

KSMC referred cases characteristics and outcomes: Retrospective study

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ABSTRACT

This retrospective hospital records-based study focused on KSMC emergency department as one of the crowded hospitals in the country. Some delays were observed regarding the referral system from primary, secondary or tertiary hospital which plays an important role in the admission process in this hospital, so it's necessary to investigate the nature of referred cases and the final outcome. Our study based on hospital records data to collect information regarding patient's status, arrival time, interventional time, final outcome additionally to other variables. Statistical analysis was performed using frequency, descriptive statistics, chi-square test, fisher exact test, Pearson correlation, relative risk and odd ratio. Our results found that there's some delay in a patient's arrival to the emergency department. But no significant delay was observed after the patient's arrival; also, the delay on intervention was observed to be correlated with poor final outcome.

Keywords: Referral, Emergency department, KSMC

1. INTRODUCTION

The highest quality of care is not always available in primary and secondary care institutions; thus patients must be transferred to a tertiary hospital. The World Health Organization states that "referral is a process where a health worker at one level of the health system seeks the assistance of a better or differently resourced facility at the same or higher level to assist in, or take over the management of, the client's case" when that facility does not have the resources (drugs, equipment, skills) (WHO, 2021).

Primary care doctors and hospital experts, who each have an important role to play in the healthcare system, must communicate with each other in both directions during the referral process (Lee et al., 1983). The primary care

physician has a responsibility to clearly explain the need to refer a patient as well as the reason or reasons for doing so. On the other hand, it is the specialist's duty when working in a hospital to clearly explain his evaluation of the patient's condition as well as a strategy for their care (Byrd & Moskowitz, 1987). When primary healthcare facilities are close to specialized hospitals, it is more likely to be linked with improved referral and appointment documentation rates. Referral loop closure is projected to rise as a result of tactics that streamline scheduling, reduce clinic variety, and boost patient access (Alabbasi et al., 2022).

KSMC is regarded as one of the large hospitals in Saudi Arabia with a capacity exceeding 1400 beds; it's one of the known referral hospitals in the kingdom having more than 150 ICU beds. This hospital was initiated more than 60 years ago to serve as a focus for trauma surgery, orthopedic surgery, neurosurgery, in addition to other specialties. Only the emergency room contains 102 beds, which was regarded as one of the crowded hospitals in KSA. The number of medical professionals who worked at KSMC is 9200. More than 20000 surgical interventions were performed in this hospital in 2019. KSMC has a high inpatient and outpatient load (moh.gov.sa) (moh.gov.sa). In this retrospective research we are willing to study the nature of referral cases to KSMC in the period from Jan 2021 to Jan 2022.

2. METHOD

This retrospective study relies on hospital records to collect data on referred cases to the KSMC emergency department. KSMC in Riyadh, Saudi Arabia, served as the study site (KSMC); it was created in 1956 and as one of the important tertiary care centers in KSA. It has total beds of 1,500, a total of 200 ICU beds. Data collection focused on arrival time of the patients since the referral, demographic characteristics, triage level, time taken from patient arrival to action taken and final outcome the triage classification was done according to CTAS and classified as (resuscitation, emergent, urgent, less-urgent and non-urgent) (Alquraini et al., 2015).

All referred cases to KSMC in the period from 1/1/2021 to 1/1/2022 were included in the study, we excluded the cases which came directly to the emergency department without referral; we also excluded 104 cases because of their incomplete data. SPSS V24 was used for data entry and analysis, we use frequency analysis for categorical variables and descriptive analysis for continuous variables, Pearson correlation was used along with chi square and fisher exact test were used for correlation between the diagnosis and final outcome, we also used odd ratio and relative risk to highlight the effect of delayed emergency intervention on patient final outcome (discharge, referral and death). For the Shapiro-Wilk test, normality was evaluated. A p-value threshold of 0.05 was used to denote statistical significance at the 95% confidence interval.

With the reference number, the KSMC review board approved waivers of authorization and ethical requirements (H1RE-20-Sep22-01). The approval for data collection from patient files has first been obtained from KSMC. Only research authors and statisticians had access to the research data, which was collected and preserved with the utmost confidentiality.

3. RESULTS

KSMC's emergency room received 5,212 referred patients in 2021. High intensity was seen in January through March, followed by a fall in April, and May, corresponding with the widely observed fasting season of Ramadan in Saudi Arabia, which is logical. Peak times for patient arrival were between 8 and 10am, and to a lesser extent, between 4 and 6pm.

The emergency department received 5212 referred patients in total; 2189 (42%) were female, and 886 (17%) patients were younger than five years old. Table 1 displays the patient classification according to their status as determined by the triage process. Resuscitation and emergency cases accounted for 7% and 18% of all patients, respectively (Table 1). There were some delays in patient's presentation at the emergency department after the development of symptoms. Out of the 3918 patients for whom data were available on the timing of the onset of symptoms, 65 percent of the patients presented at the emergency department within 24 hours of the development of symptoms. After presentation at the emergency department, patients did not experience any substantial delays in receiving treatment. Table 3. The proportion of patients who were treated within the goal time to treat is 98%. Only 8% of resuscitation cases exceeded the goal time, and around 93% of the emergent cases received care within the target time of 15 minutes. Patients for whom the target time to treat was not fulfilled had a higher risk of death, with a relative risk of 2.5 (95% CI 1.6-3.6), as compared with patients who were treated within the target time. The most prevalent cases were, cerebrovascular injury, followed by multiple fractures and trauma, figure 1. When related using person correlation resuscitation level correlated with death (P correlation .624; p value .021). The highest death rate was observed in cardiac arrest at 85%, and the highest referral rate was shown in cases of cerebrovascular injuries, Table 2.

Table 1 Illustrate frequency and percentage of triage level

| Triage level | Frequency | % |
|---------------|-----------|------|
| Resuscitation | 365 | 7.0 |
| Emergent | 938 | 17.9 |
| Urgent | 2014 | 38.6 |
| Less urgent | 1856 | 35.6 |
| Non urgent | 39 | 0.7 |

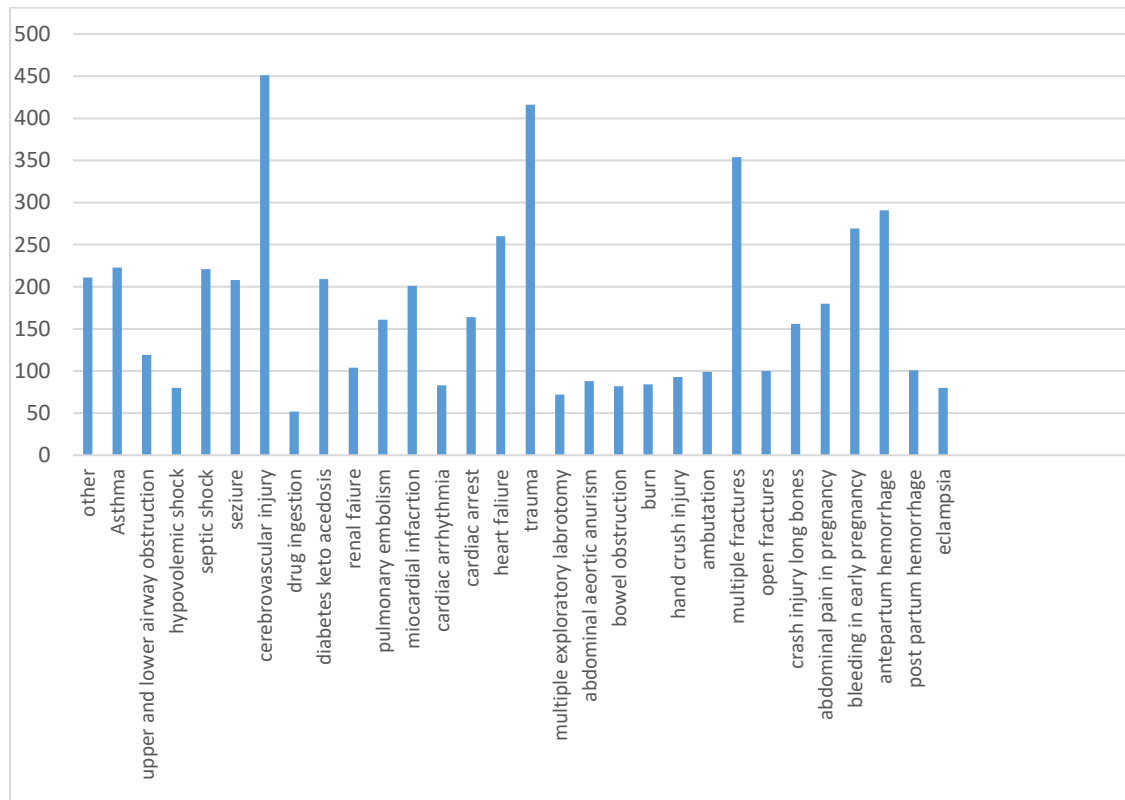

Figure 1 The most frequent referred cases to KSMC

Table 2 Chi square test of diagnosis and final outcome

| Condition | Final outcome | | | | | |
|------------------------------------|---------------|-----|-----------|-----|-----------|-----|
| | Discharged | | Referred | | Death | |
| | Frequency | (%) | Frequency | (%) | Frequency | (%) |
| Asthma | 221 | 99 | 0 | 0 | 2 | .89 |
| Upper and lower airway obstruction | 110 | 92 | 7 | 5.8 | 2 | 1.6 |
| Hypovolemic shock | 67 | 83 | 0 | 0 | 13 | 16 |
| Septic shock | 179 | 80 | 11 | 4.9 | 31 | 14 |
| Seizure | 201 | 96 | 4 | 1.9 | 3 | 1.4 |
| Cerebrovascular injury | 271 | 60 | 104 | 23 | 76 | 8 |
| Drug ingestion | 51 | 98 | 0 | 0 | 1 | 1.9 |
| Diabetes keto acidosis | 208 | 99 | 0 | 0 | 1 | .4 |
| Renal failure | 78 | 75 | 18 | 17 | 8 | 7.6 |
| Pulmonary embolism | 124 | 77 | 9 | 5.5 | 28 | 17 |
| Myocardial infarction | 122 | 60 | 10 | 4.9 | 69 | 34 |
| Cardiac arrhythmia | 61 | 73 | 4 | 4.8 | 18 | 21 |
| Cardiac arrest | 40 | 24 | 0 | 0 | 124 | 75 |

| | | | | | | |
|-------------------------------|-----|----|----|-----|----|-----|
| Heart failure | 241 | 92 | 12 | 4.6 | 7 | 2 |
| Trauma | 401 | 96 | 2 | .4 | 13 | 3 |
| Multiple exploratory lobotomy | 51 | 70 | 2 | 2.7 | 19 | 26 |
| Abdominal aortic aneurism | 41 | 46 | 0 | 0 | 47 | 53 |
| Bowel obstruction | 61 | 74 | 1 | 1.2 | 20 | 24 |
| Burn | 61 | 72 | 5 | 5.9 | 18 | 21 |
| Hand crush injury | 81 | 87 | 2 | 2.1 | 10 | 10 |
| Amputation | 91 | 91 | 3 | 3 | 5 | 5 |
| Multiple fractures | 309 | 87 | 17 | 4.8 | 28 | 9.7 |
| Open fractures | 78 | 78 | 1 | 1 | 21 | 21 |
| Crash injury long bones | 142 | 91 | 5 | 3.2 | 9 | 5 |
| Abdominal pain in pregnancy | 175 | 97 | 4 | 2.2 | 1 | .5 |
| Bleeding in early pregnancy | 264 | 98 | 2 | .7 | 3 | 1.1 |
| Antepartum hemorrhage | 284 | 97 | 2 | .6 | 5 | 1.7 |
| Post-partum hemorrhage | 98 | 97 | 0 | 0 | 3 | 2.9 |
| Eclampsia | 79 | 98 | 0 | 0 | 1 | 1.2 |
| Others | 181 | 85 | 24 | 6 | 6 | 2.8 |

Table 3 Mean time in minutes taken by intervention according to CTAS level

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---------------|------|---------|---------|------|----------------|
| Resuscitation | 365 | 0 | 4.00 | 2.5 | 1.1 |
| Emergent | 938 | 2.00 | 29.00 | 13.0 | 8.1 |
| Urgent | 2014 | 20.00 | 39.00 | 27.3 | 6.1 |
| Less-Urgent | 1856 | 36.00 | 71.00 | 50.1 | 8.4 |
| Non-Urgent | 39 | 68.00 | 145.00 | 94.7 | 22.4 |

4. DISCUSSION

Emergency services integrated system is used to provide time-sensitive medical care for injuries and acute illnesses. The emergency care system that provides these services includes treatment at the scene of the accident and transportation to the emergency room. Numerous medical therapies rely heavily on timing to save lives, but only when given at the right time (WHO, 2016). Our study demonstrates the nature of referral cases from different hospitals and primary health care centers in Saudi Arabia to KSMC emergency department. Also, we highlighted the relationship between the final outcome and the diagnosis.

Delay was observed in referral cases in our analysis; a study was carried out in Saudi Arabia to identify the factors that delay the referral of stroke patients. The study discovered significant contributing factors for late presentation following the beginning of stroke at the emergency department of a major hospital in Riyadh, the Saudi capital. More than half of the patients came in more than 4.5 hours after their stroke had begun. Being alone when the stroke first occurred, not being taken in an ambulance, being unaware that they were having a stroke, and living outside of Riyadh were all risk factors for late arrival (Al Khathaami et al., 2018). According to Doua et al., (2012) study, living in rural locations and being older than 60 were linked to pre hospital time delays. Patients who were semiconscious or unconscious were more likely than conscious patients to come first.

Large proportion of referral cases were pediatric, 22% clustered around certain diagnosis which includes (asthma, upper and lower airways obstructions, hypovolemic shock, septic shock, convulsion, drug ingestion, diabetes keto-acidosis; which observed mainly in newly discovered diabetes). Most of the reported pediatric cases were under the age of 5 years. In other pediatric ERs in the US, Lebanon, and another area in Saudi Arabia, comparable distributions have been seen (Massin et al., 2006; El Zahran et al., 2018; Alhusain et al., 2017). In comparison to other regions of the world, Saudi Arabia has a low rate of pediatric hospital admissions, according to Al-Qahtani et al., (2021). The disturbingly high number of non-urgent Emergency Department visits was mostly to blame for this. As these cases should be directed more effectively toward primary healthcare facilities, this emphasizes the issue of unnecessary usage of emergency department services, related to studies of Emergency Department visits by non-referred cases which were studied by Al-Qahtani et al., (2021). Fever was the most frequent complaint, followed by respiratory problems. Only 7 patients (0.02%) had a triage I (Resuscitation) classification, whereas the majority (71.0%) had a triage IV (Less urgent) classification. Winter was the season with the most visits.

In our study, delayed intervention was observed in some patients, which was associated with poor outcomes. In Rincon et al., a 2010 study delayed more than 5 h before transfer to the NICU was independently linked with poor outcomes at hospital discharge in critically ill patients. Not like our findings, the length of ED stay in a university hospital was not related to the prognosis of severely ill patients. However, we believe that further research should be done on how ED care and delay affect outcomes and outcome prediction in critically sick patients (Saukkonen et al., 2006).

5. CONCLUSION

The most common diagnosis associated with poor outcomes was cardiac arrest. No significant delay was observed regarding the interventional time since the patient arrival, while delay was observed in the arrival time to the hospital.

Author's contribution

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Additional information

All authors have affirmed that they do not currently or in the past have any financial ties to any organizations that might be interested in the work that has been submitted. Each author has also stated that "no other affiliations or activities might be considered as having impacted the work that has been submitted."

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

The data which support the results of this research are embedded within the manuscript.

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