Abstracts selected through 999 EMS Research Forum peer review process, and presented orally or by poster at Ambex 2002

Oral presentations

[1] CAN ‘TREAT AND REFER’ PROTOCOLS BE SAFELY INTRODUCED INTO THE AMBULANCE SERVICE?: RESULTS OF A CONTROLLED TRIAL

Objective: This study was designed to determine which of two nallbuphine dosing regimens combines the greater analgesic effect with the minimum of adverse events.

Methods: Randomised controlled trial of 172 patients suffering from chest pain, long bone fractures, or burns and administered nalbuphine by paramedics in north and south-east Wales. Group A patients received a 10mg dose of nalbuphine over 30 seconds followed by one further identical dose after three minutes if the pain score remained above 3. Group B patients received a 3mg dose over two minutes, repeated at three minute intervals until the pain score fell below four or the maximum cumulative dose of 20mg had been administered. Data were collected on analgesic effectiveness, changes in vital signs, and the incidence of patient-reported side effects.

Results: The pain score fell by a mean of 4.29 in group A compared with 3.49 in group B, a difference of 0.79 (P=0.028, 95% CI 0.085 to 1.5). However, over half the patients in each group continued to suffer moderate to severe pain at the time of arrival at hospital.

There were no significant between-groups differences in changes in vital signs following nalbuphine. Although pulse and respiratory rate, systolic blood pressure, and Glasgow Coma Score fell in both groups, the magnitude of the reductions was not considered to be clinically important.

Conclusion: A rapid dosing regimen of nalbuphine using 10mg increments is more effective and equally as safe as a cautious regimen utilising 5mg increments. Further research is required to determine if a cumulative dose of greater than 20mg would result in fewer patients continuing to suffer significant pain at the point of arrival at hospital.

Background: The number of 999 calls is rising, and some callers have been shown to have non-urgent needs. Evidence concerning the effectiveness of alternatives to the standard 999 service is lacking, although previous studies have highlighted clinical risk for some non-conveyed patients.

Objective: To evaluate the safety of ‘Treat and Refer’ (T&R) protocols for ambulance crews, allowing them to leave patients on scene, with advice or onward referral.

Methods: Treatment protocols were developed by a clinical panel and implemented in one station May - August 2000. Outcomes of care for patients within defined illness codes and attended by trained crews were compared with similar patients attended by crews from a neighbouring station. Pre-hospital, A&E and GP records were collected.

Results: 23 protocols were developed. 260 patients were included in the intervention arm and 367 in the control arm of the study. There were no age / sex differences between groups although intervention patients were more likely to have been attended during the week (χ² = 4.28, p = .05) and daytime (χ² = 6.75, p = .01). After follow up at A&E and GPs there were 62 patients for whom no information was retrieved.

Conclusion: Clinical risk was identified in both study groups. However, in the intervention arm this appeared to be a training issue, which might be avoided with optimal protocol usage. With a relatively small sample size, a considerable number of protocols and low rate of adverse incident, safety of this intervention needs to be further explored.

LESS IS LESS: A RANDOMISED CONTROLLED TRIAL COMPARING CAUTIOUS AND RAPID NALBUPHINE DOSING REGIMENS

M. Woollard, R. Whitfield, K. Smith, T. Jones, G. Thomas, C. Hinton. 1Pre-hospital Emergency Research Unit, Welsh Ambulance Services NHS Trust, University of Wales College of Medicine, Cardiff, UK; 2Welsh Ambulance Services NHS Trust, Pontypool, UK; 3Welsh Ambulance Services NHS Trust, St Asaph, UK

Objective: This study was designed to determine which of two nalbuphine dosing regimens combines the greater analgesic effect with the minimum of adverse events.

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THE OUTCOME OF PATIENTS IDENTIFIED AS DEAD (BEYOND RESUSCITATION) AT THE POINT OF THE 999 CALL

L. Harvey, M. Woollard. Pre-hospital Emergency Research Unit/Welsh Ambulance Services NHS Trust, University of Wales College of Medicine, Cardiff

Background: Currently, an emergency ambulance is dispatched to all cardiac arrest victims. It has been suggested that a non-emergency response may be appropriate if patients are identified as dead (beyond resuscitation) at the point of the 999 call. The Medical Priority Dispatch System (MPDS) code for such cases is 09B01 (obvious death).

Objective: To investigate the outcome of patients coded as 09B01 and consider the feasibility of dispatching a non-emergency (category C) response.

Methods: Dispatch records, patient report forms (PRFs) and hospital records were reviewed to determine patient outcome.

Results: Within the one-year study period 141 emergency calls were coded as 09B01. Records were obtained for 59 of these cases (42%). Of the retrieved cases 54 were diagnosed as dead (beyond resuscitation) by ambulance crews (91.5%, 95% CI 79.5 to 96.2%).

Three received resuscitation attempts by ambulance crews (5.1%, 95% CI 1.1 to 14.2%).

2 were subsequently pronounced dead at scene.

1 was pronounced dead on arrival at A&E. Two of the patients were not in cardiac arrest (3.4%, 95% CI 0.4 to 11.7%).

One assault victim who had transiently lost consciousness.

One road accident victim with a hand injury.

A total of three patients coded as 09B01 were transported to hospital for treatment other than confirmation of death (5.1%, 95% CI 1.1 to 14.2%).

Conclusion: Although our study was limited by the poor data recovery rate and its small sample size, we identified that not all patients identified as ‘dead beyond resuscitation’ by dispatchers were assessed as such by ambulance crews. Consequently, this study’s findings suggest that it is not appropriate to allocate a non-emergency response to 09B01 (obvious death) calls.
Further research is required to find the causes of coding errors and to determine the sensitivity of the MPDS in detecting all cases of obvious death.

**4. COLLABORATIVE STUDY OF THE PRE-HOSPITAL CARE OF CARDIAC PATIENTS**

C. James, D. Lee, G. Smith. West Yorkshire Metropolitan Ambulance Service NHS Trust, Threelands, Bradford Road, Birkenshaw, Bradford

**Background:** The NSF for CHD sets the standards for the management of patients with acute myocardial infarction. Our aim was to find out if services were meeting these targets. The majority of similar studies only include confirmed MI patients. Our research was to include patients with symptoms suggestive of MI in the pre-hospital setting.

**Methods:** A cross-sectional study, of patients admitted to four hospitals in West Yorkshire between July and October 2001. Semi-structured interviews were conducted and quantitative data gathered from the hospital notes. Times of events were recorded and qualitative information gained from the patient interview.

The inclusion criteria was adults (aged 18+) admitted to hospital with symptoms suggestive of MI with a working diagnosis of suspected MI not in the admission documentation.

**Results:** 1013 patients were admitted to the hospitals and met the inclusion criteria during the study period, 660 were interviewed.

Only 50 (9%) patients out of 558 that called for help to 999, GP or NHS Direct arrived at hospital within the 30 minutes as stated in the NSF for CHD. 322 (49%) patients contacted their GP first, with nearly half of these patients having a previous cardiac history.

Symptom onset was when the patient was at home in 79% of patients. The longest delay factor in getting to hospital was the patient deciding to call for help. In 51% of patients it was someone else other than the patient that made the decision to call for help. Patients who had previous cardiac history were no quicker at making the decision to call for help than those without a cardiac history (table).

**Conclusion:** Regardless of whom the patients call for help the majority (91%) did not get to hospital within the NSF standard of 30 minutes.

**Recommendations:**
- Formal triage when patients contact GP's, nurses and development of alternative treatment models within primary care.
- Review the rehabilitation and education of patients with cardiac history and those at risk of CHD, and include their partners.
- Consider CPR training for partners/relatives of patients at risk and public education campaigns to increase awareness and reduce delays.

**5. DOES PRIORITY DISPATCH MEAN DISPATCHING BY PRIORITY?**


**Background:** Since March 2001 the performance target for ambulance services in England and Wales has been to reach 75% of those calls deemed by the DoH as being immediately life-threatening (Category A) within 8 minutes. Prioritising emergency calls, through the use of a priority dispatch system, should allow resources to be focused on the most seriously ill and injured patients and provide them with a faster response. Whilst many services have now reached the required standard, it has been suggested that this has been achieved by simply improving the response to all patients. The dispatch of an ambulance as soon as the location is known, and before the severity of the patients condition is identified, is considered key to this success.

**Objective:** To determine whether the priority level assigned to emergency calls affects the speed of the response.

**Method:** The response time for all responses by the London Ambulance Service (LAS) during March 2002 was measured against the 8-minute standard. The performance within each priority level was calculated (the LAS divides calls into seven priority levels).

**Results:** During March 2002 the LAS responded to 60,952 emergency calls. RED calls are those that are targeted for an 8-minute response, and include those defined by the DoH as Category A. GREEN calls are those described by the DoH as Category C (table).

**Discussion:** It is clear that the speed of response by the LAS is affected by the priority level assigned, with calls in the highest level (RED) being more than twice as likely to be reached within 8 minutes as those in the 2 lowest priority levels (GREEN 1 and 2).

**Posters**

**6. THE SENSITIVITY OF AMPDS IN DETECTING CARDIAC ARREST**

Winner of the Emergency Medicine Journal award for Best Poster


**Introduction:** CPR is an essential part of the “Chain of Survival” and is vital to the survival of cardiac arrest patients. Early CPR administration potentially leads to improved patient outcome with the chance of survival increased by up to 50%. Telephone CPR instructs callers with no CPR training so they can start the intervention much earlier. To provide these instructions, the caller needs to identify that the patient is in cardiac arrest. Over 97% of ambulance services in the UK use the Advanced Medical Priority Dispatch System to triage their emergency calls, but currently there is no published data in this area.

**Objectives:** To examine the sensitivity of AMPDS in identifying patients in cardiac arrest.

**Methods:** A retrospective analysis was undertaken using a consecutive sample from a one-month period (April 2001). The sample comprised of 100 patient report forms in which ambulance crews identified the patients as being in cardiac arrest. The AMPDS coding and subsequent response level allocated to the 100 cases was examined.

**Findings:** 47% of cases were identified by AMPDS as cardiac arrests. A further 16% received a subsequent update that the patient had suffered a cardiac arrest. 30% were coded as unconscious. In total 93% of all cases received the highest response level (Category ‘A’) available. Of the remaining 7%, 5 cases received a Category ‘B’ response level and 2 cases received a Category ‘C’ response level, these cases are currently being reviewed.

**Conclusions:**
- The sensitivity of AMPDS is very dependent upon the information provided by the caller and as such, the triage decision can only be as good as this information. Also, the study used small numbers with data originating from one ambulance trust.
- Contrary to expectations, AMPDS is not particularly sensitive at identifying patients in cardiac arrest. As such, an element of clinical risk exists in dealing with this patient group. If a caller does not give information consistent with a cardiac arrest, telephone CPR instructions will not be offered. It is evident though, that AMPDS is sufficiently sensitive to identify potentially serious cases and allocates appropriately high response levels in the majority of cases.
Factors that Influence Retention and Attrition Amongst Volunteer Community First Responders within the North East Ambulance Service NHS Trust

C. Cessford, G. Marley. North East Ambulance Service (NEAS) NHS Trust, Ambulance HQ, Amethyst Road, Newcastle Business Park, Newcastle upon Tyne

Introduction: The National Service Framework for Coronary Heart Disease (CHD) was published in 2000. Standard 5 states: People with symptoms of a possible heart attack should receive help from an individual equipped with and appropriately trained in the use of a defibrillator within 8 minutes of calling for help, to maximise the benefits of resuscitation should it be necessary. Community based First Responder schemes, correctly deployed, offer the potential to achieve a faster response than conventional ambulances and a number are now well established within the NEAS. Evidence indicates that these schemes are subject to high volunteer turnover.

Aim: This research seeks to identify the factors contributing to the recruitment and retention of first responders in order that all ambulance services are able to minimise their attrition and thereby allocate scarce resources to first responder schemes more effectively.

Method: Qualitative data collection method of naturalistic design that uses small easy to assemble sets of people in ‘focus groups’. This method was used on two different groups from similar experiences and background. Each group was asked to discuss a number of themes and offer opinions based on personal experience. Subsequent data is presented in the form of a Pareto Analysis of all of the themes found during interview with associated qualitative comment appended where relevant.


Limitations: Both groups were structured from similar age groups, sex mix, approximate background, employment history and number of callouts. A more varied structure may give different responses. No evidence of statistical significance.

Abstract 7

<table>
<thead>
<tr>
<th>Priority level</th>
<th>% calls reached within 8 minutes</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED 1</td>
<td>86%</td>
<td>89% - 84%</td>
</tr>
<tr>
<td>RED 2</td>
<td>70%</td>
<td>71% - 69%</td>
</tr>
<tr>
<td>RED 3</td>
<td>68%</td>
<td>68% - 67%</td>
</tr>
<tr>
<td>AMBER 1</td>
<td>48%</td>
<td>49% - 48%</td>
</tr>
<tr>
<td>AMBER 2</td>
<td>44%</td>
<td>45% - 43%</td>
</tr>
<tr>
<td>GREEN 1</td>
<td>42%</td>
<td>43% - 41%</td>
</tr>
<tr>
<td>GREEN 2</td>
<td>34%</td>
<td>36% - 34%</td>
</tr>
</tbody>
</table>

Conclusions: First Responders, given the opportunity, have strong feelings regarding the efficacy of their first responder scheme and addressing the identified reasons for leaving may result in lowering attrition rates.

The Risks of Using Lights and Sirens for Category ‘C’ Calls

S. Griffiths1, C. Hartley-Sharpe2, E Glucksman3. ‘King’s College London, Strand, London; 1London Ambulance Service

Introduction: Ambulance services in England & Wales prioritise ‘999’ calls, using one of two Department of Health approved priority dispatch systems, into one of three priorities: Category ‘A’ (immediately life-threatening); Category ‘B’ (serious); Category ‘C’ (non-serious). Services are required to achieve the same 14-minute response time standard for both Categories ‘B’ and ‘C’, and to respond to Category ‘A’ calls within 8 minutes. The impact of prioritisation on accident rates involving emergency vehicles responding on blue lights and sirens has not previously been investigated.

Objective: To determine whether the rate of emergency vehicle accidents is related to the priority of the call.

Methods: The priority level for all accidents involving emergency vehicles responding with blue lights and sirens was identified from the London Ambulance Service accident database. The accident rate was calculated in relation to the total number of responses in each category. Existing accident reports do not provide a measure of accident severity.

Results: There were an additional 52 accidents for which a priority level could not be identified. Therefore, overall accident rate including this missing data was 5.2 / 10,000.

Accident rates for Category ‘A’ calls were nearly double those of Categories ‘B’ and ‘C’. The higher accident rate for Category ‘A’ compared to Category ‘B’ was highly significant ($\chi^2=13.06$, $P=0.003$) while Category ‘A’ compared to Category ‘C’ was significant ($\chi^2=6.32$, $P=0.012$) (table ).

Discussion: Although a higher accident rate when responding to immediately life-threatening (Category ‘A’) calls may be understandable, an accident rate for serious (Category ‘B’) calls being similar to that non-serious (Category ‘C’) calls is difficult to explain.

Conclusion: Further consideration should be given to a non-blue light response to non-serious (Category ‘C’) calls.

Sport Injury Care in Post Primary Schools in Ireland

L. Abernethy1, D. MacAuley2, O. McNelly3, S. McConi1. 1Accident and Emergency Department, The Ulster Hospital Derrindonald, Belfast; 2Department of Epidemiology and Public Health, The Queens University of Belfast; 3School of Nursing University of Ulster

Background: School sport is a major cause of injury in the post primary age group. Most injuries are minor but more serious injuries are potentially catastrophic, and appropriate management may influence outcome.

Objective: To explore the current management of sport related injury in schools, and to identify areas where care could be improved.

Method: A postal questionnaire study of a random sample of 150 schools in Northern Ireland (NI) and 300 schools in the Republic of Ireland (ROI). Data was collected on school size, location, sport participation, and training of sports personnel. Potential response to injury was explored using scenario testing.

Results: We received replies from 333 (74%) schools. There was no PE teacher with first aid training in 37% of schools. A portable first aid kit was always available in 35%, and communication with emergency services was always available by telephone in 49% or 81% of...
The shocking truth: The outcome of patients who have been electrocuted but with no symptoms at the point of the 999 call

M. J. Morrison, M. Woollard. Pre-hospital Emergency Research Unit/Welsh Ambulance Services NHS Trust, University of Wales College of Medicine, Cardiff

Objective: To determine whether patients who have been electrocuted but who have no significant symptoms at the point of the emergency call could be triaged to a non-emergency ambulance response using Medical Priority Dispatch System (MPDS) protocols.

Methods: Welsh Ambulance Services NHS Trust dispatch records were searched to identify all patients allocated the MPDS code ‘15C01’ [electrocution without priority symptoms] in a thirty-month period. Patient report forms completed by ambulance crews were located and reviewed for details of injuries sustained. Receiving hospitals were contacted to request information on the outcome of each patient.

Results: We identified 52 cases during the study period. Nine refused ambulance transport (17%, 95% CI 8.2 to 30.3%). Twenty-three were discharged shortly after admission (45%, 95% CI 30.5 to 58.7%) and 11 patients in this group received no treatment (21.2% of the total, 95% CI 11.1 to 34.7%). Forty-four patients had suffered burns (27%, 95% CI 15.6 to 41.0%). Thirteen patients were admitted or transferred to another hospital (25%, 95% CI 14.0 to 39.0%). We were unable to obtain hospital data for seven patients (13%).

Conclusion: The patients described were documented as having no significant symptoms at the point of the emergency call. However, a significant proportion required hospital admission. The current version of the MPDS electrocution protocol does not include questions to determine the presence of burns or pregnancy, both of which represent a clinical risk.

The evidence found during the current study offers no justification for allocating a low-priority response to patients who have been electrocuted but who report no significant symptoms at the point of the emergency call. Further research is required to determine if the addition of questions to the MPDS concerning burns and pregnancy would allow the safe allocation of a non-emergency response to other asymptomatic electrocution patients.

FIRST RESPONDERS IN NORTHUMBERLAND

I. Mulholland, R. Farvis, G. Marley, C. McAllister. North East Ambulance Service, University of Newcastle upon Tyne, Scotswood House, Amethyst Road, Newcastle Business Park, Newcastle upon Tyne

Introduction: The National Service Framework for Coronary Heart Disease (CHD) was published in 2000. One of the standards of this document is particularly relevant to the Ambulance Service. Standard 4 states: People with symptoms of a possible heart attack should receive help from an individual equipped with and appropriately trained in the use of a defibrillator within 8 minutes of calling for help, to maximise the benefits of resuscitation should it be necessary. Establishing Community-based First Responder schemes will contribute towards optimum care for CHD patients.

Aim: This project aims to prioritise areas in Northumberland where first responders would be of most benefit to the community.

Method: Call data for each area including frequency of calls and average response time for category A calls over a 6 month period were collected from ambulance control. As there are many known risk factors for coronary heart disease, census information was used to calculate the level of risk in each area. Each area received a ranking towards optimum care for CHD patients.

Results: We ranked the areas in Northumberland in order of priority using 3 variables as shown in the figure.

AN INVESTIGATION OF SECONDARY SCHOOL STUDENTS KNOWLEDGE OF THE SIGNS AND SYMPTOMS OF CARDIAC ARREST AND WHAT ACTIONS ARE REQUIRED IN THIS SITUATION


The success rate recovery from for cardiac arrests in the UK is poor particularly in community settings. Despite having a substantial amount of research on cardiac arrests and the procedures, there is little research concerning school students’ understanding of cardiac arrests and what to do if they encounter such a problem.

In order to determine school students’ knowledge of signs and symptoms of cardiac arrest, and to evaluate what actions the students...
would take in this situation, a survey questionnaire was developed. A convenience sample comprising of 152 fifteen and sixteen year-old students from an inner London secondary school were recruited to participate in this study. The gender mix of the group included 83 females and 69 males.

The questions were structured as multiple-choice questions having one correct answer from a possible choice of five. Data analysis revealed a wide range of accuracy in the answers. An extreme lack of knowledge was evident in questions that were evaluating levels relating to specific skills within Cardiac Pulmonary Resuscitation (CPR) i.e. number of compressions per minute (9.2% of the group answered correctly). However, there were extremely high levels of accuracy in other more general areas of knowledge i.e. how participants would summon help (92.7% of the group answered correctly).

Despite being an initial, exploratory piece of research, without integration to generalise from the findings, it can be suggested that within this group of school students there is clearly a knowledge deficit, which may inhibit the delivery of successful CPR. Further research is required to establish whether these findings are representative of other school students. If this is the case, it could provide a rationale for incorporating education/training about CPR into formal programmes of education to ultimately increase the possibility of survival from cardiac arrest in community settings.

**AN EXPLORATORY STUDY OF SECONDARY SCHOOL STUDENTS’ UNDERSTANDING OF THE EMERGENCY AMBULANCE SERVICE**

J. Donaghy. London Ambulance Service (University Of Hertfordshire)

Amidst increasing research into issues of appropriateness of use of the emergency ambulance service, there appears to be a dearth of empirical work focusing on school students’ experiences within this area. This study began to address this deficit by involving students from an inner London secondary school, in research designed to explore participants’ knowledge and understanding of the emergency ambulance service. Recruited through random sampling, ten students, from Year 12, participated in semi-structured interviews enabling depth exploration of topic areas. Interviews were audio taped and transcribed verbatim in preparation for data analysis. Rigorous processes of thematic analysis identified three emergent key themes: Media Influence; Perception of Pre-Hospital Emergency Care; Education. The findings suggest that participants had difficulty in clearly articulating their understanding of the emergency ambulance service. Their perceptions appeared to be influenced by programmes seen on the television or through portrayal of ambulance services by other mass media. Participants who had used the service themselves, or knew of someone who had, held a more precise view than participants who had no direct experience of the service. Interestingly, participants wanted paramedics to become actively involved in education about health issues within school settings. Being a small scale, exploratory study, the findings cannot be generalised. Further research is required to establish how representative these findings are, in relation to other school students. However, even within this sample, there was clearly a need to increase participants’ awareness of the functions of the emergency ambulance service. Further investigation might usefully explore the potential for expansion of this research to cover other schools.

**CAUSES, EFFECTS AND MANAGEMENT OF STRESS IN PARAMEDICS**

M. Catterall, G. Dean.

Completed in fulfilment of a BSc(hons) Paramedic Science, University of Hertfordshire

Objective and Aims: The majority of published research literature examines stress and it’s effects in American Paramedics, utilising qualitative methodologies. The multifaceted provision of pre-hospital care in America limits their comparability to British Paramedics. This area demands a qualitative approach to examine British Paramedics and their experiences of stress and its effects. Therefore the aims were to explore which events paramedics perceive to be distressing, what effects, if any are exhibited and how paramedics manage these effects.

Methodology: Eight operational paramedics from NHS trusts participated in semi-structured interviews to generate the data. Each interview was transcribed, then analysed utilising thematic analysis. The process generated four themes from the literature, individually constructed from subs-sets of the raw data. Interspersed within the analysis of each theme are excerpts from published literature, facilitating a direct comparison of the study’s findings and assuring validity. The results are illustrated with unidentifiable excerpts from the cassette recording transcriptions.

Results: Theme 1: The precipitators of stress composed from the component categories: of their colleagues, perception of the emergency call, working conditions and their personality. One paramedic revealed a fear of blame within their personality: ‘‘. . . when you feel that you have not done something right, I guess that you sometime criticise yourself...’’

Theme 2: The effect of stress upon paramedics and contains the following component categories: acute, delayed, and cumulative and positive. One paramedic identified the positive effects of stress occurring from: ‘‘I’ve never suffered any sort of stress or any sort of illness through trauma related, you know a bad job, or whatever. Perhaps I quite enjoy it...’’

Theme 3: The coping mechanisms employed by paramedics. Categorised as in-work, out of work, the barriers to accessing coping mechanisms and the professional constraints placed upon paramedics. One paramedic felt the professional constraints can occur from: ‘‘. . .if you are not working with someone who you feels, felt the same - then you have to hold it until you get home.’’

Theme 4: The support available for paramedics. The components are available from their managers, within the pre-hospital care culture, from counselling services available at their workplace and from their experience of critical incident stress management services. One paramedic commented about counselling services that: ‘‘I don’t think going off to Stress Counsellors, Counsellors or outside people to be helpful, they don’t understand the environment we work in...’’

Conclusions and Recommendations: The causes of stress in British paramedics are multifocal and often exert a large effect from within their occupational environment. However the effects of exposure to stress can be exhibited both positively and negatively and British paramedics are reluctant to access professional intervention services due to their negative perceptions. As these areas affect both the psychological and physical welfare of paramedics the management of Ambulance Trusts should address them. Paramedics also require further research in to positive effects of stress.

**ALTERNATIVES TO THE STANDARD RESPONSE FOR 999 AMBULANCE SERVICE CALLERS WITH PROBLEMS THAT ARE NOT LIFE-THREATENING NOR SERIOUS**

H. Snooks 1, S. Williams 2, R. Foster 2, C. Hartley-Sharpe 2, J. Dale 1

1Clinical School, University of Wales Swansea, Singleton Park, Swansea; 2University of Southampton; 3London Ambulance Service NHS Trust, ‘University of Warwick’

Background: Ambulance services are obliged to respond immediately, with a paramedic staffed lights and sirens vehicle to a rising number of 999 callers, some of whom have been shown to have non-urgent needs. Recent emphasis has been placed on crossing traditional boundaries to provide appropriate care, highlighting the need to integrate the 999 service into the emergency/unplanned care system and understanding the emergency ambulance service and its role in health care.

Objectives: To review the evidence concerning effectiveness and safety of alternatives to the standard emergency ambulance response for non-serious callers.

Methods: Online searches of Medline, BIDS, Healthplan, Helms for full papers published in the English language between 1975 and 2001, manual searches of relevant journals and cross checking with the bibliographies of previously published reviews and original articles. Papers were appraised for relevance, methodological rigour and validity of conclusions drawn.

Results: Ten US and UK based papers were identified which described the profile and outcomes of emergency patients who were not conveyed by their attending ambulance crew, or an evaluation of number of 999 callers, some of whom have been shown to have non-urgent needs. Recent emphasis has been placed on crossing traditional boundaries to provide appropriate care, highlighting the need to integrate the 999 service into the emergency/unplanned care system and understanding the emergency ambulance service and its role in health care.
and practice and clinical risk associated with non-conveyance were consistently reported. Findings reinforced the need for the development of alternatives, but also highlighted the complexity of the area.

**Conclusions:** Despite the clear need to develop a new service that provides appropriate care pathways for less serious 999 callers, the evidence base for developing alternatives is lacking. Risks identified in pilot studies suggest that this is a complex area for service development and further research is needed urgently.

**16 TRIAGE AND TRANSPORTATION TO MINOR INJURY UNITS OF 999 CALLERS: WHAT ARE THE BENEFITS TO PATIENTS AND THE AMBULANCE SERVICE?**

H. Snooks1, T. Foster2, J. Hartley-Sharp2, J. Nicholl3. 1Clinical School, University of Wales Swansea, Singleton Park, Swansea; 2London Ambulance Service NHS Trust; 3Medical Care Research Unit, University of Sheffield

**Background and objectives:** 999 calls are rising and it is known that some callers do not need to attend A&E. We set out to evaluate the effectiveness of one alternative – conveyance to Minor Injuries Units (MIUs) - in terms of patient satisfaction and ambulance performance.

**Methods:** The study was designed as a cluster randomised controlled trial. For a one-year period, during randomly selected intervention weeks, ambulance crews were asked to use protocols to transport patients who met specific criteria to an MIU. During all other weeks such patients were to be conveyed to the nearest A&E as usual, forming the control group. The study was conducted in two ambulance services, at five ambulance stations and three MIUs. Patients were followed up through ambulance service, hospital and/or MIU records, and by postal questionnaire.

**Results:** 409 patients were recruited during intervention weeks and 422 controls. Of the intervention cluster patients, 41 attended MIU, 303 attended A&E, and 65 were not conveyed. Of the control cluster patients, 37 attended MIU, 327 attended A&E and 61 were not conveyed. As a result of low compliance with the study design, outcomes were compared for patients taken to MIU with those taken to A&E.

Factors found to influence patient destination were: distance; time of day; presence of head injury; sex and service. These factors were used to adjust the case-mix when comparing outcomes. MIU patients were 7.2 times as likely to rate their overall care as excellent as A&E patients (95% CI 1.99, 25.8). Ambulance service job cycle time, time to treatment and total time in unit were shorter for patients taken to MIU than for patients taken to A&E (7.8, 95% CI –1.15, -4.1); (84.6, 95% CI –108.1, -61.1); (222.7, 95% CI –331.9, -123.5) respectively.

**Conclusions:** Usage was lower than anticipated and this study has again highlighted the complexity of changing working patterns. However, when the MIUs were used, patients and the ambulance service benefited.

**17 CLINICAL AUDIT EVALUATING THE USE OF PREHOSPITAL INTRAOSSEOUS INFUSION**

S. Matthews, L. Cave. Clinical Audit and Research Unit, London Ambulance Service HQ, 150 Seagrave Road, London

**Introduction:** USA paramedic practice is established in the use of intraosseous infusion (IO), whereas its introduction in UK paramedic practice has been much slower and only a minority of UK ambulance services currently support its use.

Two indications for the use of IO have been endorsed, children in cardiac arrest and children < 14yrs in a critical condition due to hypovolaemia.

**Audit objectives:** Assess incidence, measure protocol compliance, measure outcome, review the paramedic experience of the use of IO.

**Methods:** The audit was undertaken in three parts, a retrospective criterion based audit, a peer review process and a semi-structured survey. Measures collected included: number of calls, number of cases with IO, number of cases without IO, number of cases with IO unsuccessful. Protocol compliance was assessed based on pre- and post-crash protocol.

**Results:** 409 patients were recruited during intervention weeks and 422 controls. Of the control cluster patients, 41 attended MIU, 303 attended A&E, and 65 were not conveyed. Of the control cluster patients, 37 attended MIU, 327 attended A&E and 61 were not conveyed. As a result of low compliance with the study design, outcomes were compared for patients taken to MIU with those taken to A&E.

Factors found to influence patient destination were: distance; time of day; presence of head injury; sex and service. These factors were used to adjust the case-mix when comparing outcomes. MIU patients were 7.2 times as likely to rate their overall care as excellent as A&E patients (95% CI 1.99, 25.8). Ambulance service job cycle time, time to treatment and total time in unit were shorter for patients taken to MIU than for patients taken to A&E (7.8, 95% CI –1.15, -4.1); (84.6, 95% CI –108.1, -61.1); (222.7, 95% CI –331.9, -123.5) respectively.

**Conclusions:** Usage was lower than anticipated and this study has again highlighted the complexity of changing working patterns. However, when the MIUs were used, patients and the ambulance service benefited.

**18 SOCIO-ECONOMIC FACTORS AND THE USE OF THE EMERGENCY AMBULANCE SERVICE**

A. Rideout. Annandale & Eskdale LHCC, NHS Dumfries & Galloway, Lochmaben Hospital, Lochmaben, Dumfriesshire

**Background and methods:** This is the first study to examine the relationship between deprivation and use of the emergency ambulance service in the UK. Work in the States suggests that deprived groups may use ambulances more frequently and less appropriately. 3250 patients, representing a random 10% sample of self referred attendances, aged 15 years or older, at one Accident and Emergency department (A&E) in one year were included in the study. Of these, 627 (19.3%) used the emergency ambulance service.

This group of ambulance users was compared by age, sex and socio-economic deprivation (using Carstairs scores) and analysis of trend ($\chi^2$ for trend) for rate of use (as a proportion of total A&E attendance) was carried out. There was a significant increase in the rate of ambulance use associated with both deprivation and age ($p<0.001$ for each factor). Women were also more likely ($p=0.028$) to use the ambulance service than men.

**Discussion:** Deprivation has wide-ranging adverse effects on health. These results show a relationship between increased deprivation and use of the emergency ambulance service. The study does not address the issue of ‘appropriate’ use of the ambulance service, but other studies suggest that much ambulance use is ‘inappropriate’. By comparing proportions of A&E attenders using ambulances, the effects of age, sex and deprivation on health are removed, making ‘inappropriate’ use a more likely reason for observed differences.

**Conclusions:** Much of the variation in ambulance use may be due to social rather than medical need. This study may therefore support the use of Criteria Based Dispatch, with a second less acute level of transport available for those who have social transport needs. The study also highlights the need to tackle deprivation as a cause of poor health.

**19 COST AND BENEFIT OF ACTIVE REHABILITATION FOR INJURED AMBULANCE STAFF**

T. Nicholls, N. Hunter. East Anglian Ambulance NHS Trust, Hellesdon Road, Norwich, Norfolk and Bury Physio

Absence due to musculoskeletal injury is typically 5% to 8% in Ambulance Trusts and ill health early retirements are above average. East Anglian Ambulance NHS Trust working with Bury Physio have achieved a 40% reduction in costs through a comprehensive risk reduction and management programme for musculoskeletal disease (MSD). Very significant savings have been achieved through rehabilitation and work conditioning of the longer term and chronic injured staff who previously would have been lost to the service.

The injury prevention programme comprises:

- ergonomic assessment and workplace redesign
- provision of manual handling equipment and training for all operational staff
- pre-employment fitness assessment

Reported accidents and incidents have reduced to approximately half over the 3 years since the programme was introduced.

The injury management programme comprises:

- Rapid response physiotherapy treatment for those with acute MSD
- Work conditioning rehabilitation programme for those with recurrent injuries or longer term absence (over 4 weeks).

Eight cases undertaken as a pilot study for the rehab programme had been off work for up to 12 months, had between 21% and 56% functional deficit, had cost the Trust £50,000 in lost time, and were all possible cases for early ill health retirement and claims for injury at
work. The direct cost of rehab was between £400 and £1500 depending on the condition and chronicity. All participants returned to their original jobs on full duties within 4 months.

The programme methodology and full results to date will be presented to show how a comprehensive musculoskeletal injury management programme can achieve real business benefits to Ambulance Trusts and improvement in staff health and well-being.

[20] THE PRE-HOSPITAL TRIAGE OF PATIENTS WITH CHEST PAIN

Introduction: The Advanced Medical Priority Dispatch System (AMPDS) is currently used by over 97% of the statutory ambulance services in the United Kingdom. This systematic method of questioning triages emergency calls made to the emergency ambulance services according to clinical need. The Department of Health currently places a great emphasis on the identification and rapid treatment of patients presenting with symptoms of a Heart Attack in this process.

Objectives: To determine whether AMPDS effectively detects patients presenting with chest pains and specifically Acute Coronary Syndromes (ACS).

Methods: A retrospective quantitative study of 6610 consecutive emergency calls allocated the AMPDS chief complaint code “Chest Pain” over a three-month period was undertaken. Cases were identified through either being identified in Central Ambulance Control (AMPDS code) or the Patient Report Form (illness type number) as having chest pains. The confirmation of chest pain and acute coronary syndromes were made from the information contained on the Patient Report Form as documented by the responding ambulance crew and the administration of cardiac medication (GTN and Aspirin).

Findings: AMPDS correctly identified over 88% of all patients subsequently administered cardiac medication over the study period. AMPDS was also effective at detecting patients with chest pains (>82%). In order to achieve this rate of identification a specificity of 12% and 45% respectively was found.

Limitations: Hospital outcomes were unavailable and therefore the identification of possible ACS was made through the administration cardiac drugs by the responding ambulance crew. This data originates from one ambulance service and may not be applicable to other services.

Conclusions: AMPDS is highly sensitive at detecting patients presenting with the signs or symptoms of an Acute Coronary Syndrome. However, low specificity leads to a high degree of over-prioritisation.

In order to refine and develop both the ambulance services’ ability to respond and the care delivered to critically ill patients outside the hospital setting this degree of over-prioritisation needs to be reduced.

[21] BLUE LIGHTS AND NAPPY RASH
A. Heward, R. Brown. ‘London Ambulance Service NHS Trust, 220 Waterloo Road, London; ’St Mary’s Hospital Accident and Emergency Department

Introduction: ‘Category A’ is the response defined for patients presenting with a condition “which may be immediately life-threatening within 10 minutes of recognition but is amenable to effective ambulance service treatment”. Since the implementation of Call Prioritization in the United Kingdom the Department of Health has stipulated that all patients under the age of two years also receive this response, the highest level provided by the ambulance service. The results in patients with nappy rash receiving the same level of response as patients in cardiac arrest. Obviously implications include inappropriate resource utilisation, concerns from staff about the validity of the prioritisation system and an impact on the ability of services provide appropriate response for patients who have immediately life-threatening conditions.

Objective: To establish whether the Advanced Medical Priority Dispatch System, as used by the London Ambulance Service NHS Trust, can effectively identify patients under the age of two years with a condition presenting an immediate threat to the patient’s life.

Methods: A retrospective analysis was undertaken using a six-month consecutive sample, examining patients aged under two years of age who attended a major emergency department. The study compared the response level allocated to the patient by AMPDS against the triage level assigned by the receiving emergency department.

Findings: 22 of 376 cases were allocated a red response by AMPDS, 9 of these were subsequently given a priority call by the ambulance crew and triaged as immediate by the hospital triage system. 5 of these cases were subsequently discharged from the A&E department. A further 23 cases were allocated an amber response by the AMPDS and were subsequently triaged as clinically urgent at the A&E department, with an admission rate of 66%.

Conclusions: With 24 emergency calls not allocated a RED response level by AMPDS but triaged by the clinicians as needing medical attention within 10 minutes of arrival, a degree of clinical risk would exist without the Department of Health’s stipulation. However, the accuracy of the hospital triage may be in question with a significant number being discharged home. These cases are reviewed to determine the need or otherwise for urgent intervention.