

Original Research Article

Inter-hospital transfer of referred trauma patients admitted to the trauma centre of King George Medical University

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ABSTRACT

Background: Inter-hospital transfer is a common in trauma victims due to paucity of super-specialty care, lack of specialty beds, and lack of funding. The government of Uttar Pradesh introduced Emergency Medical Response system (EMRS). There is a need to audit and evaluate the transfer process since the introduction of the service. The objectives of this study were to identify critical gaps in the transfer of trauma patients and secondary over triage to the trauma centre of KGMU.

Methods: This prospective observational study was conducted on trauma victims referred to the trauma centre. Patients were evaluated for clinical status, Injury Severity Score, protective patient devices present, type of intravenous fluid infusion, mode of transport, and level of referring hospital. Transfer records, transport vehicles and accompanying personal were evaluated.

Results: Of the 342 patients enrolled in the study, 91 had a GCS score <8 and 112(32.74%) had a diastolic BP <60 mm Hg at arrival. Twenty patients (5.8%) were referred from tertiary care centers, 74(21.6%) were referred from district hospitals, 136(39.76%) were referred from primary care centers and 112(32.74%) were referred from private hospitals. Date and time of injury was not recorded in any of the patients. Referral time was recorded in 48(14.03%) patients. One hundred seventy-six patients (51.14%) were transferred in EMRS ambulances, 102(29.82%) patients met the criteria for secondary over triage.

Conclusions: There is a need to adopt and strictly implement guidelines for transfer of trauma victims to plug the critical gaps in the transfer process.

Keywords: Inter-hospital, Referred, Transfer, Trauma

INTRODUCTION

Transfer from one treatment facility to another is a common occurrence in care of trauma victims. The objective behind the transfer is to improve upon the management of the patient. The reasons for inter-hospital transfers include the paucity of centres providing super-specialty care, lack of specialty beds, and funding of medical care.¹⁻³ Inter-hospital transfer of trauma victims entails a potential risk of patient deterioration during transfer. A lot of efforts have been made to mitigate this

potential risk which resulted in a number of professional bodies formulating guidelines for ensuring a safe, smooth and successful transfer of patients. These include American College of Critical Care Medicine, Society of Critical Care Medicine, Intensive Care Society, Association of Anaesthetist of Great Britain and Ireland and Paediatric Intensive Care Society.^{4,5} Advanced trauma life support program developed by the American College of Surgeons has also laid down the protocols for safe inter-hospital transfer of patients. Advanced trauma life support India program has been running ATLS

courses since the year 2009 and had trained about 5000 emergency care doctors in the provider course by the end of year 2017.⁶

King George Medical University is the principal tertiary care centre of Uttar Pradesh with more than 3000 beds, a well-equipped fully functional trauma centre and round the clock super specialty services. The trauma centre of KGMU provides 24 hours receiving of trauma patients as well as 24 hours specialty and super-specialty surgical services. Due to a lack of super-specialty as well as specialty services and economic constraints, many trauma patients are transferred from other treatment facilities to trauma centre of KGMU. Lack of clear-cut guidelines regarding which patients need to be transferred to trauma centre can lead to transfer of minimally injured patients to the trauma centre (secondary over triage) which in turn may lead to inefficient use of resources and personnel available to the trauma centre. Secondary "over triage" has been defined as referred patients with ISS <10, not requiring definitive operative care and discharged within 48 hours of admission.⁷ A previous study conducted at the same trauma centre and published in the year 2013 had pointed several deficiencies in the inter-hospital transfer of the injured and 26.6% over triage.⁸ However, the study was done prior to introduction of Emergency Medical Response system introduced by the Government of Uttar Pradesh and the situation may have changed.

The objectives of this study were to identify critical gaps in the transfer of trauma patients to the trauma centre of KGMU and secondary over triage in patients transferred to the trauma centre of KGMU.

METHODS

This was prospective observational study.

Study period

The study was conducted over a period of one year. Period from July 2018 to June 2019. The study was conducted in the Trauma Centre, KGMU

Study population

Injured patients from Lucknow and adjoining areas who are referred to the trauma centre of KGMU.

Sample size

Authors included all the patients admitted on one randomly selected day of a week, subject to informed consent.

Inclusion criteria

Injured patients of either sex transferred from another facility to trauma centre.

Exclusion criteria

Burn patients since KGMU trauma centre does not have a burn unit.

All injured patients fulfilling the inclusion criteria, subject to written informed consent were assessed for the following factors:

a) Evaluation of transferred patient

- Age
- Sex
- Pre-existing chronic conditions - Coronary artery disease, Chronic Obstructive Pulmonary Disease, Hypertension, Renal disease, Diabetes Mellitus, Malignancies and any other pre-existing condition
- Injury Severity Score
- Types of injury - Abbreviated injury scale code
- Duration of hospital stay
- Operative intervention - Yes or No
- Glasgow coma scale score at the time of admission
- Pupillary size and reaction

b) Duration of admission

c) Mode of transport to trauma centre - whether by 108 ambulance, patient transport vehicle, or other vehicles

d) Type of Referring hospital - Primary care, Secondary care or tertiary care

e) Evaluation of the transfer vehicle: Facilities for

- Cervical immobilization
- Splintage
- Spinal board immobilization
- Blood Pressure cuff and manometer
- Suction
- Pulse oximeter
- Equipment for I.V access and I.V fluid
- Bag and mask ventilation

f) Evaluation of accompanying transfer personnel

- Trained or Untrained
- Level of training - doctor, nurse or paramedical staff

g) Evaluation of recorded information in transfer records of the patient

- Pulse on referral slips and during transfer
- Blood Pressure on referral slips and during transfer
- GCS Score on referral slips and during transfer
- Pupillary size and reaction on referral slips and during transfer
- Time at referral and time at injury on referral slips

- h) Transfer request from peripheral hospital- Whether made or not.
- i) Intravenous infusions present on arrival- Ringer lactate, Normal saline, 5% Dextrose or none.
- j) Protected patient devices present in situ on arrival- Cervical Collar, Endotracheal intubation, Urethral catheter, Nasogastric intubation.
- k) Reason for referral

Statistical analysis

The data was collected on a Microsoft XL sheet. SPSS was used for statistical analysis. Categorical variables are described using frequency tables. Continuous and ordinal variables are described using measure of central tendency - mean, median, mode along with measures of dispersion like standard deviation.

RESULTS

Three hundred fifty-two trauma patients referred from other centres were admitted to the trauma centre of KGMU. Of these ten patients refused to participate in the study. The mean age of the patients was 42.11±16.44 years (Median 40 years). Mean ISS score was 14.08±7.5 years (Median 9). Of the 342 patients, sixty-four (18.71%) were females and two hundred seventy-eight (81.29%) were males. Mean GCS score was 11.87±4.2 (Median 15). Ninety-one patients had a GCS score <8 at arrival. One hundred twelve patients (32.74%) had a diastolic BP of less than 60 mm Hg at arrival. Previously

associated comorbidities are shown in (Table 1). One hundred fifty-five patients (45.32%) patients required operative intervention. Mean duration of hospital stay was 10.89±12.3 days (Median 7 days). Of the 342 patients, twenty (5.8%) were referred from tertiary care centres. Seventy-four (21.6%) were referred from district hospitals, one hundred thirty-six (39.76%) were referred from primary or community health centres and one hundred twelve (32.74%) were referred from private hospitals.

The standard of documentation on transfer record was subpar (Table 2). Date and time of injury was not recorded in any of the patients. Time at which the patient was referred was recorded in 48(14.03%) patients.

Use of in situ patient protective devices was far from satisfactory. None of the 91 patients who had a GCS <8 had endotracheal tube at arrival. Only 6 (1.75%) patients had cervical collar in place at the time of arrival (Table 3).

Table 1: Associated comorbidities in the enrolled patients.

Associated comorbidity	Number	Frequency (N=342)
Coronary artery disease	10	2.92
Chronic obstructive pulmonary disease	17	4.97
Hypertension	16	4.67
Renal disease	4	1.16
Diabetes mellitus	12	3.50

Table 2: Documentation on referral documents from the last referring facility.

	Tertiary care centres (N=20)	District hospitals (N=74)	Primary or community health care centres (N=136)	Private hospitals (N=112)	Overall (N=342)
Pulse rate	15(75%)	33(44.59%)	35(25.73%)	32(28.57%)	115(33.62%)
Blood pressure	15(75%)	34(45.94%)	36(26.47%)	32(28.57%)	117(34.21%)
GCS	2(10%)	0(0%)	0(0%)	2(0.02)	4(0.002%)
Time of referral	12(60%)	14(18.91%)	14(10.29%)	8(7.14%)	48(14.03)
Pupillary size and reaction	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)

Table 3: Protective patient devices in situ on arrival from the last referring facility.

	Tertiary care centre (N=20)	District hospital (N=74)	Primary or community health centre (N=136)	Private hospitals (N=112)	Overall (N=342)
Cervical collar	3(1.5%)	1(1.3%)	0(0%)	2(1.78)	6(1.75%)
Endotracheal tube	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
Urethral catheter	14(70%)	25(33.78%)	0(0%)	11(9.8%)	50(14.615)
Nasogastric tube	14(70%)	8(10.81%)	0(0%)	3(2.6%)	20(7.3%)

One hundred seventy-six patients (51.14%) were transferred in Advanced or Basic Life Support ambulances while the rest were transferred using minimally equipped patient transport vehicles (N=34; 9.94%) or other vehicles. Of the 176 patients that were transferred using Advanced or Basic life support ambulances, 170 were transferred using the government provided 108 ambulances. Details of equipment available in the ambulances are shown in (Table 4), should be changed to Details of equipment available in the ambulances are shown in Table 4.

Twelve patients (3.54%) were accompanied by a paramedic or a nurse. None of the patients was accompanied by a doctor. Rest of the patients were accompanied by an untrained person. Transfer request was not made in any of the transferred patients.

Table 4: Functional equipment available in ambulances (N=176).

Equipment in ambulance	N(%)
Oxygen cylinder	176(100%)
Sphygmomanometer	176(100%)
Normal saline	169(96.02%)
Suction catheters - complete range	52(29.54%)
Cervical Collar	156(88.63%)
Bag and Mask - adult	126(71.59%)
Bag and Mask - Paediatric	94(53.40)
Spinal board	102(57.95%)
Orthopedic splints - upper limb - 2	134(76.13%)
Orthopedic splints - lower limb - 2	142(80.68)
Pulse oximeter	132(75%)

Table 5: Intravenous infusion on arrival.

Intravenous fluid	N(%)
Ringer lactate or Normal Saline	218(63.74%)
Other intravenous fluid	24 (7.01%)
None	100 (29.23%)

In this study 102 (29.82%) patients met the criteria for over triage i.e. they had an ISS <10, did not requiring definitive operative care and were discharged within 48 hours of admission.

DISCUSSION

Transfer of trauma patient from one treatment facility to another is fraught with potential complications due to possibility of well-known complications during transfer. Quality and timeliness of transfer as well as the time consumed during transfer may govern the resultant mortality and morbidity. Possible complications include hypoxia, hypercarbia, convulsions, intracranial haematoma, and neurological deterioration in head injury patients.^{9,10} Interhospital transfer has been reported to be

an independent risk factor for mortality in trauma patients in surgical intensive care unit.¹¹

Many countries especially the developed ones follow some kind of guidelines for transfer of trauma patients. ATLS program developed by American association of surgeons has also laid down the protocols for safe inter-hospital transfer of patients. These guidelines require thorough resuscitation and stabilization of the patients prior to transfer, intubation and ventilation prior to transfer in patients with significantly depressed levels of consciousness, mobile communication between referring and receiving units during transfer, mutually agreed local policies between treatment facilities involved in transfer as well as a nominated consultant at referring and receiving treatment facilities.

An alarming finding of our study was that none of the patients with GCS <8 on arrival had any definitive airway which is contrary to current recommendations and standards of transfer.^{12,13} Similarly, minimal use of cervical immobilization head injury patients with GCS <8 is contrary to current recommendations for transfer of head injury patients.^{12,13} Lack of intubation in head injury patients with GCS <8 and minimal use of cervical collar has been reported in a previous study at the same centre.⁸ This alarming lack of care or airway during transfer and minimal use of cervical immobilization may reflect a paucity of trained professionals who recognize the need, or a lack of ability, or lack of facilities in the referring centres. The trauma centre of KGMU primarily deals with poor patients, a majority of which are dependent on state run health hospitals. A vast majority of the of these are primary and community health centres which are located in far flung rural areas and they lack the basic infrastructure required to stabilize trauma patients.

Another alarming finding of our study was the use of inappropriate intravenous fluids in 24 patients (7.01%) and presence of hypotension without neurogenic shock in 32.74% on arrival at the trauma centre of KGMU. This may reflect delayed recognition of shock or under resuscitation of shock This finding is again contrary to current recommendations which require that a patient be stabilized before he is transferred to another facility. We found a generalized lack of documentation in referral records. However, the problem was more severe in patients referred from primary and secondary health care centres and private hospitals. There was a generalized lack of use of protective patient devices during transfer. None the patients had been intubated when they arrived at the trauma centre irrespective of the type of referring hospital. There was minimal use of cervical immobilization irrespective of the type of referring hospital. With regards to other protective devices namely urinary catheters and nasogastric tubes, the problem was more acute in primary and secondary health care centers and private hospitals.

Positive findings of our study include a greater availability of ambulances and better equipped ambulances compared to a previous study conducted at the same centre.⁸ In the previous study 14.98% patients were transferred using some kind of ambulance compared to 51.14% in this study. Compared to previous study at the same centre, the ambulances had better facilities for suction, intravenous access and pulse oximeter. Greater availability of ambulances and better equipped ambulances may be attributed to introduction of EMRS ambulance by the government of Uttar Pradesh. However, the ambulances were not uniformly equipped with the equipment required for safe transport of patients. While the availability of oxygen, BP cuff and manometer, and normal saline for infusion was excellent, the same cannot be said for other equipment especially pulse oximeter, suction catheters, bag and masks and spinal boards. Generally speaking, there is a need to look into the equipment available in the ambulances as very often the conditions laid down in the memorandum of understanding have not been fulfilled.¹⁴ These include conditions like maintenance of equipment and vehicles, geographic information system (GIS) tracking, skill upgradation, networking with government hospitals, and generating awareness among the public about 108 services were not fulfilled as per the timeline prescribe.¹⁴

Authors have reported a secondary over triage of 29.82% in our study which is slightly more than reported in a previous study in the same institute.⁸ This slight increase may be attributed to availability of 108 ambulances which were not available when the said study was conducted.

The health care system in India is yet to officially adapt any guideline or protocols for safe inter-hospital transfer of trauma patients in India. Inter-hospital transfer of a trauma patient is a matter of education, audit and funding. The aspect of education has been well covered with ATLS India training doctors in ATLS courses since the year 2009. Considerable efforts and funds have been invested in creating a fleet of ambulances for inter-facility transfer of patients. However, these need to be supplanted with adoption and strict implementation of guidelines for transfer of trauma patients as well as improvement of infrastructural facilities. On the basis of the results of our study we hereby recommend that

- Adoption, dissemination and strict implementation of evidence-based guidelines for referral and inter-facility transfer of patients.
- A standardized transfer form incorporating available evidence needs to be prepared and made a mandatory part of the referral documents. We suggest a sample transfer form as given below.
- There is a need to regularly audit the existing state inter-facility transfer of trauma patients. As of now, very few studies from India have focused on inter-facility transfer of patients. These studies are a

result of individual effort of investigators from academic institutions.

- Author suggests sample transfer form (Annexure I).

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ANNEXURE I

Sample transfer form

Patient details	Name -		
	Address -	City	Post code
	Age -	Sex	Phone
Attendant details	Name		
	Address	Phone	Relation with patient
Date and time of Injury -			
Date and time admitted to referring hospital -			
Time transferred from referring hospital -			
Condition on admission	Pulse rate Respiratory rate Blood pressure GCS score	AMPLE History	
		Probable diagnosis	
Checklist	Endotracheal tube		
	C-Spine protection		
	Oxygen		
	Chest tubes		
	Splints		
	Indwelling catheter		
	Intravenous fluid (NS)		
	Blood		
Drugs administered			
Referral details	Name of doctor		
	Name of hospital		
	Phone number		
Receiving details	Name of doctor		
	Name of hospital		
	Phone		