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Enhancing the quality of oral nutrition support for hospitalised patients: a mixed-methods knowledge translation study. (The EQONS study)

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Abstract

Aim

To report a multi-faceted knowledge translation intervention to facilitate use of the Malnutrition Universal Screening Tool and innovation in nutritional care for patients at risk of malnutrition.

Background

Malnutrition among hospitalised patients is a widespread problem leading to adverse health outcomes. Despite evidence of the benefits of malnutrition screening and recommendations for achieving good nutrition, shortfalls in practice continue.

Design

A mixed-method integrated knowledge translation study.

Methods

The knowledge translation intervention comprised nutrition champions supported by knowledge translation facilitators and an action planning process. Data collection was undertaken over 18 months between 2011-2012 in a hospital in England. Data comprised observation of mealtimes, audit of patient records, survey of nurses and semi-structured interviews with nutrition champions, knowledge translation facilitators, senior ward nurses and nurse managers.

Findings

Statistically significant differences (Chi Square) were observed in self-reported confidence of nurses a) to assess patients using the Malnutrition Universal Screening Tool, b) to teach colleagues how to use the Malnutrition Universal Screening Tool and c) to ensure that patients were assessed within 24 hours of admission. Ward-based nutrition champions facilitated successful innovation in nutrition support. Contextual factors operating at micro (ward), meso (organisation) and macro (healthcare system) levels acted as barriers and enablers for change.

Conclusion

Nutrition champions were successful in increasing the timely assessment of patients at risk of malnutrition and promoting innovation in nutritional care. Support from knowledge translation facilitators helped nutrition champions develop their role and work collaboratively with senior ward nurses to implement action plans for improving nutrition.

KEY WORDS

champion roles, knowledge translation, malnutrition, Malnutrition Universal Screening Tool, mixed methods, nursing, nutritional care

SUMMARY STATEMENT

Why is this research needed?

- Malnutrition among hospitalised patients is a widespread problem internationally, leading to adverse health outcomes.
- Despite evidence of the benefits of screening hospitalised patients for risk of malnutrition, progress with nutritional screening has been poor.
- Providing appropriate nutritional care to patients at risk of malnutrition is essential but nurses encounter barriers to achieving good nutrition.

What are the key findings?

- The multi-faceted knowledge translation intervention was successful in increasing the confidence of nurses to assess patients using the Malnutrition Universal Screening Tool, to teach colleagues how to use the Malnutrition Universal Screening Tool and to ensure that patients were assessed within 24 hours of admission.

- Ward-based nutrition champions facilitated successful innovation in nutrition support.
- Contextual factors operating at the micro (ward), meso (organisation) and macro (healthcare system) levels acted as both barriers and enablers for change.

How should the findings be used to influence policy / practice / research / education?

- Developing champion roles at ward level presents the opportunity to improve screening for malnutrition and address shortfalls in nutrition support.
- Further research is needed to gain insight into the characteristics of successful champion roles and other roles that facilitate knowledge translation.
- Further research is needed to examine the relationship between assessment of risk of malnutrition and strategies to improve nutritional intake and ultimately patient outcomes.

INTRODUCTION

The risk of malnutrition among hospitalised patients is a widespread problem leading to serious or adverse health outcomes (Ferreira *et al.* 2009). There is evidence to suggest that under-nutrition delays recovery and lowers resistance to medical complications, with an association between under-nutrition and lengthened hospital stay, morbidity and mortality (NICE 2006).

Poor nutritional status is a particular problem among older adults, many of whom experience social isolation and economic hardship in addition to health problems and are dependent on others for food preparation (Joanna Briggs Institute 2007, Volkert *et al.* 2009). Whereas the nutritional status of some patients deteriorates during a hospital stay due to their medical condition or inadequate attention paid to their nutritional needs, other patients are admitted to hospital with malnutrition. In the United Kingdom (UK), it is estimated that 60% of older people are at risk of becoming malnourished, or their situation deteriorating in hospital (Department of Health 2007). Evidence from other countries, for example Australia (Porter *et al.* 2009), Germany (Volkert *et al.* 2009), Sweden (Persenius *et al.* 2008), United States (Patel *et al.* 2014), confirms that the UK is not alone in facing this challenge.

There is growing concern that the nutritional status of hospitalised patients most at risk may be compromised because of inadequate oral nutrition support. In the UK several reports have drawn attention to the poor quality of nutritional care provided by nurses (Age Concern 2006, Care Quality Commission 2013, Vizard & Burchardt 2015). Recommendations prioritise the need to assess patients for their risk of malnutrition, improve nutritional care planning and enhance mealtime experience (NICE 2012). Clearly measures need to be put in place to improve the nutritional care of hospitalised patients at risk of malnutrition. This paper reports on selected findings from a larger study designed to improve the oral nutritional support provided to patients in hospital.

Background

Nutritional screening is a well-recognised method for identifying patients at risk of malnutrition. Several international organisations have recommended that nutritional screening is undertaken routinely to identify those who may benefit from nutritional intervention, for example the British Association of Parenteral and Enteral Nutrition (BAPEN 2003), the American Society for Parenteral and Enteral Nutrition (Mueller *et al.* 2011), the European Society for Parenteral and Enteral Nutrition (Kondrup *et al.* 2003).

There are several screening tools available. In the UK, the Malnutrition Universal Screening Tool (MUST) developed by BAPEN (2003) has been widely promoted for use in hospital, primary care settings and care homes (BAPEN 2012, NICE 2012). Its validity and reliability have been tested and it can predict mortality and length of stay in hospitalised older patients (Stratton *et al.* 2006, Henderson *et al.* 2009).

Despite recommendations to assess patients at risk of malnutrition progress with nutritional screening in the UK has been poor (BAPEN 2012, Care Quality Commission 2013). The reasons for this are complex and multi-faceted. A systematic review of barriers and facilitators to undertaking nutritional screening of patients (Green & James 2013) identified organisational culture, competing priorities, clinical judgement, training and discrepancy between attitudes and practice as determinants influencing the uptake of screening.

Patients who are identified at risk or are suffering from malnutrition should receive appropriate nutritional care. However, in recognising the poor nutritional care some hospitalised patients receive, recommendations have been made to improve mealtime experience for patients (Age Concern 2006, CQC 2013). Providing nutritious and appetising food, assisting patients to eat as required, creating a conducive environment and modifying work schedules to ensure mealtimes are not interrupted are examples of actions that can improve mealtime experience. However, an extensive survey of nurses' views of hospital nutrition (RCN 2007) identified insufficient staff to help patients eat and to monitor food intake, poor choice, quality and presentation of food and competing priorities such as medical ward rounds, as major barriers to achieving good nutrition.

Overcoming the barriers to nutritional screening and providing appropriate nutrition support to patients is essential if malnutrition is to be reduced. Although there is evidence to indicate what should happen, implementing evidence into routine practice is not straightforward. Changing healthcare professionals' behaviour requires approaches at individual, team and hospital levels that are tailored to specific settings and target groups (Grol & Grimshaw 2003). Unless effective change strategies are implemented evidence is unlikely to be taken up.

Knowledge translation (KT) frameworks provide a means of guiding the implementation of evidence into practice by taking account of the complexity of the change process. The PARIHS framework (Kitson *et al.* 1998) highlights the need to consider the nature of the evidence, approaches to facilitating change and the context where change is to take place. Applying PARIHS to the problem of malnutrition in hospitals, evidence-based assessment tools such as MUST and national quality standards on improving nutritional care (NICE 2012) exist. To maximise uptake in practice, consideration needs to be given to how change can be facilitated. The literature draws attention to the benefits of engaging opinion leaders and champions to facilitate change (e.g. Greenhalgh *et al.* 2004, Grimshaw *et al.* 2012, Grol *et al.* 2013) and there is some evidence of champions improving nutritional care (Bond 2013, Westbury *et al.* 2013). Finally, in recognising the importance of context, the barriers to malnutrition risk assessment and nutritional care need to be overcome. This paper reports on a KT project that sought to address the shortfalls in nutritional care identified above.

THE STUDY

Aim

To develop, implement and evaluate a multi-faceted knowledge translation intervention to facilitate:

- a) the use of MUST;
- b) innovation in nutritional care for hospitalised patients at risk of malnutrition.

Setting

The study was undertaken on three medical wards in a large hospital in England. Wards ranged in size from 22-28 beds, with an average ratio of registered to non-registered nursing staff of 1:0.7 and a registered nurse:patient ratio of 1:1.4.

When the study commenced the use of MUST was encouraged however timely assessment of patients following admission was not embedded in practice. The study took place at a time when the hospital was reconfiguring services, which included some of the medical wards.

Knowledge translation intervention

There were three components to the KT intervention: nutrition champions (NCs), Knowledge Translation Facilitators (KTFs) and an action planning process. This paper reports on the changes in practice that occurred as a result of the KT intervention.

Nutrition champions

Two NCs were identified on each ward through consultation with senior ward nurses (SWN) and staff who were interested in the role. One champion on each ward was a registered nurse and the second a healthcare assistant who provided nursing care under the supervision of a registered nurse, for example assisting patients at mealtimes. NCs received training in using MUST, nutritional support (e.g. use of nutrition supplements), action planning and change management. NCs received on-going support from KTFs.

Knowledge translation facilitators

Three part-time KTFs were appointed to provide training, assistance with developing nutrition action plans and on-going support to NCs. KTFs also contributed to data collection and analysis. Two KTFs were registered nurses with experience in nutrition support and the third KTF was a dietitian with expert knowledge of malnutrition. KTFs were already experienced in promoting evidence-based practice in clinical settings and were provided with additional training and support from the project team in change management, action planning and knowledge translation.

Action planning process

Each ward developed an action plan to improve nutritional care. NCs worked with SWNs and KTFs to identify priorities. Action plans included common goals to improve the confidence of nursing staff to complete MUST assessments accurately and assess patients within 24 hours of admission. Each ward identified two additional goals focused on local priorities. Actions were identified for each goal. Details of the goals identified in action plans are included in Table 1.

Approach

An integrated knowledge translation (iKT) approach (Canadian Institutes for Health Research 2012) was used whereby researchers worked collaboratively with managers, senior clinicians and front-line staff throughout the project. This included collaboration in identifying the project aims, project design, data collection and analysis, interpretation of findings and making recommendations for sustainability.

The study was guided by the Knowledge to Action (K2A) framework (Graham *et al.* 2006) that provides a structured approach to planning and implementing initiatives to promote evidence-based practice. The framework comprises knowledge creation and action phases. Knowledge creation involves the progressive tailoring of knowledge from primary research, to synthesis of research findings with other forms of knowledge to produce actionable research products such as guidelines or assessment tools. In the current study, the research product comprised MUST. The action phase involves the following steps:

- a) Identifying the problem
- b) Adapting knowledge to the local context
- c) Assessing barriers to knowledge use
- d) Tailoring implementation strategies
- e) Monitoring uptake of knowledge
- f) Evaluating outcomes
- g) Sustainability

Whereas the framework is depicted as a cyclical process, Graham and Tetroe (2010) point out that in reality KT is more complex and iterative with steps often occurring simultaneously rather than sequentially. The project team's experience of using the K2A framework in several iKT projects indicates that steps b), c) and d) generally occur simultaneously as researchers and knowledge users collaborate to identify solutions to address the gap between knowledge and practice. The application of the K2A framework to the current study therefore comprised the following four stages.

Identifying the problem: At the time the project commenced the hospital was required by the local health authority to ensure that patients were assessed for risk of malnutrition within 24 hours of admission using MUST. Nurse managers also identified the need to ensure that patients at risk of malnutrition received appropriate nutritional support. The project team worked with SWNs to gain ownership of the need for change. This involved discussing the findings from baseline data collection with staff and using these findings to identify priorities for improving nutritional care.

Solution building: The KTFs, supported by the project team, worked with SWNs to identify NCs and subsequently provided training for NCs. The team also facilitated the NCs and SWNs to develop action plans based on priorities identified from the previous stage.

Implementation: The KTFs supported NCs to implement action plans by visiting the wards regularly to review progress with NCs and SWNs and to provide support to overcome problems encountered.

Evaluating outcomes: Following a six-month implementation period data were collected to evaluate the outcomes identified in action plans.

Planning for sustainability: NCs and SWNs were given feedback on the outcomes of action plans to inform on-going development. Plans were drawn up with nurse managers to support sustainability of NC roles.

Participants

Participants included NCs (n=6), registered nurses (n=89), SWNs (n=3), clinical nurse managers (n=2) overseeing the three wards and KTFs (n=3).

Data collection

Data collection comprised three phases. Data were collected over 18 months between 2011-2012.

Base line data collection pre-intervention

Initial data collection provided insight into nutritional care and helped identify local priorities for change. Data collected from each ward comprised the following:

1. Non-participant observation of mealtimes was undertaken. Eight patients who required assistance with mealtimes were observed throughout the day on each ward on three separate occasions. A structured proforma captured activities related to mealtime preparation and continued until food was removed from the bedside. Following observation, feedback was provided to NCs and SWNs on each ward and this informed the goals identified in the action plans.
2. A documentation audit of patient records was undertaken against set criteria regarding completeness and timeliness of MUST assessment. Twelve sets of records were audited on each ward. Patient records were selected at random. Each patient record was reviewed with regard to whether a MUST score had been recorded within 24 hours of admission.
3. A short self-completed questionnaire administered to nursing staff on each ward (n=89) collected data on their self-reported confidence to calculate a MUST score when i) the patient could be weighed and ii) when alternative measures were needed because a patient could not be weighed, iii) their confidence in teaching colleagues how to undertake a MUST score and iv) their understanding of relevant care guidelines. Each question required a yes/no response. The findings were used to inform training undertaken by NCs on using MUST.

On-going data collection during implementation stage

During the implementation period, the KTFs completed field notes of their interactions with NCs, SWNs and other staff and informal observations of nutritional care when visiting the wards. Other members of the project team also completed field notes recording discussions with SWNs and NCs when they provided feedback on baseline data.

Post-intervention data collection

Following a six-month implementation period pre-intervention data collection was repeated. The baseline audit examined 12 patient records on each ward, however this was increased to 16 per ward post-intervention to gain a more comprehensive indication of the extent of MUST assessment.

The number of nurses completing the questionnaire (n=67) was slightly less than baseline data collection due to ward reconfiguration.

Semi-structured interviews were undertaken with NCs, SWNs, clinical nurse managers and KTFs. The interview agendas explored participants' perspectives of factors that had influenced the progress made with improving nutritional care focusing on the three dimensions of the PARIHS framework: evidence, facilitation and context. Interviews were audio-recorded and subsequently transcribed.

Data analysis

Quantitative data were input into an Excel spreadsheet and analysed using descriptive statistics. Chi squared was used to examine differences between pre- and post-intervention recordings. Due to staff changes on each ward during the implementation period it was not possible to match individual responses before and after the implementation process. Rather comparisons have been drawn between baseline and post-implementation data as a whole.

Qualitative data analysis drew on the principles of the 'Framework' approach to qualitative analysis (Ritchie *et al.* 2003) and involved five stages:

1. Members of the research team familiarised themselves with the data by reading interview transcripts and field notes several times.
2. A thematic framework for coding data was developed based on the interview agendas and issues arising from initial scrutiny of transcripts and field notes. This was based on the PARIHS framework examining evidence, facilitation and context.
3. Individual transcripts and field notes were coded by applying the thematic framework.
4. Coded data were subsequently organised into themes (evidence, facilitation, context) and their respective sub-themes.
5. Data from each phase were analysed separately and then brought together to form a composite analysis. The relationships between different themes were mapped by analysing the data set as a whole. Concise summaries of the themes and sub-themes were then developed and these form the basis of the analysis presented in the findings section of this paper.

Ethical considerations

Ethical approval to collect data from staff was obtained from a University Ethics Committee. Research governance approval was obtained from the participating organisation. The collection of audit and observational data from patient records was approved by the hospital. Informed consent was obtained from participants prior to interview.

Rigour

All members of the project team were involved in data analysis. Initial analysis undertaken by one researcher was checked by other members of the research team to ensure consistency in coding and interpretation and to safeguard against selectivity in the use of data. An audit trail was kept throughout the study.

RESULTS

Self-reported confidence in assessing patients at risk of malnutrition

Nursing staff were asked to indicate whether or not they felt confident to complete a MUST score on a mobile patient who could be weighed and a non-mobile patient who could not be weighed (MUST calculation based on arm circumference). As Table 2 shows there was a statistically significant

increase in confidence at the end of the intervention period for both these assessments. Initially 46% of nurses were confident to record a mobile patient's MUST score with only 26% confident in recording the score for a non-mobile patient. Following the intervention period the percentages had increased to 73% ($p<0.001$) and 55% ($p<0.001$) respectively.

Nurses were also asked to indicate whether or not they felt confident to teach a colleague to undertake a MUST score. As Table 2 shows there was a marked increase from 31% to 73% ($p<0.001$) in the proportion of nurses who felt confident to teach others.

Self-reported knowledge of nursing care guidelines

Registered nurses were asked to indicate whether or not they considered that they had a good understanding of the nursing care guideline for patients at risk of malnutrition. As Table 3 shows, 49% of nurses reported being knowledgeable initially and this increased to 72% at the end of the intervention period ($p<0.05$).

Assessment of patients at risk of malnutrition

The audit of patient documentation provided information on whether patients had received an assessment using MUST within 24 hours of admission. As Table 4 shows, pre-intervention data indicated that 56% of patients were initially assessed following admission, rising to 81% at the end of the intervention period ($p<0.05$).

Innovation in oral nutrition support

Each ward developed an action plan comprising up to four goals. In addition to common goals across wards relating to staff confidence in undertaking MUST assessment, knowledge of appropriate care guidelines and MUST assessment within 24 hours of admission, each ward identified further goals relating to innovation in nutrition. Ward staff identified local priorities for improvement that were informed by feedback from baseline observation of mealtimes. These goals and ensuing actions are summarised in Table 1. A total of six goals were identified across the three wards. Goals 1 and 2 were addressed by all three wards and the remaining goals were identified by one or two wards.

Table 1 summarises the progress made in addressing each goal. Notable progress had been made with the majority of goals during the six-month implementation period. However, progress with achieving change across several wards through establishing the Nutritional Care Forum was limited in that it took time to establish a functional forum and build relationships before collaborative change could be achieved. At the end of the implementation phase, the forum had identified areas for collaborative work but had yet to initiate change.

Factors influencing innovation in oral nutrition support

Analysis of interviews and field notes identified factors that influenced progress with achieving improvements in oral nutrition support. These issues are summarised in Table 5 and have been grouped according to the three dimensions of the PARIHS framework; evidence, facilitation and context. Key issues relating to the nature of the evidence encompassed the perceived robust evidence-base of MUST, the contribution of professional expertise and patient perspectives to identifying priorities for nutritional innovation and the role of audit and feedback in generating local evidence to identify the need for change and provide feedback on progress. The main issues identified relating to facilitation included the attributes, skills and actions of NCs and KTFs and the contribution of different training strategies. Contextual issues were operational at the micro (ward), meso

(organisation) and macro (healthcare system) level. At a micro level the benefits of supportive leadership, multi-disciplinary collaboration and shared ownership for nutritional innovation were important catalysts for change whereas staff turnover and a heavy clinical workload hindered progress. At the meso level, organisational turbulence caused by service reconfiguration had a detrimental effect on staff morale, which in turn impacted on progress made. At the macro level, external drivers from the commissioners and the Care Quality Commission (the independent regulator of healthcare services in England) to introduce MUST screening secured senior management commitment and support for change.

DISCUSSION

The multi-faceted KT intervention used in this study was successful in increasing the self-reported confidence of nurses to assess patients using MUST and to teach colleagues how to use MUST. The intervention also increased the number of patients who were assessed using MUST within 24 hours of admission to hospital. Other innovations in oral nutrition support were implemented, the majority of which led to improvements in practice within the project timescale.

Although this study was successful in increasing the timeliness of MUST assessment it has not demonstrated the impact of assessment on reducing malnutrition. Clearly assessment is the first step in a process that requires the provision of appropriate nutritional care to improve patient outcomes. There is a lack of research examining the relationship between assessment of risk of malnutrition and strategies to improve nutritional intake and ultimately patient outcomes (Weekes *et al.* 2009), a shortfall that merits further investigation.

The current study implemented innovation in nutrition in response to local priorities such as enhancing mealtime experience, improving the content and presentation of meals and improving communication between healthcare professionals. Although these initiatives met with a degree of success in terms of improving oral nutrition support provided to patients, the current study did not seek to examine the link between innovation and patient outcomes. Further research is required to examine whether such innovation leads to improved oral intake, a reduction in patients' MUST scores during their hospital stay and ultimately to improved health outcomes for patients and beneficial economic outcomes.

Green and James (2013) draw attention to the need for further research examining strategies to improve nutritional screening. Whereas the multi-faceted intervention used in the current study has met with success in improving nutritional screening, it is not clear which components of the KT intervention were most effective. Robust evidence of the effectiveness of different KT strategies is lacking (Grol & Grimshaw 2003). Whereas multi-faceted interventions have been reported to meet with more success than single interventions (O'Brien 2008, Boaz *et al.* 2011), it is not clear which combinations of strategies work most effectively. An appreciation of the importance of active facilitation highlighted through the PARIHS framework (Rycroft-Malone 2010) influenced our decision to use KTFs. Grimshaw *et al.* (2012) draw attention to the need for knowledge translators to identify the key messages for different audiences and to tailor these through language and knowledge translation products that are easily assimilated by the intended knowledge users. In the current study, KTFs worked with NCs and SWNs to engender a commitment to change, provided practical support in implementing change and employed audit and feedback mechanisms to evaluate change.

The KTFs role was funded for the duration of the research grant. Our concern for sustainability once the project ended influenced our decision to develop NCs as an integral component of the role of ward nurses and which required no additional funding to implement. By using KTFs to develop the capacity and capability of NCs to lead innovation a model for practice has been developed which following completion of the project has proved to be sustainable.

The decision to use NCs was based on evidence indicating the benefits of local champions to promote behavioural change (Greenhalgh *et al.* 2004, O'Brien 2008). There is limited research on the characteristics and role of champions. In Canada, best practice champions have worked effectively at organisation level to promote the use of practice guidelines (Pleog *et al.* 2010). In the USA, different types of champion roles have been used to promote best practice in infection control across healthcare organisations (Damschroder *et al.* 2009). Of more relevance to the current study, an initiative across Scotland introduced NCs in each health board to strengthen collaboration between catering and clinical staff and promote good practice in nutrition (Bond 2013). Work focused on mealtimes, patients with long term conditions and transition from hospital to care homes.

The champion roles cited above differ from the current study, which introduced ward-based champions. In the UK, there has been a move to develop 'link nurses' at ward level who act as conduits for information between clinical nurse specialists and ward nurses, for example regarding pressure ulcer prevention and infection control (Manley & Gallagher 2012). However, link nurses have traditionally occupied relatively passive roles disseminating information and acting as a resource for colleagues (Dawson 2003). In recognising that passive dissemination is generally ineffective as a knowledge translation strategy (Bero *et al.* 1998) we developed a proactive role for NCs with responsibility for implementing change in their own care setting. Whereas this has met with a degree of success, further research is needed to examine the effectiveness of champion roles at microsystem level. The studies of champion roles cited above have focused on experienced healthcare professionals taking up this role. In the current study NCs included both registered nurses and healthcare assistants. The registered nurses took responsibility for leading improvements in nutritional care, whereas the healthcare assistants actively supported these changes, especially in relation to improvements in mealtime experience where they had a major role liaising with housekeeping staff, preparing patients and assisting with feeding where required.

Training is widely recognised as an important means of facilitating the uptake of evidence into practice. In the current study we enabled NCs and SWNs to tailor training approaches to local preferences. Flexible training opportunities at ward level maximised the rate at which staff were trained to use MUST which in turn impacted on MUST assessment. Concern for sustainability led us to develop the capacity and capability of nurses to teach colleagues how to use MUST, thereby reducing dependency on NCs to undertake on-going training. This stance is supported by Porter *et al.* (2009) and Green and James (2013) who highlight the importance of on-going training in MUST to maximise compliance with assessment protocols.

Action plans were selected as a tool to engage nurses in the need for change and enable them to address local priorities as well as the aim of improving MUST assessment. Whereas the literature draws attention to the need to develop a plan for a KT intervention as a whole (e.g. Armstrong *et al.* 2013), the use of action plans developed and owned by knowledge users has not been addressed. The current study suggests that the action planning process was well received by staff, provided the opportunity to focus on local priorities and facilitated ownership – factors that are important in KT

(Greenhalgh *et al.* 2004). Although NCs and SWNs required support initially to develop action plans, the action planning process has now been incorporated into an annual review of nutritional care by individual wards.

The findings from the current study endorse the importance of leadership support for KT that is recognised in the literature (Rycroft-Malone 2010). As local clinical leaders, SWNs were pivotal in supporting NCs and in releasing staff for training. The findings also indicate that a lack of stability in ward leadership has an adverse effect on progress.

The influence of context on KT is widely acknowledged in the literature (Greenhalgh *et al.* 2004). The current study identified how contextual issues operating at the micro, meso and macro level acted as both barriers and drivers for change. External policy pressures to improve nutrition operating at a macro level helped to secure organisational support for the initiative from senior managers. However, although senior manager support at the meso level was clearly evident and beneficial, other organisational pressures affecting service delivery adversely affected the project. At a micro level, the findings from this study reflect the wider literature on the importance of leadership, ownership, feedback and availability of resources to enable change in practice (Greenhalgh *et al.* 2004, Rycroft-Malone 2010, Grimshaw *et al.* 2012). The findings also support the claim by Chapman *et al.* (2014) that to improve nutritional care, nurses need the autonomy to implement innovation in response to local priorities, while at the same time understanding how organisational factors may impact on progress.

Limitations

The fact that the study was undertaken in one hospital raises questions about the extent to which the findings are transferable. Contextual issues are an important influence on the uptake of evidence into practice and a similar study in a different context may yield different results. However, by describing key aspects of the local context in the current study, researchers and those interested in applying the findings in practice will be able to judge the extent to which they may encounter different contextual factors.

A further limitation is the lack of comparison with wards that did not receive the intervention. MUST had already been introduced in the hospital so it was not possible in the current study to identify wards where sufficient control could be exercised to undertake a robust trial of the KT intervention.

Moreover we did not examine if there were differences in outcomes between the three wards as the sample size for each ward was too small to undertake tests of significance. Descriptive data indicated that each ward achieved improved outcomes in each of the four areas we measured, although improvements were more modest on one ward. It may be that differences in the micro-context and/or NCs could account for these differences, but it was beyond the scope of the current study to examine this.

Finally, as identified earlier although this study identified statistically significant differences in self-reported confidence of staff to undertake MUST assessment and in the timely assessment of patients, it should be borne in mind that the individuals in the pre- and post-implementation groups were not identical, due to staff turnover in the intervening period.

CONCLUSION

The findings from the current study have demonstrated the success of NCs in increasing the timely assessment of patients at risk of malnutrition and in promoting good practice in nutritional care. Developing champion roles at ward level presents the opportunity to address shortfalls in nutritional support identified in the literature. The study has also identified the beneficial role of KTFs in supporting NCs to develop their role and to work collaborative with SWNs to implement innovation in nutritional care. Further research is needed to gain insight into the characteristics of successful champion roles and other roles facilitating KT.

The findings provide insight into influential contextual factors operating at the macro, meso and micro level. Understanding and where possible influencing, these contextual factors will help maximise the likely success of initiatives to improve nutritional screening and care.

Author Contributions:

All authors have agreed on the final version and meet at least one of the following criteria (recommended by the ICMJE*):

- 1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- 2) drafting the article or revising it critically for important intellectual content.

* <http://www.icmje.org/recommendations/>

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Table 1: Goals included in action plans for innovation in oral nutritional support

	Goal	Action	Evaluation
1	Improved confidence in undertaking MUST screening.	Individual or small group training of ward staff by NC. Establish ward-based drop-in sessions to teach staff about use of MUST. Development of nutrition screening workbook (one ward only). Promote peer teaching among nursing staff of how to undertake MUST score.	Time consuming to train all staff due to different shift patterns. Drop in sessions on wards successful in training majority of staff. Nutrition workbook time consuming to complete, but useful as adjunct to drop-in sessions. Statistically significant improvement in staff confidence in undertaking MUST score and in teaching colleagues (Table 2).
2	MUST assessment on admission.	Educate staff on importance of timely MUST assessment. On-going audit and feedback of MUST scores.	Statically significant improvement in MUST score on admission across three wards (Table 2).

3	Improved mealtime experience for patients.	Instigate actions based on feedback from observation of mealtime experience to address personal, environment and hygiene preparations.	<p>Improvement in pre-meal preparation including offering toileting facilities and hand wipes, cleaning tables, positioning patients.</p> <p>More timely assistance with eating offered to patients. Closer supervision of patients with swallowing difficulties.</p> <p>Specialist cutlery more readily available to patients in need.</p>
4	Enhanced communication relating to patients' nutritional needs include risk assessment, food preferences, dietary requirements, specialist equipment, physical assistance.	<p>Review of current nutrition communication processes.</p> <p>Development of patient specific communication sheet at bedside.</p>	<p>Nursing handover sheet further developed to include relevant information.</p> <p>Bedside communication sheet evaluated positively by staff.</p>
5	Improved presentation of food and portion size tailored to patient preference.	<p>Establish food quality circle involving nursing, dietetics and catering staff to drive improvements in food quality. Collaborate with catering to replace plated meal service with bulk meal service where portion size and presentation controlled by ward staff.</p> <p>Train ward staff in presentation of meals.</p>	<p>Food quality circle established and met.</p> <p>Positive feedback from patients on presentation of food and portion size.</p> <p>Introduction of cooked breakfast and hot evening meal.</p> <p>Involvement of nursing staff in design of menus appropriate to patient groups.</p> <p>Increase in staff satisfaction with bulk meal service compared to plated meals.</p> <p>Reduction in food wastage.</p>
6	Enhance understanding of nutritional innovation across group of wards by networking.	<p>Establish nutritional care forum across five elderly medicine wards bringing together NCs, dietitians, catering staff and clinical educators.</p>	<p>Forum established and met bi-monthly.</p> <p>Mutual support among NCs to improve MUST assessment.</p> <p>Collaboration with catering department to introduce cooked</p>

			breakfasts. Future priority identified to improve multi-disciplinary communication on nutrition.
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Table 2: Self-reported confidence in undertaking MUST score (registered nurses and healthcare assistants)

	Pre-intervention (n=89)				Post-intervention (n=67*)				Chi Sq	P
	Yes		No		Yes		No			
	n	%	n	%	n	%	n	%		
Mobile patient	41	46.07	48	53.9	49	73.13	18	26.87	11.4731	<0.001
Non mobile patient	23	25.84	66	74.16	37	55.22	30	44.78	13.9414	<0.001
Teaching colleague to calculate MUST	28	31.46	61	68.54	49	73.13	18	26.87	26.558	<0.001

*Post-intervention sample was smaller due to ward reconfiguration

Table 3: Registered nurses' knowledge of nursing care guideline for patients at risk of malnutrition

Pre-intervention (n=57)				Post-intervention (n=50*)				Chi Sq	P
Yes		No		Yes		No			
n	%	n	%	n	%	n	%		
28	49.12	29	50.08	36	72.0	14	28.0	5.7994	<0.05

*Post-intervention sample was smaller due to ward reconfiguration

Table 4: Assessment of patients at risk of malnutrition within 24 hours of admission

Pre-intervention (n=36)				Post-intervention (n=48)				Chi Sq	P
Yes		No		Yes		No			
n	%	n	%	n	%	n	%		
20	55.6	16	44.4	39	81.3	9	18.7	6.4969	<0.05

Table 5: Factors influencing innovation in oral nutrition

Evidence	
MUST	<p>Perceived as valid evidence-based assessment tool but assessment process initially perceived as complex if staff had received limited training.</p> <p>Simplified step by step pictorial guidance / poster on how to assess produced by KTFs in response to requests from NCs.</p>
Professional expertise	Nurses' understanding of shortfalls in nutritional support on their ward was seen by NCs and SWNs to be very important in identifying and prioritising initiatives that wards took forward in action plans.
Patient perspectives	<p>Informal feedback from patients on nutrition and mealtime experience used to inform initiatives taken forward in action plans.</p> <p>Patient initiated formal complaints about nutrition used to inform initiatives taken forward.</p>
Audit and feedback	Information provided to ward staff on baseline observations and audit of patient records used as evidence to support need for change, and to provide evidence of improvement.
Facilitation	
Nutrition champions	<p>NCs who demonstrated enthusiasm for nutrition and had a work pattern that enabled them to train and support other nurses were most effective.</p> <p>Stability in the NC role was important to implementing change. Where changes in NC occurred progress was delayed.</p> <p>NCs benefited from training in nutrition, change management and action planning processes. Most had limited knowledge and skills in these areas at commencement of project.</p> <p>NCs benefited from the support of KTFs in introducing change. NCs valued the opportunity to talk through ideas, the practical help and feedback received and the encouragement given to take forward innovation.</p> <p>Support from SWNs for the NC role was needed to implement change. NCs struggled if this support was lacking, for example due</p>

	<p>to sickness.</p> <p>Dedicated time to devote to the champion role was required to progress innovation. Some NCs struggled to identify sufficient time for this aspect of their role because of competing clinical priorities.</p> <p>NCs spent considerable time training nursing staff in MUST assessment which detracted from taking forward other innovation. Changes in nursing staff during the implementation period meant that they had to train new nurses starting on the ward.</p> <p>NCs required support of other ward nurses to take initiatives forward. Initially some NCs struggled when colleagues perceived that the responsibility for nutrition resided with the NC.</p>
Knowledge Translation Facilitators	<p>Motivation, enthusiasm and commitment to improving nutrition, together with knowledge of nutrition and change management were seen as essential attributes of KTFs.</p> <p>Acted as sounding board and source of ideas for NCs and SWNs in developing action plans.</p> <p>Acted as intermediary between ward staff and other departments, for example catering, to initiate collaborative working.</p> <p>Experienced tension between 'doing for' and 'enabling' aspects of their role.</p> <p>KTFs' insider position in organisation gave them knowledge of wider organisation and enabled them to network between wards and departments.</p> <p>KTFs' outsider position in relation to individual wards enabled them to become a 'critical friend' to NCs and exercise a degree of objectivity.</p>
Training strategies	<p>Staffing levels, clinical pressures and NC availability affected the rate at which staff received training.</p> <p>Tailoring training approaches to the needs of staff on individual wards facilitated timely training.</p> <p>Flexible training opportunities, for example repeat drop in sessions, maximized the number of staff receiving training.</p> <p>Face-to-face training was received more positively by ward nurses than a self-directed workbook on nutrition screening.</p> <p>Training staff in the use of MUST and developing their confidence to teach a colleague how to use MUST took the NCs considerably</p>

	<p>longer than originally anticipated.</p> <p>KTFs developed knowledge exchange tools, e.g. posters, workbook on MUST assessment, nutrition newsletters, to raise awareness of nutrition matters and disseminate ideas across the three wards.</p>
Context	
Micro context – ward	<p>Where SWN were highly committed to improving nutrition ward teams were more fully engaged and more timely progress was made.</p> <p>Stability in SWN was important to drive innovation. Where changes in ward leadership occurred progress was delayed. Absence due to sick leave of SWN on one ward, hindered progress made with innovation.</p> <p>SWNs were pivotal in releasing staff to undertake MUST training.</p> <p>Heavy clinical workload and staff shortages made it difficult for NCs to train all staff in using MUST and for staff to devote time to innovation in nutrition care.</p> <p>Ongoing turnover of staff on wards required NCs to continually train new staff who were not familiar with using MUST.</p> <p>Ownership for innovation at a local level was important to driving change.</p> <p>Collaboration across the ward-based multidisciplinary team (e.g. nurses, dietitians, medical staff) helped drive innovation.</p> <p>Collaboration across services and departments (e.g. wards, catering, dietetics, housekeeping) was important to drive improvement in food quality.</p> <p>Enabling ward teams to identify local priorities alongside the organisational priority of introducing MUST assessment helped achieve ownership for change.</p> <p>Competing priorities for quality improvement as a result of meso and macro level drivers (e.g. reduction in pressure ulcer prevalence, reduction in hospital acquired infection) diverted attention away from nutrition.</p>
Meso context - organisation	<p>Wider organisational turbulence caused by service reconfiguration affected staff morale and motivation for change and delayed progress.</p> <p>Increased clinical pressures during winter months and ensuing staff shortages adversely affected progress with achieving goals in</p>

	action plans.
Macro context – healthcare system	<p>External requirement from commissioning body to introduce MUST assessment provided initial impetus for change and secured senior manager support for project.</p> <p>The Care Quality Commission's (independent regulator of healthcare organisations in England) prioritising of nutrition acted as external driver for improvement.</p>