Inter-facility Transfer of Surgical Emergencies in a Developing Country: Effects on Management and Surgical Outcomes

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Abstract

Objectives Outcomes of surgical emergencies are associated with promptness of the appropriate surgical intervention. However, delayed presentation of surgical patients is common in most developing countries. Delays commonly occur due to transfer of patients between facilities. The aim of the present study was to assess the effect of delays in treatment caused by inter-facility transfers of patients presenting with surgical emergencies as measured by objective and subjective parameters.

Methods We prospectively collected data on all patients presenting with an acute surgical emergency at Aga Khan University Hospital (AKUH). Information regarding demographics, social class, reason and number of transfers, and distance traveled were collected. Patients were categorized into two groups, those transferred to AKUH from another facility (transferred) and direct arrivals (non-transfers). Differences between presenting physiological parameters, vital statistics, and management were tested between the two groups by the chi square and *t* tests.

Results Ninety-nine patients were included, 49 (49.5 %) patients having been transferred from another facility. The most common reason for transfer was “lack of satisfactory

surgical care.” There were significant differences in presenting pulse, oxygen saturation, respiratory rate, fluid for resuscitation, glasgow coma scale, and revised trauma score (all *p* values <0.001) between transferred and non-transferred patients. In 56 patients there was a further delay in admission, and the most common reason was bed availability, followed by financial constraints. Three patients were shifted out of the hospital due to lack of ventilator, and 14 patients left against medical advice due to financial limitations. One patient died.

Conclusions Inter-facility transfer of patients with surgical emergencies is common. These patients arrive with deranged physiology which requires complex and prolonged hospital care. Patients who cannot afford treatment are most vulnerable to transfers and delays.

Introduction

According to World Health Organization estimates, approximately two billion people around the world have inadequate access to surgical care [1]. The disease control priorities project determined that surgical intervention may avert at least 11.2 % of the global burden of disease by reducing disability and premature death [1–3]. The highest number of surgical disability-adjusted life years (DALYs) is recorded in South East Asia, and Africa has the highest ratio of surgical DALYs per 1,000 people [2].

Surgical care is considered to be an integral part of health systems worldwide [4]; still, delays due to multiple transfers of surgical patients are not uncommon, even in developed countries [5, 6]. Holena et al. [6] while assessing factors associated with outcomes in patients with necrotizing fasciitis, found inter-hospital transfers to be an independent risk factor for increased mortality. In a survey

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of surgical emergencies in Pakistan, Mushtaq et al [7] found that 28 % of patients with acute abdomen presented initially to a center where surgical facilities were not available and therefore had to be transferred. Organized transportation is required for safe transfer of such patients to a surgical care facility. Unfortunately, the ambulance system is quite immature in Pakistan, despite the increasing demand for medical transport, chiefly because of the political situation [8, 9]. Razzak et al [10] in a study on emergency medical services and mode of patient's transportation in Karachi, observed that the most common mode of transport to the emergency department (ED) was taxi (53, 58 %), followed by private car (21, 23 %).

Provision of essential surgical care remains inadequate in Pakistan, especially in rural and remote areas [11]. Patients are often transferred to far off urban tertiary care hospitals, resulting in delayed presentation [7, 11, 12]. These patients are at increased risk for metabolic, cardiovascular, renal, pulmonary, and septic complications before, during, and after the surgical intervention [13].

To the best of our knowledge, this region has never been subjected to any study by a local or international body relating to the fallout from delayed transfer of patients. Furthermore, there is a lack of data regarding the proportion or effect of inter-hospital transfer of patients vis-à-vis surgical emergencies. The aim of the present study was to assess the effect of delays in treatment on initial patient presentation, management, and subjective and objective outcomes on account of inter-facility transfers of patients with surgical emergencies.

Because the international literature is lacking in this respect, this study may prove to be pioneering work in objectively assessing outcomes of delayed transfer and its outcome. Pakistan, due to its geopolitical location and prevalent law-and-order situation needs special attention of international community.

Methods

We prospectively collected information from all consecutive patients aged 15 years or older presenting to the emergency department of the Aga Khan University Hospital (AKUH) for whom a surgical consult or a trauma call was generated from 1 to 15 May, 2012 [14].

Aga Khan University hospital (AKUH) is a 563-bed tertiary health institution situated in southeast Pakistan [15]. As a major referral center; the hospital receives patients with surgical problems from all over the country.

Data were collected by two trained surgical residents who also took part in the study design and development of the questionnaire. Informed consent was taken from the patient or an immediate family member able to make

decisions for a patient in a critical condition. Confidentiality was maintained and no patient identifying information was recorded beyond patient discharge. No intervention was performed, and care was taken so that administration of the questionnaire would not hinder patient management in any way.

Data were collected from four distinct sources with a standardized questionnaire: (1) patients or patients' attendants (age, gender, social class variables, transfer status, number of transfers, reason for transfer, mode of transportation, distance traveled); (2) emergency department record (vitals at presentation, volume of fluid resuscitation); (3) surgical chief resident (change in American Society of Anesthesiologists [ASA] status, procedure); and (4) patient file at discharge (surgical procedure, need for invasive monitoring, length of hospital stay, intensive care unit [ICU] admission, delayed admission). "social class" was defined in accordance with the Ministry of Politics and Society, Islamabad 2008. We defined "delayed admission" if a patient remained in the Emergency Department (ED) longer than 4 h before being admitted to the hospital ward or intensive care unit (ICU) [16].

Patients were divided into two groups; those transferred to AKUH from another facility (transferred) and direct arrivals at AKUH (non-transferred). The effect of inter-facility transfer was measured by objective and subjective parameters. Objective parameters included patient physiology at initial presentation to the ED (pulse, respiratory rate, oxygen saturation, resuscitation fluid requirements, Glasgow Coma Score [GCS], RTS) and hospital course (surgical procedure, need for invasive monitoring, length of hospital stay, ICU admission, and delayed admission). Subjective parameters included the surgical Chief Resident's assessment of change in ASA status, change in surgical procedure performed. Continuous variables such as age, total transfer time, and distance traveled were analyzed as means with standard deviations. Categorical variables such as gender, social class, ED presentation, number of transfers, etc. were described as proportion with percentages. Between-group comparisons were made with Student's *t*-test and the chi square test. Data were analyzed with SPSS version 17. A *p* value less than 0.05 was considered significant.

Results

A total of 99 patients were included in the study. The demographic details are presented in Table 1. The mean age of transferred and non-transferred patients was comparable (43 ± 13 vs. 40 ± 15 years). Gender was evenly distributed, with 54.4 % of the patients being male. The majority of patients belonged to middle to low social class (88 %). Acute intestinal obstruction (12.1 %), cholecystitis

Table 1 Demographics and baseline information of patient's status on presentation

Variable	Transfer (n = 49)	Non-transfer (n = 50)	p value
Age, years	43 ± 13	40 ± 15	0.152
Gender			
Male	29 (29.2 %)	25 (25.2 %)	0.742
Female	20 (20.2 %)	25 (25.2 %)	
Comorbid			
Yes	17 (17.2 %)	15 (15.1 %)	0.725
No	32 (29.3 %)	35 (39.4 %)	
Distance traveled, km	15 ± 5	178.9 ± 190.8	0.005
Social class			
High	09 (9.1 %)	3 (3 %)	0.856
Middle	27 (27.3 %)	30 (30.3 %)	
Low	13 (13.1 %)	17 (17.2 %)	
ER presentation			
Trauma call	13 (13.01 %)	6 (6.1 %)	
RTA	8 (8.1 %)	5 (5.1 %)	
Gunshot	5 (5.1 %)	1 (1.1 %)	
Consults	36 (36.4 %)	44 (44.4 %)	
IO	6 (6.2 %)	8 (8.2 %)	
Cholecystitis	7 (7.1 %)	3 (3.1 %)	
Pancreatitis	7 (7.1 %)	2 (2.1 %)	
Lower GI bleed	3 (3.1 %)	4 (4.1 %)	
Nonspecific AP	1 (1.1 %)	6 (6.1 %)	
Gangrenous foot	1 (1.1 %)	5 (5.5 %)	
Pneumoperitoneum	2 (2.2 %)	3 (3.1 %)	
Acute appendicitis	1 (1.1 %)	4 (4.2 %)	
Others	8 (8.2 %)	13 (13.1 %)	

ED emergency department, RTA road traffic accident, IO intestinal obstruction, GI gastrointestinal, AP abdominal pain

(10.1 %), acute pancreatitis (9.1 %), and road traffic accidents (6.2 %) were among the most common reasons for presentation. Forty-two patients (42.5 %) were operated on at AKUH. Of those patients, six were taken immediately to the operating room (OR) for treatment of gunshot injuries. Forty-nine patients (49.5 %) were transferred from another facility to AKUH, and the most common reasons were lack of satisfaction with surgical care ($n = 42$, 85.7 %) and non-availability of surgical personnel ($n = 7$, 14.1 %). Among transferred patients, 71.4 % ($n = 35$) had one transfer, and 28.5 % ($n = 14$) had two transfers. The mean transfer time was 27 h (± 112 h). Patients came from various locations throughout the country (Fig. 1), and the mean distance traveled was 178 km (± 190 km) (Table 1).

The mean total wait time in the ED was 8.3 h (± 4 h). The mean time from registration to generation of a surgery consult was 1.6 h (± 1.3 h). Mean time for hospital admission was 2.7 h (± 2.2 h). In 56 cases there was a

Fig. 1 Patients presenting to Aga Khan University Hospital (AKUH) from all over Pakistan, with number of patients from each city

delay in admission (a greater than 4 h wait after the decision for admission was made). Common reasons for this delay were bed availability, followed by financial constraints. Three patients were transferred out of the hospital because no ventilator was available, and 14 patients left against medical advice (LAMA) because of financial constraints. One patient died in the ER; he had severe sepsis, most likely exacerbated by delays (Fig. 2).

There were significant differences in mean pulse on arrival (115.9 bpm vs. 96.84 bpm; $p < 0.001$), oxygen saturation (95 vs. 98 %; $p < 0.001$), respiratory rate (32 breaths/min vs. 19 breaths/min; $p < 0.001$), fluid for resuscitation (1,958 ml vs. 1,131 ml; $p < 0.001$), GCS (10 vs. 15; $p < 0.001$), revised trauma scoring (TRS) (10 vs. 12; $p < 0.001$) between transfer and non-transfer patients. Patients who were transferred had poorer vital statistics than those who arrived directly. There was significant difference found in the ICU length of stay (5.67 days vs. 1.5 days, $p = 0.022$) between the two groups (Table 2).

Discussion

Surgical care is no longer considered a luxury and has now been incorporated in health care as an essential component [17]. Disparities exist in provision of surgical care worldwide. Low and middle income countries (LMIC) make up 70 % of world population where only 25 % of global surgeries are performed annually [18]. The root cause of this significant inequality is lack of trained surgical staff

Fig. 2 Flow of patients presented to the AKUH emergency department (ED)

Table 2 Subjective and objective assessment of transferred and non-transferred patients

Variable	Transfer (<i>n</i> = 49)	Non-transfer (<i>n</i> = 50)	<i>p</i> value
Subjective assessment			
Change in ASA			
Yes	24 (92.3 %)	2 (7.7 %)	0.000
No	25 (43.2 %)	48 (65 %)	
Change in procedure			
Yes	17 (34.7 %)	2 (4 %)	0.000
No	32 (65.3 %)	48 (96 %)	
Objective assessment			
Pulse, beats/min			
On arrival	116	97	0.000
After resuscitation	100	87	
Oxygen saturation	95 %	98 %	0.000
Respiratory rate			
Breaths/min	33	19	0.000
Fluid resuscitation, ml	1,958	1,131	0.000
GCS (RTA only)	10	15	0.000
RTS (RTA only)	10	12	0.003
Invasive monitoring			
Yes	23 (46.9 %)	2 (4 %)	0.000
No	26 (53 %)	48 (96 %)	
Hospital stay, days			
ICU	5.67	1.5	0.022
SCU	7.12	3.3	0.066
Ward	8.9	4.7	0.057

ASA American Society of Anesthesiologists score, GCS Glasgow coma scale, RTS revised trauma score, ICU intensive care unit, SCU special care unit

and access to surgical care in low- and middle-income countries (LMIC). Africa has been the focus of a number of studies that identify the surgical needs and practices of various humanitarian and nongovernmental organizations

(NGOs) [18–23]. Tremendous efforts by international bodies have brought issues of access to surgical care in Africa to the global health agenda [24]. International involvement in Africa has also brought about basic changes in the distribution of trained surgical personnel by NGOs leading to improvements in the basic health infrastructure [24]. This study will also help bring Pakistan to the world's attention, focusing on surgical inadequacies and the consequences for the Pakistani people.

Pakistan is among the areas in the world where facilities for essential surgical care are scarce, especially in remote and rural areas. Pakistan is the sixth most populous country in the world, having a population of 160 million, the majority (65 %) residing in rural areas, and a literacy level touching 46 %. The doctor-population ratio approaches 1:1,326 [25]. Making the situation more grave, trained surgical staff is also lacking in most of the primary and secondary care hospitals. This results in estimated 187 deaths per 100,000 population per year from preventable surgical condition [17]. Unlike most African countries, prominent NGOs and WHO have not put in any significant effort to identify the burden of surgical disease, the provision of surgical care, and the effects of surgical transfer in Pakistan.

Surgical care is extremely disappointing in Pakistan [17]. Because trained surgical staff are almost nonexistent at district level hospitals, inter-facility transfer is commonplace and leads to delays in diagnosis. This scenario is routine in Pakistan, and the result is that critically ill surgical patients require prolonged and more complex treatment with significant utilization of resources. In this study we found that surgical transfers are frequent. The most common reasons for transfer were lack of satisfaction with hospital services on the part of patients and their families and, oftentimes, non-availability of basic surgical facilities. Inter-facility transfer leads to delayed institution of appropriate treatment and poor patient outcomes. A study from Northern Pakistan has concluded that poor outcomes in surgically treatable patients were due to misinterpretation of

symptom severity by first level health care providers and late referral to an appropriate surgical facility [7, 9]. Patients in developed countries face the same situation; in a study from Ohio, the rate of perforated appendix was higher in rural areas with inadequate access to a metropolitan hospital [17]. In contrast, Mbah et al [13] in 2006 studied all patients who presented with acute surgical abdomen in a Nigerian teaching hospital and observed that poverty is the major hindrance to seeking surgical advice, and this often results in delayed presentation. With 98 % of the Pakistani population belonging to low and middle social class, the scenario in Pakistan is not very different [25].

An established ED is essential for timely and accurate surgical care, and is correctly called the “safety net” of any health care system [26]. Emergency Department overcrowding is a worldwide problem that affects the ability to provide timely surgical care and therefore outcome [26, 27]. Compared to shorter ED stay, a prolonged length of stay in the ED is associated with poor outcome [19, 20]. In developed countries, high hospital bed occupancy is responsible for a longer ED stay, whereas in developing countries financial constraints are the most common reason [27, 28]. In the present study the patients had to wait in the ED pending arrangements for covering the cost of treatment, which resulted in further delay and worsening of patients’ physiology. Another important delaying factor in our study was bed availability, which is a recognized problem worldwide. Multiple efforts have been made by different countries to shorten the ED waiting time by establishing buffers to empty inpatient beds, improve the acute admission process, add an express admit unit, and establish an expedited admission protocol [26–28].

In an attempt to decrease ED overcrowding and prolonged waiting time, we have started a critical decision unit (CDU) to observe stable patients for 24 to 48 h. This helps reduce waiting time and leads to release of patients from the ED once they are ready for discharge.

Our study was of short duration with small sample size, but it is the first study addressing surgical transfers in Pakistan. Moreover, the objective parameters of transferred and non-transferred patients were measured prospectively, something that has not been monitored in reports in the international literature. We believe this will further motivate international organizations to obtain measurable data and streamline the process of surgical care provision to the neediest areas of the world.

Subjectivity of the study in terms of chief resident’s input is also a limiting factor, but we overcame this by adding objective parameters for assessment. In this study patients who had two inter-facility transfers (28 %) experienced more deterioration of their clinical condition. To date no such finding has been reported in literature. We also

determined that distances traveled by transferred and non-transferred patients, had not been reported in any previous study.

This study also brings out that distribution of trained surgical personnel should always be needs based. Surgical staff should be strategically placed across the board to replenish the shortages and treat different problems at their respective hospital levels, thereby reducing the burden on tertiary care facilities. Policy makers should include surgical care in the planning of district health systems, as the provision of surgical care is the most cost effective component. In addition, the ambulance system needs to be organized and adequately equipped to transfer patients to high level surgical care units. Finally, an expedited admission protocol and a long stay ward are necessary to decrease ED waiting time.

This study is first of its kind from this region that has identified measurable outcomes of delayed transfer, because the international literature is lacking in this respect. It will also provide a platform from which to conduct better designed research regarding surgical care provision and utilization, while addressing unmet surgical needs. The findings of this study may also bring Pakistan to the world’s attention in general, and to international humanitarian organizations in particular, as an area where inadequacies in surgical care affect delivery of healthcare.

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