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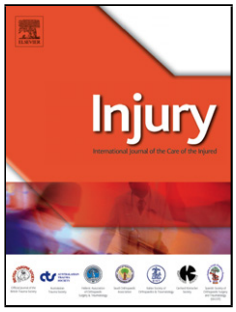

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Author: Conor Deasy Marina Cronin Fiona Cahill Una Geary Patricia Houlihan Maralyn Woodford Fiona Lecky Ken Mealy Philip Crowley<ce:collaboration id="colb0005"></ce:collaboration>

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Implementing Major Trauma Audit in Ireland.

Conor Deasy, Marina Cronin, Fiona Cahill, Una Geary, Patricia Houlihan, Maralyn Woodford, Fiona Lecky, Ken Mealy, Philip Crowley on behalf of the Major Trauma Audit Governance Group, National Emergency Medicine Audit and the National Office of Clinical Audit, Ireland.

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Corresponding Author:

Dr Conor Deasy, FACEM, FCEM, PhD

Clinical Lead, Major Trauma Audit, National Office for Clinical Audit,

Consultant in Emergency Medicine, Cork University Hospital,

Wilton, Cork, Ireland.

conor.deasy@hse.ie

+353867872349

Ms Marina Cronin, Major Trauma Audit Project Lead, National Office of Clinical Audit, 121 St Stephens Green, Dublin 2, Ireland.

Ms Fiona Cahill, Manager, National Office of Clinical Audit, 121 St Stephens Green, Dublin 2, Ireland.

Dr. Una Geary, Consultant in Emergency Medicine, St. James's Hospital, Dublin 8, Ireland.

Dr. Patricia Houlihan, Consultant in Emergency Medicine, Beaumont Hospital, Dublin 9, Ireland.

Professor Fiona Lecky, Research Director, Trauma Audit and Research Network.

Maralyn Woodford, Executive Director, Trauma Audit and Research Network.

Mr. Ken Mealy, Consultant General Surgeon, Wexford General Hospital, Clinical Director, National Office of Clinical Audit, 121 St Stephens Green, Dublin 2, Ireland.

Dr.Philip Crowley, National Director of Quality Improvement Division, Health Service Executive, Ireland.

Implementing Major Trauma Audit in Ireland.

Abstract

Background

There are 27 receiving trauma hospitals in the Republic of Ireland. There has not been an audit system in place to monitor and measure processes and outcomes of care. The National Office of Clinical Audit (NOCA) is now working to implement Major Trauma Audit (MTA) in Ireland using the well-established National Health Service (NHS) UK Trauma Audit and Research Network (TARN).

Aims:

The aim of this report is to highlight the implementation process of MTA in Ireland to raise awareness of MTA nationally and share lessons that may be of value to other health systems undertaking the development of MTA.

Methods

The National Trauma Audit Committee of the Royal College of Surgeons in Ireland, consisting of champions and stakeholders in trauma care, in 2010 advised on the adaptation of TARN for Ireland. In 2012, the Emergency Medicine Program endorsed TARN and in setting up the National Emergency Medicine Audit chose MTA as the first audit project. A major trauma governance group was established representing stakeholders in trauma care, a national project co-ordinator was recruited and a clinical lead nominated. Using Survey Monkey, the chief executives of all trauma receiving hospitals were asked to identify their hospital's trauma governance committee, trauma clinical lead and their local trauma data co-

ordinator. Hospital Inpatient Enquiry systems were used to identify to hospitals an estimate of their anticipated trauma audit workload.

Results

There are 25 of 27 hospitals now collecting data using the TARN trauma audit platform. These hospitals have provided MTA Clinical Leads, allocated data co-ordinators and incorporated MTA reports formally into their clinical governance, quality and safety committee meetings. There has been broad acceptance of the NOCA escalation policy by hospitals in appreciation of the necessity for unexpected audit findings to stimulate action.

Conclusion

Major trauma audit measures trauma patient care processes and outcomes of care to drive quality improvement at hospital and national level. MTA will facilitate the strategic development of trauma care in Ireland by monitoring processes and outcomes and the effects of changes in trauma service provision.

Introduction

Globally, trauma is the leading cause of death for individuals aged between 5 and 44 years[1]. In the European Union, trauma represents the fourth [2] and in Ireland, the third leading cause of death [3] and accounts for at least 8.5% of admissions to hospitals [4]. Trauma is the leading cause of death among young people in Ireland, causing 44.3% of deaths in 5-14 year olds and 70.0% of deaths in 15-24 year olds [5].

Major Trauma Audit (MTA) is designed to document the acute phase of care delivered to victims of trauma, collecting process and quality indicators, and providing risk adjusted mortality rates. Trauma registries, through which major trauma audit is performed, are large databases with appropriately qualified staff and governance structures designed to facilitate this process. Patients are included in the database according to specific inclusion criteria. Data including patient demographics, the circumstances surrounding injury, pre-hospital care and transport, emergency department (ED) and in-hospital interventions received, anatomic injury description, injury severity, physiological measurements, complications, and outcomes are recorded. Trauma registries increasingly include information on pre-existing diseases, recognised as an important determinant of outcome, independent of age and injury severity [6] and are moving towards reporting functional and quality of life outcomes acknowledging that mortality rates are a crude measurement of outcome [7]. Trauma registry data is abstracted and coded from the patient file by trained data abstractors and coders respectively. Registry data has been found to be superior to that found in hospital administrative databases [8,9] and is therefore essential for planning resource allocation.

The decrease in trauma mortality following the introduction of integrated trauma systems provide indirect evidence of the value of trauma audit through trauma registries [10,11]. Data is used as an internal quality control tool for benchmarking with national or international

standards, to monitor performance over time or to identify institutional outliers for internal review. Variation in patient care processes and the impact of such variation on patient outcomes can be analysed and reflective clinical practice promoted. The impact of complex patients on hospital length of stay and the predicted local and national resource implications can be considered more strategically. Though not the primary role of a registry, high quality data enables peer reviewed research that can drive clinical change. Importantly, the data also provides a framework for injury prevention strategies [12-16].

In England and Wales, the Trauma Audit and Research Network (TARN) has been in operation since 1990 while in Scotland the Scottish Trauma Audit Group (STAG) was established in 1991. Trauma registries have been implemented in the United States since the mid-1970s, around the same time that trauma centres were being developed [17-19]. These registries have been most influential and integral to the ongoing strategic development of trauma services in the USA, UK and Australia [20]. Detailed TARN inclusion criteria [22] are beyond the scope of this report however, broadly, TARN includes the more severely injured patients; those with a length of stay of 72 hours or more, trauma patients admitted to a high dependency area regardless of length of stay, and deaths of trauma patients occurring in the hospital including in the emergency department. TARN also includes those transferred into or out of the hospital for ongoing care. TARN collects observations and interventions performed across the patient journey from Prehospital, ED and Critical Care locations. Data collectors at the contributing hospitals upload the relevant information to the electronic data collection reporting system. The Injury Severity Score (ISS) is calculated using the Abbreviated Injury Severity Score; AIS coding is performed centrally by TARN data coders. The probability of survival for each patient is calculated adjusting for ISS, Glasgow Coma Score (GCS), age, sex and, more recently, co-morbidities. A comparative outcome analysis (Ws) is provided to hospitals describing their number of unexpected survivors or unexpected deaths per 100

patients treated. The physical and human resources required for data collection are a computer with internet access, access to patient records and an organised computer literate data collector who may be from a clinical or hospital administration background. One day per week per 100 TARN entries per year is the estimated time required of such a data collector. The structures and governance around MTA are key so issues raised can be readily addressed at local hospital and trauma system levels [22].

The aim of this report is to highlight the implementation process of MTA in Ireland and share lessons that may be of value to other health systems undertaking the development of MTA.

Background to Major Trauma Audit in Ireland

There are 27 receiving trauma hospitals in the Republic of Ireland. There has not been an audit system in place to monitor and measure process and outcomes of care for patients suffering major trauma. The need for high quality clinical data has long been identified as an essential component of trauma care in Ireland. Most recently, the National Trauma Audit Committee (NTAC) of the Royal College of Surgeons in Ireland (RCSI) proposed the implementation of a national system of trauma audit in Ireland using the internationally recognised TARN [22] (Trauma Audit and Research Network) in 2010. This proposal was endorsed by the Emergency Medicine Programme (EMP) of the Health Services Executive (HSE) as a public health initiative to provide a comprehensive epidemiological database of severe injury that would drive quality improvement. The EMP is a multidisciplinary working group whose aims are to improve the access, safety and quality of care for patients attending Emergency Departments (EDs) throughout the country [21]. The EMP, working with the surgical programmes involved in trauma care, recommended the establishment of major trauma audit in the National Office of Clinical Audit (NOCA).

NOCA was established in 2012 through a collaborative agreement between the HSE Quality and Patient Safety Directorate and the Royal College of Surgeons in Ireland. The primary purpose of NOCA is to establish sustainable clinical audit programmes at national level which will ultimately improve outcomes for patients in hospitals in Ireland. Current national audits in development or implementation phase include the Irish National Orthopaedic Register (INOR), Comparative Audit of Hospital Mortality (CAHM), the National Intensive Care Audit (ICU Audit), the Irish Audit of Surgical Mortality (IASM), the Irish Hip Fracture Database (IHFD) and Major Trauma Audit (MTA). NOCA functions through an Executive Team which provides managerial and operational support to deliver the objectives of the NOCA Governance Board. The NOCA Governance Board is an independent voluntary Board made up of representatives from the health service including the medical training bodies, nursing and patient advocacy representatives to oversee the establishment of sustainable clinical audit programs.

Methods

NOCA provides administrative and national operational support of this audit; a Clinical Lead was nominated (CD) and a fulltime Audit Coordinator (MC) employed. A national multidisciplinary Major Trauma Audit Governance Committee was established; stakeholder groups including the Post-graduate Medical Colleges, Faculties and Associations involved in the care of the traumatically injured patient are represented on this committee (Table 2). The committee's role is to ensure the integrity and success of the audit process, cascade key messages to the respective specialist groups represented and to advocate strategies that will bring about improvements in major trauma care in Ireland informed by the data provided by MTA.

The Trauma Audit and Research Network (TARN) based at the University of Manchester was chosen as the audit provider. TARN has been in existence since 1989 and is the largest trauma registry in Europe [22]. NOCA and TARN agreed upon a process of including Irish hospitals on the TARN electronic platform. Working with TARN, the data set was expanded to include variables appropriate to the Irish context acknowledging the different nomenclature used to describe grade of staff; medical, nursing and pre-hospital. There are also differences between UK and Irish practice in commonly used blood products and their nomenclatures that were acknowledged. Distinct TARN training programmes were developed for data collection and data reporting in Ireland. The courses are based around how injury data is collected and uploaded to ensure complete case capture and avoid missing data [22]. Accreditation was sought and achieved for these programmes enabling allocation of continuous professional development rewards for clinical practitioners. A handbook was compiled [23] to support data collection in Ireland, which is used in conjunction with the TARN Procedures Manual.

Hospital Chief Executive Officers (CEO) were engaged through a NOCA delivered MTA preparedness survey performed in June 2013. The CEOs were asked to identify a MTA Lead Clinician (Consultant level from trauma-related specialties), a MTA Data Coordinator and that the hospital Clinical Governance or Quality and Safety committees would support MTA. Hospital inpatient enquiry (HIPE), specifically S and T codes, indicative of trauma, that met TARN major trauma audit criteria in terms of length of stay or ICU admission, were used as a marker of the whole time equivalent (WTE) requirement for a hospital's data coordinator; the hospital was required to provide this resource. NOCA undertook to fund TARN licence fees and support data coordinators and clinical leads. Face to face meetings and presentations advocating MTA were undertaken around the country.

In Ireland, implied consent is agreed to be sufficient to audit the care received by major trauma patients; this is considered to balance the rights of the patient to personal data privacy with the need to quality assure and quality improve major trauma care [24, 25]. Patients are made aware through hospital signage, MTA information leaflets, media releases and hospital websites that major trauma audit is in place at the hospital and that their records may be reviewed to ensure best practice is achieved. Because clinical audit is conducted by an external third party (TARN), Irish data is de-identified through the allocation of a unique identifier that links the TARN held data with the identity of the patient; no identifiable personal data is submitted to TARN.

NOCA provides support to data-collectors and clinical leads at hospitals through facilitating TARN education, organising information meetings and regular teleconferences. Resources, experiences and solutions are shared.

Results

Twenty three Hospitals (85%) responded to the MTA preparedness survey. Though addressed to the CEOs, responses were received from Consultants in Emergency Medicine in 62% (n=17) and by Executive Management in 26% (n=7), including one duplicate response. Two Dublin hospitals were already contributing data independently to TARN, however they indicated their willingness to engage in the NOCA supported process.

There were 12 responding hospitals (52%) that indicated a process for auditing trauma care; they welcomed the opportunity to utilise TARN through the NOCA supported process. Of these, the review process was led by Emergency Medicine in nine (39%) of responding hospitals. Respondents were asked whether trauma review was currently conducted within a clinical governance framework at Hospital level; six (26%) hospitals had such a framework while nine (39%) indicated an ability to achieve it readily.

Table 1 shows the hospitals currently receiving potentially major trauma. Ireland does not have designated Major Trauma Centres (MTC). Beaumont Hospital, The Children's University Hospital Temple Street, both in Dublin and Cork University Hospital are the designated Neurosurgical centres. Of the 27 hospitals that receive major trauma 16 (59%) have trauma orthopaedic services on site; the remaining receiving hospitals perform initial management, resuscitation and packaging of the patient and arrange transfer to the most appropriate hospital based on the most severe life threatening or altering injury and local arrangements. Interventional Radiology is available at some of the bigger hospitals though not on an on-call basis (with the exception of one hospital). All hospitals have intensive care units and retain the patient unless the patient requires definitive surgery elsewhere. For example University Hospital Waterford, situated in the South East of Ireland, is a regional orthopaedic centre receiving orthopaedic transfers from South Tipperary General Hospital, St. Luke's General Hospital, Kilkenny and Wexford General Hospital. Trauma bypass, whereby ambulances do not bring patients to a hospital is in place in certain urban areas. However, self-presentations including head injury, stabbing, and low falls may present and be admitted to such smaller hospitals.

Table 2 describes the composition of the NOCA MTA Governance Committee. A single representative represents each group.

Initially, 11 trauma receiving hospitals commenced submission of MTA data to TARN in October 2013, this was followed by a further 11 hospitals in April 2014, and a further 3 hospitals in Oct 2014. NOCA continues to work directly with the remaining two hospitals to ensure complete coverage can be achieved in 2015.

Hospitals that did not have a formal process in place for reviewing audit reports were catalysed to put such a committee in place focused in the first instance on trauma but recognising that further NOCA audit initiatives would require such a governance structure to interpret and act on findings.

Reports from TARN are provided to the hospitals directly and hospitals can access their data 'live' using the secure TARN platform. A national report and individual hospital reports are provided to NOCA centrally. This allows NOCA support hospitals in reviewing their audit findings. NOCA supports hospitals in identifying unexpected audit findings real time in advance of publication of hospital reports. Hospital clinical leads and data coordinators review submissions with unexpected findings to ensure the data constituting the submission is correct as insufficient data may understate the ISS and thereby overstate the probability of survival for a given patient. The hospital is also encouraged to examine the structures and process of care provided for the patient that may have influenced outcomes. The outcomes of completed reviews are reviewed by the hospital quality and safety committees and confirmation of completion of this internal review process is notified to NOCA and the Major Trauma Audit Governance Committee.

A generic NOCA escalation process [26] has been developed that supports hospitals in ensuring they fulfil their requirements within pre-existing Irish healthcare governance structures around unexpected audit findings. Where this is not followed, the NOCA Major Trauma Audit Governance Committee may determine that additional support is required for managing these unexpected audit findings which have not achieved successful resolution and/or confirmation of action by the originating hospital. Escalation of audit findings will be to the NOCA Governance Board and to the National Director of Quality Improvement division in the Health Service.

Discussion

This report details the setting up of a population based major trauma audit highlighting the national and local MTA governance structures key to ensuring effective quality data capture and subsequent translation of audit findings. Despite severe public service cut-backs and financial pressures on hospitals the importance of engagement in this nationwide audit process was acted on. Availing of a slightly modified 'off-the-shelf' audit solution, meant the focus could be on establishing sustainable audit governance structures. Centralising different audit streams nationally with a certain independence from the service providers has ensured an appropriate dynamic and exploits synergies. These include relationships with key people within the health service, knowledge of hospital champions across the country, sharing of experience between hospitals, data management and information technology expertise, academic, media and data protection expertise.

One of Ireland's great strengths is said to be its citizens' pride in their parish and county. This may explain, in part, the disproportionately large number of trauma receiving hospitals at present in Ireland and the practice of victims of trauma being brought to the nearest hospital in the first instance. Until now, there has not been an ability to measure the performance of this system [27]. The centralisation of major trauma to units that are properly resourced to deal with the large number of immediately life-threatening complex conditions that may exist in the one multiply-injured patient has had proven results [28-32]. The formation of an integrated trauma system model of trauma care delivery has consistently shown significant improvements in the mortality and morbidity rates for victims of trauma. In Victoria, Australia a significant improvement in mortality [33] and quality of life outcomes has been achieved by such an approach [34]. The United Kingdom's recent reorganisation of trauma care delivery into trauma networks [35] reports a 30% improvement in the odds of survival for victims of trauma. This has catalysed the recent formation of a strategic group to determine how trauma care be best delivered in Ireland. The Irish Association of Emergency Medicine has published a position paper entitled 'An Integrated Trauma System for Ireland' describing how the internationally accepted model of trauma care delivery might be applied in Ireland [36]. A fundamental aspect of any such model is the ability to monitor the care the system provides and the impact of any changes in the delivery of care on outcomes for patients; a robust sustainable major trauma audit system is mandatory.

An alternative to registry data to evaluate the effectiveness of trauma systems has been the use of administrative data, such as hospital admissions data [29,37-39]. However, administrative data are limited in the detail of information collected and the timeliness of data availability. Injury severity measures are not captured, creating difficulties in identifying patients with severe injury. Previous studies have attempted to overcome the issue of case identification by severity through the use of "index" injuries [37,39] or mapping of ICD-9-CM (International classification of diseases, 9th revision, clinical modification) diagnostic codes to AIS scores [38, 29]. The use of index injuries provides only a surrogate measure of major trauma, while mapping of ICD-9-CM codes to AIS scores has resulted in substantial overestimation of injury severity [39]. Furthermore, there are no validated mapping systems for converting ICD-10 diagnostic codes to AIS codes, limiting the usefulness of this approach.

Trauma registries vary considerably with regard to physical resources, human resources and processes globally [30]. The availability of an off-the-shelf audit tool in the form of the TARN platform contributed significantly to the successful role out of Major Trauma Audit in Ireland. It was possible to focus attention and available resources on the implementation of an established, well published and reliable audit tool rather than on building such a tool from first principles. Under current data protection arrangements both NOCA and TARN receive pseudo-anonymised data from participating Irish hospitals. Should Irish hospitals wish to incorporate functional and quality of life follow up into outcomes reporting this could be performed at local hospital level to be subsequently linked with TARN outcomes.

The 'micro-management' system of interrogation and escalation being based on individual unexpected deaths differs to that in use in the NHS where the escalation trigger by TARN/HQIP is a hospitals' observed - expected mortality rate (Ws) falling more than 3 standard deviations worse than the norm over a year. It is expected that NHS trusts/hospitals examine their individual unexpected deaths unprompted. Given that Ireland is in a 'start- up' phase of trauma audit the approach is considered justifiable.

Research in trauma care is facilitated by trauma registries though it is not their primary function. The large volume of severely injured patients, a core of experienced trauma clinicians and an academic infrastructure has enabled US Level I trauma centres to be effective and productive in research and scholarly activity. As a minimum, American College of Surgeons Committee on Trauma (ACS-COT) [30] mandates a Level I Trauma Centre to have 20 peer-reviewed articles published in journals included in Index Medicus or PubMed in a 3-year period. Observational studies comparing prevention strategies, processes of care and quality of outcomes can be performed across jurisdictions and hypotheses generated for later testing through randomised controlled trials (RCTs). Indeed RCTs can be made more feasible using trauma registries as the backbone for data management; Bernard et al [41] demonstrated how the Victoria State Trauma Registry (VSTR) could be used to facilitate a prehospital randomised controlled trial of pre-hospital intubation by paramedics. In this trial VSTR facilitated data management, trial safety, and outcomes reporting including mortality and quality of life assessment. Ireland is now, by virtue of contributing to a trauma registry, better equipped to perform meaningful research in trauma care which is necessary to improve the care delivered to victims of trauma.

Conclusion

Major trauma audit measures trauma patient care processes and outcomes to drive quality improvement at hospital and national level. MTA may facilitate the strategic development of trauma care in Ireland by monitoring processes and outcomes and the effects of changes in trauma service provision.

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Table 1; Trauma receiving hospitals in Ireland and expected number of TARN eligible cases per hospital (2012 HIPE data).

Site	ED presentations	Consultant in Emergency Medicine WTE**	General Surgery	Orthopaedic Surgery	Neurosurgery	Plastic Surgery	Cardiothoracic Surgery	Specialist Designation	TARN Eligible patients
Beaumont Hospital, Dublin	51,948	4	✓	✓	✓	✓			446
Mater Misericordiae University Hospital, Dublin	53,134	3	✓	✓			✓	National Spinal Unit	426
University Hospital Waterford	53,453	4	✓	✓					400
Tallaght Hospital* , Dublin	76,296	5	✓	✓				Pelvic and Acetabullum National Centre	392
Cork University Hospital	64,830	4.5	✓	✓	✓	✓	✓		375
St. Vincent's University Hospital, Dublin	44,322	5	✓	✓		✓			350
Our Lady of Lourdes Hospital, Drogheda	57,524	3	✓	✓					335
St James's Hospital, Dublin	46,281	5	✓	✓		✓	✓	National Burns Centre	333
University Hospital Limerick	61,153	4	✓	✓					260
Midland Regional Hospital, Tullamore	30,700	2.8	✓	✓					236
University Hospital Galway	65,292	5	✓	✓		✓	✓		236
Kerry General Hospital	36,517	2	✓	✓					178
Connolly Hospital, Dublin	32,638	3	✓	✓					160
Mayo General Hospital	35,203	1	✓	✓					157

Letterkenny General Hospital	37,312	3	✓	✓					144
Sligo Regional Hospital	39,639	3	✓	✓					140
Naas General Hospital	26,929	2	✓						88
Children's University Hospital Temple Street, Dublin	47,761	3	✓	✓	✓				87
St. Luke's General Hospital, Kilkenny	41,514	0.8	✓						75
Midland Regional Hospital, Mullingar	36,932	1	✓						73
Our Lady's Children's Hospital, Dublin	33,505	3	✓	✓		✓	✓		54
Wexford General Hospital	37,574	0.8	✓						54
Cavan General Hospital	35,734	3	✓						48
South Tipperary General Hospital	36,654	0.8	✓						47
Portiuncula Hospital, Ballinasloe	23,833	1.5	✓						42
Mercy University Hospital, Cork	30,950	1.1	✓						26

* Adult and Paediatric ED

** Whole Time Equivalent

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Table 2; NOCA MTA Governance Committee composition includes representation from the following stakeholder groups;

Irish Committee for Emergency Medicine Training
Irish Association for Emergency Medicine / Academic Committee
Paediatric Emergency Medicine
National Emergency Medicine Programme for MTA
National Emergency Medicine Programme Lead
HSE Office of Nursing & Midwifery Services
Emergency Medicine Nursing Interest Group
Royal College of Physicians, Ireland-Pathology
Royal College of Physicians, Ireland-Public Health
Royal College of Physicians, Ireland-Rehabilitation Medicine
Royal College of Surgeons, Ireland-General Surgery
Joint Faculty of Intensive Care Medicine of Ireland-Intensive Care
Pre Hospital Emergency Care Council
National Ambulance Service
Patient Representative
Therapy representative
Irish Institute of Trauma and Orthopaedic Surgeons
Irish Association of Plastic Surgeons
Royal College of Surgeons in Ireland -Faculty of Radiologists
Royal College of Surgeons in Ireland -Neurosurgery Programme
Data manager with Trauma Audit experience
Data Manager-HIPE

Figure 1; Map of Ireland indicating Trauma Receiving Hospitals

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