

## Critical analysis of ICU/HC beds in South Africa: 2008-2009

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**Objective.** To determine the national distribution of intensive care unit (ICU)/high care (HC) beds and the implications for ICU bed availability in the envisaged national health insurance (NHI) scheme.

**Methods.** A descriptive, non-interventional, observational study design was used. A desk-top audit of all public and private sector ICUs, including ICU/HC beds, in South Africa was undertaken for the period 2008 - 2009. For this study, both categories were analysed and referred to as ICU beds, as they reflect the critical care component of the health service in South Africa.

**Results.** In 2008 - 2009, there were 4 719 ICU beds in the private and public sectors in South Africa, with 75% (3 533) in the former and 25% (1 186) in the latter. The majority of ICU beds in the two sectors were located in three provinces: Gauteng (49%), KwaZulu-Natal (14%) and Western Cape (15%), representing 78% of ICU beds (3 703/4 719) and catering for 54% of the country's population. Eastern Cape had fewer than 300 beds, North West and Mpumalanga had fewer than 150 beds, and Limpopo and Northern Cape had 66 and 47 beds respectively. With the proposed NHI scheme, the number of ICU beds available would be 4 719, which would translate into a bed:population ratio of approximately 1:10 000. However, there are large variations across the provinces, which makes the availability of this level of care in some provinces non-existent.

**Conclusion.** While increasing the number of ICU beds in the public sector will open critical care services to more users, the NHI scheme would not solve the huge discrepancies of access to ICUs, and availability of critical care staff, across the provinces.

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The American College of Emergency Physicians (ACEP) defines a critical illness or injury as one that acutely impairs one or more vital organ systems, resulting in a high probability of imminent or life-threatening deterioration in the patient's condition.<sup>[1]</sup>

These conditions require critical care services, which are defined as the direct delivery of medical care to a critically ill or injured patient, and involves decisions being made to prevent any further life-threatening deterioration of the patient's condition.<sup>[1]</sup>

Critical care services are rendered by critical care specialists (CCSs) in critical care units, also called ICUs or HCUs, although the level of care in an ICU is invariably greater than that available in an HCU. The ICU enables the CCS team to monitor and care for patients with potentially severe physiological instability that demands highly technological and/or artificial life support.

As the population ages, and with new and re-emerging health priorities, such as trauma, HIV/AIDS and tuberculosis that increase morbidity and mortality, there is an expectation that critical care will be available on demand to all who need it.<sup>[2]</sup> This point raises issues of cost, cost-effectiveness, availability and, moreover, ethical issues relating to rationing of scarce resources and questions regarding medical futility.<sup>[2]</sup>

In South Africa (SA), the 8.6% of GDP spent on health consists of 4.4% in the private sector (which provides for 16% of the population) and 4.2% in the public sector, which provides for the remaining 84%.<sup>[3]</sup> Almost 5 times as much money is spent on each person on medical aid as on an uninsured person using the public

sector.<sup>[4]</sup> It is estimated that only 2% of the uninsured population would access private healthcare.<sup>[5]</sup> The public sector is under-resourced relative to the population that it serves and the burden of disease presenting to it. It also has disproportionately less human resources than the private sector, hence the move in SA towards a national health insurance (NHI) scheme that would enable patients to access equitable, appropriate and high-quality health services, regardless of their socio-economic status.<sup>[3]</sup> In recent years, there has been concern over the inefficiencies prevalent in ICU use,<sup>[6]</sup> lack of guidelines and protocols, discordant use of ICUs,<sup>[7]</sup> and the high cost of care.<sup>[8]</sup>

Following world-wide trends, the demand for ICU beds for eligible patients exceeds supply,<sup>[9]</sup> and this form of expensive technology needs to be prioritised for those patients who are most likely to recover. In SA, with its high burden of disease and consequent high demand for such a level of care, CCSs often face ethical dilemmas regarding who might be admitted. The present study was conducted to establish the number of ICU beds available in the private and public sectors and whether the envisaged NHI scheme would make a difference to ICU bed availability.

### Methods

Information from proceedings of the South African Parliamentary Portfolio Committee on Health<sup>[10]</sup> (accessed electronically), personal correspondence with the Head of Department in the Gauteng Department of Health, and statistics from the Health Annals - SA, 2008,<sup>[5]</sup> an official publication of the Hospital Association of South

Africa (HASA) representing private hospital groups, was used. A desk-top audit using a descriptive, non-interventional, observational study design was undertaken of all public and private sector ICU/HCU beds in SA, with data from 2008 and 2009 being used owing to their ready availability. The ICUs analysed included general medical/coronary/pulmonology, surgical/trauma/burns, neonatal/paediatric, and labour ward/maternity ICUs. Population statistics for 2009 were obtained from Stats SA.<sup>[11]</sup> Descriptive statistics were used to analyse the data.

## Results

Within the public sector, 23% (92/396) of hospitals had ICUs v. 84% in the private sector (216/256).<sup>[12]</sup> The data presented (Tables 1 - 3) include the total population per province, the number of public sector ICU beds, the number of private sector ICU beds, the total number of ICU beds as a combination of the private and public sectors, and the bed-to-population ratio.

In 2008 - 2009, there were 4 719 ICU/HC beds in SA, with 75% (3 533) in the private sector and 25% (1 186) in the public sector. The majority of ICU beds were located in 3 provinces: Gauteng (49%, 2 311 beds), KwaZulu-Natal (14%, 672 beds) and Western Cape (15%, 719 beds), representing 78% of all ICU beds (3 703/4 719)

and catering for 54% of the country's population. The Eastern Cape had fewer than 300 beds, North West and Mpumalanga had fewer than 150 beds, and Limpopo and Northern Cape had 66 and 47 beds respectively.

The population distribution significantly affected the bed:population ratio. The public sector bed:population ratio in the Western Cape was approximately 1:20 000 and in Gauteng, the most populous province, 1:25 000, and in the Free State 1:30 000. KwaZulu-Natal, which comprises 21% of the population and carries the highest burden of HIV/AIDS, has a bed: population ratio of 1:45 000. The ratio for the rest of the provinces ranges from 1:50 000 to 1:150 000 (Table 3).

## Discussion

Within the public sector, 23% of hospitals have ICUs (92/396) compared with 84% in the private sector (216/256).<sup>[12]</sup> With the proposed NHI scheme,<sup>[3]</sup> the total ICU bed availability to the country would be 4 719 beds, which would translate to a bed:population ratio of approximately 1:10 000, assuming that all beds are commissioned. The NHI scheme would not solve the huge discrepancies of access to ICU beds across the provinces. Bhagwanjee and Scribante, in their 2005 'National audit', concluded

**Table 1. ICU/HC beds in South Africa 2008 - 2009**

Province	Population		Public		Private	
	N (million) (%)	% of total	Beds (N)	% of total	Beds (N)	% of total
EC	6.648	13.5	90	6.9	162	4.6
FS	2.902	5.9	103	7.9	293	8.2
GT	10.531	21.4	397	33.5	1 914	54.2
KZN	10.449	21.2	224	17.2	448	12.7
LP	5.227	10.6	35	2.7	31	0.9
MP	3.606	7.3	40	3.1	101	2.8
NC	1.147	2.3	21	1.6	26	0.7
NW	3.450	7	32	2.5	83	2.3
WC	5.356	10.9	244	18.8	475	13.4
Total	49.320	100	1 186	25	3 533	75

EC = Eastern Cape; FS = Free State; GT = Gauteng; KZN = KwaZulu-Natal; LP = Limpopo; MP = Mpumalanga; NC = Northern Cape; NW = North West; WC = Western Cape.

**Table 2. Public and private ICU/HC beds as a percentage of the total per province**

Province	Public		Private		Beds per province	
	Beds (N)	% of total	Beds (N)	% of total	Total beds	% of total
EC	90	1.9	162	3.4	252	5.3
FS	103	2.2	293	6.2	396	8.4
GT	397	8.4	1 914	40.6	2 311	49.0
KZN	224	4.8	448	9.5	672	14.2
LP	35	0.7	31	0.7	66	1.40
MP	40	0.9	101	2.1	141	3.0
NC	21	0.5	26	0.6	47	1.0
NW	32	0.7	83	1.8	115	2.4
WC	244	5.2	475	10.0	719	15.2
Total	1 186	25.1	3 533	74.9	4 719	100

EC = Eastern Cape; FS = Free State; GT = Gauteng; KZN = KwaZulu-Natal; LP = Limpopo; MP = Mpumalanga; NC = Northern Cape; NW = North West; WC = Western Cape.

**Table 3. Public sector ICU/HC bed:population ratio in South Africa: 2008 - 2009**

Province	Population (millions)	Public sector ICU/HC beds	Public sector ICU/HC bed:population ratio
EC	6.648	90	1:75 000
FS	2.902	103	1:30 000
GT	10.531	397	1:25 000
KZN	10.449	224	1:45 000
LP	5.227	35	1:150 000
MP	3.606	40	1:90 000
NC	1.147	21	1:55 000
NW	3.450	32	1:110 000
WC	5.356	244	1:20 000
Total	49.320	1 186	

EC = Eastern Cape; FS = Free State; GT = Gauteng; KZN = KwaZulu-Natal; LP = Limpopo; MP = Mpumalanga; NC = Northern Cape; NW = North West; WC = Western Cape.

that in view of huge discrepancies in the availability of ICU beds in the country, there is a compelling need for regionalisation of ICU services in SA.<sup>[12]</sup> The data presented in our 2008 - 2009 audit would strongly support their statement. These statistics highlight the importance of triage protocols for ICU admission and discharge, and effective treatment guidelines and algorithms in a resource-limited environment.

It would appear that the resource constraints in SA, together with the burden of HIV infection and the associated complications, impose a greater burden on already limited ICU bed resources, whereas in the USA, it would appear that *ad hoc* admissions to ICU as a result of a lack of effective implementation of triage policies have contributed to unnecessary ICU admissions. This practice is largely influenced by the threat of litigation by patients and their families. Kohn et al, in their questionnaire survey to CCSs in 2011, concluded: 'this study suggests that many ICU clinicians feel compelled to provide salvage critical care for identifiable patients with grave prognoses even when doing so measurably contravenes society's interests.'<sup>[13]</sup>

### Human resources

In the 2007 National Audit of Critical Care Services, commissioned by the Critical Care Society of Southern Africa, it was noted that there was a shortage of approximately 291 CCSs in SA, which at current rates of production would take 30 years to establish.<sup>[12]</sup> Notably, provinces such as Limpopo, Mpumalanga, Northern Cape and North West have no CCSs. In KZN overall, 19% of ICUs are staffed by CCSs.<sup>[12]</sup> In addition, patient autonomy combined with a biased fee-for-service private healthcare sector will make access to ICUs much easier in the private than in the public health sector.<sup>[14]</sup>

### Conclusion

Innovative changes such as the implementation of fast-track anaesthesia and enhanced ICU capabilities;<sup>[15]</sup> the development of sub-intensive, intermediate and step-down units;<sup>[16]</sup> and the increased use of non-invasive ventilation in regular wards, rather than only in ICUs,<sup>[17]</sup> will potentially decrease the need for ICU beds, which are always in demand and in short supply. Such changes will have

the desired effect also of decreasing the need for CCSs in favour of expansion of hospitalists/generalists in number and scope of practice.<sup>[18]</sup> The need for ICU care would be effectively decreased, as also would be hospital length of stay and costs.<sup>[8]</sup> Triage tools, based on scientifically validated guidelines and protocols, including the use of admission and discharge criteria, are required to enable optimal utilisation of intensive care services in a limited-resource environment such as SA.

The NHI scheme cannot be expected to solve the huge discrepancies of access to ICU beds across SA.

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