



## National audit of critical care resources in South Africa – open versus closed intensive and high care units

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**Objectives.** To evaluate the distribution and functioning of South African intensive care units (ICUs) and high care units (HCUs), in particular the extent to which units were 'closed units'.

**Design and setting.** A descriptive, non-interventive, observational study design was used. An audit of all public and private sector ICUs and HCUs in South Africa was undertaken.

**Results.** A 100% sample was obtained. A total of 396 acute care public and 256 private hospitals were identified; 23% of public hospitals had ICUs and/or HCUs compared with 84% of private hospitals. In the public hospitals there were 210 units and 238 units in the private hospitals. Only 7% of public units and less than 1% of private units were 'ideal closed units'.

A total number of 3 414 ICU and high care beds were identified; 71% of beds were in open units versus 29% in closed units. The distribution of ICU and ICU/high care beds comprised 64% in private sector and 36% (1 223) in public units. A total of 244 024 patients were admitted to all units in South Africa during 2002, of whom 63% were to private units and 37% to public sector units.

**Conclusion.** In the face of already limited resources (financial and human) and given the emphasis on primary care medicine (with consequent limited capacity for further ICU development), it is crucial that existing facilities are maximally utilised. Like the USA we are not in a position to implement the Leapfrog recommendations and must modify our approach to dealing with South African realities.

Several factors influence the outcome of intensive care. It is intuitive that the severity of the patient's presenting complaint and the pre-morbid condition will have a direct bearing on outcome.<sup>1</sup> With the advances in medicine in general and intensive care in particular, many have argued that the rendering of quality intensive care is complex and can only be provided by medical and nursing experts in the field of intensive care.<sup>2,3</sup> This approach is associated with improved patient outcomes and reduced cost of care.<sup>2</sup> Decisions to initiate and withdraw care and to decide when a patient is fit for discharge requires a team approach involving a multidisciplinary group of health care professionals.<sup>4,5</sup>

The traditional approach to accomplishing these objectives has been via the adoption of a closed unit policy whereby a qualified intensivist leads a team with regard to protocols and guidelines for practice based on best available evidence.<sup>2</sup> More recently it has been argued that this is an unrealistic goal even in the context of the relatively resource-rich USA health care system.<sup>6</sup> In South Africa, there are no published data as to the current design and function of intensive care units (ICUs) and high care units (HCUs).

In the face of limited resources it is crucial that decisions about the provision of health services be based on objective

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data.<sup>7</sup> To this end, the Critical Care Society of Southern Africa (CCSSA) endorsed a study to evaluate the national distribution and functioning of ICUs in South Africa, and in particular the extent to which units in the country were 'closed units'.

### Methodology

During 2003-2004 an audit of ICU resources was undertaken. Approval to conduct the audit was obtained from the ethics committees of eight universities, the Department of National Health, the respective provincial health departments, the Surgeon-General of the South African National Defence Force and the respective private hospital groups. Approval was obtained from the respective hospital management before proceeding with the study. This part of the audit was conducted as part of an 11 page questionnaire that was completed by one or more of the following persons: (i) nurse unit manager; (ii) medical director; or (iii) ICU nursing service manager.

The methodology that was followed is described in depth in a separate article.<sup>8</sup>

There is no official definition in South Africa to describe ICUs and HCUs or to distinguish between open and closed units. For the purpose of the study the following criteria were used to define open and closed units:

#### 1. Open unit:

- No medical director (any medical doctor can admit, treat and discharge patients to and from the unit).
- Has a unit nursing manager.

1319



- Adheres to the South African Bureau of Standards' equipment requirements.
2. Closed unit:
- Has a medical director (any level of trained medical doctor).
  - Has a unit nursing manager.
3. Ideal closed unit:
- Medical director is an accredited intensivist.
  - Unit nursing manager is a registered ICU nurse (neonatal or paediatric critical care where appropriate).
  - Adheres to the South African Bureau of Standards' equipment requirements
  - Unit not located in a ward.

## Results

A total of 396 acute care public hospitals and 256 private sector hospitals were identified and a 100% sample was obtained (Table I). In the public sector, 23% of hospitals had ICUs and/or HCUs compared with 84% of hospitals in the private sector.

In the public sector, there were 210 units which ranged from ICU to combined ICU/HCU to purely HCU compared with a total of 238 in the private sector (Table II). Only 7% (15) of all public sector units complied with the ideal closed unit. Less than 1% (2) of units in the private sector complied with the ideal closed unit.

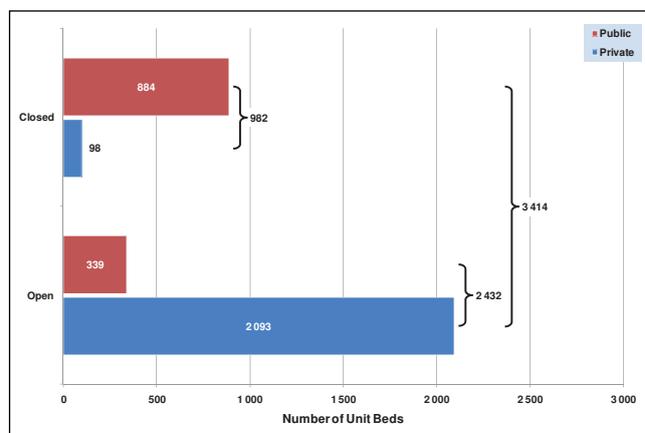
A total number of 3 414 ICU and high care beds were identified (Fig. 1). The majority of the beds (2 432 (71%)) were in open units versus 982 (29%) in closed units. The distribution of ICU and ICU/high care beds comprised 64% (2 191) in private sector units and 36% (1 223) in public sector units. In the private sector, however, only 4% (98) of the ICU and ICU/HC beds were in closed units while 72% (884) of the corresponding beds in the public sector were in closed units. A total of 244 024 patients were admitted to all units in South Africa during 2002 of whom 63% (154 044) were to private sector units and 37% (89 980) to public sector units.

**Table I. Proportion of hospitals with ICU and/or HCU facilities**

	All hospitals	ICU/HCU	Percentage
Public	396	92	23.2%
Private	256	216	84.4%

**Table II. Proportion of closed units by sector**

	ICU	Combined ICU/HCU	HCU	Total
Public hospitals	88	47	75	210
Closed unit compliant	65 (73.9%)	28 (59.6%)	24 (32.0%)	117 (55.7%)
Private hospitals	131	87	20	238
Closed unit compliant	7 (5.3%)	2 (2.3%)	1 (5.0%)	10 (4.2%)



*Fig. 1. Distribution of open and closed unit beds between the public and private sectors.*

## Discussion

South Africa is a developing country and currently 8.7% of the GDP is spent on health care.<sup>9</sup> While there is an appropriate emphasis on primary health care, tertiary care has been prioritised as part of the modernisation of tertiary services by national government. Effective health care predicated implementation of systems, structures and processes that reduce morbidity and mortality within the constraints of resource limitations.

Closed ICUs represent the most effective approach to maximising outcomes.<sup>1-3</sup> There are significant disparities in the public and private distribution of beds, with most public sector hospitals having no ICU facilities while private sector hospitals commonly have ICU facilities (23% v. 84% respectively). Conversely, more public sector hospitals have closed units (56% v. 4%) but only 17 units (out of a total of 438 units (4%)) in the country meet the requirements for the ideal ICU design. Translating this into bed numbers reveals that 71% of all beds are located in open units, the majority of which are in the private sector. With an annual admission rate of over 240 000 patients, and assuming that a proportional number are admitted to closed units, approximately 96% of patients receive care in open units. If we conservatively estimate that one additional day of care (at R1 000 per day) is required in these units, the additional cost is approximately R 230 million annually. A thorough analysis would require an assessment of morbidity and mortality which has been proposed in two other projects by the CCSSA.



It has been shown that support by intensivists significantly reduces morbidity and mortality.<sup>2</sup> In SA this would require 291 intensivists to establish ideal closed ICUs in all existing units. At the current rate of production this would take almost 30 years. Clearly there is a need to dramatically increase the production of intensivists, an imperative that should be supported by all the role players.

In the face of already limited resources (financial and human) and given the emphasis on primary care medicine (with consequent limited capacity for further ICU development), it is crucial that existing facilities are maximally utilised. Like the USA we are not in a position to implement the Leapfrog recommendations<sup>10, 11</sup> and must modify our approach to dealing with South African realities.

Lastly, this study has not addressed issues of morale and leadership. Nurses and doctors who currently practise in critical care face huge challenges in sustaining morale and providing leadership and efficiency in a domain that is undersupported and faces huge losses in numbers through emigration. Further research is required to validate these assertions.

Against this background it is clear that the Leapfrog recommendations<sup>4</sup> cannot currently be used as the yardstick, but are the long-term 'gold standard' that we should aspire to in South Africa. Based on the evidence discussed, the CCSSA proposes the following recommendations.

## Recommendations

Restructuring of services should be based on short- and long-term interventions.

### Short-term interventions

Short-term interventions should focus on the process rather than the structure of critical care delivery to improve the current quality of critical care delivery. This can be achieved by implementing the use of guidelines and protocols, continuing professional education and outreach programmes. The use of guidelines and protocols has well-documented advantages and disadvantages. The process of implementing the use of guidelines and protocols (education and evaluation) must be strictly adhered to and measures must be put in place to overcome or minimise the disadvantages to ensure full benefit from these actions.

Currently the CCSSA is involved in continuing medical education in critical care. There is a formal outreach programme for remote areas in South Africa. Prominent national and international speakers share their expertise at the CCSSA annual national congress and at refresher courses. Training more intensivists is a priority for the CCSSA.

Although moving towards a closed ICU care delivery model will make a remarkable contribution towards improving ICU

patient outcome and delivering a cost-effective service, it is unfortunately not an objective that is attainable in the short term.

A major effort should be directed at producing large numbers of practitioners at medical officer level who are trained in intensive care. This requires 6 months of training which will result in units having doctors who are capable of implementing guidelines and protocols of intensive care practice that will serve as a reasonable bridging mechanism until the ideal unit objective can be met.

### Long-term interventions

A long-term goal should be that all new ICUs should only be established as closed units in both the public and private sectors. Established open units should over time be changed to closed units.

The process of implementing this is of the utmost importance, and should be planned and driven by all the role players (government, private hospital groups, medical insurance groups and the CCSSA). The first step was to establish the demographic distribution of all units. This has been done by the national audit, followed by an in-depth ICU patient profile (admission, acuity, morbidity and mortality). The next step should be for the role players to establish a priority list of units that should be upgraded to closed units and then set a time frame within which this should occur.

Open ICUs low on the priority list can be supported by telemedicine. However the telemedicine systems should be implemented properly with adherence to strict guidelines.

## Conclusion

Critical care in each country is confronted with unique national challenges as a result of historical background, level of development of the country, availability of resources, and general and critical care health care demands. Critical care practices should be guided by local research, rather than making direct extrapolations from research performed elsewhere. Lessons from other countries can provide helpful guidelines if adapted to the South African context. Developing countries with limited resources can make a valuable contribution in evidence-based critical care planning.

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