



## A survey of trauma database utilisation in England



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### ARTICLE INFO

Article history:  
Accepted 11 October 2013

Keywords:  
Major trauma centre  
MTC  
TARN  
Trauma registry  
Registry  
Database  
Database software  
Trauma

### ABSTRACT

Trauma registries are used worldwide to coordinate patient care as well as provide data for audit and research purposes. National registries collect this data, producing research opportunities, outcome standards and a means by which to benchmark trauma centre performance. The Trauma Audit and Research Network (TARN) is the UK national registry, with data upload being mandatory from all major trauma centres (MTCs), a process which is manual and time and resource intensive.

A telephone survey was carried out to collect data from all 26 MTCs in England. A questionnaire was designed to identify how data was collected at a local level, what software and methods were used and what resources were allocated to collect and upload trauma data to the TARN. Further information on hospital size and number of beds was collected from internet searches.

Twenty-three MTCs were contacted in total. The majority used Microsoft Excel, with the next most common programme being Bluespier. Other commercially available registries used included Collector, VTOMS and McKesson. One trust created its own software and three used no electronic database at all. Electronic patient record integration was variable and limited to some commercially available registries. The mean number of TARN data collectors was two per centre, with a mean duration of data collection of 4.5 years.

The wide range of software options and their lack of integration with the hospital electronic patient records results in the duplication of data as well as requiring time and resources. This may also be due to the difference in data required for coordinating on-going patient care and that required for upload to the TARN. Whilst some of these programmes do have the capabilities for automatic data upload, further efforts must be made to provide a cohesive system that provides the required integration and customisability in order to improve efficiency and ultimately trauma care.

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### Introduction

Trauma registries have been in use since as long ago as the ancient Egyptians to document soldiers' wounds and improve injury management and armour [1]. A more recent and systematic attempt at collecting casualty and medical data was performed by the US Army in the early 19th century, where all communications and reports of the US Army Medical Department were forwarded to the Surgeon General's office, which went on to publish quarterly medical reports, improving the standards of health and living conditions of soldiers. This system became more complex and refined, allowing a wounded soldier's progress to be tracked from injury on the battlefield onwards, becoming vitally important in larger scale conflicts such as the First World War [2].

With the advent of information technology in the 20th century, the computerised trauma database was born and the first modern registry was implemented at Cook County Hospital, Chicago in 1969 using coded keypunch cards and magnetic tape. Within two years, this led to the Illinois State trauma registry, documenting hospital admission details and medical care as well as administrative and outcome data [2].

The data from the Illinois State registry, as well as other state registries created over the next twenty years in the US were soon collated into larger regional and national trauma databases, producing research opportunities, outcome standards and a means by which to benchmark trauma centre performance [3].

By the early 1990s, most of the national trauma databases currently in use in the developed world were in place including the UK based TARN [1]. Inaugurated in 1989 in response to benefits shown by standardising trauma systems in the United States, a group was created in the UK to set up these systems as well as carry out audit and research into injury and systems of care. This produced the UK Major Trauma Outcome Study in 1992 [4] and in

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the late 1990s the group was renamed the ‘Trauma Audit and Research Network’ [5].

After ten years of collecting data, a report published by TARN showed a ‘variable but valuable’ improvement in trauma care [6]. Publications such as these showing the benefits of trauma systems as well as other research into the value of trauma registries have resulted in changes in legislation such as seat belt or helmet laws [7], as well as the designation of trauma centres; mandating of their upload of data and allocation of resources towards trauma care and research [5,8–10].

These findings have also resulted in the increased funding allocated by governments for trauma care. In the UK, annual Department of Health funding for TARN increased fourfold between 1989 and 1996, from £40,000 to £160,000, though with the introduction of participation fees this number steadily fell over the next few years to around £20,000 in 2000 [5]. More recently, data submission to TARN was included in the national tariff, with a Best Practice Tariff of up to £2913 payable to trusts based on a variety of clinical and non-clinical factors, including completion and submission of TARN data within 40 days of discharge [11,12].

Internationally, amount and sources of funding for regional or national trauma databases has been variable. In the first survey of US state registries, state funding to develop a registry ranged from \$0 to \$500,000, with annual costs ranging from \$0 to \$235,000. There was significant geographical variation between states, with only 15 being provided with federal or state grants. Other sources of funding included the hospital, donations or charities and disability grants [7]. A more recent source of funding in the US has been the American College of Surgeons, as well as participation fees, also used in the UK, Japan and Australia [13]. Elsewhere in the world, funding for these registries has been provided from a range of government and public sector sources and is often a combination of these [13].

Despite recent improvements in information technology, updating and maintaining registries is a significant undertaking. During the establishment of the Victorian State Trauma Registry in Australia, the collection, analysis and infrastructure costs were estimated to be over 100 Australian Dollars per patient [8]. Annual maintenance costs can also be significant, as previously described. Data collection and upload to the state or national registry similarly requires significant investment at a local level, especially if this process is manual, as it is in the UK. Use of a more complex data management system able to automate collection or upload may be limited by software incompatibility at a local as well as national level, incurring further financial costs. In this study, we aimed to identify how data was collected at a local level in England; what software and methods were used as well as what resources were allocated to collect and upload trauma data to the TARN.

## Methods

A questionnaire was designed to identify what systems and resources were in place at each major trauma centre (MTC) for collecting trauma data and uploading it to TARN, with the questions geared towards assessing the capabilities of the local electronic systems used and whether these would be compatible with an automated link to the TARN registry (Fig. 1).

A list of major trauma centres (MTCs) in England was obtained from the National Health Service website [14] and telephone numbers were obtained from individual hospital websites. Trauma units (smaller hospitals able to manage less serious trauma) and other non-trauma hospitals in the country were not included in the study. A telephone survey was carried out over a two month period from November to December 2012 to collect data from each MTC.

Verbal consent for telephone interviews was obtained at the time of calling.

At each trust, trauma coordinators (often senior specialist nurses) were initially contacted via the switchboard to collect details of any local databases used, if the database was high level architecture (HLA) compatible, whether data entry was manual or automatic and the extent of any integration with the trust electronic patient record (EPR). If there was no trauma coordinator available, the on call trauma registrar was contacted for the information.

The clinical audit department was then contacted at each hospital via its switchboard to identify the person or team responsible for TARN data collection. Information including the number of dedicated TARN data collectors and the number of years of collected data (rounded to the nearest half year) was requested. Part time data collectors were included but counted as half of a full time collector. If efforts to contact the relevant staff members at an MTC were initially unsuccessful, further attempts were made up to a maximum of 5 times over the two month period to obtain the required information.

Details on hospital size and number of patient beds were obtained via official trust websites or other hospital rating websites [15].

## Results

Twenty-six major trauma centres were contacted; twelve combined adult and children’s trauma services, eight adult only, four children’s only and two ‘collaborative’ MTCs (centres made up of several smaller specialised units such as plastic or neurosurgery but using the same audit and research department). We were unable to contact three for their data.

The majority of hospitals (n = 11) used Microsoft Excel (Microsoft, Redmond, Washington, USA) as a local database for keeping record of the trauma patients admitted. Seven used dedicated commercial software of which Bluesprier (Bluesprier, Droitwich, Worcester, UK) was the most commonly used in 3 MTCs, with the remaining four using a different programme each, namely: Collector (Digital Innovation Incorporated, Forest Hill, Maryland USA), Virtual Trauma Orthopaedic Management System/VTOMS (Mediplus Limited, Leeds, UK), McKesson (McKesson, San Francisco, USA) and Majortam (Technical Development Department, Central Manchester Foundation Trust, UK). One used Microsoft Access and three centres reported they did not use a local database at all.

Only three responders were able to state whether the software they used was high level architecture compatible (whether it can interact with other similar systems irrespective of platform), with the rest unsure. These three responders were using Microsoft Excel and stated that their systems were not HLA compatible).

Bluesprier, VTOMS, McKesson and Majortam provided some amount of automatic data entry though this was variable, and all were reported to have a level of integration with the trust EPR. Data entry was manual for all using Excel and Access databases, for which there was no reported integration with the trust EPR. The unit using collector reported having automatic data entry but no integration with the EPR, suggesting communication with a different electronic patient information service.

The mean number of current dedicated TARN data collectors was two per centre, ranging from one to five. The Manchester Collaborative MTC had six collectors though these were spread over three separate hospitals and were counted as such. Data had been collected and uploaded to the TARN registry for a mean of five years, ranging from one to twelve years. The mean duration of data collection for trusts using Excel or Access databases was 4.5 years as compared to 5.8 years for trusts using dedicated software (Table 1).

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