

Inappropriate Utilization of Emergency Department Services in Universiti Sains Malaysia Hospital

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Summary

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.

Key Words: 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 community¹. As Hospitals ED mostly provide 24-hour services², it becomes easily accessible to the public. However, some patients attending ED have problems which can be treated in the primary care services in the community³. These patients and their conditions have been described as inappropriate for ED services⁴.

Studies have reported inappropriate utilization of ED services 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-urgent⁶.

In Malaysia, 38.3% of ED attendees were non-urgent cases in Hospital Universiti Kebangsaan Malaysia (HUKM) in 1998⁷, and 35% in Hospital Kuala Lumpur (HKL) in 2001⁸. 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 care⁹. It may also lead to inefficiency in delivering ED services⁹.

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

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Materials and Methods

A 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 cases¹⁰. 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 HKL⁸, HUKM, American College of Emergency Physician (ACEP)¹¹, and the explicit ED criteria of Davis Medical Centre, University of California⁹. 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 I 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 agreement¹².

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, the researcher and the ED experts came to a conclusion after further discussion. However, there was almost complete agreement with the classification made by the researchers.

Data were entered and analyzed using SPSS version 10.0¹³. 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 II 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 years (SD 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. These 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 visits 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 III. 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.

Table I: 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	23. Diarrhea
2. Anxiety	24. Chronic dizziness
3. Mild back pain, able to walk without assistance	25. Sexual disease exposure
4. Drug or alcohol detoxification	26. Constipation, 3 days or less
5. Dysuria (mild), female	27. Minor contusions or abrasions
6. Mild eye irritation without sign of infection	28. Mild cough (without hemoptysis), ear pain or respiratory impairment
7. Foot problems (blister, pain, ingrowing toenail, wart)	29. Minor headache without neuralgic impairment
8. Dental problems	30. Minor rectal pain or itching
9. Chronic sinusitis	31. Chronic recurrent hematuria
10. Minor skin infection, sore	32. Minor skin sore, not infected
11. Hepatitis exposure or symptoms	33. Immunizations and (-globulin request
12. Sore throat	34. Joint pain,
13. Sleep disorder	35. Lice or scabies (suspected or real)
14. Localized sunburn without blisters	36. Trauma follow-up (minor injuries originally treated elsewhere)
15. Suture removal	37. Mouth blisters
16. Muscle aches	38. Wound check
17. Neck pain (no history of acute trauma)	39. Vaginal bleeding - minor (1 pad in past 6 hours)
18. Painless urethra discharge	40. Pregnancy testing
19. Physical examination requests	41. Prescription refills
20. Pruritus without rash	42. Vaginal discharge
21. Simple, localized rash	43. Upper respiratory infection symptoms
22. Weakness - appears well	

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.
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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.
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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 immunization 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
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Table II: 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 III: 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)

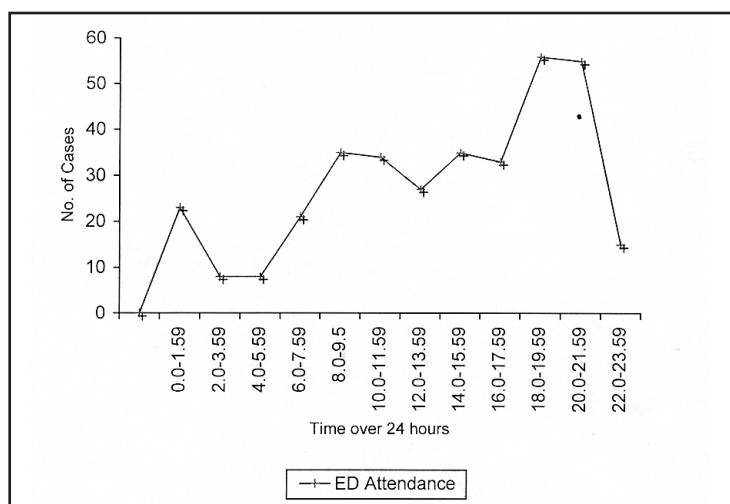


Fig. 1: Utilization pattern over 24 hours of ED-HUSM in the year 2000

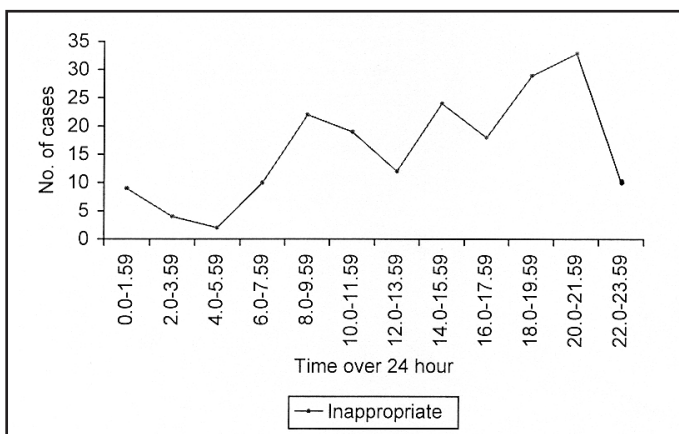


Fig. 2: Time pattern of inappropriate cases over 24 hour in the year 2000

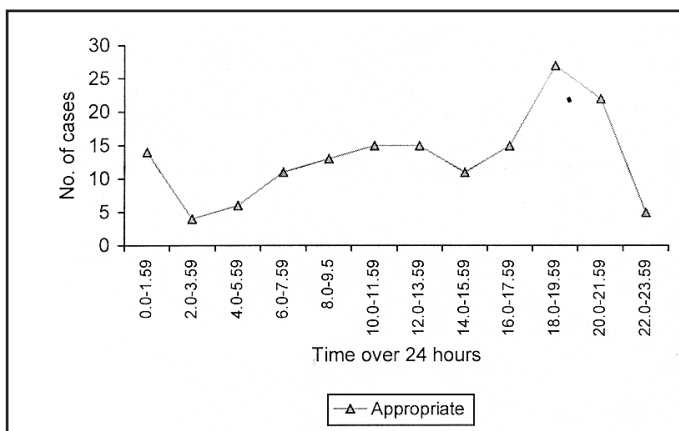


Fig. 3: Time pattern of appropriate cases over 24 hour in the year 2000

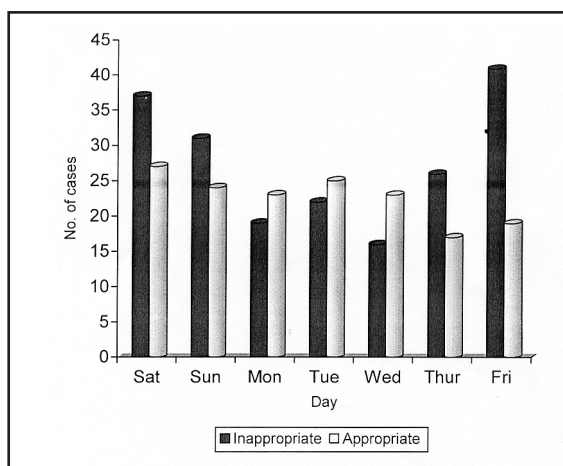


Fig. 4: Utilization pattern by days of the week of ED-HUSM in the year 2000

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 US¹⁵. 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 PM¹⁶. 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. Patients 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 morning¹⁷.

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 hour⁸.

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 department¹⁶.

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 II. 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.

Patients who absconded after registering (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 seen¹⁸. This also suggests that they were 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.

Conclusion

Inappropriate utilization of ED services in HKB and HUSM during the year 2000 were more than 50%. This is a high level of inappropriate ED utilization. The study also revealed the utilization pattern in ED and has open for several research questions.

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