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GUTS, INSTINCT AND KNOWLEDGE... at the critical moment

The Role of the Paramedic in Technical Rescue Environments

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Since the professionalisation of the role of paramedic with the advent of Health Professions Council (HPC) registration the scope of paramedic practice has expanded and broadened. Following the issue of benchmark standards for paramedic science by the Quality Assurance Agency (QAA) [1] paramedic education and training have changed beyond all recognition. Paramedic degree and diploma courses and specialist courses such as Paediatric Advanced Life Support (PALS), Pre Hospital Trauma Life Support (PHTLS) and Medicine in Remote Areas (MIRA) etc. now see paramedics able to carry out a range of clinical interventions and procedures that would, in the past, have been unheard of. The knock-on effect has been the creation of a range of paramedics with extra training in a variety of specialist areas; for example, emergency care practitioners, remote area and forensic paramedics. This article aims to explore another specialisation: that of the technical rescue paramedic.

WHAT IS TECHNICAL RESCUE?

Technical rescue refers to those aspects of saving life that employ the use of skills and tools that exceed those normally reserved for medical emergency, fire fighting and rescue [2] and involve extraordinary or highly dangerous rescue situations [3]. A concise definition is given by Collins [4] and states: rescue is a mission that requires dedication to protecting lives; a willingness to take calculated risks; an understanding of how things work (and, consequently, how things fail) and the ability to devise and implement solutions for complex problems under hazardous and rapidly changing conditions – without the luxury of time for reflection and deep concentration. Broken down to its most basic elements, [technical] rescue is something performed in the most crucial moments of an emergency by fire fighters and other rescuers guided by a combination of gut instinct, experience, knowledge of standard protocol and the ability to improvise a solution from seemingly unsolvable problems [4].

Technical rescue covers a multitude of specialist areas: confined space, mine, collapsed building, dive, swiftwater, heights, hazardous materials (HAZMAT), trench, vertical, land search and rescue, industrial, road crash, rope, wilderness and chemical, biological, radiological and nuclear (CBRN). All specialities have their own particular hazards. When added to the fact that casualties must be rescued in the first place and then rapid access to definitive medical care may be significantly delayed, the scope of the challenge of working as a technical rescue paramedic can begin to be appreciated.

Rescue and Emergency Medical Services (REMS) are an excellent example of a United Kingdom (UK) based technical rescue team. Based in Telford in Shropshire they consist of a team of joined medical and rescue professionals, each cross-trained in both medical and rescue skills. REMS are operational in both the UK and Europe and provide technical rescue and paramedical services to all areas of industry [5]. The REMS team record is an impressive one. They are constantly busy operating 365 days a year in some of the most challenging industrial locations in the UK ranging from chemical and steel works to power stations, waterways and work on highways [5]. Their Telford base has state of the art equipment and training facilities and each team deploys in four wheel drive units which contain technical rescue equipment in addition to the traditional medical equipment and drugs found on paramedic rapid response vehicles [5].

Team members are trained in rescue from heights, confined space rescue, fire-fighting and hazardous chemical environments. They also have maritime and swiftwater capability and are equipped with a 24ft rigid inflatable boat. The team traditionally deploys into sites whilst staff are undertaking particular high risk activity or during emergency repair works, but are also available to their strategic clients during an emergency [5].

REMS also hold a contract for British Energy /EDF and are the Civilian Nuclear Response Team for the UK managing a number of strategic packages of equipment located throughout the UK. The team role is to respond with this highly specialised equipment to any location requested in the UK at short notice. They also provide routine health and safety and

Dave started life as a mechanic; he then decided to fix people as opposed to fixing vehicles. Dave Joined Mersey Metropolitan Ambulance Service as a cadet. He left the service as a Paramedic at Toxteth Ambulance Station 15 years later. Dave has been a trainer for the National HQ of the Red Cross for a number of years and has also been a trauma trainer for Greater Manchester & Lancashire Fire Services. Dave has also been involved in Sales at a high level working for Vygon UK Ltd and SP Services. Dave has been privileged to have completed a plethora of causes over the years including MIMMS, PHTLS, ILS, ITLS, ALS, ACLS, confined space, BA, Rescue at Heights and many more. He explains: "I am enjoying my present role as Director of a Paramedical Rescue Company immensely, every day we find ourselves getting our clients out of even more complex pickles than the day before it is challenging but very rewarding work".

primary care services to sites when they are deployed, providing health screening and monitoring of complex work environments [5].

REMS personnel have the advantage of having daily exposure to environments that would fill most emergency medical personnel with dread. In the last year alone, REMS teams have responded to a number of serious incidents in confined spaces and rescue from heights.

RESCUER OR PARAMEDIC?

There has been debate over whether it is possible to fulfill the role of both rescuer and paramedic. Traditionally, rescue work has been the responsibility of the fire service who will undertake the task of extricating patients and delivering them to waiting paramedic ambulances. This, however, is not always ideal as it means all but the most basic medical care is delayed until the patient reaches the paramedic. Minutes can mean the difference between life and death for many patients and taken together with the fact that many need immediate pain relief it can be seen that having a paramedic on scene straight away is of immense value.

An incident in the Wicklow Mountains in Ireland illustrates this very well [6]. Two climbers found themselves stranded 3030 feet up in six feet of snow with no tent after their map blew away and fog descended. A search and rescue team were deployed and after a 21 hour ordeal found the pair suffering from profound hypothermia. Although the search and rescue team were in radio contact with a paramedic who was able to give advice on how to best

deal with the casualties, it was hours before they were able to receive the immediate medical care they required. Had the paramedic been trained in technical rescue techniques this problem would not have arisen.

The majority of paramedics are simply not equipped to enter and deal with certain situations, something highlighted by the Department of Health (DOH) when they launched the UK's first National Health Service (NHS) Hazardous Area Response Teams (HART) in 2007 [7]. The NHS describe these teams as highly trained emergency medical technicians and paramedics across England to provide a better response to major incidents [8]. The crews will be trained and equipped to work in highly hazardous areas, providing advanced life support (ALS), triage and treatment to those affected by a major incident including those with CBRN risks [8]. Typical incidents to which HART crews are dispatched will include building collapses, serious road traffic collisions (RTC), fires and tube trains stuck between stations underground in which there can potentially be thousands of dehydrated patients [8]. The NHS ambulance service go on to describe the duties of HART teams as being those areas and incidents which involve collapsed or unstable structures, incidents at height, in confined spaces or situations where casualties present in locations with difficult access [9].

THE ENVIRONMENT

The role of a technical rescue paramedic, however, goes further than being deployed after an incident has occurred. In many industrial settings, particularly those who are controlled by the Control of Major Accident Hazards (COMAH) regulations [10] technical rescue teams are put into place when workers at the site are undertaking particularly hazardous tasks. In such cases a technical rescue team will be called in and will be stationed on site in order to deal with any potential incidents should they occur. Many Paramedics who work for the NHS Trusts will never see an incident actually occur but rather arrive on scene sometime after. This then is especially difficult for Rescue Paramedics who do not have the luxury of seeing the patient with established signs and symptoms as they have not yet developed due to rescuer's immediate response. It does however mean that the observations taken from the patient are raw data and therefore it is more important to adopt an approach whereby the need for constant observations is paramount. This is vital to provide rapid intervention especially where multi-systems trauma occurs, so as not to overlook important tell tail signs and systems that can make immense difference to the prognosis of the patient. Many power stations in particular work in such a way and employ external specialist technical rescue teams on a regular basis. Many hazards exist in such an environment including COMAH dangerous substances (processed gases such as hydrogen sulphide, benzene, methane and carbon monoxide) [11], machinery, electricity, work at height, molten metal and slag, confined spaces, asbestos and fire [12].

PREVENTION

It has been said on numerous occasions by many people that prevention is better than cure. It is certainly the case in this industry. REMS operate with several strategic partners (clients) who wish to limit the need for the services of a rescue paramedic, and there many reasons for this. It looks bad to have invited contractors into your place of work only to wave them off to hospital. It interrupts scheduled work patterns and therefore is less cost effective. It lowers moral of other contractors and exposes workers and their colleagues to further risk. These are known as loss time incidents (LTI's). The total cost of investigating each incident to conclusion is approximately £54,000 [13]. The reason for prevention then can be easily seen. The Health and Safety Executive (HSE) take a very dim view of these incidents occurring and prosecutions have and will take place. So, not only was the rescue paramedic invited to work out of his original comfort zone, but now he is expected to train even further and look at ways of preventing incidents it in the first place. Here lies a further need of the rescue paramedic to develop health and safety training if he wants (as his training demands) to take a holistic approach to people under his care. This is a natural progression and it has to take place. Like any other profession which strives to challenge the boundaries it was once comfortable with, the rescue paramedic has to develop also. We are reminded that a rut is no more than a grave with the ends kicked out.

SKILLS AND COMPETENCIES

It is essential that technical rescue crews are well qualified to conduct any sort of rescue [14]. Achieving this is no mean feat when it is considered just how many specialist areas technical rescue covers. Many inadequately trained rescuers die each year simply because they feel compelled to do something despite their lack of knowledge [15]. An example can be seen in the dangers of swiftwater rescue where there have been many instances of well intentioned rescuers tying ropes around

Sarah joined the NHS ambulance service in 1996 and qualified as a paramedic in 1999. In addition to her paramedic state registration she holds a first class honours degree in Pre-Hospital Care, Royal College of Surgeons Medicine in Remote Areas and Travel and Tropical Health qualifications, PHTLS, ITLS and formal teaching qualifications. Whilst in the ambulance service she acted as clinical and academic support to student paramedics and still teaches today in a variety of arenas including the fire service, police force and for Lincolnshire Voluntary Emergency Services (LIVES). She is a member of the Royal College of Surgeons Faculty of Pre-Hospital Care and the College of Paramedics and sits on the British Paramedic Research and Audit Committee. Sarah also works in a consultancy capacity providing clinical governance and audit support to different organisations. She has been published in a wide range of medical journals having had in excess of 20 articles published to date. Sarah joined REMS in early 2009 as a technical rescue paramedic and is currently studying part time for her PhD at the University of Wales, Swansea in addition to working in a variety of pre-hospital environments

Jon in addition to his paramedic state registration, holds qualifications in offshore and remote area medicine, Royal college of surgeons PHTLS, ALS, PEPP and others. Jon is a recognised professional trainer and has extensive training experience in both the NHS and the private sector training from work as a resuscitation officer to delivering specialist training to non medical bodies such as the fire service. Jon has travelled extensively and worked with organisations delivering medical care in less developed nations. In addition to his clinical skills he is also qualified to operate in a range of technical rescue environments including rescue at heights and confined space rescue. Jon works alongside Sarah providing advice and support to a number of government and private agencies, Jon is the clinical effectiveness and hazardous operations medical lead for REMS he is also a member of the College of Paramedics

themselves in order to ford swiftwater to reach stranded victims [15]. Water moving at only 20 kilometers per hour will exert over 180 kilos of load on the body and in such cases rescuers have found themselves bent forward at the waist unable to breathe resulting in suffocation and drowning [15].

It can be seen then, that high quality training and the ongoing maintenance of those skills once they have been gained are of paramount importance. A large part of general technical rescue training includes early detection, emergency reporting, and how to properly respond to an emergency scene [14]. In addition, rescuers must be thoroughly familiar with safe working procedures, personal protective equipment (PPE) and with any other equipment used, including using equipment safely in accordance with the manufacturer's instructions [16]. From there on training becomes more specialised. It is impossible here to discuss in depth the training required for each specialist area of technical rescue. Instead, the training and skills necessary for some of the more frequently utilised skills are discussed below.

Confined Space Rescue

The Confined Space Regulations 1997 defines confined spaces as any place including chambers, vats, silos, pits, trenches, pipes, flues, wells or other similar spaces which by virtue of its enclosed nature there arises a reasonably foreseeable "specified risk" [17]. A "specified risk" is a serious injury to any person at work arising from a fire or explosion within a confined space [18]. A person can suffer a loss of consciousness in a confined space due to increases in or loss of body temperature or asphyxiation due to gas, fumes, vapour, lack of oxygen or free flowing solids [18]. In addition, risks that are present in normal working conditions are also present in confined spaces with the consequences greatly exaggerated due to the inherent difficulties of access, egress and recovery [18].

Confined spaces have limited openings for entry and exit, unfavourable natural ventilation and are not designed for continuous worker occupancy [11]. The atmosphere in confined spaces can be extremely hazardous and can be flammable, oxygen deficient or toxic [11]. Consequently, in addition to their standard medical training, technical rescue paramedics must be trained in how to work safely in confined spaces under emergency conditions, how to enter and exit confined spaces safely and deal with emergencies as they arise [16]. This includes not only treating casualties in such spaces but actually getting them out. They must be able to test the atmosphere for oxygen, flammability and toxicity so, therefore, carry personal gas detectors at all times and must receive training in how to use such equipment [11].

Use of Breathing Apparatus

Part and parcel of confined space rescue is the use of self contained open circuit (SCOC) breathing apparatus (BA), however, as the use of BA is also necessary in other types of technical rescue situations this area of expertise has been dealt with under a heading of its own.

Working in BA can be extremely claustrophobic so it is essential the rescuer is used to wearing it. Much of the training in BA is aimed at providing the participant with the knowledge and skills to have confidence in its use and be able to conduct pre-inspection checks [19]. Additionally, training is given so that participants are confident in the correct donning procedure, the different types of BA and what to do if something goes wrong [19]. The rescuer will also receive training in the different types of atmosphere they may encounter and how to store and maintain the BA [19].

Rescue at Height

Rescuing from height can be an extremely dangerous operation and can occur in a multitude of situations and environments. Training in this area is designed to ensure participants are confident and comfortable with working at height and are familiar with equipment used. Training is given in familiarisation with work at height regulations [20], risk assessment for working at height and equipment inspection and maintenance [21]. Also covered are areas such as anchor point installation, rooftop safety, specialist rope access, industrial climbing, tower and mast climbing, fall arrest, work positioning, work restraint and self escape and evacuation [21].

CONCLUSION

The authors of this article hold a mixture of qualifications in both remote area and offshore medicine and are all trained in aspects of technical rescue. These skills proved invaluable when, deployed as a team, they were faced with a male patient in respiratory arrest with a compromised airway in the middle of a lake inaccessible by road on a floating pontoon bridge in the dark. The skills acquired from these additional education programmes meant they were better prepared and equipped to manage the patient. In the same weekend they also had to administer intravenous pain relief to a ten year old child with a severe injury in the middle of a darkened inaccessible camp ground at night.

It can be seen then, that the role of the technical rescue paramedic is a combination of rescuer and medical provider.

Whether the emphasis lies on medical or rescue skills will depend on the skill level of other team members and the individual incident being dealt with at that time. Whichever skill set comes to the fore, the role of the paramedic working in a technical rescue environment is a highly specialist and rewarding one.

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