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What is the Best Form of Head Support for Patients with Potential Cervical Spine Injury? – A Review of the Literature

Abstract 990194-021

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Introduction

Prehospital spinal injury management in the USA is driven heavily by rigid protocol, and a wide range of devices available to provide spinal immobilisation are used in clinical practice. More importantly, many of these products and their effectiveness remain largely unevaluated and are often promoted by those with vested interests. In Australia the trend toward unevaluated implementation of immobilisation devices has been similar, and popular devices from the USA have become commonly used in Australia, usually without further evaluation of the evidence supporting their safety and efficacy. To date there has been no attempt to provide thorough evaluation of prehospital spinal injury immobilisation using a rigorous scientific model.

The objective of the study was to review the current scientific literature pertaining to prehospital immobilisation of spinal injury patients, specifically head stabilisation and the effectiveness of the devices used to control head movement, and to compare the results against the standard of current Victorian practice.

Methods

We searched the Medline, EMBASE, CINAHL and Cochrane CENTRAL electronic databases from their beginning until the end of February 2006.

The titles and abstracts of all the located articles were reviewed by one author to determine their relevance for further review.

The articles that were deemed relevant for additional review were sourced, these articles were then reviewed by one author for their relevance to the prehospital setting and then for inclusion into this study.

The reference list from all the relevant articles was then also reviewed to determine if they were any additional articles that had been missed.

Results

The electronic database search located approximately 5,500 articles and after the consequent title and abstract review there were 220 journal articles to be sourced. Following the review of these selected articles there were 152 that were deemed relevant to the prehospital setting. A further two articles were then identified when reviewing the reference lists, resulting in a total of 154

contextually relevant articles. From this 154, three were found that related specifically to head stabilisation.

The results demonstrated the inability of any cervical stabilisation device to adequately prevent head movement in the absence of effective securing of the trunk and the techniques involving an abdominal strap performed this task best. Results also demonstrated that preparation and application time for a device can inhibit its effectiveness.

Conclusion

Head movement in spinal injured patients cannot be adequately controlled without also controlling the lateral movement induced by an unsecured or poorly secured trunk. In the assessment of a device's effectiveness one should also include evaluation of other important data such as the ease with which the device can be used.

Prehospital spinal injury management is a poorly evaluated area of practice and more research is required to adequately assess the effectiveness of current techniques to provide an evidence base on which future practice can be built.

Who Knows Best How Accidents Happen?

Abstract 990194-024

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Objectives

Injury prevention and control is a National Health Priority Area, with the annual direct cost of injuries across the Australian health sector representing a significant public health and economic burden. In order for injury prevention and control organisations to identify and implement mechanisms to effectively reduce injury events, it is vital that accurate and specific data detailing the circumstances surrounding injury events be available. For cases attended by ambulance, Paramedics collect causal information as a part of their routine clinical documentation. Anecdotally, these records are acknowledged to be used by Clinical Coders in the hospital environment to inform coding of the medical record with regards to the causes of a hospitalised injury event. This study aims to evaluate the quality of external cause of injury information contained within ambulance records, and the extent to which this information is used to inform hospital-based injury data collections.

Methods

An online survey, using a mixture of qualitative and quantitative measures, was distributed to hospital-based Clinical Coders' nationally. The questionnaire assessed, for cases transported to hospital by ambulance, Coders' access to, and use of, ambulance documents in the coding of hospital medical records. Opinions regarding the quality and comprehensiveness of ambulance records for external cause of injury information were evaluated and compared with those for other clinical documentation sources. The utility of standardising the collection of external cause of injury information in prehospital records was also evaluated.

Findings and Conclusions

The total national sample consisted of 404 hospital-based Clinical Coders with current experience of external cause of injury coding. Results showed the clinical records of Paramedics to be held in high esteem overall, with regards to the quality of external cause of injury information. Most notably, compared to other clinical documentation sources Ambulance records were considered to be the highest quality source of this information. Significant differences were found between states as to the quality of various aspects of ambulance documentation, and a number of issues with current ambulance documentation were highlighted that if addressed will enable more effective utilisation of this valuable information source. This study highlights the significance of information documented by Paramedics, and validates prehospital emergency services records as a valuable source of injury-related information that warrants further development.

Randomised controlled trial of intranasal fentanyl versus intravenous morphine for pain relief in pre-hospital care

Abstract 990194-023

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Study hypothesis or Objective

The study objective was to investigate the efficacy and safety of intranasal fentanyl in the pre-hospital setting. Intranasal fentanyl is already used by some services and has been suggested as potentially superior to intravenous opiates as it does not require cannulation. However, there have been no prior trials assessing its use in the pre-hospital setting.

Methods

After Ethics Committee approval, 258 patients requiring analgesia for severe pain were recruited from two ambulance services. Patients were randomised to receive intranasal fentanyl (180mcg initial dose followed by 60 mcg at 5 minutes and 10 minutes if required), or intravenous morphine (initial dose 2.5-5mg followed by 2.5-5mg at 5 minutes and 10 minutes if required).

Results

Baseline pain scores and time to destination were equal between groups. Fentanyl patients had a slightly greater reduction in pain scores by destination (4.22 vs 3.57). This approached statistical significance ($p=0.06$). Both drugs were generally well tolerated and accepted by both patients and paramedics, although there was a higher but not statistically significant incidence of serious adverse events in the fentanyl group. Reduction in pain was significantly predicted by higher initial pain score and presence of back pain and there was a trend for back pain patients to respond better to fentanyl than morphine.

Conclusions

Intranasal fentanyl appears an equally if not more effective option than intravenous analgesia for the reduction of severe pain in the pre-hospital setting.

The potential role of the paramedic in the prevention of falls in the elderly patient

Abstract 990194-027

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Objectives

This study aims to provide an evidence-based understanding of current and potential strategies involving paramedics in fall prevention for the elderly.

Method

A literature review was conducted in relation to falls in the elderly and fall prevention strategies. The literature was analysed to identify possible guidelines and partnerships to be introduced in the context of paramedic practice. Existing strategies included those implemented or suggested by government bodies, health care professionals and paramedics. The literature utilised was obtained through a database search of Medline and CINAHL. Articles referenced within the literature were also included in the review. Whilst a plethora of information was found, we narrowed our inclusions to those which fit the above criteria, were of Australian origin and took a multifaceted intervention approach to falls prevention.

Findings and conclusions

Falls present a major threat to morbidity and mortality in the older adult and elderly aged 65+. The literature suggests the outcome is worse for women, and those over the age of 85. A South Australian initiative showed a decrease in falls injury ($p < 0.001$) but not in actual falls ($p > 0.001$). This study involved gait/stability, hazard assessment, exercise and walking aids. The follow up after a Sydney intervention found the risk of one fall was $CI = 0.50-0.83$ and therefore was not considered significant, suggesting the initiative was successful. This intervention primarily involved environmental hazards. Many studies promoted the usefulness of paramedic participation in falls prevention programs particularly in relation to patient mobility and risk/hazard identification as a means to further intervention success.

In addition, a gait/stability assessment tool was used in a number of studies, which proved to be beneficial in the identification of elderly candidates at risk of falls. Outcomes of the studies, which delivered multifaceted prevention strategies, generally utilised early risk identification. This was through health care professional contact, hazard reduction, diet change, exercise, education and medication control. All strategies emphasised a strong collaboration between health care services. Of particular importance are the statistically significant results regarding paramedic involvement in the hazard assessment, gait/stability assessment and referral of elderly patients to other health care professionals to promote fall prevention.

As a result of the above findings, it may be prudent for all Australian ambulance services to implement Clinical Practice Guideline changes encompassing fall prevention strategy measures for patients that are not transported. These could include home hazard assessment, gait/stability assessment and initiation of follow-up investigation by other relevant health care professionals.

Learning endotracheal intubation: Failings of current part-task trainers

Abstract 990194-013

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Background and goal of the study

Inadvertent oesophageal intubation can quickly give rise to serious adverse outcomes so there should be zero error in identifying this. Training to this level is not possible in clinical placements alone, but alternative experience can be obtained using patient simulators. The purpose of this study was to review the guidelines for confirming endotracheal intubation (ETI) and determine whether part-task trainers sold for learning and practicing ETI are suitable for this task.

Methods

Resuscitation guidelines produced by the Australian Resuscitation Council (ARC),¹ American Heart Association (AHA)² and the European Resuscitation Council (ERC)³ were studied for recommendations on airway management and part task trainers were obtained from as many different vendors possible. Each part-task trainer was tested by the authors to determine whether primary methods of confirming correct endotracheal tube (ETT) placement, (ETT seen to pass through vocal cords; bilateral chest expansion; auscultation over lung fields to determine adequate & equal breath sounds (bilateral & axillae); auscultation of epigastrium (breath sounds should not be heard); condensation in the tube) and secondary methods of confirming correct ETT placement (end tidal carbon dioxide (ETCO₂) detection and oesophageal detector device (ODD/EDD)) were possible.

As this research did not involve humans or animals, ethics approval was not sought.

Results

Of 15 part-task trainers studied, none were able to provide all the primary and secondary confirmation methods described in the resuscitation guidelines. In all trainers, the ETT could be seen to pass through the vocal cords however only 4 had bilateral chest expansion, whilst in five auscultation of lung fields was possible and only 4 auscultation over the epigastrium. No part-task trainer produced condensation within the ETT or identified ETCO₂. All part-task trainers had positive results with the ODD/EDD (no resistance felt when the plunger was withdrawn) however in six part-task trainers, false- positive results were obtained.

Conclusions

Achieving and maintaining proficiency in a skill requires overtraining through repeated, varied and authentic practice with feedback. Confirming ETT placement is an essential skill but there is

ambiguity in guidelines produced by peak resuscitation bodies that makes uniform training difficult. We developed a composite 'best practice' protocol but found no part-task trainer allowed all steps to be performed. This has major implications for quality of training that is currently possible.

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Paramedics' Perceptions of the Desirable Attributes of the Ambulance Clinical Instructor

Abstract 990194-008

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Background

In the current climate, clinical placements and clinical instructors are an integral part of student ambulance paramedic training. In Rural Ambulance Victoria (RAV), student participation in clinical placements under instruction from a qualified Clinical Instructor, are compulsory. However, the attributes required by the ambulance clinical instructor, lacked significant investigation within the literature. As part of a larger study on the role of the clinical instructor and clinical placements for the student ambulance paramedic, the purpose of this paper was to explore the attributes required by the clinical instructor, within Rural Ambulance Victoria (RAV). Three main groups were identified for inclusion in the research, including the Clinical Instructors (CIs), Student Ambulance Paramedics (SAPs), and the Clinical Supervisors including Clinical Specialists, Clinical Educators, Senior Operations Officers Clinical and Educational Services (SOOCs), and the Manager Clinical and Educational Services.

Methods

A literature review was conducted to develop a list of desirable attributes. The main fields of review included medical domains such as medicine, nursing, physiotherapy and ambulance, as well as other industries that relied on vocational training of 'novices' by 'experts'. Clinical Instructors, Mentors, Preceptors, Supervisors, and Clinical Teachers were included to create the characteristics identified as important for a CI to possess.

Final data for this paper was collected utilising a quantitative method via a Likert scale survey. Each participant was given a questionnaire consisting, in part, of a set of statements relative to the attributes of a CI. The participants were then asked to state their level of agreement or disagreement to the statement. The data was then analysed for themes and statistical differences using SPSS for Windows. Ethics committee approval was obtained.

Results

Overall, the three groups agreed on the attributes required by a CI and also agreed that placing a student under pressure was not a desirable attribute. Although the only attribute to have a significant statistical difference between the three groups was the need to devise an individual learning plan, the three groups of participants varied in their order of importance for the attributes of a CI ($p < 0.05$).

Conclusions

There was significant agreement amongst the participants as to the desirable attributes of Clinical Instructors, with only one attribute considered undesirable. The findings of this study may therefore be of value in improving Clinical Instructor programs, and in helping to develop the ongoing role of the CI.

Introduction of a Pre-hospital Critical Incident Monitoring System – Pilot project results

Abstract 990194-005

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Objectives

To implement a critical incident monitoring process in a regional/rural pre-hospital setting and to describe the nature and incidence of incidents detected over a 3 month pilot period.

Methods

A prospective descriptive study in a regional pre-hospital setting. The project has a primary focus on trauma care and reports 3 month of data collection. Paramedics and emergency department staff submitted anonymous paper and web based reports. A chart review was performed on all patients who met Victorian Department of Human services pre-hospital major trauma criteria. Select trauma cases went on to further analysis by a 'hot debrief' process.

Findings and Conclusions

41 individual cases met inclusion criteria out of 4429 ambulance responses during the study period. 24 of the 41 (58.5%; 95% CI 49.7-67.4%) were identified by the anonymous reporting systems while the remainder were patients who met major trauma criteria. A total of 77 incidents were identified (mean (SD) incident per case 1.8 (0.77)). Anonymously reported cases resulted in 26 incidents (mean (SD) 1.1 (0.12)), 8 trauma debriefs revealed 38 incidents (mean (SD) 4.8 (3.89)) and 9 chart reviews revealed 13 incidents (mean (SD) 1.6 (0.56)). 15 of 26 (57.7%) anonymously reported incidents related to resource problems and 56 of 77 incidents related to system inadequacies (72.7%; 95% CI 65.5-80%). 35 of the 77 (45.5%; 95% CI 40.4-50.5%) incidents had no impact on the patients' outcome and 34 of 77 (44.2%; 95% CI 39.3-49.1%) incidents were considered mitigated by circumstance. Incident monitoring led to widespread feedback of trends in most cases (84.4%; 95% CI 77.6-91.3%) while specific responses were required in 3 cases (3.9%; 95% CI 3.7-4.1%).

The pilot project demonstrates successful implementation of an incident monitoring system within the regional/rural pre-hospital environment. The combination of incident detection techniques has a high yield and has the potential to capture different error types. The detection of a large proportion of incidents in the 'near miss' category provides an excellent opportunity to analyse error without patient harm. System related issues dominated the types of incidents and

many were found to be mitigated by circumstance. This model is appropriate for ongoing incident monitoring in this setting.

Note: Ethics approval for this study was granted by the Barwon Health Research and Ethics Advisory Committee.

Out-of-hospital cardiac arrest in Victoria: rural and urban outcomes

Abstract 990194-004

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Objectives

To compare the survival rate in rural and urban areas from out-of-hospital cardiac arrest in Victoria, and to investigate the factors associated with these differences.

Methods

Retrospective case series using data from the Victorian Ambulance Cardiac Arrest Register. This study reports all out-of-hospital cardiac arrests occurring in Victoria that were attended by Rural Ambulance Victoria or the Metropolitan Ambulance Service between January 2002 and December 2003.

Findings and Conclusions

1790 people who suffered a bystander-witnessed cardiac arrest were included. Bystander cardiopulmonary resuscitation was more likely in rural (65.7%) than urban areas (48.4%) ($P = 0.001$). Urban patients with bystander-witnessed cardiac arrest were more likely to arrive at an emergency department with a cardiac output (OR, 2.92; 95% CI, 1.65–5.17; $P < 0.001$), and to be discharged from hospital alive than rural patients (urban, 125/1685 [7.4%]; rural, 2/105 [1.9%]; OR, 4.13; 95% CI, 1.09–34.91). Major factors associated with survival to hospital admission were distance of cardiac arrest from the closest ambulance branch (OR, 0.87; 95% CI, 0.82–0.92), endotracheal intubation (OR, 3.46; 95% CI, 2.49–4.80) and the presence of asystole (OR, 0.50; 95% CI, 0.38–0.67) or pulseless electrical activity (OR, 0.73; 95% CI, 0.56–0.95) on arrival of the first ambulance crew.

Survival rates differ between urban and rural cardiac arrest patients. This is largely due to a difference in ambulance response time. As it is impractical to substantially decrease response times in rural areas, other strategies that may improve outcome after cardiac arrest require investigation.

Note: Ethics approval for this study was granted by the Monash University Standing Committee on Ethical Research in Humans.

Ambulance Officers' knowledge and practice in regard to patients affected by alcohol and their perceived role in reducing alcohol-related harm.

Abstract 990194-010

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Background

Harmful alcohol consumption is a major social and public health problem in Australia. One strategy for reducing risky drinking and its associated harms is to encourage health care providers to implement early alcohol interventions. However there is little, if any, information concerning the current practices of ambulance officers when caring for alcohol-affected patients. Ambulance officers treat a significant number of alcohol-affected patients who do not receive care from any other health care provider. Recent NSW data from a single ambulance station indicated that 14% of all call-outs involved alcohol consumption.¹ Ambulance officers can detect public health issues that are prominent in communities, and are likely to be able to identify individuals at alcohol-related risk for early referral to appropriate services.² This may be especially important in rural communities where a limited number of GPs and often no drug and alcohol services are available. Ambulance officers may be considered to hold unrealised opportunities to participate in alcohol-harm reduction interventions.

Objectives

This research aims to first identify the perceived estimated proportion and types of incidents and services provided by ambulance officers in which alcohol is involved. Second, to assess the current practice, knowledge, level of training, perceived confidence and perceptions of ambulance officers regarding alcohol and alcohol interventions.

Methods

A cross-sectional, descriptive study of 500 randomly selected Ambulance Officers in the ASNSW was conducted in June/July 2006. Officers were sent a letter of invitation and a self-administered 8-page pen-&-paper questionnaire which was developed in consultation with researchers and ambulance officers. Two reminder letters and additional surveys were distributed at 2 and 5 weeks after the initial mail-out to optimise response rate. Data was analysed using SAS statistical software (Version 8.2).

Findings and Conclusions

Results will be presented in relation to the estimated proportions and types of call-outs involving patients affected by alcohol; the current practice and level of confidence in caring for alcohol-affected patients; knowledge of current NHMRC guidelines for risky drinking; attitudes and beliefs towards alcohol; and specific alcohol interventions which officers would be willing to

deliver. This study is unique as it is the first research to explore the potential role of ambulance officers in reducing alcohol-related harm in Australia. The findings provide a greater understanding of the contribution that alcohol makes to incidents attended by ambulance officers and indicate specific alcohol interventions which officers would be willing to deliver.

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Dressings for burn injured patients in the prehospital setting

Abstract 990194-014

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Objectives

To identify the most appropriate dressing(s) for pain relief, wound protection and infection control in acute burns patients in the prehospital setting, as managed by paramedic personnel.

Methods

A comprehensive review of the literature within the Cochrane Library, CINAHL, Medline, All EMB reviews and Embase databases was carried out using a Prehospital filter, a Burns filter and a Dressing filter. There were no restrictions on dates.

Papers were selected based on specified inclusion and exclusion criteria, and assessed on a level of evidence basis as per National Health and Medical Research Council (NH&MRC) guidelines.

Additional information was gathered from discussions and personal communications with burns experts from the Australian and New Zealand Burns Association (ANZBA), the Alfred Hospital burns unit, the Royal Children's Hospital burns unit, the American Burns Association and representatives from the Metropolitan and Rural Ambulance Services of Victoria.

Findings

Over 200 relevant papers were identified, however only a minority were influential in the outcomes of this paper. The majority of influential papers were based on expert opinion and consensus statements from leading burns organisations.

The findings of this review strongly indicate that the use of plastic wrap is the most appropriate prehospital dressing, provided first aid cooling measures have been completed. Additionally, literature was found supporting the combined use of plastic wrap and hydrogels for burn injuries that have not been adequately cooled.

Conclusions

Recommendations developed from this review have the potential to substantially change the practices of burn management currently used by ambulance services in Australia. This review suggests that plastic wrap is an inexpensive and highly effective burns dressing suitable for inclusion in paramedic practice. Plastic wrap provides adequate wound protection and infection control for acute burns, whilst minimising pain and the amount of analgesia required. Further research is required to enhance understanding and the future development of management strategies for prehospital burn management.

How effective is prehospital ventilation in relation to traumatic brain injury? A Literature Review

Abstract 990194-26

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Context

The deleterious effects of hypocapnia and hypercapnia have long been associated with increased mortality in patients with traumatic brain injuries. Several researchers have observed an increasing trend for prehospital personnel to inconsistently ventilate patients with head injuries or major trauma.

Objectives

To review the current literature and investigate the hypothesis that prehospital ventilation during intubated patients with traumatic brain injuries were of suboptimal standard. The findings form a basis for a discussion into the cardio and cerebrovascular effects of secondary insults in patients with traumatic brain injuries.

Methods

In a prospective study conducted by Davis and colleagues,¹ 426 adult severely head injured patients (GCS 3-8) underwent paralysis to facilitate RSI by a trained Paramedic. 59 candidates were subject to electronic monitoring of ETCO₂ and SpO₂, while almost all patients were monitored for ventilation rate. Associations between ETCO₂ and ventilation rates were investigated using linear regression and univariate data analysis. Trial patients were matched to 177 controls and compared with regard to mortality and the incidence of better outcomes using an odds ratio analysis. Helm and colleagues² enlisted 97 trauma patients with severe head injuries in a prospective study in which candidates underwent intubation and were monitored for arterial blood gas pressures on admission to hospital. Prehospital personnel were assigned one of two groups: 1) monitor group (n=57) and 2) monitor-blind group (n=40) whereby the screen of the capnograph was covered from the view of operators. 10ml kg⁻¹ was used as an appropriate tidal volume; ventilation rate and arterial blood gases were used to perform a statistical analysis.

Results

Linear regression performed by Davis and colleagues¹ established a statistically significant association between lowest and highest ETCO₂ value and mortality rate ($r = -0.13$, $p < 0.0001$), while matched-controls confirmed an association between hypocapnia and mortality. Lowest recorded ETCO₂ values were attributed to hyperventilation by paramedics (median 27 bpm, $p < 0.0001$). Helm and colleagues² determined that the incidence of normoventilation in the monitor-blind group was significantly less (20 vs. 63.2%; $p = 0.0001$) and the incidence of hypoventilation was significantly higher (37.5 vs. 5.3%; $p = 0.0001$) than in the monitor group.

The study also demonstrated a tendency for prehospital operators to hypoventilate (n=15, 37.5%) or hyperventilate (n=17, 42.5%) patients if a capnograph wasn't readily accessible.

Conclusions

Both studies demonstrated that prehospital personnel inconsistently ventilated patients with head injuries. Significantly lower levels of ETCO_2 were associated with hyperventilation by paramedics and an increase in mortality rate as concluded by Davis and colleagues.¹ The data also suggests that prehospital operators were unable to establish an appropriate ventilation frequency if not aided by the use of a capnograph.

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Paramedic's Perception of Risk and Willingness to Work during Conventional and Non-Conventional Disasters

Abstract 990194-006

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Introduction

Internationally, and here in Australia, emergency services routinely respond to a range of emergencies and large scale events. Less commonly, emergency services will be required to respond to a mass casualty event or disaster. It may be *expected* that emergency service providers will be both willing and able to respond, regardless of the type of event. In *reality*, emergency responders may be reluctant to work when the situation poses a possible threat to their own safety, their co-workers, or that of their families. Although we might assume that emergency service personnel have an *obligation* to report to work during any kind of event, history has proved that this is not necessarily the case. Reports from the USA, Canada, Asia and Israel highlight that during conventional and non-conventional disasters (such as Hurricanes, outbreaks of infectious disease, warfare and terrorism) emergency healthcare personnel will not always report for duty.¹⁻⁶ **Why?**

Objectives

The two primary objectives of this study were to develop an understanding of paramedic's:

1. Perception of risks involved with responding to conventional and non-conventional disasters;
2. Willingness to report to work during conventional and non-conventional disasters.

Methods

Five paramedic discussion groups were conducted in Victoria, Australia during May and June of 2006. During these discussion groups, scenarios of conventional disasters (train derailment, building bombing) and non-conventional disasters (avian influenza) were discussed. Transcripts of these tape-recorded discussion groups were analysed for recurring themes and salient issues.

Conclusions

Perception of risk and willingness to work differed for the types of disasters. Perception of risk for conventional disasters focused on safety, compared to risk of infection to self and family for non-conventional disasters. A common theme across all disaster scenarios was lack of trust in employers and an expectation that they would be given incorrect information. Paramedic's were more willing to work during conventional disasters ("it's my job", "it's my responsibility") than during non-conventional disasters ("I could get sick", "My family could get sick"). This study has identified the need for a further study to investigate the threshold at which point paramedic's decide the potential risks involved with working are too high for them to be willing to work.

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Note: Ethics approval for this study was granted by the Monash University Standing Committee on Ethical Research in Humans.

How much is too much Midazolam for patients with suspected Psychostimulant toxicity?

Abstract 990194-007

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Objective

To trial a high-dose Midazolam sedation protocol for uncooperative patients with psychostimulant-induced behavioural disorders who presented to the Emergency Department (ED). End-points were safety and effectiveness. The results would assist the design of pre-hospital sedation protocols.

Methods

This was a prospective pilot study of a convenience sample of patients from a teaching hospital emergency department. Participants included 62 uncooperative patients who displayed suspected psychostimulant-induced behavioural disorders. Patients were to be administered Midazolam in 10mg increments, intramuscularly (IM) or intravenously (IV), at 10 minutely intervals, to a point of rousable drowsiness. Rousable drowsiness is defined ideally as sleepy if undisturbed, rouses and cooperates to voice or pain. Ethical approval was gained from the Gold Coast Health Service District Ethics Committee (Research Proposal: 200332).

Findings and Conclusions

Effectiveness: Seventy-five percent of patients were effectively sedated with one or two doses of Midazolam; twenty five percent were not. However, when an alternate class of sedation was administered, rapid sedation ensued.

Safety

For patients believed to be under the influence of psychostimulants the high dose protocol was potentially unsafe in 18% of cases. No major adverse events occurred during the study, however, a prolonged GCS of ≤ 8 was identified in 9 patients. A further four patients required an airway adjunct such as guedel's or nasopharyngeal airway. This protocol was trialled in an ED where rapid access to persons with advanced airway management skills was available. The use of a normal dose (2.5-5mg) initially, to avoid therapeutic overdose and thus identify the unsafe population, is recommended. Non-response to this likely identifies the population requiring a higher dose protocol. The use of this revised protocol in the pre-hospital setting may be beneficial, however further research is needed.

Note: Ethics approval for this study was granted by Queensland Health.

Pre-hospital CPAP feasibility

Abstract 990194-032

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Continuous positive airway pressure (CPAP) has been accepted for many years as a treatment for acute pulmonary oedema (APO) in conscious patients. Typically this is administered in hospital beginning in the emergency department and often continuing on the ward or in the intensive care unit. Anecdotally, paramedics see patients with APO who on presentation at the ED, are struggling to breathe. They are placed on CPAP by ED staff and by the time we finish our paperwork, they are often feeling much better with a significant reduction in their symptoms. What if we could initiate CPAP treatment 20-30 minutes earlier and prevent such a deterioration in the first place.

The first step towards this goal is to show the feasibility of using CPAP in the pre-hospital setting. Only then can we even ask the question about the clinical benefits of earlier CPAP therapy. The scope of this paper is limited to the feasibility study mentioned above. This was conducted in several steps:

- Case card survey regarding identification of APO and estimation of APO incidence
- Equipment and literature survey
- Benchtop verification of device performance
- Ambulance modifications and flow rate testing
- Logistics trial

A case card survey was conducted at 4 ambulance stations in the southern region of Adelaide. Those cases identified by paramedics as suspected APO were followed up in-hospital for consent and to determine actual diagnosis. This survey provided confidence in the ability of paramedics to diagnose APO, and allowed extrapolation of case numbers for financial planning.

A variety of CPAP flow generators were obtained and tested in the laboratory to verify their performance and determine oxygen consumption. Current ambulance configuration incorporates two “D” size cylinders on-line with a 3-way selector valve in the patient compartment for change over. At a nominal flow rate of 100 litres per minute, a full D cylinder would last approximately 20 minutes. A portable “C” size cylinder would last approximately 5 minutes. Given these figures, it was decided to attempt a logistics trial.

It was determined that the stock 3-way selector valve introduced too much flow restriction. A larger valve and tubing was procured and installed in the ambulance to be used for the logistics trial. 12 patients with APO were treated with the CPAP system in the ambulance over a period of 6 months. Crews reported minimal hassles with the system, and general patient improvement. The South Australian Ambulance Service is currently considering options for further testing or implementation.

The rural and regional paramedic: a hospital based role

Abstract 990194-012

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The South Australian Ambulance Service (SAAS) has established a process where rural hospitals can enter into an agreement with the ambulance service to supply an Intensive Care Paramedic for emergency departments when a medical officer is unavailable. An over-worked Director of Nursing first suggested the idea to regional ambulance service staff and they and the Ambulance Service Medical Officer further developed the concept into a workable solution to a local problem.

Presenting patients are treated following the standard hospital and ambulance service clinical practice guidelines, without the need for any additional skills or training. In the event of treatment outside the standard guidelines being required, the Intensive Care Paramedic contacts the Ambulance Service Medical Officer for advice, support and treatment regimes. The intention is, where ever possible, to allow the patient to remain in the local hospital and remove the need for unnecessary transports.

This innovative paramedic role was developed in late 2003 and then offered to small isolated rural hospitals in South Australia. SAAS nominated it as one case study in a larger national research project examining the emerging roles of rural and regional paramedics.

Based on the literature review, the final thematic analysis used qualitative methods: document reviews, site visits to two communities where observations were made and eleven interviews were conducted with ambulance service staff (paid and volunteer), health professionals and members of the public.

The local Directors of Nursing strongly support the program as it removes from them the burden of being totally responsible for emergency patient care. Community members indicate that they felt safe in knowing that when there is no medical practitioner presence in the area they could still obtain quality medical treatment should the need arise. Local volunteer ambulance officers also feel confident in handing over the care of their patients to an Intensive Care Paramedic. Local General Practitioners have some reservations, but accept its value in limited circumstances. Paramedics are willing and enthusiastic participants in the program - applying clinical skills in a new setting, interacting with community, and team working with health providers.

The development of an in-hospital role for Intensive Care Paramedics demonstrates the capacity of ambulance services to work more closely with the health system in rural areas. The program is a strong example of the value of generating creative local solutions to local health workforce problems with the support of State government health authorities.

Note: Ethics approval for this study was granted by Charles Sturt University Ethics in Human Research Committee.

**Pre-employment education and the creation of an academic discipline:
Where does that leave the rest?**

Abstract 990194-031

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Objectives

To address the issues confronting the future paramedics of ambulance services across Australia, comparing between current students of the traditional post-employment programs and the future paramedics from pre-employment degrees.

Methods

A questionnaire has been developed to compare and evaluate between pre-employment (Diploma of Ambulance Paramedic Studies [DAPS]) and post-employment (Bachelor of Emergency Health [BEH]) students studying at Monash University. Students will be asked to complete an anonymous questionnaire that will address the following aspects: age, gender, capacity to undertake pre-employment degrees, prior academic qualifications and prior employment history. It is intended this survey will provide an analysis of the educational//professional landscape of the current post-employment and pre-employment students.

Study Design

A cross-sectional survey design using a paper-based questionnaire will be adopted in this study comparing DAPS and BEH students studying at Monash University during semester 2, 2006. The questionnaire will assess the student's educational/professional background using Likert Scale responses to statements. The questionnaire will use a 4-point Likert-Scale, '1' being 'strongly agree' and '4' being 'strongly disagree'. Several open-ended questions will also be used to explore further qualitative themes.

Findings

The findings are pending on return of surveys and analysis of results. This will be completed in early October.

Conclusion

The authors conclude that the findings of the survey will highlight and reveal pertinent issues that currently confront the students of post-employment and pre-employment programs. It is also

anticipated the study will emphasise the existing and future challenges the paramedic profession will need to urgently address in the next five years.

Note: Ethics approval for the study was granted by the Monash University Standing Committee on Ethical Research in Humans.

What is the Best Form of Head Support on a Long Spineboard? - A Review of the Literature

Abstract 990194-011

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Introduction

Prehospital spinal injury management in the USA follows rigid guidelines with the use of various head immobilisation devices. Many of these devices are often designed and promoted by Doctors with vested interests and lack evaluation by rigorous scientific studies. Australia, to some extent, has tended to follow the USA by using selected immobilisation devices without additional scrutiny, especially of applicability in the Australia context. Until now there has not been a thorough evaluation of prehospital spinal injury management using a rigorous scientific methodology. The objective of the study was to review the current prehospital literature on head immobilisation for patients secured to a long spine board and compare this with current Victorian practice.

Methods

We searched the Medline, EMBASE, CINAHL, and Cochrane CENTRAL electronic databases from their beginning until the end of February 2006. The titles and abstracts of all located articles were reviewed by one author to determine their relevance for further review. The articles deemed relevant for additional review were sourced, these articles were then reviewed by one author for their relevance to the prehospital setting and then for inclusion into this study. The reference list of all relevant articles was reviewed to determine if there were any articles we had missed.

Results

The electronic database search located approximately 5,500 articles, after the title and abstract review there were 220 journal articles to be sourced. Following the review of the articles there were 152 deemed relevant to the prehospital setting. Two additional articles were located when reviewing the reference lists, giving a total of 154 prehospital relevant spinal injury management articles. After reviewing these articles we found one article that was relevant for inclusion into this study. There were three methods of immobilisation identified: rolled towels, a headbed, and styrofoam wedges.

Conclusion

Three different methods of head immobilisation, rolled towels, a headbed, and styrofoam wedges were identified and compared. Whilst no method eliminated head movement completely, it was found that placing wedges underneath the head provided some small improvements in

immobilisation of the head to the long spine board. There are a number of different methods currently being used in the Victorian prehospital setting. This study supports the use of rolled towels, however other devices used in Victoria do not appear to be supported by evidence. This review has shown there is little evidence to inform practice and thus further research is recommended.

The metamorphosis of undergraduate pre-employment paramedic students

Abstract 990194-001

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Introduction

The commencement of each undergraduate study year brings students with a broad range and variety of learning styles, therefore to ensure the author's teaching remains multidimensional a student educational needs analysis is undertaken. The objective of the study was to map the learning needs and potential learning requirements of undergraduate paramedic students' undertaking the Bachelor of Emergency Health (BEH) at Monash University.

Methods

The population for the study was a convenience sample of students enrolled in semester one of the second year of the BEH over a three year period, 2004-2006.

A cross-sectional survey design using a paper-based questionnaire was used. A previously validated questionnaire utilising a "tick box" format was used, additional student data, age and access to Internet at home, was also added to the questionnaire.

The results of the Likert scale responses are reported using descriptive statistics.

Results

A total of 104 students undertook the questionnaire.

The results covering students over the three year period has identified that (66%) of our enrolled BEH students have been females with (34%) of male students. Further analysis has also highlighted that (58%) of students are considered 'Net Geners' [24 years and younger], (38%) 'Generation X' [24-44 years] and (2.5%) 'Boomers' [44 to 64 years]. Finally over two-thirds (71%) of students have Internet (broadband [ADSL] or cable) access at home.

Conclusion

These findings are an important landscape of the learning needs analysis of the BEH students. This provides the author with flexibility to adjust teaching and learning approaches, particularly if the student group are disadvantaged or less confident with web-based education, due to age, gender or Internet access. The findings of this study also suggest teaching staff must consider if their teaching styles and methods are meeting the requirements of neomillennial learners and what contemporary web-based educational approach they might incorporate into their teaching practice.

Note: Ethics approval for the study was granted by the Monash University Standing Committee on Ethical Research in Humans.

Web-based examinations in undergraduate paramedic education – Results from an attitudinal study

Abstract 990194-002

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Objectives

This paper presents the results of a descriptive study that aimed to identify undergraduate paramedic students' attitudes undertaking web-based examinations (WBE) via the e-learning platform – WebCT.

Methods: Following the completion of the web-based examination second year Bachelor of Emergency Health (BEH) undergraduate students at Monash University (n = 94) were asked to complete a questionnaire that was designed to obtain information about their attitudes of WBE.

Study Design

A cross-sectional survey design using a paper-based questionnaire was adopted in this study comparing second year students from semester 1, 2005 and semester 1, 2006. The questionnaire was adopted to assess the students' attitudes to WBE using Likert Scale responses to statements. The validated questionnaire utilised a 4-point Likert-Scale, '1' being 'strongly agree' and '4' being 'strongly disagree'.

Data Analysis

The Likert scale responses were analysed using SPSS (Statistical Package for the Social Sciences, Version 14.0. SPSS Inc., Chicago, Illinois, U.S.A.) to determine whether there were any statistically significant differences in students' perceptions and in their attitudes towards WBE in their clinical undergraduate subject.

Findings

The statistical analysis aimed to identify whether any statistically significant differences existed between the second years from 2005 and 2006 and attitudes of the efficacy of WBE as an assessment tool in undergraduate paramedic education at Monash University. Analysis of the Likert responses showed that the second year cohort [2005] had an overall mean satisfaction score of 1.51 (SD 0.55, $p < 0.03$) and was similar to the [2006] cohort mean score of 1.73 (SD 0.58, $p < 0.03$). A t-test revealed that there were no significant differences ($t = -1.84$ $p = 0.06$) in students' perceptions and attitudes towards WBE.

Conclusion

Overall analysis of the two groups combined shows that the students generally enjoyed and preferred WBE as an assessment tool compared to paper-based examinations. This study also

emphasises that WBE are a more efficient way for lecturers to conduct non-teaching activities such as written examinations.

Note: Ethics approval for the study was granted by the Monash University Standing Committee on Ethical Research in Humans.

Estimation of external blood loss: is there any point?

Abstract 990194-030

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Background

The prehospital setting provides many challenges in patient assessment in a variety of clinical surroundings. One of these challenges includes the visual estimation of external blood loss, which not only corresponds with subsequent prehospital treatment but also can often dictate and influence hospital management. This study will establish if undergraduate paramedic students are accurate at estimating external blood loss on a variety of surfaces. The study will also establish if teaching practices require modification in regard to blood loss estimation in paramedic education.

Methods

This pilot study used a convenience sample of (n=134) undergraduate students studying at Monash University in semester 1, 2006. They were recruited to participate using a prospective observational design. Students were provided with four clinical cases using different surfaces and varying simulated blood amounts (vinyl [100ml], concrete [1500ml], clothing [500ml] and carpet [1000ml]). Students were asked to visually observe the estimated blood loss – results were entered onto a data collection form. The students were not permitted to change an estimation once it was recorded. The results of the visual estimation responses are reported using descriptive statistics. Ethics approval for the study was granted by the Monash University Standing Committee on Ethical Research in Humans.

Results

Accurate estimation occurred with the vinyl simulation (100mls) with a mean estimation of 98ml (95% CI 84 to 113, range 5ml to 500mls). Analysis showed the carpet and concrete surfaces were both associated with large underestimations. The carpet simulation (1,000mls) had a mean estimation of 347ml (95% CI 320 to 429, range 15ml to 2,000mls). The concrete simulation (1,500mls) had a mean estimation of 885ml (95% CI 771 to 999, range 100mls to 3,000mls). Conversely the clothing simulation (500mls) emphasised underestimation, with a mean estimation of 1253ml (95% CI 1093 1414, range 60mls to 4,500mls). There was no relationship between increased accuracy and clinical experience or exposure, although some relationship does exist with gross inaccuracies and demographics with students <21 years of age.

Conclusion

External blood loss estimation by undergraduate paramedic students is generally too inaccurate to be of any clinical benefit. Particular absorbent and impermeable surfaces precipitated inaccuracies by undergraduate paramedic students. The findings support previous studies that visual estimations of external blood loss by paramedics are generally too inaccurate to be of any clinical benefit. This does however, highlight a pertinent teaching point that should be included in all National paramedic education and training curriculum.

Note: Ethics approval for the study was granted by the Monash University Standing Committee on Ethical Research in Humans.