

APPROPRIATENESS OF ADMISSIONS TO INTENSIVE CARE UNIT

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ABSTRACT

Objective: To improve resource utilization in the intensive care unit by assessing the appropriateness of admissions, exploring the reasons for improper selection of patients for intensive care and recommendations suggested to overcome them.

Methods: This is a retrospective study conducted at Princess Haya Hospital (a secondary hospital with a total of 120 beds) in Aqaba-Jordan during the period November 1st, 1999 to December 1st, 2001. All medical and surgical adult patients who were admitted to the intensive care unit were involved in the study. The intensive care unit capacity is six beds that open and run mainly by a nursing staff, with no specific intensive care unit policy or protocols. For each admission, patient demographics, diagnosis, cause of admission, length of stay in the intensive care unit and final outcome were collected. Data collected were analyzed for each patient to examine the appropriateness of admission to the intensive care unit according to the criteria for intensive care unit admissions published by the American College of Critical Care Medicine.

Results: There were 1169 admissions during the study period where 76% of admissions were medical patients and 53% had acute cardiovascular disorders. Surgical patients constituted 24% of total intensive care unit admissions with 72% of these surgical patients were trauma cases. Only 54.2% of total admissions (medical and surgical patients) were admitted appropriately to intensive care unit. The average length of stay was 2.3 days per patient. Sixty five percent of patients were discharged to hospital wards. About 15% of patients stayed less than 24 hours and a significant ratio 16.6% of admissions discharged home. The mortality rate was 11%.

Conclusion: Establishing guidelines for admission, discharge and triage of adult intensive care unit patients is of utmost importance and is supported by the literature. Providing guidelines based on relevant literature and expert opinion will lay down the intensive care unit policy, procedures, and by laws. Subsequently, appropriate utilization of intensive care unit resources will lead to optimizing health care cost.

Key words: Intensive care unit, Admission, Criteria.

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Introduction

Recent advances and increasing complexity of modern medicine in patients with a high level of physiological compromise and significant co-morbidities led to the development of intensive care units (ICU) during the last 50 years^(1,2). However, this advancement in the care of critically ill patients has been associated

with a huge increase in health expenditure^(1,3). As health resources become increasingly constrained, it is imperative that efficient utilization of expensive resources such as intensive care becomes a priority and should be optimized without compromising the quality of care delivered to critically ill patient⁽¹⁻⁶⁾.

The intensive care unit is the area that provides skilled medical nursing care for a heterogeneous group of

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patients with potentially acute reversible conditions requiring more technical and/or artificial support that can not safely be provided in the general wards^(1,3,7).

Ideally, patients should be admitted to ICU if they are felt to benefit from ICU care by decreasing their risk of death⁽⁸⁾. Patients who are too well or too sick to benefit from this service are not candidates for ICU admission^(1,7-9). Unfortunately, the indications for admission to the ICU remain poorly defined and the identification of the ideal patient who can benefit from intensive care is extremely difficult⁽⁸⁾. This fact and the expansion of clinical practice have led to the inappropriate use of ICU resources^(6,8).

Recently, criteria for admission to ICU have been proposed by the American College of Critical Care Medicine to optimize ICU utilization⁽¹⁾. The aim of this study was to evaluate the appropriateness of admitting patients to the ICU in a peripheral Jordanian hospital.

Methods

This is a retrospective study conducted at Princess Haya Hospital at Aqaba-Jordan during the period November 1st, 1999 to December 1st, 2001. Princess Haya Hospital is a 120-bed general secondary hospital. It has an open 6-bed general ICU that is run primarily by a nursing team. It has no specific ICU policy or protocols. The hospital provides a health service to a total population of 300,000. The services provided include general medicine, general surgery, pediatrics, and obstetrics, and gynecology. The city of Aqaba is located in the far south of Jordan at the Red Sea, 400 km from the capital of Jordan-Amman. Being the only port for Jordan most of the local population work at the port, transportation sector, and the army. King Hussein Medical Center in Amman is the tertiary referral center to Princess Haya Hospital. Patients are either referred to it electively or on emergency basis for further investigations and treatment in all subspecialties.

All medical and surgical adult patients who were admitted to ICU were involved in the study. For each patient, baseline demographic data, together with details on diagnosis, reason for admission, length of stay in the ICU, and final outcome were collected from intensive care unit logbook and patient medical records. Data collected were analyzed for each individual patient to examine the appropriateness of admission to the ICU according to the criteria for intensive care unit admissions published by the American College of Critical Care Medicine.

Results

There were 1169 admissions during the study period. Eight hundred and ninety one (76%) were medical ICU patients and 278 (24%) were surgical ICU patients. The patients mean age was 55 years, with 850 (72.7%) male patients. About 95% of admissions were referred from the Emergency Department while 5% were referred from hospital wards.

Fifty three percent of medical admissions were due to cardiovascular disorders. Seventy percent of 278 surgical admissions were multiple trauma patients as a result of road traffic accidents. Further analysis for the distribution of patients among medical disorders is shown in Table I.

The number of the patients who fulfilled the criteria for admission to the ICU as described by The American College of Critical Care Medicine was 633(54.2%) of patients admitted to the ICU. The average length of stay in the ICU was 2.3 day per patient. On the other hand, there were 78(15.2%) patients staying less than 24 hours in the ICU. Sixty five percent of the patients were discharged from the ICU to the hospital wards. One hundred and ninety five (16.6%) patients were discharged home. The mortality rate was 11%, as shown in Table II.

Discussion

In the face of the increasing demand of intensive care services, as well as the high cost of such services, systematic steps must be undertaken in order to ensure optimal utilization of these resources. In this study, 76.2% of patients admitted to the ICU were medical patients and 53.1% of them were patients with acute cardiac disorders. Surgical admissions counted for 23.8% of ICU admissions and 72.3% of them were trauma patients. In the USA and the UK, 52% of admissions to a general ICU were medical admissions, while surgical admissions counted for 48%^(2,4,5,8,10,11). The high ratio of medical admissions to our ICU is due to the fact that a cardiac care unit is not available in our hospital therefore; patients with acute cardiac disorders are admitted to the ICU. In the USA and the UK, this group of patients is admitted to cardiac care unit even in a general district hospital⁽³⁻⁵⁾. If this group of patients is excluded, the percentage of medical admissions to our ICU and their distribution among medical disorders (respiratory, neurological, poisoning, gastrointestinal and endocrine) will be comparable to medical admissions in the USA and the UK^(5,8). On the other hand, the lower surgical admissions to our ICU are due to the absence of surgical subspecialties practice in our hospital. In the USA and the UK, 51% of surgical admissions to the ICU are postoperative admissions after an elective major surgical procedure where patients are expected to stay in ICU post operatively as in vascular, thoracic, major gastrointestinal and hepatobiliary surgeries^(2,3,6,8,10,11). This group of patients and general surgical patients with physiological compromise and significant comorbidities, who are expected to need an ICU bed post operatively^(5,6) are referred to a tertiary center, therefore reducing surgical admissions to our unit. Emergency surgical admissions mostly as result of road traffic accidents and accidents involve employees at the port count for 72.3% of our surgical admissions compared to 30% in Israel, the UK, and the USA^(5,8,10,11). This high ratio of trauma patients is due to the unique location of

the city of Aqaba at the far south of Jordan. Road traffic accidents occur at the high way connecting Aqaba with the rest of Jordan and people traveling to neighboring countries through Aqaba especially pilgrims.

In this study, 46% of patients admitted to the ICU did not fulfill the criteria for admission to the ICU published by The American College for Critical Care Medicine compared to 22% of the ICU admissions in the UK ^(2,5,8,11,12) and 24% in Canada and the USA ^(3,5,8). There are many reasons for this inappropriate use of the ICU. These reasons can be classified into three main categories; the first is related to the hospital facilities and its policy on the ICU utilization; second is to the physician in charge of the patient and finally the patients and their families, as shown in Table III.

Hospital facilities and its policy regarding the ICU service have great impact on the efficient utilization of the ICU. It was found in different studies that in acute care hospitals one could identify a patient population that do not require intensive care, but need more care than that provided in general ward. These patients may require frequent monitoring of vital signs and /or nursing intervention, but usually do not require invasive monitoring. This group of patients counts for 22% of the ICU admissions, which are considered inappropriate in the UK ^(2,5,8,11). This ratio is consistent with the ratio of patients refused admission if the ICU is managed by credentialed intensivists, which ranges around 24% of total requested admissions ^(3,8). In our study, 30% of ICU admissions, which are considered inappropriate admissions to the ICU, belong to this group of patients. Substitution of hospital ward for ICU would result in saving resources. However, this situation is rarely feasible in our hospital because of the shortage of medical and nursing staffing, the unavailability of electrocardiography, oxygen saturation monitoring in hospital wards and the non – existence of intermediate care unit which is a cost-effective alternative to the ICU for this group of patients ^(2,5,11). The absence of both a physician director for the ICU and guidelines for admission has adversely affected the optimal utilization of the ICU. Therefore, our hospital must review its policy regarding appointing a physician director for the ICU and improving ward facilities for monitoring low risk patients. An ICU committee should be established and this committee should create specific policy regarding the ICU utilization. This policy should be monitored and reviewed on regular basis ^(1,13).

The lack of understanding for the tools used in assessing the severity and the prognosis of critically ill patient by the general physician and the surgeon in charge of patient care contributed for 5% of the ICU admissions, which are considered inappropriate admissions. This problem does not exist in the UK and the USA as 57% of the intensive care units have credentialed physicians in intensive care and the rest of them have a consultant anesthetist appointed as an ICU manager with rights to accept or refuse patient admission to the ICU according to potential benefit from intensive

care ^(1,9,13,14). Therefore, it is essential to have an ICU post for training at least six months for all general physicians and surgeons during their basic training rotation to overcome this problem or appointing a physician in charge of the ICU based on training, interest, type of practice and availability.

The patients and their families have their share in the misuse of the ICU. The families of the patients who are too sick to benefit from critical care are willing for their patients to undergo intensive care to achieve even few days of survival ⁽⁸⁾. Communication in an honest, clear, transparent, and compassionate fashion with the patients and their families will make the physician trustworthy. The physician decision will be easily accepted for discharge from the ICU and decisions on end-of-life for patients who are too sick to benefit from intensive care ^(1,3).

The average length of stay in our unit was 2.3 days per patient compared to 4-6 days per patient in the UK and the USA ^(3-5,8,11). The reason for this variation is simply due to improper selection of patients for intensive care in our unit and the involvement of the junior doctors in admitting patients to the ICU. There were 78 (15.2%) patients admitted to the ICU for less than 24 hours. These patients were admitted overnight by the junior doctors and discharged to the hospital wards or home when reviewed by the specialist in the next morning. These patients have affected our average length of stay and added further 10% of ICU admissions, which are considered inappropriate admissions. The involvement of the junior doctors in admitting patients to the ICU does not only allow misuse of the ICU, but there is a hidden substantial wastage of resources by the number of unnecessary routine diagnostic laboratory tests and radiographs requested by them ^(2,7). Therefore, patients should be referred and followed by the most senior member of staff responsible for their care ^(2,7,11).

The ICU step-down rate in our unit showed 65% of admissions were discharged to hospital wards, 7.3% were referred to tertiary center, 16.6% were discharged home, with an overall mortality rate of 11%. Compared to the UK 75% of the ICU admissions were discharged to hospital wards and only 3% were sent home with a mortality rate of 20-30% ^(2,5,15). Our high ratio of patients sent home is due to admitting patients who are too well to benefit from the ICU services and patients who are recovering in the ICU prefer to stay in the ICU till discharged home because the ICU environment is less noisy and has liberal family visitation policies ⁽¹⁻³⁾. The high discrepancy in the mortality rate is due to the high ratio of inappropriately admitted patients to our unit and patients at a very high risk of death were referred from our unit to a tertiary center for further treatment.

In summary, we have to explore better ways to utilize ICU services in our hospital. This includes improvement in triage, explicitly describing criteria for the ICU admission and discharge, presence of credentialed physician in critical care, and regular review of our performance and policy regarding ICU utilization.

Table I. Distribution of patients admitted to the ICU along major systemic disorder.

Clinical status	Diagnosis	No. of patients	Percentage
Medical patients Total No. 891 (76.2%)	Cardiovascular disorders	473	53.1
	Respiratory disorders	127	14.3
	Neurological disorders	93	10.4
	Poisoning	54	6.1
	Gastrointestinal disorders	33	3.7
	Endocrine disorders	26	2.9
	Others	85	9.5
Surgical patients Total No. 278 (23.8%)	Trauma	201	72.3
	Post-operative admissions	35	12.6
	Others	42	15.1

Table II. The final outcome of patients admitted to the ICU

Final outcome	No. of patients	Percentage
Transferred to hospital wards	759	65
Transferred to tertiary center	86	7.3
Discharged home	195	16.6
Died	129	11.1
Total	1169	100

Table III. The reasons for inappropriate admission to the ICU and the number of patients for each reason.

Reasons for inappropriate admission	No. of patients	Percentage of patients from total ICU admissions
Hospital policy and word facility	350	30
Lack of understanding for the tools to assess critically ill patient	58	5
Involvement of junior doctors	118	10
Social (patients and families wishes)	10	1
Total	536	46

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