

## UTILIZATION OF EMERGENCY DEPARTMENT, UKM MEDICAL CENTRE: PATTERN OF PATIENT

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### Abstract

An emergency department (ED) is a front door for a hospital where a huge number of patients visit the department to seek immediate treatment. This has led to ED overcrowding. A cross sectional study was conducted to determine the pattern of patients attending the ED in a public teaching hospital in Malaysia. 2013 daily census data contained 66,603 patients were used. In this study, 62.1% of ED attendances are non-critical case. They commonly utilized the ED in the early morning, during weekends, and early part of the week. In conclusion, non-critical patients are seen to be the most frequent ED users. They are commonly present at the ED with minor problems. Hence, ED management should implement various solving methods in order to educate such people regarding the real functions of an ED.

Keywords: Emergency department; ED attendances; ED overcrowding; pattern of patient

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## 1.0 INTRODUCTION

An emergency department (ED) is a front door for a hospital where a huge number of patients visit the department in order to access an immediate treatment. By providing 24 hours non-stop service throughout the year, it is considered as the busiest department compared to other departments available in the hospital [1]. In 2005, a total of 4.409 million patients were recorded visiting the ED in Malaysia. It shows that 3.5 million of them were recorded in hospitals in Peninsular Malaysia while the remaining patients were recorded in East Malaysia [2]. The number of ED attendances has been an increase year by year.

One of the most critical issues facing the ED is overcrowding [3]. ED overcrowding is considered as a serious national health issue faced by many industrialized countries around the world nowadays [4]. According to a study conducted by a group of

researchers in the US, they found that overcrowding in the EDs happened almost 12%-73% of the time [5]. Moreover, other countries for instance Canada [6], Australia [7], Taiwan [8], and Pakistan [9] have also reported similar matter. Unfortunately, Malaysia also faced the same problem [2].

ED overcrowding can be described as an extremely busy situation in ED in which the ED is being forced to work beyond its capacity level [10]. It can also be described as the result of a mismatch between medical resources supply and efficient service demand required by patients [11]. The main factors that contributing to this state of affair are increasing volume of patients presenting to ED, delay for hospital admission among ED patients due to insufficient inpatient bed capacity and lack of staffs [12]. Consequently, it can lead to some negative effects to occur such as delays in care, prolonged waiting time by patients especially among non-critical patients, patient dissatisfaction, medical error, and

high utilization rate among ED staffs, increase patient mortality and patient leaving without being seen staffs [12].

Recently, ED overcrowding problem is not a current issue in the research world. It has been attracting the attention of research community around the world since a few years ago. Verity efforts have been done by the hospital management along with researchers from other sectors for addressing ED overcrowding. This can be proved from the birth of related research, writing and publication regarding such issue that continued until now. [1] applied Discrete Even Simulation (DES) and Data Envelopment Analysis method (DEA) to reduce the average waiting time of the patient in ED, improve nurses' utilization and increase the number of served patient in ED of a Jordanian Hospital. In 2008, study done by [13] proposed several solutions in order to solve ED overcrowding for instance bed registration, develop fast track unit for treating patients with minor injuries, placing a triage team that include physician, nurses and assistance medical officer at triage counter, expand ED size, ambulance diversion and provide additional medical officer and nurses during peak hour.

One of the important tasks that should be conducted first in order to overcome the above mentioned problems is determining the pattern or trend of patient attending the ED. Understanding the pattern of ED attendances is important since it allows hospital management to see clearly the daily and weekly behavior of the ED. After clearly understanding how the ED behaves, other effective solutions can be suggested. This also can encourage the administration to perform the right decision to solve such problem to the ED.

Therefore, the objective of this study is to determine the proportion, percentage and pattern of patients attending the Emergency Department at the Universiti Kebangsaan Malaysia Medical Centre (ED UKMMC) in the year 2013. The ED UKMMC has been choose in this study due to critical overcrowding issues that occur frequently at the ED. Hopefully, the findings from this study will assist the hospital management in order to enhance the quality of care delivered to the emergency department patients in the future.

## 2.0 MATERIALS AND METHODS

Universiti Kebangsaan Malaysia Medical Centre or known as UKMMC was chosen as the study setting in this study. The UKMMC is a public teaching hospital in Malaysia which is located in Bandar Tun Razak, Kuala Lumpur. It is one of the main hospitals in Kuala Lumpur city, receiving more than 72,000 patients annually at ED.

In this cross section study, daily census data starting from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2013 were taken from ED UKMMC to determine the proportion, percentage, and pattern of ED patients visiting the ED

in the year 2013. The data contain the variables which are patient category (adult or pediatric), gender, ethnic group, outcome (discharge, hospital admission, observation ward admission, or death), arrival time, and triage category (critical, semi-critical, or non-critical).

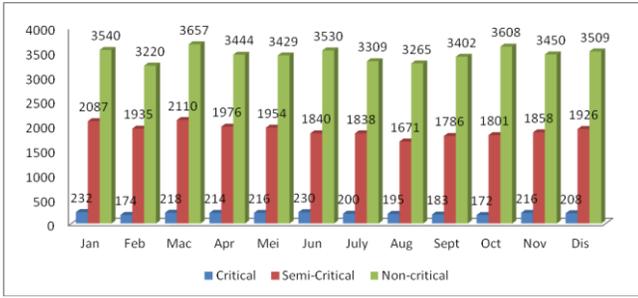
## 3.0 RESULTS AND DISCUSSION

Data from the Emergency Department of UKMMC have recorded that the total number of patients that visited the UKMMC in the year 2013 was 66,603. The highest number of visited patients was in March (5,985) followed by January (5,859), December (5,643), and April (5,634). Table 1 provides socio-demographic characteristics of ED patients that visited ED UKMMC in 2013. Based on the table, adult formed the largest proportion of 80.6% and more than half of patients were male (55.9%). Moreover, majority of the patients were Malay (60%) while Chinese and Indian represent 25.3% and 7.3% of the patients, respectively.

**Table 1** Socio-demographic characteristics of ED patients in UKMMC

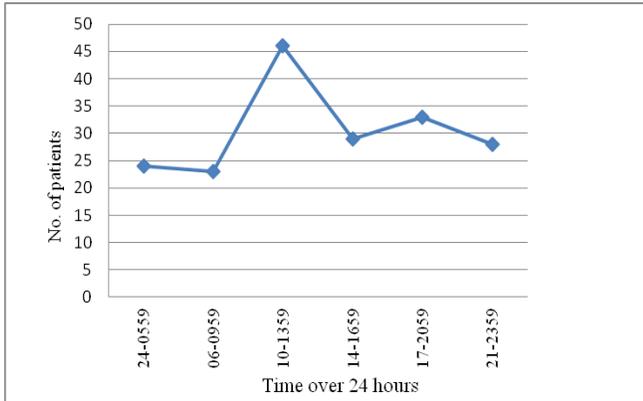
Characteristic	No.	%
Patient category		
Pediatric ( $\leq 12$ years old)	12,910	19.4
Adult	53,693	80.6
Gender		
Male	37,199	55.9
Female	29,404	44.1
Ethnic group		
Malay	39,969	60.0
Chinese	16,827	25.3
Indian	4,845	7.3
Others	4,962	7.5

Figure 1 demonstrates that a large proportion of patients present at ED of UKMMC in 2013 were under non-critical case. This represents more than half (41,363, 62.1%) of the total number of patients. Meanwhile, a total of 22,782 (34.2%) patients were classified under semi-critical case and the rest were under critical category. The graph also indicates that, there were two drops in the total number of patients among the overall category. The situations occurred in February and August.



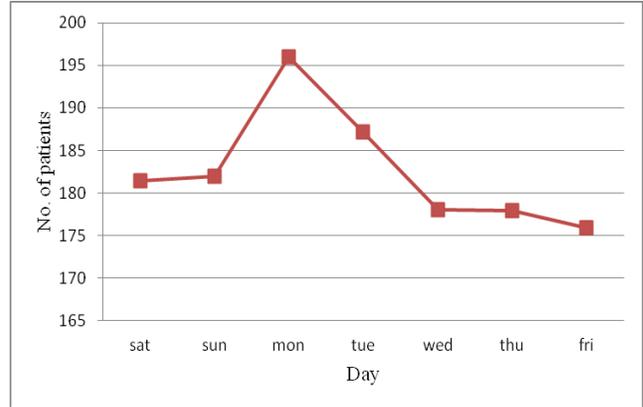
**Figure 1** Number of patients attending ED UKMMC according to triage category monthly

The 24 hours pattern of the number of patients that visited the ED UKMMC is shown in Figure 2. As we can see, the number of ED patients increased dramatically starting from the early morning around 7 AM and reached a peak approximately at 1 to 2 PM. It was also noted that there was a slight peak around 8 to 9 PM.

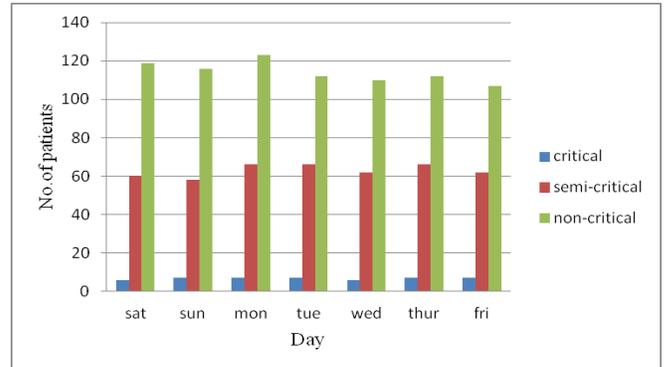


**Figure 2** Pattern of number of patients attending ED UKMMC over 24 hours

The daily trends within a week regarding patients that visited the ED UKMMC to obtain treatments are provided in Figures 3 and 4. From Figure 3, statistic shows that the volume of patients presenting to the ED start to increase gradually during weekends (Saturday and Sunday) before rise dramatically on Monday. After that, the volume starts to drop until the end of the week. Furthermore, Figure 4 shows the daily trend within a week for patients based on their triage category. Obviously, non-critical patients mostly came to the ED during and after the weekends, which are on Saturday, Sunday, and Monday. In contrast, the numbers of patients for critical and semi-critical are similar throughout the week.



**Figure 3** Pattern of number of patients attending ED UKMMC by days



**Figure 4** Pattern of number of patients according to triage category attending ED UKMMC by days

In terms of the outcome from the ED visits in the year 2013, it is found that majority of patients (76.7%) were discharged from ED UKMMC after getting their treatments here. For this study, death data was classified under discharge category. The other 18.3% of patients required hospital admission for future treatments by the specialists. However, only small percentages (5%) of patients were referred to the Observation Unit (OBS) that is located at the ED building.

Table 2 illustrates utilizations of ED according among adult patients and pediatric patients. It is noted that most adult patients were commonly came to the ED on Monday. On the other hand, young patients frequently attended to the ED during weekends which is on Saturday and Sunday. These differences are statistically significant since the *p*-value is less than 0.05 ( $p < 0.05$ ).

**Table 2** ED utilizations according to patient category (adult & pediatric)

Different utilization items	Adult	Paediatric	p-value*
Arrival day to ED			2.1838E-19
Saturday	7435	1999	
Sunday	7212	2050	
Monday	8277	1912	
Tuesday	7966	1765	
Wednesday	7614	1642	
Thursday	7712	1739	
Friday	7423	1723	

\*Chi-Square Test

\*significant =  $p < 0.05$ 

## 4.0 DISCUSSION

Among the 66,603 ED UKMMC attendants in the year 2013, adults represent approximately two-thirds of the ED visits. This result is similar to a study conducted at King Fahd Hospital, Jeddah, Kingdom of Saudi Arabia [14]. Moreover, the ED is frequently utilized by male patients rather than female patients. Similarly, other earlier studies done by [15] and [16] also point out equivalent findings.

A large proportion of patients seen by physicians in ED were non-critical category patients which is consistent with previous studies performed in Malaysia [2], Kingdom of Saudi Arabia [14], and Hong Kong [17]. Heavy ED attendances among non-critical patients occur due to lack of understanding concerning the real functions of the emergency department among our community members [18]. Patients usually come to ED with minor problems such as headaches, mild fever, minor cuts, diarrhea, or itching that can actually be treated in other primary health care services [19]. These patients together with their conditions have been named as inappropriate ED user [20] and believed to be the contributors for ED overcrowding [21]. Besides, the global economic crisis occurring today also encouraged people to change their directions to government hospitals in state of private hospital or clinic in order to get health care services. In Malaysia, all the government hospitals are subsidized by the government where 98% of medical costs for each patient are borne by the government. People are being charged about RM1 to RM5 to see a doctor [22]. Therefore, people only have to pay minimal charges when having treatment in government hospital rather than private.

During February and August, the total number of patients decreases dramatically in every triage category. The possible explanation for this is that the two main festivals in Malaysia are occurring which is just treats or admits patients who really require further treatment and observation from physician. However, [27] from the National Audit Office in England has claimed that the number of patients that needed

Chinese New Year Festival which takes place in February 2013 and Eid-al-Fitr Festival which takes place in August 2013. Both festivals are considered as the biggest holidays of the year in Malaysia. Thus, people will take opportunity to return to their home towns and villages to celebrate the holidays, leaving the big city like Kuala Lumpur to become quite empty. Since the UKMMC is located in the centre of Kuala Lumpur and the total population of Kuala Lumpur community reduces during that time, it produces less attendance to the ED during the particular months.

The ED UKMMC starts to become busy at 7 AM while the peak hour is between 1 to 2 PM. [23] suggested that quick treatment services provide by ED has become the reason why patients prefer to choose ED as their main source of care especially during office hours. As we know, during 7 AM to 2 PM other primary health clinics or Outpatient Clinics are busy. Consequently, patients need to wait for a long time to seek medical treatments from the physicians. Thus, this leads them to come to ED to get treatment. Moreover, [24] mentioned that the evening peak occurs as a result of the Malaysian community mind-set that prefers to obtain medical treatment during their free time especially for those who are working shifts.

In Malaysia, primary health clinic or Outpatient Clinic operates only during weekdays and closed on weekends and during public holidays. Thus, people will drive to ED to receive care since it is the only available source of care that operates nonstop, 24 hours per day. The proof can be seen in the increase trend of patients who went to the ED UKMMC during weekends in this study, especially among non-critical patients that stated at Figure 3 and Figure 4. Similar results and arguments that bring such patients to ED were also supported by [23, 19, 25 & 14]. Nevertheless, high number of road accident such as motorcycle accident that occurs during weekends also influences the increased number of patients to the ED [26].

Heavy attendance at the ED UKMMC was also noticed on Mondays. Among all of the attendants that visited the ED on Mondays, non-critical patients are the majority. Overcrowding situation at Outpatient Clinic also has encouraged patients to go to ED. Inappropriate cases that usually can be managed at other treatment centers for example changing continuous bladder drainage urinary catheter, gynecological problems, and wound dressing and cleaning are the regular cases identified at ED [23]. By going to the ED, the patients believe that they will be treated immediately.

Previous studies have demonstrated that the majority of patients are commonly discharged after they have received treatments from the ED rather than being admitted to the hospital [8]. Similar figure was also reported from this study. One possible reason is that because the UKMMC policy itself that hospital admission continues to increase year by year. They revealed that between 1997-1998 and 2012-2013, the number of hospital admissions in England has increased from 3.6 million cases to 5.3 million cases.

This represents about 47% rise over the last 15 years. The introduction of new hospital policy, changing of medical practices and models of care, demographic changes among the elderly population, and changing of the payment system for hospitals activity have been found as the main factors that affect the recent trends in hospital admissions.

In the current study, adult patients commonly come to ED on Mondays. One possible reason to explain this situation is due to a cultural phenomenon known as 'Monday Blues'. According to [28], the Monday Blues can be defined as a type of negative mood that experienced by people after weekend if he or she does not happy at their work place. This type of people will start feeling like depression, tiredness, anxiety, stressful and any other unpleasant emotion at the beginning of their workweek. Thus, several of them will come to ED just complaining concerning non-critical problems such as headache, mild fever and stomach ache in order to get medical leave certificate by doctors. In contrast, ED attendances among young patients usually come on weekend. This happens probably because the nature of children itself to be easily get hurt after spend more time travel with their family or friends during weekend.

## 5.0 CONCLUSION

The pattern of patients attending the ED UKMMC has been found consistent with other patterns of ED visits at other hospitals' ED. Non-critical patients are seen to be the most frequent ED users instead of emergency patients. If this situation happens continuously, it will lead to a variety of problems to happen, for instance ED overcrowding. Hence, continuous public awareness campaigns and programs should be conducted by the Ministry of Health along with the hospitals to give explanations regarding the true functions of the emergency department and educate them about the different roles between an emergency department and other primary health clinics. Hopefully, through such programs they will be able to lead our community members to head for the appropriate place whenever they need to get treatments in future.

Research on optimization resource allocation (doctors, medical assistants, and nurses) should also be carried out by the hospital management. The research is important in order to allocate enough number of ED medical staffs to fix the ED demand especially during peak hour. Therefore, it can help to minimize the resource utilization rate among the staffs. At the same time, number of medical errors can also be reduced and thus, capable to improve the health care quality.

The next phase of this study will focus on applying Discrete Event Simulation (DES) technique for modeling the operation of the ED UKMMC. By developing the model, we will be able to understand clearly the behavior of the system and identify the

bottlenecks in the system. A few improvement models will be developed with several modifications on the original simulation model to overcome the bottlenecks. Then, Multiple Criteria Decision Making Method (MCDM) will be used to rank the improvement models and select the best model to be used. By integrating the model, we hope to be able to assist ED management to make better decision to improve the performance of the ED.

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