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Appropriateness in the Utilization of Emergency Department Services in Hospital Kota Bharu and Hospital Universiti Sains Malaysia

ABSTRAK

The prime concern in the inappropriate utilization of emergency departments (ED) is compromised management of patients requiring emergency treatment. Significant attendance of non-emergency cases in ED was found in several countries.

The objectives of this study are to determine the proportion of inappropriate cases, as well as the distribution of utilization by time (over 24 hours and within a week) and by diagnoses (Phase I) and to determine the associated factors and the reported reasons in the inappropriate utilization of ED services (Phase II).

A cross sectional study (Phase I) was conducted in ED, Hospital Kota Bharu (HKB) and ED, Hospital Universiti Sains Malaysia (HUSM). A sample of 350 cases from each ED was randomly selected from ED register of the year 2000. A decision flowchart, which was adopted from 4 guidelines, was applied to identify inappropriate cases.

The proportions of inappropriate cases were 57.4 % for ED HKB and 55 % for ED HUSM. The inappropriate cases increased considerably in early morning, late evening, during the weekend and early part of the week. Most common diagnoses of inappropriate cases were upper respiratory tract infections, mild acute gastroenteritis and urinary tract infections.

The subsequent case-control study (Phase II) with 170 cases in each group revealed the independently significant factors associated with inappropriate utilization of ED services such as perceived illness (Odds Ratio (OR)=9.13; 95% Confidence Interval (CI): 4.99, 16.67), knowledge on roles and functions of

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ED (OR=0.65; 95% CI: 0.50, 0.85), knowledge on roles and functions of OPD (OR=0.24; 95% CI: 0.13, 0.44), marital status (OR=4.58; 95% CI: 1.16, 18.06), gender (OR= 3.00; 95% CI: 1.73, 5.18), number of family members (OR=0.88; 95% CI: 0.79, 0.97), and shift-work (OR= 2.34; 95% CI: 1.15, 4.71).

The first 3 factors seem to be modifiable by giving education, whereas the later 4 factors give some understanding on customer needs, which may help to customize ED and OPD services. Studies to explore further on customer needs and customizing the hospital services accordingly, which will lead to a more efficient primary care, are recommended.

ABSTRAK

Kesan utama penyalahgunaan jabatan kecemasan adalah gangguan terhadap perjalanan perkhidmatan ini kepada pesakit yang benar-benar didalam kecemasan atau tenat. Kajian menunjukkan penggunaan jabatan kecemasan bagi kes-kes bukan kecemasan adalah signifikan dibeberapa negara.

Objektif kajian ini adalah bagi mengenal pasti kadar kes-kes bukan kecemasan, corak kedatangan kes-kes bukan kecemasan dalam masa 24 jam dan dalam seminggu, serta diagnosa-diagnosanya (fasa 1) dan menentukan faktor-faktor yang mempengaruhi penggunaan jabatan kecemasan bagi kes-kes bukan kecemasan (fasa II).

Kajian hirisan-lintang bagi fasa 1 telah dijalankan di jabatan kecemasan Hospital Universiti Sains Malaysia (HUSM) dan Hospital Kota Bharu (HKB). Sebanyak 350 kes bagi setiap pusat kajian telah dipilih secara rambang dari buku pendaftaran jabatan kecemasan. Carta alir penentuan yang diolah dari 4 jenis panduan telah diguna pakai untuk mengenal pasti kes-kes bukan kecemasan.

Kadar kes-kes bukan kecemasan bagi ED-HKB adalah 57.4% manakala bagi ED-HUSM 55%. Kajian mendapati kes-kes bukan kecemasan meningkat pada awal pagi, lewat petang, masa hujung minggu serta awal minggu. Diagnosa-diagnosa utama bagi kes-kes bukan kecemasan adalah batuk dan selsema, cirit-birit dan jangkitan saluran air kencing.

Selanjutnya, satu kajian kes-kontrol bagi 170 kes setiap kumpulan mendapati faktor-faktor berikut mempunyai kaitan dengan penyalahggunaan jabatan kecemasan bagi kes-kes bukan kecemasan. Faktor-faktor tersebut adalah tanggapan terhadap penyakit (Odds Ratio (OR)=9.13; 95% Confidence Interval (CI): 4.99, 16.67), pengetahuan tentang peranan dan fungsi jabatan kecemasan (OR=0.65; 95% CI: 0.50, 0.85), pengetahuan tentang peranan serta fungsi jabatan pesakit luar (OR=0.24; 95% CI: 0.13, 0.44) taraf perkahwinan (OR=4.58; 95% CI: 1.16, 18.06), , jantina (OR= 3.00; 95% CI: 1.73, 5.18), bilangan ahli keluarga (OR=0.88; 95% CI: 0.79, 0.97) dan waktu kerja "shif" (OR= 2.34; 95% CI: 1.15, 4.71).

Tiga faktor pertama yang dikenalpasti mungkin boleh diubahsuai dengan memberi kesedaran tentang peranan jabatan kecemasan. Empat faktor yang kemudiannya pula memberi pemahaman yang mendalam tentang kehendak pengguna. Kajian lebih mendalam tentang aspek ini perlu dijalankan untuk mengenalpasti perkhidmatan yang sesuai dan lebih efisien.

Keywords:
Appropriateness, Inappropriate Utilization, Emergency Department,

Kata kunci:
Kesesuaian, Salah guna, Jabatan Kecemasan

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COMPREHENSIVE REPORT

INAPPROPRIATE UTILIZATION OF EMERGENCY DEPARTMENT SERVICES IN UNIVERSITI SAINS MALAYSIA HOSPITAL

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INAPPROPRIATE UTILIZATION OF EMERGENCY DEPARTMENT SERVICES IN UNIVERSITI SAINS MALAYSIA HOSPITAL

ABSTRACT

Inappropriate utilization of Emergency Departments (ED) services may result in compromised management of patients requiring true emergency treatment. Significant attendance of non-emergency cases in ED was found in several countries. A cross-sectional study was conducted in Universiti Sains Malaysia Hospital (HUSM) to determine the proportion of the inappropriate cases and the utilization pattern by time (over 24 hours and within a week) and by diagnoses. A sample of 350 cases was randomly selected from ED-HUSM register of the year 2000. A decision flowchart, which was adopted from 4 guidelines, was applied to classify appropriate and inappropriate cases. There were 55% inappropriate cases in this study. The inappropriate cases increased considerably in early morning, late evening, during the weekend and early part of the week. Most common diagnoses of inappropriate cases were upper respiratory tract infections, mild acute gastroenteritis and urinary tract infections. Considerable attendance of inappropriate cases calls for interventions.

Keywords: emergency department, inappropriate utilization, university hospital

INTRODUCTION

Hospital Emergency Department (ED) serves a vital role in the health care system and as the interface between hospital services and the community.[1] As Hospitals ED mostly provide 24-hour services[2], it becomes easily accessible to the public. However, some patients attending ED were having problems which could be treated in the primary care services in the community.[3] These patients and their conditions have been described as inappropriate for ED services.[4]

Studies have reported inappropriate utilization of ED services as between 6.7% and 89%.[5] In 1992, the National Hospital Ambulatory Medical Care Survey (USA) identified 55.4% of the ED visits as non-urgent.[6]

In Malaysia, 38.3% of ED attendees were non-urgent cases in Hospital Universiti Kebangsaan Malaysia (HUKM) in 1998, and 35% in Hospital Kuala Lumpur (HKL) in 2001.[8] In both settings, it was reported as an increasing trend.

The implication of inappropriate utilization of ED services is enormous. Resources intended for the care of the critically ill and injured patients may be diverted to those not actually needing emergency care.[9] It may also lead to inefficiency in delivering ED services.[9]

The purpose of this study was to determine the extent and pattern of inappropriate utilization in ED of Hospital Universiti Sains Malaysia (ED-HUSM).

METHODOLOGY

Retrospective review of hospital registration and patients' record from 1st January to 31st December 2000 was conducted to determine the proportion, pattern and common diagnoses of inappropriate cases of ED in HUSM. The study population were cases from ED-HUSM, numbering 33,126 cases.[10] All cases except referral cases were included in the sampling frame. By using systematic random sampling, a sample of 350 was selected. The above sample size was calculated for the expected proportion of 30% inappropriate utilization of ED, with a precision of 5% at 95% confidence level.

The classification of appropriateness of ED utilization into appropriate and inappropriate was based on a decision flow chart. This flow chart was developed based on four guidelines the triage guidelines from HKL[8], HUKM, American College of Emergency Physician (ACEP)[11], and the explicit ED criteria of Davis Medical Centre, University of California.[9] The initial drafted decision flow chart was reviewed by ED experts such as the ED head departments of HKL and Hospital Kota Bharu (HKB). In order to classify each and every case into appropriate or inappropriate, the 6 steps described in Table 1 were applied. If a case was noted to be appropriate in any step, (example, in step 1, arriving by ambulance), the subsequent steps were omitted. Basically, the inappropriateness is classified after exhaustively ruling out all possibilities of appropriateness in all 6 steps.

A pilot study was conducted in May 2001 on 80 cases at ED-HUSM. Two ED experts were asked to review identical sets of ED case records, by using the proposed decision flow chart. The agreement (Kappa statistic) between the two experts was

0.851 (asymptotic standard error of 0.07, p value <0.001), which was considered almost perfect agreement.[12]

Detailed medical record for each of the study sample was obtained from the record office. The data collected were age, sex, address, date of visit, day of visit, time of visit, mode of arrival and triage category. Other information such as clinical presentation, findings of physical examination, results of investigation done, diagnosis made and the management or treatments given were also collected. Based on our decision flow chart, the cases were classified by the researcher into appropriate or inappropriate ED utilization. With the help of two experts from each study setting, the classifications of cases were further verified. The experts involved were a family physician from HUSM, a senior registrar with long experience working in ED-HUSM, the ED head unit of HKB, and a senior registrar with long experience working in ED-HKB. In case of any discrepancy of the classification, researcher and the ED experts will discuss further and come to a conclusion. However, they were almost complete agreement with the classification made by the researchers.

Data were entered and analyzed using SPSS version 10.0.[13] Proportions of inappropriate ED cases with its 95% confidence interval (CI) were determined. Frequencies, percentages and appropriate charts were presented for the pattern of utilization over 24 hours, within the week, and by diagnoses.

RESULTS

Table 2 shows descriptive characteristics of ED cases ED-HUSM in the year 2000. The total sample reviewed for this study was 350 cases. Age of inappropriate cases ranged between day 5 of life up to 80 years old. The mean age was 31.8 year with SD of 19.4. There were more male than female in the inappropriate cases, while there were slightly more female than male in the appropriate cases.

From the total sample of 350 cases, the proportion of inappropriate cases was 55%. Its 95% CI was 49.8% and 60.7%.

The 24 hours utilization pattern was shown in Figure 1. Three peaks of ED visits of inappropriate cases are shown in Figure 2. There were between 8 to 10 AM, 2 to 4 PM and 8 to 10 PM. However, appropriate cases as shown in Figure 3 increased gradually over 24 H with its peak around 8 PM.

The day trend within weeks is shown in Figure 4. Obviously inappropriate ED vlsits increased during and near the weekend. In the study setting, the working week-days start from Saturday till Thursday afternoon.

The diagnoses of inappropriate cases and their distribution are presented in Table 3. Upper respiratory tract infection (URTI), mild acute gastroenteritis (AGE), urinary tract infection (UTI) and conjunctivitis were the most common diagnoses among inappropriate cases. It represented more than half (57.8 %) of the total diagnoses of inappropriate cases.

DISCUSSION

Three hundred and fifty cases that attended ED-HUSM in the year 2000 were sampled. Classification of inappropriate ED attendance based on our decision flowchart showed reasonable agreement between the researcher and ED experts. Therefore, it has been considered that the decision flow-chart developed in this study is reasonably appropriate in the local setting.

This study revealed that the proportion of inappropriate cases were 55% in ED-HUSM. Although there may be differences in classifying appropriate and inappropriate cases, our finding of a considerably high proportion of inappropriate cases is comparable with other studies: 59.4% in a study done in Saudi Arabia,[14] 55.4% in a study in US,[6] and 40.9% in another study done in US.[15] This indicates widespread inappropriate utilization of ED for non-emergency conditions.

Burnett and Grover revealed in his study that the peak arrival time at the ED was around 10 AM and 1 PM.[16] In our setting, the obvious increase of inappropriate cases (Figure 2) between 8 to 10 AM. It is interesting to note that this is the beginning of office hours. The second small peak, 2 to 4 PM is the final part of office hours. The last biggest peak is between 8 to 10 PM which coincide with the highest peak work load of appropriate cases (Figure 3).

It is worth noting that during the first peak, primary health clinics or Outpatient Department (OPD) are accessible. The possible explanation for this is that the OPDs are crowded and the waiting times are long. They felt that by going to ED, they would get earlier treatment and be able to go back to work or schools. It was also suggested that some patients came to ED for medical leave certificate in the early morning.[17]

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The evening peak might be their most free time. Asaari reported that the attitude of public seeking treatment at ED was at their convenient time and avoiding traffic congestion during daytime.[8] Furthermore, type of occupation, such as day-workers or night-time-workers or shift-workers might determine the reason for seeking ED treatment at their convenient hour. [8]

There was an increasing trend during the weekend when all outpatient clinics and primary health clinics are closed. Burnett and Grover also reported that the lack of regular source of primary care might be a factor that brings such patients to the emergency department.[16]

The heavy attendance in outpatient clinics just after the weekend may also explain why inappropriate cases are still high in ED during the early part of the weekdays. It is understandable that over crowding at out patient departments may drive patients to ED as they expect to get faster treatment.

URTI contributed the most common diagnosis of inappropriate cases (35.4%), mild AGE was 8.3%, and UTI was 7.3%. The ED was also utilized for other inappropriate cases such as to change continuous bladder drainage urinary catheter, skin diseases, gynecological problems, wound dressing and others as in Table 2. These cases can easily be managed at the out patient clinics or other primary health clinics.

For wound dressing, ED was particularly utilized during the weekends or public holidays. This cannot be avoided in our setting, as the continued treatment is actually needed for these cases while the primary care are not accessible. Perhaps health care providers should consider alternative solution, which should be community-based to overcome these problems.

Absconded cases (3.1%) in ED-HUSM were also noted. The reason for this might be explained by long waiting time as well as over crowding of the ED. Similarly, Bindman suggested that long waiting times resulted in number of patients leaving ED without being seen.[18] This also justifies that they are most probably inappropriate attendees.

Several research questions were raised. Who are these inappropriate users? What are the reasons and factors for this peak inappropriate utilization? What would be the appropriate services for them? Are the ED services compromised due to this peak inappropriate utilization? It is important to answer these questions before taking any intervention for this problem.

The main limitation in this study is the lack of a standard measurement to determine the difference between appropriate and inappropriate utilization condition of ED services. Patients presenting to the ED sometimes did not fall neatly into the two categories of appropriate or inappropriate but instead lie somewhere in a continuum. It is possible that some may be misclassified. However, the decision flowchart used in this study was validated as best as possible with locally available expertise.

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Table 1. Detail description of steps in the decision flowchart

Step 1: On arrival

Condition	Decision
Arrive by ambulance	Appropriate
Paramedic run	Appropriate
Referred cases	Appropriate
Walk-in	Further evaluation

Step 2: Triage selection

Condition	Decision
By color coding	
Red/yellow	Appropriate
Green/blue	Further evaluation

Step 3: Presentation

A. The following presentations will be determined as "appropriate":
1. Severe chest pain
2. Respiratory distress/Failure
3. Severe concussion/Open fracture of skull
4. Severe asthma/Acute exacerbation of asthma
5. Severe burns - more than 20% of body surface in adult and 15% in children
6. Shock - Hypovolemic/Cardiogenic/Neurogenic/Anaphylactic or other causes of shock
7. Polytraumatised/Multiple injured patient
8. Unconsciousness/Comatose
9. Severe bleeding

B. The following presentations need further assessment:
1. Allergy or hay fever
2. Anxiety
3. Mild back pain, able to walk without assistance
4. Drug or alcohol detoxification
5. Dysuria (mild), female
6. Mild eye irritation without sign of infection
7. Foot problems (blister, pain, ingrowing toenail, wart)
8. Dental problems
9. Chronic sinusitis
10. Minor skin infection, sore
11. Hepatitis exposure or symptoms
12. Sore throat
13. Sleep disorder
14. Localized sunburn without blisters

15. Suture removal
16. Muscle aches
17. Neck pain (no history of acute trauma)

18. Painless urethra discharge
19. Physical examination requests
20. Pruritus without rash
21. Simple, localized rash
22. Weakness - appears well

23. Diarrhea
24. Chronic dizziness
25. Sexual disease exposure

26. Constipation, 3 days or less
27. Minor contusions or abrasions
28. Mild cough (without hemoptysis), ear pain or respiratory impairment
29. Minor headache without neuralgic impairment

30. Minor rectal pain or itching
31. Chronic recurrent hematuria
32. Minor skin sore, not infected
33. Immunizations and γ-globulin request
34. Joint pain,
35. Lice or scabies (suspected or real)
36. Trauma follow-up (minor injuries originally treated elsewhere)
37. Mouth blisters
38. Wound check
39. Vaginal bleeding - minor (1 pad in past 6 hours)
40. Pregnancy testing
41. Prescription refills
42. Vaginal discharge
43. Upper respiratory infection symptoms

Step 4: Physical examination

A. The following physical signs need further assessment:

1. Temperature   35° to 38.5°C (38.3°C for age >60 years old)
2. Respiration   12 to 20 per minute
3. Blood Pressure   90 to 160 mm Hg systolic
                             60 to 110 mm Hg diastolic
4. Pulse   60 to 110 per minute

B. The following physical signs will be determined as "appropriate":

1. Physical signs (listed in step 4.A) with outside the limits mentioned above
2. Glasgow Coma Scale of less than 12
3. Burns >20 % in adult and >15 % in children of body surface.

Step 5: Investigation

If the following investigation were requested, it will be considered "appropriate":

1. Imaging studies; radiography, ultrasound studies, computer tomography, Magnetic resonance imaging
2. Laboratory tests on body fluids: e.g. ABG, electrolytes, and blood urea nitrogen
3. Tests not on body fluids; e.g. ECG, EEG, slit lamp examination
4. Otherwise, further evaluation is needed.

Step 6: Management

The following management will determine as "appropriate":

1. Hospitalization or IV fluids treatment
2. Restraints
3. Oxygen
4. Specialty consultation
5. Prescription medications administered in ED (other than tetanus mmunization or oral analgesics)
6. Treatment of an orthopedic problem by splinting with plaster, knee immobilizer, crutches, or by reducing a fracture or dislocation
7. Transfusion of blood products

Table 2. Characteristics of 350 ED cases in HUSM in the year 2000

Characteristic	Inappropriate N (%)	Appropriate N (%)
Age (year)		
0-15	76 (39.6)	45 (28.5)
16-30	39 (20.3)	41 (25.9)
31-45	23 (12.0)	36 (22.8)
>45	54 (28.1)	36 (22.8)
Gender		
Male	106 (55.2)	75 (47.5)
Female	86 (44.8)	83 (52.5)
Ethnic group		
Malay	178 (92.7)	136 (91.3)
Chinese	8 (4.2)	8 (5.1)
Indian	4 (2.1)	2 (1.3)
Other	2 (1.0)	3 (1.9)

Table 3: Diagnoses and distribution of inappropriate cases in ED-HUSM in 2000

|	Diagnosis	No (%)
1.	Upper Respiratory Tract Infection	68 (35.4)
3.	Mild Acute Gastroenteritis	16 (8.3)
4.	Urinary Tract Infection	14 (7.3)
5.	Conjunctivitis	13 (6.8)
6.	Wound Dressing	10 (5.2)
7.	Nail Prick Injuries	9 (4.7)
8.	Neonatal Jaundice	8 (4.2)
9.	Chicken Pox	6 (3.1)
10.	Eczema	6 (3.1)
11.	Absconded	6 (3.1)
12.	Measles	4 (2.1)
15.	Hemorrhoid	4 (2.1)
16.	Pyrexia of Unknown Origin for investigation	4 (2.1)
17.	Request Medication	4 (2.1)
18.	Mumps	3 (1.6)
19.	Anxiety	3 (1.6)
20.	Myalgia	3 (1.6)
21.	Haemoptysis? Pulmonary Tuberculosis	2 (1.0)
22.	Constipation	2 (1.0)
23.	Lymphoma	1 (0.5)
24.	Jaundice for Investigation (Adult)	1 (0.5)
25.	Acne Vulgaris	1 (0.5)
26.	PV Bleeding - Post menopause spotting	1 (0.5)
27.	Uterine Fibroid	1 (0.5)
28.	Change Continues Bladder Drainage	1 (0.5)
29.	Cataract	1 (0.5)
Total		192 (100)
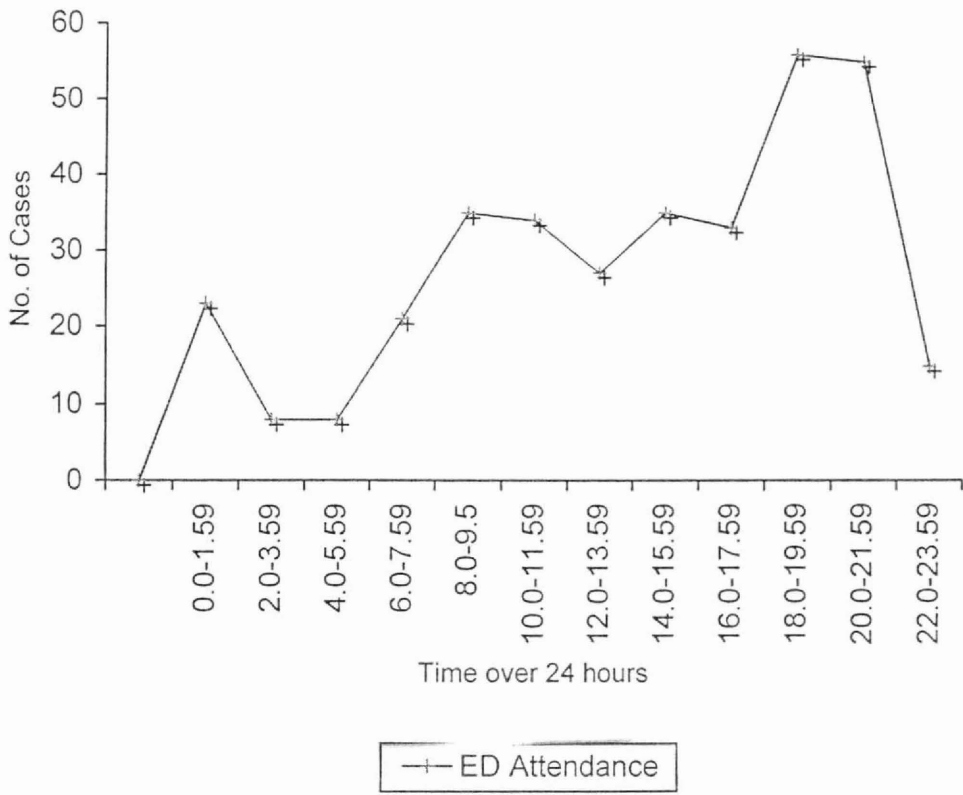
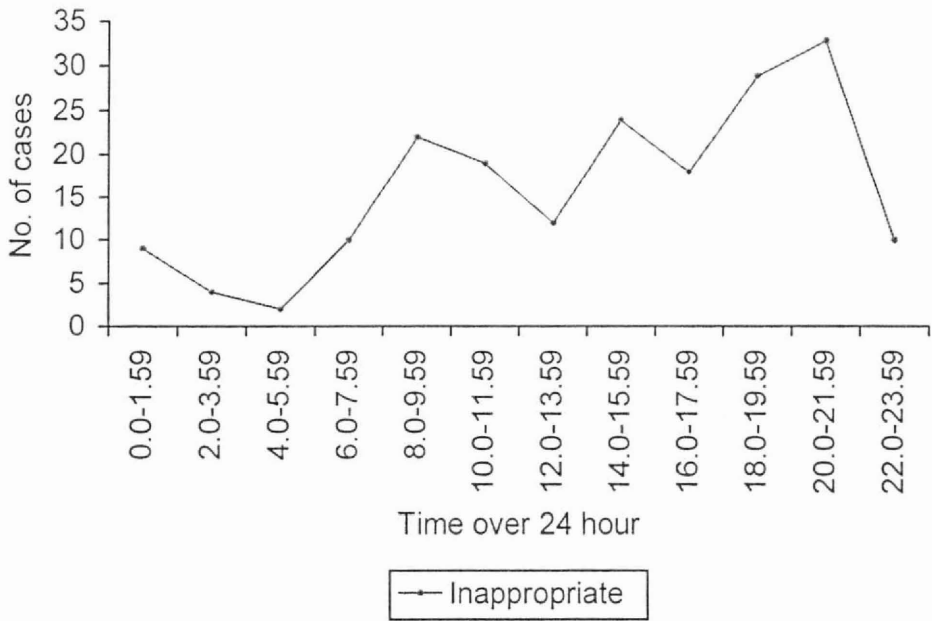Figure 1. Utilization pattern over 24 hours of ED-HUSM in the year 2000

Figure 2. Time pattern of inappropriate cases over 24 hour in the year 2000
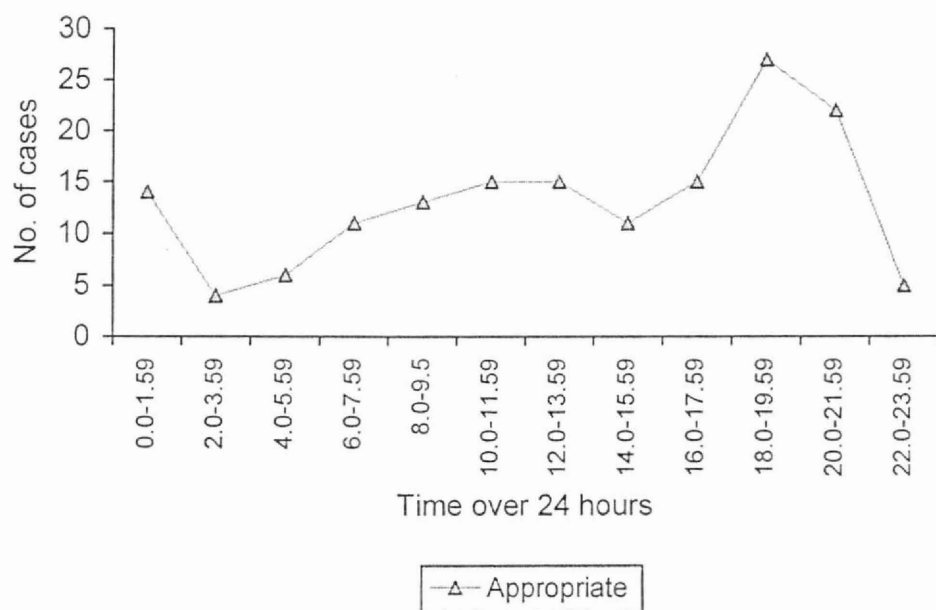
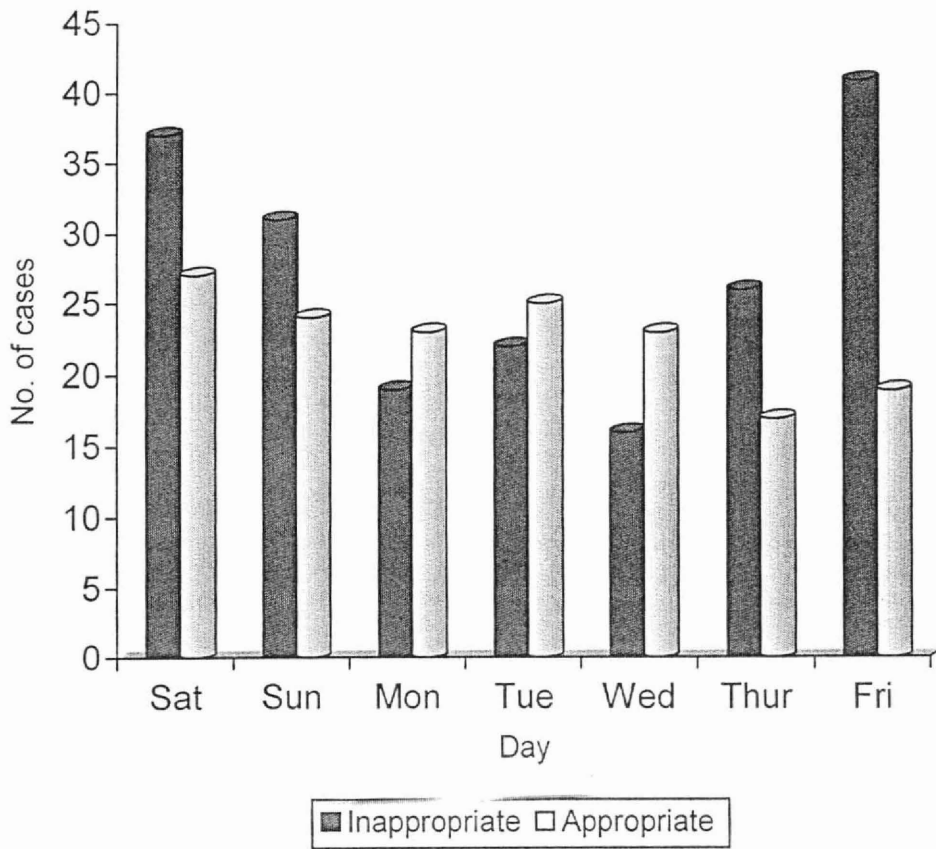Figure 3. Time pattern of appropriate cases over 24 hour in the year 2000

Figure 4. Utilization pattern by days of the week of ED-HUSM in the year 2000

FACTORS ASSOCIATED WITH INAPPROPRIATE UTILIZATION OF EMERGENCY DEPARTMENT SERVICES IN A UNIVERSITY HOSPITAL

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FACTORS ASSOCIATED WITH INAPPROPRIATE UTILIZATION OF EMERGENCY DEPARTMENT SERVICES IN A UNIVERSITY HOSPITAL

ABSTRACT

This study was carried out to determine the associated factors, and to explore the reasons for the inappropriate utilization of Emergency Department (ED) services at Universiti Sains Malaysia Hospital. A case-control study was conducted with 170 cases from ED and 170 controls from Outpatient Department (OPD). A self-administered questionnaire was designed and used to obtain sociodemographic data, knowledge on the functions of ED and OPD, health seeking attitude and behaviour, and reasons for seeking treatment at ED. The study found that gender, marital status, family size, shift work, perceived illness, and knowledge on the role and functions of ED and OPD were the seven significant associated factors. While, "the illness was severe" (85%), "can't go to OPD during office hour" (42%), and "ED is near by my house" (27%) were the 3 most common reasons for inappropriate utilization of ED services.

Keywords: emergency department, inappropriate utilization, perceived illness

INTRODUCTION

Patients with non-emergency problems often present to emergency departments (ED) for care. Liggins, reported that hospital professionals regarded the use of ED services by people with problems that could be managed in general practice as inappropriate users of the services.[1] And, the prevalence of inappropriate utilization of ED services was between 6.7% and 89%.[2]

Abusing ED services resulted in the compromised management of patients requiring true emergency treatment.[3] They would be mismatched with health care professionals who were only interested in true emergency cases.[4] Siddiqui and Ogbeide reported inappropriate utilization of ED services as a waste of resources, causing stress among ED staff and prolonged waiting time for patients requiring attention.[5] Generally the demand for services by these patients had resulted in overcrowding in many EDs.[3] A variety of factors were found to be associated with inappropriate ED attendance. In the United States, the increasing number of inappropriate ED attendance was considered to be due to lack of a regular source of primary care.[6] Other studies also reported factors such as lower socioeconomic status,[7] ED provide the most convenient services,[8] and patients' judgement on the severity of illness, were the most important determinants of inappropriate ED utilization.[4]

A local study found that 57% and 55% of inappropriate attendances in the emergency departments of Hospital Kota Bharu and Hospital Universiti Sains Malaysia (HUSM) respectively in the year 2000.[9] These should be considered a significant problem related to emergency care services. The objectives of this study are to determine the associated factors, and to explore the reported reasons for the inappropriate utilization of ED services in HUSM.

METHODOLOGY

A case-control study was conducted over a period of 4 months from October 2001 to January 2002, with 170 cases from ED (classified as inappropriate cases/utilization) and 170 controls from outpatient department (OPD) (considered as appropriate utilization). The inclusion criteria were patients having upper respiratory tract infection (URTI), mild acute gastro enteritis (AGE), urinary tract infection (UTI) and skin diseases. Selasawati *et al*, identified these four most common diagnoses which cover more than 50% of all inappropriate cases.[9] Patients aged 16 and above were included in this study so that the respondents can answer the questionnaires by themselves.

As for the exclusion criteria, all referred patients were excluded in both study groups. In the control group, to exclude possible inappropriate ED utilization cases, those who ever had treatment at ED within the last six months were excluded. Once a case was eligible, systematic random sampling method with appropriate sampling interval was used to recruit the study subjects. The sample size of 170 cases for each study group, calculated by using PS software[10], was required for the detectable odds ratio of 2.0, and the proportion of those having more than 24 hours duration of illness among non-urgent cases utilizing ED services was 35%,[11] while the *alpha* and *beta* errors of the study were set at 0.05 and 0.2, respectively.

The classification of appropriateness of ED utilization into appropriate and inappropriate in ED cases was based on a decision flow chart. This flow chart was developed based on four guidelines. They were the triage guidelines from Hospital Kuala Lumpur (HKL)[12], Hospital Universiti Kebangsaan Malaysia(HUKM)[13], American College of Emergency Physician Guidelines[14], and the explicit ED criteria of

Davis Medical Center, University of California[3]. ED experts such as the ED head department of HKL and ED head department of HKB reviewed the initial drafted decision flow chart.

A self-administered questionnaire was designed to obtain the data for socio-demographic and economic profile, knowledge on the functions of ED and OPD, health seeking attitude, health seeking behaviour and reported reasons for seeking treatment at ED. A pilot study was conducted on 40 patients at OPD-HUSM to validate the questionnaire. The internal consistency (Cronbach alpha 0.66 and 0.81) reliability of domains for knowledge and attitude scores were checked. The factor analysis revealed that items were not grouped as the questionnaire was structured, and it was probably due to the close correlation between domains.

Six questions of knowledge on the roles and functions of ED, and seven questions for knowledge on the roles and functions of OPD were selected. A score of one is given for the right answer and zero for the wrong answer. There were six questions each for health-seeking attitude towards ED and general health seeking attitude. Possible responses to each statement are on a 5-point Likert scale of "strongly agree", "agree", "neutral", "do not agree" and "strongly do not agree". A maximum score of five was given for the most demanding attitude in each question. Study subjects who were identified as inappropriate ED utilization (the cases) were asked to select the reported reasons for seeking treatment at ED. They were allowed to select more than one reason, and also given the opportunity to list any other reasons that were not listed in the questionnaire. The selected study subjects were briefed about the study, and a written consent was taken. A interview-guided self-administered questionnaire was

given to each study subject. The questionnaire was checked for the completeness on return.

Statistical analysis was done by using STATA, version 7.[15] Possible data entry errors were checked by running frequencies and the distributions. Categories with small sample size, and skewed distributions were noted. Meaningful collapsing of categories was done when indicated. Logistic regression was used to determine the factors associated with inappropriate utilization .[16] Firstly, univariate logistic regression for each independent variable was done, followed by building the preliminary main-effect models using both forward and backward stepwise variable selection procedures with log-likelihood ratio (LR) test. The numerical independent variables were checked for their linearity in the logit by categorizing the variable and fit in the model. When indicated, variables were categorized accordingly. All possible 2-way interactions were checked by LR test. Multicolinearity problem was identified by fitting the model into multiple linear regression model and obtaining variance-inflation-factors. The preliminary final model was, then, checked for model fitness using Hosmer-Lemeshow goodness-of-fit statistics, ROC curve, and the classification table. The possible influential outliers were identified by plotting the predicted probability with influential statistics such as the delta chi-square ($dx2$), delta-deviance (dd), delta-beta ($dbeta$), and leverage value. The identified influential outliers (i.e. $dx2 >= 4$, $dd >= 4$ or $dbeta >= .05$) were checked for any possible errors in their original data. With the reasonably fit model, the interpretation of the result was done.

RESULTS

The characteristics of the cases (ED-HUSM) and the controls (OPD-HUSM) are summarized in Table 1 and 2. There were significant differences of mean age, family size, family incomes and mean knowledge scores between cases and controls. The distribution of gender, marital status and academic status were also significantly different between the two groups. However, mean duration of illness, mean traveling duration to ED or OPD and mean attitude scores showed no differences.

The summary results of simple and multiple logistic regression (SLR) analysis of the factors associated with inappropriate utilization of ED services are shown in Table 3 and 4. Gender, marital status, family size, working hour, perception of illness and knowledge were the significant factors associated with inappropriate utilization of ED services in the final model. There was no significant 2-way interactions and multicollinearity problem. The model was considered reasonably fit according to the following statistics: the Hosmer-Lemeshow Goodness-of-fit test (p value of 0.461); the area under the ROC curve of 0.7868; 79.6% sensitivity, 78.8% specificity and 79.53% correctly classified in the classification table; and the identified outliers were not influential on the regression coefficients (all $dbeta < 0.5$).

Inappropriate ED users' reported reasons were shown in Figure 1. The 3 commonest reasons were "the illness was severe" (85%), "cannot go to OPD during office hour" (42%), and "ED is near to my house" (27%).

DISCUSSION

Factors such as gender, marital status, family size, employment status, perception of severity of illness, knowledge on the roles and functions of ED and OPD were found to have significant association with the inappropriate utilization of ED services in HUSM. Males were noted to have higher tendency to misuse ED compared to females. It is understandable that most of the females were housewives and were able to visit OPD during office hours as compared to males. Further exploration should be done to understand the cultural aspect of gender in health seeking behaviour.

Those who perceived their illness as very serious were very highly significant with Odds Ratio of 9 (95% CI: 4.9, 16.6) in the inappropriate utilization of ED services. The inappropriate utilization due to this overestimation of the illness severity should be acceptable, as they were not medically trained. Our study shows that shift-workers more inappropriately utilized ED than other workers such as fixed day- or night-workers. It may be different in other settings but Asaari reported that the public tended to visit ED at times that were convenient to them.[13]

Our study suggests that patients having larger family size (>5) appeared to inappropriately utilize ED less than the others. Possible explanation is that some dependent members (perhaps older children) could be helping to take care of the family while the other take the sick member to the OPD in the day time. The above explanation can also be applied to the marital status being associated with inappropriate utilization. Divorcees or widowers appeared to utilize ED services more inappropriately compared to others. Divorcees or widowers being single parents must be busy and thus, would tend to visit ED at their convenient time. The relationship of these social-related

factors and inappropriate utilization should further be explored in order to identify solutions for these socially vulnerable groups.

Having good knowledge on the roles and functions of ED and OPD seems to prevent from inappropriately utilizing ED services in our setting. However, a small randomized community trial in the US failed to find any reduction in ED attendance following the provision of a single education session on appropriate use of ED.[17] By contrast, a mass media campaign that presented repeated messages about appropriate use of ED in New York City was successfully able to reduce the hospital's ED usage by nearly 14% over two years.[18]

Although this study revealed lower knowledge level in appropriate group compared to controls, there was no significant difference in their health-seeking attitude towards ED and general health-seeking attitude. Perhaps, the attitude is influenced by other social factors additional to the knowledge such as being single parents and shift-work. The situation that they are facing possibly led them for high demanding health seeking attitude in ED. In fact, these social & environmental factors are not modifiable and the best solution might be customizing the role, functions, and working hours of hospital services including emergency department and outpatient clinics to serve the overall needs of customers. Therefore, more in deep understanding on customer needs is critically needed to identify the best appropriate solution for the local setting.

This study demonstrates that the majority of ED patients perceived their problems as urgent (85%) as their main reason for seeking ED treatment. It is comparable to Gill and Riley study which reported that 82% of patients with non-urgent problem gave similar reason.[19] Afilalio et al, also concluded that this misperception was the most important determinant in the inappropriate utilization of ED services.[4] It is

understandable that non-medical people may face difficulties in determining the severity and urgency of their illness. Although these cases are not appropriate for the prospective of hospital, these cases should not be discouraged from seeking advice for the benefit of doubt. Having an effective triage system in ED would be a solution, and perhaps, an alternative primary care service, for example, evening OPD would help these marginal cases.

Inability to attend the OPD during office hours (42%) was the second most common reason for seeking treatment at ED. In fact, this reason supports the possible explanation that we discussed earlier for associated factors such as marital status, family size, and working time. These factors probably led to inability to attend OPD during office hours. Twenty seven percent of the cases thought that they could easily utilize ED services because ED was near their home. Steel described in his study that proximity to the ED was one of the reasons why patients inappropriately attended the ED and not their GP.[20]

Several limitations are noted in this study. It would have been better to start with a qualitative study, e.g. a focus group discussion to identify the reasons for seeking treatment at ED. However, by having open-ended questions in the questionnaire, cases may also list other reason than mention in the questionnaire. Controls in this study may still be possible to be inappropriate cases. However, excluding those having visited ED in the past 6 months would minimize this possible misclassification. Odds ratio in this study should not be interpreted as approximates for relative risk as the rare disease assumption was not met. In addition, like other hospital-based studies, it is limited in understanding the representative population. However, it still provides valuable information with a reasonable degree of confidence.

In order to comprehensively address the problem, we recommend a customer survey related to primary care needs from the customer perspectives and access to available services. This will give more in-depth understanding to appropriately customize the health care services with local settings.

CONCLUSION

The study identified modifiable factors associated with inappropriate ED utilization as knowledge of roles and functions of ED and OPD, and non-modifiable factors such as gender, marital status, family size and working time. Thus, it may be beneficial by improving the knowledge of the community in various aspects of roles and functions of ED and OPD, and by modification of existing primary care services e.g. extension of OPD to the evening.

ACKNOWLEDGMENTS

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Table 1. Characteristics of cases and controls (numerical variables)

FACTOR	Case (n=170)		Control (n=170)		95% CI of mean difference	t-stat[a]	p-value
	Mean	SD	Mean	SD			
Age	40.2	14.6	36.7	13.6	(0.5, 6.5)	2.29	0.023
Family size	5.1	2.2	5.8	2.5	(0.3, 1.3)	3.29	0.001
Family incomes (RM)	1500[b]	1700[c]	1000[b]	1000[c]	(-570, -31)	-2.29	0.029
Duration of illness before seek treatment (hour)	48.0[b]	48.0[c]	48.0[b]	92.1[c]	(-3.4, 25.8)	1.51	0.132
Duration to ED/KPM (minute)	22.7	19.5	24.9	18.1	(-1.8, 6.3)	1.09	0.274
KNOWLEDGE							
ED Roles & Functions	2.7	1.0	3.4	1.3	(0.5, 1.03)	5.99	<.001
OPD Roles & Functions	5.2	0.8	6.3	2.7	(0.4, 0.8)	5.36	<.001
ATTITUDE							
Health seeking attitude to ED	21.4	3.1	21.2	2.8	(-1.8, -0.4)	-3.10	0.333
General health seeking	27.7	3.8	27.3	4.1	(-0.7, 0.9)	0.17	0.824

a Independent t-test
b Median
c Interquartile range

Table 2. Characteristics of cases and controls (categorical variables)

FACTOR	Case (n=170) No (%)	Control (n=170) No (%)	$X^2(df)^a$	p-value^a
GENDER				
Male	97 (57.1)	46 (27.1)	31.39 (1)	<.001
Female	73 (42.9)	124 (72.9)		
RACE GROUP				
Malay	161 (94.7)	158 (92.9)	5.03 (1)	0.081
Others	9 (5.3)	12 (7.1)		
MARITAL STATUS				
Not yet married	53 (31.2)	39 (22.9)	9.18 (2)	0.010
Married	104 (61.2)	127 (74.7)		
Divorce/widower	13 (7.6)	4 (2.4)		
REGISTRATION				
Paying	45 (26.5)	61 (35.4)	3.51 (1)	0.061
Not Paying	125 (73.5)	109 (64.6)		
ACADEMIC STATUS				
Not schooling	8 (4.7)	14 (8.2)		
Standard 1 - 6	10 (5.9)	29 (17.2)		
Form 1 - 5	58 (34.1)	65 (38.2)	19.18 (4)	<.001
Pre-university	56 (32.9)	31 (18.2)		
University	38 (22.4)	31 (18.2)		
EMPLOYMENT STATUS				
Not working	51 (30.0)	71 (41.8)		
Self-employed	21 (12.4)	22 (12.9)		
Government sector	70 (41.2)	46 (27.1)	8.40 (4)	0.070
Private sector	15 (8.8)	17 (10.0)		
Pensioner	13 (7.6)	14 (8.2)		
WORKING HOUR				
Not working	66 (38.8)	83 (48.8)		
Office hour	61 (36.0)	63 (37.1)	8.09 (3)	0.070
Shift work	39 (22.9)	20 (11.8)		
Not consistent	4 (2.3)	3 (2.3)		
DIAGNOSES				
URTI	75 (43.9)	76 (44.7)		
Mild AGE	29 (15.3)	27 (17.1)	0.67 (3)	0.810
UTI	14 (8.2)	18 (10.6)		
Skin	52 (32.6)	49 (28.4)		

a Pearson's Chi-square test

Table 3. Results of simple and multiple logistic regression analysis for factors associated with inappropriate utilization of ED services[a] (variables which were significant in the final model)

FACTOR	Crude OR (95% CI)	p-value[d]	Adj. OR (95% CI)	p-value[d]
Gender				
Male	3.58 (2.29, 5.64)	<.001	2.83 (1.68, 4.75)	<.001
Fmale	1.0		1.0	
Marital Status				
Divorce/Widower	3.44 (1.10, 10.76)	0.034	4.58 (1.16, 18.06)	0.009
Others[b]	1.0		1.0	
Family size				
≥ 5	0.56 (0.36, 0.89)	0.013	0.88 (0.79, 0.97)	0.041
< 5	1.0		1.0	
Working Hour				
Shift work	2.23 (1.24, 4.02)	0.007	2.34 (1.15, 4.71)	0.015
Others[c]	1.0		1.0	
Perceived Severity of Illness				
Very serious	7.31 (3.82, 13.98)	<.001	9.13 (4.99, 16.67)	<.001
Not serious	1.0		1.0	
Knowledge				
Roles and functions of ED				
Score 6	0.56 (0.43, 0.74)	<.001	0.65 (0.50, 0.85)	<.001
Score < 6	1.0		1.0	
Roles and functions of OPD				
Score 7	0.75 (0.55, 1.11)	0.057	0.24 (0.13, 0.44)	<.001
Score < 7	1.0		1.0	

a Dependent variables as "appropriateness of utilization": appropriate (control)=0; inappropriate (cases)=1
b Married and not yet married
c Office hour, not consistent and not working
d LR test

Table 4. Results of simple logistic regression analysis for factors associated with inappropriate utilization of ED services[a] (variables which were not significant in the final model)

FACTOR	Crude OR (95% CI)	p-value[b]
Age	0.96 (0.93, 1.01)	0.089
Race		
Malay	2.04 (0.00, 0.28)	0.165
Others (Chinese/Indian)	1.0	
Academic Status		
Standard 1-6	0.60 (0.19, 1.86)	0.380
Form 1-5	1.56 (0.61, 3.98)	0.352
Pre-university	3.16 (1.19, 8.36)	0.020
University	2.14 (0.79, 5.77)	0.131
Not schooling	1.0	
Family incomes (RM)		
≤ 1000	1.90 (1.24, 2.93)	0.003
> 1000	1.0	
Employment Status		
Self-employed	1.33 (0.66, 5.08)	0.425
Government sector	2.12 (1.26, 3.55)	0.004
Private sector	1.23 (0.56, 2.68)	0.606
Pensioner	1.29 (0.56, 2.98)	0.457
Not working	1.0	
Traveling duration to ED/OPD	1.01 (0.99, 1.02)	0.482
Registration Fee		
Paying	0.64 (0.41, 1.02)	0.062
Not paying	1.0	
Place Usually Seek Treatment		
General practitioner	0.00 (0.00, 1.22)	0.844
Primary health clinic/OPD	0.00 (0.00, 1.94)	0.854
Emergency department	8.87 (0.00, 23.81)	0.960
Traditional healer	1.0	
Frequency at GP/OPD	1.21 (0.92, 1.65)	0.201
Duration of Illness		
> 24 hours	0.80 (0.52, 1.23)	0.318
$\leq$ 24 hours	1.0	
Attitude		
Health seeking towards ED	1.15 (1.04, 1.28)	0.008
General health seeking	1.02 (0.95, 1.11)	0.589

a Dependent variables as "appropriateness of utilization": appropriate (control)=0; inappropriate (cases)=1
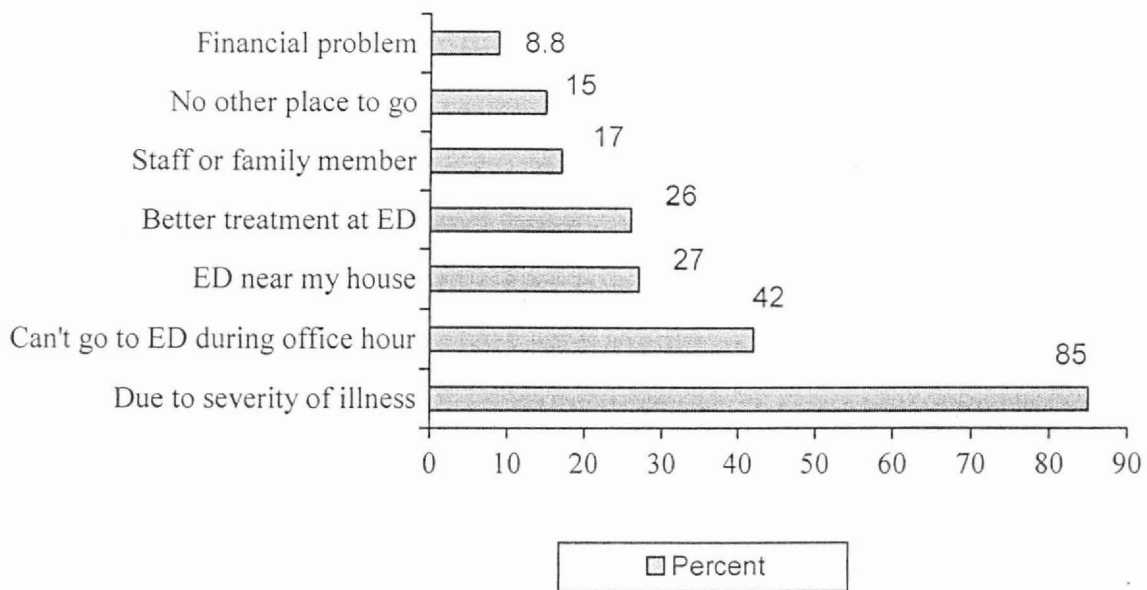b Wald test

Figure 1. Percentage of reported reasons for seeking treatment at ED among cases