The need for appropriate critical care service provision at non-tertiary hospitals in South Africa

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To the Editor: Critical care is an expensive and labour-intensive undertaking, and it is well recognised that there is a global shortage of intensive care unit (ICU) beds.[1] Although there are no recent published data regarding the cost of ICU care, total costs were estimated to exceed R2 000 per patient per day in 1991.[2] Despite the cost, it is widely accepted that patients refused ICU admission have a significantly worse outcome.[3,4]

In the Cape Town metropole, home to at least 2.7 million people,[5] there are 9 public hospitals providing approximately 2 800 adult beds, 186 of which offer critical care services (personal communication, medical superintendents, 2004). Approximately 87 (3% of all beds) beds have mechanical ventilation facilities, generally accepted to represent an ICU service.[6] The remaining beds are located in high-care units (HCUs) offering specialised care, e.g. burn units, coronary care units, and/or a higher level of care and more intensive monitoring than available in general medical wards. While the number of critical care service beds required to serve a population of this size has not been determined locally, a recent survey of service provision at an urban secondary-level hospital in Cape Town has provided some useful data.[7] G F Jooste Hospital (GFJH), a 200-bed facility serving an estimated population of at least 1.2 million people,[7] attends to approximately 58 000 emergency unit visits per annum. Of these, almost 5 500 require admission for an acute medical problem – an average of 454 admissions per month. The survey[7] assessed severity of illness on admission using the Modified Early Warning Score (MEWS)[8] and demonstrated that at least 25% of medical admissions were sufficiently ill to merit admission to a critical care service (HCU or ICU). Given this service demand, we prospectively surveyed all medical patients admitted to the 8-bed HCU at GFJH in 2003, so as to define and quantify the critical care service provided by this secondary-level hospital.

Method

All data were prospectively collected and analysed using Statistica version 6 (StatSoft, Inc. 2004). Categorical variables were compared using chi-square analysis and continuous variables were compared using a Student's *t*-test. A *p*-value of 0.05 or less was considered significant.

Results

A total of 859 medical patients were admitted to the HCU over the 12-month survey period, comprising 16% of all medical admissions – approximately 90 medical admissions per month. The spectrum of medical emergencies necessitating HCU admission is shown in Table I. Collectively acute coronary syndromes (ACSs), diabetic emergencies, drug overdose/poisoning and sepsis accounted for 76.6% of patients admitted. The median age of admissions was 45.3 years (range 13 - 86 years), with a median stay of 2 (0.5 - 14) days. The overall mean (± standard deviation (SD)) APACHE score was 10 (± 7), with an overall HCU mortality of 10.7% (in-hospital mortality 14.8%). Mechanical ventilation was required by 213 patients (24.8% of admissions). Mortality rates in ventilated patients are shown in Table II. The mortality rate for ventilated patients was 30.1% (in-hospital 38.5%). While this was significantly higher than the 4.3% for non-ventilated patients (in-hospital 7.0%) ($p < 0.01$), it compares favourably with local and international data.[9-11] Ventilated survivors had a significantly lower mean (95% confidence interval (CI)) APACHE II score than ventilated non-survivors, viz 15 (14 - 16) compared with 19 (17 - 21) ($p < 0.0001$). This was true of all survivors compared with non-survivors: 9 (9 - 10) versus 18 (16 - 20) ($p < 0.001$).

Discussion

The survey results demonstrate a good patient outcome overall, given that this HCU provides limited ICU facilities (mechanical ventilation) to more than 200 patients per year despite inadequate staff-patient ratios (1:2) and limited training – only 2 registered nurses have ICU training. In addition, the 2-day duration of stay clearly indicates the demands placed on this service. There are, however, significant differences in the outcome of patients within the different diagnostic groups. These are listed in Table I. The excellent outcome in patients presenting with acute drug overdose/poisoning, including those requiring ventilation, and the ACS group, particularly patients with unstable angina pectoris (mortality rate 0%), differs greatly from the mortality figures observed in ventilated patients with a high APACHE II admission score and/or a primary diagnosis of diabetic ketoacidosis (DKA) or sepsis.

Based on the survey data, it is clear that non-tertiary hospitals with mechanical ventilation facilities are currently providing much-needed critical care in the Western Cape.

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Table I. Primary acute medical problem requiring admission to HCU

Diagnostic group	Number of admissions (%)	Median age years (range)	Mortality rate (%) (HCU/in-hospital)	Examples of diagnoses included in this group
Metabolic disorders	257 (29.9)	42 (13 - 79)	11.3/15.2	Diabetic emergencies (DKA, hypoglycaemia) renal failure
Acute coronary syndromes	247 (28.8)	57 (24 - 85)	5.3/5.3	Myocardial infarction and unstable angina pectoris
Drug overdose/poisoning	92 (10.7)	24 (13 - 74)	3.3/3.3	Drug overdose and poisoning
Sepsis syndrome	91 (10.6)	37 (13 - 86)	31.9/41.8	Pneumonia, meningitis, septic shock
Other CVS disorders	77 (9.0)	54 (16 - 86)	13.0/26.0	Stroke, pulmonary oedema, cardiac arrhythmias, hypertension
Respiratory disorders	77 (9.0)	46 (19 - 74)	9.0/10.2	Non-infective, e.g. asthma, chronic obstructive pulmonary disease
Neurological disorders	18 (2.1)	36.5 (14 - 63)	5.5/22.2	Status epilepsy, myasthenia gravis, Guillain-Barré syndrome

CVS = cardiovascular; DKA = diabetic ketoacidosis.

Table II. Mortality outcome of patients most frequently requiring ventilation

	Ventilation required				Ventilation not required			
	Number admitted	Median age (yrs) (range)	Mean APACHE II score (95% CI)	Mortality HCU/in-hospital (%)	Number admitted	Median age (yrs) (range)	Mean APACHE II score (95% CI)	Mortality HCU/in-hospital (%)
A	39	24 (13 - 57)	14 (12 - 15)	2.6/2.6	53	25 (13 - 74)	5 (4 - 6)	1.9/1.9
B	38	47 (20 - 73)	14 (12 - 16)	15.7/18.4	39	45 (19 - 74)	8 (6 - 10)	2.5/2.5
C	43	42 (13 - 74)	18 (16 - 20)	55.8/67.4	48	38 (13 - 86)	13 (11 - 16)	10.4/18.8
D	18	48 (18 - 68)	23 (18 - 27)	61.1/72.2	141	32 (13 - 72)	11 (10 - 11)	2.8/4.3

A = drug overdose/poisoning; B = non-infective respiratory disorder; C = sepsis; D = diabetic ketoacidosis.

The lack of ICU beds nationwide would further magnify the issues if extrapolated nationally. Withdrawing these services is likely to precipitate a crisis at tertiary hospitals, given the documented service demand. There are, however, patients who demonstrate a poor outcome under the current conditions of service delivery. It is therefore a matter of urgent priority to develop national guidelines that will assist non-ICU clinicians to address the following issues: (*i*) which patients with ACS are least likely to benefit from a HCU admission, i.e. limit the unnecessary use of scare resources; (*ii*) provision of non-tertiary critical care, including short-term ventilation (less than 48 hours), for admissions with an expected favourable outcome, e.g. drug overdose patients and/or those with admission APACHE II scores of less than 15; and (*iii*) early identification and transfer of critically ill patients who require tertiary care, e.g. ventilated patients with an admission APACHE II score of 15 or more, and/or a diagnosis of DKA or sepsis. For these criteria to be useful they will need to be based on simple, reliable clinical data, such as those suggested here, viz. primary diagnosis necessitating critical care, APACHE II score on admission and need for mechanical ventilation beyond 48 hours. The data from this audit have been provided to superintendents at both tertiary and non-tertiary hospitals as well as key critical care planning personnel at provincial level including the co-ordinating clinician for critical care services for the Western Cape. The detailed information provided should assist in formulating clinical guidelines for tertiary and non-tertiary critical care service provision. There is, however, also a national group of clinicians working on the formulation of national guidelines for the care of critically ill patients. The data provided by our survey may therefore serve to inform policy-making decisions at this level as well. Given inter-provincial differences in health care resource allocations, policy adjustments between provinces may be required. Despite these potential differences, clear guidelines regarding assessment and transfer of critically ill patients would be widely welcomed by the large number of clinicians currently managing critically ill patients outside the comparatively well-resourced settings of tertiary hospitals in South Africa.

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