



Neurosurgical Capacity Building in the Developing World: Pediatrics

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Introduction

In Tanzania, there are 4 neurosurgeons for 46 million people, with a large proportion of cases being children. To address this need, we have developed an intensive, hands-on, bedside neurosurgery training program, with local health workers trained to operate independently and then trained to train others. This report quantifies increasing self-sufficiency in the neurosurgical care of children in a remote, rural Tanzanian hospital.

Methods

Hospital records were abstracted retrospectively for all patients aged 17 years or less who underwent neurosurgery from one year prior to program implementation (2005) through 2010. Analysis of de-identified data utilized descriptive statistics and multivariable modeling, including an assessment of Tanzanian independence, case complexity, and patient safety.

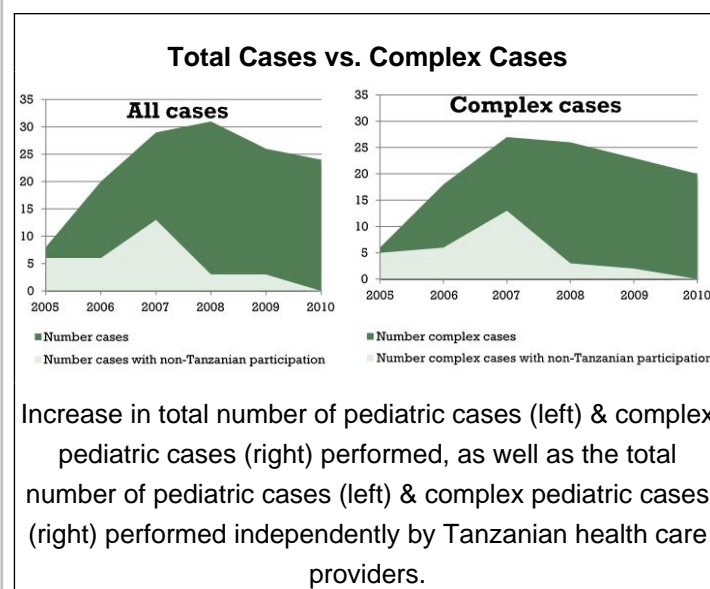
“Independent” surgery was defined as performed by a Tanzanian alone, or a Tanzanian with a Tanzanian trainer.

Complex cases consisted of shunt placement or revision, burr holes for tumor biopsy, craniotomies for any reason, myelomeningocele or encephalocele repair, spinal decompressions, discectomy, fusions, or tumor excision.

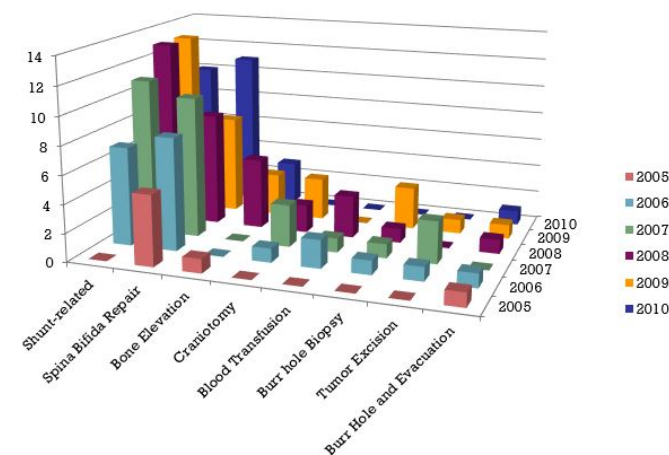
Results

By 2010, three generations of Tanzanian health care workers had been trained, with the following findings:

- Over half of the patients (77 of 140) were under 1 year of age
- The most common diagnoses, allowing for multiple diagnoses in a single patient, ($n > 10$ of 173) were hydrocephalus (62), spinal bifida (51), head trauma (20), and brain tumor (11)
- Tanzanian independence increased over time (12.5% in 2005 to 96% in 2010, $p < 0.001$)
- The number of complex cases performed independently also increased from 0% to 100% ($p < 0.001$)
- Multivariable analysis to assess patient safety indicated that post-operative complications decreased, with patients admitted as training progressed 49% less likely to have post-operative complications (odds ratio 0.51, 95% confidence interval 0.36-0.71, $p = 0.00$)



Most Common Procedures by Year



Most common pediatric procedures by year, beginning the year before program implementation.

Conclusions

This training method was an effective approach to increasing neurosurgical self-sufficiency and improving patient outcomes in this resource-poor setting.

