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Glass, Trevor Brian

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A SURVEY OF USAR HEALTHCARE PRACTITIONERS' REQUIREMENTS IN ORDER TO OPERATE EFFECTIVELY IN THE COLLAPSED STRUCTURE ENVIRONMENT.

Trevor Brian Glass

Student number: 9202510v

Professor Efraim Kramer

Supervisor

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfilment of the degree of Master of Science in Medicine in Emergency Medicine

Cape Town, May 2016

Declaration

Declaration

I, Trevor Brian Glass, declare that this research report is my own work, except to the extent so indicated in the acknowledgements and references. This report is being submitted in partial fulfilment for the degree of Master of Science in Medicine in Emergency Medicine. It has not been previously submitted, in part or in whole, for any degree or examination in this or any other academic institution.

I declare that I have not intentionally plagiarised the work of any other person. All work produced by or with assistance from others has been acknowledged or referenced.

I further declare that this research project has been undertaken in accordance with the approval of the Human Research Ethics Committee (Medical), clearance certificate number M120317.

Signed on this the 10th Day of May 2016 in Cape Town, South Africa.



Trevor Glass

Student number: 9202510v

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Dedication

This research report is dedicated to my wife, Tami, and my children, Connor, Hannah and Ben who have endured with me and sacrificed with me, as we have walked this long road together. Without their unwavering love, tolerance and unconditional support, I would not have been able to successfully complete this task.

Abstract

Background: An Urban Search and Rescue (USAR) Healthcare Practitioner (UHP) is a medical professional (doctor, nurse or paramedic) that works as part of a USAR team. UHPs are essential for effective USAR operations and are required to function as an integral component of the USAR team. The purpose of a UHP is to 1) provide for the medical requirements of their team; 2) the team's search dogs and 3) provide emergency medical care to victims entrapped in collapsed structures. The International Search and Rescue Advisory Group (INSARAG) Guidelines require that a USAR team have a medical component, however, there is currently no international consensus or standardisation regarding the requirements of UHP's. This research set out to survey members of the UHP community to gain insight into the demographics and experience of current UHP's and to determine their opinions regarding UHP selection processes and USAR specific training for UHP's.

Methods: This study was a prospective, descriptive, transverse study comprised of closed and open-ended questions conducted using an online questionnaire. Requests for participation, which included a link to the online questionnaire, were emailed to the researcher's personal contacts in twenty countries. These UHP's were requested to send the request for participation in the study to their respective UHP networks. This resulted in a total of 136 study respondents from nineteen countries.

Results: Of the UHP's that participated in this survey, 82% were 36 years or older, with the largest group (44%) being older than 44. Males accounted for 83.7% of the respondents. Paramedics make up the majority (43.2%) of the UHP community that participated in the survey. The largest number of respondents (35%) have been

medically qualified as a doctor, nurse or paramedic for > 20 years. The majority of respondents (30%) have been involved in USAR for 3-5 years. The experience of respondents in responding to actual USAR incidents is low, 47% had never responded internationally and a further 42% had deployed on 1-3 international USAR responses. The vast majority of survey respondents (94.3%) are of the opinion that there is a need for a selection process for prospective UHP's and 93% are of the opinion there is a need for UHP's to undergo a USAR-specific training program after being selected as a UHP. There was unanimous agreement to the need for an on-going USAR training program that includes the practical aspects of USAR medical care, USAR rescue techniques and USAR simulation exercises at some point between 6 months and two years.

Conclusion: Participants completing the online survey questionnaire supported the need for a UHP selection process to become part of a UHP team and the need to undergo a USAR-specific training course prior to becoming an operational member of the team. They also supported the requirement to undergo continuous professional development training, which includes practical aspects of USAR medical care, USAR rescue techniques and USAR simulation exercises.

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Finally, I wish also to acknowledge all of you from around the world who have assisted me by participating as a respondent. Having worked with many of you on many different occasions, I am all too aware of how humbly you go about applying your knowledge and skills, sometimes at great risk to yourself, to assist those in dire need.

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Abbreviations

AEME	Africa Europe Middle East
BoO	Base Of Operations
CIS	Critical Incident Stress
EMS	Emergency Medical Services
ESB	Emergency Service Branch
FCSS	Field Coordination Support Section
FDNY	Fire Department New York
GAR	General Assembly Resolution
IFRC	International Federation of Red Cross Red Crescent Societies
INSARAG	International Search and Rescue Advisory Group
IEC	INSARAG External Classification
ISG	INSARAG Steering Group
IP	Internet Protocol
IV	Intravenous
MWG	Medical Working Group
M_w	Moment Magnitude
NGO	Non Governmental Organisation
OCHA	Office for the Coordination of Humanitarian Affairs
OSA	Obstructive Sleep Apnoea
PPE	Personal Protective Equipment
PTSD	Post Traumatic Stress Disorder
SME	Subject matter expert
SOD	Sudden onset disaster

TWG	Training Working Group
UAE	United Arab Emirates
UHP	USAR healthcare practitioner
UK	United Kingdom
UN	United Nations
USAR	Urban Search and Rescue
USA	United Sates of America
USGS	United States Geological Survey
WTC	World Trade Centre
WWII	World War II

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Chapter 1 Introduction

1.1 Construction of Research Report

This report comprises five chapters. Chapter one serves to provide the reader with an overview of the construction of, and the reason for, this research report. It also includes a literature review of relevant, published, international, English language literature. Chapter two describes the research methodology and the on-line software tool that was used to conduct this study. Chapter three presents the results derived from the analysis of the gathered data. Chapter four discusses the findings of the research as it relates to the stated objectives. Chapter five discusses the limitations and offers conclusions derived from the data analysis and discussion and also suggests issues that would benefit from further study.

1.2 Research Overview

The researcher's first exposure as an urban search and rescue (USAR) healthcare practitioner (UHP) was in 2003 during a deployment to the 6.8 Moment Magnitude (M_w) Boumerdes earthquake in Algeria. Moment Magnitude is a unit of measure of the intensity of an earthquake (1). Over the subsequent years the researcher deployed to numerous other earthquakes to which the international USAR community also responded. From 2005 to date the researcher has worked as a part-time consultant to the United Nations (UN) Office for the Coordination of Humanitarian Affairs (OCHA) Field Coordination Support Section (FCSS) in support

of the International Search and Rescue Advisory Group (INSARAG) as a subject matter expert (SME) on USAR.

As the researcher's exposure to international USAR increased, he became aware of the lack of consistency and standardisation between the medical components of USAR teams from around the world. Despite these variations, these different teams respond concurrently to major earthquake disasters, where the same austere environment and challenges confronts them. The varying capabilities of teams prompted questions regarding the requirements needed by a UHP in order operate effectively in the collapsed structure environment.

To the best of the researcher's knowledge, this study represents the first international, comprehensive, systematic evaluation of UHPs regarding their own opinions on the requirements of a UHP.

1.3 Literature Review

A UHP is a medical professional (doctor, nurse or paramedic) that works as part of a USAR team. UHPs are essential for effective USAR operations and are required to function as an integral component of the USAR team (2). USAR is a specialised discipline of technical rescue that has been developed to provide a response capability to structural collapse incidents.

A structural collapse occurs when the structural integrity of a building fails. This is due to spontaneous structural failures, most often resulting from poor construction

methods or sub-standard materials; made-made events, e.g., bomb blasts, or sudden onset disasters, e.g., earthquakes.

USAR involves the location, extrication, and provision of emergency medical care to victims trapped in collapsed structures and confined spaces caused by the structural collapse (3).

The origins of USAR can be traced back to World War II (WWII) where teams of rescuers were trained to search for, and rescue, survivors in the aftermath of aerial bombing raids (4). However, the skills and experience acquired during the war faded, as they were no longer required after it ended. It was decades later that USAR re-emerged to become a recognised discipline of technical rescue.

Most victims of structural collapse incidents are rescued by the spontaneous local community response and the first responder emergency services (5). However, some victims cannot be located or accessed without specialised teams and equipment.

Victims of structural collapse can be divided into four categories (6). Victims killed immediately or expected to die within minutes are categorised as Class 1. Class 2 victims includes those who have sustained serious injuries and are trapped in the collapsed structure and require complex, time-consuming rescue to facilitate extrication and definitive emergency medical care until they can be handed over for further treatment. Class 3 includes victims that require only basic first aid and Class

4 includes victims with no apparent injuries that are trapped in areas that offer protection from injury until rescued (6).

Of the trapped victims, some are entrapped and others are entombed. An entrapment occurs when collapsed building material or building content falls onto a victim, physically trapping them. Victims become entombed when they are enclosed in a void space but have not been held down by debris. A void is a special area, usually free of debris, that occurs when solid structures do not collapse completely, but collapse against each other and other structures. This space is termed a “void’ by USAR practitioners. It is the deeply entombed or entrapped survivors that pose the most complex rescue challenges and require a high degree of specialised skills and equipment in order to provide an effective rescue (7). Hence the need for USAR teams, of which UHPs form an important component.

In the United States of America (USA) the history of USAR dates back to 1985 when the Fairfax County Fire & Rescue and Metro-Dade County Fire Department developed teams trained for rescue operations in collapsed structures (8,9). In South Africa, the catalyst for developing USAR capacity for collapse structure incidents was a response by a non-government organization (NGO), Rescue South Africa, to an earthquake in Turkey in 1999 (10).

Of the causes of structural collapse, it is earthquakes that are the most dangerous and destructive. Injuries and fatalities occur in their thousands directly as a result of structural collapse as well as from their secondary consequences e.g., tsunamis, fires and landslides.(11) The 1976 Tangshan earthquake resulted in 250,000

fatalities, the 2005 Kashmir earthquake more than 80,000 fatalities with 200,000 injuries and the 2008 China East Sichuan earthquake 87,857 fatalities (12,13,14,15). The 2010 Haiti earthquake resulted in 316,000 fatalities and 300,000 injuries. A search of the United States Geological Survey (USGS) for earthquakes resulting in more than a 1000 fatalities since 2000, revealed 13 events which had resulted in a total of 805,511 fatalities (16).

Although usually smaller in quantity, the fatalities and injuries from human-made structural collapse incidents can also be significant. There were 2,726 fatalities during the bombing of the World Trade Centre in the USA with injuries numbering in the thousands (17). In April 2013, a spontaneous structural collapse at a garment factory, the Rana Plaza, in Bangladesh, resulted in 1,127 fatalities. There were an additional 2,438 victims, many of whom were injured, rescued after the collapse (18).

It was the aftermath and the subsequent international response to a major earthquake in Armenia that was to become the catalyst for the establishment of the international USAR network, the International Search and Rescue Advisory Group (INSARAG). On the 7 December 1988 a devastating earthquake, measuring 6.9 M_w on the Richter scale, struck North Western Armenia. The earthquake and subsequent aftershocks resulted in more than 60,000 fatalities, 15,000 injuries and left 500,000 Armenians homeless (19). The rescue effort that followed was the largest foreign cooperation to the then Soviet Union since WWII. Rescue and medical personnel, medical supplies, rescue equipment and search dogs, (dogs trained to search for victims buried in collapse structures), were provided by teams originating from the USA, much of Europe, South America and the Far East (20).

Although USAR teams in the USA had deployed previously to the 1985 Mexico City and 1986 El Salvador earthquakes, prior to the 1988 Armenia earthquake, the international response to Armenia was the first of its kind on such a global scale (9). However, even though there was tremendous international support, the response was uncoordinated, ineffective and highly criticized. There were challenges of communication between the international teams and the Government of Armenia due to language differences and this resulted in the lack of coordination. There was a concentration of resources in some areas, with little to no resources being distributed to other areas in need. The Armenians did not know the extent of the capacity that had arrived from the international community and therefore did not know how best to utilise it.

Following these destructive Mexican and Armenian earthquakes, the then League of Red Cross and Red Crescent Societies, now called the International Federation of Red Cross & Red Crescent Societies (IFRC), produced a report that identified a growing need for international resources to respond to similar future disasters and the requirement for better coordination between the affected government, national responders and international search and rescue organisations (21). The report identified several important characteristics of an effective international rescue team which included: skills and equipment to locate and extricate victims, medical knowledge and equipment, self-sufficiency and the ability to arrive quickly after the onset of a disaster (21). The report recommended establishing effective international response teams and coordination. Accordingly, the IFRC together with the then Department for Humanitarian Affairs-United Nations Disaster Relief Organization,

now called the Office for the Coordination of Humanitarian Affairs (OCHA), convened the first International Search and Rescue Workshop in Geneva, Switzerland, which paved the way for the inaugural meeting of INSARAG, held in December 1991 (21).

INSARAG is an international network of providers of USAR assistance, as well as earthquake prone countries likely to require international USAR assistance. The INSARAG structure is composed of an INSARAG Steering Group (ISG), three INSARAG Regional Groups (Africa-Europe-Middle East, Americas, Asia- Pacific) and a permanent Secretariat provided by the UN OCHA Field Coordination Support Section (FCSS) (2).

In 2002, INSARAG was formally endorsed by the UN General Assembly through the unanimous adoption of UN General Assembly Resolution (GAR) 57/150 on "*Strengthening the Effectiveness and Coordination of International USAR Assistance*" (22). The aim of international USAR response is to save lives, as is highlighted in GAR 57/150, which stresses,

> "…the need to improve efficiency and effectiveness in the provision of international urban search and rescue assistance, with the aim of contributing towards saving more human lives;"

Today there is a well-established global USAR network united under INSARAG, as was evidenced by the 82 international USAR teams that either deployed to the 2010 Haiti earthquake or monitored the response via the UN OCHA Virtual On Site Operations Coordination Centre (23).

INSARAG acknowledges the need for a medical element within every USAR team. The need for the provision of emergency care to the injured in the collapsed structure environment has long been recognised as a requirement (21). Bywaters first described crush syndrome in 1941 during the Blitz. He is quoted as saying,

> "Amongst air-raid casualties seen at this hospital have been four cases of crush injury of the limbs which, because of the general similarity of their clinical course, were thought to represent a specific and hitherto unreported syndrome, and one which has been and will be seen elsewhere during the war." (24).

However, it was only much later that studies showed that survivability was increased if medical care and monitoring was initiated as early as possible, even while the patient was still trapped, and they were then transported to intensive care facilities as soon as possible after being extricated (25,26). It was also discovered that if, during the rescue efforts of patients suffering entrapment with crush injuries (crush syndrome), there was a rapid release of the compressive force, there was a risk of sudden haemodynamic compromise to the patient which could result in cardiac arrest. Hence the need to conduct a well-coordinated release of the crushed patient between the rescuers and the UHP, with on-going medical monitoring and intervention (25,27). The USAR medical goal is to,

> "Recover a live patient in a manner that maximises odds of full recovery to their pre-entrapment status." (8).

Therefore INSARAG requires that a USAR team be composed of five key component disciplines: management; logistics; search; rescue and a medical component (2). It is the UHPs that make up the medical component of a USAR team.

INSARAG has developed several policies and processes to guide international USAR practise. One of the processes utilised is the INSARAG External Classification (IEC) process (28). Prior to the implementation of the IEC process, USAR teams conducted a self-evaluation of their capability against a checklist, developed by the INSARAG community and listed in the INSARAG Guidelines. This self-evaluation lent itself towards a biased and subjective evaluation. The INSARAG community therefore identified a need to improve the level of standardisation and consistency of capabilities amongst INSARAG affiliated teams. Therefore, in 2005, the ISG implemented the IEC process. The IEC process is a voluntary, independent, peer-review verification of a USAR team's response capability and technical capacity conducted against a set of established criteria. These evaluation criteria are itemised in a list, the IEC Checklist. The IEC Checklist, developed by international USAR responders, is based on the INSARAG Guidelines. The INSARAG Guidelines, which have been endorsed by GAR 57/150, is a document that has been produced by the INSARAG community, which provides guidance on international USAR policy and operations (22).

During an IEC, a cohort of USAR subject matter experts (SME), the classifiers, observes the team undergo a full-scale USAR simulation exercise. Classifiers have qualifications and experience in the five components required of an INSARAG USAR

team, namely management, logistics, search, rescue and medical. The exercise follows a response cycle of activation, mobilisation, operations and demobilisation. It is conducted over a minimum of 36 hours so that the IEC classifiers can observe whether the team has sufficient personnel and capacity to sustain operations for several days, which is a requirement of INSARAG (2,29,30).

One of the elements evaluated during an IEC is the team's medical capability. A UHP from a INSARAG team will review the team's medical documents, process and policies and observe the medical element of the team set up and operate the medical station in the Base of Operations (BoO) and perform medical care, as required by medical scenarios included in the exercise, including in the confined space. A BoO is the campsite where the USAR team is accommodated and operates from during a deployment.

From the IEC exercises it became apparent that there were significant variations in the composition, education, skills, experience, scope of practise of UHPs and the perceived roles and responsibilities of the medical component of a USAR team, even though these teams would be responding into the same austere environments. Similar discrepancies and variations were also observed anecdotally by UHPs who responded to actual disasters alongside other INSARAG USAR teams.

Although the INSARAG Guidelines mandated the requirement of having a medical component as part of a USAR team, they fell short of providing any detailed information on the roles and responsibilities of UHPs. UHPs selected as IEC classifiers also came from significantly varying backgrounds and experience levels.

Consequently, the combination of the lack of a more descriptive IEC Checklist and varying capabilities of medical classifiers resulted in subjective medical assessments of a USAR teams medical capability during an IEC.

It is important to note that the austere nature of structural collapse incidents and the resulting challenges confronting the UHP make it a clinically, physically and mentally demanding undertaking that is not without occupational risks (31). The clinical challenges facing a UHP can be extremely complex. Victims of structural collapse face numerous clinical sequelae, of which, crush injury and crush syndrome are well documented. Crush injury occurs when there is local compression of extremities or other parts of the body, which results in localized muscle, blood vessel and nerve damage (32). Crush syndrome, sometimes referred to as traumatic rhabdomyolysis or *Bywaters' syndrome,* is a life-threatening syndrome that results from a compression injury that further deteriorates into multi-organ system manifestations. It is characterized by hypovolaemic shock, life threatening levels of serum potassium (hyperkalaemia) and renal failure (25). The incidence of crush injury in earthquakes is estimated at between 3% to 20% of all injuries, increasing to as much as 40% in victims extricated from collapsed multi-storey structures (33). Other studies have shown that patients who are entrapped in a collapsed structure face an increased risk of developing crush syndrome (34,35).

In addition to crush injury and crush syndrome, victims of structural collapse incidents may also suffer fractures, penetrating wounds and lacerations or impaled objects, such as metal rods used to reinforce concrete. In rare instances, a victim's limbs may be so severely entrapped, an on-site amputation is required to free them.

The administration of intravenous fluid, analgesia, sedation, anaesthesia and the performance of field surgery may be required to manipulate limbs and perform amputations in order to facilitate extrication in a way that is humane and does not further compromise the victims clinical condition.(36,37)

The circumstances under which emergency medical care is provided may vary significantly. Two examples from the 2010 Haiti earthquake serve to illustrate this point. In the first example, the victim was a 37-year-old male who was located on day 1 after the earthquake in a collapsed multi-storey structure; he was entombed (enclosed) in a void space, but not pinned down by fallen debris. After access by the rescue crews, he was found to be alert, clinically stable and was able to leave the void where he was trapped with minimal assistance. The UHP was not required to enter the collapsed structure and had only to provide oral fluids to treat his dehydration that occurred due to him not having had anything to drink while he was trapped (37). This can be compared to the second example. The victim was a 21-year-old female located 5 days after the earthquake and was deeply entrapped in a collapsed multi-storey building. She was lying in a face down position with her left arm completely trapped by fallen debris. After initially locating the victim, it took rescue crews several hours to gain access to her. Due to the complexity of her entrapment and her clinical condition, a UHP was required to access the patient, which required crawling into the collapsed, inherently unstable structure, with inherent dangers. The victim was found to be in a critical medical condition with a decreased level of consciousness. Her critical medical condition required acute, advanced emergency care in the confined space in which she was entrapped with minimal physical access to the patient. The victim's treatment required administration

of intravenous fluids (IV) due to hypovolaemic shock, the administration of IV sodium bicarbonate to mitigate complications from her crush injury, IV analgesia to control pain and, once stabilised, sedation and anaesthesia to perform an on-site amputation of the entrapped limb (37). The amputation was successfully completed and the victim was extricated. The victim, accompanied by a UHP, was transported in local transport to a field hospital with surgical capabilities. The outcome of the victim is unknown.

In extreme situations, there is also sometimes the need to dismember (removal of limbs) the dead in order to gain access to the living (38). This occurs when a dead victim is blocking the only viable access route to a live victim and the only way to remove that dead victim to gain access to the living victim is to dismember them.

Large scale incidents, such as earthquakes, are often accompanied with the loss of healthcare delivery services, there is a non-selective victim profile including very young, very old and victims with pre-existing comorbidities and there are often delays in treatment, exacerbating the presenting clinical condition when victims are eventually reached (8). The UHP has to contend with these clinical challenges in medical resource-poor settings because the usual resources have been affected by the earthquake or are completely overwhelmed, further compounding the issue.

In addition to the clinical challenges, the austere nature of the structural collapse environment confronting the UHP make it a physically and mentally demanding undertaking that is not without occupational risks. The UHP is required to crawl into voids in collapsed structures that contain entrapped victims, clinically assess,

diagnose, treat and extricate the victim. A response in a collapsed structure may require many hours of intense physical work and agility to be able to lift and carry (equipment and patients) while moving around, on and in the collapsed structure (8). The nature of the environment is such that there is diminished ambient light; workspaces are confined and can sometimes only be accessed with the use of rope systems; the workspace may contain corpses of other victims; work surfaces are jagged, uneven, slippery and strewn with debris; there are high levels of ambient noise and vibration during rescue operations and the confined space atmosphere is most often contaminated with dust and other pollutants (39). Due to the complicated nature of the entrapment, it can take rescuers several hours, sometimes in excess of 12 hours, to free the victim. This requires the UHP to provide on-going care and monitoring for a protracted period in a very challenging environment.(37,40)

Following an earthquake, aftershocks are prevalent and create risks of secondary collapse. A secondary collapse occurs when the movement of the earth causes a shift of debris that results in further collapse. There is also the risk of falling debris, which becomes dislodged, either as a result of an aftershock or because of a spontaneous shift in load. Rebecca Anderson, a nurse, was killed after being struck on the head by falling debris during the response to the 1995 Oklahoma City bombing (41). Other examples of occupational risks to rescuers and UHPs include hazards that could cause a rescuer to trip (e.g., unstable surfaces), inhalation of contaminated atmospheres (e.g., dust and or carbon monoxide, methane) and electrocution due live electrical wires that become exposed, to mention a few. It has also ben documented that rescue personnel are prone to suffer from Critical Incident Stress (CIS) and Post Traumatic Stress Disorder (PTSD) (42,43). PTSD was

diagnosed in 25% search and rescue personnel studied 2 months after the 2003 Bingol earthquake (44).

In a study of rescue personnel who responded to the Oklahoma City bombing, musculoskeletal ailments were the most common injury (21.4%), foreign bodies in the eyes accounted for 14.5% and other minor soft tissue injuries accounted for 18.4% (45). During the response following the attack on the World Trade Centre (WTC), a total of 5,222 rescue personnel visited healthcare facilities of which the majority of complaints were musculoskeletal ailments (19%), respiratory complaints accounted for 16% and foreign bodies in the eye accounted for 13%. There was one fatality and of those that visited healthcare facilities for the ailments listed above, 52 rescue personnel required hospital admission (46).

Research has shown there are not only acute medical consequences occurring during the response but also short-term (1-4 years) and medium term (4-9 years) effects (47). The chronic effects of USAR-related occupational exposure following the WTC response are the most widely and comprehensively studied and therefore provide the most current literature in this regard. In reference to the research findings published in the years following the WTC response, Dr Matthew Mauer of the New York State Department of Health, wrote, “"We now know that, in one of the largest WTC rescue and recovery cohorts, health effects have persisted for almost a decade.” (43).

Therefore, in order to address the short-comings of the medical guidance in the Guidelines and to introduce a more standardised and objective medical assessment

during an IEC, a need was identified to establish an ad hoc working group to specifically look at the medical aspects of USAR and provide more detailed guidance to UHPs. In 2008 the ISG endorsed the establishment of an inter-regional Medical Working Group (MWG) (48). Since its inception the MWG has produced various policies that aim to provide guidance and direction to the medical component of USAR teams and UHPs. One of these principle policies is Section F11 of Chapter F of the INSARAG Guidelines (2).

Section F11 of Chapter F of the INSARAG Guidelines describes the responsibilities of the UHP as follows:

- "Provide preventative health care, primary health care and emergency medical care to USAR team members
- Provide veterinary care to the teams search dogs in collaboration with their handlers.
- Provide emergency medical care to entrapped victims during USAR operations, which is to be initiated as soon as the victim has been located and can be accessed. This care is to be continued until these patients can be handed over to local health resources or similar capability (e.g., field hospital)." (2).

Section F11 lists the medical capabilities that should be available within the team and the role of a UHP throughout the various phases of a deployment, i.e. preparedness, mobilisation, operations and post mission. It describes that UHPs must be capable of working in an austere environment and may be required to enter

into the confined space of a collapse structure to provide emergency care. It further describes the need for UHPs to be able to provide:

- Primary healthcare care for the team
- Adult and paediatric emergency care, including definitive airway management, ventilation and surgical procedures, e.g., amputations
- Mental / behavioural healthcare
- Search dog emergency care
- Health and hygiene
- Care of deceased

Search canines may suffer from dehydration, lacerations, strains and sprains occurring as a result of working on a collapsed structure. The INSARAG Guidelines state that the USAR Team has an embedded capability to provide for the medical needs of its search canines. They do not stipulate how this should be done, other than by stating that the care can be provided by either the search canine handler who has been trained in canine medical care, or USAR medical personnel trained in canine medical care or a combination thereof (30). Some USAR teams deploy with a veterinary surgeon, which ensures the presence of a discipline specific professional being on hand to provide for the teams veterinary needs. In the absence of a vet, this responsibility falls upon either the search canine handler who has undergone canine medical care training of a UHP who has undergone similar training, most commonly a short courses that addresses the most common ailments encountered in the context of USAR. The INSARAG Guidelines do not however offer any more information regarding search canine medical care other than the fact that there needs to be a capability.

While Section F11 offers detailed information on required medical capabilities, it does not provide information on the recommended qualifications, personal criteria, selection or training requirements of a medical professional in a USAR team.

The INSARAG Guidelines does require that USAR teams have a skills acquisition and a continuous skills maintenance or refresher program commensurate with the team's technical capacity (2). This acquisition and maintenance training should address all five of the components of an INSARAG USAR team, including the medical component. The INSARAG Guidelines do not stipulate how this training should be conducted and therefore it is left to the interpretation of the training officer and medical management of the team.

INSARAG Classified USAR teams are required to conduct an annual full-scale field USAR exercise including all five of the components of the team, designed around a constantly evolving scenario that is as close to representative of a real life situation as possible (30). This simulation exercise provides one opportunity for the medical component of the team to participate in USAR medical related training. However, compliance this annual requirement can only be checked with classified USAR teams, as the IEC and reclassification provides the only opportunity for an independent evaluation of adherence by a team to the stipulated requirements. Non-classified teams are required to voluntarily adhere to and comply with this recommendation, which may be challenging during times of economic austerity.

The bulk of a USAR team is normally made up of rescue personnel from a single organisation, e.g., a fire service. However, the specialised position sin the team, like the engineers and medical personnel are often drawn from different organisations. This has the potential to pose challenges in getting personnel released from their day-to-day work obligations to participate in training exercises.

The academic community has yet to embrace conducting research in USAR in general, and the medical aspects of USAR specifically. Hence, there is a paucity of literature on the requirements needed by UHPs in order for them to operate effectively in the collapse structure environment. An internationally accepted reference source providing guidance on the requirements of UHPs, which would enable them to function safely and effectively in the collapsed structure environment, does not exist. A PubMed and Medline search in English using the terms *USAR, medic, healthcare, practitioner, doctor, nurse, paramedic, rescue, collapsed structure, search and rescue, earthquakes, crush injury, crush syndrome, INSARAG, OCHA and requirements* revealed 12 results, however, none of these publications addressed the issue of UHP requirements.

There are also variations in the number of UHP's incorporated into each USAR team's structure. Some teams have a combination of doctors, nurses and paramedics; some teams have doctor and paramedics or nurses. Some teams have only one doctor, whereas other teams will have several doctors. Chapter G of the INSARAG Guidelines, specifically Table 1(Section G7) and Table 2 (Section G8), stipulates the need for at least one doctor and a minimum of 3 paramedics or nurses (2). Therefore the minimum recommended number of UHP's per team is four, of

which at least one should be a doctor. However, while Chapter G acknowledges the three professional qualifications, i.e. doctors, nurses and paramedics, it falls short of making any recommendations on the type of qualifications and or experience that would be useful for a doctor, nurse or paramedic in the context of collapse structure search and rescue. The way the UHP component of the team is staffed is left to the discretion of the medical management element of each team. This will usually be determined on the clinical scope of practise of each of the professional groups, or whether in fact they have all three in a country's specific healthcare system. By way of example, some countries do not have paramedics. The INSARAG Guidelines specifically mentions doctors as they have the highest and broadest clinical scope of practise and will hold medical responsibility for the team. Section F11 of Chapter F states that it is necessary to have a medical person at each worksite where USAR operations are being conducted while maintaining a medical presence in the BOO (2). These references, do not however, make any recommendations as to the qualifications, skills, experience or training required by doctors, paramedics or nurses to become a UHP.

1.4 Summary

A summary of the present situation, based on current literature, shows the following is evident. The USAR environment in which a UHP is required to work is austere and poses a multitude of occupational risks, both immediate and longer-term. USAR is the discipline that has been developed to respond to collapse structure incidents and INSARAG requires that a USAR team be staffed with medical professionals, licenced to practise in their own country, who are required to function as an integral

component of the USAR team. UHPs will be confronted with complex and challenging patients and they are expected to function effectively and safely in these environments. There has been the development of an international USAR network, INSARAG, endorsed and supported by GAR 57/150 that has developed the methodology and guideline in an effort to guide international USAR response practise. There exists an independent and voluntary classification process, the IEC process, to assess teams response capability and technical capacity, including that of the medical component. Under INSARAG there is a MWG that is tasked to assist in the medical USAR community developing relevant policies and protocols to guide and assist practise.

However, there is currently no international consensus or standardisation on what is required of UHPs. The demographics and experience of UHPs is not known. It is not known how UHPs are being selected, or whether this selection process, if present, is effective. Nor is it known if UHPs are, or indeed should be, undergoing a USAR specific training course once selected, or whether, based on their existing knowledge and experience, that training is deemed appropriate.

Following an extensive English literature review, it does not appear that there has ever been a study conducted which aims to identify what the requirements of USAR healthcare providers should be in order for them to operate effectively in a collapsed structure environment. Therefore, the aim of this study was to survey a purposive sample of UHPs, by means of a survey questionnaire, regarding their opinion of what they believed are the requirements needed by a UHP in order to operate effectively and safely in the collapsed structure environment.

The study objectives were to identify the demographic data of the UHP participating in the study questionnaire and to determine the opinion of the survey participants regarding their USAR experience, the need for and adequacy of a selection process and the need for and adequacy of a USAR specific training program in an effort to ensure that those selected as UHPs are able to function effectively and safely in the USAR environment.

Chapter 2 Methodology

2.1 Introduction

The detailed methodology applied to this study is described in this chapter. It addresses the ethical considerations and ethics approval process, the study design, questionnaire, population, inclusion and exclusion criteria, and the data collection and analysis applied to the study results.

2.2 Ethical Considerations and Approval

Ethical permission to carry out this study was obtained from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand. Ethics approval was issued on certificate M120317 (Appendix 1).

SurveyMonkey® was utilised to conduct this study. It is an online survey tool that enables users to design their own surveys using various question format templates,

offering self-guided tutorials to ensure that new users are able to use the software effectively. It offers a respondent-friendly, voluntary and confidential mechanism to obtain data. The data can be exported into programs like Microsoft Excel® for analysis. Once the survey had been developed, SurveyMonkey® generated a link to the survey which was then included in the invitation to participate in the study. SurveyMonkey® is available in a fee basic version as well as an enhanced version available at a cost, the latter was utilised to conduct this study.

An email requesting participation in this study (Appendix 2) was sent to a group of UHP's already known by the researcher through USAR meetings, USAR exercises and disaster responses. In order to obtain a suitable sample size of respondents, the email requested the researchers contacts to forward the request for participation on to their respective UHP contacts. Apart from the initial primary points of contact, the researcher had no knowledge of who else received the request to participate in the study.

2.3 Study design

This study was a prospective, descriptive, transverse study comprised of closed and open-ended questions conducted using an online questionnaire.

2.4 Study questionnaire

The study questionnaire used to conduct this study is included in Appendix 3. Not all of the information gathered from the questionnaire is discussed as the volume of

data obtained is simply to great and exceeds the scope of this research report. This report focused on the results obtained from the following questions:

Objective 1: Identify the demographic data of the UHPs participating in the study questionnaire.

Questionnaire Section 1 - Anonymous Personal Information

1) What is your gender?
2) What is your age (years)?
3) What is the nationality of the USAR team you are attached to?
4) What is your professional medical-related qualification?

Objective 2: Determine the opinion of the survey participants regarding what experience, selection process and training of USAR team healthcare practitioners is relevant, in order to be involved in collapsed structure rescue.

- Questionnaire Section 1 - Anonymous Personal Information
  6) How long have you been medically qualified (in years)?
  12) What is the total number of years you have been involved with Urban Search and Rescue (USAR)? (Include both formal as well as informal involvement)
  13) How many practical USAR Training exercises have you participated in?
  15) How many international USAR incidents have you responded to?
- Questionnaire Section 8 – Selection of USAR Healthcare Practitioners
  1) Do you think that all potential USAR healthcare practitioners should undergo a selection process to become part of a USAR team

3) Do you think your team's current selection process for USAR healthcare practitioners is adequate?
4) Once selected, should USAR Healthcare practitioners undergo a USAR-specific training program before becoming an operational member of the USAR team?

- Questionnaire Section 9 – USAR Healthcare Practitioner Training Requirements
  2) In order to maintain competency and currency as a USAR healthcare practitioner, how often do you think a USAR healthcare practitioner should participate in the following activities?
  3) Do you think your team's current training program for USAR healthcare practitioners is adequate?

The question design utilised in the study varied. Some questions required the respondents to select only one of the options presented. Other questions required respondents to select all of the options they thought were relevant. There were also some questions that included an 'other' option. Respondents were required to enter text in their own words when they selected 'other'. Due to the nature of the survey software, it was not possible for respondents to copy and paste answers from one question to another. So although it was possible for respondents to skip questions, when a question was answered, it was done so purposefully.

2.7 Study Population

Requests to participate in the study were emailed to the researcher's personal contacts in twenty countries. The researcher, through prior contact at USAR meetings, USAR training exercises and or disaster responses, already knew the contact details of the 37 UHPs in these countries. These UHP's were requested to send the request for participation in the study to their respective UHP networks. In all, 136 respondents completed the survey.

2.8 Inclusion Criteria

Any registered or licensed paramedics, doctors and nurses, that were or are actively involved in providing healthcare in collapsed structure environments, either domestically and or internationally.

2.9 Exclusion Criteria

- Due to the legalities regarding an ability to offer consent, any persons less than 18 years of age was excluded from participation. This was not deemed as a significant exclusion factor as it was highly unlikely anyone under the age of 18 would be considered eligible for selection onto a USAR team.
- Healthcare professionals whose knowledge and experience of the medical aspects of technical rescue was non-USAR related e.g. vehicular entrapments and industrial accidents.
- Any potential respondent who was otherwise well qualified but not computer and or Internet literate would not have been able to participate in this study as it was conducted entirely on-line via internet-based software.

- Any potential respondent who was otherwise well qualified but was unable to read or write English would not have been able to participate in the study as the study was conducted in English.
- All emails that did not reach a prospective respondent because of:
    - Incorrect email address;
    - Recipients 'inbox' being full.

    None of the abovementioned was a factor in the emails sent out by the researcher to his list of primary contacts. However, this may have been a factor with regard to emails forwarded by the primary contacts. If this did occur, the number of cases is unknown.

2.10 Data collection

All answers were automatically stored and counted by the survey tool. This allowed the researcher to review exactly how many of the total respondents completed each question. The researcher was also able to keep track of responses as the survey tool provided the option of doing a periodic analysis of the responses received up to a specific date.

All emails requesting participation were sent directly to the list of primary contacts from the researcher's laptop computer. Each primary contact was emailed separately so as to maintain their privacy by preventing disclosure of email addresses to a large pool of recipients. All email correspondence pertaining to this study, both sent and received, have been securely stored via password protection on the researcher's

email server. These contact details will not be included as an appendix to this report for confidentiality and privacy reasons.

2.11 Data analysis

Respondents were given six weeks to complete the survey. Following the cut-off date, the raw data captured from SurveyMonkey® was exported to a Microsoft Excel® spread sheet. The data analysis was then conducted using the intrinsic statistical computations embedded within Microsoft Excel®. The descriptive data technique, Measures of Central Tendency, specifically Mode, was used to describe the data.

2.12 Summary

This chapter presented the methodology that was applied in conducting this research.

Chapter 3 Results

3.1 Introduction

This chapter will present the results of the survey. When reviewing the results, the reader is requested to note that when not illustrated otherwise, any value with a decimal greater than 0.5 was rounded off to the next whole numeral and the opposite with any value with a decimal less than 0.5.

The following represents an overview of the results:

- The UHP's that participated in this survey are predominantly males; likely base on fact that of emergency services have historically been male dominated.
- Paramedics make up the majority of the UHP's that participated in this survey.
- The make of a UHP group that participated in this survey, in terms of combination of doctors and paramedics or doctors and nurses and or paramedics, reflects the ambulance services of the home country.
- The UHP that participated in this survey is mature with a high level of professional experience and reasonable levels of USAR experience, however the actual response experience level to international USAR incidents is relatively low. Gaining actual response experience is however a factor that is largely outside of the control of the UHP, their team and their sponsoring agency as they require acts of nature to occur, which do so in an unpredictable manner.
- The vast majority of survey respondents are of the opinion that there is a need for a selection process for prospective UHP's prior to becoming an active member of a UHP cadre of a USAR team.
- The vast majority of survey respondents are of the opinion that there is a need for UHP's to undergo a USAR-specific training program after being selected as a UHP.
- There was unanimous agreement from the survey respondents that there needs to be an on-going USAR training program that includes the practical aspects of USAR medical care, USAR rescue techniques and USAR simulation exercises at some point between 6 months and two years.

3.2 Number of Respondents

There were a total of 136 respondents who accessed the survey. Of those 129 (95%) completed the survey, in part or in full. The 129 respondents included one veterinarian, one secretary, one disaster manager and there was one respondent that did not answer any questions in the entire study. These respondents were excluded from the data analysis. Therefore, the maximum sample size was 125 (92%). Not all respondents answered all the questions, however SurveyMonkey® records the number of respondents for each question, therefore the analysis was conducted on the number of respondents for each question.

3.3 Objective 1: Identify the demographic data of the UHPs participating in the study questionnaire.

3.3.1 Country Respondents by Team

Respondents from twenty countries were contacted to participate in the survey and represented 24 USAR teams. (Table 1)

Table 1 Country Respondents by Team

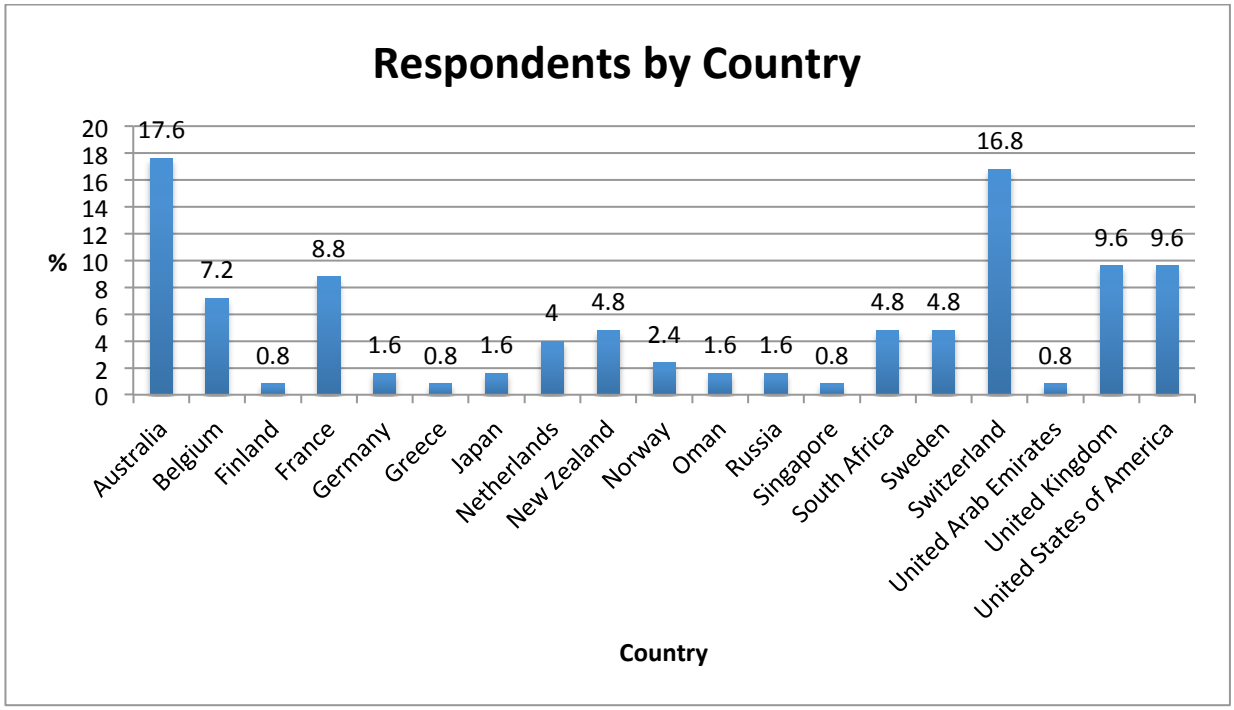
Country	**USAR Team**
Australia	Australia Taskforce 1
Australia	Australia Taskforce 2
Belgium	Belgium First Aid and Support Team

China	China International Search and Rescue
Finland	Finnish Rescue
France	Pompiers de l'Urgence Internationale
Germany	Technisches Hilfswerk
Germany	International Search and Rescue
Greece	Hellenic Disaster Response Unit
Japan	Japan Disaster Relief
Netherlands	USAR.NL
New Zealand	New Zealand USAR
Norway	Norwegian Search and Rescue Team
Oman	Sultanate of Oman National Search & Rescue Team
Russia	Central Airmobile Rescue Team of EMERCOM of Russia
Singapore	Singapore Operation Lionheart Contingent
South Africa	Rescue South Africa
Sweden	Swedish International Fast Response USAR Team
Switzerland	Swiss Rescue
United Arab Emirates (UAE)	United Arab Emirates USAR
United Kingdom (UK)	United Kingdom International Search and Rescue
UK	Search and Rescue Assistance in Disasters
United States of America (USA)	USA Taskforce 1
USA	USA Taskforce 2

3.3.2 Respondents By Country

The Figure below (Figure 1) illustrates the number (in %) of respondents from each of the twenty countries represented in this study. The respondents that selected 'Other (Please specify)' were both from the Royal Sultanate of Oman (Oman). Therefore, in this and subsequent figures, the 'Other (Please specify)' was converted to Oman.

Figure 1 Respondents by Country



Number of respondents to this question: 125 /125 (100%)

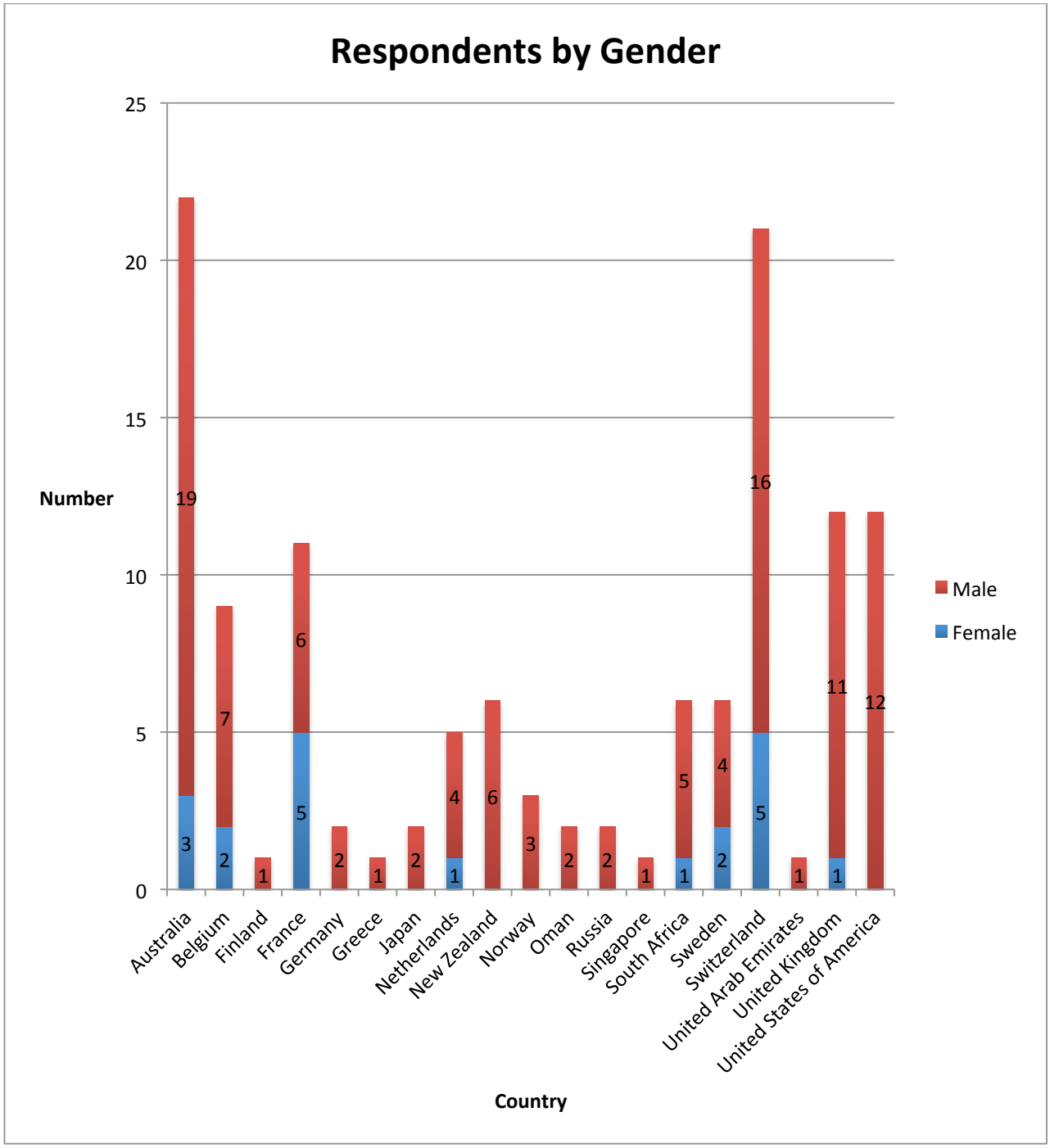
There was a very good rate of UHP participation from the teams contacted. The researcher directly contacted UHP's from 24 teams, representing 20 countries. Of those, 23 teams (96%) from 19 countries participated in the survey. The results included input from all three of the INSARAG regional groups. Of the 19 countries,

13 (68%) were from the AEME Region, however this is reflective of the current distribution of INSARAG USAR teams.

3.3.3 Respondents By Gender

Figure 2 illustrates the gender segregation of respondents from each of the countries.

Figure 2 Respondents by Gender



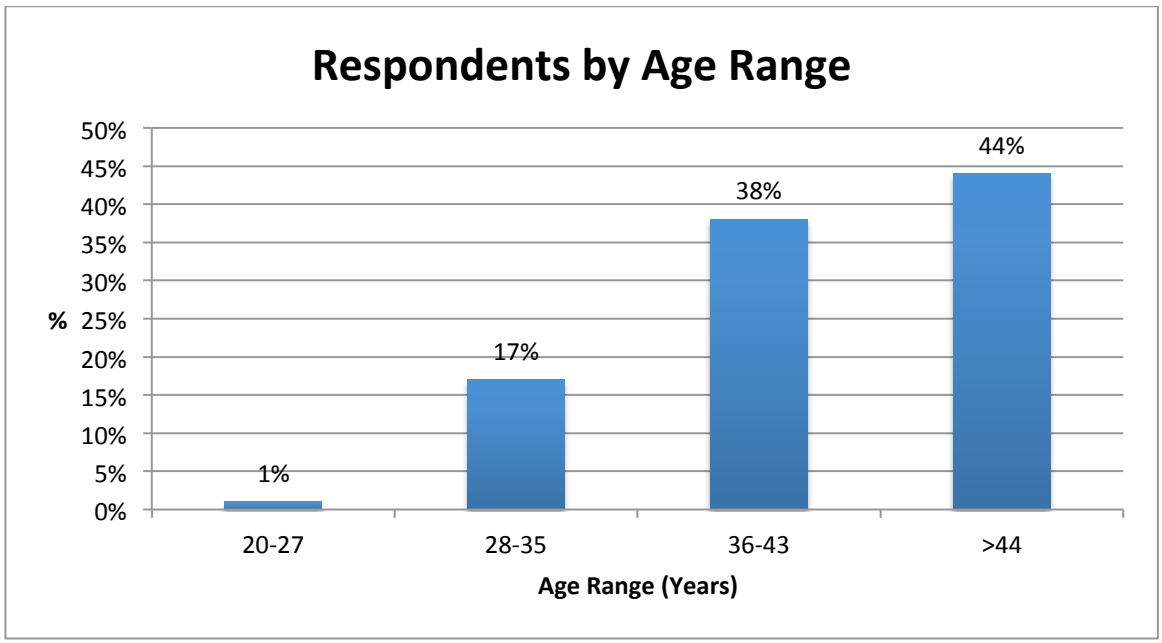
Number of respondents to this question: 125 /125 (100%)

The results of the survey show that 83.7% of respondents were male and 16.3% of respondents were female. There were responses received from females from 42.1% of the participating countries.

3.3.4 Respondents By Age

Figure 3 illustrates the age of respondents, by age range.

Figure 3 Respondents by Age Range

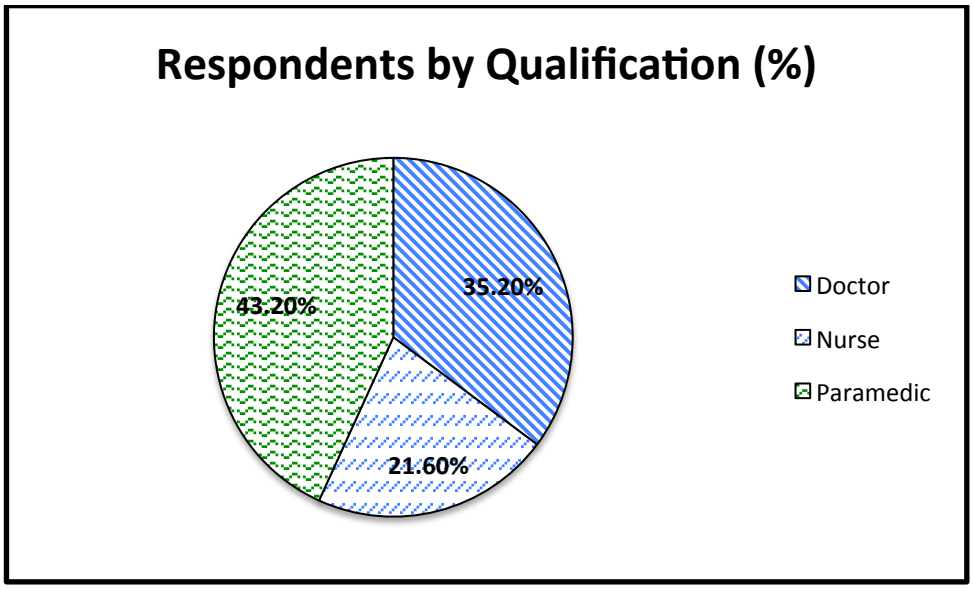


Number of respondents to this question: 125 /125 (100%)

3.3.5 Respondents By Qualification

Figure 4 illustrates the qualification of respondents, namely doctors, nurses and paramedics that participated in the study.

Figure 4 Respondents by Qualification

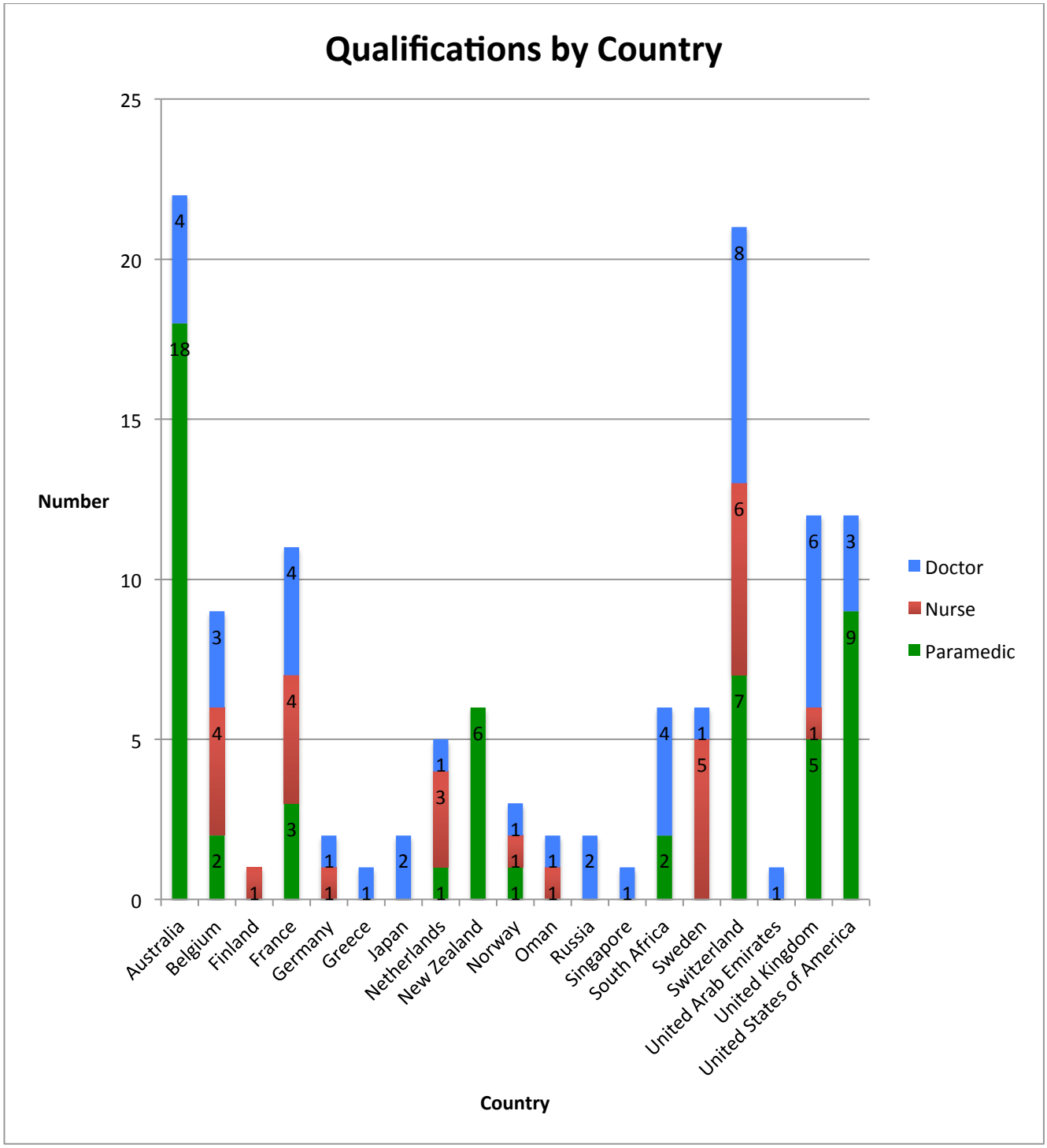


Number of respondents to this question: 125 /125 (100%)

3.3.6 Qualification by Country

Figure 5 illustrates the distribution of qualification by country.

Figure 5 Qualifications by Country



Number of respondents to this question: 125 /125 (100%)

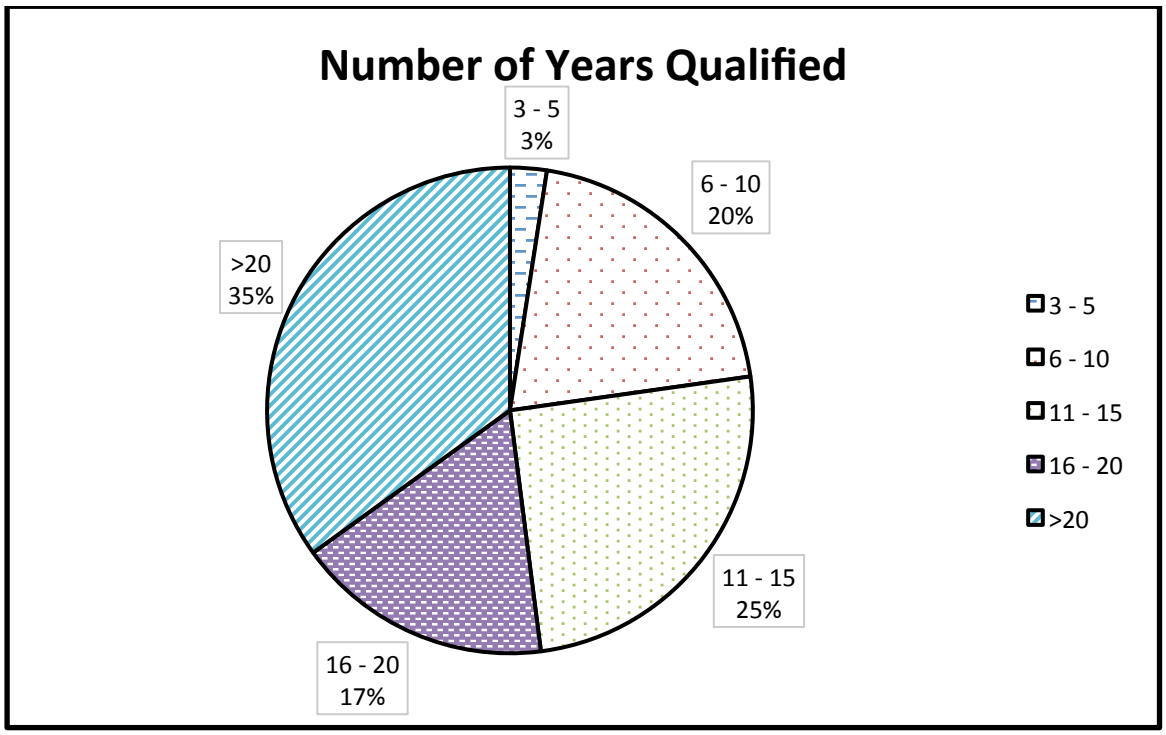
3.4 Objective 2: Determine the opinion of the survey participants regarding what experience, selection process and training of USAR team healthcare practitioners is relevant, in order to be involved in collapsed structure rescue.

3.4.1 Experience

3.4.1.1 Number of Years Qualified

Figure 6 illustrates the range in the numbers of years the respondents have been qualified as a doctor, nurse or paramedic, it does not take into account any postgraduate qualifications. A range of 1-2 years was offered, however none of the respondents selected this option; therefore it is not included for illustrative purposes.

Figure 6 Number of Years Qualified

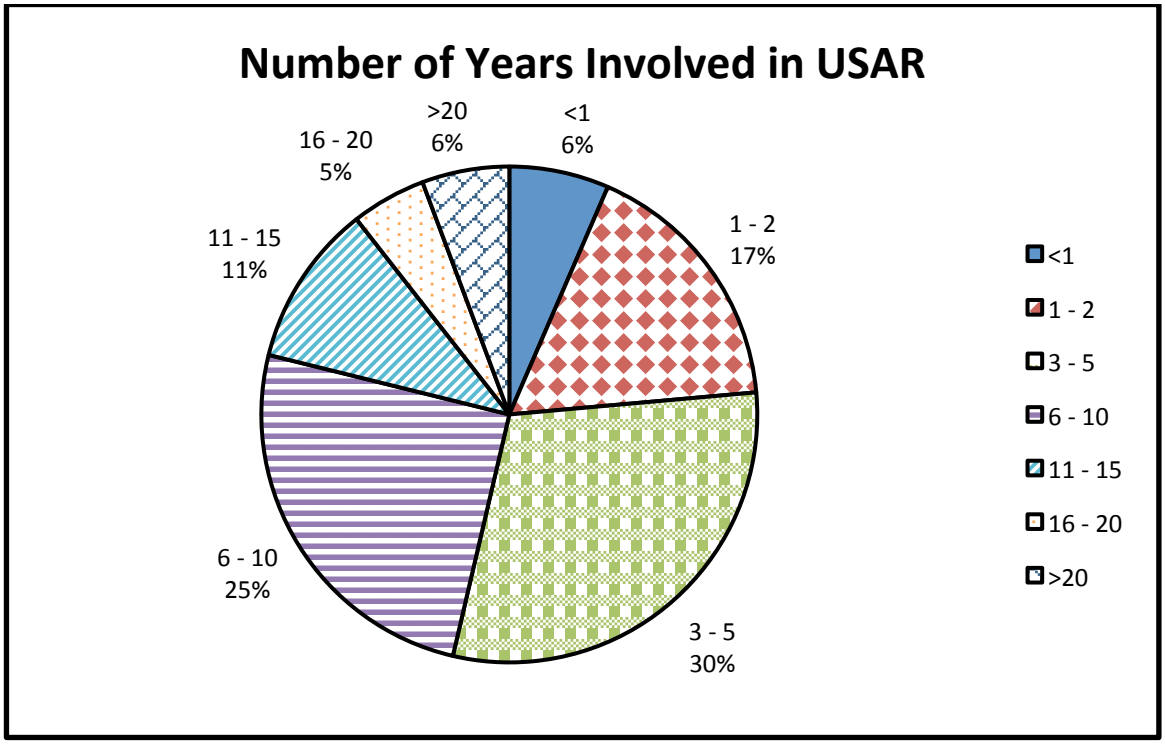


Number of respondents to this question: 125 /125 (100%)

3.4.1.2 Number of Years Involved in USAR

Figure 7 illustrates the numbers of years the respondents have been involved in USAR.

Figure 7 Number of Years Involved in USAR

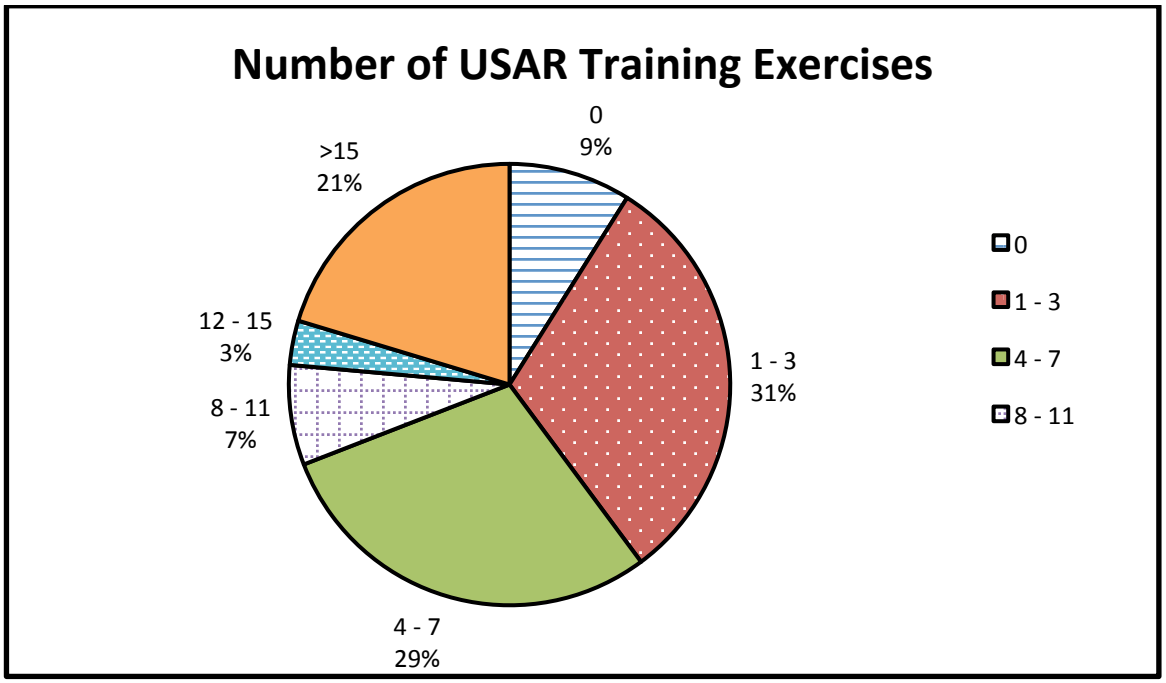


Number of respondents to this question: 125 /125 (100%)

3.4.1.3 Number of USAR Training Exercises

Figure 8 illustrates the number of USAR training exercises the respondents have participated in.

Figure 8 Number of USAR Training Exercises

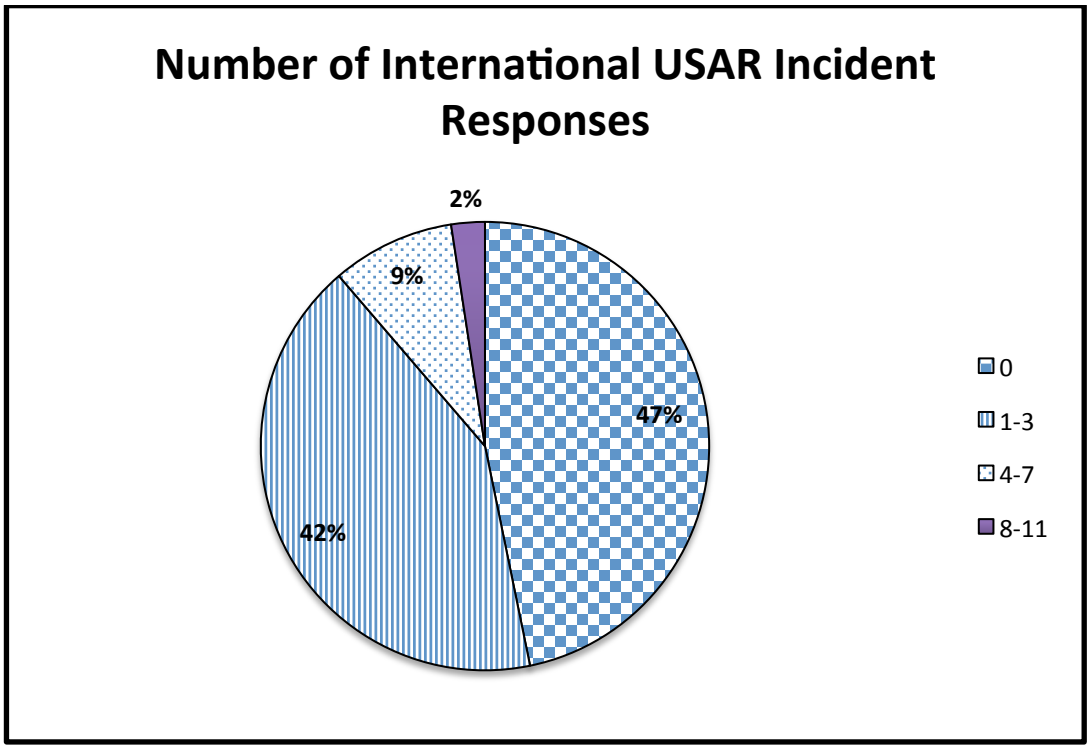


Number of respondents to this question: 125 /125 (100%)

3.4.1.4 Number of International USAR Incident Responses

Figure 9 illustrates the number of international USAR incident responses the respondents have participated in.

Figure 9 Number of International USAR Incident Responses



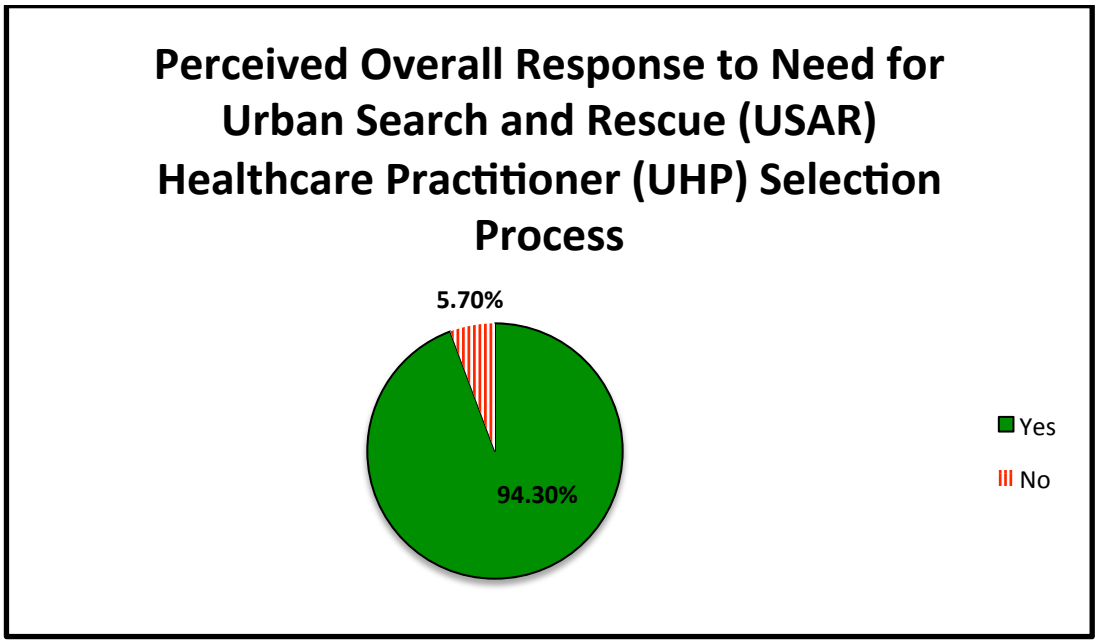
Number of respondents to this question: 125 /125 (100%)

3.4.2 Selection Process

3.4.2.1 Perceived Overall Response to Need for UHP Selection Process

Figure 10 illustrates the overall response for the need for a selection process.

Figure 10 Perceived Overall Response to Need for UHP Selection Process

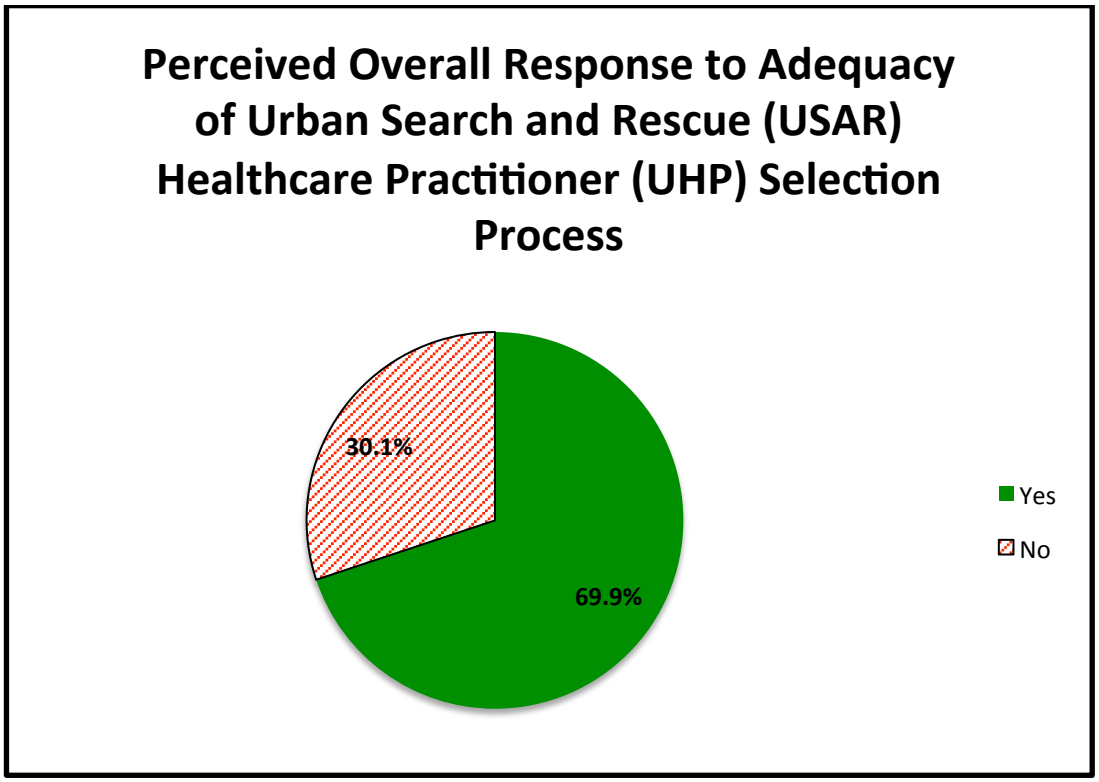


Number of respondents to this question: 125 /125 (100%)

3.4.2.2 Perceived Overall Response to Adequacy of UHP Selection Process

Figure 11 illustrates the overall response as to whether the UHP's current selection process is deemed adequate, in their opinion.

Figure 11 Perceived Overall Response to Adequacy of UHP Selection Process

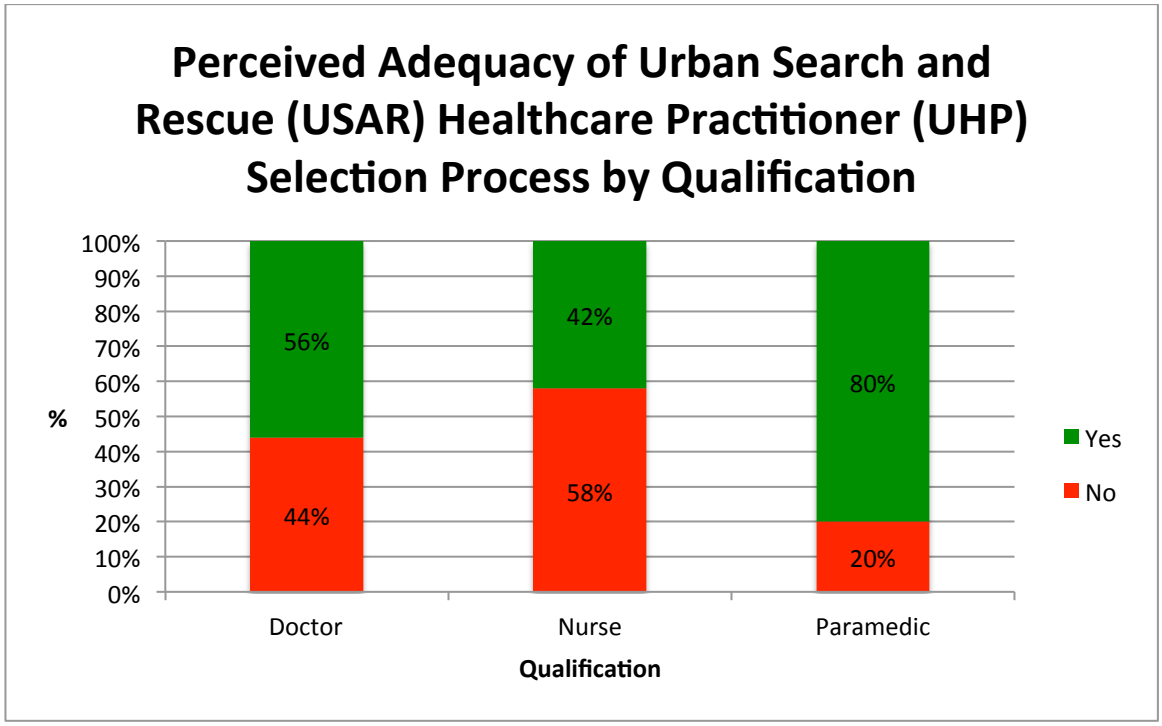


Number of respondents to this question: 125 /125 (100%)

3.4.2.3 Perceived Adequacy of UHP Selection Process by Qualification

Figure 12 illustrates the distribution of the response of the opinion of the UHP's to the adequacy of the UHP selection process of their team, according to qualification.

Figure 12 Perceived Adequacy of UHP Selection Process by Qualification



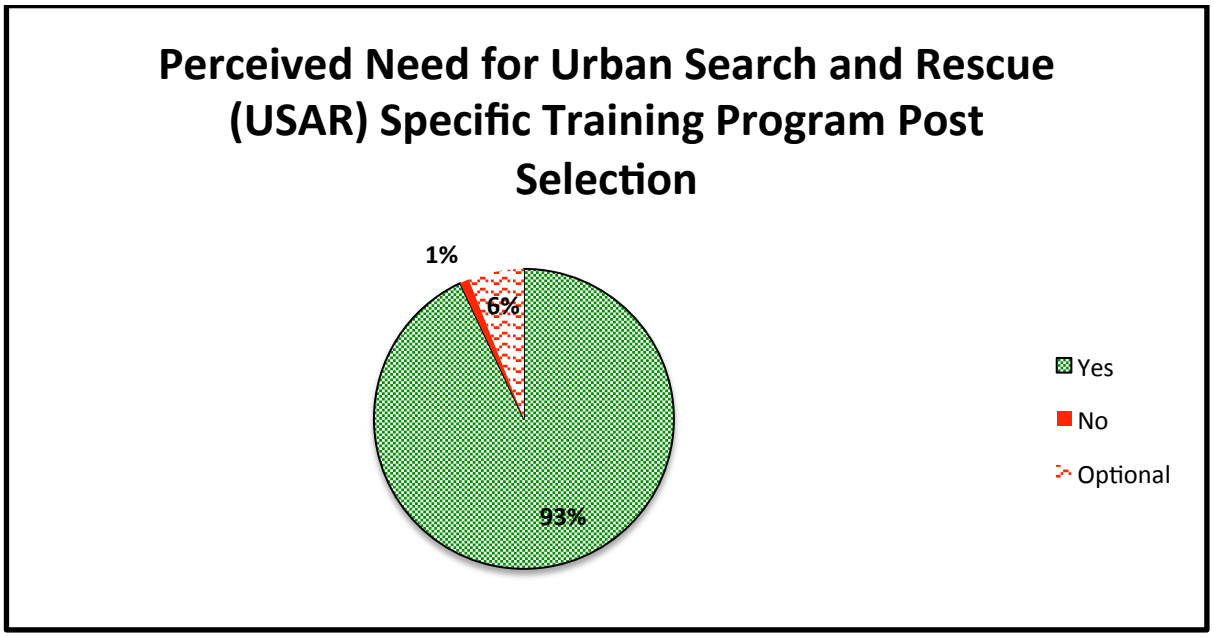
Number of respondents to this question: 125 /125 (100%)

3.4.3 Training

3.4.3.1 Perceived Need for USAR Specific Training Program Post Selection

Figure 13 illustrates the distribution of the need for UHP's to undergo a USAR specific training program following being selected onto the USAR team.

Figure 13 Perceived Need for USAR Specific Training Program Post Selection

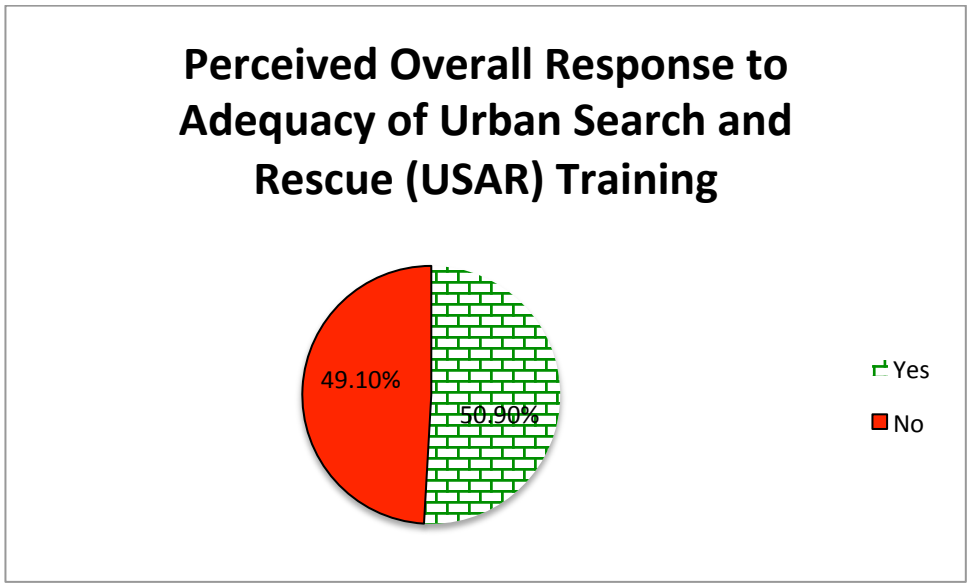


Number of respondents to this question: 125 /125 (100%)

3.4.3.2 Perceived Overall Response to Adequacy of current USAR Training

Figure 14 illustrates the distribution of the overall response to the perceived adequacy of the current USAR specific training program in their respective situations.

Figure 14 Perceived Overall Response to Adequacy of current USAR Training

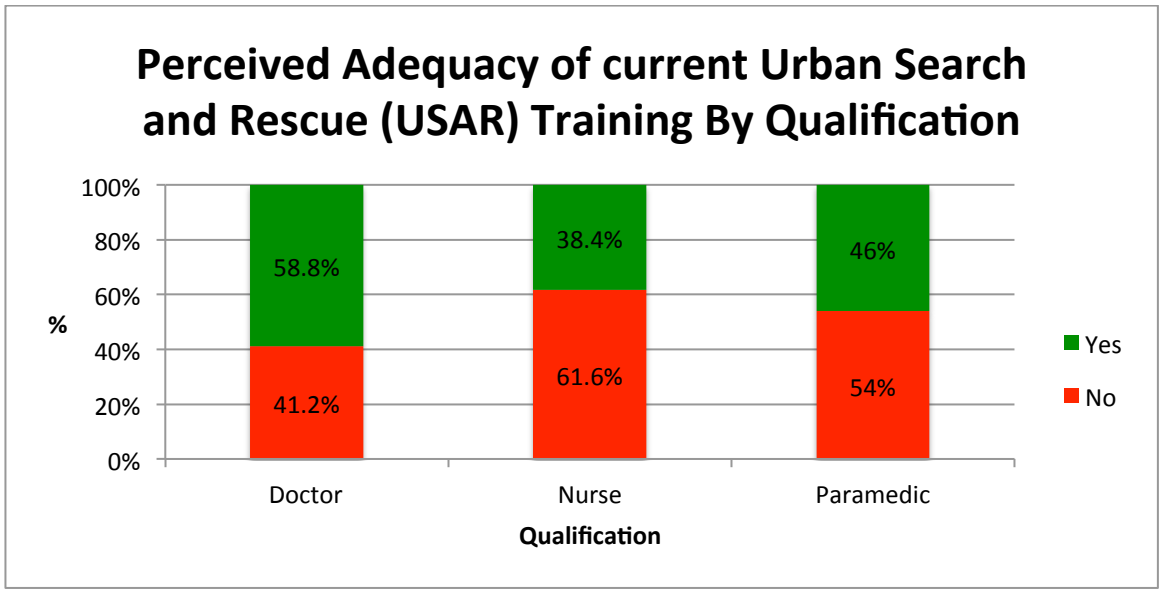


Number of respondents to this question: 125 /125 (100%)

3.4.3.3 Perceived Adequacy of current USAR Training by Qualification

Figure 15 illustrates the distribution of the perceived adequacy of the current USAR training program, according to qualification.

Figure 15 Perceived Adequacy of current USAR Training by Qualification



Number of respondents to this question: 125 /125 (100%)

3.4.3.4 Perceived Response to On-going Training Requirements

Table 2 illustrates the distribution of the respondents perceived training requirements for UHPs in order to maintain competency and ensure they are current.

Table 2 Perceived Response to On-going Training Requirements

Training Activities	Monthly	6 monthly	Yearly	2 yearly	Not required	Total
Practical USAR medical training	8.6%	26.7%	49.5%	15.2%	0.00%	100%
Practical USAR rescue training	7.6%	30.5%	45.7%	16.2%	0.00%	100%
Theoretical training	8.6%	21.9%	48.6%	15.2%	5.7%	100%
Practical USAR Simulations	0.9%	20.9%	43.8%	34.3%	0.00%	100%

Number of respondents to this question: 125 /125 (100%)

3.5 Summary

This chapter described the results obtained from the respondents who partook of the online internet-based study questionnaire. The results of objective 1, namely to identify the demographic data of the UHPs participating in the study questionnaire were described, as were the results of objective 2, which was to determine the opinion of the survey participants regarding their experience, selection process and training as a UHP.

Chapter 4 Discussion

4.1 Introduction

This chapter will provide an analysis and discussion of the results obtained from the survey. It will analyse the demographic data, and the opinions of the survey respondents regarding their experience, views on the need for a selection process and the adequacy of the selection process in their particular situations and the need for, and adequacy of, USAR-specific training required in order to be involved in collapsed structure rescue.

4.2 Limitations

The ability to reach potential respondents via email was the main limitation of the survey. In this regard, there were two factors that influenced the size of the study sample. Firstly, there was the willingness of the researchers primary contacts to forward the request for participation on to their respective networks of UHP's. Secondly, the study sample size was also affected by the willingness of all those that received the invitation to actually participate in the study.

Many people nowadays have multiple email addresses. Therefore, there was no guarantee that the email used would be accessed by the potential respondent in the allocated timeframe.

This research was conducted entirely on-line and it was therefore dependent on technology, which could have failed. It was also possible that respondents who were busy completing the study may have been interrupted (e.g., connectivity issues), which would have resulted in the questionnaire not being completed. Respondents who started the study but did not complete it in the same sitting would not have been able to re-access the study from the same Internet Protocol (IP) address. This is a feature of SurveyMonkey®. If a respondent was blocked by SurveyMonkey®, they would have had to contact the researcher and inform him that they had been blocked. They would also have had provide him with their IP addresses so that the researcher could have accessed the survey and deleted that IP address, which would then have enabled the respondent to re-access the survey. The researcher was however not contacted with any such requests so it was not considered a significant factor.

It was also technically possible for the same respondent to answer the survey multiple times if they did so using a different IP address that SurveyMonkey®. However this was deemed to be highly unlikely.

Lastly, the survey was conducted on-line in English, which required that respondents were able to read and write English. There may have been potential respondents who received the invitation to participate in the survey but did not do so because they lacked the required English proficiency. There were fourteen countries included

in the survey that do not speak English as a first language; some examples include China, Japan, Russia, Switzerland and Oman.

4.3 Discussion

4.3.1 Objective 1: Identify the demographic data of the UHPs participating in the study questionnaire.

4.3.1.1 Country Respondents by Team

The 23 teams that participated represent 25% of all international USAR teams registered on the INSARAG global USAR directory (49). The team that was contacted that did not participate was the China International Search and Rescue team, from the Peoples Republic of China. It is likely that the reason for non-participation was due to a language barrier as the survey was conducted in English. Based on the researchers prior personal experience with the team, the English proficiency within the team in general, as well as the UHP's, is relatively low. The high rate of participation may be attributable to the fact that the researcher had a personal relationship with a UHP in each of the teams contacted and so was able to explain the nature of the research and lobby support, both in terms of participating in the study but also encouraging them to contact their respective networks and invite them to participate in the study.

4.3.1.2 Respondents by Country

The INSARAG Guidelines divides the world into three regions, namely America's Region, Africa Europe Middle East (AEME) Region and Asia Pacific Region.(2) An analysis of the respondents by country shows that each region was represented in the survey results. This is an important consideration as the results include input from participants from well-established, highly experienced teams as well as more newly established teams with less experience, from across the world.

The majority of the researchers personal network are involved with classified USAR teams. Based on the number of classified teams in each region that participated in the survey, respondents represented 100% of the classified teams in the America's region, 40% in the Africa Europe Middle East (AEME) Region and 56% in the Asia Pacific region (49). This was important in so far as the survey results included input from all three of the regional groups and is therefore representative of the global USAR community. Of the 19 countries, 13 (68%) were from the AEME Region, however this is reflective of the current distribution of INSARAG USAR teams. Currently there are a total of 92 USAR teams registered on the USAR Directory, of which 67% are located in the AEME Region. (50)

There was a single response only from 4 countries. As the researcher had a direct point of contact in each team, it is probable that where there was a single respondent

only, this was the researchers point of contact. However, it may be that the researchers point of contact forwarded the request for participation on to their respective UHP networks, at least one of which completed the survey, but the researchers point of contact did not complete the survey themself. It is certain though that 78% of the researchers point of contacts forwarded the request for participation on, which solicited at least one other response.

Australia had the greatest number of participants (17.6%), followed by Switzerland with 16.8%. The UK and USA each accounted for 9.6% of respondents. Collectively, these four countries accounted for 53.6% of survey respondents. These top four countries, in terms of highest number of survey respondents, represent the three INSARAG regions, which ensures that the response results are representative of the global USAR community. The remaining 15 countries accounted for 46.4% of responses with response rates ranging from 0.8% to 8.8%.

4.3.1.3 Respondents by Gender

Of all the countries in the America's and Asia Pacific region, 80% had a male only response, where as in the AEME region, 47% of countries had female respondents. Out of the Middle Eastern countries in the AEME region, there were no female respondents. This is not surprising as it is well-known that the Middle East has a very conservative culture with regard to woman in the work place in general, so it is to be expected that this would be exaggerated in the often austere and physically

demanding environment in which the UHP would be expected to work. Of the European countries in the AEME Region, 60% had female respondents. Of these, the country with the highest female to male ratio was France with 45.5% females versus 55.5% males. The country with the next highest ratio was Switzerland with females making up 23.8% of respondents. This too is to be expected as equality between women and men is one of the founding values of the European Union.(51) Of the countries with a response range of 1-3 responses, 100% of responses were from males.

Within the INSARAG system there are working groups, one of which is the INSARAG Medical Working Group (MWG) another is the Training Working Group (TWG). The MWG comprised of UHP managers from several countries and is representative of the three INSARAG regional groups. The INSARAG MWG is made up of 100% male representation, as is the TWG.(52). Of the female respondents, 30% were doctors, 50% were nurses and 20% were paramedics. In the male survey respondents, 42% were doctors, 15% were nurses and 43% were paramedics. According to the World Health Organisation (WHO), the highest proportion of doctors are males while the nursing profession are predominantly females (53). The WHO does not report of the gender balance of paramedics but according to a national assessment of the emergency medical services workforce in the USA, it is heavily male-dominated with 72% of all paramedics being male (54). The results show that the demographic of UHP's who participated in this survey are in line with other published reports relating to the ratio of male to female workers in the healthcare professions involved in USAR.

From the results obtained, the UHP community that participated in this survey is very much male dominated, which was to be expected. Fire services and other paramilitary, uniformed organisations still tend to be more male dominated, despite significant efforts to raise the profile of woman in the work place and ensure they enjoy equal rights and benefits. The nature of the work is also potentially less desirable to woman, as it may require them to be away from home for extended periods, and work in an austere environment that is physically demanding.

4.3.1.4 Respondents by Age

Only 1% of respondents were in the age range of 20-27 years. Seventeen per cent fell into the age of 28-35 years and 38% were between 36-43 years old. The largest number (44%) of respondents fell into the age range of >44 years. One of the contributing factors to the largest number of respondents falling into the oldest age category may be due to the fact that the discipline of USAR is a relatively young one (8,9,10). Many of the older UHP's would have been in their early twenties when USAR first started to re-emerge as a specialised discipline. Therefore this group of UHP's may well represent an era of UHP pioneers who first become involved in USAR when they were twenty years younger and have remained involved since. There are definite benefits from having an older UHP population in so far as they have a greater degree of clinical experience, they are likely to have more emotional maturity and more established life skills and are therefore more able to cope with the

emotional stresses that accompany the USAR environment and they will likely have some degree of management and leadership experience that will enable them to lead the medical component of a USAR team.

However, there is also a disadvantage to an aging UHP population and this relates to the loss of human capital, the knowledge possessed by employees. Human capital is the aggregated or combined competence and experience of the personal that make up the group (55). It provides the knowledge to the group to create new knowledge, identify and solve problems and develop individuals involved with the group. When someone leaves the group, so do their knowledge, functional expertise, experience, skills and contacts. Research has shown that a loss of human capital has numerous negative effects on a group, whether it is a team or an organisation. Examples of these negative impacts include deteriorations in functionality and group cohesiveness, reduced productivity and efficiency, increased human resource costs and decreased morale and motivation (55).

With a large number of UHP's respondents being at the oldest end of the spectrum, there exist a possibility that a large number of UHP's will retiring from USAR in a relatively short space of time, thereby compounding the negative effects associated with the loss of human capital. It must however also be acknowledged that the attrition of personal may also have a positive effect in so far as it creates opportunities for a new generation to step up and make their contribution. In order to mitigate the effects of lost human capital, organisations should look to employing a

succession planning process. Succession planning, is a process that aims to ensure that future staffing requirements can be met with suitably qualified and experienced individuals (56). Effective succession planning supports stability and sustainability of the group. Succession planning is particularly important in terms of UHP's because it is an entirely human-dependent; it is not an industrialised undertaking. However, one of the potential challenges identified in the respondents is that demographics indicate there are fewer people available to fill the roles. Nor does becoming a UHP seem to be appealing to woman, who could potentially be an emerging group of the UHP community workforce. Of the female respondents, there were no females in the age range of 20-27 and only 25% were in the age range of 28-35 years. As we have seen in the literature, the INSARAG Guidelines require that with the medical component of the team there is a medical manager (2). In time, this may prove challenging to USAR teams that have multiple UHP's older than 44, at is likely that it is these same UHP's that hold senior positions in their respective teams, e.g., UHP Manager or USAR team medical directors. In a situation where there may be a large exit in a short space of time, a disproportionately large amount of human capital will be lost. If a team has not employed a succession plan, it would potentially struggle to fill these senior positions as younger UHP's interested in moving up may not have the skills and experience required because they have not been adequately mentored.

4.3.1.5 Respondents By Qualification

The INSARAG Guidelines requires the medical component of a USAR team must be comprised of doctors, and then nurses or paramedics, or combinations thereof. The INSARAG Guidelines do not specify any particular ratio of doctors to nurses to paramedics, the only stipulated requirement is that there must be at least one doctor (2). The survey respondents represented all three healthcare professions with paramedics accounting for the largest number of respondents (43.2%), followed by doctors (35.2%) and then nurses at 21.6%. The work place of paramedics' is in the out-of-hospital environment, often unpredictable, non-formalised, non-structured environment. This is not dissimilar to the USAR environment. It is not surprising therefore that paramedics made up the larger majority of the sample population, as they are generally better acquainted with these types of environments than their doctor or nurse counterparts and would potentially therefore feel more confident about getting involved in USAR. The researchers personal network, who were the primary points of contact for inviting participation in the survey, consisted of representatives from all three healthcare professions, so there was not a bias towards one particular healthcare profession. The results show there was no major difference in distribution of respondents across the three medical professions, which ensured that the survey results were representative of the three healthcare professions involved in UHP activities.

4.3.1.6 Qualification by Country

With the exception of Finland and New Zealand, every other country that participated in the survey included responses from doctors. The lack of a doctor's response from

Finland and New Zealand may be due to the fact that the researchers primary contact in both of those countries was a non-doctor. The researcher is however aware that the teams in both of these countries have doctors in their USAR teams, and therefore do meet the INSARAG Guidelines stipulated requirement, of having at least one doctor (2). The survey results show that the nurse / paramedic composition of the UHP element of a USAR team reflects the ambulance system, i.e. whether it is nurse based or paramedic based, prevalent in that particular country. Australia, New Zealand, South Africa and the USA all have paramedic-based ambulance services (57,58,59,60). The respondents from these four countries were a combination of doctors and paramedics; there were no respondents who were nurses. This reflects the paramedic-based nature of the ambulance services. In Europe, ambulance services are staffed with nurses, who have undergone specific training to work in the out-of-hospital environment.(61) Some European ambulance services are staffed with a combination of nurses and paramedics, however the nurse holds the higher clinical qualification and clinical responsibility.(62) All of the European countries that participated in the survey included respondents who were nurses, again reflecting the nurse-based nature of European ambulance services. The results show that the medical qualification, i.e. nurse versus paramedic, of a countries ambulance service is a reliable predicator of the composition of the medical qualifications that make up that countries UHP element. This makes sense in so far as the UHP leadership and management would ideally want medical professionals in a UHP team that work in a day-to-day environment that prepares them, as far as is reasonably possible, to function safely and effectively in a collapse structure environment. The survey results support this notion, as it was determined that only 3.2% of UHP respondents did not have any out-of-hospital experience and this group of respondents were made up of

doctors and nurses in equal part. It must be noted however that there may well be nurses from countries who have paramedic-based ambulance services who are interested in getting involved in USAR, but are unable to do so because holding a paramedic qualification is a pre-requisite for joining the team.

4.3.2 Objective 2: Determine the opinion of the survey participants regarding what experience, selection process and training of USAR team healthcare practitioners is relevant, in order to be involved in collapsed structure rescue.

4.3.2.1 Experience

4.3.2.1.1 Number of Years Qualified

Three per cent of respondents fall into the experience range of 3-5 years. The highest number of respondents (35%), for number of years qualified, fell into the longest period of experience, i.e. > 20 years. The next highest range was 11-15 years (25%). A total of 67% of respondents had been qualified for more than 11 years. This result concurs with the results observed in Section 4.3.1.4 “Respondents by Age”, where the largest number of respondents fell into the oldest age category. France had the highest number of UHP’s qualified for the longest period with 19%. France was followed by the UK and the USA, which each had 14% with the Swiss having 12%. The history of USAR originated in Europe in WWII and then the re-emergence was led by the USA in the 1980’s (4,8,9). It may therefore be that these

countries have the most established USAR systems and therefore have stricter recruitment criteria with regard to the number of years an individual has to be qualified before they are eligible for selection as a UHP. However, this is contradicted by the fact that the countries with the shortest amount of time qualified, i.e. 3-5 years, were both European countries, namely Belgium with 67% and Germany with 33%. Of the healthcare professions falling into the longest period of experience, i.e. >20 years, paramedics were highest with 44%, followed by doctors with 37%, followed by nurses with 19%. This is somewhat surprising as the paramedic profession is the youngest of the three healthcare professions involved with USAR. This may however be due to the fact that when USAR was re-emerging and personnel were being sought to staff the medical component of a USAR team, individuals working in an out-of-hospital environment were a logical first port of call. Of the healthcare profession falling into the lowest experience category, i.e. 3-5 years, it was doctors (67%) and nurses (33%). We also know from Section 4.3.1.4 “Respondents by Age”, only 1% of respondents were in the age range of 20-27 years. This would typically be the age range of someone who has completed his or her primary professional academic study and who has gained a few years of work experience. A collective 82% of respondents are older than 36 years. This indicates that the majority of respondents are likely to have a high level of the clinical experience in their respective functions as doctors, nurses or paramedics. This result confirms the finding that the UHP community that participated in this survey has a significant amount of clinical experience in their respective medical professions. It also lends credibility to the fact that a large proportion of the UHP community have been involved in USAR, and the medical aspects thereof, since it’s re-emergence in the late eighties and early nineties. This equates to a high proportion of very

experienced clinicians being involved in USAR. It must be noted however that clinical experience in a normal day-to-day environment is not automatically synonymous with clinical experience in the context of providing emergency care in the collapsed structure setting.

4.3.2.1.2 Number of Years Involved in USAR

The results of an analysis of the number of years the survey respondents had been involved with USAR showed a deviation from the trend observed in Section 4.3.1.4 “Respondents by Age” and 4.3.2.1.1 “Number of Years Qualified”. In both the age and number of year’s qualified data, the highest number of participants fell into the highest range choice available. In this section, however, the highest range of “Number of Years Involved in USAR”, i.e. >20 years, accounted for only 11% respondents. The highest number of respondents (30%) fell into the range of 3-5 years, of these; the majority (43%) came from Sweden. It was the UK and USA, each with 29%, that had the respondents with the longest involvement in USAR, whereas Australia had the highest number of respondents (33%) with the shortest amount of involvement in USAR, followed by Belgium and France, each with 22%. It was not surprising that respondents from Belgium fell into the shortest period category, as we know from Section 4.3.2.1.1 “Number of Years Qualified”, Belgium respondents accounted the highest percentage (67%) of respondents who had been qualified the least amount of time. The USA had the largest number of the respondents (13%) in the range of 6-10 years. Doctors accounted for 60% of respondents who had been involved in USAR the longest, with paramedics

accounting for the other 40%. There were no nurses in the category of being involved in USAR the longest. It was, however, nurses who accounted for 100% of respondents who had been involved in USAR for the least amount of time. Interestingly, there was an almost even split between doctors, nurses and paramedics that had been involved for the average range of 6-10 years, with doctors and paramedics each accounting for 35% and nurses accounting for 30%. One of the possible reasons for the deviation in these results is that becoming involved in USAR, as a UHP, is something healthcare professionals consider later on in life and their professional careers. This may be attributable to the fact that earlier on in their careers they are focused on becoming established professionally and may also have greater family commitments due to for example, young children, and may therefore not yet have had the opportunity to get involved. Another factor could be the time commitment required. The INSARAG Guidelines require that an INSARAG USAR team, depending on the team's capability, be capable of being operational in an affected country for 7 – 10 days, this excludes travelling to the affected country. In the context of international deployments this could add at least a day, if not two, on either side of a deployment. Additionally there is the time commitment for training and exercises, as required by the INSARAG Guidelines (2,30). Dependant on the policy of their employer, and whether they are formally assigned to a USAR team as a UHP or get involved in a volunteer capacity, they may have to resort to taking personal leave to fulfil both the training and deployment requirements. The time commitment required could represent a significant portion of their annual leave allocation. This may present an obstacle for some who would ordinarily be interested but are not able to make that level of time commitment for either professional or personal reasons, or a combination thereof.

4.3.2.1.3 Number of USAR Training Exercises

A total of 9% of respondents had not participated in a USAR training exercise. The countries included in this category were Australia, Norway, South Africa, Sweden and Switzerland. Of these it was Switzerland that had the highest number (45%) of respondents who had never participated in a USAR exercise, Australian and South Africa each had 18%. Twenty seven per cent of respondent in this category had been involved in USAR for less than 1 year and a further 45% had been involved in USAR for between 1-2 years. It is therefore it is likely that the reason they had not participated in a USAR exercise was due to lack of opportunity. Interestingly, however, 18% of respondents in this group had been involved in USAR for between 6-10 years and there was one respondent who had been involved in USAR for more than 20 years who had never participated in a USAR exercise. When the data was analysed on the basis of healthcare profession, 81% of respondent who had never participated in a USAR exercise were doctors, with nurses and paramedics each accounting for 9%. On the other end of the spectrum, paramedics (52%) accounted for the respondents who had participated in the greatest number of USAR exercises, followed by doctors (32%) and nurses 16%. The USA accounted for the respondents who had participated in the greatest number of USAR exercises (28%) followed by the UK with 20%. The highest number respondents (31%) fell in the range of 3-5 USAR training exercises. The next highest number of respondents (29%) fell into the range of 4-7 USAR training exercises with 7% and 3% falling into the ranges of 8-11 and 12-15 respectively. There was however a spike in the largest range, i.e. >15

USAR training exercises, with 21% of respondents falling into this category. If the team does not have a policy that requires it's UHP's to undergo certain preparedness activities and leaves the decision on whether to participate or not up to the individual, there may well be a drop off in USAR training exercise participation once the UHP feels like he or she has benefited as much as they are going to from such participation. The INSARAG Guidelines require that teams that have undergone an IEC classification are required to participate in an annual full scale field USAR simulation exercise as part of the efforts to ensure the team is in a state of readiness to deploy and is able to operate safely and effectively (30). However, the INSARAG Guidelines to not stipulate any requirements with regard to individual team members, other than to state that it is up the team to ensure it's personnel meet the teams own eligibility requirements (2). Teams also apply a redundancy ratio to team positions, catering for personnel taking leave or being unavailable for other reasons, to ensure they are always able to field the required number of team members. So, while a team may participate in an annual exercise, an individual UHP may not. Also, not all teams registered on the INSARAG USAR directory are classified teams (49). Therefore, while the INSARAG Guidelines recommends that all USAR team participate in an annual USAR training exercise, this does not always occur, thereby limiting a UHP's access to such a training opportunity. A USAR team may not have a policy or annual budget allocation that enables them to run an annual USAR training exercise. Another factor may be the fact that very few UHPs are employed in a USAR team in a fulltime capacity, it is far more common that they are employed elsewhere and are called upon as required. Many of the potential respondents worked in governmental organisations e.g., Emergency Medical Services (EMS), hospitals, fire and rescue services. Places of fulltime employment

may not have the staffing capacity, or be willing, to release their staff to participate in USAR training exercises, which would again restrict UHP's access to such training opportunities. This may account for the fact that so many doctors have not participated in USAR exercises. However, in all healthcare systems around the world, a doctor always holds clinician superiority over nurses and paramedics, regardless of the number of years qualified, and therefore there is arguably a greater need for a doctor to be well versed with the USAR environment and the requirements it demands of UHP's. While the UHP themselves may be keen to participate in USAR training exercises, through circumstances beyond there control, they may not have the opportunity to do so.

4.3.2.1.4 Number of International USAR Responses

The results show that 47% of UHP's that participated in the survey have never deployed on an actual international USAR response. Twelve of the nineteen countries that participated in the survey had respondents who had never deployed to an international USAR incident. Of these, Switzerland (22%) had the highest number followed by Australia with 19%. Based on the healthcare profession, it was the paramedics (46%) with the highest number of respondents, followed by doctors (33%) and then nurses (21%). This is surprising as nurses make up the smallest population of UHP respondents, yet as a group, they have the smallest number of members with no international USAR deployment experience. Conversely, paramedics, who have the highest respondent population, are the group with the highest number of no international USAR responses. This may be attributable to the

fact that only Belgium, Netherlands and Sweden are comprised of doctors and nurses only. Of the remaining countries, 9 are doctor / paramedic teams and the remaining 7 are a combination of doctors, nurses and paramedics. Therefore, 84% of teams that participated in the survey include paramedics in their composition. As mentioned in Section 4.3.2.1.3 “Number of USAR Training Exercises”, many teams apply some degree of redundancy to its manning levels. Therefore, it is likely there are more paramedics than nurses available to respond when international USAR deployments do occur. A further 42% selected the range 1-3 responses. Only 2% of respondents had deployed to between 8-11 events and of these, there was an even split between the countries, namely France, Switzerland and the USA. The healthcare professionals with this level of experience were made up of paramedics (67%) and doctors (33%). All of these respondents were older than 44 and all of them had been involved in USAR for greater than twenty years. The survey results show that the sample of UHP’s who participated in this survey is largely inexperienced when it comes to actual international USAR response events. However, deploying on actual USAR responses is something that the UHP has very little control over. Structural collapse incidents, and large-scale incidents, e.g., earthquakes, that require an international USAR response, are unpredictable and relatively infrequent events. Over the period 1993-2013, there were 45 earthquakes, which required an international USAR response (63). Although that equates to an average of 2.25 incidents per year, there is no consistency of occurrence and so there may be a period of several years between incidents. Another factor is that not all USAR teams deploy to all international USAR events. Whether a team deploys or not is influenced by the affected country requesting assistance and the USAR teams sponsoring organisations willingness to deploy the team. The geographical location

of the event in relation to the location of the team may also be an influencing factor. A further factor is one of selection of UHP's. Circumstances may be such that due to availability, one individual UHP may be selected for consecutive incidents and another UHP from the same team is not available. Additionally, certain UHP's may be considered too junior and are therefore not eligible for selection. Due to the infrequency of events, there may also be a selection bias towards UHP's with previous international USAR response experience. While this is good in terms of the UHP experience level of the deployed team, it limits the possibility for inexperienced UHP's to gain experience in the real environment. These factors all come into to play and have an influence on a UHP's opportunities to deploy on an international USAR response and they are all likely contributors as to why the experience base in the survey respondents is as low as it is.

4.3.2.2 Selection Process

4.3.2.2.1 Need for UHP Selection Process

There was an overwhelming positive response (94.3%) by the survey respondents as to whether, in their opinion, there was a need for prospective UHP's to undergo a selection process. What was interesting to observe was that the population of respondents who said 'no' (5.7%), included an even split of doctors, nurses and paramedics. Switzerland accounted for 50% of "no" respondents, followed by France with 33% and Australia with 17%. When the experience of the "no" respondents was analysed, it was found that 67% had less than two years experience in USAR, and

the remaining 33% had between 3-5 years of USAR experience. Of this group, 83% had participated in three or less USAR exercises and none of the “no” respondents had deployed to an international USAR incident. The overall USAR experience base of this group was low. The overwhelmingly positive response could be based on the fact that once UHP’s have gained more experience from participating in exercises and actual international USAR deployments, and therefore have deeper insight and a better understanding of what is required of a UHP, they recognised the importance of having a selection process. We know from the literature that UHP’s may sometime encounter clinically complex cases in a very austere, physically and emotionally demanding environment (37). Developing a UHP component within a USAR team is potentially not just simply a question of selecting a doctor and a few nurses and or paramedics to make up numbers. The team management and the UHP’s themselves need to be aware that they may be confronted with situations they have never been exposed to before, yet will be expected to perform safely and effectively, as clinicians, but also as part of a larger team (2). In the USA, FEMA has a set of pre-requisites that any prospective UHP must comply with in order to be eligible for selection as a UHP (8). However, from the literature review, this practise does not appear to be commonplace. It is possible therefore that those individuals interested in getting involved as a UHP are able to do so without undergoing a selection process. This may be a factor that accounts for the 5.7% of respondents who said they did not see the need for prospective UHP’s to undergo a selection process. It was not possible, however, to ascertain from the data which of the survey respondents had themselves undergone a selection process.

4.3.2.2.2 Overall Response to Adequacy of UHP Selection Process

The survey results showed that of the respondents who were required to undergo a selection process, 69.9% felt that it was adequate, whereas 30.1% felt that it was not adequate. Respondents from thirteen countries (68%) answered “no”. Respondents from Australia, South Africa, Switzerland and the UK were the leading countries that answered “no”, each with 13%. Greece and Oman both had 100% “no” responses followed by South Africa with 80% “no” responses. The USA had the lowest percentage of “no” respondents with 17%. Interestingly, as we have seen from the literature, it is also the country that has an established and clearly defined selection pathway for UHP’s (8). Two individuals made up the 17% of “no” respondents from the USA. Both of them had participated in more than 15 USAR exercises but only one of them had responded to an international USAR incident. It was interesting to observe, that both these individuals had a long association with, and a high level of experience as UHP’s, and came from what is currently potentially the most established UHP selection process, yet they were of the opinion that their team’s selection process was not adequate. It again raises the issue of experience in relation to evaluating adequacy. When the results were analysed on the basis of adequacy of the UHP selection process by qualification, it was the paramedic group that had the highest number of “yes” responses with 80%. The “yes” responses for the doctor and nurse groups were 56% and 42% respectively. In lieu of the fact that the paramedic group work in the out-of-hospital environment, it was not surprising that this group has the highest number of “yes” responses. Similarly, due to the fact that nurses normally work in a hospital environment, it was expected that this group would have the highest number of “no” responses. The most balanced split was the doctor group. Ambulance services also employ doctors, so by the nature of their day-

to-day work, they work in the out-of-hospital environment. While it is plausible that the more out-of-hospital experience an individual UHP has, the more likely they are to deem a UHP selection process adequate, an analysis of the data revealed that there was no significant difference between the groups when reviewed in terms of out-of-hospital experience. Of the “no” group, 3.2% of respondents had no out-of-hospital experience, whereas in the ‘yes’ group, 2.7% of respondents had no out-of-hospital experience. There does not appear to be any correlation between having out-of-hospital experience and making a determination on the adequacy of the selection process. The “no” respondents included responses from the entire list of ranges offered for the number of years involved in USAR, the highest (29%) from the 3-5 year range, followed by 6-10 and 11-15, both with 19%. Forty-eight per cent had responded to at least one international USAR incident. Of the 69.9% who deemed the selection process to be adequate, 41% had not responded to an international USAR incident. Similar to Section 4.3.2.2.1 “Need for UHP Selection Process”, the percentage of respondents with no international USAR response experience in the “yes” group versus the percentage of respondents with international USAR response experience in the “no” group raises the question of the degree of understanding of what a real USAR response requires of a UHP. It may well be a case of respondents not being aware of the realities of the demands and challenges a UHP faces during an actual response and their positive answer was based on their current awareness and limited experience levels, which is understandable and expected. Dependent upon how the UHP views themselves in relation to their perceived ideas about USAR in general and UHP’s specifically, it may also be a situation of, “If I get in, the selection process must be ok.” We know from the literature that the USAR environment is an austere one. In order to operate safely in a confined space, the

UHP may be required to wear personal protective equipment (PPE), e.g., helmet, respiratory protection, eye protection, hearing protection, with which they may be unfamiliar and impedes their senses, and they may be required to be secured to a rope rescue system (8,30). Prospective UHP's may suffer from claustrophobia or acrophobia, that they may or may not be aware of, yet they may be required to function under circumstances which activate stress response to these phobia's. A selection process potentially provides an opportunity for the team selectors to assess a UHP under simulated USAR conditions and to evaluate their potential suitability. Similarly, it will allow the prospective UHP to conduct a self-evaluation to determine their suitability to the requirements of a UHP. This is not dissimilar to the selection processes that take place in fire services and certain military units (64,65).

4.3.2.3 Training

4.3.2.3.1 Need for USAR Specific Training Program Post Selection

Only 1% of respondents felt that there was no need for a USAR specific training program following an individual being selected as a UHP. The single respondent in this category was a French nurse, who had been involved with USAR for 6-10 years, had participated in 4-7 USAR exercises but had never deployed on an international USAR response. Six per cent of respondents said it should be optional. This group was made up of six single respondents from Australia, Belgium, France, Norway, Russia and Sweden respectively. Two were doctors, one was a nurse and three were paramedics. There was a range of experience in this group, some respondents

having being involved in USAR for 1-2 years and another respondent having been involved in USAR for 11-15 years. Most of these respondents (67%) had participated in a minimum of four USAR exercises, but 67% had also never responded to an international USAR incident. The remaining 93% said that there was a need for such training. Some teams, for example teams in the USA, have a structured USAR medical training program and there is a requirement to undergo an initial training course in order to become an active UHP team member.(8) However not all teams require it's UHP's to undergo a USAR specific training course post selection as a UHP. While a USAR specific training program for UHP's is not common practise across all teams, the results show that the vast majority of survey respondents feel that it is indeed necessary. This may be due to the fact that actual response experience to international USAR incidents is low, 47% of respondents have no international USAR response experience and a further 42% of respondents have responded to only between 1-3 incidents. These respondents may not feel confident that they have the necessary knowledge and skills required to function safely and effectively as a UHP. With the majority (82%) of the UHP's who participated in this survey being over the age of 36, they would possibly be less inclined to thinking they "know it all". Healthcare professionals also come from a background of structure learning with supervised medical practise and mentoring prior to becoming qualified. Depending on their qualification, once qualified, they may still be required to practise under supervision, albeit indirect, e.g., paramedics in certain countries. Prospective UHP's may therefore expect a similar pathway to becoming a qualified UHP and would want to undergo structured, supervised training in a controlled environment, prior to having to respond to a real incident. The nature of a UHP's day-to-day work and how that aligns with the UHP's perceived responsibilities would potentially

influence how prepared a UHP felt in order to perform their function. This is based on the proviso that they have a good understanding of what will be required of them, which in turn is influenced by their level of exposure and experience. If for example the UHP team has in its group an orthopaedic surgeon, then the task of performing an out-of-hospital amputation would be less challenging than if that responsibility fell to a general practitioner with a lot of USAR experience but with far less experience in performing amputations. However, if that out-of-hospital amputation had to be performed in a confined space in a collapsed structure, while the orthopaedic surgeon may be very experienced with the clinical procedure, without prior exposure to and training in the USAR environment, they may well be completely overwhelmed by the environment in which the procedure needs to be performed. In that scenario, the general practitioner, who is well versed and comfortable operating in the USAR environment, may be better suited to performing the procedure. However, it is not only the emergency care roles and responsibilities to be considered, there are other roles and responsibilities INSARAG requires of UHP's. These requirements are not what all UHP's would be accustomed to performing. Some examples include pre-deployment medical screening of USAR team members prior to deployment, preparing a medical briefing on the affected country, familiarisation with UN coordination mechanisms and INSARAG documentation, providing emergency veterinary care to the teams search dogs, hygiene practises in a BOO, providing emergency care in a confined space and donation of medical supplies in the affected country (29). Many of these requirements would require training, or at a minimum, familiarisation, prior to a UHP being able carrying out these responsibilities. We also know from the literature that there may also be an expectation on UHP's to be proficient in certain aspects of rescue, e.g., rope rescue and confined space rescue

(39). Although a UHP would not be expected to build a rope rescue system, they could certainly be required to tie into the system to be lowered into a confined space where the victim is located and their medical expertise is required. This would not be possible without prior specific rescue training.

4.3.2.3.2 Overall Response to the Adequacy of USAR Training

Of those respondents that have undergone USAR training, there was a very even split in opinion, 50.9% felt that the training was adequate whereas 49.1% felt that it was not adequate. The data did not reveal whether the USAR training the UHP's had received was USAR medical training, USAR rescue training or a combination thereof. Of the 19 countries that participated in the survey, 79% felt that their current USAR training was not adequate. This is an increase from the 68% of countries who said their UHP selection process was not adequate. Of these "no" responses, respondents from 6 countries had 100% "no' responses, these included Finland, Greece, New Zealand, South Africa, Sweden and the UAE. It was the UK that had the lowest number of "no" respondents, with 22%. It was the nursing group that had the highest number of respondents who felt that their current USAR training was not adequate. This is likely because nurses would generally work in a hospital environment, which is well lit, clean and there is good access to patients and resources. The hospital environment stands in contrast to the austere nature of the USAR environment where there is diminished ambient light, it is dusty and strewn with debris and there is often very limited access to victims and resources (39). The result of the paramedic group however was somewhat surprising in so far as the

majority of paramedics (54%) were of the opinion that the USAR training they have received was not adequate. As the paramedic work environment has similar characteristics to the USAR environment, it would be reasonable to assume that this group would be the one that felt most suited to the requirements of a UHP. However, it may well be that because this group potentially has the best insight into the USAR environment, and therefore they may well be best suited to judge the adequacy of USAR training. The majority of the doctor group (58.8%) felt that the USAR training they had received was adequate. The results have shown us that the majority of UHP's have more than 10 years clinical experience. Therefore, the perception in the doctor group may be based on a confidence in their clinical abilities more so than in their ability to perform those clinical skills in the challenging context of a collapsed structure. In order to accurately determine whether the USAR training was adequate or not, respondents would have to have been able to compare the training received, and the preparation that provided, against the actual environment of a real international USAR response. The results have shown that the international USAR response experience base is low, 47% of respondents have no international USAR response experience and a further 42% have only responded to between 1-3 incidents. In addition to the number of responses, another factor that may influence perceptions, is that every international USAR response is different and not every response will require a UHP to perform all functions. In certain instances a USAR team may not encounter any live victims in collapsed structures and therefore the UHP would not be required to enter into a confined space. In other instances a UHP may be required to enter into a confined space to render emergency care. However, the literature has shown that the number of live victims encountered by USAR teams in collapsed structures is a very low percentage of the affected population. In the

2010 Haiti earthquake, out of the estimated 300 000 victims injured, there were only 133 live victims rescued by the international USAR community. Of all the USAR teams that responded, some teams performed multiple rescues whereas other teams performed no rescues (21). There is no data available which states what percentage the 133 entrapped victims were of the total entrapped population. It is possible therefore that there are UHP's who participated in the survey that have responded to real international USAR incidents but have not been required to enter into a confined space to render emergency care. It would therefore be difficult for them to accurately determine the adequacy of the USAR training they have received because they do not necessarily fully comprehend what would be required of them. It is possible that some respondents who answered 'yes', after responding to an actual incident that requires them to enter into a confined space to render emergency care, may in fact come to realise that the training they have received doesn't adequately prepare them for a real event. The converse is also applicable.

4.3.2.3.3 Response to On-Going Training Requirements

There was unanimous agreement from the survey respondents that there was a need to have on-going training in practical USAR medical training, practical USAR rescue training and practical USAR simulations at some point within a two-year cycle. The only training activity that solicited a response of 'Not Required' was theoretical training, and this was a small percentage, 5.7%, of all respondents. The respondents in this group were a doctor from Switzerland, a nurse from Sweden and a paramedic from the USA, two of which had international USAR response

experience. There was no correlation between this group and 1% of respondents said there wasn't a need for USAR training post selection and 6% of respondents said it should be optional, as they all said it should be a requirement. Of the timing options offered, namely Monthly; 6 Monthly; Yearly; 2 Yearly and Not Required, the majority of responses pertaining to all the training activities offered, fell in the Yearly timing allocation. This result, which includes a training activity of a practical USAR simulation exercise, coincides with the INSARAG requirement of classified USAR teams of participating in an annual USAR training exercise.(30) The results show that the UHP's who participated in the survey recognise the importance of practical USAR training, both medically as well as in terms of rescue techniques. This overwhelmingly positive response to the need for on-going training may stem from a culture of continuing professional development that is present in many medical professions around the world.(66) Medical professions, be they medicine, nursing or EMS, understand the need to ensure that their staff regularly participate in activities designed to maitain their knowledge and clinical skills at required levels. These continuing professional development programs are design with the patient's best interests at heart. As UHP's are selected from the medical profession, or have some professional medical training, which stipulates certain continuing professional development requirements in order to be able to practise clinically, it is not surprising that this culture has been pulled through the medical aspects of USAR.

4.4 Summary

This chapter discussed the results obtained from survey respondents regarding the

demographics and experience of the UHPs and their opinions regarding selection and training for UHPs.

Chapter 5 Conclusions

This chapter will conclude this research report. The conclusions are based on the results provided by survey respondents and ensuing discussions presented in the previous chapters. The conclusions take into account the biases that may have influenced results. Finally the chapter will offer a number of recommendations for future research.

5.1 Sources of Bias

Due to the methodology employed with regard to respondent selection, all of the survey participants were approached to participate in the study. The researcher invited participation from his personal network of UHP's, with a request to that network to invite participation from their respective personal network of UHP's. This may have resulted in a selection bias of like-minded UHP's, which could have influenced the results of the survey.

Another bias of this survey is the opinion held by the researcher that the employment of a selection process and subsequent USAR–specific training should be mandatory prior to becoming a qualified UHP. Although this bias had no influence on the methodology or results of this research study, it may have had influence on certain

aspects of the discussion presented in chapter 4.

It is also important to note that these results reflect only the opinions of those who participated in the study.

5.2 Conclusions

Many countries have developed USAR teams to deploy to structural collapse incidents. While structural collapse rescue first came about during WWII, it is only in more recent times that it has become a formalised rescue discipline. As countries deployed their teams internationally to assist disaster-affected countries in the aftermath of earthquakes, valuable lessons were identified with regard to coordination, standards and methodologies that would enable teams to cooperate more efficiently and effectively. This lead to the formation of INSARAG, a network that has produced various documents that serve to guide teams engaged in structural collapse rescue. While these documents articulate the “what” needs to be done, they consistently fall short of informing the “how to” achieve the required outcomes.

There currently does not exist an internationally accepted and adopted collapse structure rescue standard. While the INSARAG Guidelines make an attempt to address this shortfall, adherence to the INSARAG Guidelines is voluntary, as is participation in the IEC process. The IEC process has created an opportunity for information sharing and an opportunity to observe how different teams conduct their work practically, however, this opportunity is only available to teams that have

volunteered to participate in the IEC process. While international responses also provide an opportunity for information sharing, these too occur inconsistently and infrequently, and when they do occur, not all teams have the opportunity to respond to these incidents.

Although there are now many countries with dedicated teams, that actively participates in collapse structure rescue, there is limited scientific evidence to support current practices. Prior to this research, we have known very little about the UHP community, who they are, where they come from, what qualifications they have, how much experience they have acquired, what selection processes they went through, if any, and what USAR-specific training they have undergone.

This research report set out to identify the demographics of the UHP community who participated in this survey and to gain insight in their level of professional and USAR experience as well as to determine their opinions regarding selection as a UHP and USAR training for UHPs. Taking into account the limitations and biases of the survey, there is now greater insight into the UHP's that participated in this study, their qualifications, experience and perceptions about selection processes and USAR medical training requirements. These findings have informed several recommendations, based on original research. In addition, they have also informed areas of future potential research.

5.3 Recommendations

Based on the findings of this research report, the following are recommended:

- The UN Field Coordination Support Section serves as the permanent secretariat of INSARAG. The UN is also a leading and active advocate of gender equality and therefore, USAR organisations should look at ways of increasing the number of females involved in the team as UHP's.
- UHP managers are encouraged to try and raise awareness of the existence of UHP's and their roles and responsibilities in an effort to try and attract younger members of the medical community to become involved. Successful achievement of this recommendation would result in an effective succession plan for a USAR teams UHP's.
- All USAR teams should employ a policy of having a selection process of prospective UHP's prior to them becoming active members of the UHP cadre of a USAR team.
- All USAR teams should employ a policy of putting all newly selected UHP's through a USAR specific training program prior to them becoming active members of the UHP cadre of a USAR team.
- All USAR teams should employ a policy of having an on-going USAR training program, which includes the practical aspects of USAR medical care, rescue techniques and USAR simulation exercises on an annual basis.
- Further research is required concerning what should be included in a UHP selection process and what should be included in both the initial and the on-going USAR specific training programs for UHP's.

5.4 Summary

This final chapter has described various biases and presented the conclusions derived from the results and discussion of this research study. Several recommendations have been offered that may assist in improving the gender balance and age composition of the UHP community as well as better defining the UHP selection and USAR training requirements.

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Appendix 1 Ethics Clearance Certificate: M120317

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Mr Trevor Glass

CLEARANCE CERTIFICATE	**M120317**
PROJECT	A Survey of Urban Search and Rescue (UASAR) Healthcare Practitioners Requirements in Order to Operate Effectively in the Collapsed Structure Environment
INVESTIGATORS	Mr Trevor Glass
DEPARTMENT	Division of Emergency Medicine Medical School
DATE CONSIDERED	30/03/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 30/03/2012

CHAIRPERSON .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Prof Efraim Kramer

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix 2 Electronic mail sent to USAR Healthcare Practitioners

Dear USAR Healthcare Practitioner

My name is Trevor Glass and besides my active involvement in USAR, I am also sitting for a Master of Science in Medicine in Emergency Medicine (MScMed) degree at the Faculty of Health Sciences at the University of the Witwatersrand in Johannesburg, South Africa. As part fulfilment of the MScMed I am undertaking a research project that will survey the opinion of USAR healthcare practitioners regarding the requirements that a USAR team healthcare practitioner should have in order to operate effectively in the collapsed structure environment. You have been selected as a potential participant because of your expertise and experience in USAR and I would be most appreciative if you would participate in this survey.

It is widely acknowledged that a USAR team should have a medical component. However, there is currently no international consensus or standardisation on what is required of a USAR healthcare practitioner to operate effectively in the collapsed structure environment. Currently, no study of this nature has been undertaken.

Please will you participate in this study by linking to SurveyMonkey®, an anonymous online survey provider? Your participation is completely voluntary. The survey questionnaire is accessible by clicking on the link below and will take approximately 15 – 25 minutes of your valuable time. Linking to the survey will be regarded as providing informed consent for participation in the survey. Ethics approval, Clearance

Certificate M120317, has been obtained from the University of the Witwatersrand, Human Ethics Research Committee (Medical).

Link to survey questionnaire: https://www.surveymonkey.com/s/NRJ5TGB

SurveyMonkey® does not allow you to re-enter the survey from the same email address more than once, therefore please complete the entire survey once you log in. If you are unable to complete the survey for whatever reason, pleased notify me so that I can clear the non-completed survey which will enable you to access the survey again.

In an effort to enlist as many potential respondents as possible, and if you agree, I would like to kindly request you to forward me the email addresses of individuals you are aware of who fulfil the inclusion criteria. The inclusion criteria are any registered healthcare professional that has been or is actively involved in responding to and treating patients in USAR related collapsed structure environments either domestically and or internationally. Please note that you are under no obligation to forward me the contact details of any other potential respondents and if you wish you may send this email directly to such potential respondents.

If you have any queries, please do not hesitate to contact me for clarification. I can be contacted via email at: trevor@csinternational.com.au.

Thank you very much for considering participating in this survey. Your valuable time and effort is greatly appreciated and will positively contribute to safe practices, good patient management and ethical observances in USAR operations.

Trevor Glass

Wits student No: 9202510v

Appendix 3 Survey Questionnaire

1. Anonymous Personal Information

1. What is your gender?

◯ Male ◯ Female

2. What is your age (years)?

◯ <20 ◯ 20-27 ◯ 28-35 ◯ 36-43 ◯ >44

3. What is the nationality of the USAR team you are attached to?

◯ Australia
◯ Austria
◯ Belgium
◯ Canada
◯ China
◯ France
◯ Germany
◯ Greece
◯ Korea
◯ Japan
◯ Finland
◯ Iceland
◯ Israel
◯ Netherlands
◯ New Zealand
◯ Norway
◯ Poland
◯ Russia
◯ Singapore
◯ Spain
◯ South Africa
◯ Sweden
◯ Switzerland
◯ United Arab Emirates (UAE)
◯ United Kingdom (UK)
◯ United States of America (USA)

◯ Other (please specify)

4. What is your professional medical-related qualification?

☐ Physician / Medical Doctor
☐ Professional Nurse
☐ Paramedic - Advanced / Intensive Care
☐ Paramedic - Intermediate
☐ Paramedic - Basic
☐ Other

5. What are the details of your highest medical academic qualification? (Please complete all fields)

Type Qualification e.g., Bachelors Degree of Science

Duration of Study e.g., 3 years

Year Completed e.g., 1995

Title of Qualification e.g., Nursing Science

6. How long have you been medically qualified (in years)?

- ◯ <2
- ◯ 3-5
- ◯ 6-10
- ◯ 11-15
- ◯ 16-20
- ◯ >20

7. Have you undergone any specialist training in any of the following? Select all that are relevant.

- ☐ Emergency Medicine
- ☐ Anaesthesiology
- ☐ Intensive / Critical Care Medicine
- ☐ Trauma Surgery
- ☐ Orthopaedic Surgey
- ☐ Paediatrics
- ☐ Neonatology
- ☐ Aviation Medicine
- ☐ Military Medicine
- ☐ Disaster Medicine
- ☐ Medical Rescue
- ☐ CBRN
- ☐ Other

8. Do you currently, or have you in the past, responded to incidents in the prehospital environment e.g.; motor vehicle accidents; industrial accidents, multiple patient incidents, etc?

- ◯ Yes
- ◯ No

9. If your answer to the previous question is YES, over what time period (years) did you consistently respond in the prehospital environment?

- ◯ < 1
- ◯ 1-5
- ◯ 6-10
- ◯ 11-15
- ◯ 16-20
- ◯ >20

10. Do you consider your understanding of the prehospital environment to be

- ◯ Excellent
- ◯ Good
- ◯ Adequate
- ◯ Poor

11. Do you consider your experience in the prehospital environment to be

- ◯ Excellent
- ◯ Good
- ◯ Adequate
- ◯ Poor

12. What is the total number of years you have been involved with Urban Search and Rescue (USAR) ? (Include both formal as well as informal involvement)

- ◯ <1
- ◯ 1-2
- ◯ 3-5
- ◯ 6-10
- ◯ 11-15
- ◯ 16-20
- ◯ >20

13. How many practical USAR training exercises have you participated in?

- ◯ 0
- ◯ 1-3
- ◯ 4-7
- ◯ 8-11
- ◯ 12-15
- ◯ >15

14. How many USAR incidents have you responded to in your own country?

- ◯ 0
- ◯ 1-3
- ◯ 4-7
- ◯ 8-11
- ◯ 12-15
- ◯ >15

15. How many international USAR incidents have you responded to?

- ◯ 0
- ◯ 1-3
- ◯ 4-7
- ◯ 8-11
- ◯ 12-15
- ◯ >15

2. Structure of USAR team and responsibilities of USAR healthcare practitioner...

1. What is the total number of personnel in your USAR team when it deploys?

- ◯ <30
- ◯ 31-50
- ◯ 51-75
- ◯ 76-100
- ◯ >100

2. Would your team be classified as;

- ◯ Light
- ◯ Medium
- ◯ Heavy

3. Has your team undergone an INSARAG External Classification (IEC)?

- ◯ Yes
- ◯ No

4. Has your team undergone an INSARAG External Reclassification (IER)?

- ◯ Yes
- ◯ No

5. If you answered YES to the previous two questions, what is your teams current level of classification?

- ◯ Medium
- ◯ Heavy

6. What is the number of USAR healthcare practitioners in your USAR team when it deploys?

- ◯ 1
- ◯ 2-3
- ◯ 4-5
- ◯ 6-7
- ◯ 8-10
- ◯ >10

7. Does your USAR team deploy with its own contingent of search dogs?

- ◯ Yes
- ◯ No
- ◯ Sometimes

8. If you answered Yes to the question above, does your USAR team deploy with a Veterinarian?

- ◯ Yes
- ◯ No
- ◯ Sometimes

9. If you did not answer Yes to the previous question, are the USAR healthcare practitioners responsible for providing emergency medical care to the USAR search dogs?

- ◯ Yes
- ◯ No
- ◯ Sometimes

10. What is the scope of medical practice and responsibility of your USAR team healthcare practitioners? Select all that are relevant.

- ☐ Primary Healthcare of USAR team
- ☐ Hygiene and Welfare of the USAR team
- ☐ Occupational Health and Safety of the USAR team
- ☐ Emergency Medical Care of USAR team
- ☐ Emergency Medical Care of victims located in collapsed structures
- ☐ Emergency Medical Care of the locally affected population
- ☐ Care of the Deceased
- ☐ Medical Care of other USAR team members
- ☐ Medical Care of members of the international media
- ☐ Other (please specify)

3. USAR Healthcare Practitioner Personal Characteristics

1. Do you think that a USAR healthcare practitioner should possess personal characteristics to enable him/her to work effectively in the following environments? Select all that are relevant.

- ☐ In limited visibility
- ☐ In extremes of temperature
- ☐ When daily routines are disrupted
- ☐ When sleep patterns are disrupted
- ☐ When diet is disrupted
- ☐ Areas of flooding
- ☐ Areas of drought or famine
- ☐ When personal hygiene is disrupted
- ☐ When there is a threat to personal safety
- ☐ In culturally diverse environments
- ☐ In religiously diverse environments
- ☐ In language diverse environments
- ☐ Away from home for extended periods

2. Do you think it is acceptable for USAR healthcare practitioners to have a phobia of the following?

	Yes	No	Sometimes
Heights	○	○	○
Darkness	○	○	○
Confined spaces	○	○	○
Dogs	○	○	○

3. Do you think that USAR healthcare practitioners should fulfil the following criteria?

	Always	Never	Sometimes
Be physically fit	○	○	○
Be physically healthy	○	○	○
Be a good communicator	○	○	○
Work effectively under pressure	○	○	○
Be a team player	○	○	○
Be a tolerant person	○	○	○
Be a flexible person	○	○	○
Be adaptable	○	○	○

4. How would you grade the relevance of the following on the USAR healthcare practitioners during selection for the team?

	Relevant and Beneficial	Relevant and Detrimental	Not relevant
Being married?	☐	☐	☐
Undergoing divorce?	☐	☐	☐
Parenthood?	☐	☐	☐
Being devoutly religious?	☐	☐	☐
Being an Agnostic?	☐	☐	☐
Being a homosexual?	☐	☐	☐
Being on chronic medication?	☐	☐	☐

5. How would you grade the relevance of the following on the USAR healthcare practitioners during a deployment?

	Relevant and Beneficial	Relevant and Detrimental	Not relevant
Being married?	○	○	○
Undergoing divorce?	○	○	○
Parenthood?	○	○	○
Being devoutly religious?	○	○	○
Being an Agnostic?	○	○	○
Being a homosexual?	○	○	○
Being on chronic medication?	○	○	○

6. Do you think it is acceptable for a USAR healthcare practitioner to have had a criminal conviction?

- ○ Yes
- ○ Circumstance dependent
- ○ No
- ○ Not relevant

7. Must a USAR healthcare practitioner be able to communicate effectively in English? Select all that are relevant.

	Excellent	Good	Poor
Speak	○	○	○
Read	○	○	○
Write	○	○	○

4. USAR Healthcare Practitioner Medical History

1. Do you think it is acceptable for USAR healthcare practitioners to deploy with the USAR team if they:

	Always	Never	Sometimes
Are alcohol dependent?	○	○	○
Are a recreational drug user?	○	○	○
Are drug dependent?	○	○	○
Are pregnant?	○	○	○
Are obese?	○	○	○
Have a family history of sudden death at a relatively young age?	○	○	○
Have a history of cardiac disease e.g. myocardial infarction?	○	○	○
Wear glasses?	○	○	○
Wear contact lenses?	○	○	○
Use chronic medications?	○	○	○
Are suffering from a chronic disease?	○	○	○
Are suffering from an acute infectious disease?	○	○	○
Are suffering from a chronic infectious disease?	○	○	○
Have a history of psychological illness?	○	○	○
Have a history of psychotic episodes?	○	○	○
Are HIV positive?	○	○	○
Have a history of depression?	○	○	○
Have a history of chronic back problems?	○	○	○
Are suffering from acute back problems?	○	○	○
Suffer from Marfan Syndrome?	○	○	○

5. USAR Healthcare Practitioner Medical Experience Requirements

1. Do you think USAR healthcare practitioners should have experience in the following?

	Yes	No	Optional
Emergency Department (ED)	○	○	○
Prehospital environment	○	○	○
Aviation emergency medicine	○	○	○
Military emergency medicine	○	○	○
Wilderness emergency medicine	○	○	○
Paediatric emergency medicine	○	○	○
Gynaecological emergency medicine	○	○	○
Emergency obstetrics	○	○	○

2. Do you think all USAR team physicians should be capable of performing the following?

	Yes	No	Optional
Limb amputation	○	○	○
Emergency burr holes	○	○	○
Post mortem examination	○	○	○
Dismemberment	○	○	○
Emergency thoracotomy	○	○	○
Emergency antenatal caesarean section	○	○	○
Emergency perimortem caesarian section	○	○	○
Suprapubic catheter placement	○	○	○
Surgical venous cut-down	○	○	○
Emergency damage control laparotomy	○	○	○

Other (please specify)

6. USAR Healthcare Practitioner Clinical Requirements

1. Who in the USAR medical component should be able to perform the following?

	All USAR healthcare practitioners	All Physicians	At least 1 Physician	Nurses and Paramedics	Not relevant
Identify vaccination requirements for the disaster area	○	○	○	○	○
Administer vaccinations	○	○	○	○	○
Conduct pre-deployment medical examination	○	○	○	○	○
Critical Incident Stress Debriefing	○	○	○	○	○
Casualty assessment, treatment and evacuation prioritisation (triage)	○	○	○	○	○
Management of life threatening medical emergencies	○	○	○	○	○
Management of life threatening trauma emergencies	○	○	○	○	○
Management of life threatening paediatric emergencies	○	○	○	○	○
Management of gynaecological and obstetric emergencies	○	○	○	○	○
Management of a tension pneumothorax	○	○	○	○	○
Acute Wound care	○	○	○	○	○
Wound debridement	○	○	○	○	○
Advanced airway management	○	○	○	○	○
Surgical airway management	○	○	○	○	○
Rapid sequence intubation	○	○	○	○	○
Advanced cardiac resuscitation	○	○	○	○	○
Damage control resuscitation	○	○	○	○	○
Peripheral intravenous access	○	○	○	○	○
Central intravenous access	○	○	○	○	○
Multi-site Intraosseus access	○	○	○	○	○
Fracture splinting	○	○	○	○	○
Emergency thoracotomy	○	○	○	○	○
Intercostal drain insertion	○	○	○	○	○
Acute burns management	○	○	○	○	○

Procedural sedation	○	○	○	○	○
Pain management	○	○	○	○	○
Hypo/hyperthermia management	○	○	○	○	○
Acute crush injury	○	○	○	○	○
Crush syndrome	○	○	○	○	○
Burr hole craniotomy	○	○	○	○	○
Antenatal caesarean section	○	○	○	○	○
Perimortem caesarian section	○	○	○	○	○
Wound suturing	○	○	○	○	○
Anaesthetic regional blocks	○	○	○	○	○
Anaesthetic spinal blocks	○	○	○	○	○
Local anaesthesia	○	○	○	○	○
General anaesthesia	○	○	○	○	○
Spinal immobilisation	○	○	○	○	○
Patient packaging	○	○	○	○	○
ECG interpretation	○	○	○	○	○
ETCO2 interpretation	○	○	○	○	○
SPO2 interpretation	○	○	○	○	○
Tourniquet application	○	○	○	○	○
Limb amputations	○	○	○	○	○
Dismemberment	○	○	○	○	○
Handling of the deceased	○	○	○	○	○

7. USAR Healthcare Practitioner Search Dogs Clinical Requirements

1. Which of the USAR healthcare practitioners should be able to recognise and/or treat and/or perform the following regarding the USAR team search dogs.

	All USAR healthcare practitioners	All Physicians	At least 1 Physician	Nurses and Paramedics	Not relevant
Parasite control	○	○	○	○	○
Acute wound care	○	○	○	○	○
Acute wound debridement	○	○	○	○	○
Suturing	○	○	○	○	○
Intravenous access	○	○	○	○	○
Tracheal intubation	○	○	○	○	○
Analgesia and sedation	○	○	○	○	○
Euthenasia	○	○	○	○	○

8. Selection of USAR Healthcare Practitioners

1. Do you think that all potential USAR healthcare practitioners should undergo a selection process to become part of a USAR team?

- ◯ Yes
- ◯ No

2. If you answered YES to the previous question, should this selection process entail?

	Yes	No	Sometimes
Physical fitness evaluation	◯	◯	◯
Physical strength evaluation	◯	◯	◯
Psychological evaluation	◯	◯	◯
Vision testing	◯	◯	◯
Advanced driving skills	◯	◯	◯
Hearing and audiological screening	◯	◯	◯
Swimming evaluation	◯	◯	◯
Screening for fear of heights	◯	◯	◯
Screening for fear of dark	◯	◯	◯
Screening for fear of confined spaces	◯	◯	◯
Screening for fear of dogs	◯	◯	◯
Medical evaluation	◯	◯	◯

3. Do you think your teams current selection process for USAR healthcare practitioners is adequate?

- ◯ Yes
- ◯ No

4. Once selected, should USAR healthcare practitioners undergo a USAR-specific training program before becoming an operational member of the USAR team?

- ◯ Yes
- ◯ No
- ◯ Optional

9. USAR Healthcare Practitioner Training Requirements

1. If you answered Yes to the previous question, which of the following do you think should be included in the USAR-specific training program for USAR healthcare practitioners?

	Essential	Optional	Not relevant
Recognition and treatment of crush syndrome	○	○	○
Practical training in performing a limb amputation	○	○	○
Practical training in post mortem dismemberment	○	○	○
Safe hygiene practice	○	○	○
Primary healthcare training	○	○	○
Management of the critical trauma patient	○	○	○
Management of the critical medical patient	○	○	○
Management of the critical paediatric patient	○	○	○
USAR environment orientation	○	○	○
Rope rescue	○	○	○
Confined space rescue	○	○	○
Structural collapse rescue	○	○	○
Trench rescue	○	○	○
Hazardous materials awareness	○	○	○
Incident Command System	○	○	○
Structural triage	○	○	○
Structural marking	○	○	○
Emergency signals	○	○	○
Safe operation around helicopters	○	○	○
Triage	○	○	○
Handling the deceased	○	○	○
Cultural awareness training	○	○	○
Safety and security training	○	○	○

2. In order to maintain competency and currency as a USAR healthcare practitioner, how often do you think a USAR healthcare practitioner should participate in the following activities?

	Monthly	6 monthly	Yearly	Every 2 years	Not required
Theoretical training	◯	◯	◯	◯	◯
Practical USAR medical training	◯	◯	◯	◯	◯
Practical USAR rescue training	◯	◯	◯	◯	◯
USAR Simulation exercises	◯	◯	◯	◯	◯

3. Do you think your teams current training program for USAR healthcare practitioners is adequate?

◯ Yes

◯ No

4. Thank you very much for your participation and time. It is greatly appreciated and no doubt will contribute towards safe USAR responses and effective patient management. Please feel free to comment in the space provided below.

Regards

Trevor Glass.