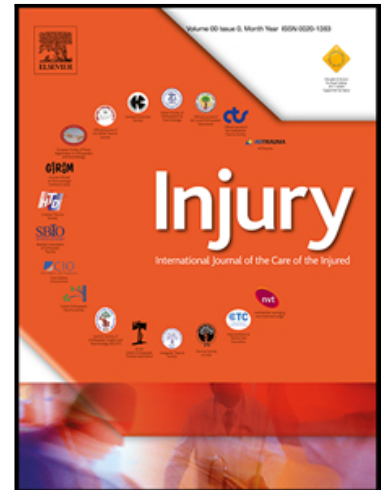# Journal Pre-proof

A survey of current practice in UK Emergency Department management of patients with blunt chest wall trauma not requiring admission to hospital.

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A survey of current practice in UK Emergency Department management of patients with blunt chest wall trauma not requiring admission to hospital.

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Highlights

- There is UK-wide variation in the Emergency Department management of patients with blunt chest wall trauma

- Potential areas for improvement include identification of high-risk patients, initial assessment and management strategies.

- Further research is needed as to whether structured national guidelines would lead to an overall improvement in outcomes.

Abstract

Introduction: There is no universal agreement or supporting evidence for the content or format of a standardised guidance document for patients with blunt chest wall trauma. The aim of this study is to investigate current UK Emergency Medicine practice of the management of patients with blunt chest wall trauma, who do not require admission to hospital.

Methods: This was a cross-sectional survey study, with mixed quantitative / qualitative analysis methods. A convenience sample of all professions working in the Emergency Departments / Urgent Care Centres in the UK was used. A combination of closed and open-ended questions were included, covering demographics and current practice in the respondent's main place of work. Themes explored included management strategies for safe discharge home, risk prediction and variables considered relevant for inclusion in patient guidance.

Results: A total of 113 clinicians responded from all UK trauma networks, including all devolved nations. A total of 20 different risk prediction tools / pathways were reported to be used when assessing whether a patient is safe for discharge home, with over 35 different variables listed by respondents as being important to highlight to patients. Qualitative analysis revealed that a small number of respondents believe patients can be better managed through the improvement of the following;

identification of the high-risk patient, initial assessment and current management strategies used in the ED / UCC.

Discussion: The wide variation in practice highlighted in this study may be due in part to a lack of national consensus guidelines on how to manage this complex patient group. Further research is needed into whether structured national guidelines for the assessment and management of such patients could potentially lead to an overall improvement in outcomes. Such guidelines should be developed by not only expert clinicians and researchers, but also and more importantly by those service-users who have lived experience of blunt chest wall trauma.

Keywords

Management; Blunt chest wall trauma; Emergency Department; Survey study

Introduction

Blunt chest wall trauma accounts for over 15% of all trauma admissions to hospitals from Emergency Departments (ED) worldwide, with reported mortality ranging between 6% and 33% [1-3]. Reported common injury mechanisms include low velocity falls (<2m), high velocity falls (>2m), road traffic accidents, assaults and sporting injuries [4]. Historically, analgesia and chest physiotherapy have been advocated as the primary methods of managing a patient with blunt chest wall trauma, with the main aim of reducing the acute risk of the development of potentially fatal pulmonary complications [5]. More recently there has been an improved awareness of longer-term outcomes such as chronic pain and disability. In a recent

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prospective study, a prevalence of chronic pain of 64% and disability of 67% were reported [6]. These results do not reflect the outcomes of patients who are less severely injured and are discharged directly home from the ED, as this has not yet been investigated.

Difficulties in the management of blunt chest wall trauma patients in the ED are becoming increasingly well recognised in the literature [7]. There are many risk prediction tools used in routine clinical practice for this patient cohort, including the RibScore [8], Injury Severity Score [9], Chest Trauma Score [10], STUMBL Score [11], PIC Score [12]. Most of these prediction models lack external validation or impact studies necessary to provide the clinician with evidence of clinical and cost-effectiveness [13].

The majority of patients with isolated blunt chest wall trauma are discharged directly home from the ED or Urgent Care Centre (UCC), without admission to hospital. A proportion of these patients however will re-attend the ED with delayed complications, which can lead to prolonged hospital stays and in some cases, result in death [14,15].

In some hospitals in the UK, on initial discharge, current practice is to provide the patient with self-help advice or guidance, usually in the form of a paper leaflet. This advice may include guidance on analgesia, chest physiotherapy and return to activity [16,17]. A recent practice review concluded that structured national guidelines for the assessment and management of such patients that include appropriate rib fracture assessment tools may improve outcomes [18]. There is, to date, no universal agreement or supporting evidence for the content or format of a standardised guidance document. The aim of this study was to investigate current UK Emergency

Medicine practice of the management of patients with blunt chest wall trauma, who do not require admission to hospital.

Methods

Ethics approval was not required for this study, confirmed by the Joint Scientific Review Committee, Swansea Bay Health Board. This study adhered to the STROBE guidelines for cross-sectional studies.

Study design

This was a cross-sectional survey study, with mixed quantitative / qualitative analysis methods. When designing the survey content and distribution methods, consideration to clinical burden was needed, due to the fact this was completed during the COVID-19 pandemic over a seven week period (23rd November 2020 to 11th January 2021).

Setting and population

UK-wide EDs and UCCs were targeted using a convenience sample of clinicians, including doctors, nurses, advanced clinical practitioners (ACPs) and allied health professionals (AHPs), who manage patients with blunt chest wall trauma. Major trauma centres (MTC), trauma units (TU) and local emergency hospitals were included, from different geographical regions. A convenience sample, aiming for over 100 clinicians from across the UK was agreed. This sample size was considered sufficient to allow for variation in hospital type, geographical region and clinician type in the responses. This sample size was used in a previous study completed by our research team [19].

Study design and distribution

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A survey and target group of clinicians was developed by an expert group of clinicians, researchers and patient representatives, (as there was no pre-existing validated survey) and piloted, using the guidelines produced by Boynton and Greenhalgh [20]. A combination of closed and open-ended questions were included, covering demographics and current practice in the respondent's main place of work. Themes explored included management strategies for safe discharge home, risk prediction and variables considered relevant for inclusion in patient guidance. The survey was piloted on a sample of 10 clinicians (that were representative of the target population) and edited based on feedback received. The final version is included in supplementary file 1.

The survey was distributed electronically using Survey Monkey™ (online survey development software) and circulated on Twitter™ (online social media application) and regional UK Trauma Networks Leads via the Trauma Audit and Research Network (TARN). This method of distribution was chosen based on patient representative feedback and has been recently used with success in other Emergency Medicine Research. The survey was live for two months, to allow sufficient time to achieve the target number of responses. Clinicians were asked to respond according to their own hospital practice, not the trauma network practice.

Data analysis

Quantitative data analysis was undertaken using SPSS version 22 and descriptive statistics were presented as numbers and percentages. In order to facilitate the qualitative analysis, the open-ended survey data was organised into categories using coding strategies common to reflective thematic analysis. This work was undertaken by hand by two coders (CB and LN); the coders worked independently of one

another using an inductive strategy, to agree a coding framework. The six stages of data analysis described by Braun and Clarke were used; data familiarisation, generating initial coding, searching for themes, reviewing themes, defining and naming themes, and producing a report [21]. Any survey with missing demographic data was included in the study and the remaining responses included in the analysis.

Patient and public involvement

One of our research team's previous multi-trauma patient representatives (JB) helped to develop the study protocol and provided a patient perspective on the recovery process from initial injury and management in the ED through to long-term follow-up. She specifically advised on the content, format and distribution of the survey, interpretation of the results and write-up of the final report.

RESULTS

There were 383 engagements with the tweet advertising the survey, and 42 retweets. A total of 113 clinicians responded; this comprised 90 (80%) doctors, eight (7%) AHPs, eight (7%) ACPs and five (4%) nurses. The demographic section of the survey was completed in full by all respondents. Most respondents reported working in an ED (n=96, 85%), with two (2%) working in a co-located UCC, two (2%) in a separate UCC and 13 (n=12%) working in other areas including critical care, orthopaedics, anaesthetics, geriatrics and medical and surgical assessment units. Geographically, responses (ranging between 1 and 13 per network) were received from all UK trauma networks, including all devolved nations. A total of 32 (28%) of respondents worked in a MTC, 66 (58%) in a TU and 13 (12%) in a local Emergency Hospital. One respondent reported working in a future MTC and one in a District General Hospital. 12 respondents sent the advice sheets used at their hospital.

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Follow-up options used by the departments in the respondents' place of work were reported (n=110 overall responses), with 61 (55%) respondents reporting using 'home with GP referral'. A total of 22 (20%) respondents reported using 'home with planned ED / UCC re-attendance and 22 (20%) respondents also using 'home with referral to an outpatient department'.

The variation in risk prediction tools or pathways used by departments when assessing whether a patient is safe for discharge home is shown in Table 1. The most frequent response was that no risk prediction tool or pathway was used. A total of 125 responses were recorded, as respondents were permitted to add multiple answers.

Table 1: Risk prediction models and pathways used by respondents to assess patient discharge status

Risk prediction tool / pathway	Number / Percentage
Local pathway	16 (13%)
Regional pathway	4 (3%)
Nexus Chest Rule	2 (2%)
STUMBL / Battle Score	19 (15%)
Chest Trauma Score	7 (6%)
RibScore / Rib Injury Score	7 (6%)
American Association for the Surgery of Trauma guidelines	1 (1%)
PIC (Pain, Inspiration, Cough) Score	1 (1%)
Chest Injury Severity Score (ISS)	2 (2%)
Unknown	5 (4%)
Other	11 (9%)
None	50 (40%)

Total n=125

The variables (n=270) listed by respondents that are included on their hospital's advice sheet given to patients with blunt chest wall trauma being discharged directly home from the ED / UCC are outlined in Table 2. All respondents completed this question (n=113), with a total of 43 respondents stating that they do not use an advice sheet.

Table 2: Variables included on advice sheet given to patients being discharged directly home from the ED / UCC

Variable included in advice sheet	Number / Percentage
Analgesia	70 (26%)
Deep breathing exercises / physiotherapy / cough advice	53 (20%)
Explanation of injury and expected healing time	13 (5%)
Exercise	26 (10%)
Activities of daily living / lifting	10 (4%)
Red flags / safety netting / worsening symptoms (non-specific)	61 (%)
Return to work	8 (3%)
Positions for pain relief / sleeping	8 (3%)
Smoking	6 (2%)
Binding / strapping chest wall	5 (2%)
Driving	3 (1%)
Other	8 (3%)

Total n=270

The variables reported by all respondents (n=113) that they discuss with patients with blunt chest wall trauma being discharged directly home from the ED / UCC, but which are not included on an advice sheet, are shown in Table 3. A total of 282 variables were reported.

Table 3: Additional variables discussed with patients, *not* included in the advice

sheet

Variable included in advice sheet	Number / Percentage
Analgesia	50 (17%)
Deep breathing exercises / physiotherapy / cough advice	51 (18%)
Lower respiratory tract infection signs and symptoms	21 (7%)
Exercise / activity / relative rest	17 (6%)
Explanation of injury and expected healing time	29 (10%)
Red flags / safety netting / worsening symptoms (non-specific)	44 (16%)
Shortness of breath management	9 (3%)
Smoking	9 (3%)
Return to work	9 (3%)
Positions for pain relief / sleeping	5 (2%)
Anticoagulants	4 (1%)
Constipation / laxatives	2 (1%)
Driving	2 (1%)
Flying	3 (1%)
Pacing of activities	2 (1%)
Co-morbidities / frailty	4 (1%)
Family support	2 (1%)
Other	9 (3%)
Nothing additional	10 (4%)

Total n=282

Qualitative analysis

The final survey question required an open response, asking respondents to record

anything else (that hadn't been asked in the survey) that they considered important

when discharging a patient directly home. There were 34 respondents included in

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this analysis representing all professions and type of hospitals from all trauma networks apart from Northern Ireland, Sussex, Wessex and Scotland. Analysis revealed three key themes: identification of the high risk patient, ensuring completion of an appropriate assessment prior to discharge, and improvement of current management strategies.

Identification of the high risk patient

When deciding whether to discharge the patient with blunt chest wall trauma directly home from the ED / UCC a number of the respondents suggested that there were additional risk factors for development of pulmonary complications that should be considered. One respondent reported that "This is particularly important… especially with the rise in silver trauma patients". With the well-documented increase in the number of silver trauma patients (major trauma in older people), frailty was highlighted as an important risk factor for poor outcome; this factor is often overlooked in the ED. The number of co-morbidities and social circumstances of the patient were also considered to be as important as more traditional risk factors (such as increasing age and injury severity). If was felt that assessment should result in an appreciation of the patient's overall vulnerability to the development of pulmonary complications. One respondent reported that the patient who is sometimes seen as the "stereotypical, stubborn, male/ older patient" should be targeted for comprehensive advice pre-discharge.

Ensuring completion of a full and thorough assessment

A number of respondents highlighted that they felt the use of a CT scan is more accurate than chest x-ray in the management of patients with blunt chest wall trauma and should be considered. It was also suggested that overnight observation on an

Emergency Medicine ward facilitated more accurate and holistic assessment of the patient. Referral to occupational therapy was suggested as key to ensuring a full assessment was completed. Good multi-disciplinary management within the ED / UCC using a trauma co-ordinator was considered best practice for the silver trauma patient.

Improvement of current management strategies

Changes to the routine management strategies were suggested by a number of respondents. The need to improve analgesic strategies was highlighted, in particular the range of medications and modalities available. One respondent reported "In my current department and others… I do not have adequate analgesia TTO (To Take Out) set up for blunt chest injury". Another reported "Patients with blunt chest injury with inadequate analgesia". It was reported that access to take-home medications other than codeine-based analgesia is often limited and codeine is known to cause constipation in a proportion of blunt chest wall trauma patients. One respondent suggested the need for discharging patients home with regional blocks in situ, with district nurse follow-up. It was also suggested that it should become routine practice for a physiotherapist to review the vulnerable patients at 48-72 hours post-discharge. It was suggested, "Having the frail or older patient reviewed in the frailty service after discharge as there is a very high risk of repeat fall and further injury". Another respondent stated this sort of service would provide a "holistic safety-net for vulnerable silver trauma patients".

Discussion

This is the first study, to our knowledge, to investigate current UK Emergency Medicine practice of the management of patients with blunt chest wall trauma, who

do not require admission to hospital. Responses were received from all trauma networks across the UK including all devolved nations, ensuring a good geographical representation. Good representation from MTCs, TUs and Local Emergency Hospitals, in addition to EDs and UCCs was also achieved.

A previous Canadian study which evaluated ED practice in the management of patients with acute minor thoracic injuries demonstrated a significant difference among the hospitals studied in admission and discharge practices [22]. This current study has also highlighted a number of differences in practice across the UK. Over 20 different risk prediction tools or pathways to guide management decisions regarding safe, direct discharge home were reported; 40% of respondents reported not using a tool at all. It is well-recognised that when blunt chest wall trauma is less severe, it is challenging to predict which patients are appropriate for discharge from the ED, as symptoms alone are insufficient to determine appropriate discharge [15,22-24]. As concluded in a recent practice review, despite the prevalence and significance of chest wall injury in the elderly, there is currently no universally applied investigation strategy, risk score, or management guideline in use in either the UK or USA [18].

In the Canadian study that evaluated practice and follow-up of acute minor thoracic injuries in the ED, it was reported that 19% of patients returned to the ED for unplanned follow-up with the chief complaint being insufficient analgesia [22]. The key finding of this study is that no universally agreed, fully evidence-based guidance currently exists for the management of patients with blunt chest wall trauma discharged directly from the ED / UCC, in the UK. Over 35 different variables were listed by respondents as being important to highlight to patients. In terms of advice

sheet content, analgesia was the most commonly reported variable included, but even this was only cited by 26% of respondents.

Differences in follow-up and safety netting advice was noted, including emphasis on differing symptoms / complications to monitor, expected timescales for recovery, and places to contact or attend if symptoms worsened. A number of differences in specific advice given to patients was also evident in the results. In some hospitals, patients were advised to stop smoking following their injury, in contrast to others that advised the patient to continue smoking during the acute recovery phase, before considering cessation. Advice regarding binding the chest wall also differed, with some promoting and some advising against the practice. One respondent suggested that patients should be presented with their personal risk of deterioration. This could potentially facilitate an open discussion with patient and their family member discharge and safety netting options.

The qualitative analysis highlighted that a small number of respondents believe patients can be better managed through the improvement of the following; identification of the high-risk patient, initial assessment and current management strategies used in the ED / UCC. Due to the emergence of silver trauma, that now makes up the largest proportion of trauma patients presenting to the EDs / UCCs in the UK [25,26], assessment and management should change accordingly. Consideration of frailty, social circumstances and co-morbidities should now have as equal emphasis as age and injury severity when discharging patients directly home from the ED [27-29]. A recent study found that in addition to the anatomic features that compose the RibScore, frailty is a significant risk factor for predicting pulmonary complications in this patient population [27]. These variables should therefore be

considered for inclusion in risk prediction tools and pathways and patient advice sheets.

A number of respondents suggested that management decisions in the ED should be made using a multi-disciplinary approach, overseen by a specialist trauma co-ordinator. If uncertainty exists regarding a patient's risk level, overnight admission to an Emergency Care ward was suggested; this would optimise analgesia and allow for full assessment by the MDT. This is not, however, always feasible as many hospitals do not have such wards or MDT support. Research is needed to provide a patient and cost benefit for such additional services. Geriatric assessment for these patients in the ED was also suggested in this study and this agrees with one of the main conclusions in a recent review by Birse et al [18].

Follow-up of patients discharged home was also suggested as a necessary part of routine clinical care. If such follow-up was in place, then the use of more advanced analgesic modalities such as blocks could be considered. The use of emerging new frailty services is one suggested possibility for improving follow-up of patients with blunt chest wall trauma, secondary to a low-velocity fall. One of the key conclusions of the Canadian study was that follow-up recommendations for patients are insufficient in view of possible delayed complications or disabilities commonly reported in blunt chest wall trauma [22]. With this in mind, further research into developing guidance regarding follow-up is needed.

Possibly the key difficulty in standardising care for blunt chest wall trauma and thus the variation in survey responses, is the heterogeneity inherent in the patient population. Discharging a young patient with a single rib fracture is very different to discharging a frail 80 year old with three rib fractures. Although beyond the scope of

this study, further research is needed for this patient cohort, exploring optimal strategies for development and provision of standardised patient advice, drawing on Emergency Medicine literature focused on similar patient groups. The Royal College of Emergency Medicine (RCEM) have written a Best Practice Guideline on giving information to patients in the ED, including generic discharge information that can be adapted into bespoke guidance, according to the patient population [30].

There were a number of limitations in this study. The use of social media to distribute the survey will have potentially introduced selection bias, as not all clinicians will have been captured, if not twitter™ users. We attempted to address this by using the distribution via TARN to the trauma networks. We are unable to provide in-depth analysis of analgesic or imaging policies, or draw conclusions regarding patient outcomes when discharged, as this was not within the scope of our survey. The thematic analysis is also limited to a smaller subset of 34 respondents so possible conclusions are limited. Respondents may not have seen the question as an opportunity to discuss concerns about certain patient populations. To address this limitation however, we are conducting further research including an outcomes study using anonymised linked data to investigate outcomes of patients with blunt chest wall trauma discharged directly home from the ED, and a focus group study, in which we will explore patient and clinician experiences in more depth in order to gain further insight into whether structured national guidelines would be beneficial for this patient group.

Although the target sample size and good geographical representation were achieved, due to the use of social media and TARN in distributing the survey, an accurate response rate cannot be provided as the number of clinicians who received the survey is unknown. Despite knowing all trauma networks were included in the

analysis, it is not known whether all MTCs were included or how many hospitals within each network are represented, which will impact the generalisability of the study findings. Furthermore, the study was completed during the COVID-19 pandemic, at a time when clinicians may have been over-burdened with surveys and other primary demands on their time. This was a consideration when developing the content and distribution method of our survey. Using a non-validated survey has limitations and we did not assess inter-rater agreement, although we piloted and revised the survey extensively, using both clinicians and patient representatives. Due to the wording used in the survey, it is possible that the respondent has described their individual practice rather than their hospital policy.

In conclusion, the wide variation in practice highlighted in this study may be due in part to a lack of national consensus guidelines on how to manage this complex patient group. Further research is needed into whether structured national guidelines for the assessment and management of such patients may lead to an overall improvement in outcomes. Such guidelines should be developed by not only expert clinicians and researchers, but also and more importantly, by those service-users who have lived experience of blunt chest wall trauma.

Declaration of Competing Interests

The authors declare that they have no competing interests.

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