



FACTORS ASSOCIATED WITH PATIENTS LONG WAITING TIME IN EMERGENCY CARE DEPARTMENT AT UNIVERSITY TEACHING HOSPITAL OF KIGALI-RWANDA

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ABSTRACT

Background

Long waiting times for patients to be seen by health care providers in accident and emergency departments (AED) is a worldwide problem including Rwanda hospitals especially at University teaching Hospital of Kigali and it is associated with morbidity and mortality thus affecting quality of health care. The University Teaching Hospital of Kigali-Rwanda AED still records poor patient's outcomes and complains as well as lengthy waiting time. These might make patients to doubt the quality of health care services being provided. More so, there is limited existing literature exploring factors/characteristics of patients in the whole AED of UTHK of Rwanda to guide in the enactment of evidence based solutions towards overcoming the problems of patients within this department. The objective of this study was to measure waiting time and identify factors associated with long patient waits in AEDs at University Teaching Hospital of Kigali (UTHK). **Methods:** This cross-sectional study used observational checklist and semi-structured questionnaire for data collection. Three hundred and seventy-six participants, at least 18 years and older, from the AED participated in this study. Using STATA version 13, bivariate analysis and logistic regression models were performed to indicate the statistical significance, strength and direction of associations. We used a P value <0.05 for significant variables with odds ratio 95% confidence interval. The study was approved by the University of Rwanda and the UTHK ethical review boards. **Results:** In this study, 51% (193) of respondents were women, 18% (68) were between 50 and 59 years old, and 61% (230) were not satisfied with services provided at the AED due to long waiting time. Factors found associated with patient long waiting time were resident in the Northern and Western provinces {(OR: 11.48, 95% CI: 2.37-55.58), (OR: 30.49, 95% CI: 3.53-263.37)} and being diagnosed with gastrointestinal disease (OR: 4.14, 95% CI: 1.18-14.58). The overall patients waiting times for study participants indicates that nearly 62% (225) spent between 60 and 180 minutes waiting for hospital services at the AED. **Conclusion:** We studied patient long waiting time within the AED of UTHK. Factors found to be associated to patient waiting time were patient satisfaction, poor patients' outcome like morbidity and mortality, increase staff frustration and chances of exposing staff to patient violence. Efforts should be focus on patients coming from the Northern and Western provinces as well as those diagnosed with

gastrointestinal disease to better outcomes.

BACKGROUND

Patients' long waiting time is generally seen in all Accident and Emergency Department (AED) of hospitals and contributes to a variety of public health problems including impaired access to healthcare, disruption of AED hospital work patterns and decrease patient satisfaction(1). Emergency department waiting time is the period of time between time of registration and initial assessment of health care provider which is accepted measure for the quality care of all hospital emergency care units(2). It is a global concern that AED in most times is crowded due to long wait by patients' which limits their access to timely emergency care – prolongs patient suffering, compromises quality of clinical care, increase staff frustration and chances of exposing staff to patient violence(3) . Patient waiting time for health care service at AED is identified by the WHO as one of the key measurements of a good responsive health systems(4).

Health care organization and its process have been for a long time been observed within the context of extensive queuing by focusing on how patients arrived, wait for services, obtain services, and depart(5) . The simplest queuing model is called server single queue model(6). It is a condition in which patients are served one by one based on single patient's line. By definition, a queuing model is a constructed model used for queue length and to estimate waiting time. In the hospital setting, input source is the arrival process of patients. Thus, patients who visit the AED enter into the queuing system and join a queue to be served. This means that patient in a queue are served according to the discipline rules of the service mechanism and then leave the queuing system after services are being rendered through a procedure called output process (7). Patient's arrival to the AED is termed a variable even though there is a concern of constant patient arrival rate in health care system(7,8)

The patient's charter of the United Kingdom (UK) government used different series of standards which focused on waiting time and concluded that all patients must be seen by a provided within 30 minutes of their arrival at the AED. As a result of this, it is globally agreed that a well-designed health care service management system,

should not have long waiting time for consultation and treatment(4). Even at that, the Wales hospital between 2014 and 2016, recorded an average waiting time for semi-urgent and non- urgent patients of about two hours and the latest waiting time were eight hours(9).

A study conducted by Schull and cookes in the USA has showed that AED are crowded due to long waiting by patient as clients wait for more than 60 min to get consulted by a doctor (3).In Ontario Hospital-Canada, waiting longer than 24 hours was associated with higher risk mortality within 30days(10). It is generally easy to find a postponed patient care due to long waiting time whereas, patients often spend more time waiting than actually consultation with health professionals. For instance, in a Malaysia public hospital, the average patient waiting time from registration to receipt of a prescription slip was more than 2 hours while time spent in consultation room for medical doctor was just only 15 minutes(11). A study conducted to quantify services for different phases of emergency care using quantile regression also found that at the 90th percentile, patients experience long waiting time (393-616 minutes) and boarding times (381-1228 minutes) across the AED(12). In Kenya it was also found that about 79% of patients wait longer in terms of minutes while minority 35% had good accessibility in terms of a reduced patients waiting time(13).

Long waiting time causes client dissatisfaction of care received, deterioration of health conditions, suffering, and delay in diagnosis together with treatment(14). Also, prolonged wait times causes crowding at AED which is associated with morbidity and mortality(15). Often, most critical measure of quality health care is measured by how long patients are requested to wait so as to access medical care. As much as the global community strives to achieve Universal Health Coverage (UHC) some authors in the United States have claimed d that the UHC causes long waiting time since health services are now very affordability to the population (16).

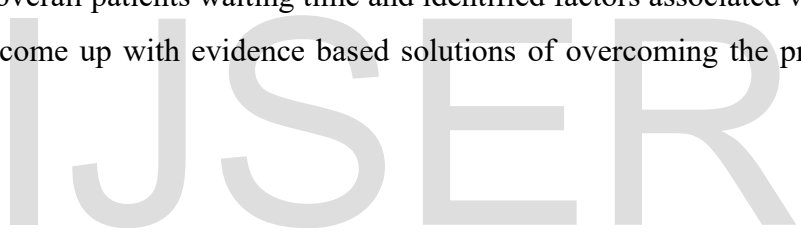
Several factors affect patient waiting time. These include the numbers of patients and available resources(17). Patients long waiting time and related problems are also sometime attributed to limited number of health care professionals in hospitals and low incentive at work which lead to low job satisfaction among health care professionals(9).

A well-structured health care system should have a timely health care delivery and convenient access to health services for all clients. Different studies on waiting time have been conducted in different specialized health care settings such as the child health, maternal health, medical clinic for specific services like HIV/AIDS, elective surgery with organ transplant and other cosmetic surgery and generally all Out Patient Department (OPD) clinics and found that health care professionals face the problems of limited resources which cause overcrowding and make patients experience long waiting time(18).

In Rwanda, patients have reported to wait for long to get health care services that they need. About 42.75% of

them waited for more than 3 hours while 27.54% spent 2 to 3 hours to get those services(18). Hospital waiting times are recurrent in Rwanda and the more life expectancy increases, the more complex illness that require expensive and sophisticated care are needed(19). Managements of long waiting time of clients at AED is an important factor of increasing patients' satisfaction. It is mandatory that the AED management systems take into account the characteristics of the health status of their visiting clients so as to shorten the real waiting time(20). Factors of patient long waiting time have also been studied and presented by different authors, even within the AED of the UTHK but most of them have not done a deep analysis of patient's health characteristics and have only considered those in the AED who went for radiology services(21) .This study aims at narrowing this gap by looking at general patient waiting time at emergence within the entire hospital.

UTHK is among the top referral hospitals in Rwanda that receive many patients from all districts within the AED even though they there are always complaints of long waiting time(21). Long patient waiting time prior getting treatment at the AED makes patients to feel uncomfortable and might doubt the quality of health care services provided. Moreover, there are limited research studies focused on patient waiting time in the AED of UTHK. Hence, we measured the overall patients waiting time and identified factors associated with long waiting time at AED in UTHK so as to come up with evidence based solutions of overcoming the problem of patients' long waiting time in AED.



METHODS

STUDY DESIGN AND SETTING

We conducted a cross-sectional study at UTHK. UTHK is one of the referral hospitals in Rwanda which is located at Nyarugenge District in Kigali city mainly in Nyarugenge sector. UTHK counts 732 health workers; 56 medical doctors and dentist, 425 nurses, 51 midwives, 100 paramedical, and 100 administrative staffs with 14 departments so as to delivery all services. The AED is among the 14 departments of the hospital. It has 4 specialist physicians, 26 residents at different stage of emergency trainings, 3 general practitioners, and 38 nurses. The AED has 24 beds capacity: 1 for triage bay, 1 resuscitation room with 4 beds, 1 post resuscitation room with 6 beds, 1 observation room with 13 beds and 1 bed in minor procedure room. The UTHK was established in 1918 as a health center. In 1965 the health facility was upgraded as a hospital and awarded a status of a referral and teaching hospital on 7/12/2000 by law No 41/2000 with the capacity of 560 beds and serve around 1000000 people most of them are from urban area of Kigali city (18).

Measures

The Kish –Leslie formula was used to calculate the study sample size. A previous local study done in the AED

but considering Radiology patients at UTHK reported that 42.73% of patients waited more than 3 hours(18), which helped us to estimate the Alpha and beta for this study to get the study sample size of 376. We used a systematic random sampling to include all patients above 18 years who seek emergency health care services in AED of UTHK during four weeks of data collection. We recruited three research assistants who worked day and night so as to minimize bias and were expected to find 15 patients daily till reached the sample size. According to patient registration at the AED, the average numbers of patients register per day were 45. By calculating the sampling interval from the hospital daily sample frame meant that every 3rd patient who was found seated and waiting for a health care provider at the AED was consented (written consent) to join the study.

The required sample size in the department calculated as showed below.

$$\frac{\text{Daily sampling frame}}{\text{Daily required sample size}} = \frac{45}{15} = 3^{\text{rd}}$$

At this time, patients' demographic information and arrival time were recorded. The rest of the questionnaire was responded to by checking patient files and completing on an observational checklist tool. The researchers followed the respondents while recording their waiting time till point of exit at AED. At the end a semi-structured questionnaire was each responded to participants for at most 5 min.

Study variables

Dependent Variable:

The dependent variable is the overall patient waiting time. This was a continuous variable used to measure the total and average waiting time. The total average waiting time is also a continuous variable got by a summation of all wait time for patient in each assessment area or any service points.

Independent variables

The first explanatory variables on the outcome are socio-demographic and clinical factors like age, sex, residence, education, current employment, and severity of illness according to triage category of health professional, nature of diagnosis, types of patient referral, the day and time of arrival and the length of the queue.

Data collection

Data collection tools and Patient flow analysis

We used two major data collection tools, the first being time and motion that measured time by using stop watch

and observational checklist developed by the researchers based on patient flow at UTHK. The second one was a structured questionnaire adapted and fitted into the UTHK context. This tool was adopted from Musinguzi Conrad Report of 2013 (22) used to find out patient waiting time in one outpatient Uganda hospital. On the patient queue, every third patient was requested to participate in the study, patients were given the paper containing the arrival time and identifiable code number.

Quality control

All research assistants were trained on data collection methods and process by using tools in English translated tools into Kinyarwanda for two days. The Principal investigator checked daily all questionnaires and time tracking tools for completeness and errors. To minimize observer bias and change of behavior by health care providers and patients, the research assistants kept a distance from the patients that were being tracked.

Data management

The principal investigator and research assistants checked all collected data for completeness, consistency and clearness. Data was entered in SPSS software version 25. Recorded variables were place of residence, principle diagnosed diseases, reason of delaying, and poor services delivered got at AED.

Data analysis

Pre-analysis

Time and motion data were transferred to excel sheet (as EPI-INFO software cannot make a real time entry, data were entered as decimal, converted into real time AM or PM and at the end into minutes in excel sheet) while patient's data was instead transferred to STATA version 20. These data were verified and then merged by using patient's identifiers into one dataset in STATA.

Analysis per objective

To determine how long patients wait to receive health care service at AED, data was converted into minutes for each section/service and added up as a patient move in the AED. The summary of time that patient spent with health care provider and time spend waiting to meet generated. The service and waiting time were summed-up for each patient in order to get the overall patient waiting time (calculated and categorized). The time taken by patient to move through each section was displayed by using frequencies, percentage and a graph for the independent variables and the outcome variable respectively.

Univariate, bivariate and multivariate analysis.

Bivariate analyses were categorized into three sections: socio-demographic characteristics and pre visit characteristics, so the outcome variable was binary (waited for 3 hours or less or more than 3 hours), bivariate analysis was done by using Chi-square test to evaluate the association between the outcome variable: overall waiting time, each patient demographic and clinical characteristics. The Alpha of 0.05% was used so as to do bivariate analysis, continuous variable such as age and arrival Time was categorized into categorical variable so as to ensure that all different categories was analyzed separately. For multivariate analysis, all variables were performed by using logistic regression model. Thus, only the significant variables in bivariate analysis were considered in multivariable model.

Ethical considerations

The study was approved by University of Rwanda, College of Medicine and health Sciences Institution Review Board (IRB) with approval notice: 149/CMHS IRB/2021 while permission to collect data was given to the Researcher by the University Teaching Hospital of Kigali UTHK research committees.

RESULTS



CHARACTERISTICS OF THE STUDY PARTICIPANTS

Results show that about 51% (193) of our participants were female, 18% (68) were between 50 and 59 years old, and 8% (144) were from Kigali city. Regarding the reasons for visiting the hospital' AED and the appreciation of the services, about 55% (206) stated that they visited this department for consultation and 61% (230) did not appreciate the services provided in AED. When asked about the level of satisfaction with the hospital services at AED, the study participants stated that they were satisfied with 45% (168) and among those who stated that they were dissatisfied with the services, they stated that it was due to the limited number of health care providers with 29% (66) and the long waiting line with 29% (66). Of the diseases diagnosed in the study participants, traumatic or mechanical conditions accounted for 23% (86), followed by respiratory diseases 17% (63).

Table. 1: Characteristics of the study participants

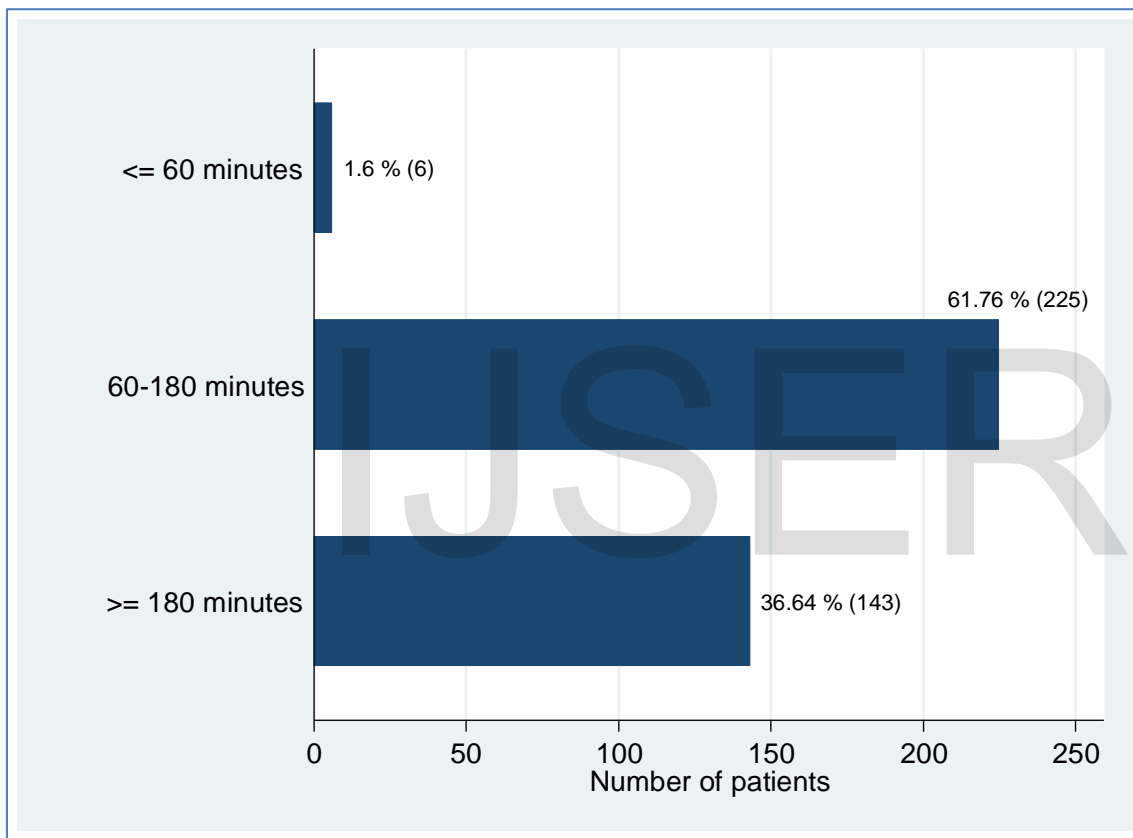
Variable	Frequency	%
Gender		
Female	193	51.33
Male	183	48.67
Age		

< 19 years	20	5.32
20-29 years	63	16.76
30-39 years	94	25
40-49 years	91	24.2
50-59 years	68	18.09
60-69 years	26	6.91
> 70 years	14	3.72
Province		
City of Kigali	144	38.3
Eastern Province	78	20.74
Northern Province	44	11.7
Southern Province	66	17.55
Western Province	44	11.7
Hospital visit reason		
Review	48	12.77
Referred	206	54.79
Walk-in	122	32.45
Appreciation of service		
Yes	146	38.83
No	230	61.17
Reason for dissatisfaction		
Delay in treatment services	88	38.1
Few healthcare providers	66	28.57
Staff failed to respond in time	10	4.33
Long queue	66	28.57
Poor communication	1	0.43
Level of satisfaction		
Very satisfied	30	7.98
Quite satisfied	74	19.68
Satisfied	169	44.95
Not satisfied	90	23.94
Very dissatisfied	13	3.46
Disease category		
Traumatic/Mechanical condition	86	22.87
Infectious Diseases	27	7.18
Chronic/Malignancies Diseases	28	7.45
Renal Diseases	20	5.32
Heart Diseases	41	10.9
Gastro-intestinal Diseases	54	14.36
Respiratory Diseases	63	16.76

PATIENT’S WAITING TIME AT AED

The figure on the next page demonstrates hospital service (AED) waiting time for study participants, it indicates that nearly 62% (225) spent between 60 and 180 minutes waiting for hospital services at AED.

Figure 1: Hospital service (AED)waiting time



PREDICTORS OF WAITING TIME IN HOSPITAL SETTING

Table 2 presents possible factors that might lead to a long wait time at AED. The results state that among the all study variables, province of residence ($P < 0.001$), reason for hospital visit ($P < 0.001$), appreciation of services ($P < 0.001$), level of satisfaction ($P < 0.001$) and diagnosed diseases ($P = 0.001$) were statistically significant to be associated with patients' wait time at the hospital AED.

Table.2: Bivariate analysis of waiting time and its predictors

Variable	More than 3h	3h or less	P-value
Gender			0.186
Female	80	113	
Male	63	118	
Age			0.247
< 19 years	8	12	
20-29 years	28	35	
30-39 years	37	57	
40-49 years	29	60	
50-59 years	31	37	
60-69 years	5	21	
> 70 years	5	9	
Province			P<0.001
City of Kigali	75	69	
Eastern Province	28	50	
Northern Province	5	39	
Southern Province	32	32	
Western Province	3	41	
Hospital visit reason			P<0.001
Review	18	30	
Referred	59	147	
Walk-in	66	54	
Appreciation of service			P<0.001
Yes	23	122	
No	120	109	
Reason for dissatisfaction			0.581
Delay in treatment services	50	38	
Few healthcare providers	31	35	

Staff failed to respond in time	6	4	
Long queue	33	32	
Poor communication	0	1	
Level of satisfaction			P<0.001
Very satisfied	10	20	
Quite satisfied	5	69	
Satisfied	35	132	
Not satisfied	80	10	
Very dissatisfied	13	0	
Disease category			0.001
Traumatic/Mechanical	42	42	
Infectious Diseases	16	11	
Chronic/Malignancies	4	24	
Renal Diseases	8	12	
Heart Diseases	17	24	
Gastro-intestinal Dis	11	43	
Respiratory Diseases	26	37	
Neurological Diseases	19	38	

Multivariable analysis of waiting time and associated factors

Table 3 presents result from the multivariable analysis of patient waiting time and associated factors. Of these, place of residence particularly the Northern and Western provinces were found to be almost 11 and 30 times respectively more likely to be associated with hospital AED long waiting time than others {(OR: 11.48, 95% CI: 2.37-55.58), (OR: 30.49, 95% CI: 3.53-263.37)}. In addition, appreciation of AED services and diagnosis of gastrointestinal disease were almost 3 and 4 times respectively more likely to be associated with patient long waiting time at the AED than lack of appreciation and traumatic diagnosis {(OR: 2.56, 95% CI: 1.19-5.50), (OR: 4.14, 95% CI: 1.18-14.58)}. On the other hand, with regard to the level of satisfaction with AED services, the unsatisfied category was found to be less strongly associated with waiting time (OR: 0.05, 95% CI: 0.01-0.19) than the very satisfied category.

Table. 2: Multivariable analysis of waiting time and its predictors

Variable	Odds Ratio	P-value	95% CI	
Province				
City of Kigali				
Eastern Province	1.36	0.509	0.55	3.36
Northern Province	11.48	0.002	2.37	55.58
Southern Province	1.10	0.84	0.45	2.66
Western Province	30.49	0.002	3.53	263.37
Hospital visit reason				
Review				
Referred	2.02	0.134	0.81	5.07
Walk-in	1.73	0.275	0.65	4.62
Appreciation of AED services				
No				
Yes	2.56	0.016	1.19	5.50
Level of satisfaction				
Very satisfied				
Quite satisfied	4.09	0.05	1.00	16.76
Satisfied	1.35	0.577	0.47	3.91
Not satisfied	0.05	P<0.001	0.01	0.19
Disease category				
Traumatic/Mechanical	1.00			
Infectious Diseases	0.51	0.329	0.14	1.96
Chronic/Malignancies	3.76	0.175	0.55	25.51
Renal Diseases	1.39	0.686	0.28	6.81
Heart Diseases	0.71	0.57	0.22	2.30
Gastro-intestinal Dis	4.14	0.027	1.18	14.58
Respiratory Diseases	0.81	0.683	0.30	2.21
Neurological Diseases	2.35	0.147	0.74	7.46
Constant	0.54	0.43	0.12	2.48

DISCUSSION

This study aimed at examining factors that influence patients long waiting time in the AED of UTHK. Specifically,

we explored patients waiting and what patient health characteristics/ factors led to that long waiting time in the general AED at the UTHK. Knowing that long hospital wait times are detrimental to patient satisfaction, measuring patient wait times in the hospital is an essential tool to ensure patient satisfaction(1).

Our results show patients who often visited this department were females, patients aged 50-59 years and living in Kigali City probably because the hospital is located in Kigali. Similar results evaluating the demographics of AED patients found that nearly 54.9% of their AED patients were female and the median age of those patients was 52 [2]. Additionally, because UTHK is located in the city of Kigali, at the time this study was conducted, did not have a district hospital, this would explain why most patients visiting the AED were from the city of Kigali. The results of this study indicate that the majority of patients spent between 60 and 180 minutes or 1 to 3 hours in the ward. Other results elsewhere reported the same results(19). Some of the main reasons for this long wait time could be as a result of insufficient space, stretcher, beds, health care providers and so on(19). This means that reducing patients' long waiting time and bettering patients' health care satisfaction, a better work force management should be put in place(23).

Place of residence such as living in the Northern and Western provinces, were positively associated with patient waiting times at the AED. That could be so because the Northern and Western provinces are far from the UTHK and patients from these provinces travel long distances to arrive then start queuing-up. This could explain why living in these two provinces is subjectively associated with long waiting times. An alternative explanation would be that patients arriving at this time find the points of care saturated with other patients(20). Similar results were reported at Mulago hospital where the actual wait time was found to be associated with patients arriving later in the day (>11 am), and this time would increase by roughly 3 to 4 minutes for each patient added to the lineup(24). Furthermore, actual waiting time was found to be associated with AED service appreciation. Similar results have been reported in a study conducted in the outpatient department of Mulago hospital where patients' overall satisfaction with services was closely related to their satisfaction with waiting time(24). Additionally, other findings have indicated that waiting time had an impact on perceived quality of care and patient appreciation(15).

Being diagnosed with gastrointestinal disease was also positively associated with actual waiting time. This may be because diagnosis of these conditions is time-consuming and requires several tests that is imaging and sometimes due to the specific age of patients, some may require prior blood results. Previous studies have shown a strong relationship between diagnosis of gastrointestinal disease and wait times, particularly for gastrointestinal bleeding(11,17).

The results of this analysis also indicate that the level of satisfaction with AED services particularly dissatisfied category, was negatively associated with waiting time. This may be due to the patients who express dissatisfaction

with AED services were not thinking about the waiting time, but rather what contributed to their dissatisfaction, especially if it was due to other factors. Nevertheless, for decades, numerous studies have shown that patient waiting times were a major source of dissatisfaction [6]. Other studies have also seen the same finding, with some stating that patient waiting time was associated with varying levels of patient dissatisfaction [12, 5]. Similarly, a study in the Chinese community found that the emergency department patients who were less satisfied with waiting times were less likely to be happy with the overall care they experienced(9). Base on this findings, there is a need for further studies in this department to understand why patients dissatisfied with services do not care about wait time but care more about. The main reasons which have been tackled in this study were patients overload, inadequate diagnostic materials, shortage of health care providers to respond on time and give immediate support to all emergency patients, delay in treatment services, shortage of rooms, existing of many services points, mid-day patient arrival, carelessness of job for some health care providers, long queue, unnecessary emergency cases, many referred patients and poor patients' orientation. So different recommendations should be taken as priority so as to minimize patient long waiting time in AED.

Limitations

There is some potential weakness of this study in the results. The methods of data collection might have biased study findings in the sense that the exact waiting time might not have been recorded since delays might not necessary be related to service provision. The queue might also have been mixed-up and the participant initial interval selection might had been missed-up thus displacing potential study participant. Despite these, the quality assurance team, employed several procedures to ensure such biases were minimized.

Conclusion and recommendation

The issue of patients long waiting time at UTHK in AED was studied and factors associated to it were patients from northern and western province together with those ones who were diagnosed of gastroenteritis. Different measures and strategies should be put in place to improve patient waiting time especially by focusing on patients coming from far district as well as patients diagnosed with gastrointestinal disease. This could be possible by properly triaging patients in terms of disease and location, further study should also be done to see the improvement of patients waiting time in AED.

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COMPETING INTEREST

All authors report no competing interest.

AUTHORS CONTRIBUTIONS

GB initiated the study, analyzed data and drafted the manuscript; MN interpreted the results and wrote the discussion while TST data collection and analysis. All authors commented on and approved the final manuscript.

What was known before

- Patient long waiting time in AED
- Limited number of health care providers

What is known now

Factors associated with patients long waiting time:

- Place of Residence of patients
- Types of diseases diagnosed to the patient

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