

A Descriptive Study on the Factors Affecting the Length of Stay in the Emergency Department of a Tertiary Private Hospital in the Philippines

Ma. Lourdes D. Jimenez,^{1,2} Rafael L. Manzanera,³ Jose J. Mira,^{4,5} Isabel M. Navarro⁴ and John Q. Wong⁵

¹Ateneo School of Medicine and Public Health, Philippines

²The Medical City, Ortigas, Philippines

³Health and Economic Benefits Area, MC Mutual, Barcelona, Spain

⁴Health Psychology Department, Universidad Miguel Hernández, Elche, Spain

⁵Alicante-Sant Joan Health District, Alicante, Spain

ABSTRACT

Objective. The study aims to describe factors that contribute to the Length of Stay (LOS) in the Emergency Department (ED) patients of a Tertiary Private Hospital in Philippines.

Methods. This is a retrospective descriptive study from September 1, 2015 to March 31, 2016 on the factors of ED consultations specifically on demographics (age and sex), payment schemes (Out of Pocket (OOP) and third party payer), shift times (morning, afternoon and night) and triage-levels were associated with LOS.

Results. Our ED consultations with age (mean 40.75 years, SD 16.8, N 20,687, range 95) were dominated by females (56%), two age-range, 21-30 (28.4%) & 31-40 and third party payer (57%). LOS (mean of 4.40 hours, SD 3.89, N 18540, range 68) was significantly higher ($p < 0.001$) on OOP patients, older age-range; 71-80, (3.5%) and 81-90, (2.3%). Emergent cases had higher incidence ($X^2 = 30.2$, $p < 0.001$) on morning shift, urgent cases on afternoon shift and trauma cases on evening shift. Non-urgent cases were consistent on all time frames. LOS was significantly higher ($X^2 = p < 0.001$) on urgent and emergent cases and on morning and afternoon shifts and significantly lowest, ($p < 0.001$) on night shifts.

Conclusion. Higher LOS was associated on the following: urgent and emergent triage- levels, older age range, OOP, and morning and afternoon shifts.

Key Words: Emergency Department (ED), Length of Stay (LOS), Triage, Out Of Pocket (OOP)

INTRODUCTION

The increasing usage of the Emergency Department (ED) has become apparent worldwide. It was consistently stated that ED would remain as the safety net for decades that may lead to the escalation of the number of ED visits on all types of healthcare situations.¹ Reports also concluded that the increasing ED visits could be a reflection of a declining primary healthcare access, an increasing healthcare costs and vulnerable cases.²

On a local scale, it was estimated that 96,141 beds were available nationwide for the Filipino population.³ In 2011, the hospital bed density was estimated at 1.2 beds in every 1,000 population which was short from the WHO recommendation of 20 beds in every 10,000 population.⁴ In 2009, the Philippines had a total of 1,796 hospitals where the following areas ranked highest respectively; CALABARZON, Central Luzon, and National Capital

Corresponding Author: Ma. Lourdes D. Jimenez, MD, MSc
The Medical City, Ortigas, Philippines
Ateneo School of Medicine and Public Health, Philippines
Telephone: +632 9881000 local 6610
Email: ldjimenez@themedicalcity.com

Region while Autonomous Region of Mindanao had the lowest.⁵ Around 60% of the Hospitals were privately owned and concentrated in the urbanized area. It was also estimated that about half (48%) of those who were deemed for hospital confinement were admitted in private hospitals.⁶

In general, there are four main financing sources of local healthcare: (1) national and local government, (2) insurance (i.e. government and private), (3) out of pocket (OOP), and (4) donors.⁶ Local studies also showed variability in hospital payment schemes for hospitalization had a high proportion of OOP (i.e. thru salary, income, loan or savings) payments were utilized for public and private and sectors. In 2010, Philippine Health Insurance Corporation (PhilHealth) declared that the National Health Insurance Program covered 85% of the national population while in 2005, Philippine National Health Insurance reported a 6.3% of healthcare spending were financed by private insurance or third party payer (i.e. Health Management Organization <HMO>).⁷ Evidently, the utilization of Philhealth and a third party payer were noticeably higher in private sectors.⁷

The Tertiary Private Hospital has a 516 bed capacity and has been classified with a level four service capability with an annual hospital occupancy rate of 70-75% and a mean hospital average length of stay of four days for in-hospital admissions. In 2015, there were 113,596 patients served in the ED of which 18% were subjected for hospital confinement and about 70% of the total ED consultations were financed thru a third party payer. Based from the midyear comparative 2016 Emergency Department report, amongst other private hospital institutions, it holds 18% of the monthly competitive shares which measures the market percentage shares of ED consultations within Metro Manila from that period and was subsequently ranked to have one of the top ED consultations nationwide.⁸ This report was consistent with the annual comparative report of the Admitting Section where it garnered the highest number of bed occupancy from year 2014-2015 among surveyed hospitals.⁹

Determining the different characteristics affecting the complexity of the daily ED operations allows us to know the variations on the type of population we have in relation with the kind of service we render. Our ability to understand this will help us manage variations since it is considered as the root of all quality issues.¹⁰

Length of stay (LOS) is a key measure of Emergency Department (ED) throughput and a marker of overcrowding.¹¹ Studies correlate LOS with patient's satisfaction, perceptions of care compromise, Left Without Being Seen and direct costs.¹²⁻¹⁵

Upon review, majority of the related published studies were conducted in large university hospitals of an international setting. Until now, there are no local studies of a tertiary private center which captures the extent of the analysis of the ED population considering the trends of visits, financial schemes and demographics in relation

to their length of stay. Due to our distinct local healthcare system where majority of our hospitals belong to the private sector, the analysis of the different characteristics of our ED patients can be a reflection of the majority of the private hospitals and may explain the local healthcare situation specifically the needs of our population.

General Objective

The study aims to describe the different factors that contribute to the Length of Stay (LOS) in the Emergency Department of a Tertiary Private Hospital in the Philippines.

METHODS

This retrospective descriptive study which utilized the database of emergency consultations of the adult section in the emergency department of a tertiary private hospital, located in a highly urbanized area in the Philippines for a seven (7) month period from September 1, 2015 to March 31, 2016. For this study, the following variables were identified: (1) demographics (i.e. age and gender), (2) payment schemes (i.e. out of pocket (OOP) and third party payer), (3) time shifts (i.e. morning, afternoon and evening), (4) case severity or triage levels (i.e. non-urgent, urgent, emergent and trauma), and (5) length of stay (LOS). Our baseline reporting classified trauma as a separate triage level category since the trauma section is segregated from the physical structure of the adult medical cases.

The time shifts were categorized into three clinical time shifts that coincided with the nurse shifts and global hospital endorsements: i.e. morning (i.e. 600hr-1400hr), afternoon (1400hr-2200hr) and evening (2200hr-600hr) within the 24 hour time period. The mode of ED consultations were also classified based on the following institutional triage levels guided by modifiers and physiologic parameters which were classified as follows: (1) **Emergent**: patients with life threatening cases requiring immediate and rapid management, (2) **Urgent**: patients with significant medical problems that could become life threatening, (3) **Non urgent**: patients with stable conditions, and (4) **Trauma**: patients with related trauma cases.

Data collection was possible with the use of a wireless tracking device known as Radio Frequency Identification (RFID) which operates through an electromagnetic field to transfer data. The RFID sensing system allows automated tracking and management flow of patients at the Emergency Department through the RFID tag which feeds real time data to different readers strategically placed on different key points of the entire ED. This allows key metric data to be captured and conduct analysis by providing visibility which triggers timely interventions. The cycle of the tracking system from entry to exit necessitates the administrative clerks and nurses to tap in and tap out the RFID tags to the strategic placements of the RFID readers to generate a real time data catchment. Hence, the materials which includes RFID tags,

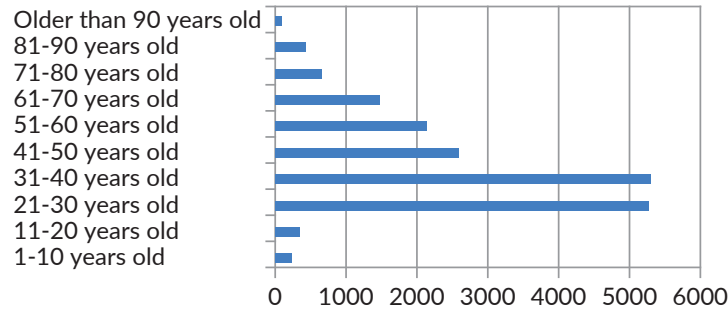


Figure 1. Age Range Distribution of The Medical City ED Consultations.

Wi-Fi Readers and network availability of Wi-Fi should be available at all times.

In the statistical analysis, we used univariate descriptive analysis of daily ED attendance of possible variables such as age, gender, payment schemes, time shifts, day of the week and triage levels. The association between LOS and the categorical variables of gender, payment options, time shifts, day of the week, and triage levels were analyzed using Pearson's chi-square with level of confidence set at 95%. On the other hand, the association between LOS and the continuous variables age were established using Pearson's correlation. For multiple variables, ANOVA test was used to assess variances using regression analysis among groups of triage levels, age range, time shifts and payment options within the 4-hour turnaround time (TOT) with significant levels set at $p < 0.001$.

Prior to the conduct of the study, a protocol was submitted to the Institutional Review Board (IRB) which was reviewed and approved.

RESULTS

A. Demographics

During the time period from September 1, 2015 to March 31, 2016, a total of 20,687 ED consultations included in this study were predominated by females (57.6%) with a mean age of 40 years (24-58) and SD 16, within two consecutive age groups of 21-30 (28.4%) and 31-40 (28.6%) (Figure 1).

Upon analyzing the demographics in relation with their LOS, significant ($p < 0.001$) variations were detected. There was a lower LOS on younger age range: (i.e. 1-10 and 11-20) and higher LOS for older age range (i.e. 71-80 and 81-90) (Table 1). Gender was noted to be similar in relation with the LOS wherein Male has a mean of 4.41, SD 3.38 (N 8,762) while Female has mean 4.39, SD 3.90 (N 11,884) (Table 2).

B. Financial Schemes

As to the payment options, majority (70%) were financed thru a third party payer (i.e. HMOs) and LOS was significantly ($p < 0.001$) higher for those who paid on OOP while lower for those who have a third party payer (Table 3).

C. Time Period Coverage as to

C.1 Triage Levels

Global data of the time period coverage detected significant variations ($p < 0.001$), on different arrival time shifts when compared with triage levels (Table 4). Trauma cases were seen significantly higher on evening shifts while emergent cases on morning shifts. Urgent cases were higher on afternoon shifts while non-urgent cases arrival were constant on all time shifts (i.e. morning, afternoon and evening).

Table 1. Age Range Distribution per Gender in relation with Length of Stay in the Emergency Department of a Tertiary Private Hospital in the Philippines

Age Range (Years)	Male			Gender Female			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
1-10	4.12	6.60	120	2.89	2.53	107	3.54	5.13	227
11-20	3.44	2.86	182	3.34	2.43	161	3.39	2.66	343
21-30	4.04	3.60	2148	4.02	3.63	3125	4.03	3.62	5273
31-40	3.99	3.25	2328	4.14	3.39	2975	4.07	3.33	5303
41-50	4.38	3.41	1140	4.42	3.90	1458	4.40	3.69	2598
51-60	5.09	4.82	843	4.65	3.93	1296	4.82	4.31	2139
61-70	5.60	4.56	615	5.11	4.66	863	5.31	4.62	1478
71-80	5.94	4.64	293	5.95	4.86	356	5.95	4.76	649
81-90	5.81	4.64	169	6.65	6.52	264	6.32	5.87	433
>91	5.00	3.00	36	6.17	4.18	61	5.74	3.81	97
Total	4.41	3.88	7874	4.39	3.90	10666	4.40	3.89	18540

Table 2. Proof of Inter-subject effects of Age Range and Gender in relation with the Length of Stay in the the Emergency Department of a Tertiary Private Hospital in the Philippines

Origin	Sum of Squares Type III	gl	Half Quadratic	F	Sig.
Corrected template	7173,810 ^a	19	377.569	25.570	0
Intersection	92234.323	1	92234.323	6246.321	0
Gender	0.049	1	0.049	0.003	0.954
Age_Range	6632.750	9	736.972	49.909	0
Gender * Age_Range	402.307	9	44.701	3.027	0.001
Error	273469.705	18520			
Total	639581.765	18540			
Total corrected	280643.515	18539			

Table 3. Length of Stay of the Different Payment Options in the Emergency Department of a Tertiary Private Hospital in the Philippines

Payment Option Category	Mean	SD	Number
Out of Pocket (OOP)	4.93	4.41	5172
Credit Card	5.76	4.84	13
Corporate Accounts	4.73	4.29	444
Employee	4.45	4.47	458
HMO-Intellicare	4.16	3.58	3357
HMO-Maxicare	4.08	3.26	4153
HMO-Medicard	4.13	3.76	2222
HMO-Others	4.46	3.92	3561
HMO-Philcare	4.20	3.49	1307
Total	4.41	3.87	20687

C. 2 Weekly ED Consultations per Month

In reference with the ED consultations census, seasonal conditions also detected significant variations ($p < 0.001$) on the different time shifts, days, weeks and months of ED consultation (Figure 2). In relation with the different weeks (i.e. 1st - 4th week) of the month during the time period, significant variations ($p < 0.001$) of ED consultations occurring on the first week is higher on the months of October and November and lower on the month of January. An ED consultation during the second week is higher

during months of December and January and lower on the month of October. On the third week, October was noted to have higher ED consultations and on the fourth week, ED consultations are higher on the months of January and October and lower during September. However, no significant variations ($p=0.172$) were noted between the different weeks and triage levels.

C.3 Daily ED Consultations per Month

From the global daily data of ED consultations variations were also depicted. It was noted that the ED consultations were significant lowest ($p < 0.001$) at evening shift of January 2016. It was specifically higher on Mondays of September: Tuesdays and Wednesday of March, Thursdays and Fridays of October; Saturdays of January and low on Sundays of January (Figure 3). LOS is also significant ($p < 0.001$) highest on Mondays and Tuesdays and lowest on Saturdays and Sundays.

C.4 Time Shifts

Upon the investigation of the time shifts in relation with the LOS, it was significantly ($p < 0.001$) highest at the morning shift that was followed by afternoon shift and was lowest at evening shift (Table 5).

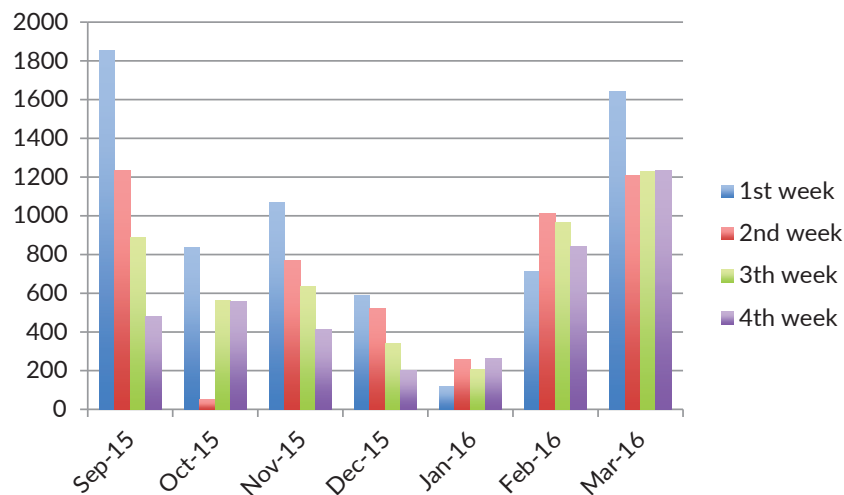


Figure 2. Weekly Distribution of ED Consultations per Month from September 2015-March 2016 of a Tertiary Private Hospital in the Philippines.

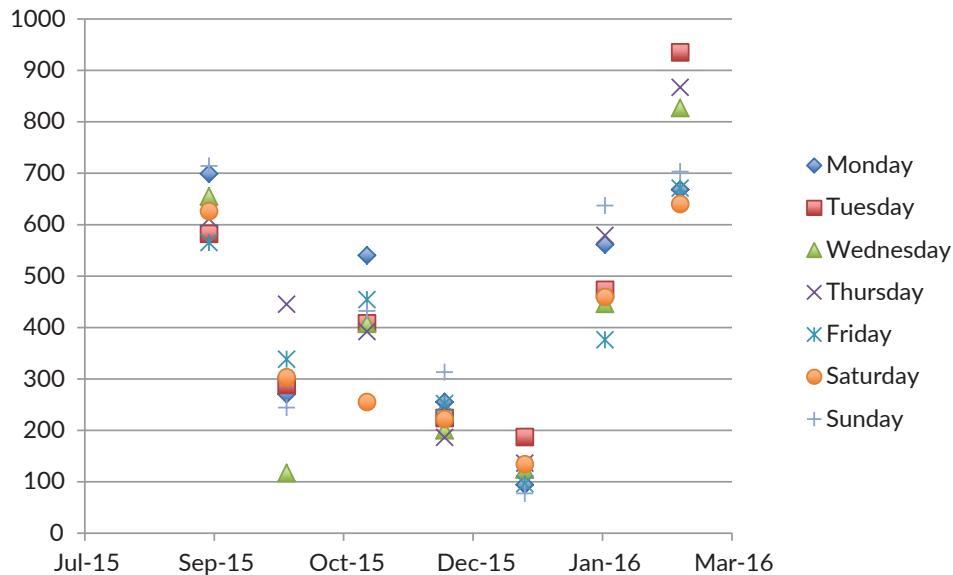


Figure 3. Daily Distribution of ED Consultations per Month from September 2015-October 2016 in the Emergency Department of a Tertiary Private Hospital in the Philippines.

C.5 Length of Stay

C.5.1 Length of Stay per Triage Levels

When associating the triage levels with the LOS, it was noted that length of stay (LOS) is significantly ($p < 0.001$) higher in the urgent and emergent section and lowest in non-urgent and trauma (Table 6).

C.5.2 Length of Stay per Age Range and Gender

Upon analyzing the different variables, significant ($p < 0.001$) variations were depicted within age, gender, time frames (i.e shifts and day/months) and triage levels. Younger patients were higher in the non-urgent section while elderly patients were higher in the urgent and emergent sections.

Table 5. Time Shifts in Relation with Length of Stay in the Emergency Department of a Tertiary Private Hospital in the Philippines

Shift	Mean	SD	N	ANOVA					
				Sum of All Squares	gl	Mean Squares	F	Sig.	
Morning	4.63	4.2	7298	Between Groups	705.059	2	352.530	24	0
Afternoon	4.36	3.7	8761	Within Groups	308976.016	20684	14.938		
Evening	4.14	3.6	4628	Total	309681.075	20686			

Table 4. Time Shifts Distribution in relation with their Triage Levels in the Emergency Department of a Tertiary Private Hospital in the Philippines

Time Shift	Non-urgent		Urgent		Triage Levels Emergent		Trauma		Total	
	N	%	N	%	N	%	N	%	N	%
Morning	1835	22.7	2372	22.9	71	20.4	350	18.1	4628	22.4
Afternoon	3426	42.5	4280	41.4	150	43.1	905	46.9	8761	42.4
Night	2808	34.8	3687	35.7	127	36.5	676	35.0	7298	35.3
Total	8069	100	10339	100	348	100	1931	100	20687	100

Table 6. Triage Levels in relation with Length of Stay in the Emergency Department of a Tertiary Private Hospital in the Philippines

Triage Levels	Not Within Turnaround time			Within Turnaround			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Non-urgent	6.32	4.04	1961	2.34	0.97	6108	3.30	2.75	8069
Urgent	7.81	4.63	5601	2.74	0.78	4738	5.48	4.28	10339
Emergent	8.29	5.48	221	2.62	0.87	127	6.22	5.17	348
Trauma	7.90	6.47	304	2.00	0.87	1627	2.93	3.44	1931
Total	7.46	4.65	8087	2.45	0.92	12600	4.41	3.87	20687

Likewise, it was noted that younger patients were higher on September and October while more elderly patients were higher on December and January. ED consultations of younger patients of both genders were noted on the evening shift while more elderly patients of both genders were noted to be higher on the morning shift. On the other hand, there were no significant variations ($p = 0.302$) noted between age and visit day.

DISCUSSION

The different characteristics as to demographics (i.e. age and gender) and manner of ED consultations (i.e. time shifts, payment options and triage levels) are all important in surmising the demands required of our ED services. Despite the worldwide increase of geriatric population, this study showed that only 14.3% of our ED consultations were more than 60 years old and above which is quite lower than the estimated worldwide geriatric range which has reached to 1/3rd of the ED visits.¹⁴ It was also reflected in the study the congruence of young adults increasingly relying on ED consultations that can be consistently referred with the 36.86% composition of a 25-54 year old age bracket of the 2016 Philippine population.^{16,17}

The most common payment options for ED consultations is thru a third party coverage locally known as Health Maintenance Organizations (HMOs). The potential theory as to the prevalence of the age range and the payment options can be attributed to the location of the ED that is positioned in a central business district (CBD) where there is a concentration of the Business Process Outsourcing (BPOs) industries operating on a 24/7 time shifts. Majority of the BPO's employees belong to the young professional (21-40 years old) cluster with a health insurance financed through an accredited Health Maintenance Organization (HMO) provided by their companies.

The study showed significant clinical variations were noted on different time shifts (i.e. time shifts, days, weeks and months). These variations can be explained by several theories. First, local climate, which is limited to dry (November-April) and wet (May-October) season, can be a contributory factor where respiratory and gastrointestinal problems remain to be the top local morbidity which were consistent with our most common ED chief complaints dominated by fever, abdominal pain and cough. However, this can still be validated with the clinical diagnosis that we cannot access yet. Certain studies illustrates that ambient temperature had differential effects on ED patient visits of different specialties and severities.¹⁸ Supporting studies also associates rainy season with the occurrence of respiratory problems and cold weather are associated with complex medical and pediatric diseases requiring ED utilization with higher severity levels.¹⁹ Secondly, majority of our ED consultations are through third party payer, it can be associated with the subscription of their health card wherein

the extent of the health benefits' ceiling for the year can only be maximized until the last quarter of the year that can explain a higher ED consultations on the latter part of the year (September-December). Resetting of health coverage benefits will then resume at the start of the year (January) which can be rooted from an irrational use of the Emergency Department for its' access and convenience leading to congestion and overcrowding. Finally, the latter part of the year consists of long holidays and festivities that may lead to change of lifestyle (i.e. eating patterns) and unavailability of primary healthcare access.

The study also showed that significant differences were detected based on the triage levels in different time shifts. It was said that a wide variations in disease variety and acuity of illness presenting at the ED has its impact in the approximation of resources.²⁰ The constant pace of the non-urgent consultations across all three (3) different time shifts can be explained by its singular ED accessibility at any given time. This nature supports the idea that through the advent of third party payer which gained its control in utilizing health services it may have resulted to a great deal of attention to the use of ED for non-emergency cases together with other supporting theories such as poor primary healthcare access and greater convenience.^{21,22} Increased LOS was also associated through personal accounts that can be explained due to a possible constrained access to funds availability and hesitancy in consenting for a hospital admission from decision makers who will provide the funds for the unplanned ED visit. Likewise, OOP specifically on emergency situations can lead to impoverishment restricting the uninsured with basic healthcare necessities resulting to financial burden.

In addition to this, trauma cases were recorded to be significantly higher during the evening time shift. Possible explanations as to the trauma cases can be due to the highly urbanized location near a major intersection road (C5) that contributes to road traffic accidents which is still the major cause of unintentional trauma in developing countries.²³ Although with limited publications, a study in New Zealand, stated the significant burden of alcohol related presentations at the ED on Saturday evening and night shifts.²⁴ Local data reported that in 2009 that 21,136 (32.65%) of the road traffic incidents occurred at night from 18:00hr to 05:44hr but fatal accidents are considered during high times and during the early hours of the morning.²⁵

In this study, higher LOS was associated with two (2) triage levels (i.e. emergent and urgent) and two (2) consecutive time shifts: morning and afternoon which may require more time for observation, diagnostics, referrals and/or admission process. Appropriateness of emergency utilization (i.e. emergent cases) were consistent with early morning shifts however, the heavy utilization of ED during morning and afternoon shifts could have a combined contribution on the LOS due to resource inappropriateness. Also, certain studies supported that hospital admissions

originating from the ED particularly for ICU are factors associated with LOS.²⁶ It was also illustrated on the same study that the bed demand for inpatient exceeds during late morning and early afternoon hence, recommending early in-patient discharge. In this case, resource dimensions (i.e. manpower and physical) should also be examined for a possible contributory factor.

Though, it has also uncovered significant variations on patient's age, triage levels and LOS wherein older patients (i.e. age range of 71-80 and 81-90) that were triaged at urgent or emergent were associated with a higher LOS compared to younger patients that were triaged at non-urgent section with a significant lower LOS. The elderly range can be associated with complex problems requiring more investigation; admission and critical care thus having a higher LOS and chances of admission than younger patients.²⁷

This study allows us to determine the pattern of ED visits which can entail necessary resource and manpower adjustments in reference with the surge capacity and capability of the ED brought about by different time shifts, triage levels, payment options and demographics that can affect the length of stay which can lead to overcrowding, decreased satisfaction, poor clinical outcome, staff burn out and increased financial cost. Hence, is necessary to develop a more streamlined method in handling a more complex triage levels (i.e. emergent and urgent) that can contribute to a more efficient process for in-patient admission and a more lean and integrated process for diagnostics, observation and coordination to achieve the set recommended quality parameters.

This will serve as our baseline study for our subsequent papers since an analytic approach is needed to establish causation for predictability of the different variables investigated in relation with the length of stay (LOS).

CONCLUSION

To our knowledge, this is the first local study analyzing the different factors affecting the functions of the Emergency Department. In this study, significant findings were noted with increased age range (71-80 and 81-90), out of pockets (OOP), a more complex triage levels (i.e. urgent and emergent) and the two (2) different time shifts: (i.e. morning and afternoon) were associated with an increased LOS. Also, it was also noted that there were no significant variations found between patient's age and the day of ED consultation.

The preliminary results of this study can be a reflection of an ED pattern among all private sector hospitals specifically on the urban setting since the strategies in relation with the similarities of payment options are limited to OOP and third party payer. Considering the totality of our general population, our socio economic status, the number of private healthcare sector, payment options of ED consultations delimited to OOP and third party payer and the non-coverage of PHIC of ED visits, it may be safe to assume that

the coverage of the ED services are delimited to a certain sub-population which possess a certain level of financial security that becomes a public health concern since we may be responding only to patients who can afford ED healthcare and delimit our services to those who really need it.

On the other hand, the inappropriateness of ED consultations has become apparent worldwide which can be suggestive of the lack of access to primary healthcare, the promotion of preventive healthcare and the analysis of payment schemes and financial implications.

Hence, this study was able to resolve several assumptions confronting the private Emergency Departments in the Philippines: (1) the universal increasing number of non-urgent cases which stipulates to about 1/3 of our ED consultations, (2) the Philhealth's non-coverage of ED consultations despite the fact that majority of hospital admissions comes from ED consultations, (3) the responsibility of the third party payer (i.e. HMOs) in educating their subscribers in relation to non-emergency consultations through access to a primary care facilities, (4) the increased turnover rate of the ED healthcare providers through regulation of working hours, competitive salaries and professional development programs, (5) the ability to assess the clinical outcome of patients discharged from the ED through continuity of care to a primary care facilities, and (6) our ability to respond to the healthcare needs of our financial burdened patients by improving social health coverage and development of a streamlined coordination process to government facilities.

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Statement of Authorship

All authors have approved the final version submitted.

Author Disclosure

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