and the nursing practices deriving from it, such as the use of various occlusive and semi-occlusive dressings. What the above discussion does not do, however, is explain why these

nurses are so well informed. In the researcher's judgement the answer lies not in the psycho-social character of the particular nurses working in Unit C, nor indeed in the organisation or structure of this unit, but in its 'market potential' as perceived by the companies selling the new dressings associated with the MWHT (see section 4.7.2).

The importance of commercial influences in increasing clinicians' awareness and facilitating their adoption of innovations in the health care field will be discussed in more detail in the chapter which follows. Suffice it to say that the extent to which the companies marketing these new dressings consider any given setting to be a good market for their products (in terms of their potential for increased sales and thus increased profits) will determine the intensity with which they promote them, and by the same token, the level of awareness which clinicians working within these units have of developments in the health care field.

3.5.2 Should Clinicians' be Up-To-Date with Changes in Wound Healing Theories?

The assertion that nurses should be up-to-date on such matters was endorsed by the overwhelming majority of them (32). Most nurses supported the general principle of "moving with the times", equating change with advancement and progress - an obviously 'good thing'. Being up-to-date on such matters was regarded as important, not only for their own personal and professional advancement, but also for improving patient care. Most nurses considered it important for them to be up-to-date on such issues, whereas some doctors certainly did not, neither for themselves nor for nurses. The message seemed to be that clinical experience and the practical aspects of wound management are what matter rather than knowledge of the theories involved. According to two doctors, most doctors and nurses do not regard this area as "high priority" or of particular interest to them. As far as one of these doctors was concerned:

".....I really have no great interest inwhat goes on under a microscope...and I am sure most nurses don't either."

The implication from this quote, and the comments made by other respondents, is that interest in, or knowledge of, the healing process is the domain of the academic or the research scientist and not the clinician. This view provides us, one could argue, with a concrete present day example of the historical division between the 'bench' and the 'bedside' and the knowledge which clinicians think is appropriate for personnel in these two sections of the medical system to possess. However, implicit in the comments made by some of the doctors is that certain types of knowledge are even less appropriate for certain clinicians to possess than others, such as nurses' need of theoretical knowledge.

There were many contradictions in the comments made in this section and a tendency to shift responsibility for being up-to-date onto others, thereby deflecting criticism for their lack of knowledge in this field. Some nurses and doctors believed that, for example, 'other' doctors, from 'other' units which specialise in wound care or which deal with wounds regularly are, and indeed ought to be, more knowledgeable than themselves about innovations in this field. However, they often failed to recognise themselves in the descriptions they gave, a point which did not go unnoticed by some nurses. Five nurses from Unit C believed that for nurses such as themselves, for whom wound care represents the main part of their working day, and indeed for any nurse who influences the manner in which wounds are managed, then being up-to-date on advances in wound healing theory was important.

3.5.3 Constraints on Nurses and Doctors being Up-To-Date on Developments in Wound Healing Theories

A variety of constraints were cited as being responsible for nurses and doctors not being up-to-date on such issues. Criticisms were levelled at both the institutional and individual level. As far as some nurses were concerned, lack of resources - both financial and human - were to blame for such a situation. This together with increased work loads, left nurses little time to keep up-to-date. As far as some nurses were concerned, they were too busy "getting on with the job" to keep up-to-date on such matters. This was also the view of two doctors.

On another level, nurses complained of the lack of up-dating material and instruction, both in terms of its availability and accessibility. Insufficient encouragement or stimulation to keep up-to-date were also cited. On an individual level, some nurses believed that it was the responsibility of nurses to keep themselves up-to-date (4 nurses), and that if they were not, then it was their fault. They also attacked nurses in general for their conservative attitudes; of doing what they have always done; sticking to favourites and what they have been taught; being suspicious of new things and lacking the motivation to read or study once qualified, or to question their practice.

However, the argument that if nurses are not up-to-date on advances in wound healing theory, then they have only themselves and their conservative attitudes to blame, should, the researcher believes, be reappraised. The responsibility for nurses not being up-to-date on such issues lies not so much with the individual nurses themselves, but with the nursing profession and the attitudes it inculcates into its members. It is not so much that nurses as individuals are conservative, but the nursing profession itself is. It is the very nature of nursing which determines nurses' traditional, highly pragmatic and instrumental attitudes towards theory and practice, and transfers these attitudes to individual nurses through their socialisation.

A number of doctors and nurses implied that they did not think that there was a great deal to be up-to-date with. " Why, are there any new theories?" queried one nurse, while according to two doctors from Units S and C:

"I don't think there are any major advances in wound healing that I've heard of in the last five years."

and

"I don't know that there has been a great deal new found out about wound healing....I don't think anybody has proposed anything radical."

3.5.4 The Sources of Clinicians' Knowledge about Innovations in Wound Care

When asked how they thought nurses **could** be up-dated about innovations in wound healing theories and wound care practice, formal communication

channels such as lectures and meetings, in-service training, courses and study days were reported. Informal communication channels such as contact with "experienced others" were only cited by two nurses. A similar story was repeated when asked how they thought nurses are kept up-to-date on such matters, although reading was seen as particularly significant (27 nurses), especially of nursing journals (20 nurses). Only 6 nurses spoke of nurses learning about new treatments through informal channels.

However, despite the generally held view that nurses are and could be informed of changes in the wound care field via formal communication channels, the concrete example of the MWHT and associated dressings reveals that in reality nurses and doctors are more commonly up-dated through informal channels, including observations in clinical practice, personal experience and word of mouth from medical and nursing colleagues. Fourteen of the 15 nurses and 3 of the 7 doctors who had heard of the MWHT had done so indirectly through using certain of the associated dressings. Indeed, the nurses' knowledge of this theory derived almost exclusively from what they knew about one particular dressing - namely OpSite (13 nurses). Only one of the doctors cited OpSite. Another said he had come across the MWHT in connection with "plastic foams or...polythene things."

The most significant way by which the nurses and the doctors had learned about the dressings based on the MWHT was from the manufacturers of these dressings. Approximately half of the nurses and a third of the doctors had heard about them from lectures given by their sales representatives, particularly those promoting OpSite (13 nurses) and to a lesser extent from Granuflex representatives (4 nurses). The lectures given by these representatives, their leaflets (6 nurses), free samples (3 nurses) and information printed on and in the containers of these dressings (12 nurses) appeared to be the main ways by which nurses were introduced to these dressings. Equally significant for the doctors was learning about these dressings from journals (5 doctors).

Three times the number of nurses from Unit C reported sales representatives coming to talk to them, compared to those from the other

two units. The reasons for this are the same as those used in the earlier discussion to explain why more nurses from Unit C had heard of the MWHT than those from the other two units. OpSite representatives seem to have a higher profile in Unit C (9 nurses) than in Unit S (2 nurses), where Granuflex representatives seem to be more in evidence (7 nurses). The reasons for this difference may be two-fold. Firstly, the dressings' contracts negotiated between dressing manufacturers and the various Regional Health Authorities (RHA) determine which particular dressings are to be supplied to the various institutions under a particular RHA's jurisdiction. Thus it could be that the companies marketing OpSite and Granuflex are contracted with Unit C and Unit S respectively. Secondly, OpSite, as the first dressing to be associated with the MWHT and the first to be included on the Drug Tariff was available on prescription in the community at a much earlier date than any of the other related dressings, such as Granuflex. Thus it is not altogether surprising to find that OpSite is the more popular dressing amongst nurses from Unit C. (Issues concerning the contract system and the Drug Tariff as they pertain to the new family of dressings associated with the MWHT will be discussed in more detail in the chapter that follows).

Informal networks such as word of mouth from other nurses (12 nurses, 5 doctors) and experience (15 nurses); from seeing them used (3 doctors) or using them themselves (2 doctors) on various wards were also reported as significant diffusion networks of the new dressings. These examples not only show the primacy of clinical experience in informing practitioners of changes in wound care practice, they also demonstrate the primacy of 'bedside' teaching, based on the wards, in the transmission of such esoteric knowledge.

However, several nurses complained of the inadequate nature of some of the explanations received through informal communication channels. They reported being instructed on how to use these new dressings but that no explanations were given as to how they work.

"She said you should leave it on till it healed. We only gave it the benefit of 2 days... didn't know how we would know when it had healed. I presumed when it looked clean underneath or you took it off, had a look at it and put it back on if it wasn't healed."

The role of observation in this regard is interesting, for being asked to observe a wound under one of these new dressings, such as OpSite, is all right, one could contend, if one knows what one is observing, but as with this nurse (who clearly did not), confusion and uncertainty lead to incorrect usage (in terms of the manufacturers' instructions). The manufacturers' advise clinicians not to remove the dressing (ie. "look at it and put it back on") for fear of bacterial contamination. The confusion and contradiction in some of the nurses' understanding of the MWHT and associated dressings led to them removing or seeing others remove these dressings because the wound looked dirty and nasty, or put perhaps more eloquently, looked "gungy". The reason for all this confusion, one nurse believed, was due to the conflicting ideas which exist about wound healing. To quote her:

"So many people have different ideas about wounds still. You can put something on a pressure sore one day that occludes it and makes it moist. Somebody comes along the next day and rips it off and says you've got to keep them dry."

It is perhaps significant that not one of the nurses cited doctors as key informants about these dressings, although two nurses from Unit T believed it to be a doctor's responsibility to keep nurses up-to-date on new treatments. After all, one of them said, doctors are the first to find out about new drugs and dressings from drug company representatives.

The overwhelming evidence suggests that as inadequate and incomplete as some of the nurses' knowledge about these dressings is, they are more knowledgeable about such matters than the doctors, a point readily conceded by many of the doctors (8 doctors). Moreover, nurses frequently keep doctors abreast of developments in the wound care field and not vice-versa. One doctor from Unit C described the first occasion he was introduced to OpSite by a district nurse:

" I said 'That sounds very interesting. Does it work?' She said ' It's magic,' so I said 'Here's a prescription'."

Yet despite all this, and the fact that it is nurses and not doctors who are the target audience for company representatives selling dressings, the kind of attitude displayed by the respondents from Unit T cited

above is indicative of the hierarchical and paternalistic basis on which the doctor-nurse relationship continues to be perceived by some clinicians.

OpSite (the first dressing to be associated with the MWHT) was launched in 1971, although most of the doctors had only heard about dressings based on the MWHT, such as OpSite, two or three years ago in the late 1980's (5 doctors). It is of course true that the 1980's, and particularly the mid 1980's, witnessed an upsurge in the production of various dressings based on the MWHT, with competition raging between the various manufacturers. Thus it is not altogether surprising that doctors of the type interviewed had only recently become aware of their existence. Had the research been conducted amongst surgeons, particularly plastic surgeons, at whom the marketing efforts of manufacturers of the early film dressings were aimed (as incise drapes and later as wound dressings), then different responses may have been obtained.

However, the researcher would contend that the argument posited above can only go so far in explaining the doctors' lack of knowledge in this area, in the same way that a similar emphasis on experience was not regarded as a sufficient explanation of why nurses were less knowledgeable about certain aspects of the healing process than others (see section 3.3). Now, as in the case of the nurses, a more likely argument is that no matter how extensive their experience or what their speciality is, if doctors do not consider certain types of knowledge relevant to their day-to-day practice they will not endeavour to learn or to keep themselves informed about them.

3.6 THE TYPES OF OCCLUSIVE AND SEMI-OCCLUSIVE DRESSINGS USED BY THE CLINICIANS

There was much confusion, not to say scepticism, in some of the nurses' and doctors' understanding of the MWHT and related dressings. For some respondents occlusive dressings were paste bandages (2 nurses, 3 doctors) or gauze covered with Gentian Violet (1 nurse, 1 doctor), cling film (1 nurse, 1 doctor), polythene gloves (2 doctors) and plastic gloves (1

doctor), but by far the most frequently cited dressing type was OpSite (32 nurses, 4 doctors). Other dressings based on the MWHT such as Granuflex (10 nurses), Bioclusive (4 nurses), Tegaderm (4 nurses) and Debrisan (1 nurse) were less frequently cited. Six doctors said that they could not remember any names. Those respondents who initially said they had not heard of dressings termed 'occlusive dressings', when prompted with certain brand names, such as OpSite, Granuflex and Geliperm, went on to report having used both OpSite and Granuflex.

It was obvious from the examples and comments cited above that some respondents were not able automatically to equate the term occlusive dressing with particular brand names, and tended to apply the term in its more traditional sense, meaning to cover or seal off a wound, and not in terms of its current usage, denoting a new type of dressing based on the MWHT. However, since conducting this part of the study the researcher has become aware of the increasing differentiation between the various dressings, with the use of terms such as occlusive and semi-occlusive to denote 'total' occlusion and impermeability to air or oxygen (which, according to its manufacturers, only Granuflex possesses), and semi-occlusion indicating permeability to the gases (which describes the majority of the other dressings).

OpSite was used by the majority of nurses and doctors (33 nurses, 6 doctors) and to a much lesser extent Granuflex (5 nurses, 1 doctor) on a whole variety of wounds including pressure sores (35 nurses, 7 doctors), superficial wounds and grazes (8 nurses), leg ulcerations (6 nurses, 2 doctors), surgical wounds (6 nurses, 4 doctors), burns (2 nurses, 1 doctor) and to hold intravenous cannulas in place (7 nurses, 1 doctor). The use of OpSite on 'problem' wounds and as a 'last resort' perhaps demonstrates the experimentation and informal 'trials' to which this and similar dressings have been subjected by certain practitioners. Implicit in the comments made by some respondents is that when all the tried and trusted therapies have failed to heal a wound clinicians may decide to use one of these new dressings, based on the premise that 'it can't make things any worse than they are now'. It is from such a negative and indifferent starting point that converts may be recruited, should the dressing confound all the scepticism and actually work to heal the wound.

3.6.1 The Rationales Underlying the Use of These Dressings

The nurses reported a greater variety of reasons for using these dressings than the doctors, and altogether seemed much more knowledgeable about them, although there were some conflicting and confused points of view amongst nurses regarding the purpose of these dressings. The rationales given by the respondents for using dressings based on the MWHT were both treatment and management orientated. They were used essentially to aid wound healing (23 nurses, 10 doctors) and in a prophylactic capacity (21 nurses, 7 doctors), although they were also used to prevent infection developing (6 nurses), to occlude the air from the wound (4 nurses) and to reduce the need for frequent dressing changes (2 nurses).

3.6.2 The Mechanisms by which Dressings Based on the MWHT Aid Wound Healing

Given that nearly three quarters of the nurses and two thirds of the doctors believed that the purpose of these dressings was to aid wound healing (a claim also made by their various manufacturers), the question of how this occurs was then addressed. A range of explanations were given (see Table 2).

A third of the doctors and a quarter of the nurses said that they did not know how these dressings aid wound healing. A similar number thought they are able to do this by preventing bacteria or infection from entering the wound.

The way in which some of the respondents attempted to deal with the apparent inconsistency of wounds healing in moist conditions - without either rejecting their previous training and practice, nor accepting in total the new principle - was to argue that the wounds healed because these dressings prevent bacteria or infection entering the wound. However, this belief appears to modify previous thinking about the cause of infection. In the clinicians' argument against the MWHT, infection was blamed on internal factors, namely the moist conditions surrounding the wound providing the ideal breeding ground for infection to develop.

TABLE 1

DOCTORS' AND NURSES' ACCOUNTS OF THE MECHANISMS BY WHICH THE DRESSINGS ASSOCIATED WITH THE MWHT PROMOTE WOUND HEALING

Explanations of how these dressings promote wound healing	Number of nurses citing this explanation (N=36)	Number of doctors citing this explanation (N=15)
Provides barrier against bacteria/infection	11	5
Keeps area/tissues moist	7	1
Serous fluid/exudate under dressings promote healing	7	-
Keeps wound clean	6	1
Protection against trauma	5	2
Keeps air out	4	1
Prevents further breakdown	3	-
Keeps wound warm	3	-
Not disturbing wound (because frequency of dressing changes is reduced)	2	2
Hydroscopic dressings draw fluid to them (Debrisan)	1	-
Keeps external moisture from entering the wound	-	1
Prevents contamination	-	1
Have bactericidals in them	-	1
Absorbs the fluid from the wound/reduces oedema	-	1
Provides an artificial skin	-	1
Kills bacteria in the wound	-	1
Don't know	9	5

Now, the cause of infection has been externalised to the pathogens in the environment outside the wound, which these dressings prevent from entering the wound. What this case demonstrates is the way in which clinicians attempt to make their environment meaningful and intelligible by ordering their observations and experiences in terms of familiar categories - even if this means that traditional wound care practices, such as exposing wounds to the air because of its 'beneficial' natural healing properties, are contradicted, albeit inadvertently.

The more consistent something is, in terms of it according with the established pattern of assumptions, the more acceptable it is and the more confidence practitioners have in their assumptions. Discordant facts either get ignored or rejected or distorted so as not to disturb the established set of assumptions. The effectiveness in clinical practice of the dressings associated with the MWHT precludes this theory being totally ignored or relegated outside the boundaries of accepted wound healing knowledge. Moreover, to do so would mean that the system is continually under attack from dissenters. Instead, distortion appears to be the way that a number of respondents sought to deal with the MWHT, as the above discussion demonstrates. However, it could be argued that distortion can only go so far in providing explanations for the success of these dressings in clinical practice, before the new principles are accepted and the structure of assumptions has itself to be modified in order to accommodate the new.

It is evident from the data in this section that there exist different levels of understanding about the MWHT amongst the various doctors and nurses studied. Also evident are the different levels of understanding which clinicians have of wound healing in general. Whether healing does or does not occur depends, according to some respondents, on the moisture (referred to in the term the moist wound healing theory) and its properties (3 nurses, 1 doctor) and on the wound type (7 nurses, 3 doctors). Thus some respondents argued that certain wounds heal moist while others have to be dry (2 nurses, 2 doctors). What we have here is an example of the way in which clinicians retreat to the sanctity of 'differences', 'specificity' and 'uniqueness' when confronted by generalities and universal laws, such as those contained in the MWHT, because the former is a world which they understand and feel in control of while the latter is not.

The importance of warmth for a healing wound is not a concept with which most nurses appeared familiar, particularly with respect to the use of conventional wound dressings. Therefore, it is not altogether surprising to note how few nurses mentioned the role of these new dressings in promoting healing through keeping the wound warm.

3.6.3 What is the Moisture in the MWHT?

The majority of the nurses thought the moisture under the dressings associated with the MWHT to be exudate (14 nurses) or serous fluid (9 nurses). Many nurses did not know (9 nurses). There was much uncertainty amongst the nurses regarding the purpose or beneficial properties of this moisture. Many did not know (9 nurses) or did not think it had any (2 nurses) - although 13 nurses thought it did. In many cases their comments demonstrated that rather than actually understanding (or even believing) that the moisture serves some purpose, they merely reported what they had been told, with comments such as "They say it does" or " They say the exudate from the wound actually helps in the healing process." When asked how, one nurse responded:

" It just does.....it's printed in the literature and someone mentioned it. They say it doesn't hurt to have a bit of discharge under the dressing."

When asked whether she was convinced of this, she said "no".

This tendency to distance themselves from their comments by attributing them to others reveals nurses' uncertainty and lack of confidence in accepting what others have stated with regard to this new knowledge. The reasons for this may, on the one hand, be due to the fact that such knowledge emanates from commercial enterprises, which lack credibility in the eyes of many clinicians because their 'raison d'etre' is seen to be profit maximisation and not health promotion. On the other hand, their perceptions of exudate and their practical experience of dealing with it may conflict with the ideas arising from the MWHT about it. For example, the above quote, where the nurse uses the term "discharge", with its overtly 'dirty' and 'polluting' connotations, instead of exudate, perhaps illustrates the negative perceptions which nurses have of exudate. Conventional wound management practices dictate frequent dressing changes, because dry cotton-based dressings quickly become soaked with exudate, thus providing a medium for bacteria to enter the wound, or encrusted with it. It is little wonder then that nurses, who have traditionally viewed exudate in a negative light because of the problems it creates in clinical practice, now question its positive and

beneficial effects, believing that if it had any, their practice would have reflected this.

The nurses' lack of understanding of the beneficial properties of exudate should not, however, be regarded merely as a deficiency on the nurses' part, so much as typical of the general lack of understanding which prevails amongst most clinicians about it. Indeed, exudate as a focus of enquiry has received scant attention, even from the scientific community, with the result that, until recently, little theoretical understanding of its properties actually existed. This may be because until the development of materials with properties capable of maintaining exudate in a liquid state on the wound surface, scientific investigation of its properties and mode of action in vivo was difficult to conduct.

3.6.4 Characteristics of the Dressings Associated with the MWHT

In relation to the nursing management of wounds the MWHT can be regarded as the 'science' - representing a scientific view of the healing process - and the various synthetic and semi-synthetic dressings as the 'technology' - the physical embodiment of it in artefact. Various materials have been produced which contain properties capable of creating the moist and warm conditions said to be conducive to healing. There are at present a whole range of dressings based on this theory, variable in structure and properties, appearance and methods of use. Therefore it cannot be said that there is an **exact** technological embodiment of the MWHT or indeed only **one**.

Despite the variability of the characteristics of the dressings based on the MWHT, one feature common to all of them is that they do not require the daily changes necessary for conventional dressings. The various manufacturers offer different guidelines for leaving their dressings in situ, from two or three days to a week and more, although these recommendations are not firmly fixed; their usage is constantly evolving and with it, one could argue, what is considered the correct and incorrect way of using them.

It is precisely this rather unusual feature (compared to conventional dressings) which was explored with the nurses because of its important implications for wound management: essentially, by what criteria do the nurses determine the length of time that these dressings are left in situ? Do they follow the manufacturer's guidelines or are they influenced by clinical factors? For some nurses the state of the wound (4 nurses) and the dressing itself (10 nurses) determined how long the dressing is left on the wound; more specifically, the dressing remains in situ until it, for example, wrinkles up or ruffles off (3 nurses), leaks or the exudate becomes excessive (3 nurses). Other nurses spoke of leaving these dressings on the wound for between three and seven days (4 nurses), four to five days (3 nurses), one week (4 nurses), seven to ten days (2 nurses), two weeks (1 nurse) and in some cases months (1 nurse) and indefinitely (2 nurses).

As well as inter-unit differences in the length of time that these dressings were left in situ, there were also intra-unit variations. The nurses in the three units under study used different criteria to determine how long to leave any of these dressings in place. For example, the state of the dressing was more likely to determine when it was to be removed in Unit T than in Unit S, where the length of time that the dressing had actually been on the wound determined its removal. Comparing comments made by respondents within the same unit, we find, for example, one nurse being guided by the state of the wound, while another, caring for the same patient, takes more note of the manufacturer's instructions, which state the number of days that the dressing should ideally be left on. The end result, one could argue, is inconsistent patient care.

3.7 ATTITUDES OF PRACTITIONERS TO THE MWHT AND ITS ASSOCIATED DRESSINGS

As may be expected of such a controversial innovation, there were mixed opinions over both the theory and the products associated with it. For example, there were as many nurses who approved of the theory (8 nurses) as were suspicious of it (8 nurses).

Some nurses felt they were unable to pass comment on the MWHT either because they did not know anything, or much about it, or did not understand it (8 nurses). The use of terms such as "mad", "alien", "unlikely" and "it doesn't sound theoretically possible", were essentially bound up with the fact that the MWHT contradicts what nurses have been taught about wound healing. Some of the doctors were unsure of their reactions to it, although several seemed keen to learn more. One doctor regarded it as a somewhat "unusual opinion", which he described as "doctor speak" for "we've not heard of it before but we'd be interested to hear more".

If caution and uncertainty described the overall reaction to the MWHT, the reactions to the associated dressings were more clear-cut. Opinion seemed to be divided between those who liked them and found that "they work like magic" and those who did not like them because they found their appearance disturbing, because they did not know what these dressings were supposed to do, or did not understand them. However, one nurse gave another reason for why she thought nurses disliked these dressings:

"Some nurses don't like Op-Site because they probably need less care from the district nurse, but this worries some nurses, because they feel neglectful."

It does appear that attitudes have changed towards this innovation in wound care - not because the doctors or nurses have somehow come to believe in the validity of the theory, but because the dressings work in practice - they heal wounds. Conversely, the attitudes of others have become further entrenched because these dressings have failed to work for them in practice, thus more a case of induction rather than deduction and experience ruling out that which has been scientifically established. Those nurses and doctors who had seen them work very well in some cases and not in others had mixed feelings and in many instances did not know what to think of them. It may of course be that some individual nurses and doctors have privately revised their patterns of assumptions concerning healing because of the MWHT, but that is not to say that this has occurred collectively, as public assumptions, and it

can be said social norms, have a tendency to rigidity and cannot be easily or quickly revised.

It has been said, not least by some nurses themselves, that nurses are generally change-resistant. Instead of embracing the new, they return to the security of the old and do what they have always done. The case of the MWHT and related dressings appears to confirm this view, yet it does so only superficially. On a deeper level, it shows that most nurses are willing to embrace the new and that long-standing and entrenched assumptions can be changed if nurses can see positive results in practice.

Some of the respondents recognised that as well as there being advantages in using these dressings, there are also recognised disadvantages. However, instead of relating them to problems inherent in the dressings themselves, we find either nurses (4 nurses) or patients (4 nurses) being blamed for them. Thus the problems associated with applying OpSite were blamed by the nurses on nurses, for simply not knowing how to apply it properly. Moreover, OpSite's tendency to come off sooner than intended was blamed on the patients, for moving too much, particularly for patients with pressure sores, where the friction from moving around on the bed can cause it to rub off.

From the comments given by the nurses it seems that the use of these new dressings has been more successful in changing wound care practice than the MWHT has been in changing nurses' understanding of the wound healing process. However, almost as many nurses said that using these dressings had not changed their wound care practice (16 nurses). This claim is supported by the fact that nearly all of the nurses and a substantial proportion of the doctors interviewed (33 and 9 respectively) still believed that exposing wounds to the air promoted wound healing. One doctor thought this practice to be "theoretically very good", although six of them did think its effectiveness to be dependent on other factors.

A significant proportion of respondents still practised either leaving wounds uncovered (11 nurses, 10 doctors) or drying them using fans (3

nurses,3 doctors), hairdryers (11 nurses,6 doctors) and piped oxygen (8 nurses,7 doctors), alone or in conjunction with certain topical solutions, such as eusol and paraffin (2 nurses), gentian violet (4 nurses, 3 doctors) and egg whites (5 nurses). Overall, the practice of blowing oxygen onto wounds received little verbal support from the doctors, despite the fact that some of them still employed this method to promote wound healing. The practice of exposing wounds to the air appeared to be defended on a number of levels. On a 'scientific' level, exposing wounds was thought to inhibit the proliferation of anaerobic organisms and those thriving in 'wet' and 'soggy' conditions and thus prevent the development of infection. On a more common-sense and tacit level, this practice was defended because "it seems healthier that way" or more "natural".

Overall, it is clear that conflicting ideas abound on the role of drying in wound healing, perhaps illustrating the general lack of consensus in the field of wound management. This may result in inconsistent therapy, with certain wound types being exposed by some carers and covered with various dressings by others. The reasons behind these practices are often unclear. Many of the respondents did not have a clearly formulated rationale for drying wounds and some of them readily admitted to not actually knowing. This was particularly true with respect to the practice of blowing oxygen over wounds. There seemed to be little awareness or understanding of the effects which the various practices may have on the healing process - particularly the extremes of temperature resulting from the use of hot or cold air from fans and hairdryers as cited by some doctors.

Thus while we can say that the theory of the moist wound healing environment appears to be gaining ground, it has not been universally accepted, as one can find clinicians practising techniques which have not only been discredited by this theory, but which continue to be used, because traditionally they always have been, by practitioners who do not appear to understand the reasons for doing them. One explanation for this may be because work based on empirical knowledge is more reliably grounded than practices underpinned by somewhat unreliable theoretical knowledge.

There is much in this section of the study which supports the views held by numerous writers on innovation and its diffusion in different social systems, namely that new knowledge and techniques hardly ever involve total displacement of earlier knowledge and practices. Rather, the new tends to get added to the existing stockpile of knowledge, and the introduction of new techniques and the adaptation of old ones takes place incrementally.

3.8 CONCLUSIONS

The findings in this section of the study have demonstrated that the nurses' knowledge of the general principles of wound healing was seriously deficient, even on issues they thought they knew about or could be expected to know about, such as granulation and infection. The use of different methods to elicit this information only served to confirm their limited and superficial understanding. Thus nurses' confidence in their knowledge of certain aspects of the wound healing process is grossly misplaced.

The proposition discussed in the previous chapter, that clinicians' different perceptions and experiences colour what they see and the meanings they attach to their observations, has found further support in this section of the study, particularly in terms of the variable descriptions nurses offered of different wound states, for different nurses clearly experience different things. Practical experience informs and colours clinicians' perceptions of new knowledge as much as it does established knowledge. From the comments made against the MWHT, binary oppositions of **dry** and **clean** and **moist** and **dirty** can be observed. Dry wounds are implicitly or explicitly regarded as clean because they are free from exudate and discharge and the negative connotations associated with such wound emissions. Moist wounds, on the other hand, tend to be regarded as dirty because clinicians' training and clinical experience has taught them that moist wounds are potentially infected wounds and thus implicitly 'dirty'. However, the researcher would argue that such binary oppositions have less to do with simple hygienic categorisations of clean and dirty, and more to do with their symbolic representation.

Firstly, managing wounds according to the conventional wisdom that wounds have to be kept dry, takes up a great deal of nurses' time, because they have to be frequently cleaned and dressed. It is precisely the effort expended by nurses in this regard which is responsible for them conceptualising such wounds as clean. Indeed, to do otherwise would be an indictment of their actions. In contrast, wounds managed along the lines of the MWHT may be conceptualised as dirty because the dressings associated with this theory ostensibly require much less nursing time and attention. They do not require daily changes and are 'promoted' by their manufacturers as easier and quicker to apply than the various layers of conventional dry dressings, although the time taken to acquire the necessary application techniques governing these new dressings means that nurses do not initially experience any saving in time.

Secondly, the concept of dirt or, according to Mary Douglas in 'Purity and Danger' (1966), pollution, is a reaction to protect "cherished principles and categories from contradiction". Therefore, what is unclear and contradicts prevailing wisdom, as moist wound healing does, tends to be regarded as unclean. In other words, that which is unclear becomes unclean. Moreover, as far as Douglas is concerned, when "pathogenicity and hygiene" are abstracted from our notion of dirt, we are left with the old definition of dirt as "matter out of place."

There is also a sense in which the MWHT and its related dressings can be viewed as dangerous, because of the association of a moist environment with bacterial proliferation and infection. Indeed, some of the early users of OpSite have been cited in the literature on this dressing as holding precisely this opinion of it. According to Douglas, "attributing danger...is one way of putting a subject above dispute. It also helps to enforce conformity." The MWHT may be seen as encouraging conformity but not to itself, but to the traditional view of healing. As long as the MWHT is disputed and regarded as an anomaly, the primacy of the prevailing paradigms concerning wound healing and wound care practice remain. However, the success in clinical practice of the dressings associated with the MWHT has ensured that the primacy of prevailing wisdom about wound healing is continually being challenged. What all this demonstrates is not so much a schism in wound healing knowledge and

practice, but a period of hostility before reconciliation.

On another level of analysis, there appears to be an inverse relationship between the actions of wound dressings and the role of the nurse. The function of cotton-based dressings is to absorb, cover, conceal and only indirectly to heal. Indeed the idea that wound dressings can influence wound healing did not emerge until the Second World War; before then it was more a case of what was put on the wound which was thought to affect the healing process. The essentially passive role which traditional dressings perform means that nurses have an important active role to play in the promotion of wound healing.

In contrast, with the advent of synthetic and semi-synthetic wound dressings which actively create the optimum healing environment by controlling the humidity, temperature, gaseous concentration and protecting the wound from infection and secondary trauma, the role of the nurse in wound management is undergoing a radical shift. No longer involved in the daily ritual of cleaning and dressing, nurses are increasingly being forced to adopt the role of a passive, patient observer. For many, this contradicts much of their training and professional socialisation into the role of active carers.

The implications for nurses of their changing roles are two-fold. Firstly, the need for their 'gaze' (Foucault, 1973) to be trained so that they know what they are observing becomes all the more important. Secondly, wound management is an area where nurses have traditionally been in control, free from too much interference by the medical profession, but with the shift from being active to passive participants in wound care, nurses may run the risk of losing some of this control. The association of moist wounds with 'dirt' and 'pollution', as discussed above, may also be understood in terms of the nurses' insecurity concerning their status. In other words, the challenge which the MWHT presents to their knowledge base is symbolically read as a threat to their professional standing and position in the health care hierarchy.

Despite the views of some of the doctors and nurses in this study, that doctors understand the wound healing process in a more detailed and

technical way than do nurses, there is much in this study which points to the contrary. The data indicate that as far as the management of wounds is concerned, doctors and nurses operate on very similar principles and have very similar experiences. A superficial analysis of some of the clinicians' comments about wound care matters could be seen to support the stereotypical distinction between what is considered appropriate for doctors and nurses to know - to the doctors the theory, to the nurses the practicalities but a more reflective reading of the data indicates that doctors are as much pragmatists as nurses. They are more concerned with whether a dressing works in practice than with the theoretical principles underlying its mode of action. They are also as equally suspicious of the new, and appear to be little interested in theoretical matters.

One could argue that it is the empiricism of modern medicine, with its central emphasis on seeing, which is responsible for the convergence of the two professions in this regard. It appears that for clinicians, particularly nurses, there seems to be no more to healing than what is 'visible' and 'observable'. The extent to which their 'gaze' is trained in this regard and they are able to make informed assessments is certainly under question given the findings from various sections of this study. This central concern with the 'gaze' at one and the same time bestows primacy to perception and experience while subordinating theory, with the result that theory occupies a marginal position vis-a-vis clinical practice at best, and becomes totally alienated from it at worst. The case of the MWHT, one could argue, provides an example of the marginality of theory, where the clinicians place great emphasis on the artefacts, namely the dressings associated with the theory, while the theoretical understanding of their mode of action is either not known or understood, or simply regarded as of secondary importance.

The findings from this section of the study indicate that nurses can adopt innovatory practices without knowing or fully understanding the principles underlying them, but it has also shown the consequences when theory and practice are not synchronised and the rationale for using these dressings is not fully explained or understood by practitioners involved in wound management. The belief that doctors are sufficiently

knowledgeable about recent advances in the wound care field as to hold informed discussions with nurses about the various products has not been borne out by the findings from this study. It is evident from the data that doctors rely on nurses for advice on wound management issues; that this reliance is at times seriously misplaced is equally evident. Implicit in all this is that the doctors' own knowledge of this area is scanty. The question of whether doctors' reliance on nurses to inform them of innovations in the wound care field is not equally misplaced depends on the level of awareness which is required.

The data in this study indicate that nurses are 'earlier adopters' than doctors of innovations in the wound care field, and frequently act as sources of information and evaluators of innovations for them. If all that a doctor requires is to be merely informed about innovations in this field then nurses can be quite successful. If, however, a more detailed understanding of the dressings and the principles underlying them is required, then doctors may be wrong to rely on the nurses for such information. Nurses may be more aware than doctors of innovations in the wound care field and know something about the theoretical principles underlying them, yet it is clear that nurses do not know as much as the doctors give them credit for. The confused nature of nurses' knowledge about the dressings associated with the MWHT, the rationales for their use and understanding of their mode of action demonstrates that they are able to provide doctors with only a very generalised and superficial understanding of such matters.

The doctors' defence that their lack of direct involvement in wound care (and, one could say, their lack of interest) excuses them from the responsibility of being knowledgeable about wound matters, and explains their reliance on nurses for information, should not be accepted uncritically. Despite the rhetoric, in practice doctors in different units often wield a significant amount of authority. Implicitly or explicitly they often decide what products are used. This was evident from the comments made by many of the nurses and supported by some of the staff at Smith and Nephew Ltd, as will be discussed in the chapter which follows. It is perhaps an example of the medical profession's power that as uninterested and lacking in knowledge about wound healing

matters as doctors may be, they are still able significantly to influence wound management practices. Thus while on one level nurses are regarded as relatively autonomous concerning wound management regimes, with doctors merely 'rubber stamping' their decisions, on a deeper level one could argue that 'hidden' doctor/nurse games are enacted in such situations. It may be that nurses' socialisation and deferential attitudes towards doctors compels some of them to say that doctors exercise the final authority. In a desire to portray themselves as liberal and non-patronising individuals some of the doctors speak of nurses being in control.

The above discussion appears to confirm and confound, at one and the same time, a particular perspective of doctors and nurses vis-a-vis medical and nursing knowledge. On the one hand it seems to dispel the notion of the medical profession as gate-keepers of nursing knowledge, in a bid to monopolise the esoteric knowledge of healing. Yet on the other it could be argued that it confirms the view that certain, perhaps uninteresting or non-technical features of therapeutic knowledge, are relinquished by doctors to other paramedical and nursing personnel.

However, despite the fact that doctors rely on nurses for advice on wound management issues, the incongruity of the situation is that they do not appear to have high expectations of nurses regarding their knowledge of wound healing. In fact, their expectations of what nurses should know were frequently lower than those of the nurses themselves. Another reading of this material is that doctors do not actually know what nurses know about wound healing, hence their rather vague and highly generalised responses. Given the lack of awareness amongst doctors as to the knowledge which their medical colleagues are thought to possess, the above assertion concerning nurses should not come as a surprise.

There appears to be a dichotomy between what nurses consider to be the 'ideal' basis of their wound management practices and what actually occurs in practice. The majority of the nurses interviewed felt that those involved in wound care should know everything about the wound healing process. Indeed, many were highly critical of their own present

state of knowledge regarding such matters and spoke of the need for improvement for a variety of personal and management-orientated reasons. In reality, however, it was evident that the day-to-day nursing management of wounds was not informed by nor based on any systematic knowledge or understanding of the wound healing process. One reason for this was that such knowledge was considered somewhat superfluous to their practice, even though current day research and literature in this area stresses the importance of synchronising theory and practice. This kind of attitude was, however, more prevalent amongst the doctors than the nurses, in terms of their beliefs about nurses as well as of themselves.

It could be argued that the doctors' and nurses' lack of knowledge about the wound healing process, and their view of this kind of knowledge as virtually irrelevant to their management of wounds, is partly responsible for the wound problems, such as infection and failure to heal, which they encounter in clinical practice. Certainly, if such knowledge does not underpin their day-to-day management of wounds, clinicians such as those interviewed in this study do not always know what effect is likely to occur as a result of some of their actions, nor why. In many instances, clinicians' very lack of knowledge of the various agents used makes them overlook the possibly deleterious effects their actions are having on a wound.

On the other hand, it may not be so much lack of knowledge, but the variable understanding which clinicians have of the healing process which accounts for the problems they encounter in clinical practice. For example, the lack of consensus between the clinicians in this study over the characteristics of an infected wound and one healing normally may lead one nurse to judge a red and swollen wound as infected and another to regard it as being in the early stages of healing.

The existence of conflicting ideas about wound healing may be responsible for the variable understanding which clinicians have of the healing process. This, together with the availability of a range of wound care products, may account for the variable use of different management regimes in clinical practice, and the development of certain

wound problems because of the resultant inconsistency in patient care and inadequate understanding by clinicians of the consequences of their actions. Thus, the failure of a wound to heal may be due to different nurses applying the different theories about healing, such that on some occasions a patient's wound is dressed twice daily with cotton-based dressings because the particular nurse holds to the 'keep wounds dry' idea, while on other occasions it is covered with a polyurethane film dressing and left for two weeks, because this particular nurse supports the theory that a moist wound environment promotes healing.

However, the researcher would argue that it is not so much the existence of different theories about healing which is responsible for the variability in clinicians' understanding of healing and their employment of different wound management regimes, but the influence of non-clinical criteria. The nurses and the doctors in this study felt that members of their two professions have a rather simplistic approach when it comes to choosing what to use on wounds. The data indicate that their choice of agents and dressings is not based on clinical or technical criteria alone but a complex interplay of social, institutional and economic factors, such as personal influence from their colleagues and commercial influence from sales representatives, availability, cost, following the dictate of others, ward policy and custom and practice. However, this kind of argument is not intended to be perceived as supporting the notion that if non-clinical influences are eliminated from clinical practice, then the kind of problems discussed above would cease to exist. The researcher would argue that in the first instance, medicine and nursing cannot be separated from the social context in which they are practiced, and so it follows, from the various socio-economic and political influences contained therein. Secondly, the history of wound care clearly demonstrates that there has always been a lack of consensus about how to treat wounds. The MWHHT is not the cause of this confusion; it has merely exposed the illusion of consensus which existed in this field. To argue otherwise is to judge the present situation against some unstated 'ideal type' situation, where choice of treatment is based on clinical criteria alone and all clinicians possess a shared understanding of what these are. Thus, if, as we have seen, scientific principles play a small part in clinicians' understanding of the healing

process and their management of wounds, the existence of a dominant theoretical paradigm (as drying wounds was and the MWHT is attempting to be) will not eliminate the variety of wound management techniques which co-exist.

In analysing the impact of the MWHT in the world of wound healing one could be forgiven for seeing it as the cause of much confusion and the disruption of an ordered and understandable world with respect to wound healing. Indeed, there is nothing new about the way in which the past is portrayed in a positive light when challenged by something new. The researcher would, however, argue that this 'stable' world of wound healing, prior to the introduction of the MWHT, was built on an 'illusion of consensus', perpetuated through 'traditional' practices and underlying assumptions which were rarely questioned. What the MWHT has done is challenge this structure of assumptions and the conservative bias which has developed in the wound healing field.

The case of the MWHT illustrates that when the physically invisible but socially marked boundary of implicitly accepted knowledge of healing becomes challenged practitioners begin to look at, and perhaps question, their previously take-for-granted knowledge base and practices. Only then can they see that some of them are indeed built on very shaky foundations.

Thus with the MWHT, we can see a case of disputed boundaries - but only initially - for through incorporating the new observations into the corpus of existing knowledge the threatened disruption of these boundaries, and through them the status quo, is averted. The dispute is thus resolved not by 'excluding' this deviant case but by actually shifting the boundaries to 'include' it so that an 'illusion of consensus' can once again be established. What we have with the case of the MWHT is an illustration of a power struggle being waged between research scientists and bedside clinicians over knowledge boundaries. These boundaries are not immutable or fixed by nature, but permeable and shifting. They can be seen as conventions where different groups upholding their own social and professional interests 'draw the line'. As far as the scientists go, they 'draw the line' concerning wound

healing knowledge around that which can be observed via a microscope in the social microcosm of the laboratory, while the nurses draw the boundary line around that which can be observed by the naked eye in the macro-cosmic social world.

Using this framework of analysis we can see that with the discovery of moist wound healing the scientists have shifted the focus of inquiry from the external environment being an important determinant of wound healing to the internal micro-environment of the wound. What the clinicians then appear to do is shift the whole thing right back out again into the external world, in order symbolically to re-establish their control over this area of knowledge and, with it, their status. The emphasis of the MWHT on the micro-environment of the wound and the inner workings of the body serve to alienate the clinicians from their patients. It relegates the external environment which they both share, and which was previously seen as important in healing wounds, to a secondary status. We could also regard this struggle, over whose version of the healing process is to gain hegemony, not just as an inter-professional struggle, but also as a gender-based one, between the predominantly female nurses who seek to prevent their apparent monopolisation of esoteric knowledge relating to wound care being taken over by predominantly male scientists, thereby further subordinating their status as independent health care practitioners.

The analytical tool of boundaries and concepts of 'internal' and 'external' are also useful when considering the nature of wounds. Are wounds 'internal' or 'external' manifestations? Patients may on occasion feel totally alienated from them - as if they are not part of their body. Certainly some of the nurses discussing patients with malignant lesions felt that this was the case in many instances. For bedside clinicians a wound is an 'external' phenomenon, visible to the naked eye on the outside of the body, while for research scientists wounds are more 'internal' manifestations - only properly observed through a microscope. Viewed this way it seems perfectly appropriate for them to hold different visions of the healing process and the factors thought likely to influence it. That is not, however, to say that a

consensus exists between all clinicians on this subject. The findings from this study have certainly demonstrated that.

As well as putting forward an external/internal dichotomy and observing the way different professional groups, actively in the case of scientists, and reactively in the case of nurses, seek to make sense of their observations, there is a sense in which the traditional view of the wound healing process and the new theory share some common ground - namely their emphasis on the natural. It must, however, be said that they approach the concept of what is natural from totally different perspectives. The previously dominant view regards it as natural for wounds to be dried by the air/oxygen in the atmosphere. After all, oxygen is natural and all living things need it to survive. Adherents of the MWHT are of the opinion that by covering a wound with a synthetic or semi-synthetic covering, conditions conducive to wound healing are created which allow the natural cleansing and healing properties of the body to repair itself.

The data indicated that few of the respondents had internalised the new theory of wound healing, or understood its implications in terms of what is currently considered beneficial to the wound healing process. From an analytical point of view, one could say there are two fundamental reasons for the confused nature of the nurses' understanding of the MWHT and associated dressings - namely their lack of knowledge and suspicion of the new.

Firstly, the nurses appear to be using these dressings either without knowing about the principles on which they are based (the MWHT) or not understanding them. Many clinicians said that their lack of knowledge about OpSite and its mode of action affected their adoption of it, but why should this be the case? It is evident that there is much information available about these dressings and the associated theory, whether from formal or informal sources. However, rather than focussing on the objective amount of information which may or may not be available, one needs to question just how accessible this information is. Does everyone have equal access to it, and what do people mean when they say they do not know enough about it? Does it mean that they are

necessarily lacking information about it, in terms of amounts, or is it more subjective than that? It may be that what they are saying is that they do not understand what they have been told or read about it, and that it does not fit within their existing frames of reference. Or is it perhaps that, as 'radical' as the MWHT is, in terms of overturning conventional understanding of the healing process, the channels adopted to diffuse information about it have failed to make a clear connection between the MWHT and related dressings. They may also have failed to impress upon clinicians the 'revolutionary' nature of the underlying principles, such that these new dressings become perceived as nothing more than just **another** range of dressings to add to the existing stockpile of wound management products. Thus the internal fissure in wound healing knowledge and practice which such innovations may be expected to cause is prevented, or at least temporarily postponed, because the new is thus assimilated with the old.

The credibility which clinicians attach to the channels diffusing information about these innovations in wound care will also affect their perceptions of them. The 'deviant' products emanate from dressing manufacturers, who could be said to occupy a marginal position vis-a-vis the health care system and who certainly lack credibility in the eyes of many clinicians. The clinicians often distrust information from such sources because of the profit-orientated basis of their operations.

Secondly, the MWHT fundamentally conflicts with the theories about wound healing which clinicians, particularly nurses, have been taught, and on which they have perhaps based their practice for years - namely that wounds and dressings have to be clean and dry, and that moist, warm conditions are conducive to the development of infection. Thus in advocating a moist wound healing environment as the 'ideal' environment for healing, this theory challenges two fundamental tenets of nurse education about wound healing. Furthermore, the nature and use of these dressings challenges nurses' basic wound management techniques. On the one hand, these new dressings are made from a range of synthetic and semi-synthetic materials, very different in appearance and function to the traditional natural cotton-based conventional dressings, thereby confounding their entrenched notions of what wound dressings should look

like and what functions they should perform. For example, with the cotton-based dressings, the wound is covered (and thus hidden), whereas with transparent dressings such as OpSite, the wound is clearly observable, something which perhaps does not suit many nurses, particularly on the occasions when discoloured exudate can be observed. Observing exudate in such a form (as opposed to seeing it dried and encrusted on a gauze dressing) is also something unfamiliar to the nurses and thus liable to make them suspicious of it.

On the other hand, the varying methods of applying these new dressings and the unconventional norms governing their removal (particularly because these dressings do not require daily changes) require nurses to acquire new skills and conceptual frameworks. Thus its complexity of use may have significantly affected the speed of adoption of OpSite, particularly if the users perceived it as difficult or time-consuming to apply compared with their current wound dressing procedures. Thus it is not surprising that many nurses were highly suspicious of both the theory and the dressings, and were consequently confused and slow to adopt them. The adoption of innovations is often influenced by rational reactions to anything new which does not sit comfortably with current understandings or perceptions of the world.

However, one could argue that such actions reveal not so much lack of knowledge per se, or highlight the sceptical nature of nurses towards anything new. Instead, it seems that one has to focus attention on the type of knowledge which is being disseminated and the manner of its diffusion into nursing practice. Any new knowledge or technique which has not evolved from the practitioners' perceived needs of a given situation, but is imposed on them from external sources or from above, is liable, according to Rogers and Shoemaker (1971), to meet resistance, distrust and slow adoption. This is particularly the case if what is presented as new is incompatible with existing knowledge and practices and requires the adopters to re-conceptualise fundamental beliefs and attitudes and learn new skills. Resistance is particularly marked if the adopters feel that they are somehow personally being attacked and their old practices discredited, or that adoption of the new carries certain negative connotations. In the case of the MWHT and related dressings, if

the nurses are seen to embrace too quickly that which contradicts and challenges their training and experience, then it may perhaps be regarded as tantamount to admitting that they have been doing it wrong all these years! Also it is generally viewed that innovations which involve minor alterations or modifications, representing a kind of evolutionary development, are more readily accepted than radical, revolutionary alterations.

On another level one could ask whether nurses' knowledge on other matters of theory and practice are not likewise confused and uncertain. In this case, what we have here may prove to be less of an exception and more of an illustration of the wider problem afflicting nurse education and clinical practice. Or could it be that the nurses' confusion over the MWHT and related dressings is merely indicative of the general confusion which exists amongst health care professionals concerning this new theory and dressings? Certainly, the comments made by some of the doctors in this study confirm this point of view.

The development of the MWHT is not, one could argue, simply a case of new versus old, right versus wrong, but perhaps science versus non-science, and accepted versus potentially 'provisional' knowledge. The MWHT represents a scientifically developed theory of the wound healing process, whereas drying wounds seems to have been based on observations which can be traced back to Hippocrates, who, it was said, preferred to leave wounds to dry once they had been washed. Nature, he believed, would best heal the wound (Scales, 1963). Observations and beliefs such as these appear to have been accumulated over the years and passed, like folk-lore, through the apprenticeship system of nursing into ritualistic practice.

Thus if nurses are distrustful of and resistant to this new theory, it may not be related to their suspicion of new knowledge per se, but rather to their unfamiliarity with particular types of knowledge - the theoretical and the scientific. Nurses' clinical practice is not often informed by theoretical principles. They appear to become aware of theoretical changes only when they have been translated into a tangible form which they can apply in their practical situation of administering

care. This is perhaps a reflection of the failure of nurse education to develop in nurses the ability critically to evaluate and analyse scientific findings, and to understand scientific principles, instead of merely teaching them how to perform practical tasks.

However, the view that the MWHT is scientific and therefore somehow represents "certain" knowledge, while that currently possessed by practitioners is "uncertain" knowledge, is somehow too simplistic. Certainly Atkinson (1977), in his analysis of the socialisation of medical doctors, speaks of the clinician as not operating in a state of "uncertainty", but rather on the "sure warrant of his stock of experience". Thus it is not so much uncertain knowledge which doctors and nurses are operating with, but rather the certainty of direct experience and personal knowledge.

Foucault (1980) speaks of a "return to knowledge" and in this sense the case of the MWHT provides an interesting example, one where clinicians, in attributing primacy to experience, appear to be arguing that it is not theory but life which matters - not knowledge but reality. Theories are perpetually changing whereas the patient's bedside, according to Foucault, is a place of "constant stable experience". This provides the practitioner with justification of his or her pragmatic emphasis on first hand experience. Indeed, the data in this section of the study have indicated the way in which clinicians use experience as a yardstick by which to evaluate novel theories.

However, despite this there is a sense in which a "return to knowledge" is occurring with a shift in the balance of power from the clinician to the research scientists. The latter's strength lies not just in the fact that they have a theory of healing, which the clinicians do not, but also that their theory, as embodied in various dressings, actually works. Thus it may not be just a case of science versus non-science but an illustration of the historical social and professional conflict of interests between medical scientists and clinicians. Looked at in this way, the MWHT may be regarded as the "bench/lab" versus "bedside" case study.

The sources of nurses' knowledge about the MWHT and its associated dressings reveal the dichotomy which seems to exist between the way knowledge is thought to be disseminated and indeed ought to be, and the way it actually is in practice. There seem to be certain traditionally recognised channels for disseminating knowledge, for example, through written materials and formal teaching. That these are failing to fulfil their roles adequately with respect to keeping nurses up-to-date with new information is evident from their comments. That nurses still believe that these are the appropriate ways for nurses to be updated, was equally evident from their demands for more written materials and more formal teaching.

Clinicians learn about the general principles of wound healing and wound care via formal and informal networks. Doctors and nurses, for example, receive formal tuition in their respective medical and nurse training on the physiological aspects of the healing process, although they speak of learning more informally through experience, observation in clinical practice and word of mouth. They also become aware of the new dressings associated with the MWHT formally and informally. Compare the doctors' citations of literature (notably journals) with the nurses' references to information printed in and on the dressing containers. The different types and levels of knowledge contained therein may not only reflect their different roles vis-a-vis the practice of wound management, with nurses as direct carers and doctors as peripheral advisors. It may also metaphorically illustrate through the low order and high order hierarchies of knowledge - the nurses' subordinate role in the health care system.

There seems to be more than a mere passing similarity between the way that nurses learn how to use these new dressings and the way that they as women learn how to cook certain products and use certain cleansers - by reading the instructions on the backs of packets and bottles. This assimilation of everyday, domestic practices (and, as we saw in the section on malignant lesions, categories and concepts), with all the ideological and cultural factors associated with them, into nursing practice should not be so much a revelation as sociological confirmation of the nature of nursing.

Amongst the many features that we can observe about the diffusion networks of the MWHT and its associated dressings are the two levels of discrepancies, between how theoretical knowledge as information is and ought to be disseminated, and how technique as knowledge embedded in practice is and ought to be disseminated. However, nurses not only attribute more formal and structured diffusion channels to certain types of knowledge as opposed to others, they also ascribe differential status to formal and informal modes of knowledge diffusion, the former being regarded as the 'proper' way and the latter the less desirable.

Implicit in the comments made is that a superior form of knowledge is disseminated via formal channels, namely theoretical knowledge, while an inferior, more pragmatic, task-orientated type of knowledge is disseminated via informal channels. It must be said, however, that knowledge acquired formally need not only be theoretically 'pure' knowledge; it can also be 'applied' knowledge of skills and technique.

Moreover, there was also a tendency amongst the clinicians to attribute to others a more formal and structured method of learning. Thus while some respondents thought that 'others' learn about the MWHT and associated dressings through, for example, reading, in reality most learn through their clinical experience and commercial sources. It may appear that by positing a distinction between how they themselves and others acquire such knowledge the nurses are passing comment on the sources of this knowledge. However, on closer reflection, it is not merely the sources of knowledge which are at issue here but the type of knowledge which is being diffused.

The important role which informal channels play in diffusing knowledge was re-affirmed by a totally unexpected source, namely the research process itself. It became increasingly clear to the researcher (judging by the various comments made by some doctors and nurses), that through the study and her questioning of the respondents, some doctors' and nurses' level of awareness of this theory and associated dressings was being raised - not their understanding of it, it must be said, but their awareness. Indeed, some of the clinicians spoke of the interviews themselves having given them the incentive to proceed to learn more about this whole area. One could argue that the above discussion

illustrates the point that the field of study is rarely left untouched by the act of doing research, despite the fact that some traditional, and perhaps more quantitative research method texts, do not recommend that this should occur.

This section concludes this chapter, and indeed, the part of the thesis devoted to presenting the findings from the clinicians' interviews. The chapter which follows, Chapter Four, begins the third and final part of the study. Collectively, Chapters Four and Five focus on the 'supply' side of the case-study, in contrast to this and the previous chapter, which can be said to have presented the 'demand' side.

Chapter Four will present the findings from interviews with the research scientists involved in the development of the MWHT. This is followed by Chapter Five which focuses on the findings from the study of the company which marketed the first synthetic dressing to be associated with this theory.

CHAPTER FOUR: THE THIRD STAGE - FROM WOUND HEALING THEORY TO
INNOVATION THEORY

4.1 THE DEVELOPMENT, DIFFUSION AND ADOPTION OF INNOVATIONS - A REVIEW
OF THE LITERATURE

INTRODUCTION

The preceding chapter focused on the clinicians' knowledge and understanding of an innovation in health care practice and the sources of that knowledge. It investigated the extent to which nurses, for whom wound care represents a substantial part of their practice, and doctors who often indirectly influence the way wounds are managed, have adopted the new dressings associated with the MWHT. In other words, the findings in the preceding chapter represent the 'demand' side of this research study. The sections that follow will focus on the 'supply' side by investigating the genesis of the MWHT and OpSite, the first dressing to be associated with this theory, and the pathways by which the latter was diffused into health care practice.

This section begins with a literature review of various perspectives on the development and diffusion of innovations, albeit to different degrees, as some are more developed and abound with literature on them, while others are relatively under-developed and have attracted little analysis. An understanding of the principal factors which determine the rate and direction of innovative activity is of interest to academics and practitioners (of all kinds), particularly with respect to developing policies to stimulate innovation in the case of the latter.

There has been little substantive work undertaken on the sociological factors and processes involved in the development of medical knowledge and innovations and their diffusion and adoption. There has, however, been more sociological investigation of the factors which influence the development of medical knowledge, given medicine's association with science and the growing tendency amongst sociologists since the 1960's to subject science and scientific knowledge to sociological scrutiny.

Scientific medicine, like scientific knowledge itself, has traditionally been thought to be guided by the values of objectivity and neutrality, free from its historical, cultural and social origins. However, an increasing number of writers from varying disciplines have criticised this view, arguing that scientific knowledge and innovations (Barnes, 1977; Kuhn, 1962; Mulkey, 1972, 1979) (and thus by implication medical knowledge and innovations) are considerably influenced by the social context in which they are produced, representing one possible version of reality and not the ultimate truth of how things actually are.

If a search of the sociological literature on the development, diffusion and adoption of medical innovations reveals a paucity of information, a similar search for material on innovations which affect nursing theory and practice reveals virtually nothing. These areas have received scant attention from academics and clinicians alike. The only directly related literature concerns the development of drugs and their diffusion and adoption by physicians. Thus for insights into the social processes of nursing innovations, there is a need to draw upon the concepts and models used in other areas, which this study will proceed to do.

4.1.1 The Development of Innovations

Many social scientists have studied the causes of technical change. The fundamental question within this field is whether science and technology come first and then markets have to be developed for the products - **technology push** - or whether technology is developed to satisfy market needs - **demand pull**.

Technology push can be from old, existing technology or from new scientific findings. Inventions are not necessarily based on prior scientific knowledge (Gilfillan, 1935). Indeed, the relationship between science and industry is usually more complex than the simple discovery and application concept frequently used implies. Price (1969) argues that rarely does a new piece of science have direct technological repercussions, although it may appear that certain advances, especially the "spectacular and anomalous", derive from the "injection of science".

Authors who argue that innovations arise from other than purely scientific factors do not form a coherent school of thought. According to one particular perspective, it is not that science shapes technology but that technology shapes technology (Winner, 1977). Many authors who support this perspective argue that new technology emerges from existing technology through gradual and minute modifications (Gilfillan, 1935). Existing technology is thus an important pre-condition to new technology (McKenzie and Wajcman, 1985), albeit not the only influencing factor. Others, however, see the entire form of a society as being conditioned by technology (Large, 1980; White, 1978). Technological determinists, as those propounding this perspective are often called, see technology as autonomous and existing "outside" of society, literally or metaphorically, and argue that changes in technology cause social changes (Ogburn and Nimkoff, 1964).

In contrast to these arguments, there are those which contend that social factors shape technology and are responsible for technological change. The notion of the social shaping of technology holds that technology does not develop as the result of some inner logic but rather as the function of a complex set of social, technical, economic and political factors. Thus, social class (Noble, 1985), bureaucratic (McKenzie and Wajcman, 1985) and gender interests (Schwartz-Cowan, 1983; Cockburn, 1985) are seen to lie behind the development of certain innovations. However, in propounding such a viewpoint care has to be taken not to present a socially reductionist account of technology, nor to regard the social categories thought to be influential as static and unidirectional.

The economic model which posits that demand or need is the dominant force behind invention and innovation has much support (Baker et al, 1967; Carter and Williams, 1957; Gruber, 1969; Myers and Marquis, 1969; Schmooker, 1966). Freeman (1979) argues that one of the reasons why the 'demand' theorists have been so influential is because they provided "for the first time ... quantitative, statistical support for this viewpoint." Prior to this, he argues, arguments had been on the basis of "individual case studies or anecdotes." However, Freeman (1979), amongst others, would argue that demand is not a sufficient explanation for

innovation, nor that need is the same as demand. According to Cohen (1953) there are a multitude of human needs which have gone unsatisfied throughout the ages. Moreover, there is a difference between recognition of an existing and a potential demand (Myers and Marquis, 1969). An innovation may be developed for which there is no immediate demand but which a firm may try to stimulate through its marketing strategies.

By re-analysing many of the studies frequently cited as proving the importance of demand factors to the genesis of innovations, Mowery and Rosenberg (1979) have demonstrated that in fact they do not provide unambiguous evidence in support of demand as the only, or even the major factor, determining the rate and direction of innovation. It must be said that some of the authors cited as 'demand' protagonists have stated that they do not support such a simple 'linear' model of innovation or argue in terms of a single factor causality (Langrish et al, 1971; Schmookler, 1966). One of Mowery and Rosenberg's (1979) major criticisms of these studies is their broad and rather loose definitions, and at times interchangeable use of the terms 'need' and 'market demand'. They and McKinlay (1981) also cite many methodological problems with respect to lack of definition of terms used and the selection bias, where only successful innovations are analysed. No wonder that "technology push appears relatively unimportant", claim Mowery and Rosenberg (1979), when the open-ended style of interview technique has been used and where:

"..business men are asked to reconstruct the decisions made in successful innovation processes. It seems obvious that no entrepreneur is going to admit to having gambled blindly on a technological potential alone, giving no thought at all to the profitability of its development....yet this in effect is the response necessary to demonstrate the primacy of 'technology push'" (p141).

The role of serendipity in the genesis of innovations does not appear to receive much mention (Buzzell and Nourse, 1967; Myers and Marquis, 1969), although it is realistic to assume that it occurs, whether admitted to or not.

A number of studies underline the prime importance of good communications to the successful conclusion of technological innovations (Burns and Stalker, 1961; Carter and Williams, 1957; Langrish et al,

1971). According to Burns (1969):

"...the mechanism of technological transfer is one of agents not agencies; of the movement of people among establishments rather than of routing information through communication systems" (p12).

The transference of ideas throughout the scientific and technological communities is important to the stimulation of new scientific and technological endeavours. Overall, the evidence seems to suggest that external sources such as vendor or potential supplier, government agencies and universities, play an important role in the idea generation phase of innovation (Mueller, 1962; Myers and Marquis, 1969), although in-house sources also play a part in some innovations (Freeman et al, 1971).

However, having generated the idea leading to the instigation of an innovation and defined the problem, the next step is to find a solution to the problem. Utterback (1971) claims that:

"...information inputs come most often from outside the firm during idea generation but that during problem solving internal sources are more heavily used" (p130).

This is corroborated by other studies (Allen, 1969; Myers and Marquis, 1969).

One of the major functions of an industry's Research and Development laboratory is to assist in solving technical problems (Gibbons and Johnston, 1974; Myers and Marquis, 1969), although certain external sources, such as industry, suppliers, government and universities also play an important part (Langrish et al, 1971; Myers and Marquis, 1969). Gibbons and Johnston (1974) claim that scientists in universities frequently contribute to the resolution of technical problems, either because of their expertise or because of the facilities at their command. Industries have, for example, been known to employ academic scientists directly as consultants or to provide financial support for university research units relevant to a company's interests. This has long been the case in the United States, and is becoming increasingly common in British higher education institutions.

The educational level of the 'problem solver' has been found to be a significant variable determining the type of information source used (Gibbons and Johnston, 1974). For example, the better educated the problem solver (university level), the more they rely on external sources of information, particularly academic and scientific sources. In contrast, those with industrial education (such as apprenticeships or knowledge gained through years of experience) depend more on information they already possess and commercial sources, particularly sales representatives, to help them overcome certain problems they encounter.

The existence of fairly lengthy time lags between the generation of a technical idea, its utilization for an innovation and its ultimate adoption, have been well documented (Enos, 1962; Mansfield, 1968). There is evidence to suggest that the time lags are getting shorter, particularly for innovations which follow on the heels of a pioneering innovation - the 'imitators' - and that they vary between industries (Utterback, 1971). However, Langrish (1969), amongst others, attacks such "constructors of lists" such as Enos, arguing that one can select suitable examples to lend support to any hypothesis. He demonstrates that for some innovations, the time lags between discoveries and their application are in fact increasing.

4.1.2 The Diffusion and Adoption of Innovations

There is at present a substantial literature on the diffusion and adoption of innovations, from fields such as anthropology, education, rural and medical sociology, public health, mass communications, economics, business and industrial management (Rogers and Shoemaker, 1971). The majority of diffusion studies look at the diffusion process retrospectively, although there are those which have investigated it while the process was still going on (Mansfield, 1971).

Much recent work has been concerned with the development of alternatives to the 'taken-for-granted' linear model of diffusion, namely, 'science discovers, technology applies, society adopts'. It is now held that this model presents an over-simplified and highly mechanistic vision of reality. The study of innovations considers fundamentally new products

or ideas involving major socio-economic changes, as well as substitute products or modifications requiring relatively small changes. Lancaster and White (1977) claim that relatively little research has been conducted into the area of simple product improvements, additions and imitations.

The traditional and most completely developed approach to the study on the diffusion of innovations, and one which has, according to Brown (1981), dominated academic thinking on the subject is the adoption perspective. On initially surveying the literature, one would be forgiven for thinking that the adoption perspective is the only perspective available for understanding the diffusion process. Studies utilizing this paradigm variously focus on the individual, household, group or firm as the unit of adoption and employ concepts such as innovators, early adopters, late adopters and laggards to explain differences in their adoption behaviour. The basic tenet of this conceptualisation is that the adoption of an innovation is primarily the outcome of a learning or communications process (Rogers and Shoemaker, 1971; Hagerstrand, 1967). Accordingly, research has focused on the factors which influence the rate of adoption, particularly emphasising the role of social networks, information flows and psychological variables, such as innovativeness and resistance to adoption (Rogers and Shoemaker, 1971; Midgley, 1977).

Advocates of the adoption perspective tend to identify the various channels of information transfer and to determine their relative importance at different stages in the adoption process. A number of them have identified a multi-stage adoption process. Wilkening (1956) for example, identified three stages of this process: the awareness, decision making and action stages. This latter stage requires instructions of how to implement the change. Other authors on this subject such as Miller (1975) and Rogers (1962) cite five stages: the awareness, interest, evaluation, trial and adoption stages.

It is generally agreed that the principal sources affecting decisions to adopt innovations are sales representatives, or as the American's call them 'detail men'. (Bauer and Wortzel, 1966; Coleman et al, 1966; Ferber

and Wales, 1958; Ryan and Gross, 1943), journals (Katz, 1961; Ryan and Gross, 1943; Stocking 1985; Wilkening, 1956), journal advertisements (Caplow, 1952; Ferber and Wales, 1958; Webster, 1969), television and radio (Neal, 1962; Wilkening, 1956), newspapers and magazines (Wilkening, 1956), direct mail (Bauer and Wortzel, 1966; Coleman et al, 1966; Ferber and Wales 1958; Neal, 1962), colleagues (Coleman et al, 1966; Crain, 1966; Katz, 1961; Stocking, 1985) and neighbours (Crain, 1966; Katz, 1961; Ryan and Gross, 1943).

However, various authors differentiate between the 'informational' and 'legitimizing' roles of the various diffusion channels. Impersonal information (Rogers, 1962; Wilkening, 1956), or "cosmopolite" sources (Rogers and Shoemaker, 1971) are seen as important at creating awareness of an idea, and particularly for innovators rather than laggards (Carter and Williams, 1959; Katz, 1961; Rogers, 1962; Ryan and Gross, 1943). The mass media, and particularly commercial sources, tend to be regarded as the major and most influential sources of first information about an innovation for potential adopters.

Personal (Rogers and Beal, 1958; Rogers, 1962), or "localite" sources (Rogers and Shoemaker, 1971) on the other hand, are most important at the evaluation (Miller, 1975) or decision making (Wilkening, 1956) stage in the adoption process, and for later as opposed to early adopters, for laggards than for innovators (Rogers, 1962; Rogers and Shoemaker, 1971). For example, colleagues, neighbours and professional journals may at times fulfill a secondary function as a source of first information (Katz, 1961; Rogers, 1962; Wilkening, 1956), but they become increasingly important as later sources in exerting influence on the potential adopters to adopt (Coleman et al, 1966; Crain, 1966; Ferber and Wales, 1958; Katz, 1961), through their 'legitimizing' roles (Coleman et al, 1966; Crain, 1966; Ferber and Wales, 1958; Metcalfe, 1970).

The extent to which potential adopters utilize these 'convincing' sources depends, for example, on their age (Ferber and Wales, 1958) and relative isolation (Caplow, 1952). Ferber and Wales for example, found that young doctors, with fewer years in practice, rely more on journals

and detail men as convincing sources than older and more experienced doctors. Where empirical evidence regarding the innovation is contradictory, ambiguous or lacking (Bauer and Wortzel, 1966; Coleman et al, 1966), or adopters lack the time and skill necessary to judge or evaluate an innovation (Coleman et al, 1966; Crain, 1966), most individuals rely on the judgement of others as to whether it is right and safe to go ahead. Despite the professional training of the doctors in Coleman et al's study, they did not make the decision about whether or not to adopt the new drug Gammanym on the basis of technical criteria alone, but by reliance on the opinions of their colleagues.

Colleagues (Coleman et al, 1966; Wilkening, 1952), educational establishments (Wilkening, 1952), county and agricultural agents (Ryan and Gross, 1943; Wilkening, 1952) and commercial firms were important in the 'action stage' or 'trial stage' of the adoption process. Indeed, commercial change agents are thought to be more important at the trial stage than at any other stage in the adoption process (Miller, 1975; Rogers, 1962; Ryan and Gross, 1943), particularly for early adopters as compared to later ones (Ryan and Gross, 1943). This is when the potential adopters need advice and instructions on how and when to implement the innovation (Miller, 1975; Wilkening, 1952). Given that the techniques of putting new practices into operation is a task orientated function, it is not surprising to discover this role performed by those having the technical knowledge.

However, the frequent citation of colleagues as important convincing sources may have less to do with their own inherent characteristics and more to do with the fact that commercial sources tend to be regarded as biased and lacking credibility. The motives of commercial change agents, as perceived by the potential adopters, may be one reason for their relatively low credibility (Rogers, 1962). They may recognise the vested interests of the salesman (Coleman et al, 1966; Waite, 1971) and are therefore reluctant to adopt on their recommendations alone. In addition to these various and ostensibly 'external' sources of information, one could argue that an individual's own past experience, or his deductions from known information, should also be considered an

important source of information in convincing a person to adopt an innovation.

There do, however, appear to be methodological problems attached to respondents' ability to recall accurately the influences on their adoption of a product (Katz, 1961), or the sequence of information sources leading to their decisions to adopt (Rogers, 1962). It was found that using subjective methods, such as asking respondents to remember the influencing factors, were liable to distortion, in terms of giving "socially acceptable" sources of information (Ferber and Wales, 1958; Menzel et al, 1959). For example, colleagues and professional sources tend to be given emphasis for sources of information on drugs, in contrast to commercial sources (Ferber and Wales, 1958; Menzel et al, 1959). Hawkins (1959), amongst others, reported that many doctors are likely to under-report the importance of sales representatives, as it is not fully acceptable to admit to having been influenced by them, even though they seem to be the main source of doctors' information on medical innovations (Coleman et al, 1966; Ferber and Wales, 1958). However, the use of 'objective' evidence to determine the influences on adoption, such as reading specialist magazines, is also not infallible, as it may lead to inferences being made that are not there (Katz, 1961).

The external nature of initial information sources is the central tenet of Katz's (1957) classic "two step flow" hypothesis. This hypothesis postulates that new ideas flow from the mass media and personal influence, such as sales representatives, to opinion leaders and from them to the less active sections of the population." (Brooks, 1957; Katz and Lazarsfeld, 1955). Each source is in effect acting as the primary source of influence for those who follow.

There have been studies which have confirmed Katz's two step flow of diffusion (Ryan and Gross, 1943) and those which have not (Arndt, 1967; Crain, 1966). In contrast to Brooks's (1957) claim that the mass media are a decisive influence on changing behaviour and attitudes, others argue that interpersonal influence is more effective than the mass media in this regard (Crain, 1966; Katz and Lazarsfeld, 1955). There is further evidence to suggest that the second step of the communication

chain, involving interpersonal communications, from opinion leaders to others, does not consistently occur nor that interpersonal influence consistently flows vertically. Katz and Lazarsfeld's study on fashion suggests that horizontal flows of influence also occur between individuals of the same strata.

However, for Brooks (1957), the question remains why some innovations 'trickle down' and others do not. For him the answer lies in the fact that some opinion leaders are also the 'gate keepers' of information flow for their particular stratum. The concept of 'gatekeeper' and their function in filtering and screening messages have been implicitly (Crain, 1966) and explicitly identified, both nationally with respect to organisations (Allen, 1967; Rogers and Rogers, 1976; Stocking, 1985), as well as internationally (Allen et al, 1971).

A long standing debate has been raging over the assertion that drug manufacturers have assumed an important, even dominant role, in the post-graduate education of doctors on drug prescribing (May, 1961; Silverman and Lee, 1974), although it must be said that much of this debate has been between the industry and its critics and much less has been heard from the doctors themselves on this issue. Views differ over why this is not a good thing and who is to blame for this situation (Flesh, 1971; May, 1961; Silverman and Lee, 1974). There is much to suggest that drug companies, and in their turn, salesmen, have simply stepped into the vacuum which the academic world (Lasagna, 1969), and more specifically, the medical schools and medical societies (Silverman and Lee, 1974) have permitted to develop, despite the eagerness with which the industry's critics would like to believe otherwise. The aim of the drug companies' 'educational' role tends to be regarded by their critics as a marketing ploy designed to increase their respectability in the clinicians' eyes and thus their profits through increased sales.

4.1.3 Factors Influencing Adoption

A whole range of factors is cited in the literature as affecting adoption. The adopter category of greatest interest to sociologists, apart from that of opinion leaders, is the innovator, because s/he is

the first person in the system to adopt an idea or product. A number of studies have found age (Lancaster and White, 1977; Lowry et al, 1958; Mansfield, 1971; Metcalfe, 1970), education (Hobbs, 1960; Katz, 1961; Ryan and Gross, 1943), high socio-economic status (Belcher, 1958; Rogers and Burdge, 1962) and the possession of 'modern' rather than 'traditionalist' values (Coleman et al, 1966; Katz, 1961; Menzel et al, 1959; Ryan and Gross, 1943) to be positively correlated with innovativeness. Various reasons are cited to explain the correlation between these variables (Lancaster and White, 1977; Mansfield, 1971; Rogers and Shoemaker, 1971), although some studies have found no significant relationship between these variables and certainly no causal relationship between them (Katz, 1961; Rogers, 1962).

There is also an inverse relationship between the size of the adopting body and the date of first use. Larger hospitals (Russell, 1979), bigger cities (Crain, 1966) and bigger firms (Lancaster and White, 1977; Mansfield, 1971) tend to adopt innovations to a much greater extent than their smaller counterparts. In contrast, other studies have indicated that the very size of an organisation may hinder adoption of innovations because of the "inherent inertia" of large institutions (Stocking, 1985) and because smaller firms have less complex decision making structures (Webster, 1969).

There appears to be little evidence that lack of knowledge about a given innovation delays its adoption or significantly affects its rate of adoption (Rogers, 1962). Katz (1961) found that information regarding an innovation's existence does not seem sufficient to make people adopt it. In Ryan and Gross's (1943) study of the diffusion of Hybrid Seed Corn in Two Iowa Communities, over 90% of the farmers had heard of the new seed by 1934 but less than 20% had tried it by then. However, some authors do claim that better understanding of the innovation under question leads to increased adoption (Crain, 1966; Mansfield, 1971).

The actions of governments can also affect the diffusion process. For example, a government may try to promote the adoption of new technologies by helping to pay for the necessary equipment or the training of people to use it (Russell, 1979). A government, through its

various departments, can also impede the diffusion of certain medical innovations in ways which have not been addressed in the literature, by causing a delay in including or withholding the inclusion of certain products onto the drug tariff.

The adoption perspective not only investigates the adopting units' characteristics, in order to identify factors which affect the diffusion and adoption of innovations; it also looks at the innovations themselves (Rogers and Shoemaker, 1971) in the belief that not all innovations are "equivalent units from the viewpoint of analysis" (Rogers, 1962). Even if an innovation is obviously superior to the product already available or offers obvious advantages, this does not guarantee nor adequately explain its rapid adoption (Berggren, 1985; Russell, 1979; Ryan, 1948). The extent to which an innovation is compatible with existing values and past experiences (whether individual or social) may also speed up or retard the rate of adoption (Rogers and Shoemaker, 1971). For example, Graham (1956) found that only 24% of his upper class respondents adopted the television compared with 72% of the lower class. Divergent upper and lower class values on types of recreation were proposed to explain these differences in the rates of adoption of television as a leisure activity.

The speed of adoption of innovations is also influenced by their tendency to require major or minor changes in the adopters' patterns of thought and action (Coleman et al, 1966; Katz, 1961; Rogers and Shoemaker, 1971; Stocking 1985). Those innovations which demand only limited changes in the socio-technical system and do not require the learning of new skills (Berggren, 1985; Metcalfe, 1970) are more likely to be adopted earlier than major or radical innovations which cannot be easily introduced without extensive socio-technical changes (Berggren, 1985).

Divisibility of a product and personal experimentation are also considered to be important contributors to successful adoption (Brooks, 1957; Ryan, 1948). In other words, innovations which can be accepted partially or experimented with on a trial base (Coleman et al, 1966; Crain, 1966; Metcalfe, 1970; Rogers, 1962; Ryan and Gross, 1943) have

more chance of being adopted earlier than those which cannot because, according to Ryan (1948), the decision to adopt does not carry with it such a great risk. However, the ability to adopt partially is not possible with all products, such as air conditioners (Whyte, 1954).

The adoption perspective discussed above is said to be concerned with the demand side of the diffusion process (Brown, 1981). There are however, alternative perspectives which are concerned with the supply side of innovations which are known as the market-infrastructure and economic-historical perspectives. The 'demand' and adoption side of diffusion has received much attention while the supply side of the argument is, according to Brown (1981) "virtually virgin territory for academic and applied investigation". The adoption perspective, according to Brown, implicitly assumes that innovation diffusion involves personal choice and that all people have an equal opportunity to adopt. The market-infrastructure perspective, which is mainly concerned with the way innovations are made available to potential adopters, takes the stance that the opportunity to adopt is in many cases unequal. The basis of this perspective is the belief that individual behaviour does not represent free will so much as choices within a constrained set, and that it is government and private institutions which establish and control the constraints (Brown, 1981). Brown argues that, rather than beginning the analysis by focussing on the adoption process and the adopter, we have to go back much further to the organisation which developed the innovation and established diffusion agencies (the outlets through which it is to be distributed). The diffusion agency is in fact a central element of the market-infrastructure framework. Brown identifies various diffusion agency activities such as the development of infrastructure and organisational capabilities, the price charged for the innovation, promotional communications and market selection and segmentation. The only diffusion agency actions given attention in the traditional view of the diffusion process are sales representatives and advertising (Midgley, 1977; Rogers and Shoemaker, 1971). However, even when their activities are examined, Brown (1981) claims that they are not treated as a "manipulable variable with differential aspects resulting from alternative strategies".

Thus, it appears necessary to examine how the market strategy of the firm diffusing the innovation affects adoption of it. Some authors claim that the greater the promotional efforts by change agents (such as the firm selling the product), the greater is the likelihood of adoption of innovations (Ross, 1952; Webster, 1969). Rogers (1962), in contrast, claims that the evidence to support such an hypothesis is weak. Nevertheless, the extent to which a potential adopter is bombarded with direct mail, advertisements, sales men, free gifts and samples is determined by the promotion agency, which will in turn affect a potential adopter's amount of exposure to a given innovation and will ultimately influence, in various degrees, their adoption behaviour.

A diffusion agency's promotional campaign may determine who gets to know about the innovation. For example, it may be that the particular use of an innovation is thought by the firm to be better placed in certain segments of the market than others. Therefore information regarding it is more likely to be made available there than anywhere else.

Lack of knowledge of an innovation may have less to do with a person's lack of motivation to find out about it, as the adoption protagonists may claim, and more to do with the fact that access to the innovation has been limited to certain adopters. Limited access may be due to the 'market segmentation' tactics of the firm, the cost of the innovation and the potential adopters' proximity to the infrastructure relevant to using it (Brown, 1981). For example, in an investigation of three cost saving innovations in the weaving sector of the Lancashire textile industry, Metcalfe (1970) agrees with Griliches (1957), Lancaster and White (1977) and Mansfield (1971) that the capital cost of a given innovation can affect its speed of acceptance. It must be said, however, that cost on its own is not always a sufficiently significant factor to affect adoption (Reekie, 1982). The manner in which the diffusion agency markets the innovation can over-ride cost concerns. For example, it can promote its advantages and cost-effectiveness over time.

The number of visits a given doctor receives from salesmen may have little relation to a doctor's use of drugs or need for information, and more to do with logistics and the geographical location of a given doctor (Caplow, 1952) and his/her social class. Salesmen have been found

to visit the upper social status clientele disproportionately more than the lower strata, and to interact most effectively and most often with clients who have a similar status to their own (Rogers, 1962). However, one could argue that all this effort is likely to be misplaced if the target audience does not read the company's promotional material or accept their gifts, because of the negative attitudes they hold towards the company or the product, or if the impact of their advertisements is so transitory that they are unable to recall what they have seen. Using the technique of aided and unaided recall adopted by Belley (1943), Ferber and Wales (1958) discovered that over half of their sample of doctors could not remember any journal advertisements unaided (although more doctors recalled more advertisements when aided). This lack of recall was particularly marked amongst the older generation of doctors. Recall of journal advertisements was higher than for direct mail advertisements, but this was explained in terms of it being more respectable to read the former than the latter. Furthermore, studies have shown that a whole range of factors determine whether doctors read promotional material such as journal adverts and direct mail. For example, the source (the drug house) of the material (Bauer and Wortzel, 1966); the direct eye-catching nature of the advertisement (Caplow, 1952), the general readability of the magazine (Caplow, 1952) and whether or not it has pictures (Ferber and Wales, 1958), have all been identified as important factors in this regard, and are clearly determined by the marketing strategy of a given company.

Studies have also shown, not surprisingly, that while positive attitudes to a diffusion agency's activities will promote diffusion, negative attitudes are likely to block the diffusion path. A number of studies have indicated that many doctors are generally favourably disposed towards salesmen (Caplow, 1952; Silverman and Lee, 1974) and journal advertisements (Caplow, 1952; Ferber and Wales, 1958; Waite, 1971). However, there is evidence to suggest that such positive attitudes are often based on erroneous assumptions. For example, Caplow (1952) found that 39% of the doctors he studied believed that all or most of the detail men were graduate pharmacists, which is clearly not the case. Other authors have found that the favourable attitudes held by some doctors towards the claims made by drug manufacturers, and journal

advertisements in particular, are based on the fundamentally false assumptions that the latter have been checked for reliability by the editor and the former are controlled by various government bodies (Caplow, 1952; May, 1961; Silverman and Lee, 1974; Waite, 1971).

There are, however, several factors which affect the diffusion of innovations which may have little to do with the potential adopter being overly resistant or less innovative, or because they have not been targeted by diffusion agencies. Improvements in the innovation prior to and during diffusion are considered important determinants of the rate and extent of diffusion (Mak and Walton, 1972; Rosenberg, 1972). The adoption and market-infrastructure perspectives tend to embody the assumption that the innovation does not change over the diffusion period, as indeed does the traditional school of economic history. The reinterpretation of the economic history perspective, with which Brown mainly concerns himself, explicitly introduces the notion that innovations evolve and are continually being perfected and adapted to new uses and new markets (Brown, 1981). Most inventions are relatively crude and inefficient at the date when they are first recognised as constituting a new invention (Rosenberg, 1972) and will be poorly adapted to many of the ultimate uses to which they will eventually be put. In these cases, because they may offer only very small advantages over existing techniques, adoption is slow.

The speed with which an innovation is improved, the techniques modified to meet the needs of specialised users (Feller, 1966) and the price of the product reduced, will determine its acceptability amongst an increasingly wide circle of potential users, and thus its speed of adoption (Rosenberg, 1972). Thus, delaying adoption may be the outcome of a rational decision making process, based upon the knowledge that "tomorrow's innovation is likely to be considerably different and better than today's" (Brown 1981). The slowness of adoption may be further explained, even when an invention "genuinely contains important elements of novelty" by the "difficulty of breaking away from the old forms and embracing the different logic of a new technique or principle" (Rosenberg, 1972). This may include the length of time taken for adopters to develop the skills necessary to use the new technology.

The adoption theorists frequently cite companies as important sources of information in teaching adopters how and when to use the innovation. Yet little reference seems to be made to the role that personal experience and trial and error plays in this regard, even though this may significantly affect the speed of adoption of an innovation. According to Rosenberg, many technical skills are not readily transferable "through formal education or the printed word" but are acquired through "direct, on the job participation.."

The economic-historical perspective also introduces the concept of complementaries, in the belief that no matter how wonderful an innovation is, its diffusion will be hampered unless certain other inventions are also made (Rosenberg, 1972). Similarly, rather than fixing one's attention solely on the innovation, the economic historians argue that one has to take notice of the improvements which are being made to the technologies which the innovation is replacing, in order to understand its speed of diffusion. In general, research seems to suggest that the appearance of new technology induces improvements in those it is replacing (Rosenberg, 1972) and so retards the diffusion of the new technology (Fogel and Engerman, 1971), by postponing the time when the new technology is clearly superior.

Authors working within this perspective see inventive activity as evolutionary in nature, where the old and the new co-exist for a long time after the innovation has been introduced. They regard inventive activity as being much more about continuities than discontinuities (Rosenberg, 1972); about the accretion of little details and modifications than cataclysmic events (Gilfillan, 1935), which appears to be the traditional way in which innovations are perceived.

4.1.4 Time Taken for the Adoption of Innovations

When analysing the diffusion process, studies tend to focus on the time factor, in other words how long it takes a product to be adopted. After all, diffusion takes time and it is often a protracted and uncertain process (Metcalfe, 1970; Wilkening, 1956).

Subjective methods, such as recall (Ryan and Gross, 1943) and objective means, through the use of records (Coleman et al, 1966; Crain, 1966) have been used to determine when the adoption of a particular innovation took place. The problems of error attached to relying on recall, particularly when months and years lie between the time of first use and interview of the adopters, were, according to Katz (1961), demonstrated by Coleman et al. They measured the discrepancy between objective and subjective dating of first use and found that doctors tended to report themselves as having adopted the new drug earlier than they actually did. Menzel (1957) likewise found that one half of the doctors in his study gave a much earlier date for having first used the new drug, often many months earlier, than that established by the prescription search.

Where information on the time of adoption is available, the date of 'first use' is frequently employed as the measure of acceptance (Ryan and Gross, 1943), but first use may or may not be followed by continued use (Coleman et al, 1966; Mansfield, 1971). Other studies have tended to differentiate between different time periods. Researchers have tended to isolate two distinct time periods that comprise the total adoption period (Rogers, 1962) - the 'awareness to trial', and 'trial to adoption' periods. Evidence seems to suggest that the former is longer than the latter (Beal and Rogers, 1960). Thus efforts have been made to encourage consumers to try innovations by offering free trials of the products, as a way of speeding up adoption.

Time is an important factor in the diffusion process because it provides the basis for the charting of diffusion curves and hence the construction of mathematical models. The S shaped curve of diffusion (Fig.2a) is the most commonly found indicator of diffusion. It indicates that there are characteristic stages in the diffusion process (Katz, 1961). The relatively slow initial rates of adoption are variously attributed by the adoption theorists (Brooks, 1957; Metcalfe, 1970; Ryan, 1948; Ryan and Gross, 1943) to the innovativeness characteristics of the potential adopters or their resistance to adoption. The market-infrastructure theorists on the other hand, attribute the slow initial rates of adoption of innovations to propagator and diffusion agency strategies (Brown, 1981). The economic historians contend that

this is due to the time needed to improve the innovation and adapt it to a variety of potential markets and users as well as delays in adoption due to the users' anticipation of further improvements in the innovation (Rosenberg, 1976).

The steeper 'middle' part of the curve is variously explained as being due to the lowering of resistance to adoption, through demonstration effects and the 'snowballing' effect of interpersonal communication networks (Brooks, 1957; Coleman et al, 1966; Katz, 1961; Ryan and Gross, 1943; Wilkening, 1956). The more people who adopt a new product, the steeper the curve becomes (Rogers, 1962). The "bandwagon" effect associated with the sharply rising middle portion of the S curve of diffusion is thought to be caused by intra-industry competition (with respect to technological innovations), according to the market-infrastructure perspective (Brown, 1981), and the development of technical skills among users and development of complementaries, according to the economic history perspective (Brown, 1981).

A number of studies have demonstrated the S shaped curves of diffusion (Coleman et al, 1966; Ryan, 1948; Ryan and Gross, 1943), although linear diffusion curves (Fig. 2b) have also been demonstrated, which indicate a gradual and consistent adoption rate. Crain (1966) found a U shaped curve when analysing the adoption of fluoridation, indicating the reverse of the normal diffusion process. Such a U shaped curve (Fig. 2c) indicates that the adoption rates were initially high, dropping very quickly before rising again.

The development, diffusion and adoption of innovations is a complex process. Various theories exist to explain the motivations behind innovations as far as the individual firm is concerned and the diffusion and adoption of innovations in the market place. The traditional adoption perspective has its shortcomings. There is much in the literature to suggest that it does not provide a sufficient explanation of the diffusion and adoption of innovations, and indeed one could argue that it cannot do so as long as it fails to consider supply as well as demand factors.

Fig. 2. Diagrams Illustrating the Diffusion Rates of Innovations

Fig. 2a. The 'S' shaped curve of diffusion

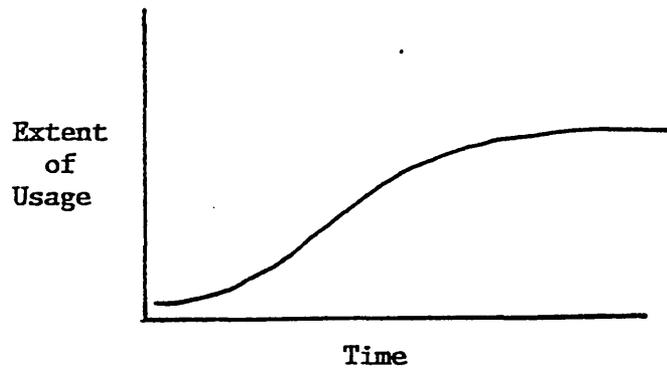


Fig. 2b. The linear curve of diffusion

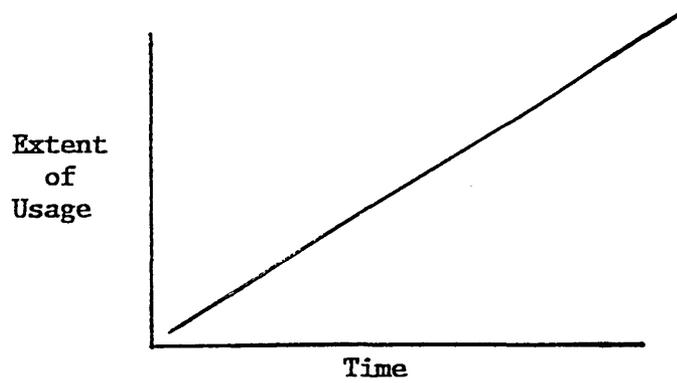
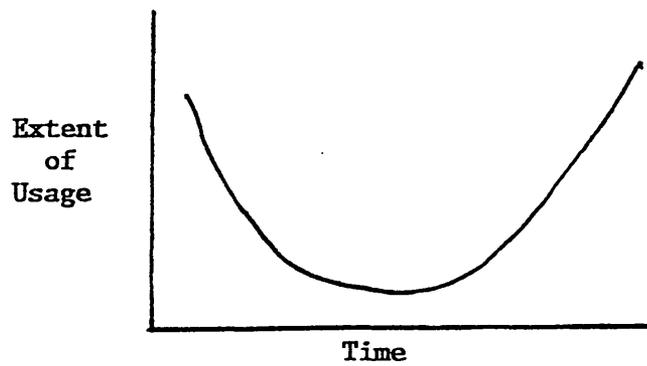


Fig. 2c. The 'U' shaped curve of diffusion



The importance of commercial influences to the diffusion process is clearly evident. There does, however, appear to be a need for a deeper analysis of these influences than is evident in much of the diffusion literature. For example, much of it appears to present a linear model of diffusion and thus a somewhat passive account of the commercial sources of influence on the adopters. In other words, information is disseminated via various methods which the adopters receive and utilize (or not as the case may be). Little if any emphasis is given to investigating the two-way process of influence, namely the extent to which feedback from the adopters influences the company's future marketing activities. This may affect the style of their promotional literature, emphasis on particular issues, placing of advertisements and remit of the sales representatives, in terms of who their target audience is to be and the approach to be adopted to sell their products most successfully. As we have seen, the market-infrastructure perspective pays more attention to the influence of marketing strategies but nevertheless this two-way process is not sufficiently emphasised.

4.2 THE ORIGINS AND DEVELOPMENT OF THE MOIST WOUND HEALING THEORY (MWHT)

This section presents the findings from the interviews conducted with the research scientists involved with George D. Winter (1927-81) at the time of his discovery that a moist wound environment enhances wound healing - namely, Dr John T. Scales (now Professor Scales) who was Winter's superior, Sheila E. Barnett and Sarah J. Varley the technicians who worked with him. The discussion demonstrates that the MWHT resulted from fundamental research, and locates the work in the context of the individual, social and institutional influences which made it possible. These multi-factoral forces are identified and the manner in which they influenced the development of the MWHT are discussed.

Having graduated in Zoology from Birkbeck College (University of London) in the early 1950's, George Winter began work as a technician in the Department of Biomechanics and Surgical Materials, located within the Institute of Orthopaedics at the Royal National Orthopaedic Hospital

(RNOH) at Stanmore. Initially, four people comprised the entire department: Winter as the senior technician, Sheila E. Barnett as junior technician, Dr John T. Scales and a full-time secretary. Sarah J. Varley joined the department later.

Winter's registration for a PhD several years later with the University of London was prompted, according to Barnett, by his desire to become a doctor. However, his presumed failure to have completed successfully a medical degree begun at the end of the Second World War meant that studying for a PhD was the only way that he could achieve the title of doctor. Winter in fact gained a PhD in 1966 for his thesis, 'A Study of Wound Healing in the Domestic Pig'. His failure to obtain a medical degree was regarded by the above respondent as a little known fact. It was certainly one which Scales seemed to know little of, for he argued that family circumstances prevented Winter from even starting his medical training. One possible explanation of these different accounts is that one of these two people was privy to more intimate information about Winter's private life than the other. What is important about the above discussion is not which version of events we take to be the truth, but the differences of opinion that arise from it. Indeed, this is the first instance where differences of interpretation concerning Winter's life and work occur. More fundamental differences are scattered throughout this chapter.

Different views were, for example, put forward by the respondents to account for the fundamental ideas and stimulus for Winter's wound healing work. One point of view saw his background and training as major influences in this regard. Winter's own awareness of the state of research in this area was seen as another important factor. A third view was that the influence of Professor Buller (who was to become one of his supervisors) and his assistant Edna Lawrence (both from Birkbeck College) was very significant, and yet a fourth was that the influence of personnel in the Institute of Orthopaedics at the RNOH at Stanmore was crucial and has been underestimated, although one of the respondents had very clear views on this latter issue. According to her, the stimulus for Winter's wound healing work did not come from:

"..... Professor Scales and it certainly wasn't a stimulus that came from the Institute of Orthopaedics."

There were further disagreements between the respondents over the real purpose of Winter's work. According to Barnett, it was not aimed at designing and producing a new dressing:

"He was basically a boffin bod in those days....George initially couldn't care tuppence whether people developed his ideas into a commercial product or not."

In the opinion of Professor Scales, Winter's work was directed towards the improvement of the adhesion of wound dressings. This appears to be at variance with others' understanding. One could argue that these different accounts of the purpose of Winter's work are not important in themselves but in the underlying attitudes they reveal. The researcher would argue that these differences reflect the respondents' various perceptions of Winter's work arising from their own particular orientations and interests, and their desire to elevate or play down Winter's achievements. Given Scales' clinical background and highly pragmatic orientation to scientific research, where considerations of utility are paramount (as will be discussed shortly in a brief and highly selective account of Scales' career) it is perhaps not surprising to find him emphasising the 'applied' rather than the 'pure' nature of Winter's work. Moreover, in doing this Scales symbolically puts Winter in his place vis-a-vis himself, as his subordinate, for 'pure' research is often regarded as a higher intellectual activity than 'applied' research and thus higher status is accredited to those who pursue it (Beveridge, 1970). In contrast, by emphasising the 'pure' as opposed to the 'applied' nature of Winter's work some of his other colleagues, who were subordinate to Winter in status, seek to elevate his achievements thereby indirectly also elevating the role that they played in such a scientific endeavour.

The experiments which led to the discovery of moist wound healing were conducted on animals (white domestic pigs). There were a number of scientific and pragmatic reasons for using pigs. Firstly, the composition of pig skin closely resembles human skin. Secondly, ethical reasons precluded them from conducting such experiments on humans,

although Hinman and Maibach were later to do parallel studies in the USA using humans; and finally, the RNOH at Stanmore had a large animal house containing pigs.

Twelve partial thickness wounds were created on each pig model (six down each side), only the epidermis (top layer of the skin) and papillary layer of the dermis (just underneath the epidermis) were removed. The thin pieces of skin were then discarded and the wounds either covered with a polythene film or left exposed to the air, as the control group. After an allotted period of time, the middle of the wounds were excised and cut into two or four pieces and then into serial sections. The term serial section means that if one begins with the first piece and places them all back together (serially), one can build up a three dimensional picture of the original tissue. However, before these pieces can be cut into serial sections for biopsy, they have to undergo a multi-stage preserving process to prevent tissue distortion and degeneration. The tissues are then mounted on glass slides and microscopically examined in order to investigate how much of the epidermis has actually grown back. The scale of the work was, according to Barnett "absolutely colossal". It represented years of tedious microscopic, histological and mathematical work.

Winter and his colleagues discovered that the wounds on the half of the pig left exposed took roughly five to seven days to become fully covered with epithelialisation, while those covered with polythene were fully covered in three days. Fired by the enthusiasm of having made some fundamental scientific discovery, they repeated their experiments "many, many, times over" just to confirm and convince themselves of their findings. Analysing the results, Winter and his colleagues discovered that the "terrific explosion" in healing was due to the moisture underneath the film providing the optimum conditions for cell regeneration and migration to occur.

4.3 WINTER'S WOUND HEALING WORK AND THE VARIOUS FACTORS WHICH INFLUENCED IT

In order to understand how this potential "biological curiosity" became a practical reality, we have to look at the institutional, individual and socio-economic influences which made it all possible. In particular, how was Winter able to pursue research in wound healing which was unrelated to the general remit of his department and for which he was neither employed nor paid to do and in an Institute of Orthopaedics where such things were not considered 'real' orthopaedics? Furthermore, what motivated him to experiment with synthetic as opposed to the more conventional and readily available natural materials? Let us begin by dealing with the latter issue first.

According to Barnett and Varley, the early to mid 1950's saw the development in the food industry of a cellulose film material for wrapping food, particularly meat. It was to mark the beginning of the pre-packaging era. Food could now remain fresher-looking for longer. This development created a great deal of scientific interest, according to these two respondents, not least among food bacteriologists because of the spate of food poisonings that subsequently followed. Lack of knowledge and understanding of the effects of temperature changes on meat wrapped in this film was blamed for the observed increases in bacterial proliferation. The movement of meat from the butcher's warm shop window to the customer's cool larder was held responsible for such temperature changes as refrigerators were not as readily available or as popular in those days as they are today (European Marketing Data and Statistics, 1974-1990).

As far as Varley was concerned, it was this innovation together with the everyday observation that "if you stick a piece of bread into a polythene bag your sandwiches keep fresher than if you... don't", which led Winter to wonder what would happen if a piece of polythene film was applied to a wound. One of the reasons for considering using polythene film for such an experiment was because it was the most readily obtainable and flexible of all the films available at that time.

According to Barnett and Varley, Winter did not know for certain that

this film would prevent a wound from drying out. However, working on the principle that if it has this effect on foodstuffs, then it may also prevent dehydration of human wound tissue, he proceeded with his experiments and the embryonic idea for the MWHT was born. "It was as simple as that", concluded Varley.

Of course with hindsight such things do appear remarkably 'simple', but there is nothing more complex, one could argue, than that which is passed off as simple, for it frequently belies the various intellectual strides which have to be made. The process described above reveals a number of things. Firstly, on a general macro/social level it provides us with an example of the way in which materials as well as ideas are 'transferred' from one field to another, in this case from industry to medicine. Indeed, there are many examples of developments in non-medical fields finding application in the medical world. One such example is the development of the Airstrip wound dressing from battery separator plates with which, according to his own accounts, Scales was intimately involved. The micro-porous nature of the polyvinylchloride (PVC) material used as battery separator plates (placed inside batteries so as to separate their various constituent parts and allow the electrolyte through) allowed the medical world in the 1950's to develop a revolutionary water vapour-permeable synthetic wound dressing.

Secondly, on a micro/individual level the move from covering food with a synthetic film to covering wounds highlights certain characteristics of scientific research, the importance of which and the role which they play do not appear to have been fully appreciated or understood. For example, curiosity is an important key in understanding the motivation behind Winter's work (and also Scales' work, as will shortly become evident), for it was his inquisitiveness to find out 'What will happen if?' which led him to conduct experiments on human tissue with materials considered, at that time, unorthodox for that purpose. However, it was 'reasoning' (although some may call it intuition), which led him to consider that if polythene film prevents dehydration of foodstuffs then it may have the same effect on human wound tissue.

The ability to adapt materials and ideas from one field to another demonstrates a versatility and courage of mind. Winter was not, for example, afraid of following his intuition; after all, there was always the chance that his idea could prove incorrect. His actions also show an openness of mind, of not being constrained by convention nor the confines of his own narrow field of work, for he was obviously well informed of principal developments taking place in other fields. The researcher would argue that the case of Winter and his discovery of moist wound healing supports the claims made by many analysts of science and innovation, such as Ben-David (1960), that significant innovations tend to come from young researchers and those holding marginal positions in the scientific community. It could be argued that Winter, as a young research scientist, did not have a strong commitment to the prevailing paradigm about wound healing nor a reputation to lose by attempting to overthrow it. Indeed, according to Mulkay (1972):

"...the young scientist has everything to gain from nonconformityif he comes up with a successful new idea at the outset of his career he will have made a strong bid for eminence on the basis of minimal investment. In other words, his risks are low and his potential profits exceptionally high." (p50)

Winter could therefore be said to epitomise Mulkay's example of a young scientist who takes a gamble and wins, for he will forever be remembered as the man who discovered moist wound healing.

What has been argued above concerning Winter and his work can be equally applied to Scales and his work. However, without wishing to take any credit away from Winter as an individual, his ways of thinking and working have many similarities with those of his superior, Scales. This may have less to do with a convergence of similar personality types and more to do with Scales' influence, whether directly on a personal level or indirectly through example or via his relationships with industry, which together provided Winter with the financial and intellectual freedom to proceed in the way that he did.

In order to investigate the extent to which Scales facilitated Winter's work in this field it is pertinent to investigate how Scales's own character and interests influenced developments. The following accounts

are also of relevance in helping us understand Scales' reactions to and opinions of Winter's discovery of moist wound healing and the reactions of the scientific and clinical communities to Winter's findings, given Scales' position as Winter's superior.

Scales qualified as a doctor shortly after the Second World War and has had a long and varied medical career. He is perhaps one of the few doctors to have been made a companion by the Institute of Mechanical Engineers for his life long interest in this field and his pioneering work in developing high and low loss air bed systems, which he regarded as "complex engineering". This link between medicine and industry was to be the key to many of his future successes as well as the cause of many of his problems.

Scales is an innovator, a pragmatist with a unique ability to transform an idea into a practical reality and to devise an engineering solution to a clinical problem. The idea for the air bed systems arose, according to Scales himself, from his own knowledge of a naval incident in the 1950's, where badly burnt men were taken to a Maltese hospital and laid on beds with the windows wide open to allow the warm breeze to blow over their exposed burns. The burns were found to heal "extraordinary well".

In order to emulate, in a controlled clinical setting, the conditions found to have been so effective in the above example, Scales set about creating a "mini desert" by constructing a perspex box, inside which a patient was placed. A complex air flow system was developed to allow warm air into the box and out again through an exhaust apparatus. The experiment worked well. As an extension of this project a further system was built which allowed air to be 'moved' so that the patient could be floated on it. Unfortunately, this experiment was not very successful. Whilst riding on a hovercraft one day and observing that it is able to float over a 'wavey' sea his curiosity and keen intuitiveness led him to wonder whether it would be able to support a floating irregular shaped 'wave -like' human body, if turned upside down. It was out of this idea that Scales developed, what became known as the high air loss bed. This was a cumbersome, costly and complex apparatus of scaffolding, poles and jets of air. Anaesthetised pigs with partial thickness wounds were

levitated on these jets of air with the aim of promoting healing of the wounds. The concept of floating pigs on air aroused great interest in the scientific and medical community. It was also newsworthy and rated a Giles cartoon in a daily newspaper. This caused general amusement but also embarrassment in certain circles. The high air loss system was later replaced with a more practicable low loss air bed system. The patent for the latter was eventually sold to a private company which continues to make these beds to help in the prevention of pressure sores.

The above discussion appears to support the proposition that curiosity and intuition play an important role in scientific research and the development of innovations. One could argue that without the eclecticism and flexibility of mind of certain scientists many a discovery and innovation would never see the light of day. However, it is not the intention of the researcher to present scientific discoveries merely as products of individual scientists' innate psychological make-up. The discussions of Winter's and Scales' work presented thus far indicate that micro-level factors, such as a person's education and training and experience, as well as macro-level socio-economic and political considerations, influence in very important ways the direction of scientific work. The extent and manner in which such macro-level factors determine scientific research will receive further attention in the discussion that follows.

The particular project discussed above is an example of the way in which Scales appears not to have hesitated to pursue projects which some considered unsuitable for University departments to get involved in, if, in his opinion, these would ultimately benefit patients. There is some evidence from comments made by Barnett and Varley that not everyone understood Scales' views and ways of working, and that his unconventionality was not always popular with some of his contemporaries and colleagues. Furthermore, the association of some of his projects with industry appears to have resulted in conflict within the Institute of Orthopaedics. Not everyone accepted that fundamental research should be associated with industry and commerce and this was seen by some of the respondents as being reflected in the status assigned and premises

allocated to Scales' department, situated as it was in a converted "bed store" at the end of the building next to a "cripples' workshop".

Scales, however, was ahead of his time in recognising the need for scientific establishments to forge strong links with industry, despite his awareness that to some of his colleagues industry was a "dirty word". One could argue that such negative perceptions of industry are essentially bound up with the historical class distinctions in English culture between, on the one hand, non-manual abstract and theoretical science, and on the other, engineering as a manual and applied practical activity; the latter is perceived as having a lower status than the former, as are the personnel engaged in it (Symonds 1977). Scales cultivated numerous contacts with industry and established good relations with key people within it, as well as with their networks of associates. His philosophy of developing and maintaining strong links with industry were essentially pragmatic, as the discussion which follows indicates.

The importance of linking academia with industry was based on Scales' realisation that industry is able to inject a sense of reality into the world of scientific research, of what is possible and practicable in terms of production and marketing. Moreover, University departments, Scales believed, do not have the facilities to progress beyond the prototype stage, even with the most ingenious of ideas. Only industry, he believed, has the resources - both financial and technical - to take any project to its developmental stage. But perhaps more important than all these considerations is that Scales recognised then, what is becoming increasingly obvious now, that "industry is where the money is". Through his various links with industry he was able to provide the department with paid work and research funding. Because of the quality of the specialist facilities at Stanmore companies would, for example, contract to pay the department to do fundamental work on their dressings or to evaluate them. An alternative method was for the companies to agree to pay a sum of money over a certain period of time, such as five or ten years, to the department or to fund the entire department for a number of years. The advantage to the company of such arrangements is

that they are able to share in the kudos which arises from the work done the department.

According to the comments made by the respondents, without Scales' contacts with industry and his ability to secure funds, much of his department's research efforts, including Winter's wound healing work, would not have been possible. Moreover, Scales' entrepreneurial character and foresight, in recognising the importance of diversification rather than concentrating all their research efforts in one specific field, ensured the survival of the department and with it, Winter's position in it. The ability of Scales' department to be financially self-supporting was an extremely powerful weapon in countering the growing and, according to one of the respondents, at times intensive criticism directed at Scales personally as well as at Winter for their work, which was not regarded as "real orthopaedics", and their ways of working.

However, one could argue that Scales' actions cannot be separated from the wider socio-economic climate. After all, in the late 1950's and early 1960's, funding from public and private sources was abundant for fundamental research. It did not need to have a practical application. One wonders whether Scales would be as successful in securing funding for such a piece of work in today's economic climate, where, according to Scales himself, research is increasingly having to justify itself on a short-term basis and produce something "useful". Indeed, throughout the 1970's and early 1980's Winter, and the other staff members comprising Scales' department, increasingly found themselves on a "tread mill" of having to do more contract work in order to pursue their research efforts. Thus less and less fundamental work was able to be conducted. From these accounts we can clearly see the growing extent to which political and economic considerations have come to influence not just the direction of scientific work, where, according to Barnes (1985):

"....considerations of utility and short-term utility at that are receiving greater and greater priority." (pg 6)

but also the amounts of this type of work which can be undertaken.

Given the focus of part of this study on the development and diffusion of the MWHT and one of the dressings first associated with it - OpSite, it is interesting to learn that Scales and his department, from wherein arose the MWHT, have had a long-standing relationship with Smith and Nephew Ltd, the company which developed and produced OpSite. Their relationship was said to have begun with their mutual interest in orthopaedics in the 1950's, and has extended through the development of both Airstrip (which Smith and Nephew Ltd produced and marketed) and OpSite and the accompanying fundamental studies and full scale trials. Scales' department has over the years secured numerous contracts for paid work and funding from Smith and Nephew Ltd, sometimes at extremely crucial junctures. For example, the departure of Winter for America in the early 1980's rendered his two associates 'surplus to requirements' as far as the senior management at the Institute of Orthopaedics at Stanmore were concerned. According to Barnett and Varley, it was only Smith and Nephew's need for fundamental research on their new adhesive for OpSite which saved the department from closure, for they 'bought' the department and the two technicians "lock stock and barrel" for a year.

4.4 THE DIFFUSION AND ADOPTION OF THE MOIST WOUND HEALING THEORY

The dissemination of the MWHT to personnel within the scientific and clinical world followed a number of channels. It formed part of Winter's PhD thesis (1966). He also published papers and articles in various scientific, medical and nursing journals on his findings (Winter, 1962; 1963;1971;1972;1978), and was invited to give various lectures. Smith and Nephew Ltd was also an important channel for disseminating information about the MWHT, through their OpSite literature, for as OpSite became associated with the MWHT, their promotion of the dressing also meant diffusion of information about the theory which underpinned it. In addition to these, what may be referred to as 'formal' channels of communication, it is likely that Winter's findings were also disseminated via more 'informal' channels. It is well recognised that the sending of private papers between scientists about their current research activities is an important way in which they keep abreast of developments in their field, often long before information about them is

diffused through more formal channels (Mulkay, 1972).

A number of factors affected acceptance of Winter's work. The perceptions of those working closely with Winter at the time of his discovery was that many in the scientific and clinical community were sceptical of Winter's findings at best and totally uninterested, and at worst, thought it "crazy". His former colleagues regarded this suspicion and scepticism as particularly prevalent amongst the British (because of their conservative attitudes towards change generally and innovations more specifically), whereas, the Americans were said to have taken Winter's findings much more seriously.

One of the main stumbling blocks to acceptance of the MWHT was, according to the respondents and some of the literature written in the 1960's and 1970's (see section 3.1), the clinical objection; in other words, that a wet wound is potentially an infected wound. Its association with various synthetic dressings such as OpSite (the main hydrogels and hydrocolloids were not developed until after Winter's death), was regarded by the respondents as another stumbling block, where the problems associated with the adoption of OpSite became problems associated with the MWHT.

The researcher would argue that the problems attached to acceptance of the MWHT are similar to those of any innovation. Scientists, like clinicians, and indeed lay people in general, judge the new in the light of their own experience, knowledge and prejudices. It is an illusion to assume that scientists are completely dispassionate, open minded and unprejudiced. They are as much influenced by current orthodox views as the clinicians discussed in the previous chapter. Hence their scepticism and slow acceptance of the MWHT, because it conflicted with the reigning paradigm on how wounds heal.

Another reason for the slow acceptance of the MWHT was, in the researcher's opinion, the reputation of Scales himself. According to Winter's former associates, it was very hard in the 1960's to have any new theories accepted within the scientific community unless you were a well known and respected figure or your superior was. The researcher

would, however, go further and argue that the question of "Who says so?" is an extremely important question in science and using it as a 'yard-stick' to judge new findings is not something peculiar to the 1960's; it has always played this central role. The implication arising from this kind of argument is that "some scientists count more than others" (Barnes 1985). It is not simply that a scientist's status in a given scientific community is used as an indicator of who should be listened to, but also the degree to which what they say should be taken seriously. Thus an eminent scientist is more readily listened to than an unknown researcher. According to Barnes (1985):

"This is particularly the case when the new contributions are unorthodox and at variance with existing ideas." (p56)

The fact that Winter was a young and unknown technician could partly explain why his findings were not immediately embraced by the scientific community. But why was not Scales, as his superior and more eminent scientist, able to champion his cause? The answer to this question is two-fold. Firstly, Scales may have been well known in certain scientific circles but as already indicated by the comments made by Barnett and Varley, his at times unconventional views, his ways of working, and his links with industry made him unpopular amongst some in the scientific fraternity, including some of his working colleagues. The effect of this unpopularity may have been to prejudice their opinions of anything that Scales said or did, or indeed anything that anyone closely associated with him said or did. It should therefore come as no surprise, the researcher would contend, to find that some in the scientific community were deeply sceptical of Winter's moist wound healing concept. If some of them did not take Winter's findings seriously, it was perhaps because they regarded it as typical that a discovery which overturns conventional understanding of how wounds heal should emanate from someone working in a department run by a man well renowned for his unorthodox views and activities.

A second reason why Scales was perhaps not in a strong position to influence the scientific fraternity's reaction to Winter's findings was because, in the researcher's opinion, Scales himself was never really totally convinced of Winter's theory. However, the extent to which the

outside world was aware of this fact is not well established. Thus how far Scales' attitude towards Winter's findings negatively affected acceptance of the concept of moist wound healing must remain at the level of speculation, although anyone remotely familiar with Scales' background and work can see the potential conflict in opinions that the MWHT could engender.

The researcher would argue that Scales' attitude towards Winter's findings may have hindered not only acceptance of the moist wound healing concept amongst those who had heard of this theory, but also its actual diffusion into the scientific community. If Scales had been seen to actively promote Winter's findings then perhaps more people would be aware of the connection between Scales and Winter. As it is, the researcher would argue, few people know of Scales' involvement with Winter and his work. From the comments made by Scales it was obvious that he was only too well aware of this fact, yet he blamed this on Winter's failure to acknowledge his relationship with Scales (as his subordinate) and Scales' involvement in his work. Winter may deserve this criticism but would Scales be so dependent on Winter informing 'others' about his involvement if he had also worked more actively to establish the connections between himself and Winter through promotion of the latter's discovery? Thus the above discussion seems to support the argument that the respectability which Winter's theory is now gaining in scientific as well as clinical circles, albeit almost thirty years on, has been achieved despite Scales' lack of support rather than because of it.

If, as the comments made by Winter's former colleagues suggest, Scales was never really totally convinced of Winter's theory, what are the reasons for this? The researcher would argue that they are essentially three-fold. Firstly, Winter's discovery that a moist environment provided the optimum conditions for healing to take place contradicted Scales' medical training and experience, which held that wounds have to be dry and that a wet environment is an ideal environment for the multiplication of micro-organisms. Secondly, moist wound healing appears to have contravened not only certain scientific and clinical principles but certain common-sense notions also. Scales, for example, employed

'naturalistic' arguments to question the validity of the MWHT by arguing that from time immemorial wounds have healed 'naturally' through exposure to air or drying. Finally, the MWHT appears to the researcher to conflict with much of Scales' own work of blowing air and oxygen over wounds, which the earlier discussion of Scales' pioneering work on high and low loss air bed systems clearly demonstrates. The differences between Scales and Winter discussed above are clearly illustrative of the competing paradigms about wound healing which continue to co-exist today.

However, despite these seemingly 'clear cut' objections to Winter's discovery of moist wound healing, there were occasions in the interview with Scales which indicated that his position was much more ambivalent. At times he seemed to support the MWHT, arguing that Winter's discovery marked the death knell for the practice of drying wounds. He also acknowledged some of the disadvantages of keeping wounds dry but nevertheless felt that the idea that drying wounds helps healing has not been totally eradicated by Winter's findings. The researcher would argue that to perceive Winter's findings in this way is to perhaps miss the point. It is not that the MWHT holds that wounds exposed or dried do not heal, for generations of empirical evidence would certainly contest this; it is just that they heal more slowly and less effectively than those under moist conditions. Thus the strength of the MWHT is that it offers better healing in qualitative as well as quantitative terms.

The researcher would agree with Scales when he argues that Winter's findings do not mean that the final chapter of wound healing has been written. The MWHT may be regarded as radical today compared to yesterday's knowledge about wound healing which it overturned, but tomorrow it too may be superceded by another theory. After all, all scientific knowledge is provisional. It should not be thought of as a "set of fixed truths" nor "a direct reflection of the real world" to quote Barnes (1985). One could argue that the MWHT no more offers us the 'truth' about how wounds heal than the theory it superceded or the one which will surely supplant it. Each of them offers us one particular interpretation of the healing process, one version of reality, but by no

means the only one. Thus one could say that the final chapter of wound healing may never be written.

Indeed, because the MWHT was a case of inductive reasoning, where Winter started from a collection of facts and then developed a general theory to explain his observations, one could argue that several other theories may have been inferred from the same evidence. In other words, the MWHT may be one of many theories that could have been postulated from the same facts. For concentration in one direction cannot be achieved, one could argue, without progress in the other being blocked.

In the researcher's opinion there appeared to be a reluctance on Scales' part to discuss Winter's work. Throughout the interview, Scales tended to play down the innovative nature of Winter's findings. Indeed, the pioneering nature of the wound healing experiments was a subject of much controversy. According to Barnett, Winter's findings were unexpected and surprised everyone involved, including Winter himself. Professor Scales took a counter view and argued that the findings confirmed what was already known. According to Scales, Winter already believed that allowing a wound to dry slowed down the healing process and caused tissue damage, while maintaining it in an environment akin to the body's natural physiological environment had the opposite beneficial effect.

According to Beveridge (1970):

"Probably the majority of discoveries in biology and medicine have been come upon unexpectedly or at least had an element of chance in them, especially the most important and revolutionary ones". (p31)

Winter's findings may have been unexpected but that is not the same as saying that his was a 'chance' or 'accidental' discovery, for to speak in such terms is to imply incorrectly, the researcher would contest, that Winter played a passive role. Instead one should regard Winter as someone who actively took advantage of opportunities which presented themselves, noticed the clues in his research and grasped their significance. The researcher would thus argue that the claim made by Walshe (1944) that:

"... just as important as making discoveries is what we make of our discoveries." (p297)

is an apt way of viewing Winter's wound healing work. And if Winter's findings were unexpected this may be because he possessed a 'prepared' mind and allowed himself to be exposed to the risks of encountering the unexpected and recognising them when they become apparent.

If, by saying that Winter's findings were not unexpected, Scales meant that Winter was not the first to discover that wounds heal in moist conditions, then the researcher would agree with him in part. The literature review in section 3.1 discussed the various studies which preceded Winter's work where wounds healing in moist conditions had been observed. It could be argued that the failure of these earlier researchers lay in the fact that they did not follow up their findings by building them into a general body of knowledge. The success of Winter, on the other hand, was that he did just that; he provided a coherent theory to explain his observations.

The discovery of moist wound healing and the development of OpSite are generally seen as radically different from the theory and dressings which they superceded. In actual fact there is much to suggest that they represent more a continuum than a radical departure from what existed before. It could be argued that the clinical reports, prior to Winter's findings, claiming that wounds heal better under moist conditions, were reporting a discovery made before its time, in that the complementary technologies needed to make this concept clinically and commercially feasible had not yet been developed. The materials available in the 1940's and 1950's did not allow the full benefits of moist wound healing to be observed. They lacked many of the necessary requirements, such as conformity and oxygen permeability, and they were relatively expensive. Looked at in this way, the innovativeness of Winter's work was its timing. Winter conducted his experiments at a time when synthetic materials were not only growing in number but were continually being improved.

It has been said that the reception of an original contribution to knowledge may be divided into three phases. The various comments cited

in the literature review (section 3.1) concerning the discovery of moist wound healing as well as the comments made by the respondents in this section of the study fully support this observation. To quote Beveridge (1970) on this issue:

"... during the first (phase) it is ridiculed as not true, impossible or useless; during the second, people say there may be something in it but it would never be of practical use; and in the third and final phase, when the discovery has received general recognition, there are usually people who say that it is not original and has been anticipated by others." (p113)

Scales repeatedly referred to the part that luck played in Winter's discovery, saying for example, that he was lucky in terms of the great amount of help he received from the Institute of Orthopaedics and implicitly from Scales himself. However, from the comments made by Scales himself, the whole of the wound healing programme was done without the financial assistance or backing of the Institute, and both Scales and Barnett and Varley openly and continually spoke of their terrible struggles to keep the project going. Thus there appears to be some discrepancy here. This may be related to a matter of deeper concern to Professor Scales, namely Winter's failure to acknowledge the contribution that he, Scales, made to his work, to which he may not wish to make direct reference because it clearly places him in a difficult position. Indeed, he spoke of it as being "extraordinary" that some people do not know that Winter worked with Scales, and was in fact his subordinate. Of course, underlying Scales' criticism of Winter is the regret that, rather than Winter receiving all the kudos and accolades, as he did, Scales (and his department) could have shared in more of the glory.

Scales' attempts to present the wound healing research as a collaborative piece of work were in contrast to the accounts provided by Winter's former colleagues. They did not give prominence to Scales' involvement with Winter's research and indeed spoke of Winter's individuality. Scales' criticism of Winter for his lack of acknowledgement of the help he received from himself and the Institute of Orthopaedics has to be understood in terms of the prevailing scientific culture and the important role which recognition from fellow

scientists plays. According to some authors such as Barnes (1985):

"Recognition is quite literally the **currency** of the reward system of the academic scientific community." (p46)

Thus what Scales seeks is due recognition for the part he played in Winter's discovery, from his fellow scientists and the clinical community, although it appears ironic that a person whose views and work made him unpopular amongst many in the scientific community nevertheless still desires their approval.

Winter's departure to the United States, to a position with the multi-national company 3M, was attributed by his former colleagues to a number of factors. Firstly, to his growing disenchantment with the lack of financial recognition for his pioneering work in Britain, because, to quote one of them:

" by this time he'd lost the boffin instinct and decided that material benefits were his right of way."

Secondly, his thwarted desire to extend his fundamental healing work on burns (through investigating, in greater depth, his 'leap-frog' theory of epidermal cell migration) and finally, the continual rejection and criticism of his work from the scientific community did much to persuade him to leave for America.

Moreover, the changing economic climate made it increasingly difficult to obtain research funds. As money became tighter the contract work done by Winter and his associates inevitably increased. The growing climate of animal protection also made the use of experimental animals problematic, particularly for the study of burns, because of the application of hot water scalds on animals. All these factors affected Winter personally, claimed Barnett, in that "the actual working joy went out of him...".

From some of Professor Scales' comments the researcher gained the impression that he did not approve of Winter's departure to the United States and may even have regarded it as an act of betrayal. The irony of this situation is that having always believed in, and throughout his

life closely worked with industry, he should lose a valued colleague to industry and felt somewhat resentful of it.

SUMMARY

This section has provided an account of the development of the MWHT. By highlighting the sociological, institutional and politico-economic factors which influenced Winter's work the researcher has attempted to demonstrate that science and scientific knowledge are neither exempt from sociological analysis nor independent of its social context. It is hoped that this section has provided the reader with a glimpse of the social processes whereby scientific knowledge is generated, accepted as valid by the scientific community and passed on to the wider society, thereby addressing an area which has generally received little attention in standard scientific textbooks and journals. Thus from both a theoretical and practical standpoint the researcher hopes to have challenged the orthodox way in which scientific knowledge and practice is presented and perceived.

NOTE

The information on Dr G. D. Winter contained in this section (4.2) of the thesis is based on that obtained by the researcher in the course of this research project. It should not be taken as the definitive account of Dr Winter's life and work.

4.5 THE GENESIS OF A DRESSING - OPSITE

The aim of this section is to trace the development and marketing of OpSite, the first dressing to be associated with the MWHT, through the assemblage of comments made by respondents from various departments of Smith and Nephew Ltd and archival material. The various factors which influenced the development and diffusion of OpSite amongst clinicians will be identified and discussed.

The different, and at times contradictory accounts and versions of events reported by the respondents, illustrate both the complex nature of the innovation process and the different interpretations which individuals have of this process, which may be based on more than just their varying levels of knowledge about it.

4.5.1 The History of OpSite

The pertinence of the following discussion to our study of the film dressing OpSite is that it will provide the reader with a brief overview of some of the products which the Smith and Nephew corporation has produced since the 1950's using thin films of various kinds. Their interest and work in this area, prior to the development of OpSite, should lead us to perceive OpSite not as a radical departure from Smith and Nephew's normal product range but representing more of a continuation of their interest in developing breathable synthetic materials.

Smith and Nephew Ltd was perceived by some of its staff as an innovative and forward looking company. Its wide-ranging interests in consumer and medical products was regarded as evidence of this. They have for many years been interested in the problems of materials used on the skin. Plastics in particular have engaged their research interests and especially their search for a 'breathable' material which can be used on the skin. Their collaboration with various research scientists and manufacturers in the 1950's, which eventually led to the development of Airstrip - the first synthetic micro-porous wound dressing, is indicative of their interest and work in this area.

The 1950's saw Smith and Nephew's interest in the field of cosmetics increase. Staff at Smith and Nephew Ltd became interested in manufacturing artificial fingernail covers, at that time "a top seller in America", for the British market. They approached an American company, Clopay Corporation, which was already developing fingernail coverings from PVC, to provide them with the technological knowledge necessary to manufacture this kind of product.

However, various problems surrounding the adhesive used on these fingernail coverings, namely its inability to allow the nails to 'breathe' through the film, thus causing them to split and become brittle, finally led Smith and Nephew Ltd to halt production of them and the American Food and Drug Administration (FDA) to force Clopay Corporation to withdraw them from the American market. Smith and Nephew's involvement with Clopay Corporation did not end with the termination of production of these fingernail coverings. According to the article in the 'S&N Reporter' (a monthly in-house newspaper of the Smith and Nephew group of companies) November 1970 issue, staff at Smith and Nephew Ltd once again approached Clopay in the late 1950's for ideas for new products. They were said to have suggested developing a "very thin gauge polythene film - a half a thousandth of an inch thick" to be used for wrapping clothing in the dry cleaning and laundry industry. This proved to be a very successful venture for Smith and Nephew Ltd, despite initial resistance from customers and heavy competition.

In 1964 Smith and Nephew Plastics Ltd acquired a licence from a German firm to manufacture and market a polythene film which they used to develop plastic bags for the food and hardware industries and carrier bags for shoppers. Smith and Nephew's work with various polythene films continued over the years, extending their involvement in these and other fields.

It was twelve years later, according to the 'S&N Reporter' November 1970 issue, that Smith and Nephew Ltd, having solved the problems associated with their earlier attempts to develop artificial fingernail coverings, decided to produce them once again. According to some respondents, the decision to go into production with these fingernail coverings for a

second time was not taken because staff at Smith and Nephew Ltd recognised the market potential for such a product, but because they were approached by a company to supply them with a shiny fingernail cover as an alternative to nail varnish.

There were disagreements amongst the informants, as well as between their verbal accounts and Smith and Nephew's archival material, concerning the dating of the development of these fingernail coverings, which were named Tip-Top, and this product's relationship to OpSite. Most of the verbal reports located the development of Tip-Top in the 1960's, while Smith and Nephew's archival material located it in the 1970's. One explanation for this discrepancy is that the respondents interviewed were confusing Smith and Nephew's development of Tip-Top with their earlier attempts to enter the artificial fingernail market. The researcher would argue that it was the respondents' incorrect dating of Tip-Top which was responsible for most of them incorrectly locating the development of OpSite in relation to Tip-Top. Thus some respondents thought that Tip-Top was developed at the same time as OpSite or before it, arguing that the material used on the first OpSite came out of the fingernail cover technology. Smith and Nephew's promotional literature of that period, however, supports the comments made by one respondent, that Tip-Top fingernail covers evolved from the OpSite technology (see fig.3) and not vice-versa, which would clearly date Tip-Top in the 1970's and not the 1960's. Thus the claim made by a couple of respondents that Smith and Nephew's interest in cosmetics was short-lived - "a brief flirtation" lasting between about 1967 and 1969 - is not altogether correct, although the production of Tip-Top fingernail covers was indeed short-lived because the company did not consider them to be commercially viable.

OpSite was first introduced in the UK in 1971 as a transparent, synthetic, adhesive surgical incise drape which was permeable to oxygen and water vapour, but impermeable to bacteria and liquids. The idea for adhesive incise drapes was first introduced in America, based on the principle that a sterile waterproof sheet placed over the incision area, and through which the surgeon then made the incision, would prevent the migration of harmful bacteria into the incised wound. But what were the

Fig. 3. An Example of Smith and Nephew's Promotional Literature for
Tip-Top Artificial Finger-nail Covers

Have
Op-Site™
at your
Fingertips

the quickest way
to colour your nails
beautifully

reasons underlying Smith and Nephew's decision to develop this kind of product? Two lines of argument arise from the comments made by the respondents and Smith and Nephew's archival material, that of - 'demand-pull' and 'technology-push'. Let us begin by discussing the 'demand-pull' argument.

Synthetic (plastic) transparent incise drapes, such as Steridrape (manufactured by 3M) and Barrier (manufactured by Johnson and Johnson Ltd), were already on the market prior to the development of OpSite. This demonstrated to staff at Smith and Nephew Ltd that a market potential for incise drapes clearly existed. However, the low moisture vapour permeability of the existing products tended to cause maceration of the skin during surgical procedures, because they did not allow sweat or moisture to escape. Rather than develop a 'me-too' product, Smith and Nephew Ltd sought to improve on the incise drapes already on the market by developing a non micro-porous incise drape with high moisture vapour permeability which would prevent skin maceration and remain in situ during long operations. Thus the idea for OpSite was born.

The second line of argument to explain the origins of the idea for OpSite, that of 'technology push', is much more involved. Although we now just speak of 'OpSite', from 1971 to 1974 it was known as 'OpSite Mark 1' and from 1974 onwards as 'OpSite Mark 2'. These different names were used to denote the change in material of the product. Once Smith and Nephew Ltd had settled on the material used to make OpSite Mark 2, the need to differentiate between the old and the new product no longer existed, and so the suffix 'Mark 2' was dropped and the product simply became known as OpSite.

The evidence seems to suggest that the original idea for OpSite Mark 1 arose from investigations into the potential uses of a polymer with the trade name Hydron, but what is less clear is who initiated this research. Comments made by the respondents variously attributed it to the Medical Research Council and a company by the name of Hydron Ltd. The 'S&N Reporter' of May 1969 reports that Smith and Nephew Ltd were working on a research and development programme to investigate the potential uses of Hydron for "adhesive dressings", amongst other things.

The researcher would, however, argue that Smith and Nephew Ltd were not working alone on this research project, as may be implied from the above discussion, but that it was a joint venture, between the Hydron Corporation and Smith and Nephew Ltd. The evidence for this comes from Smith and Nephew's archival material which reports that it was Smith and Nephew Associated Companies and the National Patent Development Corporation of New York which joined together to form the company Hydron Ltd.

From the above discussion it would appear that the first version of OpSite (Mark 1) was made from Hydron - a hydrophylic Copolymer film, and indeed Smith and Nephew's promotional literature at that time states this (see fig.4). However, according to one respondent, and some of Smith and Nephew's archival material certainly supports his claim, it is not strictly correct to speak of OpSite Mark 1 as being made from Hydron, for the name Hydron is not a generic name of a polymer, but a trade name, taken from the company of that name, the Hydron Corporation.

OpSite Mark 1 was considered satisfactory by certain informants as an incise drape and it was said to have given Smith and Nephew Ltd an advantage over the competition, but it was not considered flexible enough for general use around the body. Smith and Nephew's scientific and technical staff believed that they could find something better. A search of various polymer manufacturers, to see if any of their range of polymers fitted Smith and Nephew's criteria of good breathability and conformity, eventually led them to a commercially available polyurethane. It was subsequently developed and marketed as OpSite Mark 2 in 1974 (see fig.5). OpSite Mark 2 was regarded as a much better product than OpSite Mark 1. Its moisture vapour permeability had been improved to give better performance under operating conditions. It was thinner, stronger, more elastic and more conformable.

4.5.2 The Technological Aspects of the Production of OpSite

The basic process by which a film like OpSite is produced was described by a number of respondents. Plastic can be made by extrusion or casting. OpSite was made by casting. Casting a film is the process whereby the

Fig. 4. An Example of Smith and Nephew's Promotional Literature for the First OpSite made from Hydron Film

Op-Site

the effective skin flora barrier made from Hydron[®] film

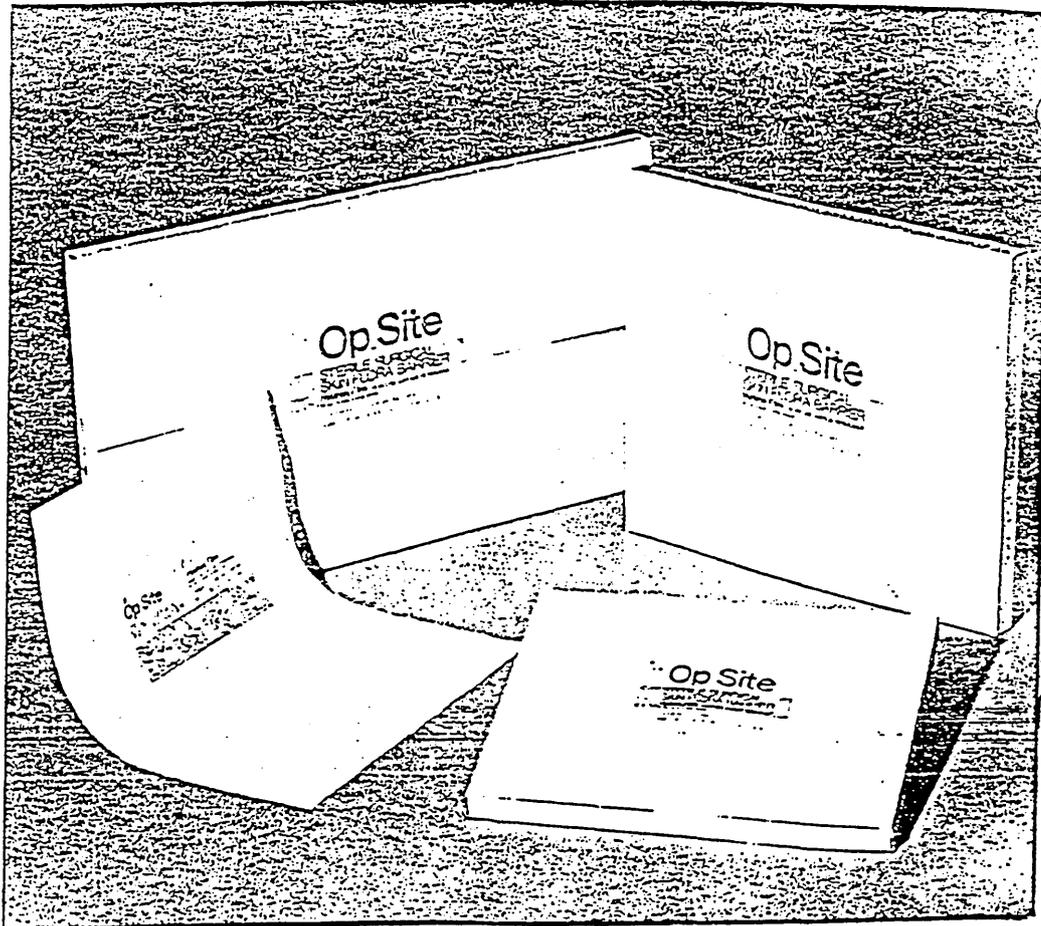


Fig. 5. An Example of Smith and Nephew's Promotional Literature for the Second OpSite made from a Polyurethane Film

Op-Site *MARK 2*
**-a major development
in adhesive drapes.**



strength and conformability

polymer is dissolved in solvent and then run down a conveyor belt and spread in a thin layer onto silicon coated paper. It is then passed down a heated tunnel which causes the solvent to evaporate, leaving a thin plastic film to emerge.

The porosity in films such as OpSite is obtained by the salt process. In this process finely powdered salt is mixed with the plastic prior to casting and is then washed out, leaving holes in the place of the salt particles. The finer the salt, the smaller the hole. When the holes are very small the material becomes waterproof while maintaining its porosity to water vapour and gases. The complexity of what appears to be a perfectly simple process is evident when one considers that a film such as OpSite needs to have holes big enough to make it oxygen and water vapour permeable, yet small enough for it to be impermeable to bacteria and liquids.

Smith and Nephew Ltd faced many technical problems in the process of developing OpSite -"probably hundreds" said one respondent. Scaling-up the process from test tube amounts to factory production quantities was just one of them. The actual process of scaling up often changes the entire composition of many polymers. In the case of those used for OpSite, a great deal of in-house development work had to be done to ensure that when they were scaled-up they possessed the same ideal properties as when they were developed in the test tube. In order to produce a film as thin as the one required for OpSite the polymers had to be dissolved. This provided the company with another technical problem, for some polymers cannot be dissolved or, if they are, change their structure so completely that they cannot be used. The polymers used for OpSite required further technical adjustments to make them appropriate for their intended purpose once dissolved to the desired thickness.

According to some of the respondents, the technology and techniques for the development of OpSite existed prior to the existence of the product itself. Staff at Smith and Nephew Ltd had a great deal of in-house knowledge and expertise with regard to producing films and coating them with adhesives, but they had never worked with such a thin and elastic

film as OpSite. This presented them with an engineering challenge and required them to design as well as to modify existing equipment so that it could handle such a thin film.

In addition to investigating and developing the film technology that was to form the basis of OpSite, Smith and Nephew personnel also had to do much development work on another necessary component to this innovatory dressing - namely adhesion. They were unable to use their traditional Elastoplast adhesive for OpSite for a number of reasons. Its adhesive was not transparent and so it could not be used on a clear film such as OpSite. It was also made up of natural rubber and resin and so suffered the disadvantages associated with natural rubber, such as non-uniformity. Unable to use their in-house adhesive and unimpressed with those available on the market at that time, they decided to develop an adhesive specific to OpSite. After much research they produced a synthetic adhesive with the desired qualities. For example, it was transparent, non-toxic, non-irritant, oxygen and moisture vapour permeable and was sufficiently predictable as to allow uniform batches of adhesive to be produced when scaled up into full production.

In terms of the developments related to the OpSite film and adhesive the staff at Smith and Nephew clearly saw themselves as being in competition with other dressing manufacturers. However, with respect to sterilization, co-operation rather than competition was the by-word, for it was seen to be in the interests of the world at large that all dressing manufacturers use proper sterilizing procedures. Staff at Smith and Nephew Ltd developed and used Ethylene Oxide as a sterilizer for OpSite.

4.5.3 Resistance Within Smith and Nephew to the Development of OpSite

Little is often heard, even less written, about the dissenting voices and resistance which exists within companies to the launch of an innovatory product. The discussion which follows is thus both interesting and important as it serves to de-mystify the consensus which is often thought to exist in such instances because of the lack of any contrary evidence.

There were differences of opinion regarding the extent and nature of resistance within the company to the development of OpSite. One point of view was that there was some resistance in the early stages because the numerous technical problems associated with its development made the waste levels of OpSite extremely high, which, together with its very labour-intensive production process made it a very costly and difficult product to produce. Its sales were also very slow. Indeed, its very innovativeness was said to have made some people within the company seriously question whether they should carry on with its production. It was not, however, clear exactly where these dissenting voices were emanating from. The comments made by some of the informants implied that opposition may have variously come from staff within the Research and Development, Technical or Sales departments. Had it not been for the few people within Smith and Nephew Ltd who recognised OpSite's potential and had faith in the product (and perhaps influence and power) or the very positive clinical results which were being reported, the company may well have ceased production of OpSite, it was claimed.

However, according to one respondent, there was more resistance within the company to the association of the MWHT with OpSite than to the development of OpSite per se. In contrast, another respondent argued that the reason why Smith and Nephew Ltd spent "a fortune promoting moist wound healing" was because many within the company were convinced it was right, even though it called into question the rationale for some of their other range of wound care products such as Elastoplast and Melolin.

Nevertheless, despite all the problems of the early days OpSite was generally viewed as a commercial success story. It was regarded by many of the respondents as the major product in Smith and Nephew's wound care range and, according to one of them, is the "flagship of Smith and Nephew Medical Ltd".

4.6 SMITH AND NEPHEW'S CONTACTS WITH OUTSIDE SCIENTIFIC AND MEDICAL PERSONNEL

The technical and scientific knowledge and expertise necessary to develop OpSite was, according to a number of respondents, the result of many years of in-house experimentation and collaborative work with other scientists and institutions. However, there were differences in opinion over the extent to which the staff at Smith and Nephew Ltd made use of outside medical, scientific or technical advice in the early stages of the development of OpSite. Several people made the point that when OpSite was first being developed Smith and Nephew Ltd were working in isolation, drawing only on in-house knowledge and expertise, as little specialist knowledge was available at that time. Indeed, there is much in the literature on innovation to suggest that this is a common feature of many innovating companies, for the reasons outlined. Other respondents, however, presented a somewhat different view of Smith and Nephew's independence at that time. They began by saying that they did not think that the company had made use of outside help, but then went on to give examples of individuals and institutions whose specialist knowledge and expertise had been sought. These included clinical, scientific, academic and technical personnel, such as orthopaedic and plastic surgeons, polymer consultants, adhesion technology consultants, material science consultants and staff from university departments.

The tendency of some of the informants to over-emphasise the company's self-reliance arises, the researcher would contend, from their desire to invest Smith and Nephew Ltd with all the credit for the development of this innovatory dressing. Their desire for recognition for being 'the first' company to develop such a dressing is obviously felt to be compromised if they admit to having made use of external sources of information, no matter how unrealistic the idea that no external advice was sought.

4.6.1 The Role of Dr George Winter and the MWHT in the Development of OpSite

Given the focus of this research and the association between OpSite and the MWHT, it is pertinent to investigate more closely Smith and Nephew's relationship with staff in the Department of Biomechanics and Surgical Materials in the Institute of Orthopaedics at the Royal National Orthopaedic Hospital at Stanmore, and in particular with George Winter. Comments made by some of the respondents about Smith and Nephew's long-standing relationship with this hospital confirmed Professor Scales' comments (see section 4.3). Winter was known to some of Smith and Nephew's Research and Development staff both formally and informally. They were said to have met at conferences and certain members of Smith and Nephew's research staff were said to have worked closely with him in the 1960's and 1970's. They were also acquainted with his work professionally.

It is interesting to note that when dating Winter's discovery of the MWHT some staff at Smith and Nephew Ltd tended to date it either as following or coinciding with the development of OpSite, despite the fact that Winter conducted his experiments in the early 1960's and Smith and Nephew Ltd had only managed to develop a prototype of OpSite by 1969 (the date when their UK patent for OpSite was filed).

In addition to disagreements over the dating of Winter's work, there were also differences of opinion between certain Smith and Nephew staff over exactly how OpSite became identified with the MWHT. As has already been mentioned, OpSite was initially developed as a surgical incise drape; it was not developed as a wound dressing in response to the development of Winter's MWHT. One idea put forward to explain the origins of the association with the MWHT and OpSite was that Winter purposely chose OpSite with which to experiment because he believed that it possessed the characteristics capable of creating and maintaining a moist wound environment. However, as far as some respondents were concerned, it was Smith and Nephew Ltd who approached Winter to do some experiments for them on OpSite and thus began the association between the MWHT and OpSite. Comments made by Winter's colleagues at that time

appear to support this latter version of events.

There is much in the above discussion to illustrate the highly selective view of history which some of the informants had, informed by, in the researcher's opinion, their desire to elevate the pioneering and innovative nature of OpSite and with it Smith and Nephew's status. To claim, as some respondents did, that OpSite provided the medical and scientific world with a tool through which moist wound healing could be achieved is one thing; but it is highly contentious to then assert that without OpSite Winter's findings would never have been translated into a practical reality. The belief that moist wound healing was not proven to work until the development of OpSite is certainly incorrect.

The researcher has no wish to deny the important role which OpSite played in making the MWHT a clinical reality but she does wish to expose the limited vision implicit in some of the assertions cited above. It is sometimes very difficult to think outside the confines of our present history. We imagine that things could not have been any other way, instead of thinking that at any given point in history there is a range of possible courses that events could take and that what we have is only one of them. Any one of the whole range of dressings now associated with the MWHT could, for example, have made moist wound healing a clinical reality. What gave OpSite the privileged position of being the first was serendipity. OpSite was available just at the time when Winter and his colleagues were working on this new theory and staff at Smith and Nephew Ltd were well acquainted with staff at Stanmore. The association between the MWHT and OpSite thus demonstrates the importance of communication networks in the transference of ideas.

4.7 OPSITE - MARKET DIVERSIFICATION AND INFILTRATION

In addition to its initial use as an incise drape OpSite was also promoted for use on skin grafts and donor sites. Its major shift in usage came in the mid 1970's when it began being marketed as a wound dressing. There was, however, a lack of consensus among the various respondents from the Sales and Marketing departments over OpSite's move from an incise drape to a wound dressing. Some respondents thought that

it was the early users such as surgeons, particularly the plastic surgeons, who, having incised and sutured through the OpSite incise drape, then discovered that if left in situ on post-operative wounds healing occurred. Others attributed the shift in OpSite's usage to the later users - the nurses, and their experiments with it on various wound types. However, as far as the researcher is concerned, the story of OpSite's use as a wound dressing represents a synchronisation of observations from the customer and recognition of market potential from Smith and Nephew Ltd, as part of their aim to "branch out" and "logically" extend OpSite's range of uses.

From the mid 1970's onwards OpSite was promoted for use as a wound dressing on a range of indications such as abrasions, lacerations, ulcerations, pressure sores and burns and also in a prophylactic capacity. Other attempts at market diversification with OpSite were OpSite spray (made from the original Hydron) to compete with other medical sprays already on the market; the introduction in 1980 of the OpSite I.V. dressing for securing cannulae at the drip site during intravenous infusions; and OpSite Skin Closures as an alternative to suturing the edges of an incised wound together. However, OpSite Skin Closures was not a commercial success and the company ceased production of it in the mid 1980's.

It was not until 1983 that the OpSite wound dressing was finally put on the UK Drug Tariff, making it available for the first time on prescription in the community. Up until that point it had only been available in hospitals. Despite all kinds of barriers and objections raised against its inclusion, clinical evidence and cost effectiveness studies were thought to have been responsible for its eventual success in this regard.

According to some respondents, up until the mid 1980's Smith and Nephew Ltd were promoting the basic OpSite product for a range of indications. From about 1986 onwards, however, the company began developing a range of completely innovative products from the OpSite technology. Products such as Allevyn and Transigen were developed for use on wounds for which OpSite is unsuitable, such as heavily exuding wounds and those with

variable exudate levels. OpSite CH (OpSite impregnated with Chlorhexidene), on the other hand, was developed in response to the launch by one of their competitors, 3M, of an Iodine-impregnated incise drape called Iobane to mitigate the risks of infection.

4.7.1 The International Market for OpSite

In addition to being sold in the UK OpSite is also available in most European countries, Australia, Canada, South Africa, Singapore and Hong Kong, although it is still regarded as a novel product in Japan, and is yet to be registered there as a wound dressing. The market for OpSite in the Middle East is said to be still somewhat "underdeveloped".

Germany and the USA represent for Smith and Nephew Ltd their biggest markets for OpSite, although they have very strong competition in the USA as two of their major competitors, Johnson and Johnson Ltd and 3M are American companies. The American market is said to be worth approximately £15-20 million to Smith and Nephew Medical Ltd as compared to the UK market which is worth £5 million or less (at 1988 prices).

4.7.2 The United Kingdom Market for OpSite

National Health Service hospitals are said to be Smith and Nephew's main market for OpSite, although the firm is increasingly seeking to expand its market into the private health field. Surgical Units such as orthopaedic, cardio-thoracic and plastic surgery provide a ready market for OpSite, for it is in these settings that OpSite's ability as an incise drape to remain in situ during lengthy surgical procedures is best observed. Geriatric and Orthopaedic Units are also an important market for OpSite because of the preponderance of bed-bound and immobile patients likely to develop pressure sores. The large number of district nurses and the wide variety of wound types which they manage also makes community nursing an extremely important market for OpSite. In contrast, the market for OpSite in, for example, terminal care and specialist cancer hospitals is thought to be low for a number of reasons. Firstly, because patients in such settings are often beyond the stage where OpSite can be of any help. Secondly, because the indication most

frequently helped by OpSite, namely pressure sores, either do not develop because of the high carer:patient ratio (more staff members are available to turn patients and thus prevent the development of pressure sores), or are not regarded as worthy of special attention given the general debility of the patient. However, the evidence from this study, conducted in part amongst clinicians in such units, indicates that perhaps the Marketing and Sales staff at Smith and Nephew Ltd have not recognised the full market potential of such units, or are unaware of the precise nature of the types of wounds and management regimes employed by nursing staff working therein. Various sections of this study have clearly demonstrated that nurses in these units are very familiar with OpSite and use it on a whole range of indications (see section 3.6).

The mechanisms through which dressings are supplied to UK hospitals and the community vary. There are seventeen Regional Health Authorities (RHA) in the UK and each one offers out an annual contract or tender inviting dressing manufacturers to submit bids. A decision is then reached by the various RHA committees as to which product will be supplied to a given health authority for the districts under its jurisdiction for that year. The manufacturer of that product essentially becomes the monopoly supplier in that region. However, the decisions of these committees do not appear to be totally free from commercial influence, for the companies are said to rely on a "loyal core" of committee members to promote their particular product. Even if Smith and Nephew Ltd lose an RHA contract they can, it was claimed, still retain a percentage of their business in certain areas through the actions of their "loyalists", although this depends on how closely the RHA polices their districts. If the RHA has absolute control over its districts and thus its users, one respondent from marketing claimed, "they can bring you to the point where you don't sell anything". However, he felt that very few RHA's are so organised as to be able to exert that degree of control.

In contrast, dressings are supplied to the community nurses via prescriptions. Unlike hospital pharmacists who have to dispense the product on their particular hospital's tender, irrespective of what may

be written on the prescription, community pharmacists are obliged to dispense exactly what is written on the prescription. Thus it is to the direct prescribers, which dressing manufacturers have identified as being the district nurses and not the GP's, that companies such as Smith and Nephew Ltd focus their attentions, in order to influence what product they write on prescriptions.

The main users of OpSite in the early days were surgeons because OpSite was initially marketed as a surgical incise drape. OpSite's move from an incise drape to a wound dressing not only represented a simplistic shift in usage, it also represented a more fundamental shift in user. Nurses now became the main users of OpSite and for Smith and Nephew Ltd their key audience. Despite this, as a number of respondents recognised, and the evidence from other sections of this study has demonstrated, nurses do not always have the autonomy to decide which dressings to use, as doctors often exert significant influence over this area of their practice. This is despite the fact that wound management is regarded as a nursing responsibility and doctors are not generally perceived as being particularly interested in such matters. It is not unusual, claimed one respondent from Smith and Nephew Ltd, for one of their sales representatives, when speaking to nurses, particularly district nurses, to be greeted with: "I can't use it unless the doctor says so." It is in recognition of this incongruous state of affairs that Smith and Nephew Ltd continue to promote OpSite to medical practitioners, albeit to a very limited extent.

However, the researcher would argue that a nurse's comment that she cannot make a decision over whether to use OpSite without the doctor's authority may be less of a sign of deference to the doctor and more a case of pragmatically shifting responsibility onto him/her, should any problems arise if OpSite is used. Such comments could also be tactically inspired in order to remove a bothersome representative. One could also view this kind of scenario as illustrative of the 'doctor-nurse' game, where the nurse appears to defer to a doctor's authority over which dressing to use, in recognition of his/her higher status, while in practice effectively making all the decisions regarding wound care. Discussions concerning doctors' and nurses' knowledge bases revealed the

misconceptions which some Smith and Nephew personnel have of these two groups of health care professionals. The stereotypical views which they hold about their interests and areas of concern were also evident. For example, despite the general recognition that more nurses than doctors are aware of and understand the MWHT, it was nevertheless held that those doctors who do know about it "obviously know about it in more detail than the nurses", because knowing about "fine biological effects" is considered to be their area of speciality and interest. In other words, doctors are more interested in theory and biological details than nurses. Doctors were also credited with being more innovative than nurses and more attracted to that which is new, because of its novelty value, and more willing to embrace new ideas and to accept new practices. In other words, they are considered to be less conservative and change-resistant than nurses.

The researcher's interviews with various doctors and nurses, however, confound the perceptions cited above. She found that doctors, like many nurses, are somewhat suspicious of the new, until it has been demonstrated to work in practice. Moreover, the doctors proved to be greater pragmatists and less interested in things theoretical than some of the respondents at Smith and Nephew Ltd supposed.

4.8 THE MARKETING OF OPSITE

The comments made by some of Smith and Nephew's Marketing and Sales personnel clearly implied that no formal market research was conducted by the staff of Smith and Nephew Ltd, either before they launched OpSite as a surgical incise drape or as a wound dressing, to ascertain whether there was a market for this kind of product. Thus the observations that Steridrape (an early incise drape produced by 3M) was selling well appeared to have been taken by staff at Smith and Nephew Ltd as evidence enough of the existence of a market for surgical incise drapes. This somewhat 'reactive' style of marketing was not, however, regarded as particularly unusual for a British company in the 1970's. According to some of the informants, in those days they tended to be more concerned with research and development and the technological aspects surrounding the production process than with marketing. Nevertheless, the general

opinion of the informants was that Smith and Nephew's previous style of marketing was incorrect and that if OpSite was to be launched today, they would do certain things very differently, although it was difficult to discern from their comments precisely what this would be.

Apart from utilizing the services of advertising agencies, particularly the specialist medical agencies, to help them develop their marketing strategies for OpSite, Smith and Nephew Ltd have, according to some of the informants, made little use of the literature on the diffusion and adoption of innovations or of outside consultants to guide them on their promotional tack. They have tended to be rather insular in this regard, drawing on in-house expertise or working by trial and error. The company's Marketing personnel have over the years used a variety of techniques to promote OpSite to health care practitioners in UK hospitals and the community. Direct mail is one such example, although there was a lack of consensus between respondents from the Sales and Marketing departments (both on the hospital and primary care side) regarding the precise definition of direct mail, its effectiveness and whether the firm still uses it as a promotional technique.

Smith and Nephew Ltd spend a large sum of money on advertising OpSite, although according to one respondent, this amount has decreased over the years. The content of an advertisement and the publication in which it is to be placed depends on the message that the company's Marketing staff wish to deliver and the target audience they plan to reach. For example, if they wish to reach a wide and general nursing audience they may place an advertisement in the popular Nursing Times. Alternatively, if they wish to focus on specific individuals, such as the key decision makers who influence which dressings are to be used (within a Regional Health Authority or a hospital), they may advertise in journals such as the Professional Nurse.

The company's overall philosophy towards the giving of free samples to potential customers is, according to some of the informants, a negative one. This practice is disapproved of, it was claimed, because it is viewed as "unethical" and "unprofessional" and because it is costly with no guarantee of increased sales. The researcher would, in fact argue,

that it is these latter economic concerns which underlie Smith and Nephew's stand on this practice and not the more morally praiseworthy ones which the company would perhaps like outsiders to believe, in their attempt to present a respectable corporate image. Nevertheless, despite all this, it was evident that the giving away of free samples does occur and according to one respondent, "reps will always free sample".

In an attempt to break OpSite's monopoly of the synthetic wound dressing market, Smith and Nephew's early competitors 3M and Johnson and Johnson Ltd began using, what one respondent referred to as "consumer-style American promotions", namely offering free gifts as inducements to nurses to use their dressings in preference to OpSite. This style of promotion was, however, directed at district nurses only and not hospital nurses. The reason for this is that this kind of promotional activity can only be effective in changing adoption behaviour if it is directed at those who are directly responsible for deciding which dressings are to be used. Dressing manufacturers know that the tender of a given hospital determines what dressings hospital nurses can use and not the direct users themselves. In contrast, district nurses, because they frequently write the prescriptions for dressings (a fact regarded as "common knowledge" amongst dressing manufacturers) effectively determine which dressings they use.

Despite the apparent disapproval of and protestations to the Department of Health and Social Security by Smith and Nephew's senior management about the use of such "unethical" promotional activities, Smith and Nephew's Primary Care personnel soon followed their competitors' example. This shift in policy was an attempt to offset the decline in OpSite's market share amongst district nurses which had already begun to occur. Thus in October 1986 Smith and Nephew Ltd launched their first such promotion, where they requested district nurses to send back ten empty pouches of OpSite in return for a Nivea gift pack (the Nivea range of toiletries is one of Smith and Nephew's most long standing and successful line of products), or a book on the management of wounds (see fig.6). As far as the researcher is concerned, Smith and Nephew's reason for offering an educationally and clinically valuable gift, such as a book on wound management, was because of its 'ethical' connotations. If

Fig. 6. An Example of Smith and Nephew's Promotional Literature Offering Inducements to District Nurses to adopt OpSite.

NEW SELF-ADHESIVE HANDLES

USE

Easy OpSite*

CLAIM

Your free gift

PRACTICAL NURSING HANDBOOK

WOUND MANAGEMENT

A Comprehensive Guide to Dressing and Healing

Jill A. David

they can be seen to be offering something which can help nurses in their clinical practice as opposed to merely pandering to their consumerism, then it allows the company to legitimate their involvement in such promotional activities both to themselves and to their potential critics.

According to one respondent, almost all of the Primary Care Unit's promotional activity is now in this format. They have offered various Nivea sun preparations, steering wheel clip boards and brief cases to the district nurses over the years. It has now reached the stage, this respondent lamented, where district nurses seem more concerned with what the next offer is going to be than with the dressings themselves. To quote:

"I have known situations where the rep has gone through all her sales pitch and then said to the nurse, 'Well, can I have your commitment.... are you going to use the product'? and they'll say 'Yes, but I rather like what 3M are giving away, what are you going to be offering because I don't like your clipboard..' I've seen them, they've opened their drawer and said 'Look I've got empty pouches, I am waiting for something I want and when you do something I want, I've got all the pouches ready.....'"

It is interesting to note that having instigated this type of promotional drive and engendered in the district nurses a consumer-type mentality towards dressings the Marketing staff at Smith and Nephew Ltd have been unprepared for and unable to deal with the consequences. They now accuse district nurses of becoming "very materialistic" and "greedy". This kind of attitude is perhaps a reflection of their own embarrassment and unease at getting involved in such promotional activities, which one respondent described as "tantamount to bribery".

The above marketing strategy is, one could argue, a clear example of the way in which commercial techniques employed in the wider society to promote all kinds of non-medical products are now being used to sell clinical products in the medical world. Many critics of this style of promotion would argue that while it may be suitable for selling household detergents it has no place in the medical world, not least because it creates a 'consumer type' mentality in nurses which is the antithesis of their application of clinical judgement.

However, if we argue that medicine, in terms of its knowledge and practice, is influenced by a whole range of social factors, then the adoption of such promotional activities as these should not surprise us. What may be of surprise, and for some, disquiet and distaste, is that such examples clearly demonstrate the way in which the values and practices of the wider society impinge on the medical world. This is in contrast to the 'hidden' and often 'unacknowledged' influences which have always existed and will continue to co-exist alongside the stereotype of medicine as value-free and untainted by mundane concerns.

In some instances the marketing devices adopted by Smith and Nephew's Marketing staff have been designed to accord with its image as a caring and ethical company. It was, for example, amongst the first medical firms in the UK to offer 'educational' films. Over the years the company has produced various films on the healing and treatment of wounds, particularly in more recent times, to promote OpSite. 'Protection of the Wound' made in 1974 and 'Helping Nature to Heal' made in 1978 are but two. The aims of Smith and Nephew's films have changed over time as the company's position in the market place has shifted. In the early days its staff regarded themselves as educators, a role which was both possible and desirable when Smith and Nephew's monopoly of the film dressing market predominated. However, with the arrival of competition in the early 1980's their perception of their films changed and with this their style of presentation. Smith and Nephew's Marketing and Sales staff now tend to regard them as sales and not educational aids. According to one respondent, they decided that:

"we're not going to make a half hour film on why wounds heal quicker under OpSite. We're going to make a film which actually sells OpSite."

Of all the different marketing devices used to change adopter behaviour "sales repping" was unhesitatingly cited by most of the respondents from the Sales and Marketing units as the most effective. As one respondent put it, "the bread and butter of our promotion is done by the sales reps." The importance of sales representatives to companies such as Smith and Nephew Ltd was said to lie in the regular, persistent and personal 'face to face' contact they can establish with, and the control

they can exert over their customers in terms of the content and the manner of the message they deliver. Different sales teams are responsible for promoting OpSite to medical and nursing personnel in the community and hospitals (both private and NHS) through meetings, study days, workshops and symposia.

However, as far as one respondent was concerned, their sales force can only reach "approximately 10%" of the potential market for the product; the remainder learns about OpSite through word of mouth. To quote:

"...If you tell one nurse that OpSite's wonderful and she tries it and it is, she tells her mates in the next ward and they use it... it goes like that."

What this respondent clearly recognises is the importance of informal inter-personal networks in promoting OpSite to health care practitioners. No matter how effective the formal methods of diffusing information about OpSite are in themselves, they may not be available or accessible to all clinicians. One important informal channel by which clinicians learn about innovations in the health care field, such as OpSite, is through opinion leaders. These people can be drawn from the ranks of many groups in the health care field, for example, surgeons, nurses and pharmacists. They are said to be very identifiable, tending to "stick out like a sore thumb", and are by their very nature "opinionated", "innovators" and "salesmen", in that they have the ability to 'sell' things to other people. Smith and Nephew's Marketing and Sales staff appear to expend a lot of time and effort in identifying these key people and using their status to promote OpSite to other health care personnel. This may take place through, for example, involving them in collaborative clinical trials or persuading them to write and publish journal articles on their experiences of using OpSite or talk about it at clinical meetings. Implicit in the use of opinion leaders is the belief that having presented the message, informal diffusion networks will do the rest of the work in spreading information about OpSite so as to increase its adoption.

However, the tactic of using opinion leaders or innovators, which may or may not be the same person, to promote OpSite may produce different

effects to those intended. They may not, for example, be as well respected by the clinicians as the company believe them to be. Moreover, innovators, by their very behaviour, in adopting innovations earlier than the rest of their community, may be seen by those within that community as 'outsiders' or even deviants, on the periphery of the system. Thus the extent to which members of that community will listen to them and take their advice may be debatable.

4.8.1 Changes in Smith and Nephew's Marketing Strategy to Promote OpSite

Until the launch of OpSite the MWHT was relatively unheard of in clinical circles. The reluctance of some clinicians to adopt OpSite was variously blamed on the innovative nature of the MWHT and OpSite, in overturning conventional understanding about the healing process and how wounds ought to be managed. However, the researcher would argue that the source of the message played almost as important a part in making clinicians reluctant to adopt OpSite as the content of the message, given that clinicians' first source of information about OpSite and the MWHT was usually from sales representatives, who, in the researcher's opinion, lack credibility in the eyes of many clinicians as sources of unbiased scientific information, given their commercial links.

The education of clinicians about the theory underlying the moist wound healing concept and OpSite itself, as well as the practical skills necessary to use OpSite, was regarded by some of the informants as absolutely critical if staff from Smith and Nephew Ltd were to persuade people to use such an innovative product. Thus the company launched a major educational programme with the introduction of OpSite. "If it hadn't have required education", one respondent commented, "we wouldn't have done it."

However, a shift in Smith and Nephew's marketing strategy was soon to occur. Their previous heavy emphasis on education about the MWHT was replaced by more explicit promotion of OpSite. Various reasons were offered to explain this change. One account was that the arrival of competition in the early 1980's made the company's Marketing personnel

realise that the exclusive connection between the MWHT and OpSite now no longer existed and so they should put more emphasis on promoting OpSite instead of educating the clinicians about the MWHT. They could no longer guarantee, after all, that their educational efforts would result in nurses using OpSite as opposed to one of their competitors' products, given that they too were based on the MWHT.

Another argument was that the shift from education about the MWHT to the promotion of OpSite's effectiveness through using, for example, clinical proof came in response to the recognition that nurses are rarely interested in detailed theory as long as the dressing works. According to one respondent, the MWHT in itself never sold the product, other than by making it more respectable and scientific. What did sell the product, according to another respondent, were the claims that:

"this will heal your pressure sores faster, safer, less pain and it saves you money."

A third perspective also locates the company's shift in marketing strategy in terms of the clinicians' lack of acceptance of the MWHT, but it does not blame this on the clinicians' lack of interest in the theory but on the failure of the company to convince them of it. According to one respondent putting forward this view, the MWHT is "common sense" and easily understood by anyone if "put over correctly".

It is perhaps to be expected when researching the development and diffusion of an innovation that there should be differences of opinion amongst the people interviewed about the various issues and factors involved, given their different experiences and perceptions, notwithstanding the complexity of the actual process itself. In this regard, the case of OpSite is no exception, and the different opinions cited above are replicated elsewhere in this section. For example, the shift in the marketing of OpSite, with the increased employment of clinical evidence to prove OpSite's efficacy, arose not from the Marketing personnel's recognition of the nurses' lack of interest in matters theoretical, as some informants claimed, but from various issues related to the arrival of competition in the 1980's. One argument put forward is that in order to maintain their market share, in what was

becoming an increasingly competitive environment, the Marketing staff of Smith and Nephew Ltd sought to turn their competitors' deficiency in clinical evidence to their advantage. As soon as 3M launched Tegaderm, Smith and Nephew's Marketing and Sales personnel, using various marketing devices, sought to focus nurses' attention on 3M's lack of clinical support for their product as compared to the several hundred clinical papers proclaiming OpSite's efficacy.

However, another argument is that Smith and Nephew's Marketing staff's shift to using clinical evidence was as much a reaction to 3M's attack on OpSite's handleability, as to 3M's lack of clinical evidence to support Tegaderm. 3M identified the one main disadvantage of OpSite - it was difficult to apply. 3M's advertisement, depicting a "screwed up" OpSite thrown in a bin, aimed to illustrate OpSite's tendency to stick to itself, brought the problem of handleability sharply and embarrassingly to the attention of Smith and Nephew's Marketing and Sales staff, although not everyone agreed that it took their competition to alert them to this problem. The problem of handleability was something which staff at Smith and Nephew Ltd were said to have known about since 1981, due to the feedback they were getting from clinical staff around the world, but what some of the respondents did criticise themselves for was their dilatoriness in acting on their users' complaints much earlier. The researcher would go further and argue that it is the somewhat dismissive attitude which some of Smith and Nephew's personnel have towards users' complaints which is responsible for the existence of this kind of situation. Some respondents, for example, failed to see the problem of application as a legitimate complaint and dismissed it with the attitude that if OpSite is "a pain in the backside to put on, so what, if it works".

One could perhaps go some way in agreeing with the claim made by some of Smith and Nephew's staff that the problems of application associated with OpSite were due to the users' inexperience in applying the dressing and that the problems would remedy themselves as the users became more experienced. The solution therefore, would seem to be for users to be taught the appropriate skills and then leave time to do the rest. The fact that this is not what happened has as much to do with the threat to

OpSite's sales which 3M's product posited as to any problems inherent in the design of OpSite itself. Staff at Smith and Nephew Ltd sought to deal with OpSite's problems over handleability by replacing in 1984 the 'floppy' green stripes positioned down two sides of OpSite, which had been used since about 1973 to stick the dressing to the patient and then either left in-situ or cut off, with self-adhesive 'rigid' ones, made from a special type of tape reinforced with paper backing.

Another example of the way in which staff at Smith and Nephew Ltd took notice of their users' complaints, when the company's survival in the market place was under threat, concerned the clinicians' disquiet over the potential infection risks from the moist conditions created by the exudate under OpSite. The now classic studies on human and pig exudate, conducted by Buchan et al (1980 and 1981) at Smith and Nephew Research Ltd in collaboration with Professor Scales' department at the Institute of Orthopaedics at Stanmore were stimulated, the researcher would argue, more by the desire to placate growing disquiet amongst clinicians over the observed accumulation of exudate under OpSite than to fill any knowledge vacuum in this area. Indeed, one respondent said almost as much when s/he spoke of these studies being a "pure case of marketing".

What is interesting about the increased use of clinical evidence in the 1980's by Smith and Nephew's Marketing staff to promote OpSite's efficacy, as opposed to continuing with the education of users on the theory underlying the product, is that they misjudged their users' response to it. The company's Marketing staff found that, contrary to their expectations, nurses appeared not to be very interested in clinical evidence nor, one could argue, any more able to interpret and understand the results of clinical trials, than they were the MWHT. The nurses' pragmatic and somewhat blase attitude towards the existence of Smith and Nephew's hundreds of clinical papers can be summed up by the following quotation from one respondent from Smith and Nephew Ltd attempting to portray nurses' typical attitude:

"if I can apply Tegaderm easier and it keeps the wound moist and helps it heal, then why shouldn't I use it? I don't care about your 100 and odd clinical papers."

The surprise expressed by some respondents in discovering that nurses were not interested in clinical evidence, nor in detailed theory as was discussed earlier, in other words that they were essentially pragmatists, is hard to believe given that staff from Smith and Nephew Ltd were said to have had a close working relationship with nurses for many years. Surely anyone working as closely with nurses as they claim to have done should have known such things, or at the very least should have anticipated this kind of outcome, particularly a commercial enterprise whose very existence could depend on their thorough understanding of the market place? The truth may of course be that they were more interested in establishing scientific credibility with the scientific and medical fraternity through the production of clinical evidence that they did not stop to assess the true nature of their key audience.

Since the mid 1980's Smith and Nephew's Marketing and Sales staff have promoted OpSite on the basis of its cost-effectiveness. This move towards concern over the price of OpSite appears to have been as much a reaction to the increasing domination of issues of cost in the health service at large as to the staff at Smith and Nephew Ltd wishing actively to influence the market by setting the trends which other companies follow.

One example of the way in which Smith and Nephew's Marketing staff sought to promote OpSite's cost-effectiveness was to promote its ability to stay in place on a wound for up to two weeks. If OpSite does not require replacing as frequently as other dressings it has the automatic advantage of being cheaper to use in the long run. But were the origins of the instructions given to users to leave OpSite in situ for fourteen days tactically inspired, as suggested above, or did this concept arise out of other than purely marketing concerns? One informant regarded the shift from recommending that OpSite can be left on a wound from two to seven days in the early promotions, to fourteen days in their later ones, as a calculated marketing move to win back nurses who had changed to Tegaderm because of OpSite's application problems. The discovery that nurses were having to change their competitor's dressing frequently, because of its poor adhesion, led Smith and Nephew's Marketing

personnel, according to this respondent, to promote OpSite's superior adhesive qualities by claiming that it can remain in situ for up to fourteen days.

There is, therefore, much evidence to suggest that the concept of leaving OpSite in situ for up to fourteen days was marketing inspired. Can we thus assume that the origins of the initial idea to leave OpSite in situ for up to seven days were the same? There were differences of opinion on this issue. One suggestion was that this concept arose out of a desire by Smith and Nephew's Marketing staff to secure OpSite's adoption by clinicians used to more conventional dressings. They recognised that OpSite's high unit cost, as compared to conventional cotton based dressings, would make it uneconomical and had it been promoted as requiring daily changes, as was conventional wound management wisdom at that time, its adoption would have been impeded.

An alternative perspective was that users were advised to leave OpSite on the wound site from two to seven days in order for the benefits of moist wound healing and the characteristics of OpSite, such as moisture vapour permeability and transparency, to be fully realised. If a wound is, for example, covered by a dressing which allows it to 'breathe', as OpSite does, and can be observed because of the dressing's transparency, there appears to be less need to change it as frequently as a dressing which does not possess these characteristics. Winter was also thought to have recommended that dressings such as OpSite should be left in situ for up to seven days in the first instance, and longer if possible, because of his findings that wounds healed more quickly in the moist environment created by the wound exudate if they were not disturbed too frequently.

4.9 CONCLUSION

This chapter on the findings derived from interviews with the commercial personnel who took part in the study marks the end of the presentation and analysis of the data investigating the development and diffusion of the MWHT and the dressing first associated with it. It also marks the end of the part of the thesis devoted to presenting and

analysing the empirical data arising from this study on the development and diffusion of wound healing theory and practice. Let us begin with a brief discussion of the findings from the previous section on the MWHT before making some conclusions about the development and diffusion of the first dressing associated with this concept.

Much in this study suggests that scientific research is, contrary to the prevailing view, imbued with social considerations. On a macro-social level, the changing socio-economic climate from the 1930's onwards, in terms of the decline of the textile industry and growth of the cellulose industry, made an increasing number of synthetic materials available for scientific research. Things may have been very different had natural fibres been the only materials for Winter to experiment with. The readily available research funds for fundamental research in the 1960's were also, one could argue, an important factor in the development of the MWHT, as it helped fund the unit in which Winter worked and thus helped Winter to pursue his fundamental work into the healing process.

On a micro-institutional level, one could also argue that Winter's background, experience and associates influenced the direction in which he focused his attention and the interpretations he gave to his observations. Moreover, the institutional influences arising from Winter's place of work, and more especially, the character of his superior, played a very significant role, in terms of making his whole work possible. The involvement of Scales' department at Stanmore with industry, not just in terms of financial support but of technical knowledge and suggestions of what is possible and what is not, may have also influenced the direction and content of Winter's work in many significant ways. Thus, it was the coming together of a whole range of factors, at a particular point in history, which accounts for the innovativeness of Winter's findings.

As one looks back to the development and diffusion of innovations, one may be initially struck by the apparent logic and order of it all. However, as one begins to look a bit deeper one quickly comes to realise that this is seldom the way things actually occur. The case of the MWHT provides a clear example of this, as indeed does the case of OpSite. It

indicates, for example, the extent to which serendipity plays a part in the discovery of new knowledge and the importance of a whole range of sociological factors to this process. Furthermore, the case of the MWHT also demonstrates the highly complex and involved nature of the process by which new knowledge is discovered. It is frequently a process full of 'fits and starts' and much uncertainty, where there is often little sense of a simple movement along a continuum from ignorance to enlightenment.

The image that many in the outside world have of the scientific world is that the knowledge produced therein is trustworthy, perhaps almost infallible, and is a true representation of reality (Barnes, 1972). While it is true to say that scientists, as humans, are as capable of making mistakes as any of us, what differentiates them from lay people, is that there is more at stake if they admit to making mistakes. Thus in order to prevent their credibility and authority as experts being seriously undermined many scientists, as well as adherents of the scientific tradition, tend to portray scientific investigation as wholly objective and informed by logic and reason (Barnes, 1985; Mulkay, 1979). It is hoped that the case of the MWHT has demonstrated that to view scientific research in this way is illusory. Tracing the development of the MWHT has shown the way in which every-day knowledge and commonsense notions frequently inform scientific research. Moreover, that the direction of scientific investigation and the theories which ultimately result from it are determined in very significant ways by highly subjective factors. Scientific knowledge should not therefore be viewed as a set of 'truths'. It is only one of many possible ways of looking at and interpreting the world, and even in its own terms it represents a provisional version of reality as new knowledge is continually superceding the old.

The researcher would further contend that there persists another illusion, particularly amongst non-scientists, of the consensus which exists amongst scientists (Barnes, 1985). This arises, she would argue, from our perceptions of science and scientific knowledge. If we view scientific knowledge as a set of objective truths then we would expect all scientists to agree on what these truths are and to 'speak with one

voice'. If, on the other hand, we regard scientific knowledge as nothing more than provisional interpretations, then such unity would not be expected. The researcher has attempted to show, through the case of the MWHT, that all scientists do not 'speak with the same voice', in the sense that some scientists' voices are heard more than others and are listened to more than others, which may have little to do with what they are saying and more to do with who they are and their status.

The case of the MWHT has highlighted the controversies which often exist in science between different paradigms. But rather than view them in a negative way, the researcher would argue for their positive elements to be stressed. In the researcher's opinion, such differences of view are not only inevitable, they are also healthy. Scientific findings should not be accepted uncritically, neither by scientists themselves, nor by those called upon to apply scientific findings, such as clinicians in the case of the MWHT and associated dressings. Unfortunately many clinicians, particularly nurses, are not trained to evaluate scientific findings critically, although they make up for this with a scepticism which is based on the assumption that that which contradicts their experience is treated with suspicion until it has 'proven' itself in practice.

In the previous chapters the researcher identified the important role which observation plays in informing clinicians' practice. She also argued that the belief that clinicians see the same things and attach the same meanings to their observations is an illusion. The evidence from this chapter seems to indicate that these same arguments can equally be applied to scientists. Observation plays a key role in any scientific investigation, but scientists, like clinicians, cannot observe everything. They too filter what they see. Their perceptions are circumscribed by their education and training and experience, with the result that differences in any, or all of these variables, can produce different interpretations of given empirical facts.

The evidence from this study shows that our subjective experiences colour our memory of past events. Our recall is not simply a reflection of our level of knowledge about them but our interpretation of them, which may be influenced by a whole host of psycho-social factors. The researcher has already discussed the importance of this idea with respect to the development of OpSite. Its relevance, however, also applies to the development of the MWHT. It could be argued that the disagreements between Scales and some of Winter's former colleagues over the original purpose of Winter's research and the extent to which his findings were a surprise may be explained by the fact that Scales had not worked as closely with Winter as the other respondents or, as has been hinted at throughout this chapter, that Scales had personal motivations for an alternative interpretation of this history.

A further example of the above proposition is that despite Scales' frequent citation of his involvement in the development of Airstrip no-one at Smith and Nephew Ltd mentioned it. The impression given by the respondents from Smith and Nephew Ltd was that, notwithstanding the help they received from certain people, credit for the development of Airstrip belonged essentially to Smith and Nephew Ltd. Thus, it could be argued, Smith and Nephew's and Professor Scales' desires for recognition by their respective communities and wider society may have resulted in each of them emphasising their particular involvement and the significance of their contribution.

The researcher has argued in the previous section that Scales' clinical background and experience prejudiced his reaction to the concept of moist wound healing, made worse by his feelings of personal betrayal due to Winter's failure to acknowledge the role that he played in the wound healing work. One could understand it if the two technicians, particularly Barnett, who helped Winter with much of the histological and laboratory work, felt indignant over the lack of acknowledgment and credit for their contributions, yet there was nothing in their comments which hinted at this kind of attitude.

In the researcher's opinion, the different reactions observed between Winter's various colleagues has much to do with their status vis-a-vis Winter and the differential expectations each of them had of their work. Scales' reactions are understandable when one considers the normal supervisor-student relationship. The student may do much of the work on a research project but in many cases it is the supervisor, by virtue of the authority invested in his/her status who receives the credit. This is in many cases, particularly in the natural sciences, a well understood and accepted state of affairs. However, in the case under discussion, we have the reverse happening, with the junior being bestowed with all the kudos while his senior's contribution remains largely unacknowledged. When one analyses the reactions of the two technicians who had worked closely with Winter, one finds a more modest attitude, which is perhaps in keeping with their lower status vis-a-vis Winter. Implicit in their comments was that they were merely doing their job and so expected little personal credit. Indeed, the very fact that they were involved with, what they saw as, a fundamental scientific discovery, was honour enough.

There are many similarities in the problems encountered in the diffusion and adoption of innovations amongst scientists as amongst clinicians. The fact that the MWHT offered better and quicker healing and thus had relative advantage over drying wounds (the traditional wound management practice which the MWHT and dressings associated with it effectively overturned), did little to increase its adoption. Instead, as the discussion in this chapter has indicated a multitude of other factors mediated this process. The researcher argued that the credibility of the source of information about a scientific discovery can significantly affect whether and to what extent it gets diffused amongst the scientific community and the speed of its adoption. Thus young, inexperienced and unknown research scientists have a much harder time in getting their discoveries accepted, no matter how ingenious, than better known and respected scientists (Barnes, 1985). Scientists, like

clinicians, also rely upon their existing knowledge to assimilate, make sense of and test new knowledge. They too have difficulty in escaping from prevailing doctrines and tend to be highly sceptical of radical innovations which appear to overturn conventional wisdom (Barnes, 1985; Beveridge, 1970).

On first analysis the development of OpSite appears to represent a sharp departure from Smith and Nephew's normal product range, for this company is well known for its cloth dressing Elastoplast. However, through investigating not just their development of OpSite, but also some of their other range of products, through archival material and speaking to various personnel at Smith and Nephew Ltd, a fuller picture emerges, one in which OpSite can be seen more as a continuation of, rather than a radical departure from, the firm's normal business.

As we have seen, Smith and Nephew Ltd have, for many years, been involved in the development of various products made from thin films, including laundry covers, carrier bags, fingernail coverings and wound dressings, namely Airstrip. This company's versatility and enterprise, in being prepared to go off into directions previously unknown to them and to take the accompanying risks, is as evident with the development of OpSite as with many of their other products. However, that is not to say that the development of OpSite did not require major changes to their production process and much research and development work.

The argument that the development of OpSite does not represent as radical a departure from Smith and Nephew's normal product range as may be supposed from a superficial look at the company and its activities, is equally valid when one considers the development of OpSite in terms of other wound care products. OpSite, as the incise drape it was initially launched as, was not the first such product to be developed. Thus, one could argue, it did not represent a radical departure from that which went before it but arose from attempts to improve, through minor modifications and adjustments, on those products already in existence. OpSite's launch as a wound dressing in the mid 1970's and its association with the MWHT, however, can be viewed as a radical departure from the prevailing paradigm about wound healing which advocated keeping

wounds dry and the largely cotton based dressings which predominated wound care practice at that time, although Airstrip had done much to pave the way for synthetic wound care products.

The linear model of innovation, where 'science discovers, technology applies and society adopts', is far too simplistic a vision and one which does not fit the development of the MWHT or OpSite. This model does not, for example, take account of the extent to which users shape technology and are responsible for technical change. According to some respondents from Smith and Nephew Ltd, the users' experimentations with OpSite on indications other than those recommended by the manufacturer accounted for OpSite's move from an incise drape to a wound dressing. However, it is not the researcher's intention to give the reader the impression that companies such as Smith and Nephew Ltd are always receptive to users' comments and take immediate action on them. Indeed, there is much to suggest that staff at Smith and Nephew Ltd have at times been very dismissive of their users' complaints and slow to take any action until they have been forced to by market pressures.

Just as the linear model of innovation discussed above is regarded by the researcher as too simplistic to apply to the development of OpSite, so too is the 'demand-pull'/'technology-push' dichotomy. The 'demand-pull' argument perhaps seems the most reasonable to account for the development of OpSite since the 'technology-push' perspective carries with it too many risks for the company in deciding to develop a product for which there is no known market. Nevertheless, an analysis of Smith and Nephew's activities over the years, of which this study has discussed but a few, indicates that this company has, on occasion, involved itself in ventures for which there has not always been a ready market. They have of course at times paid the price of failure for engaging in such projects, although the existence of a market for a product is no guarantee of its success either. Even if we accept that there was a market for synthetic incise drapes when OpSite was first launched, that is not the same as saying that the development of OpSite was in response to a 'need' for such a product or that staff at Smith and Nephew Ltd were aware of the size and nature of that market and took this into account. Thus it seems more fruitful to regard the development

of OpSite as a synchronisation of research and development work conducted by staff at Smith and Nephew Ltd on various polymers on the one hand, and their awareness of developments in the medical world on the other, rather than attempt to fit OpSite's development into either one or the other discrete model.

It is difficult to discern from the different accounts given by Winter's associates the rationale underlying Winter's work, whether it was instigated more by market concerns (demand pull) than the search for knowledge (science push). Barnett and Varley tended to favour the latter argument, portraying Winter as someone motivated by interest in fundamental research. In contrast, Scales leaned more towards a 'demand pull' explanation for Winter's work, presenting him more as someone engaged in scientific research in order to find practical solutions to clinical problems.

The findings from this study indicate that sales representatives play a vital role in up-dating health care practitioners about innovations in the wound care field. This educative role is, however, not one which Smith and Nephew's Marketing and Sales staff have sought. Rather it is one which they feel they have had to assume in order to fill the vacuum created by the failure of both the National Health Service and academic institutions to incorporate the MWHT into the nursing curriculum and to institute in-service training to educate nurses on innovations in the wound care field.

The researcher would also argue that the education mantle is not one which the company has taken on for any moral or ethical ideal, but for pragmatic economic reasons - to sell dressings. Thus the education of clinicians via Smith and Nephew's promotional literature and sales staff about the scientific principles underlying their innovatory dressing should, in the researcher's opinion, predominantly be seen as a marketing strategy to increase the rate of adoption of OpSite. Their shift in marketing strategy to less education on the MWHT and more promotion of OpSite, as their sales fell with the arrival of competing products in the marketplace in the 1980's, seems to confirm the real nature of Smith and Nephew's educative role. The rejection by Smith and

Nephew's Sales staff of the invitation made by various schools of nursing to develop teaching programmes on the MWHT, on the grounds that this would be "too educational" and without any immediate pay-off in terms of increasing OpSite's sales, further supports this proposition.

The distinction between what is educational and what is promotional can be a very difficult one to discern, but the researcher's impression, through conversations with various professionals in the health care field, is that clinicians often have little trouble in differentiating between an 'educator' and a 'salesman'. The staff of companies such as Smith and Nephew Ltd may perceive themselves as 'educators' yet clinicians, while they may acknowledge and appreciate their educational input, are under no illusion that in the final analysis, whatever tactics are adopted and irrespective of the image created, Smith and Nephew employees, like their competitors, are motivated by profit and as such will always be regarded with a certain amount of suspicion.

Indeed, many clinicians are highly suspicious of the claims made by dressing manufacturers. Certainly the differences which exist between the various companies' claims about the optimum conditions for wound healing appear to do little for their credibility. For example, Squibb Surgicare Ltd, the manufacturers of Granuflex (one of the first hydrocolloid dressings to be based on the MWHT), claim that wounds do not need atmospheric oxygen for cell regeneration. This is in contrast to the claims made by Smith and Nephew Ltd. Are they both right, or is one of them right and the other one constructing 'scientific' claims for political and economic ends?

The findings from this study confirm many of those discussed in other studies of innovations and their diffusion into different social systems, such as the importance of informal channels of communication and the role of company representatives in changing adopter behaviour (Rogers and Shoemaker, 1971). However, some of these studies split the adoption process into various stages in order to demonstrate that although company representatives are important elements in the diffusion network, they view them more as **informants** - raising potential adopters' awareness of their product in the early stages - rather than being

directly responsible for changing their behaviour. Colleagues and 'personal' contacts are thought to be more directly responsible for influencing adopter behaviour (see section 4.1.2). Although this study was not designed to investigate whether **awareness** and **adoption** sources were one and the same, with respect to the MWHT and OpSite, there was much in the comments made by the clinicians in this study to suggest that although sales representatives and the promotional literature from companies such as Smith and Nephew Ltd was how they first came to hear of the MWHT and OpSite, it was only through discussions with their medical and nursing colleagues that they decided to try OpSite. There may be a number of reasons for this. On the one hand, it may be that clinicians do not feel competent to judge the product on technical criteria alone and use this to inform their decision about whether to adopt it or not. On the other hand, it may be that sales representatives' very marginality, being essentially outsiders to the health care system, and their association with commercialism and the profit motive, make them an unreliable source of unbiased information.

Authors such as Wilkening (1952) and Miller (1975) claim that commercial change agents play a further role in the final 'action' stage, when a person decides to adopt the innovation and requires technical information about how to use the new product. Unless the case of OpSite is highly atypical of other innovations, which the researcher would argue it is not, then having made the decision to try OpSite the company representatives help the adoption process by 'educating' the users as to the 'correct' usage. Nevertheless, we should neither ignore nor under-estimate the findings from this study of OpSite which indicate that clinicians often learn how to use dressings through informal methods such as 'trial and error' and observation of 'others' and not just from formal instructions. The extent to which clinicians were able to experiment with OpSite facilitated, the researcher would argue, OpSite's adoption because they did not have to committ themselves to a wholesale adoption of it and could cease using it immediately if they were not satisfied with its performance. Such user control is not of course always possible with all innovations. Perhaps clinicians' perceptions that experimenting with and adopting wound dressings is not as life threatening an exercise as that associated with drug

experimentation and adoption also facilitated OpSite's adoption in the long run.

The fact that company representatives play an important role in influencing adopter behaviour, albeit to a lesser extent than imagined by the companies themselves, supports the argument that the actions of the company marketing the product can significantly affect adoption of it. However, not all clinicians have the same access to these commercial sources of information. The extent to which a doctor or nurse sees a sales representative will depend on numerous political, social, institutional and economic factors. For example, a clinician's familiarity with OpSite may be determined by the frequency with which Smith and Nephew representatives visit his/her particular setting. This in itself may be determined by the commercial attractiveness to this company of their particular unit, in terms of the quantity and types of wounds they have to manage, or the extent to which their representatives are encouraged or invited to visit.

The evidence from the interviews conducted with the nurses in this study indicated that Smith and Nephew's representatives had a higher profile in Unit C than the other two Units S and T, perhaps because of the above reasons. Thus it is perhaps not surprising to find nurses from Unit C being more familiar with OpSite than any other similar dressings, although the reason for this may also be due to the fact that OpSite was the first dressing of its kind and so nurses have had a longer exposure time to it.

The adoption of OpSite may have also been affected by its restricted availability in certain units due to the way that these new dressings are supplied to hospitals and the community. The fact that OpSite was not officially available in the community until it gained inclusion on the drug tariff, eight years after it was launched as a wound dressing, quite clearly affected the speed of its adoption by district nurses. The same also holds true for hospitals, where what dressing is available for nurses to use is determined by the contracting system. The extent to which nurses in certain hospitals are therefore familiar with and able to adopt any of these new dressings may be significantly influenced by

which company has won the contract for supplying that particular hospital.

Cost is also an important factor in determining the adoption rate of an innovation. A new dressing which is more expensive than those it is replacing, no matter what its advantage over them, will find adoption to be slow. This need not, of course, disadvantage it too severely, for a given dressing can be marketed in such a way as to promote its cost-effectiveness over time. This is the approach employed by Smith and Nephew Ltd with respect to OpSite. They argued that whereas conventional dressings need to be changed twice a day, if not more frequently, OpSite can be left in situ for up to a week and more, thereby making it cheaper to use over time. Moreover, key decision makers, such as the buyers who control hospital budgets, play a significant role in influencing the adoption of innovations such as OpSite, for they effectively decide which dressings are going to be available in a given unit and therefore which dressings nurses are able to use.

Thus issues of availability and accessibility and the marketing strategies and promotional efforts of the company diffusing the innovation are important considerations in understanding its adoption. To regard the adoption or non adoption of a particular innovation as evidence of people exercising free choice is not to recognise the constraints which governments and private institutions establish and maintain over this process.

In addition to the issues discussed above, other factors relating to the actual product also need to be looked at in order to understand OpSite's adoption process. For example, one could argue that its innovativeness was such that time was needed for the users to acquire the necessary skills and techniques to apply it and conceptual and cognitive frameworks to understand the principles underlying it, thus slowing down the rate of its adoption. After all, OpSite and the MWHT underpinning it were not compatible with existing patterns of thought and clinical practice, irrespective of the fact that Winter and his associates, staff at Smith and Nephew Ltd, or even some clinicians, regarded them as superior to or offering obvious advantage over existing products and

wound management practices.

Moreover, its extension of usage from an incise drape to a wound dressing in the middle of the 1970's was clearly an important factor in increasing its adoption, as it could now be used on a whole range of indications other than operation sites. This shift in usage was also accompanied by a fundamental shift in user, from surgeons to nurses, who represent a much larger pool of potential adopters. Smith and Nephew's subsequent segmentation of the dressing market made OpSite appropriate for use on indications previously not applied, thereby creating yet further markets. One should not, however, ignore the contribution which improvements in the dressing itself played in increasing the extent and rate of its adoption, such as the new handling system. Improvements which essentially aimed to meet the specialised needs of a new group of users. It is perhaps true to say that had OpSite been developed and promoted specifically as a wound dressing, which subsequent competitor products have been, and not as a 'converted' incise drape, which OpSite effectively is, the speed of its adoption could have been much quicker.

The researcher has attempted to show, with the above discussion, how one can understand the adoption of an innovation like OpSite without focussing solely on the characteristics of the potential adopters. This is what many respondents from Smith and Nephew Ltd did, and is, in fact, the traditional way in which the adoption process is investigated. The discussion which follows is an attempt to analyse critically the factors which some staff at Smith and Nephew Ltd saw as important in understanding the adoption process for OpSite.

The attitudes which a person holds towards change were considered by some of Smith and Nephew's Marketing staff to be important in influencing their decision to adopt an innovation and their speed of adoption. Thus someone with a modern attitude was thought more likely to adopt an innovation earlier than someone with a traditional and conservative one. But is the possession of either type of attitude dependent on an individual's psychological predisposition? Much of the evidence in this study points to the social and institutional influences which shape attitudes. If change is perceived as destabilising and

threatening one's position, as opposed to enhancing it through increased power and status over others, then negative as opposed to positive connotations will be applied to anything new, and the adoption of innovations will be thus affected.

Other characteristics of the potential adopter, such as age, were also cited by some informants as significant in influencing his/her reaction to the new. An older nurse is thought to be more resistant to change as it is seen to threaten her knowledge base and question her practice. A younger nurse is thought to owe no allegiance to the past and is thus more likely to challenge established practices and embrace the new.

However, the evidence from the interviews conducted with the nurses and doctors in this study presents a more complex picture. When analysing the responses made by the younger and older nurses who took part in this study, the older nurses did not appear to be any more sceptical of the MWHT and OpSite than their younger counterparts, for both were unsure of OpSite and often resisted adopting it too soon. To assume that increased adoption is due to the actions of the young is to ignore the institutional constraints which exist to maintain the status quo and to control change. The young nurse may hold modern values, but she rarely has the respect, power and authority to institute dramatic changes in clinical practice. It is a well recognised sociological observation that the socialisation of nurses into the nursing profession shapes their attitudes in significant ways, such that, the researcher would argue, the innovators or those likely to question their practice and that of others are regarded as delinquents whom the system either seeks to control or eject (Smith, 1976).

District nurses came in for particular criticism from some Smith and Nephew staff concerning their reluctance to change their practices and to adopt OpSite. Some of the respondents blamed this on the fact that present day district nurses are women who trained in the late 1960's and early 1970's and were therefore not in the hospital environment when OpSite was first introduced. Implicit in some of the other comments, however, was that district nurses' resistant attitudes were less to do with when they trained and more to do with their actual socialisation, given that many were said to still regard Melolin (another Smith and

Nephew product) as a new dressing even though "it's been around for twenty odd years."

Evidence from the researcher's interviews with nurses indicated that district nurses were more up-to-date and knowledgeable about dressings such as OpSite than any of the other nurses in the sample, although this does not of course mean that nurses in this unit used OpSite more than those in the other units. One reason for this discrepancy between awareness and adoption is that the inter-personal influences found to be so important in convincing potential adopters to adopt are not as readily available in the community as in hospitals. District nurses tend to work alone and thus do not have the same access to colleagues as hospital nurses from whom to seek advice and gain the confidence to try a new product. Moreover, the adoption of OpSite by district nurses may also be affected by its restricted availability in this unit due to the way in which it is supplied. Thus district nurses, who officially can only use items included on the drug tariff, could not have adopted OpSite until almost ten years after its launch, although there is much to suggest that hospital colleagues supplied them with it before it officially became registered on the drug tariff.

What the above discussion demonstrates is that, although it may be important to focus on the characteristics of potential adopters to try and understand their motives for adopting or not adopting innovations such as OpSite, to do this without also considering other factors, such as the actions of the company diffusing the innovation and the product itself, is to fail to comprehend and adequately explain the complexity of the adoption process. A fuller picture emerges when both 'demand' and 'supply' factors are considered.

There is much in this study to suggest that innovators have a harder struggle to have their innovations accepted than imitators, those who follow on the heels of the pioneer. The imitators are often able to exploit the inroads and learn from the mistakes made by the innovators, in order to speed up the adoption of their own products. For example, Smith and Nephew's competitors were able to produce a product better suited to the requirements of a wound dressing than OpSite, which was

ostensibly an 'adapted' incise drape. They were also able to utilise the exudate studies conducted by research staff at Smith and Nephew Ltd to promote the safety and beneficial properties of their own dressings. The extent to which OpSite's imitators exploited the inroads which Smith and Nephew Ltd had made over the years into the wound care field is clearly evident when one considers that the dressings which followed OpSite obtained inclusion onto the drug tariff within a very short period of time of being launched, in contrast to OpSite which took eight years. According to some of Smith and Nephew's personnel, their early competitors merely had to claim that their products were equivalent to OpSite, for them to gain immediate inclusion. The speed with which OpSite's competitors were able to achieve this can perhaps be accredited to OpSite's success and the clinical evidence which supported the usage of synthetic dressings and moist wound healing.

However, there are also disadvantages to being an imitator. The innovator has often been able to establish a monopoly over that particular area of the market and created a loyal following. In the case of Smith and Nephew Ltd, OpSite held a monopoly over the film dressing market from the early 1970's until the arrival of competition in the mid 1980's, which the other firms then had to fight hard to break. Imitators have also to promote themselves as being fundamentally different from the innovator, if not superior, for otherwise there is no reason for the user to adopt their product in preference to the one they are already using.

Studying the development and diffusion of the MWHT and OpSite has provided us with a unique opportunity to study the issues arising from the adoption of a concept and a related product; pure and applied knowledge, and how the two inter-relate. Although the study was never designed to prove or disprove any particular diffusion or adoption model, from the data available to the researcher she would suggest that the diffusion and adoption of OpSite followed the traditional path of most innovations until the early 1980's, with an 'S' shaped curve of diffusion. But whereas this model indicates a gradual levelling off of adoption following the initial upswing, with respect to OpSite we can

observe an actual fall. Let us analyse in more detail the factors which, in the researcher's opinion, have influenced the upswings and down-turns in the adoption of OpSite over time.

When OpSite was first launched in the early 1970's it was aimed primarily at the surgical market. The relatively small size of this audience; the innovativeness of OpSite, in terms of the users needing to acquire new skills and techniques to apply it; its high unit cost and unproven advantage over existing methods accounted for its initial slow adoption the researcher would contend.

The gradual increase in OpSite's sales from the mid 1970's can be attributed to the workings of the various social networks and inter-personal information flows, where an increasing number of people began to hear of the product and were persuaded to try it. However, its extension of use from an incise drape to a wound dressing in the middle to the late 1970's was, the researcher would argue, the main factor responsible for its increased adoption. For this shift in usage was accompanied by a fundamental shift in user, from surgeons to nurses. This move opened up new and expanding markets for OpSite, as it began to be used on a whole range of indications, other than operation sites, and by a larger army of users. The impact of Smith and Nephew's promotional campaigns and educational input, concerning the principles underlying OpSite and its method of usage, can also be said to have taken effect by this point and influenced adoption.

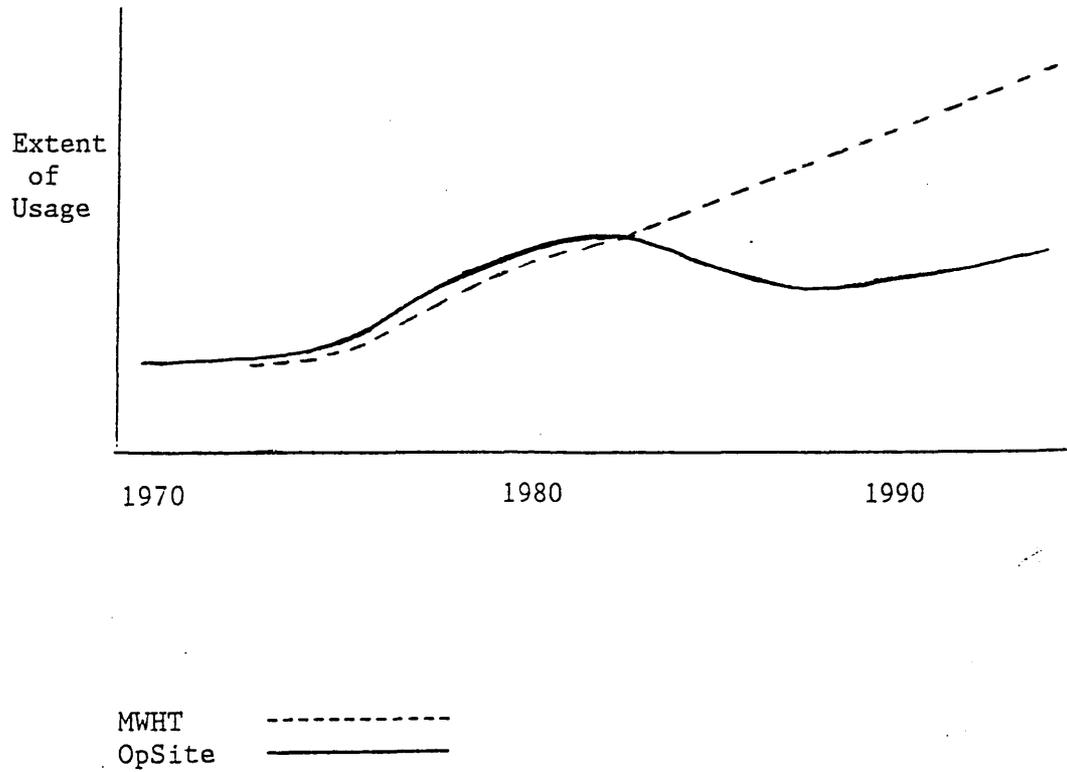
The slow down in the adoption of OpSite occurred not because the market was by the early 1980's saturated, the researcher would argue, but because of the arrival of competition. From the mid 1980's various companies began launching synthetic and semi-synthetic dressings based on the MWHT, which cut into OpSite's market share thus inevitably affecting its adoption rates. However, according to staff at Smith and Nephew Ltd, there has been a gradual upswing in the adoption of OpSite from the late 1980's. There could be a number of reasons for this, the researcher would contend, including improvements in the dressing itself; the various marketing strategies and promotional drives of Smith and Nephew's marketing and sales staff; clinicians' increased familiarity

with and experience of using OpSite and adoption by a wider user audience who may never have heard of OpSite until they began using one of the other dressings based on the MWHT and then decided to try OpSite.

If we attempt to plot the diffusion and adoption of the MWHT a linear curve of diffusion can be observed rather than an 'S' shaped one, as in the case of OpSite (see fig.7). Although the MWHT was discovered by Winter in the early 1960's the complimentaries necessary for it to become a practical and clinical reality were not available at that time. It was only with the development of OpSite in the 1970's, and more specifically, OpSite's shift in usage to a wound dressing, that we can begin tracing its diffusion and adoption. Once it had become associated with OpSite, as the adoption of OpSite increased so too did the adoption of the MWHT. However, the fall in OpSite's sales in the mid 1980's did not have the same effect on the rate of adoption of the MWHT, for the new products which came onto the market at that time, and began competing with OpSite, were also based on the MWHT and so as their sales increased so too did the adoption of the MWHT. Indeed, it is at this juncture that the previously exclusive and parallel fortunes of OpSite and the MWHT ended and the latter's adoption became tied with an increasingly wide range of dressings.

However, it is the researcher's opinion that these links will not necessarily ensure the continued acceptance of the MWHT for there is much evidence in this study to suggest that clinicians are more likely to accept changes in wound care practice than they are changes in thinking about the wound healing process (see section 3.7). Moreover, perusal of the current promotional literature of some of the dressings currently associated with the MWHT and discussions with staff at Smith and Nephew Ltd have led the researcher to conclude that the association between the MWHT and these various dressings will become increasingly more difficult to discern. The researcher would argue that in a few years time many clinicians will be even less aware of the theory underpinning the usage of these dressings than they are now. It may be that in the not too distant future the MWHT will only merit a reference in the promotional literature of some of the company's marketing these dressings, as their marketing and sales staff become more concerned with

Fig. 7. Diagram illustrating the Diffusion Curves for the MWHT and OpSite.



selling their particular product rather than seeking to justify its usage theoretically and scientifically. The reasons for this may be two-fold. Firstly, it may be that as competition between an ever growing number of companies marketing dressings of this kind intensifies they will become more concerned with promoting that which distinguishes their particular product from the rest than that which unites them, namely the MWHT. Alternatively, it could be that these companies have found the association between their product and the MWHT more of a hinderance than a help in increasing sales, in that clinicians have been found not to be particularly concerned with matters theoretical and scientific and the changing of deeply entrenched beliefs and conceptual frameworks about the healing process, which the MWHT demanded, a difficult challenge to meet without the long-term help of academic institutions.

CHAPTER FIVE: CONCLUSIONS AND DISCUSSION

The researcher has attempted to show in this thesis that scientific knowledge and practice is as influenced by social, political, economic and institutional factors as is medical and nursing knowledge and practice. Moreover, that these factors shape clinicians' level of knowledge and understanding about wound healing matters and their choice of wound management therapies in much the same way as they do the direction of scientific research, the interpretations given by scientists to their findings and the speed with which new knowledge gains acceptance within scientific and clinical circles.

The data suggest that every-day knowledge, common-sense notions and ideas, frequently informally and often haphazardly acquired, are used to guide commercial activities in much the same way as they do scientific, medical and nursing knowledge and practice. The findings in this study indicate that experience and trial and error, rather than theoretical knowledge, inform medical and nursing practice. Even though experience and trial and error may be regarded as non-scientific methods on which to base practice, there is much in this study to suggest that research scientists also employ them to guide their activities. Commercial personnel also rely on tacit, taken-for-granted and experientially based knowledge to inform their various marketing strategies.

What the evidence from this study suggests is the primacy of empirical and informal types of knowledge over the theoretical and the formal in informing practice, be it clinical, scientific or commercial. Personnel in these fields tend to regard empirical evidence as more trustworthy and relevant. With respect to the nature and management of malignant lesions little formal and structured knowledge exists, thus it seems quite appropriate that clinicians use informal and experientially based knowledge to inform their practice. However, we can observe that the same is still the case in areas where formal knowledge does exist, as with respect to general wound management matters and innovations in the wound care field. Moreover, while one could argue that clinicians' lack of knowledge and understanding concerning the nature and management of

malignant lesions is due to the paucity of information which exists about this condition, their similar lack of knowledge about wound healing theory and practice more generally, where such knowledge is more abundant, cannot be so easily explained.

Nurses' highly pragmatic and instrumentalist views towards knowledge and their conservative attitudes towards their practice are shaped, the researcher would contend, by a whole range of factors, including their education and socialisation. In nurse education the 'what' and the 'how' appear to predominate while the 'why' is rarely addressed, and tradition offers security and justification for the continuation of certain practices even when some of them have been discredited by new scientific evidence. Indeed, discussions over nursing knowledge raise the question over theory and practice, and whether nurses should be seen primarily in terms of their mastery of practical skills or their theoretical knowledge and understanding. The current moves to link nurse education more closely to higher education can be seen as one attempt to resolve this debate.

There is much in this study to suggest that not all clinicians are happy with the state and level of their knowledge about wound care issues. Many argue for their practice to be more theoretically informed than it currently is, although generally speaking there is evidence to suggest that certain types of knowledge are regarded as more appropriate for certain types of people to possess. Knowledge of the healing process was, for example, regarded by many clinicians in this study as the domain of the academic and research scientist and not the clinician. This illustrates, one could argue, the power struggle between the 'bedside' and the 'bench' and the knowledge thought appropriate for these two groups of people to possess.

Various sections of this study have shown that informal and formal channels of communications are as important for diffusing scientific findings to others within the scientific community and outside it, as for informing clinicians about innovations in health care practice. Clinicians believe that they ought to learn about such matters via formal as opposed to informal means, tending to regard this as the

proper way in which such knowledge ought to be diffused. There is much to suggest that commercial personnel and those within the scientific community are less inclined than the clinicians to attribute an inferior status to informally acquired knowledge.

This study has shown the important role which industry plays with respect to scientific research and clinical practice. Science and medicine have aligned themselves with industry for various pragmatic reasons, especially financial. The scientific community increasingly needs funding to continue its research and the clinical community needs help to keep practitioners up-to-date with respect to innovations in health care practice. Commercial enterprises have increasingly stepped into the vacuum created by academic establishments to educate health care practitioners on innovations in the wound care field because the latter do not have the resources or the will to do it themselves. Dressing manufacturers do not, however, engage in such activities, the researcher has argued, for any moral or ethical concerns but for pragmatic economic reasons - to increase their sales and thus their profits.

Doctors and nurses hold misconceptions and highly stereotypical views about one another in terms of their interests, sources and levels of knowledge and areas of concern, much as company personnel do about both these groups of health care professionals. The evidence from this study suggests that doctors are as much pragmatists as nurses and much less innovative or interested in matters theoretical than nurses, and those in the commercial world assume. Nurses are, in fact, more up-to-date than doctors on innovations in the wound care field. Indeed the latter frequently rely on the former to keep them informed of changes in this area, and not the other way round as the stereotypical view of doctors may suppose. Nevertheless, there is much in this study to indicate that the doctors' reliance on nurses for advice on wound management matters is at times seriously misplaced.

Moreover, despite the rhetoric that wound management is a nursing province free from too much control by the medical profession, there is much in this study to suggest that doctors still manage to wield a

significant degree of control over nurses' knowledge and practice, and nurses in certain units are not as autonomous as they and other observers may suppose. The evidence from this study also shows that on numerous levels there is a communication problem between many doctors and nurses, and between nurses of various grades. Despite what the doctors say, nurses do not feel that they are treated as competent professionals by the medical or indeed some senior nursing staff.

Illusions persist amongst clinicians and scientists alike regarding the consensus which exists amongst these groups of professionals. Scientists, like clinicians, do not see the same things nor attach the same meanings to their observations. They both filter what they see and interpret their observations according to their education, training and experience. Thus the assumption that medical, nursing and indeed scientific knowledge and practice are based on objective truths which are universally understood and applied by those within these fields has not been borne out by the findings from this study. Through the case of the MWHT and OpSite the researcher has attempted to show that scientific, medical and nursing knowledge are both influenced by the social context in which they are produced, representing one possible version of reality and not the ultimate truth of how things are. The case of the MWHT and OpSite has certainly highlighted the controversies which exist in the scientific and clinical worlds over this particular area of knowledge.

The data also suggest that scientists and the scientific community are as suspicious as those within the clinical community of innovations which appear to conflict radically with prevailing orthodoxies and contradict current understanding. Scientists too judge the new in the light of their own experiences and knowledge and prejudices, as much as lay people and clinicians, thus dispelling the myth that scientists are somehow more open-minded and untainted by social values than non-scientists.

The accounts presented of the MWHT and OpSite have indicated that the determinants of innovative activity are complex and that there is rarely a single factor causality. Moreover, that as radical as an innovation may at first appear, it more often represents a continuation of that

which it supercedes than a totally radical departure from it. The speed of adoption of new technology has been shown to be a similarly complex matter, where the 'new' does not immediately replace the 'old' but co-exists with it for a long time. The complexities of these various processes are therefore best understood by investigating the ways in which the 'demand' and 'supply' side of the diffusion process interact and influence the adoption of innovations in health care practice than focus solely on one at the expense of the other.

Research into the development and diffusion of innovations has been conducted in numerous fields but the whole area of the diffusion and adoption of innovations by nurses and the sources of their knowledge has hardly been addressed. How clinicians learn about innovatory research findings and practices pertinent to their every-day work and the factors which influence whether or not they adopt them, has, in the researcher's opinion, been sorely neglected. In investigating the development, diffusion and adoption of the MWHT and its associated dressings the researcher has, through this study, attempted to begin redressing this imbalance. In the process, various avenues for future research have presented themselves. For example, although, the researcher's educational background precluded her from directing the study into more scientific and clinical areas, such as investigating the nature of malignant lesions histologically, assessing the effectiveness of the local and general treatments used on them or presenting the patients' perspective, she considers these areas worthy of further investigation. Moreover, for various reasons discussed in the introduction, the investigation of the diffusion and adoption of the MWHT and associated dressings was not treated in the manner of other diffusion studies, although it clearly has enormous potential as a wide-ranging and interesting diffusion study.

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APPENDICES

Appendix. 1. Verbal Statement Issued to the Nurses Explaining the Purpose of Using the Pictorial Projective Technique

Some of the nurses I have interviewed told me that they had difficulty in remembering certain details about the wound healing process. So I wonder if you would help me by answering a few questions about the wound healing process with the aid of some pictures. This is so as to find out whether using pictures in this way could help to refresh nurses' memories about wound healing and at the same time to find out whether you feel that these pictures (which are widely available as a teaching aid to nurses) are useful in illustrating this process.

Appendix. 2. Letter Given to the Nurses at the Onset of the Interviews
Detailing Information about the Researcher and the
Research

Sheffield City Polytechnic

36 Collegiate Crescent
Sheffield S10 2BP
Telephone Sheffield 665274 (STD Code 0742)

Department of Health Studies
Head of Department: G V Larkin BA MSc Econ PhD

I would like to take this opportunity of explaining a little bit about the research. The research is concerned with the nursing management of patient's with Fungating and / or Ulcerating malignant lesions. The idea of doing such a study arose from the observation that there is a lack of information about this condition and its treatment in the medical and nursing literature. Yet nurses are responsible for caring for such patients and making decisions about the management of such lesions.

However, despite this lack of formalised information about this condition, nurses who care for patients with such lesions, have developed through their practise considerable knowledge about this condition. It is this knowledge which the study aims to tap.

To say a few words about myself. My name is Olga Ivetic and I am a Researcher in the Department of Health Studies at the Sheffield City Polytechnic. The research is being funded by the Local Education Authority (LEA).

If you wish to contact me with regard to this research please write or ring me at the Polytechnic. The address and Tel. No. are at the top of this letter.

Thank you for taking part in the research.

Date

I would be grateful if you could provide the following information about your nursing career. This will constitute an important element of the study as it will enable me to obtain information regarding the characteristics of the samples of nurses that have been chosen to take part in this research.

- ** When you have completed the questionnaire could you please place it in the envelope provided and seal it to ensure confidentiality. If you could then place the sealed envelope in the box marked:-

SHEFFIELD CITY POLYTECHNIC
RESEARCH PROJECT

The box can be found

Thank you for your co-operation.

Date

- ** Please could you complete the questionnaire by the as the box will be collected

Sheffield City Polytechnic

36 Collegiate Crescent
Sheffield S10 2BP
Telephone Sheffield 665274 (STD Code 0742)

Department of Health Studies
Head of Department: G V Larkin BA MSc Econ PhD

01/35

3 December 1986

Dear

Some time ago the Family Practitioner Committee granted permission for Dr P Lyne (Department of Health Studies, Sheffield City Polytechnic) to conduct a study concerning the nursing management of patients with fungating/ulcerating malignant lesions.

I joined the project as research assistant in 1985 and have extended the study to include aspects of the collaboration between medical and nursing staff in the care of patients with such lesions.

We consider that a medical perspective will make a significant contribution to the substance of the study, particularly with regard to the development and dissemination of knowledge in the areas of wound healing and management of fungating malignant lesions.

I have already conducted interviews with approximately thirty-six nurses and nine hospital doctors.

The Sheffield Local Medical Committee gave me permission to make contact with General Practitioners to ask if they would be willing to take part in the study. From a sampling frame consisting of the names of all Sheffield GP's I selected a sample of eight at random. Yours was one of the selected names.

I am therefore writing to ask if you would be willing to take part. Your participation would involve a single interview, at the time and place of your choice. The interview would last approximately half an hour and would be concerned with the subjects mentioned above, ie fungating/ulcerating malignant wounds, wound healing and aspects of the collaboration between medical and nursing staff caring for patients with cancerous lesions.

I will be only too pleased to discuss the above issues with you - either by telephone or in person - whichever is the most convenient for you.

I will telephone your secretary in the next week or so to find out your decision.

Yours sincerely

OLGA IVETIC (Ms)
Research Assistant

Sheffield City Polytechnic

36 Collegiate Crescent
Sheffield S10 2BP
Telephone Sheffield 665274 (STD Code 0742) (Ext. 3231)

Department of Health Studies
Head of Department: G V Larkin BA MSc Econ PhD

I would like to take this opportunity of explaining something about this research project. It is made up of two parts.

1. A study of the nursing management of patients with fungating/ulcerating malignant lesions. This aims to investigate the extent and sources of nurses' knowledge about the nature and management of such malignant lesions.
2. An investigation of the processes involved in the dissemination of knowledge between the medical and nursing professions with particular reference to the areas of wound healing and malignant lesions.

It is hoped that one outcome from the project will be an increased understanding of the means by which knowledge is transmitted between the professions and that this may be of relevance to nurse education. Therefore, it is important that the views of both medical and nursing staff be sought and studied.

To say a few words about myself. My name is Olga Ivetic and I am a researcher at the Sheffield City Polytechnic in the Dept. of Health studies. The research is being funded by the Local Education Authority. I must emphasise that I am in no way attempting - nor am I in a position to - make any judgements on what you know or do in practise with regard to patients with such a condition. I would also like to assure you that whatever you say, will be treated in the strictest confidence.

If you wish to contact me with regard to this research please write or ring me at the Polytechnic. The address and telephone number are at the top of this letter.

Thank you for taking part in the research.

Date

3) Are there any other relevant details of your training which you would like to add?

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4) Are there any comments which you would like to make about this questionnaire/interview?

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SHEFFIELD CITY POLYTECHNIC

RESEARCH PROJECT ON - FUNGATING/ULCERATING MALIGNANT LESIONS

I would be grateful if you could provide the following information about your medical career - particularly with respect to your previous experience in the field of Oncology and/or work with cancer patients.

1. Please tick which of the following age groups you belong to.

under 25	<input type="checkbox"/>
26 - 35	<input type="checkbox"/>
36 - 45	<input type="checkbox"/>
46 - 55	<input type="checkbox"/>
56 -	<input type="checkbox"/>

2. Date of qualifying (eg. MB,ChB)(year only)

3. Institution where qualified

4. Have you ever worked with a specialist Oncology firm?

Yes

Please complete Q5 and Q6

No

Please complete Q6

5. Please could you list in chronological order any posts which you have held in this speciality.

<u>POSTS</u> (eg. HO, SHO, Registrar etc)	<u>YEAR OF COMMENCEMENT</u>	<u>APPROX. LENGTH OF SERVICE</u>	<u>NAME AND LOCATION OF UNIT</u>	<u>CONSULTANT</u>	<u>SPECIALITY OF FIRM</u> (eg. Paediatric Oncology, Terminal Care etc)

6. Please could you list in chronological order posts which you have held in which you have treated cancer patients (other than any posts mentioned in Q5)

<u>POSTS</u> (eg. HO, SHO, Registrar etc)	<u>YEAR OF COMMENCEMENT</u>	<u>APPROX. LENGTH OF SERVICE</u>	<u>NAME AND LOCATION OF UNIT</u>	<u>CONSULTANT</u>	<u>SPECIALITY OF FIRM</u> (eg. Paediatric Oncology, Terminal Care etc)

Please complete the remaining sections (if appropriate)

7. If you have attended any post-registration course(s) related to any aspect of Oncology - Please complete the following section.

<u>COURSE TITLE</u> <u>(IF KNOWN)</u>	<u>YEAR OF</u> <u>ATTENDANCE</u>	<u>LENGTH OF</u> <u>COURSE</u>	<u>WHERE THE COURSE</u> <u>WAS HELD</u>	<u>ASPECTS OF ONCOLOGY</u> <u>COVERED ON THE COURSE</u>	<u>RESULTING</u> <u>QUALIFICATION(S)</u> <u>(IF ANY)</u>

8. Are there any other relevant details of your medical career/training which you would like to add?

.....

9. Are there any comments which you would like to make about this questionnaire/interview?

.....

CONTACT ADDRESS - Ms. Olga Ivetic
 Dept. of Health Studies
 Sheffield City Polytechnic
 36, Collegiate Crescent
 Sheffield S10 2NP

Appendix. 9. Note Given to the Doctors Explaining the Reasons for the Questionnaire and Instructions Concerning its Method of Collection

In order to help me define the characteristics of the sample(s) of doctors interviewed, I would be grateful if you could provide the following information about your medical career.

When you have completed the questionnaire could you please place it in the envelope provided and post it.

Thank you for your co-operation.

Date

** Please could you complete the questionnaire by the
.....

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Appendix. 10. Characteristics of the Nurses in the Study

Table 1. Age Range

20 - 29	6
30 - 39	10
40 - 49	5
50 - 59	10
60+	1

Staff Grade

Unit	Sister/Charge Nurse		Senior Nurse	SRN/RGN	SEN	Nursing Auxiliary
C	9	1	1	1	0	0
S	2	1	0	6	3	0
T	2	0	0	4	1	5

Length of Time in that Grade

6 mths - 1 yr	8
2 - 4 yrs	6
5 - 7 yrs	10
8 - 10 yrs	0
11+ yrs	8

Full-time or Part-time

Full-time	21
Part-time	11

Table 2a.

Qualifications and Training

Unit	SRN	RGN	SEN	District Nurse Certificate	SRM/SCM	None	Other
C	9	1	0	9	2	0	Orthp Nurs Cert (1) RSCN (1)
S	3	5	2	0	0	0	Orthp Nurs Cert (1)
T	6	0	1	1	3	4	RSCN (1) School Nurs Cert (1)

Table 2b.

Number of Nurses Who have Attended Post-Basic Oncology Courses

Unit	Course	Duration	Number of Nurses who have attended	Year(s) in which course attended
C	Care of dying patient & family (JBCNS)	6 months	1	1975/76
S	Oncology nursing (JBCNS, ENB, ENBCC)	6 months	3	1980, 1980/81, 1985/86
	Oncology & radiothrpny nursing	6 months	1	1969/70
T	Care of dying patient & family (JBCNS, ENB)	6 weeks	3	1981, 1984, ?

Table 2c. Number of Nurses Who have Attended other Oncology Courses and In-Service Training

Unit	In-Service Training	Study Days	Study Half Days	Courses/Short Courses
C	0	0	2	0
S	2	3	0	2
T	3	5	0	2

Table 2d. Number of nurses Who have not Attended any Recognised Oncology Courses

Unit	Sister/Charge Nurse	SRN/RGN	SEN	Nursing Auxiliary	Total Numbers
C	8	1	0	N.A.	9
S	0	4	2	N.A.	6
T	0	4	0	5	9

Table 2e. Number of nurses Who have not Attended any Oncology Course or In-Service Training

Unit	Senior Nurse	Sister/Charge Nurse	SRN/RGN	SEN	Nursing Auxiliary	Total Numbers
C	1	7	0	0	N.A.	8
S	N.A.	1	3	1	N.A.	5
T	N.A.	0	2	1	3	6

* N.A. Not Applicable

* Four questionnaires were not returned. Therefore, it was not possible to include the details for these nurses in the above tables.

SHEFFIELD CITY POLYTECHNIC
RESEARCH PROJECT ON THE DEVELOPMENT AND
DIFFUSION OF AN INNOVATION - OpSite

I would be grateful if you could provide the following information about your academic and career background.

1. Name

2. Please tick which of the following age groups you belong to.

under 25	<input type="checkbox"/>
26 - 35	<input type="checkbox"/>
36 - 45	<input type="checkbox"/>
46 - 55	<input type="checkbox"/>
56 - 65	<input type="checkbox"/>
66+	<input type="checkbox"/>

3. Please could you list in chronological order any academic qualifications which you have obtained (eg. A Levels, ONC, HND, Degrees (Graduate and Post-Graduate)).

QUALIFICATIONS OBTAINED	SUBJECTS	INSTITUTION WHERE OBTAINED	APPROX. DATES

4. Please could you list in chronological order any professional/recognised qualifications which you have obtained.

QUALIFICATION(S) OBTAINED	SUBJECTS	INSTITUTION WHERE OBTAINED	APPROX. DATES

5. Please could you list in chronological order previous employment to commencing work at Smith & Nepeau.

NAME OF EMPLOYER	NATURE OF BUSINESS	POST HELD	BRIEF DESCRIPTION OF DUTIES	APPROX. DATES OF EMPLOYMENT

6. Please give details of your present post at Smith & Nephew's and any others which you have held within the organisation.

POSITION HELD	BRIEF DESCRIPTION OF DUTIES	FROM - TO	WHICH DEPT(S)	REASON FOR CHANGING POSTS (IF APPROPRIATE)

7. Have you attended (or are you currently attending) any courses which relate directly or indirectly to any aspect of your work at Smith & Nephew's (eg. In-Service training, external courses etc).

COURSE TITLE	YEAR OF ATTENDANCE	LENGTH OF COURSE	WHERE THE COURSE WAS HELD	COURSE CONTENT	REASON(S) FOR ATTENDANCE	RESULTING QUALIFICATIONS (IF ANY)

8. Are you a member of any organisations / societies etc which relate to any aspect of your work at Smith & Nephew?

NAME OF ORGANISATION/ SOCIETY ETC	LENGTH OF TIME AS MEMBER	LOCATION	RELEVANCE TO WORK AT SMITH & NEPHEW	REASON(S) FOR MEMBERSHIP

9. Are there any other relevant details about your career which you would like to comment further upon?

CONTACT ADDRESS Olga Ivetic
Dept. of Health Studies
Sheffield City Polytechnic
36 Collegiate Crescent
SHEFFIELD
S10 2 BP

PLEASE RETURN THE COMPLETED FORM IN THE SAE ENVELOPE PROVIDED

Thank you for taking the time to complete this questionnaire.

Appendix. 12. Characteristics of the Staff from Smith and Nephew Ltd

Of the four questionnaires returned two of the staff were between the ages of 26 and 35 while the other two were between the ages of 46 and 55. All four of them were educated to degree level. Each of them had at least one professionally recognised qualification, although two of them had several pertinent to their particular speciality.

The questionnaire revealed that three of the respondents had worked for the company for more than ten years, over thirty years in the case of one of them. It was clear that each of them had worked their way up the company through promotions. Their comments revealed that the company provides much in-service training and encourages its personnel to attend courses outside the company pertinent to their particular speciality. Some of the respondents were also members of various organisations, societies and committees pertinent to their work in the company.

The researcher realised that in retrospect some of the questions asked of the respondents were perhaps too detailed and requested information which the respondents may have felt uncomfortable at answering. This was particularly the case with the question requesting information about their previous employment to commencing work at Smith and Nephew, which only one of the respondents adequately answered, and the question requesting information about any courses they have attended. Clearly for those respondents who have been at the company for many years to remember such details is indeed difficult.

The researcher was also confronted with a problem common to using questionnaires, that of being unable to read the respondent's handwriting or make sense of what they have written, particularly as some of these respondents included highly specialised information frequently written in an abbreviated form.

Table 2c. Number of Nurses Who have Attended other Oncology Courses and In-Service Training

Unit	In-Service Training	Study Days	Study Half Days	Courses/Short Courses
C	0	0	2	0
S	2	3	0	2
T	3	5	0	2

Table 2d. Number of nurses Who have not Attended any Recognised Oncology Courses

Unit	Sister/Charge Nurse	SRN/RGN	SEN	Nursing Auxiliary	Total Numbers
C	8	1	0	N.A.	9
S	0	4	2	N.A.	6
T	0	4	0	5	9

Table 2e. Number of nurses Who have not Attended any Oncology Course or In-Service Training

Unit	Senior Nurse	Sister/Charge Nurse	SRN/RGN	SEN	Nursing Auxiliary	Total Numbers
C	1	7	0	0	N.A.	8
S	N.A.	1	3	1	N.A.	5
T	N.A.	0	2	1	3	6

* N.A. Not Applicable

* Four questionnaires were not returned. Therefore, it was not possible to include the details for these nurses in the above tables.

4. Please could you list in chronological order any professional/recognised qualifications which you have obtained.

QUALIFICATION(S) OBTAINED	SUBJECTS	INSTITUTION WHERE OBTAINED	APPROX. DATES

5. Please could you list in chronological order previous employment to commencing work at Smith & Heaney.

NAME OF EMPLOYER	NATURE OF BUSINESS	POST HELD	BRIEF DESCRIPTION OF DUTIES	APPROX. DATES OF EMPLOYMENT

