A descriptive evaluation of referral patterns and patient flow from Primary Health Facilities to the Emergency Department Hospital Sungai Buloh

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ABSTRACT

Introduction: Referrals from Primary Health Facilities (PHF) to hospitals occur due to clinical needs for speciality care in managing the presenting illness, social factors such as poor compliance or lack of family support, and are requested by patients. The journey for any patients transferred from PHF to hospitals has three major components, which are (a) the PHF intervention and activation of ambulances; (b) the Prehospital Care Services (EMS) deployment, care of the patient and transportation to the hospital; and (c) the process of review or admission at the destination hospital. We detail the journey, processing time, and outcomes of patients referred from PHFs via EMS to a tertiary referral hospital in Selangor, Malaysia.

Materials and Methods: This is a retrospective study analysing data from 980 referred patients from PHFs transported by Klang Valley Ambulance Service (KVAS) to Hospital Sungai Buloh between 1st January 2023 and 30th June 2023. Data collected includes PHF classification, KVAS activation details, patient demographics, Emergency Department length of stay (EDLOS), and the patient's outcome in the ED. Patient's outcome in ED is categorised as (a) admitted; (b) discharged; or (c) discharged against medical advice (DAMA).

Results: Out of the 980 referred patients, 83.3% were triaged as Priority 1 by PHFs. The majority were males (56.8%), with a mean age of 28 years. The median waiting time for ambulance arrival was 54-58 minutes. The percentage of referred patients who were admitted to the ward was 65.8%. The median EDLOS was 540 minutes (9 hours), with discharged patients having a shorter median EDLOS of 321 minutes (approximately 5 hours). The median total patient waiting time from PHF to final disposition was 605 minutes (10 hours) for admitted patients and 382 minutes (6 hours) for discharged patients.

Conclusion: A significant proportion of referred patients experienced prolonged EDLOS, whereas only 22.4% of referred patients were discharged within eight hours. Average EDLOS of 12 hours suggests the need for a "Fast-Track Referral System" to improve efficiency and reduce unnecessary gatekeeping processes.

KEYWORDS:
Emergency Department; Emergency Medical Services; Interfacility referral; Primary Health Care; Length of stay

INTRODUCTION

Public Primary Health Facilities (PHF) referral process involves the transfer of patients from one facility to another to meet the increased demands for services.1 This can involve transfers either between hospitals or transfers from a clinic to a hospital to provide the clinical needs of patients. The reasons for transfer from PHF to hospitals may include (a) the need for specialty expertise in managing the presenting illness, (b) social factors such as poor compliance or lack of family support; (c) request by patients to be admitted.[2] The Ministry of Health Malaysia (MOH Malaysia) defines basis for interfacility transfers into four categories or reasoning: (a) step-up care to a centre with better expertise or facilities to treat the patient; (b) same level care for logistics reasoning in the primary facility; (c) step-down care for continuation of treatment after stabilisation; and (d) at the request of patient or family.[3] The journey for any patients transferred from PHF to hospitals has three major component which are assessment and intervention by PHF, activation and transportation by EMS and the process of review or admission at the destination hospital. The interaction between the three components affects the patient in terms of the cost of transportation for family members or caregivers and additional waiting time at the receiving facility, especially in the Emergency Department (ED).[1]

The usual disposition of ED patients after assessment can be divided into four categories: (a) discharged without the need for observation; (b) observation for a short duration before discharge; (c) admission for inpatient care; and (d) died in the

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ED. The ED in Malaysia has a policy that states all patients are to be admitted to inpatient services within an 8-hour timeline from consultation and care.[4] However, in the current burden of ED access block, it is challenging to meet the 8-hour timeline. The ED Observation services are not considered as inpatient services based on the national ED policy.[4] While waiting for an inpatient bed, patients requiring admission may have completed their treatment and been discharged from the ED due to their prolonged length of stay. The ED length of stay (EDLOS) is defined as the time interval between a patient's arrival at the ED and the time the patient physically leaves the ED.[5] The EDLOS is an accepted marker for clinical interventions, system organisation, and an indicator of ED overcrowding.[6]

ED has yet to have a policy and pathway that separates referred patients from walk-in patients to the department. Thus, there is a need to have a gatekeeper for the referral system. Without the barrier of a gatekeeper, the problem of ED access block may be compounded further.[7] Family Medicine Specialists (FMS) are gatekeepers to ensure appropriate utilisation of the referral system.[8] The elements considered by FMS for referrals include the coordination of care, control of referral, and financial and social factors on a case-by-case basis.[8] The role of FMS as gatekeeper has been studied from the perspective of appropriateness of referral and of admission. Ang et al., classified referrals as appropriate or inappropriate based on the patient's condition, the reason for referral and the management capacity of the referring clinic.[9] Study by Chan S., classifies referral and its eventual admission as appropriate or inappropriate based on benefit and services received by the patient.[2] A referral with eventual admission is deemed inappropriate when patients do not derive any significant benefit or when no active services are provided, and where the best care can be rendered in a less costly manner at a lower level of care.[2] There has never been a study that reviews PHF referrals from the perspective of the patient's journey and length of stay within the ED.

This study aims to describe the journey, processing time and outcome for patients referred from PHF transported using EMS to a tertiary referral hospital in Selangor. Through this observational study, we hope to assist health system managers on the policy of care pathways in hospitals for patients who have been assessed and referred from PHF. By understanding the demand, processes, and flow of patients, policy makers would be able to identify potential areas of system improvement.

MATERIALS AND METHODS

This is a retrospective descriptive study involving referred patients from PHF to ED Hospital Sungai Buloh from 1st January to 30th June 2023. The institutional approval reference is NMRR ID-24-01225-Q75. The study included data of all patients referred from PHF to Hospital Sg Buloh Specialty Services via the ED. EMS in Sg Buloh utilises the Klang Valley Ambulance Service (KVAS). Only patients transported using KVAS are included in the study. Pregnant mothers referred for Obstetrics Services, or patients for direct admission, or any patients that are referred out to another facility are excluded from the study. Such patients have specific pathways that bypass the general patient flow in the ED. Our study is aimed at describing the patient flow processes with key time matrices in obtaining Speciality care from PHF.

PHF data collected encompasses patients' triage classification during KVAS activation and basic emergency intervention provided to patients by the PHF prior to KVAS arrival. The basic emergency interventions provided are categorised as oxygen or intravenous fluid administration or none. Fluid administration is subclassified into either bolus or maintenance. KVAS established an ambulance activation system using an electronic form that is completed by PHF. The form collects the patients': (a) demographic information, (b) basic emergency intervention provided by PHF, (c) triage categorisation of patients by PHF, and (d) referral communication by PHF to the destination hospital. KVAS and PHF utilise a two-tier ambulance triaging system. The two-tier triage system classifies patients as requiring Priority 1 or Non-priority 1 response. Priority-1 triage category is assigned by PHF based on patients' physiological parameters, clinical syndrome, together with the National Guidelines for Primary Care ambulance service.[10] The Priority 1 classification used in the national guidelines is adapted from the Medical Priority Dispatch System (MPDS, Priority Dispatch Corporation) version 10.

The patients' demographic data analysed are gender and age. KVAS data of the patient's transport time were also utilised for analysis. Our team reviewed ED and Bed Management Unit data for EDLOS and the outcome for patients in the ED. Patient's final outcomes are divided into three categories: (a) admitted; (b) discharged; or (c) discharged against medical advice (DAMA). We define admission as any in-patient bed is made available for the patient and the patient being successfully transferred to the ward. We define discharge as any patient discharged from the ED either by the ED team after a period of observation, or by the Speciality team upon completion of treatment while waiting for an inpatient bed. Patients' age, and EMS transport times are summarised using mean, standard deviation and median quartiles. Categorical data are summarised using frequency, percentages and statistics are analysed using the Pearson Chi-Square method. Incidence rates and outcomes are tabulated in frequencies and percentages according to PHF triage categories of either Priority 1 or Non-priority 1 for comparison. EDLOS are tabulated as admission or discharged categories for comparison. Data analysis utilises SPSS Statistical software version 29.

RESULTS

Between 1st January and 30th June 2023, a total of 980 referred patients from PHF to Hospital Sungai Buloh were included in this study for analysis. Table I describes the patient demography. A total of 557 (56.8%) of the patients are male. The mean age of patients is 28 years (SD ±23), where 515 (52.6%) of them were adults. Overall, 816 (83.3%) patients were triaged by PHF as Priority 1 during EMS activation. An outcome of 645 (65.8%) referred patients were

Table I: Referred patients' demography and the final outcome at Emergency Department

	ALL N=980 n (%)	PRIORITY 1 N=816 n (%)	NON-PRIORITY 1 N=164 n (%)	p-value
Gender				
Male	557 (56.8)	472 (57.8)	85 (51.8)	0.156[a]
Female	423 (43.2)	344 (42.2)	79 (48.2)	
Age				
Mean	28	28	26	
Median	25	25	26	
Std Deviation	±23	±22.8	±21.2	
IQR 25	6	6	6	
IQR 75	45	45	43	
Category of age				
Paediatric	337 (34.4)	283 (34.7)	54 (32.9)	0.398[a]
Adolescent	61 (6.2)	47 (5.8)	14 (8.5)	
Adult	515 (52.6)	427 (52.3)	88 (53.7)	
Geriatric	67 (6.8)	59 (7.2)	8 (4.9)	
Outcome of Patient in Emergency Department				
Admit	645 (65.8)	544 (66.7)	101 (61.59)	2.0[b]
Discharge	333 (34)	270 (33.1)	63 (38.41)	
Discharge Against Medical Advice (DAMA)	2 (0.2)	2 (0.2)	0 (0.00)	

a = Pearson Chi Square test; b = Fischer exact test

Table II: Referred patients' waiting time for an ambulance at Primary Healthcare Facility (PHF)

	ALL N=980 n (%)	PRIORITY 1 N=816 n (%)	NON-PRIORITY 1 N=164 n (%)	p-value
Waiting time for ambulance at PHF (minutes)				
Mean	63	63	64	
Median	55	54	58	
Std Deviation	49	51	37	
IQR 25	37	38	37	
IQR 75	80	81	76	
Categorisation of waiting time for ambulance at PHF				
30 minutes and less	144 (14.7)	119 (14.6)	25 (15.2)	0.791[b]
More than 30 minutes to 60 minutes	397 (40.5)	335 (41.1)	62 (37.8)	
More than 60 minutes to 90 minutes	228 (23.3)	182 (22.3)	46 (28.0)	
More than 90 minutes to 120 minutes	93 (9.5)	81 (9.9)	12 (7.3)	
More than 120 minutes to 150 minutes	49 (5.0)	40 (4.9)	8.2 (3.2)	
More than 150 minutes to 180 minutes	19 (1.9)	16 (2.0)	3 (1.8)	
More than 180 minutes to 210 minutes	9 (0.9)	7 (0.9)	2 (1.2)	
More than 210 minutes to 240 minutes	6 (6.0)	5 (0.6)	1 (0.6)	
More than 240 minutes	35 (3.6)	31 (3.8)	4 (2.4)	

b = Fischer exact test

admitted to the ward (Table I). There were only two (0.2%) referred patients who requested DAMA.

Table II describes patients' waiting time for an ambulance arrival at the Primary Healthcare Facility. The mean waiting time for an ambulance is 28 minutes (SD±23), where 515 (52.6%) of them are classified as adults. An outcome of 769 (78.5%) patients received an ambulance within 90 minutes.

Table III describes basic emergency intervention received by patients in PHF prior to transfer. A total of 99% of the patients were seen in PHF with access to FBC, biochemistry and urine analysis tests. Among the patients categorised as Priority 1; 376 (46%) patients are provided with intravenous maintenance fluid, as compared to 83 (50.6%) in Non-priority 1. Ab overall of 204 (25.0%) patients triaged as Priority-1 received oxygen as compared to 26 (15.9%) in the Non-priority 1 group ($p<0.05$). There is no statistical significance between the use of intravenous fluids between the two triage groups. These interventions are started by the PHF and continued by KVAS till arrival to ED. There are 216 (26.5%) Priority 1 patients that did not receive any interventions at PHF.

Figure 1 describes the temporal distribution of patients' ambulance activation time, ED arrival time and disposition from ED time. Ambulance activation time for our patients is clustered between 11 am and 4 pm, which correlates to clinic operating hours. The median waiting time for patients in the PHF for ambulance arrival time is 54 minutes for Priority 1 and 58 minutes for Non-priority 1 triage classification. A total of 77% of patients in Priority 1 and 81% in Non-priority 1 categories have ambulance waiting time up to 60 minutes. Only 15% of patients in the Priority 1 category receive an ambulance within 30 minutes at the clinic. Patients' arrival time to the ED is clustered between 12 noon and 5 pm. Cluster

Table III: Access to investigation studies and basic emergency intervention received by patients in PHF prior to ambulance arrival.

	ALL N=980 n (%)	PRIORITY 1 N=816 n (%)	NON-PRIORITY 1 N=164 n (%)	p-value
Access blood and urine investigation at Primary Healthcare Facility (PHF)				
Full Blood Count				
Yes	975 (99.5)	812 (99.5)	163 (99.4)	1.000[b]
No	5 (0.5)	4 (0.5)	1 (0.6)	
Biochemistry test				
Yes	971 (99.1)	808 (99.0)	163 (99.4)	1.000[b]
No	9 (0.9)	8 (1.0)	1 (0.6)	
Urine analysis				
Yes	975 (99.5)	812 (99.5)	163 (99.4)	1.000[b]
No	5 (0.5)	4 (0.5)	1 (0.6)	
Basic emergency intervention received by patients at Primary Healthcare Facility (PHF)				
Oxygen therapy				
Yes	230 (23.5)	204 (25.0)	26 (15.9)	0.015[a]
No	750 (76.5)	612 (75.0)	138 (84.1)	
Intravenous fluid as bolus				
Yes	73 (7.4)	62 (7.6)	11 (6.7)	0.748[a]
No	907 (92.6)	153 (93.3)	754 (92.4)	
Intravenous fluid for maintenance				
Yes	459 (46.8)	376 (46.1)	83 (50.6)	0.304[a]
No	521 (53.2)	440 (53.9)	81 (15.5)	
No intervention received				
Yes	261 (26.6)	216 (26.5)	45 (27.4)	0.847[a]
No	719 (73.4)	600 (73.5)	119 (72.6)	

a = Pearson Chi Square; b = Fischer exact test

Table IV: Patient's length of stay in the Emergency Department (EDLOS) based on outcome, admitted or discharged

	ALL N=980 n (%)	Admitted N=645 n (%)	Discharged N=335 n (%)	p-value
Outcome of Patient in Emergency Department				
Priority 1	816 (83.3)	544 (84.3)	272 (81.2)	0.241[a]
Non-priority 1	164 (16.7)	101 (15.7)	63 (18.8)	
Total Patient's waiting time from PHF to final disposition (minutes)				
Mean	766	853	600	
Median	542	605	382	
Std Deviation	±599	±598	±565	
IQR 25	360	431	249	
IQR 75	1085	1306	746	
Patient's EDLOS (minutes)				
Mean	703	789	537	
Median	475	540	321	
Std Deviation	±600	±599	±565	
IQR 25	295	364	187	
IQR 75	1045	1240	678	
Categorisation of Patient's EDLOS				
4 hours and less	171 (17.4)	59 (9.1)	112 (33.4)	p <0.05[a]
More than 4 hours till 8 hours	320 (32.7)	212 (32.9)	108 (32.2)	
More than 8 hours till 12 hours	170 (17.3)	139 (21.6)	31 (9.3)	
More than 12 hours till 16 hours	55 (5.6)	38 (5.9)	17 (5.1)	
More than 16 hours till 20 hours	53 (5.4)	30 (4.7)	23 (6.9)	
More than 20 hours till 24 hours	74 (7.6)	51 (7.9)	23 (6.9)	
More than 24 hours	137 (14.0)	116 (18.0)	21 (6.3)	
Total patient's waiting time from PHF to final disposition in ED				
4 hours and less	112 (11.4)	38 (5.9)	74 (22.1)	p<0.05[a]
More than 4 hours till 8 hours	297 (30.3)	170 (26.4)	127 (37.9)	
More than 8 hours till 12 hours	224 (22.9)	179 (27.8)	45 (13.4)	
More than 12 hours till 16 hours	72 (7.3)	52 (8.1)	20 (6.0)	
More than 16 hours till 20 hours	51 (5.2)	31 (4.8)	20 (6.0)	
More than 20 hours till 24 hours	72 (7.3)	49 (7.6)	23 (6.9)	
More than 24 hours	152 (15.5)	126 (19.5)	26 (7.8)	

a = Pearson Chi-Square

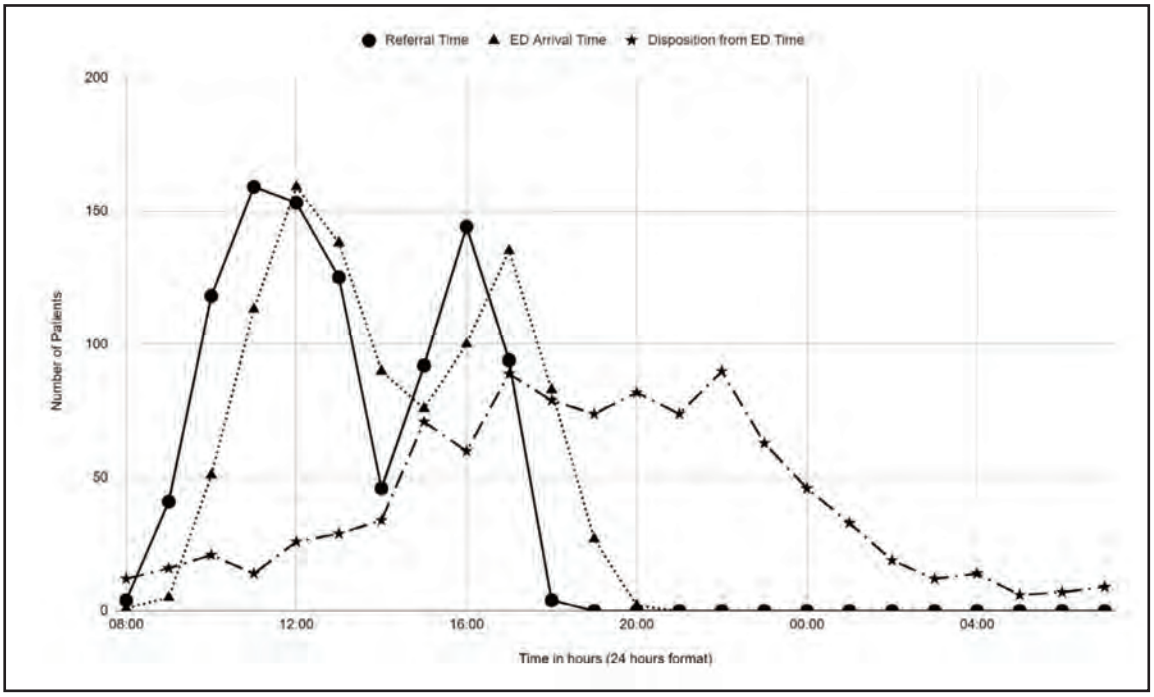

Fig. 1: Line chart showing the temporal distribution of patients' ambulance activation, arrival to the Emergency Department time and disposition from the Emergency Department time either to home or ward

of patient movement from the ED for admission in ward or discharged home occurs between 1 pm and 8 pm.

Table IV describes the EDLOS and total waiting time for patients from EMS activation till disposition from the ED. Cumulatively, 75% of patients have EDLOS up to 1085 minutes (11 hours) (mean 766 minutes, SD±599). The median EDLOS for all patients is 540 minutes (9 hours). Discharged patients have a shorter EDLOS of 321 minutes (about 5 hours). However, among discharged patients, those who request for DAMA have higher mean EDLOS of 972 minutes (16 hours). Median total patient's waiting time from PHF to final disposition is 605 minutes (10 hours) for admission compared to 382 minutes (6 hours) for patients who are discharged.

DISCUSSION

So far, there is no documented study on a patient's journey from the time an ambulance is activated in PHF till final disposition in the ED for Malaysia. This is an important marker in determining the process efficiency, case complexity and disposition outcomes among referred patients in the ED. PHF in Malaysia has two methods of ambulance activation for interfacility transfer: (a) internal activation utilising the ambulance under the command of the clinic, and (b) activating an external ambulance from either a nearby clinic or even the hospitals. We have confined our study to analysing the second method of ambulance used for the transfer under the KVAS project. In this project, affected PHF has limited or no access to their own ambulance service. Hospital Sungai Buloh receives referrals from PHF from several Public Health Districts; however, we only focus on two of KVAS operational areas, which are the Petaling Jaya area of Petaling Health District and the Sungai Buloh area of Gombak Health District. KVAS is a pilot project for the unification of ambulance service within the Ministry of Health facilities in the urban area of the central Klang Valley with the aim of better transport and logistical coordination.[11]

Priority 1 triage was assigned to 83% of patients by the PHF. Age by category and gender are not statistically significant in the determination of ambulance response triage by PHF (Table I). The aim of using a two-tier triaging system is to identify Priority-1 patients who (a) require basic emergency intervention started at PHF and subsequently continued in the ambulance and later in the ED; or (b) referrals with time-sensitive diagnosis requiring rapid transport to the hospital for timely care. Use of oxygen as an intervention was the only statistically significant difference between the triage categories. The majority of patients within the Priority-1 category received intravenous fluid, which was set as maintenance fluid. Basic emergency intervention was not required in 261 (26.6%) of patients transported by KVAS (Table II). The heavy reliance on ambulances to transfer referred patients to the hospital by PHF may be due to other non-clinical factors, such as the prevention of patients' non-compliance in going to the ED for further management and space constraints in PHF to observe patients with interventions such as intravenous fluids.

Ambulance waiting time is not statistically significant when compared with the patient's triage criteria (Table III). We found that 80% of all referrals received ambulance response time of less than 90 minutes (mean 63 minutes, median 55 minutes, SD±49). Only 14.7% of our referred patients receive an ambulance within 30 minutes. There may be several contributing factors to this: (a) the Guideline For Ambulance

Service In Primary Care by MOH Malaysia acknowledges that ambulance response in PHF is dependent to its availability on standby at the facility; (b) there is no performance measure for ambulance arrival time to PHF for Priority 1 referral patients when there is no ambulance on standby at the facility; and (c) KVAS directive sets its ambulance arrival time to PHF within 90 minutes unlike the response time set for a 999-Priority 1 case of 15 minutes.[10,11] Our team could not compare the data from PHF, which utilises its own internal ambulance team for transfers, which, to our knowledge, has never been published. MOH Malaysia needs to review its performance measurement for ambulance arrival time to PHF for referral. An example is that used by the National Health Service (NHS), United Kingdom.[12] The NHS divides ambulance response levels following assessment by Healthcare Professional (HCP) into four categories: (a) HCP Level 1 with mean response time of 7 minutes for patients in need of immediate, life-saving intervention; (b) HCP Level 2 with mean response time of 18 minute for patients requiring immediate additional clinical care in an ED or acute receiving unit; (c) HCP Level 3 with locally commissioned response for patients who need urgent assessment by specialist; and (d) HCP Level 4 with locally commissioned response who require admission but not as an emergency.[12] There are two peak times for ambulance activation by PHF, occurring at 11am and 4pm, which align with peak patient arrival times at the ED at 12 noon and 5 pm (Figure 1). This pattern corresponds with PHF's operational hours of 8 am to 5 pm. It suggests that ambulance activation timing may be influenced by operational convenience rather than by patients' clinical needs. It may also be a factor contributing to the prolonged ambulance arrival time. The distribution curve for patients' disposition time from ED has a plateau period between 5 pm and 10 pm (Figure 1). The admission rate for our study population is 65.8% (Table I), similar to that of Umgelter et al., findings of 62.6% in the metropolitan area in Germany.[13] Among the 335 (34.2%) referred patients that were discharged, we found that there is no statistical significance between the triage category of Priority 1 and non-Priority 1 by PHF. Thus far, there is no data to compare our findings of 34.2% discharge rate for PHF-referred patients. Malaysia's ED has a policy of patient boarding time of no longer than 8 hours.[4] Within the 8-hour period, 220 (65.6%) patients were able to be discharged (Table IV), and among them, 112 patients were discharged within EDLOS of 4 hours. This signifies that the majority of referred patients require further assessment and care that could not be provided at PHF. It also correlates Ang et al. (2014) and Chan et.al., an appropriate referral definition based on management capacity of the referring clinic, benefit and services received by the patient.[2,9]

We analysed patients' processing time in ED within two categories: (a) the admitted group; and (b) the discharged group, as the triaging process in ED is independent from the triage category assigned by PHF. The mean EDLOS is 537 minutes (9 hours) for the discharged group (median 321 minutes, SD±565) and 789 minutes (13 hours) for the admitted group (median 540 minutes, SD ±599 minutes) (Table IV). A total of 489 (49.9%) patients stayed in the ED for more than 8 hours before disposition occurred. A study by Ahmad Hanif et al. among walk-in patients in the ED of University Kebangsaan Malaysia Medical Centre reported a mean EDLOS of 7 hours (median 6 hours, SD 5), which is shorter than ours.[14] However, they excluded referred patients from PHF in their study population.[14] Another study by Mohammad Miqdam Abdul Aziz et al. reported a mean EDLOS of two hours (median 1 hour, SD 1) in ED Hospital Taiping among patients referred from hospitals within the Northern Perak Cluster.[15] These diverse findings of EDLOS between different cohorts of ED patients, i.e., walk-in patients, referred from PHF and referred between hospitals; suggests difference in case complexity and system processes between hospitals for admission. From the patient's perspective, total waiting time for final disposition begins from the time of ambulance activation till the time the patient physically leaves the ED. Mean total waiting time is 600 minutes (10 hours) for the discharged group (median 382 minutes, SD±565) and 853 minutes (14 hours) in the admitted group (median 605 minutes, SD±598). Hospital Sungai Buloh has a referral system that requires a Medical Officer of the referred discipline to see the patients in the ED prior to the decision for admission. Only selected disciplines, such as the critical care service for adults and neonates, have a direct admission policy. This system indirectly creates a triple layer of gatekeeping for PHF patients, beginning from FMS in PHF, to Emergency Physician in ED and finally Medical Officers of the various disciplines, again as compared to the cohort of walk-in patients of two layer of gatekeeping. It contributes to congestion in the ED, causing delay in the processing time for patient disposition, especially when the admission rate among PHF-referred patients is beyond 65%. There have been several studies looking into improving ED congestion and also the creation of a "Fast-Track Referral System" as one of the interventions.[7,16] Our findings support the implementation of a dedicated "Fast-Track Referral System" which incorporates two components: (a) an education system with a structured referral communications sheet for PHF; and (b) an enhanced multidisciplinary coordination process within the ED.[7,16] Such system will improve patient flow, improve resource utilisation and reduce unnecessary delays in ED. It will also reduce the overall referred patients' total waiting time.

Our data of ambulance transfer time in this study is reviewed only from the perspective of PHF that utilises an external source of ambulance from KVAS in its first six-months of the pilot project. Further study is needed to analyse the ambulance waiting time comparison for patient transfer between PHF that activates its own ambulance team and that of an external team. Our EDLOS data investigated the system implemented by a single tertiary centre, which may differ from other hospitals. Furthermore, we did not include details on interventions received by referred patients in the ED, their vital parameters upon arrival at the ED and the clinical syndrome which they were treated for. Incorporating these factors could enhance understanding and improve the 'model of care pathway' for referral patients. It is beyond the scope of our study and the available data analysis to provide insight into ED overcrowding factors and the cost-effectiveness of our proposed solutions.

CONCLUSION

This study describes the journey of referred patients from PHF, beginning from the point of ambulance activation till they physically leave the ED. The admission rate in the study population is 65.8%. Mean EDLOS for all patients is 12 hours, which is beyond the ED policy of 8 hours, which suggests a significant access block. The mean total time spent by patients from PHF till ED disposition of 13 hours suggests that there is a need to have a "Fast-Track Referral System". Additional gatekeeping process within the hospitals for referrals from PHF is redundant, as only 22.4% of total referred patients can be discharged from the ED within 8 hours.

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