IpAC Unit
interprofessional ambulatory care unit

ECU AUSTRALIA EDITH COWAN UNIVERSITY

Interprofessional learning through simulation

Injury and trauma management: *issues related to rural and remote practice*

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Health Simulation Centre

ECU AUSTRALIA EDITH COWAN UNIVERSITY

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Acknowledgements

This resource was developed by the Interprofessional Ambulatory Care Program (IpAC) at Edith Cowan University (ECU) in collaboration with the ECU Health Simulation Centre with funding provided by the Australian Government under the Increased Clinical Training Capacity (ICTC) Program.

Foreword

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Australia's health workforce is facing unprecedented challenges. Supply won't meet demand, and the safety and quality of care remain key issues. The national health workforce agency, Health Workforce Australia (HWA), an initiative of the Council of Australian Governments (COAG), has been established to address the challenges of providing a workforce that meets the needs of our community – now and in the future.

Accordingly, ECU has set a priority on meeting these challenges, with a focus on the national health workforce reform agenda set out in the 2008 National Partnership Agreement (NPA) on Hospital and Health Workforce Reform.

In June 2010, ECU was awarded $4.6M from the Australian Government through a nationally competitive process under the ICTC Program, an initiative which aims to develop interprofessional learning and practice capabilities in the Australian health workforce.

The IpAC Program aims to complement traditional clinical placement activities with high quality interprofessional learning competency development and assessment, so that at the earliest point students gain exposure to best work practices within multidisciplinary teams that have the patient's individual needs as the focus.

Additionally, the IpAC Program has developed interprofessional learning resources and interprofessional health simulation challenges in collaboration with the ECU Health

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Simulation Centre. The ECU Health Simulation Centre is recognised internationally as a specialist centre in providing human factors based sequential simulation programs using professional actors. Most simulated learning interactions revolve around a single moment, such as a patient's admission to the emergency department. What we provide at the ECU Health Simulation Centre is a sequential simulated learning event that follows the patient and carer's journey through the healthcare system, for example, from the accident site following a motor vehicle accident, to the emergency department, to a hospital ward, to their home and into the community for GP and allied health follow-up.

Human factors in health care are the non-technical factors that impact on patient care, including communication, teamwork and leadership. Awareness of and attention to the negative aspects of clinical human factors improves patient care.

ECU's involvement in national health workforce reform is all about playing a role that enables the health workforce to better respond to the evolving care needs of the Australian community in accordance with the NPA's agenda. The IpAC Program is an example of how we can work across sectors, nationally and internationally, to determine better ways of addressing the pressing issue of how best to prepare students for the workplace and thus assuring that health systems have safe, high quality health services.

Interprofessional Ambulatory Care Program

ECU's IpAC Program was established with support from the Australian Federal Government through funding from the ICTC Program. The IpAC Program aims to deliver a world-class interprofessional learning environment and community clinic that develops collaborative practice among health professionals and optimises chronic disease self-management for clients.

This is achieved through the provision of clinical placements within the multidisciplinary team at the IpAC Unit, a community clinic that develops communication and collaboration among health professionals and optimises chronic disease self-management for clients. Additionally, a range of clinical placements are offered at existing health facilities, where trained IpAC Program clinical supervisors provide clinical support and ensure the integration of interprofessional learning into each clinical placement.

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The IpAC Unit, in collaboration with the ECU Health Simulation Centre, has developed a range of interprofessional learning through simulation resources. These learning resources are packages consisting of an audiovisual resource and a facilitator's manual, and aim to facilitate interprofessional learning and to support the participants in the development of interprofessional skills.

The interprofessional learning through simulation resources developed by the IpAC Program aim to provide health students and health professionals with the opportunity to learn with, from and about one another by engaging them in interactive live simulation events. These simulations encourage students and professionals to challenge themselves and each other in a safe learning environment.

ECU Health Simulation Centre

ECU houses the only fully functioning Health Simulation Centre of its kind in Western Australia, specifically designed and equipped to address the interprofessional learning needs of the health workforce and implementation of both state and national safety and quality frameworks.

The ECU Health Simulation Centre offers health workforce training and development specialising in clinical skills, human factors, and patient safety training for multidisciplinary health teams. Using a variety of educational techniques, including a broad range of simulation mannequins, professional actors and task trainers, ECU specialises in immersive simulation and observational learning. Supporting the ECU Health Simulation Centre are nursing, medical, paramedic and psychology academic and technical staff whose aim is to cultivate the development of competent and confident health professionals centred on enhancing patient safety.

Interprofessional learning

Interprofessional education occurs when two or more professions learn with, from and about each other in order to improve collaboration and quality of care (Centre for the Advancement of Interprofessional Education, 2002).

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Interprofessional learning is the learning arising from interaction between students or members of two or more professions. This may be a product of interprofessional education or happen spontaneously in the workplace or in education settings (Freeth, Hammick, Reeves, Barr, & Koppel, 2005). It has been found that interprofessional education can improve collaborative practice, enhance delivery of services and have a positive impact on patient care (Canadian Interprofessional Health Collaborative, 2008; Canadian Interprofessional Health Collaborative (CIHC), 2008).

The World Health Organization (WHO) has recognised the importance of interprofessional education and collaborative practice in developing a health workforce that is able to meet the complex health challenges facing the world and assist in the achievement of the health-related Millennium Development Goals (World Health Organization, 2010). In developing its framework for action, the WHO have recognised that models of interprofessional collaboration are most effective when they consider the regional issues and priority areas (including areas of unmet need) in the local population (World Health Organization, 2010). In doing so, interprofessional education and collaborative practice can best maximise local health resources, reduce service duplication, advance coordinated and integrated patient care, ensure patient safety and increase health professional's job satisfaction (World Health Organization, 2010).

The end goal of interprofessional education is to create a health workforce with improved levels of teamwork, collaboration, knowledge-sharing and problem-solving, eventually leading to better patient and client outcomes in health settings (Braithwaite et al., 2007).

Interprofessional learning through simulation

Simulation in education refers to the re-creation of an event that is as closely linked to reality as possible. Gaba (2004) defined simulation as a technique, rather than a technology, to replace or amplify real life experiences with guided experiences often immersive in nature to evoke or replicate aspects of the real world, in a fully interactive pattern. Simulation provides a safe learning environment for students to practice, where they are free to make mistakes, correct them and improve the processes of care (Kenaszchuk, MacMillan, van Soeren, & Reeves, 2011). Simulation is the bridge between classroom learning and the real life clinical experience, allowing students to put theory into practice.

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Interprofessional learning through simulation combines the principles of interprofessional learning and the use of simulation as an educational methodology. Interprofessional learning through simulation provides students with the opportunity to practice working with other health professionals and allows participants to explore collaborative ways of improving communication aspects of clinical care (Kenaszchuk, et al., 2011).

Many of the interdisciplinary team core competencies, such as problem solving, respect, communication, shared knowledge and skills, patient-centred practice, and the ability to work collaboratively (Canadian Interprofessional Health Collaborative, 2010) can all be developed by interprofessional learning through simulation.

Teamwork and interprofessional practice and learning are being recognised as central to improving client care and outcomes and enhancing client safety (Sargent, 2008). Promoting patient safety through team efforts is one of the five core competencies identified by the Institute of Medicine (2003).

In today's healthcare setting, no one health professional can meet all of the client's needs and therefore a healthcare team approach is required. Interprofessional learning through simulation provides learning opportunities to prepare future healthcare professionals for the collaborative models of healthcare being developed internationally (C. Baker et al., 2008).

How to use this resource package

This interprofessional learning through simulation resource package has been designed to support the facilitation of interprofessional learning among students and practitioners with an interest in developing their skills and knowledge of interprofessional practice.

The package consists of two components: an audiovisual resource and a supporting manual. In order to optimise the learning opportunities from this package it is recommended that participants are firstly introduced to the concepts of interprofessional learning and human factors in health care.

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The audiovisual resource depicts the journey of a patient through the health care system following a motor vehicle accident at a rural location. The scenario also follows the patients as complications require her to be transferred from a rural hospital to a metropolitan hospital.

The package has been created in a format to enable flexibility in its application depending of the educational setting. We recommend the following format:

1. Facilitator guided discussion around the concepts of interprofessional learning and human factors in health care
2. View the first segment of the audiovisual resource
3. Facilitator guided discussion around the scenario specific learning competency areas (samples given within manual)
4. View segments 2 to 4 of the audiovisual resource
5. Facilitator guided discussion around the scenario specific learning competency areas (samples given within manual)
6. View segments 5 and 6 of the audiovisual resource
7. Facilitator guided discussion, identifying and discussing what changes in interprofessional collaboration can be made to result in an alternative outcome. In particular discussion relating the barriers for these changes to occur in personal (future) practice is essential in improving interprofessional practice.

Opportunities for further reading and exploration of the scenario are provided in the *Further Information* and *References* sections of this resource manual.

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Scenario brief

An elderly woman and her husband take their infant granddaughter for a drive in the country. Their grandson is riding his trail bike and collides with his grandparents' vehicle and a bus resulting in several casualties. Emergency services are called, and local paramedics together with the Royal Flying Doctor Service assist with the injured and take the casualties to the nearest metropolitan hospital. The elderly woman is taken to the regional hospital with a cut on her forehead, an ankle fracture, a small burn on her foot, and exacerbation of asthma and diabetes. The depth and gravity of the burn are not properly assessed at the regional hospital, resulting in sepsis and an urgent transfer to a major metropolitan hospital.

List of characters

- Academic researcher
- Bus driver
- High Dependency Unit Doctor
- High Dependency Unit Nurse
- Nursing post Nurse
- Patient
- Patient's grandson
- Patient's husband
- Physiotherapist
- Regional hospital Doctor
- Regional hospital Nurse
- Royal Flying Doctor Service Doctor

Key learning competencies

The key learning competencies for this scenario are based on the IpAC Program learning objectives as well as the Canadian Interprofessional Health Collaborative (CIHC) Competency Framework (Canadian Interprofessional Health Collaborative, 2010). The specific competency areas for this scenario are:

- Client centred care
- Interprofessional communication
- Team functioning

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Client centred care

The interaction between team members and the client demonstrates:

- Sharing important information with client and team members in a respectful manner
- Communicating with the client in a way that is clear and understandable
- Listening respectfully to the needs of all parties to ensure the most appropriate care is given

Interprofessional communication

The interaction between professionals demonstrates:

- The sharing of relevant client medical history to facilitate rapid and appropriate medical intervention
- Communication that is relevant to the client's medical history
- Active listening to team members (including the client)
- Communication that ensures a common understanding of care decisions
- The development of trusting relationships with client and other team members

Team functioning

Professionals support a team approach by:

- Establishing and maintaining effective and healthy working relationships and team interactions
- Respect team ethics and demonstrate trust and mutual respect for members of the team
- Be an active participant in collaborative decision making that works towards client centred outcomes
- Be an effective and engaged participant in discussions and interactions among team members demonstrating open communication and attentive listening
- Value and respect the knowledge and skills of the range of disciplines in the team

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Key discussion points

Segment 1: Events leading to the crash

- What has contributed to the severity of this accident? What could Eileen, Harry, Tristan or the bus driver have done differently?
- What people or services can be contacted to assist with this type of emergency in a rural or remote area?
- What resources may be available at the site?
- Who is responsible for preventing this accident? Think also about legislation and health promotion activities.

Segment 2: Call to emergency services

- How would you describe the communication between the bus driver and the emergency service?
- Has the emergency services operator communicated well with the caller? What should an operator do to keep the caller calm, and why?
- Would you be able to provide the same information as the bus driver did, should you find yourself in this situation?
- Why would the operator ask the bus driver to focus his care on the baby?

Segment 3: At the crash site and transfer to a regional hospital

- How would you describe the communication between the Nurse at the crash site and the patient? Has the Nurse actively listened to the patient's concerns? Is there anything she could have done differently?
- What can the Paramedics and the nursing post Nurse do to communicate any concerns they have to the regional hospital? How can the team ensure that everyone has the same information?
- How would you describe the communication between the Nurse and Doctor at the regional hospital?
- Has the regional hospital Nurse been an active participant in the care team? Are her questions to the Doctor appropriate?
- How well has the regional care team communicated with the patient?

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- Do you think the patient's admission check has been adequate? What could have been done differently? Would it be different if the patient had been admitted to a metropolitan hospital?

Segment 4: The deteriorating patient and liaison with the RFDS

- Would the outcome be any different if the patient had been admitted to a metropolitan hospital? Is there anything the regional care team could have done differently?
- How would you describe the communication between the regional hospital Doctor and the RFDS contact?
- Do you think that the regional hospital Doctor shares all of the relevant information to facilitate the appropriate medical care for the patient?
- Has the regional hospital Doctor sufficiently acknowledged the psychological impact of the incident?

Segment 5: Evidence-based practice – bridging the gap

- Do you think the HDU Doctor and Nurse communicate well together?
- How do you think the HDU team feel towards the regional care team? What gives you this opinion?
- How would you describe the communication between the HDU Doctor and the academic researcher? Do you think that they value and respect the knowledge and skills of the other's relevant discipline?
- Do the Nurse, the HDU Doctor and the academic researcher understand the issues faced by medical staff working in rural or remote locations?

Segment 6: Physiotherapy rehabilitation

- Do you think that, overall, the care team has worked well together to achieve the patient's outcome?
- Is the patient part of the care team?
- Describe the relationship the patient has developed with the care team. What would have impacted positively on her perception of the care team?
- Would the patient have received the same quality of interprofessional care had she been treated solely at the regional hospital?

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- What can impact the level of care provided at a regional hospital compared with a metropolitan hospital? Who can address this?

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Literature review

Every year approximately 5 million people worldwide die from injuries (Holder et al., 2001). Injuries account for an estimated 7.5% of total deaths, 5.5% of hospitalisations and 7% of the total burden of disease in Australia (Australian Institute of Health and Welfare, 2008). The World Health Organization (WHO) recognises that to prevent death from severe injury and trauma, effective pre-hospital care must be delivered promptly (Sasser, Varghese, Kellermann, & Lormand, 2005). Unfortunately, the majority of the world's population does not have access to adequate pre-hospital injury and trauma care (Sasser, et al., 2005); evidence however suggests that provision of first aid by appropriately trained individuals can prevent a fatal outcome for many injuries (Hargarten & Karlson, 1993; Hussain & Redmond, 1994; Husum, Gilbert, Wisborg, Van Heng, & Murad, 2003; Marson & Thomson, 2001). Most deaths from serious injury or trauma occur in the first hours after the incident and are the result of compromised airways, respiratory failure or uncontrolled haemorrhage – all three of which can be readily treated using basic first aid measures including proper wound and burn care, immobilisation of fractures and oxygen support (Sasser, et al., 2005). These measures and others can reduce the likelihood of future complications.

Lower population density is the strongest predictor of trauma death rates in developed countries (Grossman et al., 1997). In Australia, rates of death from trauma are highest in rural and remotes areas, particularly for men (Australian Institute of Health and Welfare, 1998). The death rate from injuries increases with progressing remoteness (McDonell, Veitch, Aitken, & Elcock, 2009). Optimal care of trauma in rural and remote Australia is an issue that requires an organised approach which recognises the range, complexity and critical nature of major injury.

The concept of modern injury and trauma management systems originated from experiences with the management of soldiers injured in the Korean and Vietnam wars, where military casualties were greatly reduced by quality pre-hospital care and fast evacuation of patients by helicopters to medical centres (Mullins, 1999). This led to the development of state-wide systems for treatment of civilian motor vehicle accident victims in the United States of America in the early 1970s (Bazzoli, Madura, Cooper, MacKenzie, & Maier, 1995; Mullins & Mann, 1999).

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Workforce issues

The Clinical Health Goals and Targets report, published by the Health Department of Western Australia (HDWA) in 1994 (Western Australia Task Force on State Health Goals and Targets, 1994), outlined a number of recommendations to improve trauma care and management services in Western Australia (WA). The State Trauma Advisory Committee (STAC) was set up to implement these recommendations – one of the most crucial being the improvement of workplace training for health professionals (Government of Western Australia & Department of Health).

Trauma is a major health problem for rural areas, with mortality and morbidity rates significantly higher than in urban areas (McDonell, et al., 2009). In Australia, hospital separation rates for trauma incidents increase with increasing remoteness (Australian Institute of Health and Welfare, 1998). It may therefore be assumed the health workforce in rural and remote locations has significant exposure to trauma incidents. Inter-hospital transfers are often required between district hospitals to regional base hospitals, or to tertiary referral hospitals in metropolitan areas depending on the severity of the injuries sustained and the resources available.

Maintaining an adequate medical workforce in rural and remote areas has been a challenge in Australia and internationally for many years. In 1998 only 15.5% of medical practitioners worked in rural and remote Australia, caring for 28.7% of the population (Australian Medical Workforce Advisory Committee, 1998). Many health policies exist focusing on measures to increase workforce supply in small rural and remote under serviced communities (Pampalon, Martinez, & Hamel, 2006).

Kamien and Buttfield (1990a, 1990b) recommended that Australian universities change medical school selection and undergraduate training criteria to facilitate entry of more rural and remote students, and also suggested that medical schools provide opportunities for rural and remote practice and support for those with an attraction to the challenges of rural and remote practice. A number of universities have implemented these recommendations, and have established programs encouraging an increase in nursing and allied health professionals in rural and remote practice. For example, the University of Sydney established the Rural Careers Project in 1991 which includes rural placement opportunities for 14 health disciplines and the Queensland University of Technology established a rural

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undergraduate clinical program for nurses in 1996 (Smith, Edwards, Courtney, & Finlayson, 2001). Commonwealth Government initiatives to promote growth in the workforce include the Rural Clinical Training and Support (RCTS) Program, the University Departments of Rural Health (UDRH) Program and a range of scholarships through the Nursing and Allied Health Scholarship and Support Scheme (NAHSSS) (Department of Health and Ageing, 2012).

Although doctors, nurses and allied health professionals in rural and remote practice are under-represented, there are no systematic national strategies to recruit medical, nursing and allied health professionals as there has been for health students (Laurence & Wilkinson, 2002).

Isolation

Due to the isolation of those in rural and remote Australia, pre-hospital care is often provided by individuals with basic first aid skills who are members of local volunteer services, such as fire-fighters or ambulance drivers (Sasser, et al., 2005). A community initiative to implement mandatory training in first aid and resuscitation as a compulsory component of obtaining a drivers license would result in an increase in assistance at rural crash scenes and could reduce rural response time (Tziotis, Roper, Edmonston, & Sheehan, 2006). Research has demonstrated that the time from trauma to the first care provider is the most critical period in the rural trauma chain of survival, with a 19% increased risk of death per hour (Fatovich, Phillips, Langford, & Jacobs, 2011). The vastness of WA, creating geographic isolation in rural and remote areas magnifies the major problems of addressing rural trauma care via access to the hospital system compounded by a lack of resources in remote locations (Fatovich, Phillips, Langford, et al., 2011).

Timely access to resources and information

The successful management of trauma and injury in any trauma system is dependent on the resources and capabilities of that system (Danne, 2003). A system with limited resources, such as a short supply of paramedics and ambulance vehicles, a lack of pre-hospital and retrieval services, as well as the isolation and difficult terrain between the site of the incident and the emergency centre, cannot be expected to provide the same assistance and care to trauma patients as a sophisticated trauma system with advanced equipment and services.

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The Trauma Working Group (TWG) of WA, published recommendations in 2007 which suggested that a trauma system be developed in WA with the goal of delivering each patient to the trauma care facility which has the right resources to match his/her needs in the shortest possible time (Towler, 2007).

The success of the transfer of the patient whose trauma took place at some distance from the hospital where the patient will receive long-term care is primarily dependent on the availability and skills of two sets of resources: people available at or near the scene of the injury; and people available to transfer the patient to a hospital of first treatment and/or tertiary hospital (Danne, 2003).

Resources at the site of the accident should be sufficient to prevent secondary injury without necessarily having to be able to diagnose and treat the primary injury. If there is no possibility of transfer to a tertiary hospital, the diagnosis and management of the primary injury must be completed at a non-tertiary centre (Danne, 2003).

There are a number of resource issues faced in rural and remote Australia, not simply limited to the transfer of patients to the hospital. In addition to adequate retrieval times, once patients arrive at the care centre additional issues may be faced, including limited access to beds and appropriate surgical and resuscitation teams. These factors are considered essential for a successful integrated trauma system (Danne, 2003).

Professional development

The provision of opportunities for professional development for existing staff and volunteers is of significant importance to the community and the individual. Research has shown that continuing professional development increases not only the competencies and efficiency of the workforce, it also increases professional satisfaction (Buykx, Humphreys, Wakerman, & Pashen, 2010). Ongoing education and training has been identified as an important indicator of intention to take-up practice in rural and remote areas (Gagnon, Fortin, & Landry, 2005). Formative evaluations suggest that there is a positive impact of education and training programs on retention of rural and remote allied health and nursing professionals (Cox & Hurwood, 2005; Postler-Slattery & Foley, 2003; Shobbrook & Fenton, 2002; van Haaren & Williams, 2000). Ongoing education and training is often a compulsory prerequisite of the

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maintenance of one's professional registration and the provision of professional development opportunities by employers is often seen as an incentive to remain with the current employer. However, there is no definitive evidence supporting the provision of ongoing education and training in the retention of health professionals in remote and rural communities (Buykx, et al., 2010).

The traditional method of education is face-to-face interaction. A large number of educators prefer this method as it allows for the provision of technical, or 'hands on' skills (Sargeant, Allen, & Langille, 2004). However, with the growing advances in technology, education is now able to be delivered over the internet. Internet education is considered to "contribute to attracting and retaining staff in the rural sector where turnover is a continuing problem" (Dillon & Loermans, 2003, p. s17), but there are issues surrounding the use of this technology, most importantly the difficulty to provide students with practical experience over the internet. A study of internet use by nine different health professions working in rural Australia found that despite the availability of web-based information and support its use was problematic for several reasons:

1. internet-based professional development activities did not provide the quarantined time for study outside of the workplace due to interruptions from daily duties;
2. lack of access to the internet at work or home, either due to lack of personal computer, restricted internet access or because out dated infrastructure did not provide adequate download speeds; and
3. unreliable internet connectivity because of local conditions.

Source: (Herrington & Herrington, 2006)

Professional development is essential as it can improve staff satisfaction associated with feelings of being able to do tasks competently and confidently, and in turn feeling more valued by the employer and patient as well as contributing to staff stability and morale (Buykx, et al., 2010). Continued professional development also supports: the development of generalist expertise in primary health care; culturally safe service delivery; provision of quality, safe care by individual practitioners and teams; keeping older health professionals in the workforce longer; increased job satisfaction and may address staff turnover in rural health services (Health Workforce Australia, 2011). The absence of effective programs may increase dissatisfaction and lower workplace morale, with a consequent increase in turnover of staff (Buykx, et al., 2010). This can have further consequences:

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1. risks to patient safety and quality of care as practitioners lose confidence in their skills and ability to provide adequate services;
2. a workforce which is inappropriately oriented and inadequately skilled to meet community needs;
3. missed opportunities for isolated health professionals to develop supportive peers and professional networks; and
4. lost opportunities for former workers to re-enter local workforce

Source: (Buykx, et al., 2010).

Therefore providing opportunities for staff to engage in professional development is essential and has become mandatory for health professionals in Australia in 2010 (Health Workforce Australia, 2011).

Technology in rural and remote health

The internet and innovative use of technology can make the sharing of information among staff involved in care possible through e-health technologies. This can reduce travel and costs for families having to travel to a major city from rural and remote areas for expert care (Health Networks Branch, 2009). Sharing patient information however does have a range of issues including cost effectiveness, confidentiality, security of information, patient consent and professional indemnity and litigation (Jones, Banwell, & Shakespeare, 2004). There does not seem to be enough significant evidence to support the use of telehealth or e-health as a safe and cost-effective practice (Dillon & Loermans, 2003).

Telephone consultations for health professionals and the general public such as the Poisons Information Centre or HealthDirect may be of particular value for rural and remote locations. These services can provide first aid or first responder advice that may minimise the harm to the injured until more formal care is available (Health Networks Branch, 2009).

Distances and patient transfer

Inter-hospital transfer of major trauma patients is common and is not simply confined to rural and remote areas. The treatment of injuries however, is often impeded by the long distances emergency services must travel to reach and transfer injured people, and the restricted

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diagnostic capacity, delayed treatment and/or incomplete surgical capabilities in rural areas (Grossman, et al., 1997; Peek-Asa, Zwerling, & Stallones, 2004). As a consequence, many patients who suffer major trauma or injury require transfer to specialist emergency centres. A number of studies (Danne et al., 1998; Deane et al., 1988; McDermott, Cordner, & Tremayne, 1997) have highlighted problems related to inter-hospital transfer of patients. These included the inadequate provision of resuscitation of the patient before leaving the country or base hospital due to the physicians being inexperienced in the delivery of trauma care (Danne, 2003).

In Australia, transfer of patients predominantly occurs by road through the use of state services such as ambulances, or by air via the Royal Flying Doctors Service (RFDS) or Rescue Helicopter Services. In order for the trauma systems to be effective, the severity of trauma sustained by the patients must be identified at the site and patients must then be transported to the trauma service best suited to provide appropriate care (Towler, 2007). Issues surrounding the necessity of patient transfer arise predominantly from incorrect triage of patients. The goal of a triage system is to ensure that patients are consistently transported to the most suitable hospital in the shortest time. Pre-hospital triage has been successfully implemented in some states in Australia, though not all (Towler, 2007). The development of a reliable and sensitive pre-hospital triage process is complex, as pre-hospital triage has previously been shown to result in both over- and under triage issues (Macken & Manovel, 2005; Towler, 2007). Therefore current recommendations for pre-hospital transport using ambulance assessment protocols remains in place in Western Australia until research can support the use of triage system (Towler, 2007).

The RFDS provides dedicated aero-medical retrieval service for the whole of WA via a state-wide 1800 number which can be accessed by any health service or member of the community outside the metropolitan area. Approximately 80% of retrieval requests received are from country hospitals, with the remaining 20% being from locations without hospital or medical practitioners (Towler, 2007). With increasing medical specialisation and centralisation there has been a rapid growth in the amount of patients requiring transfer to Perth, which has a significant impact on response times, crew fatigue and maintenance of planes (Towler, 2007).

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A recent study investigated the effects of distance and remoteness on major trauma patients transferred by the RFDS from rural and remote WA (Fatovich, Phillips, Jacobs, & Langford, 2011). This study identified that the level of remoteness rather than the length of distance travelled is a stronger predictor of the outcome death. The study also highlighted the greater magnitude of the effect of remoteness on death from major trauma, mainly due to the prolonged transport times, but also the reduced capacity of the services available. Additional findings from this study highlighted that a large proportion of trauma incidents were due to motor vehicle crashes. A suggested strategy to overcome some of the issues surrounding retrieval is automatic crash notification systems that use car sensors and global positioning system to alert local rural emergency services that a crash has occurred, together with a precise location, which may assist in reducing patient retrieval times thus improving patient outcome for this type of incident (Lahausse, Fildes, Page, & Fitzharris, 2008; Rogers, Shackford, Osler, Vane, & Davis, 1999).

Triangle of care

As discussed, there is a clear need for scoring systems to classify trauma patients in the field of emergency or intensive care in order to provide appropriate pre-hospital triage (Towler, 2007). Over 50 scoring systems have been published to aid in the classification of trauma and aid in the decision making necessary, highlighting not only a need, but also the limited capacity of each to meet the range of requirements in emergency or intensive care (Health Networks Branch, 2009).

Given the limited available resources in the health system and the high care needs of the seriously injured patient, differentiating between patients who can be cared for locally and those who need specialist and intensive care available at trauma centres is crucial (Health Networks Branch, 2009; Towler, 2007). Assessment of the care required can be based on a score on a tool assessing the patient's injuries, such as for example by the use of the Injury Severity Score (ISS), which provides a score range for minor, moderate, severe, or critical (S. P. Baker, O'Neill, Haddon, & Long, 1974). The limitations with using a scale taking only current injuries into consideration are that pre-existing comorbidities are not considered, and neither are the available resources to address the care required taken into consideration (Health Networks Branch, 2009).

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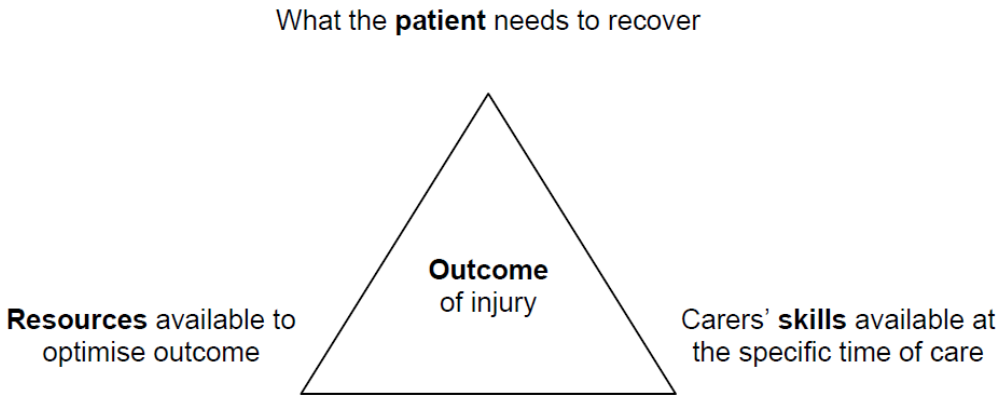
The WA Injury and Trauma Health Network proposes that classification of severity of trauma needs to take into account the resources and skills at the existing site, much like in the definition of a disaster, where the capacity at the location of the incident plays a crucial part in the assessment of whether an incident is a disaster (International Federation of Red Cross and Red Crescent Societies, 2012). The definition process proposed by the WA Injury and Trauma Health Network is based on the 'Triangle of care' (figure 1).

Figure 1: Triangle of care



Source: (Health Networks Branch, 2009)

In this tri-fold assessment, the needs of the patient for recovery (including urgency, how life-threatening, pre-existing comorbidities, care required from multiple disciplines) are taken into account, together with the resources and skills available at the location. This assessment forms the basis of the decision to transfer the patient to the most appropriate health service for treatment, be it a local health service, a tertiary hospital or a specialist trauma hospital.

Conclusion

In rural and remote Australia, trauma is a major cause of death and disability with the death rate from injuries increasing with increasing remoteness. To address this greater impact of trauma, improvements in range of areas are suggested, including workforce availability and skill development in trauma care and triage, and the development and evaluation of assessment, triage and trauma systems.

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Connecting health care providers across the continuum of care could address a range of the issues faced in providing appropriate trauma care in rural and remote settings: creating opportunities for communication, knowledge sharing, referral and discharge planning between health services in urban, rural and remote locations, between those providing general or specialised care, will enhance the safety and quality provided across the whole system of care (Health Networks Branch, 2009).

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Medical glossary and acronyms

Allied health professionals	An 'umbrella term' for health professionals who are neither doctors nor nurses (e.g. Physiotherapists, Social Workers).
Injury	Physical damage, or harm, to the body. Cause may be intentional or non-intentional.
Interdisciplinary teams	A team that is collaboration-oriented. The team meets regularly to discuss and collaboratively set treatment goals and carry out treatment plans. There is a high level of communication and cooperation among team members (Korner, 2008, p. 2)
Multidisciplinary teams	A team that is discipline-oriented. Each professional works in parallel, with clear role definitions, specified asks and hierarchical lines of authority (Korner, 2008, p. 2).
Remote	Situated a long way away from towns or other civilisation.
RFDS	**Royal Flying Doctor Service** An aero medical service providing 24/7 assistance to those in rural and remote areas of Australia.
Rural	Refers to the country, or areas outside of the metropolitan.
STAC	**State Trauma Advisory Committee** A committee established by the Health Department of Western Australia to administrate and improve Western Australia's trauma services.
Trauma	An injury or wound resulting from an external force (Miller & Keane, 1983). May be physical or psychological. Physical trauma is where a person suffers an injury to the body, whereas psychological trauma is an emotional response such as distress or shock to a terrible ordeal or event.

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Further information

Australian Injury Prevention Network (AIPN)

http://www.aipn.com.au

A national organisation promoting injury prevention.

Australasian Trauma Society (ATS)

http://www.traumasociety.com.au

With a primary focus on multidisciplinary trauma management, the ATS gives members opportunities for networking and access to international journals and conferences for those working in injury and trauma care and prevention.

Injury Prevention Journal

http://injuryprevention.bmj.com

An international journal which publishes research and opinion on injury prevention.

Injury and Trauma Health Network

http://www.healthnetworks.health.wa.gov.au/network/injury.cfm

A network of the Health Department of Western Australia which aims to provide advice and strategies on injury and trauma prevention and management.

National Rural Health Alliance (NRHA)

http://nrha.ruralhealth.org.au

A collaborative body of 33 national organisations working together to bridge the gap between metropolitan and rural and remote health, with the primary objective to improve access to health services for those living in rural and remote areas. The member bodies include the Rural Health Workforce (RHW), the Council of Ambulance Authorities – Rural and Remote Group (CAA RRG), the Australian College of Rural and Remote Medicine (ACRRM), Rural Doctors Association of Australia (RDAA) and Allied Health Professionals Australia Rural and Remote (AHPARR).

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Royal Flying Doctors Service (RFDS)

http://www.flyingdoctor.org.au

A not-for-profit aero medical service providing 24/7 assistance to those in rural and remote areas of Australia.

Rural and Remote Health Journal

http://www.rrh.org.au

An international journal which publishes research and educational materials about rural and remote health.

Rural Health Workforce (RHW)

http://www.rhwa.org.au

Funded by the Department of Health and Ageing (Australia), RHW is a not-for-profit entity which facilitates national programs to improve access to health care for those living in rural and remote Australia.

Services for Australian Rural and Remote Allied Health (SARRAH)

http://www.sarrah.org.au/

Advocates for, develops and provides services to enable Allied Health Professionals who live and work in rural and remote areas of Australia to confidently and competently carry out their professional duties in providing a variety of health services.

St John Ambulance Australia

http://www.stjohn.org.au

Australia's primary provider of first aid training and services. St John also provides ambulance services in Western Australia and the Northern Territory.

State Trauma Advisory Committee (STAC)

http://www.health.wa.gov.au/watec/committee/overview.cfm

A committee established by the Health Department of Western Australia to administrate and improve Western Australia's trauma services.

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