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Defining the Three Delays in Referral of Surgical Emergencies from District Hospitals to University Teaching Hospital of Kigali, Rwanda

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Abstract

Background Surgical conditions represent up to 30% of the global burden of diseases. The aim of this study was to assess the delays in patients transferred to a tertiary referral hospital from district hospitals (DHs) in Rwanda with emergency general surgery (EGS) conditions.

Methods We performed a prospective review of all EGS patients referred from DH over a 3-month period to assess delays in transfer and accessing care. We then surveyed general practitioners to define their perspective on delays in surgical care.

Results Over a 3-month period, there were 86 patients transferred from DH with EGS conditions. The most common diagnoses were bowel obstruction (n = 22, 26%) and trauma (n = 19, 22%). The most common performed operations were laparotomy (n = 21, 24%) and bowel resection (n = 20, 23%). The mortality rate was 12%, and the intensive care unit admission rate was 4%. In transfer to the referral hospital, 5% patients were delayed for financial reasons and 2% due to lack of insurance. After reaching CHUK, 5% patients were delayed due to laboratory and radiology issues. Other delays included no operating theater available (4%) and no surgeon available (1%). Providers' perceptions for not performing surgeries at DH were predominantly the lack of a competent surgical provider or anesthesia staff.

Conclusion EGS patients represent a broad range of diagnoses. Delays were noted at each step in the referral process with multiple areas for potential improvement. Expanding surgical access at the DH has the potential to decrease delays and thereby improves patient outcomes.

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Introduction

Surgical conditions represent up to 30% of the global burden of diseases [1]. Authors in low- and middle-income countries (LMICs) have reported on the scarcity of surgical and anesthesia workforce, gaps in infrastructure, and limited access to specialized surgical care [2–4]. Emergency general surgery (EGS) remains a public health challenge [5]. Access to safe, timely, and affordable emergency general surgical care is limited in settings with limited resources. Most surgical emergencies are transferred and arrive late in tertiary referral hospitals, which increase mortality and morbidity [6, 7].

Delays have been recognized as an important barrier to timely and effective surgery [8]. Delays have been categorized in three levels: delays in seeking care, delays in reaching care, and delays in receiving care. This model was initially developed to characterize delays in maternity patients contributing to adverse outcomes [9]. However, the model has since been extrapolated to other surgical emergencies [10–12].

The Rwandan health system is designed on a pyramidal model where—aside from cases of trauma—patients first consult the health center, then the district hospital, before being transferred to a referral hospital. Most (97%) of the Rwandan population has health insurance through a government-sponsored community-based health insurance program [13]. Through this health insurance program, 90% of in-hospital charges are covered. To qualify for the community-based health insurance coverage, patients must pass through the health care system.

In Rwanda, efforts have been made to decentralize health services, including surgical services. There are four referral hospitals and 44 district hospitals [2]. In 2012, there were approximately 50 full surgeons for a population of around 12 million, with most located in urban centers [2]. The majority of Cesarean sections are done in district hospitals by general practitioners [2]. However, few emergency general surgeries are being managed at the district level [14].

University Teaching Hospital of Kigali (Centre Hospitalier Universitaire de Kigali, CHUK) is a 565-bed teaching and referral hospital in Kigali. CHUK serves a catchment area of 19 district hospitals, accounting for around 50% of the Rwandan population. The main operating room is composed of six operating rooms shared by different surgical specialties: general surgery, pediatric surgery, orthopedics, neurosurgery, urology, plastic surgery, maxillofacial surgery, and otorhinolaryngology. The hospital has two additional operating theaters reserved for obstetrics and gynecology. In 2013, there were 2800 major operations performed at CHUK [15]. Emergency operations accounted for 64% of cases and, of these, 56% were general surgery [15]. The overall perioperative mortality rate in general surgery patients is 11% [16].

The aim of this study was to assess the delays in EGS patients referred from district hospitals to CHUK based on both patient and provider perspectives.

Materials and methods

This is an observational study of EGS patients referred to CHUK from district hospitals in Rwanda. The aim was to define the patient perspective on delays in accessing care at district and referral hospitals. This was accomplished through a prospective study of all EGS patients referred from district hospitals to CHUK over a 3-month period (March 1, 2017–May 31, 2017). Using a questionnaire, we prospectively collected data on patient demographics, symptom duration, distance from health facilities, and retrospectively reviewed the patient's file for management at the district hospital, transfer to CHUK, diagnoses, operation, and outcomes data. An informed consent was obtained from all study participants.

We assessed potential delays in presentation or transfer to the referral hospital. Delays were categorized according to the three delays model [9, 17], assessing delays in patients seeking care, delays in reaching care and delays in receiving care. Delays in seeking care included visiting a traditional healer and duration of symptoms prior to presentation at the district hospital. Delays in reaching care included the travel time and distance to the health center and district hospital, mode of transportation, and cost of transportation. Delays in receiving care included availability of trained surgical and/or anesthesia providers, operating room availability, and material supplies.

We next assessed the perspective of practitioners at the district hospitals and their experiences with delays in transfer of surgical patients. This consisted of a paper-based survey of providers based at district hospitals. We surveyed current general practitioners at the district hospitals who were scheduled to enter surgical training at College of Medicine and Health Sciences, University of Rwanda academic year 2017–2018. The survey included questions regarding operating room capabilities and characteristics at the district hospital, indications, and challenges with patient transfer to CHUK, perceived reasons for delays in transfer, challenges in performing surgical procedures at the district hospital, reasons for transfer to the referral hospital, and challenges in patient transfer.

We quantified the amount of time delay at each of the three delays. Time delay for seeking care was defined based on symptom duration prior to reaching the district hospital. Time delay in reaching care was defined as the time spent at the health center and district hospital. Time

delay in receiving care was defined as time from CHUK hospital admission to operating room.

We described the reasons for delays and proposed strategies to reduce delays at each of the three delays steps.

This study was approved by the University of Rwanda College of Medicine and Health Sciences institutional review board. Informed consent was obtained from all study participants.

Results

Over a 3-month period (March, 2017–May 31, 2017), 86 patients were transferred from district hospitals to CHUK (Table 1). Most (n = 57, 66%) were male with a median age of 25.5 years (interquartile range (IQR): 17, 43). Most patients (n = 75, 87%) had a government-sponsored, community-based health insurance. Two patients (3%) were hypotensive on admission to CHUK. The most common diagnoses for transferred patients were bowel obstruction (n = 22, 26%), trauma (n = 19, 22%), and soft tissue infection (n = 11, 13%). Seventy-three (85%) patients underwent operation at CHUK. The most common operations were laparotomy (n = 21, 24%), bowel resection (n = 20, 23%), and debridement (n = 9, 11%). Nine (11%) patients required a reoperation, and three (4%) patients were admitted to the intensive care unit (ICU). Ten (12%) patients died.

The median length of hospital stay was 7 days (IQR: 3, 13) (Table 2). Shorter hospital stays were noted in patients with appendicitis (median 3 days, IQR: 2, 4) and other diagnoses (median 2 days, IQR: 2, 4). Longer hospital stays were noted with patients diagnosed with skin and soft tissue infections (median: 8 days, IQR: 4, 27), bowel perforation (median: 8 days, IQR: 6.5, 18.5), and peritonitis (median: 10 days, IQR: 6, 16).

Delays in seeking care

Twenty-four (28%) patients visited a traditional healer prior to presentation in the health system. The median symptom duration prior to presentation at the DH was 4 days (IQR: 2, 7) (Table 2). The symptom duration was longer for patients with a diagnosis of skin and soft tissue infection (median: 10 days, IQR: 5, 19) and bowel perforation (median: 10 days, IQR: 4, 24). The symptom duration was shorter for patients with a diagnosis of trauma (median: 0.5 days, IQR: 0, 2).

The median time for seeking care based on symptom duration prior to presentation at the district hospital was 4 days (IQR: 2, 7).

Table 1 Characteristics of patients referred with emergency general surgery conditions from a district hospital to University Teaching Hospital of Kigali

	N	%
Gender		
Male	57	66
Female	29	34
Province		
East	27	31
Kigali city	27	31
North	19	22
West	8	9
South	5	6
Profession		
Farmer/housewife	28	33
Student	14	16
Self employed	13	15
Employed by a company or institution	5	6
Unemployed	22	26
Other	2	2
Not documented	2	2
Insurance		
Community-based health insurance	75	87
None	6	7
Other	5	6
Past medical history		
None	69	80
Human immunodeficiency virus infection	5	6
Psychiatric diagnoses	3	3
Diabetes	1	1
Stroke	1	1
Other	7	8
Past surgical history		
Prior surgery	11	13
None	75	87
Vital signs on admission to the referral hospital[a]		
Fever	11	14
Tachycardia	51	62
Tachypnea	19	24
Hypotension	2	3
Hypoxia	4	5
Diagnosis		
Bowel obstruction, not otherwise specified	22	26
Trauma	19	22
Skin and soft tissue infection	11	13
Peritonitis, not otherwise specified	9	11
Appendicitis	7	8
Peptic ulcer disease perforation	5	6
Volvulus	4	5
Bowel perforation	4	5
Other	5	6

Table 1 continued

	N	%
Operation		
Yes	73	85
No	13	15
Type of operation		
Laparotomy, not otherwise specified	21	24
Bowel resection	20	23
Debridement	9	11
Appendectomy	7	8
Incision and drainage	5	6
Omental patch	5	6
Splenectomy	3	4
Other	3	4
Intensive care unit admission		
Yes	3	4
No	83	97
Reoperation		
Yes	9	11
No	77	90
Outcomes		
Survival	76	88
Death	10	12

[a]Fever: temperature ≥38 °C; tachycardia: heart rate >100 beats per minute; tachypnea: respiratory rate >20 beats per minute; hypotension: systolic blood pressure <90 mmHg; hypoxia: oxygen saturation <90%

Delays in reaching care

Seventy-eight (92%) patients went to a health center prior to presentation at the DH. Thirty-three (42%) patients live within 5 km of a health center (Table 3). The median duration of stay at the health center was 1 day (IQR: 0, 1). The distance from the health center to the DH was more than 10 km for 37 (47%) patients. At the DH, most patients received IV fluids (n = 71, 83%) and antibiotics (n = 54, 63%) (Table 4). No patients underwent surgery at the DH. The median duration of stay at the DH was 1 day (IQR: 1, 2). 54% of district hospitals were located at more than 50 km from CHUK. Seventy-three (85%) patients were transferred to CHUK via ambulance. Most (n = 70, 81%) patients did not report a delay in transfer to CHUK. Six (7%) patients were delayed for financial reasons, and three (3%) patients were delayed due to lack of insurance.

The median time to reach care based on time spent at the health center and district hospital was 2 days (IQR: 1, 5).

Delays in receiving care at the referral hospital

A surgeon was immediately available in the ED for 78 (91%) of patients. The operating was immediately available for 72 (86%) patients presenting to the referral hospital. Seventy-six (88%) patients did not report any delays receiving care at CHUK. Four (5%) patients were delayed due to laboratory and radiology issues. Other delays included no operating theater available (n = 3, 4%) and no surgeon available (n = 1, 1%).

Median time from admission to OR was 10.8 h (IQR: 4.6, 17.5). The shortest time from admission to OR was seen in patients with diagnoses of trauma (median: 6 h, IQR: 3.5, 17.5), appendicitis (median: 6.1 h, IQR: 3.8, 10.5), and peptic ulcer disease perforation (median: 6.3 h, IQR: 3.9, 17.8). Longer times from admission to OR were seen with skin and soft tissue infection (median: 11 h, IQR: 8.4, 17.4), volvulus (median: 11.3, IQR, 2.6, 24.2), and bowel perforation (median: 20.1, IQR: 1.7, 274).

The median time to receive care at the referral hospital was 10.8 h (IQR: 4.6, 17.5).

Table 2 Time delays by diagnosis

Diagnosis	Symptom duration[a] (days)	Time to operating room[a] (h)	Length of hospital stay[a] (days)
Total	4 (2, 7)	10.8 (4.6, 17.5)	7 (3, 13)
Bowel obstruction	3.5 (1, 7)	9.2 (6.5, 17.6)	7 (4, 14)
Trauma	0.5 (0, 2)	6.0 (3.5, 17.5)	7 (3, 20)
Skin and soft tissue infection	10 (5, 19)	11 (8.4, 17.4)	8 (4, 27)
Peritonitis,	7 (4, 7)	8.8 (4.6, 19.6)	10 (6, 16)
Appendicitis	2 (2, 3)	6.1 (3.8, 10.5)	3 (2, 4)
Peptic ulcer disease perforation	4 (4, 5)	6.3 (3.9, 17.8)	5 (4, 7)
Volvulus	3.5 (2.5, 4.5)	11.3 (2.6, 24.2)	6 (5, 17)
Bowel perforation	10 (4, 24)	20.1 (1.7, 274)	8 (6.5, 18.5)
Other	6 (3, 6)	7.1 (1.7, 15.3)	2 (2, 4)

[a]Reported as median (interquartile range)

Table 3 Distances travelled for health care

	N	%
Distance from home to health center		
<5 km	33	42
5–10 km	33	42
>10 km	13	16
Distance from health center to district hospital		
<5 km	22	28
5–10 km	20	25
>10 km	37	47
Distance from district hospital to referral hospital		
<10 km	15	18
10–50 km	24	29
>50 km	45	54

Providers' perspectives on delays in emergency surgical care

We surveyed 18 general practitioners, from 15 different hospitals, who had practiced for a median of 12 months (IQR: 12, 17). Eleven (61%) were working in district hospitals, two (11%) in provincial hospitals, and five (28%) in peripheral referral hospitals. Most (n = 16, 88%) worked as a medical doctor, one (6%) functioned as the medical director, and one (6%) was the head of the surgical department.

Seven (39%) respondents worked in hospitals with qualified staff were able to operate on emergency surgical conditions (Table 5). On average, respondents reported between 10 and 20 EGS patients presenting to the district hospital per month. Every hospital had at least one operating room for obstetric operations. However, five (28%) respondents reported that their hospital had no room reserved for surgical procedures. Most respondents reported that their hospitals were able to perform Cesarean section (n = 17, 94%), debridement (n = 15, 83%), and incision and drainage (n = 14, 78%).

Reasons commonly cited for not performing surgeries included lack of a qualified surgical provider (n = 14, 78%), lack of qualified anesthesia staff (n = 9, 50%), lack of ICU (n = 8, 44%), and materials (n = 6, 33%). Providers felt that most cases were transferred to CHUK because they need operation (n = 15, 83%), ICU management (n = 9, 50%), or imaging (n = 7, 39%).

Financial, insurance or payment issues were a leading reason noted for delay in transfer (n = 15, 83%). Other reasons for delayed transfer included a lack of space at CHUK (n = 11, 61%), shortage of ambulances (n = 2, 11%).

Discussion

Emergency general surgery (EGS) remains a public health challenge [5]. There is a shortage of surgical and anesthesia workforce, infrastructure, and limited access to specialized surgical care in many LMICs [2–4]. In Rwanda, the tiered health care system leads to many challenges in efficient transfer of EGS patients. Other studies have shown that inter-hospital transfer delays surgical intervention and increases length of hospital stay [18]. In Pakistan, patients transferred from other facilities had more deranged physiologic variables compared with those directly admitted [7]. Patients with sepsis or septic shock transferred from

Table 4 Management at the district hospital

	N	%
District hospital management		
Intravenous crystalloids infusions	71	83
Antibiotics	54	63
Nasogastric tube decompression	32	37
Surgery	0	0
Mode of transportation to referral hospital		
Ambulance	73	85
Private vehicle	9	11
Public vehicle	4	5
Patient perceived reasons for delayed transfer to referral hospital		
Financial payment issue at district hospital	6	7
Lack of insurance	3	3
Lack of ambulance or personnel to transport	1	1
Other	6	7
None	70	81

Table 5 Provider perceived delays in transfer of emergency general surgery patients according to three delays model

	N	%
Average number of emergency general surgery patients presenting to the district hospital each month		
<10	3	17
10–20	8	44
21–30	4	22
>30	3	17
Hospital and operating room characteristics		
Qualified staff doing surgery		
Yes	7	39
Surgeon	5	71
General practitioner with surgery training	2	29
No	11	61
Working operating rooms		
Obstetrics		
One room	8	44
Two rooms	10	56
Surgery		
No room	5	28
One room	6	33
Two rooms	7	39
Types of operations performed at the district hospital as reported by respondents		
Cesarean section	17	94
Debridement	15	83
Incision and drainage	14	78
Inguinal hernia repair	10	56
Laparotomy	9	50
Appendectomy	6	33
Other	1	6
Average number of operations performed each month at the district hospital		
<5	5	28
5–10	3	17
11–20	2	11
21–30	5	28
>30	2	11
Other, including none	1	5
Perceived challenges and delays		
Reasons for not operating on emergency general surgery cases at the district hospital		
No qualified/skilled surgical provider	14	78
No qualified/skilled anesthesia provider	9	50
No intensive care unit	8	44
Missing or inadequate materials	6	33
Operating room not available	6	33
Complex operative case	4	22
Insufficient nursing staff	3	17
No anesthesia machine	3	17
Reasons for transferring emergency general surgery patients		
Needs operation	15	83
Needs intensive care unit	9	50
Needs further imaging	7	39

Table 5 continued

	N	%
Diagnosis unclear	5	28
Causes for delays in transfer of patients to the referral hospital		
Financial or payment issues	15	83
No space at referral hospital	11	61
No ambulance	2	11
Other	1	6

Eighteen general practitioners were surveyed regarding their perceptions of emergency general surgery patients presenting to the district hospital and the capacity for management, surgery, and transfer to a referral hospital

another facility were less likely to have appropriate initial antibiotics and resuscitation management [19]. In addition, emergency room overcrowding is associated with delay in initiation of blood product transfusion, decreased amounts of transfusions, and delays in procedures [20].

Prior to seeking care in the health system, 30% of patient visited a traditional healer. Patients were symptomatic for 4 days before presenting to the health system, with variability based on diagnosis. There was more rapid presentation in trauma patients, whereas other diagnoses had longer symptom duration. Trauma may be a more readily recognized surgical condition compared with other, more nonspecific presentations. It is unknown how finance plays into the delay in seeking care as we did not query patients on financial barriers to seeking care. In a pediatric surgery population in Uganda, cost was a significant barrier to care even when free care was provided [10]. Patients may potentially delay seeking care due to financial limitations. The time to seek care was 4 days compared with 2 in reaching care and 1 in receiving care. In a pediatric surgery population in Uganda, delays in seeking care were predominant [10].

Once entering the health care system, patients spent on average 2 days reaching care at the referral hospital. Expanding surgical access at the district hospitals could potentially decrease time by 1 day and potentially improve patient outcomes. Transfer time from health center to DH greater than 90 min is associated with worse neonatal outcomes after cesarian section [11]. Efforts in Rwanda have focused on increasing the number of trained surgeons and deploying more surgeons to the district hospitals [21]. In addition, there are varied surgical outreach missions at the district hospitals to improve access to surgical care in the periphery. In addition to earlier access to surgical care, this would likely decrease cost of care as patients would not have to pay for ambulance and transportation costs to Kigali. Transport accessibility has been recognized as a barrier to care delivery [22]. Prior studies have shown that 70% of Rwandans surveyed do not have funds to cover the cost of transportation to the tertiary care facility [8].

Surgeons and operating rooms were available more than 90% of the time when patients arrived at CHUK. Most patients were taken to the OR within 24 h. However, depending on the diagnosis and clinical presentation, some patients may benefit from even faster time to the OR. We did not collect data on time of day that patients went to the OR. There may be certain times of the day when the OR is functioning at capacity and therefore cannot handle additional patient volume. Other studies have shown that arriving during the night shift has been associated with longer wait times and delayed initial assessment [23]. Delays in care at CHUK were also noted on some cases mainly due to laboratory and radiology issues, absence of operating theater, and unavailability of surgeon on time of admission to assess them and decide the appropriate management on time. When compared to other available reported studies, financial, lack of space at referral hospital and admission to DH surgical wards, duration of more than 7 days from admission to referral recommendation, and weak referral system are the highlighted factors of delays in transfer [12]. Efforts to increase surgical capacity at the DH will decrease the burden on surgeons at CHUK and potentially increase OR time and space.

Equipping district hospitals with basic resources to deliver the package of essential surgical care and assurance on sustainability is likely to have wide ranging effects on the health systems of low- and middle-income countries. The most commonly cited challenge with surgery at the DH was lack of trained surgical and anesthesia staff. With an increase in trained staff, deficits in material resources may then become more noticeable. Management of emergency surgical conditions requires not only the personnel but also the materials, medications, and infrastructure. Lack of materials like sutures, operating room for surgical conditions in some different district hospitals do not allow providers to manage EGS patients near their home to minimize the cost and time in accessing the care. These are

the basic requirements to address, as management at CHUK did not require specialized care such as ICU admission for most patients.

We had some limitations to consider while interpreting our study results. We only described people who managed to reach CHUK and where surgical team was involved. Prior studies suggest that many patients may die prior to presentation to the health care system [8]. There are likely other patients who were not transferred to CHUK prior to referral or surgical consultation. Some patients may have been successfully operated or managed at the DH, whereas others may have had a prolonged hospital stay at the DH. There are individuals that never interact with the health care system due to a wide range of reasons including socioeconomic, logistic, and cultural. However, this study was not designed to capture these individuals. A separate, community-based study would be needed to better understand the challenges and barriers that these individuals experience. There is no defined consensus on time quantification of delays. An equivalent symptom duration for one diagnosis may be appropriate, but considered a delay for another diagnosis. The low numbers make it difficult to make conclusions based on diagnoses. We collected data on a 3-month time period. Based on prior experience, this patient population is representative of patients commonly presenting to CHUK [15, 16, 24]. However, there is variability in the health system with visiting surgical teams, changing providers at the DH, rotating general practitioners in different services within the district hospitals, and variable material resource availability. This all may influence the capacity of district hospitals to manage EGS at the district level at any given time. Finally, the survey of general practitioners provides an individual's perception of delays encountered at the DH but is not correlated with specific patient data and therefore may be biased.

Conclusion

EGS patients represent a broad range of diagnoses. Delays were noted at each step in the referral process with multiple areas for potential improvement. Expanding surgical access at the DH has the potential to decrease delays and thereby improve patient outcomes.

Compliance with ethical standards

Conflict of interest The authors have no financial disclosures to report.

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