

## “A tale of two cities.”

# A snapshot survey of neurosurgical procedures performed in public and private sectors in eThekweni

R Harrichandparsad,<sup>1</sup> SS Nadvi,<sup>2</sup> A Naidoo,<sup>3</sup> O Mahomed<sup>4</sup>

<sup>1</sup> Senior consultant in the Department of Neurosurgery based at Inkosi Albert Luthuli Central Hospital, Durban, South Africa and lecturer at the Nelson R. Mandela School of Medicine, University of KwaZulu-Natal

<sup>2</sup> Consultant neurosurgeon in private practice at St. Augustine's Hospital, Durban and is a lecturer at the Department of Neurosurgery, Nelson R. Mandela School of Medicine, University of KwaZulu-Natal

<sup>3</sup> Registrar in the Discipline of Public Health Medicine, School of Nursing and Public Health, University of KwaZulu-Natal, Durban, South Africa

<sup>4</sup> Public Health Medicine Consultant in the Discipline of Public Health Medicine, School of Nursing and Public Health, University of KwaZulu-Natal, Durban, South Africa

**Corresponding author:** Dr Rohen Harrichandparsad (Harrichandparsad@ukzn.ac.za)

**Summary:** Access to neurosurgical care in South Africa is influenced by prevailing inequities in healthcare. It is generally perceived that the public sector performs mainly emergencies relating to trauma, and the private sector performs mainly elective spinal surgery. In March 2015, emergencies constituted 51% of cases in the public sector compared to 8% in the private sector. Trauma, paediatric hydrocephalus and intracranial sepsis constituted nearly 75% of the operative workload in the public sector. Cranial surgery accounted for the majority (95%) of operations in the public sector, whereas the majority in the private sector was spinal (75%). There is considerable disparity in the type of neurosurgery being performed in the public and private sectors in KwaZulu-Natal and with the current financial constraints, there is a potential unmet need for elective spinal surgery in the public sector.

S Afr J Surg 2019;57(2)

<http://dx.doi.org/10.17159/2078-5151/2019/v57n2a2732>

## Introduction

South Africa has a two-tiered healthcare system characterised by a large public sector funded through the tax system and a rapidly growing private sector that is funded by individual contributions to medical schemes. In the public sector, health services are provided via a network of clinics, community health centres, district, regional, tertiary and central hospitals. The nurse-led primary healthcare centre is usually the first point of contact between the patient and health service. A patient is then referred up the chain of facilities for services required based on the defined package of services delivered. Central hospitals are at the apex of the pyramid offering highly specialised services through highly qualified personnel. Of the total public health expenditure in 2014/15, hospital services accounted for an estimated 58% (R76.7 billion) of the expenditure with central and tertiary hospitals together accounting for approximately 33% (R25 billion) of the total hospital expenditure.<sup>1</sup> An estimated R3.1 billion was spent on

central hospitals in KwaZulu-Natal in 2014/15, translating to a cost per patient day equivalent of R3288.<sup>2</sup>

In the private sector, an estimated R46.4 billion was paid to private hospitals with inpatient admissions accounting for 88% of the R46.4 billion.<sup>3</sup> Payment to specialists amounted to R29.1 billion or 23.5% of total healthcare benefits paid in 2014, with R6.4 billion being paid to surgical specialists as a group.<sup>3</sup>

There are eight private hospitals in eThekweni providing neurosurgical services, manned by 14 consultant neurosurgeons. Inkosi Albert Luthuli Central Hospital (IALCH) is the sole neurosurgical referral centre in the public sector for KwaZulu-Natal and parts of the Eastern Cape with 7 full-time neurosurgical consultants, 12 registrars, 2 medical officers and 2 supernumerary registrars. The neurosurgical unit consists of 110 beds (paediatric and adult) and shared adult and paediatric high care. The paediatric neurosurgical unit has 18 beds with high care beds, sepsis beds and isolation units.<sup>4</sup> As a central referral hospital, the neurosurgical department

is expected to manage the following conditions from a surgical perspective: trauma to the brain and spine; congenital conditions (hydrocephalus, spinal bifida, craniofacial disorders); primary and metastatic tumours of the brain and spine, vascular lesions of the brain and spine (aneurysms and malformations); spinal degenerative disease; neuroinfections (bacterial sepsis and meningitis, parasitic); epilepsy and movement disorders requiring surgery. Treatment modalities include craniotomy, craniectomy or burrholes for open surgical access to the brain, anterior or posterior approaches for spinal decompression, endovascular access for intracranial and spinal vascular interventions, and functional neurosurgery for epilepsy and movement disorders. The following neurosurgical services are to be provided at a tertiary level: management of intracranial sepsis (abscess and empyema, meningitis); hydrocephalus; tuberculosis and intracranial haemorrhage including subarachnoid haemorrhage.<sup>5</sup>

The provision of the above package of services requires neurosurgeons with a wide range of skills encompassing microsurgery, spinal instrumentation, stereotactic, endoscopic and endovascular surgery amongst others.<sup>6</sup> The practice of the above skills will produce neurosurgeons that are able to practise their trade with confidence in both the public and private sectors. It was our impression that in the current era of budgetary constraints and cost containment within the public health sector, services in the public sector are largely dominated by the provision of emergency neurosurgical services for the most commonly occurring conditions, whilst in the private sector access to neurosurgical services is dominated by elective surgery for non-communicable diseases viz. spinal degenerative disease. Within this context, the study aimed to document the types of neurosurgical procedures performed in the public and private sectors in eThekweni.

## Methods

This is an observational descriptive cross-sectional study. All patients who underwent a neurosurgical operative procedure in both the public and private sectors in eThekweni from 1 March 2015 to 31 March 2015 were prospectively included. Data collection forms were distributed to neurosurgical theatres in all 9 hospitals providing a neurosurgical service. King Dinuzulu Hospital Complex, which offers orthopaedic spinal surgery to public sector patients, was excluded from the study as their primary focus is on orthopaedic spinal trauma and infection, with little or no degenerative spine surgery performed (personal communication with the Head of Spinal Unit). Theatre sisters or neurosurgeons were requested to complete a data form for each procedure performed. The individual surgeons verified data at the end of the study period. Variables included demographic characteristics of patients (gender, age); type of surgery (elective vs emergency, cranial vs spinal) and classification of the 6 most frequent procedures based on underlying aetiology (trauma, sepsis, degenerative spine, hydrocephalus including number of endoscopic third ventriculostomies performed, tumours and vascular/endovascular).

Ethical approval for the study was obtained from the Biomedical Research Ethics Committee of the University of KwaZulu-Natal (BE078/15).

## Results

There were a total of 424 neurosurgical operative procedures performed in the one-month period in both the public and private sector. Of these 187 (44%) were performed in the public sector, and 237 (56%) in the private sector (Table 1). The majority of all procedures, 248 (58%), were performed on males, with equal distribution of male to female patients in the private sector and an approximate male to female ratio of 3:1 in the public sector. Seventy-three percent (n=136) of patients in the public sector were male. The majority of patients in the private sector, 233 (98%), were adults, whilst adults accounted for 130 (70%) of patients in the public sector. Adult patients in the public sector were younger with a mean (SD) age of patients of 36.3 (14.4) years compared to the private sector with a mean (SD) age of 55.2 (16.1) years.

The majority of procedures performed by neurosurgeons in the public sector were intracranial, 178 (95%), as opposed to spinal, 9 (5%). This contrasts with the private sector where neurosurgeons performed predominantly spinal, 178 (75%), rather than intracranial procedures, 59 (25%). The majority of cases, 95 (51%), in the public sector were emergency cases, followed by hydrocephalus, 55 (29%), followed by vascular/endovascular surgery, 26 (14%). In comparison, degenerative spinal operations constituted the majority of the surgical workload in the private sector, 171 (72%), with 218 (92%) of all private cases being elective.

## Discussion

Although the study provides a cursory snapshot of the neurosurgical procedures being performed in both the public and private sector in KwaZulu-Natal, the results indicate

**Table 1. Frequency Distribution of Neurosurgical Cases in the Public vs Private Sector in eThekweni in March 2015**

	PUBLIC	PRIVATE
TOTAL	N=187, n(%)	N= 237, n(%)
Emergencies	95 (51%)	19 (8%)
Electives	92 (49%)	218 (92%)
Males	136 (73%)	112 (47%)
Females	51 (27%)	125 (53%)
Adults	130 (70%)	233 (98%)
Paediatrics (≤ 12 years)	57 (30%)	4 (2%)
Cranial	178 (95%)	59 (25%)
Spinal	9 (5%)	178 (75%)
<b>Nature of Procedure</b>		
Trauma	72 (39%)	13 (5%)
Sepsis	12 (6%)	5 (2%)
Hydrocephalus	55 (29%)	13 (5%)
Tumours	15 (8%)	26 (11%)
Vascular/Endovascular	26 (14%)	6 (3%)
Degenerative Spine	2 (1%)	171 (72%)

significant differences between the public and private sector. Access to neurosurgical care in South Africa is influenced largely by prevailing inequities in healthcare, the quadruple burden of disease and resource constraints. Patients receiving neurosurgical procedures in the public sector are generally of a younger age group and the procedures are predominantly due to traumatic brain injury, congenital hydrocephalus and intracranial sepsis while neurosurgical services in the private sector are dominated by elective surgery for degenerative spinal disease.

Injuries accounted for 9.6% of the total mortality in 2012.<sup>7</sup> Interpersonal violence and road traffic injuries are ranked 8th and 9th respectively amongst the top ten causes of mortality amongst all race groups in 2012; however, interpersonal violence ranks as the second leading cause of death amongst males.<sup>7</sup> The leading causes for traumatic brain injury (TBI) include assault, motor vehicle collisions, falls, sports injuries, explosive blast and combat injuries. The major risk factors for TBI are extremes of age, male gender and low socioeconomic status. The public sector is usually the first point of contact for most patients who have been assaulted or sustained a road traffic injury. These patients are usually critically injured and require emergency procedures. Due to the high burden of interpersonal violence, associated traumatic injuries, and road traffic injuries, neurosurgical services in the public sector are largely dominated by the provision of emergency neurosurgical services for traumatic brain injury.

Hydrocephalus accounted for 55 (29%) cases in the public sector with 38 (69%) of the cases being paediatric patients. It has been estimated that more than 100 000 new-borns annually develop hydrocephalus before 1 year of age in Sub-Saharan Africa.<sup>8</sup> Maternal medication or alcohol use during gestation, lifestyle modifiable maternal pathologies such as obesity, diabetes, or hypertension, lack of prenatal care, and a low socioeconomic status were identified as significant maternal environmental risk factors for congenital hydrocephalus development. Maternal infections and trauma to the mother during pregnancy have also been highlighted as potential mother-related risk factors.<sup>9</sup> Despite the significant investment in improving maternal healthcare, disparities exist between socio-economic strata and this has an influence on the incidence of hydrocephalus, which explains the high number of cases within the public health sector.

Degenerative spine surgery accounted for only 1% of cases in the public sector. This may be as a result of clearly demonstrated competing priorities in the context of limited resources. Being largely elective, surgery for spinal degenerative disease receives lower priority, which does not imply that the need for such surgery in the public sector does not exist. There is a waiting list of at least 6 months for elective spine surgery at IACH. All 7 public sector neurosurgery consultants were able to provide general spinal surgery services, however there was no dedicated sub-specialist trained spinal surgeon. In the private sector the vast majority of neurosurgery, 161 (72%), is elective degenerative spine surgery. The high proportion of spinal surgery for spinal degenerative disease in the private sector may not necessarily

reflect a high burden of disease as the indications for surgery were not tested and over-servicing for degenerative spine surgery has been described.<sup>10-13</sup>

The differences in the neurosurgical procedures conducted in the public and private sector have implications for the unmet need for services as well as the overall training of neurosurgical specialists. Life expectancy in South Africa has increased to 62.4 years due to advances in health care which include the wide scale provision of antiretroviral therapy.<sup>14</sup> As a result, an increase in non-communicable diseases associated with aging, which include spinal degenerative diseases, are expected to increase. Spinal degenerative disease although not a fatal condition accounts for significant morbidity which is associated with considerable tangible and intangible costs.<sup>15</sup> In view of the cost containment measures at public health institutions, patients will be placed on waiting lists that may extend for a considerable period of time. Secondly, registrars will be deprived of the opportunity of practical training in services considered as elective, thereby limiting their scope of practice as neurosurgeons.

The National Department of Health aims to reduce the inequities in health care and achieve universal health coverage through the national health insurance, which is a financing mechanism.<sup>16</sup> A key feature of the NHI is the contracting of public and private providers to deliver comprehensive needed services to all South Africans and long term legal residents irrespective of socio-economic status.<sup>16</sup> The current White Paper for the National Health Insurance is silent on the proposed financing mechanism as well as the modality of the provision of highly specialised services. In order to provide accessible services to the entire population regardless of socio-economic status, one option would be to develop a cost effective comprehensive package of services that includes neurosurgical services.<sup>15</sup> The neurosurgical interventions could include general and specific neurosurgical procedures, which may be informed by a nationwide study of the burden of neurosurgical disease. A cost per procedure should be determined at public and private facilities prior to making a decision on a contracting model.

The data for the study was limited to eThekweni, which was considered representative of KZN because the catchment population of IALCH includes the entire province, however this may not be applicable to other provinces. Seasonal variation is not likely to have a significant impact on the key differences observed. Efforts were made to minimise information bias by verification of data with individual surgeons at the end of the study period. The purpose of this publication is to describe overall differences in types of surgery in the public and private sector to stimulate a discussion on developing strategies to reduce the inequalities and achieve universal health coverage. Further research is required to quantify the burden of spinal degenerative disease in the public sector in KZN.

#### REFERENCES:

1. National Treasury. Intergovernmental Fiscal Reviews (IGFR) - 2015 - Provincial Budgets and Expenditure Review : 2010/11

- 2016/17. Pretoria: National Treasury; 2015.
2. KwaZulu Department of Health. Annual Report 2014/15. Pietermaritzburg: KwaZulu Natal Department of Health; 2015.
  3. Council of Medical Schemes. Annual Report 2014/15. Pretoria: Council for Medical Schemes; 2016.
  4. University of KwaZulu Natal. Neurosurgery. Durban: University of KwaZulu Natal; 2017 [accessed 15 May 2017]. Available at: <http://neurosurgery.ukzn.ac.za/AboutUs.aspx>
  5. National Department of Health. Detailed definitions of Regional (secondary) and Tertiary Health Services. Pretoria: National Department of Health; 2013.
  6. Fieggen G. Neurosurgery in South Africa. *S Afr Med J*. 2014;104:254.
  7. Pillay-van Wyk V, Msemburi W, Laubscher R, et al. Mortality trends and differentials in South Africa from 1997 to 2012: Second National Burden of Disease Study. *Lancet Glob Health*. 2016;4:e642-53.
  8. Piquer J, Qureshi MM, Young PH, Dempsey RJ. Neurosurgery Education and Development program to treat hydrocephalus and to develop neurosurgery in Africa using mobile neuroendoscopic training. *J Neurosurg Pediatr*. 2015;15:552-9.
  9. Kalyvas AV, Kalamatianos T, Pantazi M, Lianos GD, Stranjalis G, Alexiou GA. Maternal environmental risk factors for congenital hydrocephalus: a systematic review. *Neurosurg Focus*. 2016;41:E3.
  10. Epstein NE. Are recommended spine operations either unnecessary or too complex? Evidence from second opinions. *Surg Neurol Int*. 29 Oct 2013;4(Suppl 5):S353-8. doi: 10.4103/2152-7806.120774. eCollection 2013
  11. Epstein NE. "Unnecessary" spinal surgery: A prospective 1-year study of one surgeon's experience. *Surg Neurol Int*. 2011;2:83. Available at: <http://dx.doi.org/10.4103/2152-7806.82249>
  12. Raabe A, Beck J, Ulrich C. Necessary or unnecessary? A critical glance on spine surgery. *Ther Umsch*. 2014;71(12):701-5. Available at: <http://dx.doi.org/iv.1024/0040-5930/000614>
  13. Epstein NE. Spine surgery in geriatric patients: Sometimes unnecessary, too much, or too little. *Surg Neurol Int*. 2011;2:188. Available at: <http://dx.doi.org/10.4103/2152-7806.91408>
  14. Statistics South Africa. Mid-year population estimates 2016. 55,9 million people in South Africa: Planning for a better tomorrow. [Accessed 15 May 2017]. Available at: [www.statssa.gov.za](http://www.statssa.gov.za)
  15. National Department of Health. Policy and implementation guidelines 2008: Regular treatment of school-going children for soil-transmitted helminth infections and bilharzia. In: Health NDo, (ed). Pretoria: Government Printing Press; 2008.
  16. National Department of Health. White paper on National Health Insurance. Government Gazette; 2015.