

## Practising anaesthesia as a community service doctor: a survey-based assessment

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**Background:** Anaesthesia-related maternal mortality remains unacceptably high, especially in district hospitals. Community service doctors (CSDs) play an important role in the provision of anaesthesia in these hospitals. The purpose of this study was to understand the experience of doctors providing anaesthesia during community service. Identifying deficiencies in the performance of anaesthesia by CSDs can lead to remedial actions.

**Methods:** A prospective, questionnaire-based study was done of doctors who had done their anaesthesia rotation during their internship in Pietermaritzburg, between 2008 and 2010. Quantitative data were collected regarding their performance of anaesthesia during community service. The data included details concerning the provision of anaesthesia, supervision and training, and whether CSDs felt adequately prepared to perform anaesthesia during community service. Qualitative data were also collected, which will be reported in another article.

**Results:** The study response rate was 72.9%. Roughly half of the respondents performed anaesthesia during community service, of which two-thirds did more than 50 cases. Obstetric anaesthesia was the most common procedure performed. CSDs worked largely unsupervised, 63% had very little supervision and 62% received no further training in anaesthesia during community service. CSDs felt adequately prepared to administer obstetric anaesthesia, but less well prepared to perform general anaesthesia for appendicectomies and ectopic pregnancies.

**Discussion:** CSDs perform a large proportion of the anaesthesia in rural hospitals, where they work largely unsupervised. Furthermore, CSDs feel less well prepared to perform general anaesthesia than spinal anaesthesia. To meet the needs of patients in these areas, intern training needs to be aimed at improving anaesthesia delivery in rural hospitals and guidelines need to be established regarding the performance of anaesthesia by CSDs.

**Conclusion:** The study showed that CSDs play an important role in provision of anaesthesia services, especially in rural areas. However, they work largely unsupervised and receive little further training or support. A large proportion do not feel comfortable in administering general anaesthesia. Intern training should be adjusted to meet the needs of CSDs.

**Keywords:** Intern training in anaesthesia, community service doctors experience

### Introduction

It is apparent that the lack of training and inexperience of young doctors working in rural hospitals is a contributor to poor maternal outcomes.<sup>1</sup> These young doctors have only their internship training behind them before being expected to work, often in rural areas, for their community service. In 2005 the duration of internship was increased from one to two years. This was to better equip community service doctors (CSD) for practice. This two-year internship was standardised, with fixed rotations, including two months for anaesthesia.

Compulsory post-internship one-year community service was introduced by the Department of Health in 1998 in order to improve access to medical care for all South Africans, especially in rural areas. Community service itself is largely unregulated. Very little work has been done to understand the experiences of community service doctors and their confidence in providing anaesthesia. CSDs often work long hours in challenging environments in understaffed rural hospitals.<sup>2</sup> Previous authors have stated that CSDs may make errors due to an excessive workload and work-related stress. One of the main challenges of CSDs remains inadequate support and supervision by senior doctors, which can negatively affect skills development and confidence.<sup>3</sup>

The South African Society of Anaesthesiologists (SASA) recommends that community service doctors should perform anaesthesia only under supervision, even if placed in remote districts.<sup>4</sup> However, a large proportion of community service doctors work in rural areas with little or no supervision. It is therefore essential that interns are adequately trained and feel confident to perform anaesthesia during community service. The two months of training during their internship has been viewed by previous authors as inadequate to allow independent anaesthesia practice.<sup>5</sup>

The fifth World Health Organization Millennium Development Goal was the reduction of maternal mortality by 75% by 2015.<sup>6</sup> One focus was the prevention of avoidable deaths. Worldwide, maternal mortality declined in the period from 1990 to 2015. In South Africa, it has remained largely unchanged in this period. Anaesthesia is numerically a small contributor to maternal mortality; however, most anaesthesia deaths could have been prevented (between 80% and 93% avoidable in the various reports).<sup>7–9</sup> The anaesthesia-related maternal mortality has remained unchanged, despite the increase in anaesthesia training time during internship. However, in last report indicates an apparent decline in anaesthesia-related mortality between

2011 and 2013.<sup>9</sup> Whilst this result needs to be further investigated to exclude underreporting, it could represent the benefits of improved intern training and the implementation of the Essential Steps in the Management of Obstetric Emergencies (ESMOE) training. Taking further measures to prevent anaesthesia-related maternal deaths will be a major step towards improving maternal health in South Africa.

The Caesarean section rate in South Africa is rising, whilst the output of trained anaesthesiologists has remained static.<sup>10</sup> This is leading to an increasing gap between skilled anaesthesia providers and Caesarean sections performed. Efforts need to be made to improve the skills of non-anaesthesiologists performing anaesthesia, as a large number of obstetric cases will need to be performed by non-anaesthesiologists.

A previous study<sup>11</sup> showed that most doctors felt that their internship training had adequately prepared them for community service. However, anaesthesia was an exception. CSDs commented that they lacked confidence in certain critical anaesthetic and obstetric skills. This is concerning, as CSDs are expected to perform anaesthesia, especially if placed in rural hospitals.

The aim of this prospective questionnaire-based study was to understand the experience of doctors providing anaesthesia during community service. The study group consisted of doctors who had completed their two months of anaesthesia training during their internship between 2008 and 2010. Feedback will be used to improve intern training in anaesthesia, with an emphasis on skills required to be competent during community service. A survey of interns at the end of the anaesthetic block was first performed by the authors in 2012.<sup>12</sup>

## Methods

Doctors who completed the anaesthesia rotation of their internship in Pietermaritzburg between 2008 and 2010 were included in this prospective questionnaire-based study. In Pietermaritzburg, the interns rotate at varying times through anaesthesia, and could do the anaesthesia rotation in either the first or second year of internship. This questionnaire-based study was a follow-up study, to assess doctors' community service experience following intern anaesthesia training in Pietermaritzburg.

A database was designed using REDCap (Research Electronic Data Capture) software ([www.project-redcap.org](http://www.project-redcap.org)), made available to the investigators by ANSA (Anaesthesia Network for South Africa, a project of the South African Society of Anaesthesiologists). Study data were collected and managed using REDCap electronic data-capture tools.<sup>13</sup> REDCap is a secure, web-based application designed to support data capture for research studies. Ethical approval for the database (Intern training anaesthesia: Pietermaritzburg complex) was granted by the University of KwaZulu-Natal Biomedical Research Ethics Committee (BE520/14). The database was password protected and results anonymised.

An online questionnaire was piloted and peer reviewed amongst 10 anaesthesia consultants in Pietermaritzburg. After finalisation, it was sent to the Pietermaritzburg Complex interns who had rotated through anaesthesia between 2008 and 2010. An equivalent face-to-face or telephonic questionnaire was offered to participants as an alternative.

Two data sets were collected:

- Quantitative data: This included demographic data, details regarding their intern training and general details regarding their community service. Details concerning anaesthesia performed during community service were obtained, which included the number and type of cases done, the level of supervision, further training received in anaesthesia and the preparedness to perform certain cases during community service. Their opinion on the adequacy of both the duration of the anaesthesia rotation as well as the number of cases done during the rotation was also obtained.
- Qualitative data: Doctors were asked to elaborate on adverse events experienced during the administration of anaesthesia as a CSD. They were asked to give feedback on their opinions as to the adequacy of their intern anaesthesia training and feedback on how to improve the training to better equip them for community service. They were questioned about their current career and factors that had influenced their career choice. This is discussed in a separate article.

Results were analysed using REDCap software and an Excel® spreadsheet (Microsoft Corp, Redmond, WA, USA). The data were analysed using descriptive statistics.

There were no exclusion criteria. All the doctors who had completed their anaesthesia rotation in Pietermaritzburg from 2008 to 2010 were included in the study.

## Results

Of the 298 interns who completed their anaesthesia rotation in Pietermaritzburg between 2008 and 2010, three had subsequently died, leaving a total group of 295 potential participants to complete the survey. Thirty-nine doctors were excluded as no current contact details could be obtained. The survey was sent to 259 doctors, 189 of whom responded (72.9%).

The study included doctors from all medical schools in South Africa, and their response rates were similar. The response rate between male and female respondents and those who did their rotation in either the first or second year of internship were also similar (Table 1).

Of the Pietermaritzburg interns, 41% did community service in KwaZulu-Natal (Figure 1), and 52% did community service at a district, often rural, hospital.

Of the respondents, 51.3% provided anaesthesia during community service, and 68% of these did so at a district hospital (Figure 2). Of the doctors who performed anaesthesia, 65.6% did more than 50 cases during their community service and 44% performed more than 100 anaesthetics during community service (Figure 3). Of the 43 doctors who performed more than 100 anaesthetics, 20 obtained the Diploma in Anaesthesia (DA) during community service.

Anaesthesia for obstetric cases was performed by the majority of CSDs (Figure 4). Community service doctors did a wide variety of different types of anaesthesia, including spinal anaesthesia, general anaesthesia, local anaesthesia and sedation (Figure 5).

Majority of community service doctors (63.2%) seldom or never had supervision whilst performing anaesthesia. Of those who were given supervision, even if only occasionally, the supervision

Table 1: Demographics

Factor	Survey group (n = 189)	Original group (n = 291)*	p-value
Sex (female)	122 (65%)	184 (62%)	0.85
Year of rotation (1st year)	82 (43%)	141 (47%)	0.30
Undergraduate University	(n = 189)	(n = 281)**	
UKZN	37 (20%)	51 (18%)	0.71
Pretoria	34 (18%)	52 (18%)	0.90
Stellenbosch	27 (14%)	47 (17%)	0.52
Freestate	26 (14%)	31 (11%)	0.39
UCT	25 (13%)	35 (12%)	0.89
Wits	22 (12%)	33 (12%)	1.00
Unitra	13 (7%)	21 (7%)	0.86
Medunsa	3 (2%)	11 (5%)	0.17
Other	2 (1%)		

\*Sex not captured for seven interns in the original group.

\*\*Undergraduate university not captured for 17 interns in the original group.

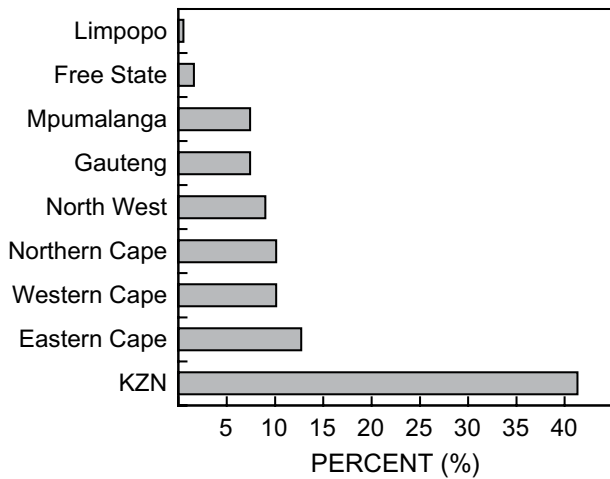


Figure 1: Province of community service.

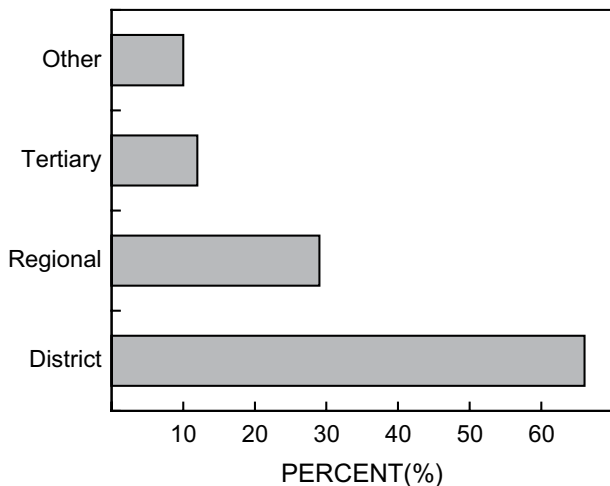


Figure 2: Level of hospital where anaesthesia performed.

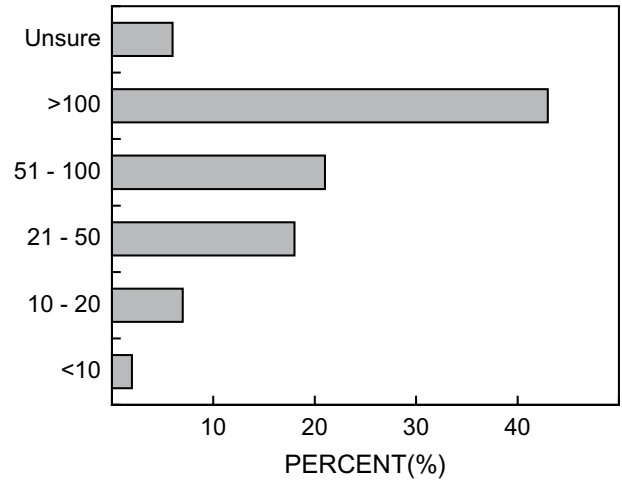


Figure 3: Number of cases done.

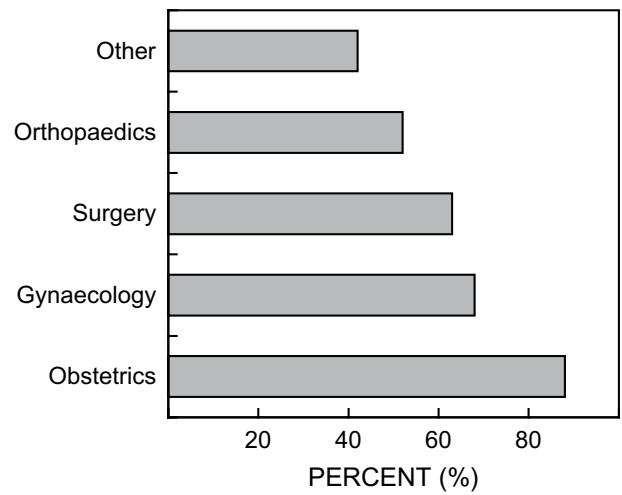


Figure 4: Types of cases.

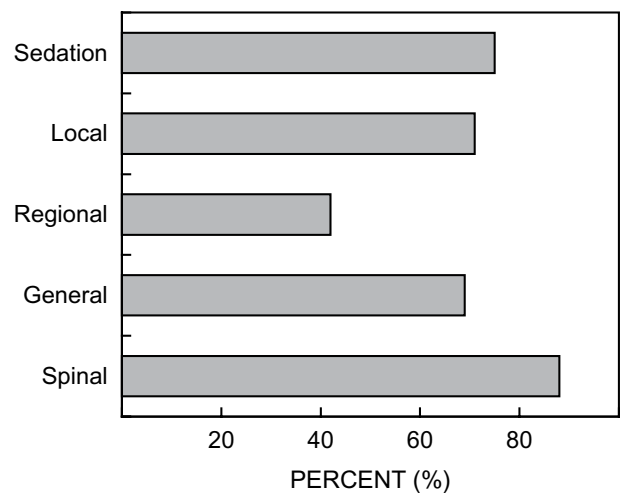


Figure 5: Percentage of doctors performing different types of anaesthesia.

Table 2: Comparison of confidence levels

Type of procedure	Intern anaesthetic rotation		p-value
	1st year (n = 42)	2nd year (n = 54)	
Caesarean section	37 (88%)	47 (87%)	1.0
Non-obstetric spinal	27 (64%)	40 (74%)	0.37
Appendectomy	26 (62%)	39 (72%)	0.38
Ectopic pregnancy	23 (55%)	30 (56%)	1.0
Stabilise a head injury patient	29 (69%)	45 (83%)	0.14

was mainly from senior doctors with previous experience only (39.4%) or doctors with a Diploma in Anaesthesia (37.9%).

Whilst 20 doctors completed their DA, the majority (62%) had no further anaesthesia training during community service. Those doctors who completed the DA all worked at hospitals with specialist anaesthesiologist supervision.

The doctors were asked if they felt adequately trained to perform anaesthesia for different procedures during community service. A total of 88% of respondents felt adequately trained to perform a spinal for a Caesarean section. Fewer CSDs felt adequately trained to perform non-obstetric anaesthesia: 69% felt adequately prepared to perform spinal anaesthesia for a non-obstetric case; 67% to perform general anaesthesia for an appendectomy; and 55% to perform general anaesthesia for an ectopic pregnancy. Interns who did their anaesthesia rotation in their second year of internship seemed to feel better prepared for anaesthesia during community service; however, this was not statistically significant (Table 2).

Whilst the majority of respondents (70%) felt that they did enough cases during internship, only 48% thought that the duration of the anaesthesia rotation was adequate.

## Discussion

This questionnaire-based study focused on the experiences of doctors during community service. The study results can be used to improve intern training in anaesthesia and to improve anaesthesia-related outcomes in rural hospitals. The Pietermaritzburg Department of Anaesthesia has always incorporated feedback from interns during the block to improve future training. The results of this study will further aid in the improvement of intern anaesthesia training by identifying needs only identified during community service.

Community service doctors often work long hours without any supervision. This may lead to an increase in work-related stress and substandard care delivered to patients, especially in rural hospitals. This can negatively affect CSDs' confidence levels and their skills development.<sup>3</sup>

Our study showed that more half of all doctors perform anaesthesia during their community service, with roughly two-thirds of CSDs doing so in remote and rural district hospitals. CSDs also performed a significant number of cases, with two-thirds of the doctors doing more than 50 cases during their community service. Whilst this is definitely good in addressing the needs of the patients in rural areas, it is important to ensure

that community service doctors are adequately prepared for this task. Their intern training should be structured to prepare them for anaesthesia in community service.

Some 29% of CSDs did fewer than 50 anaesthetics during their community service. Doing less than 50 cases a year could affect CSDs' confidence as they are only occasionally performing a complex task. It is the authors' opinion that the minimum number of anaesthesia cases to ensure adequate clinical competency needs to be defined.

CSDs in this study most commonly performed spinal anaesthesia for obstetric cases. This is not unexpected as Caesarean sections are the most common operation in rural hospitals.<sup>14</sup> South African maternal mortality remains unacceptably high.<sup>9</sup> Even though the anaesthetic contribution to the maternal mortality remains relatively small, most of these deaths are avoidable.<sup>7-9</sup> The contribution of community service doctors to the maternal mortality in South Africa is not known. In KwaZulu-Natal, 27% of doctors working in rural hospitals are CSDs.<sup>15</sup> Given that the community service doctors perform a large number of anaesthetics in South Africa, it is reasonable to assume that their lack of obstetric anaesthesia experience is a significant contributing factor to anaesthesia-related morbidity and mortality.

Even though SASA recommends that CSDs work under supervision, nearly two-thirds of community service doctors in our study were seldom or never supervised during the administration of anaesthesia. This is in keeping with other studies that have highlighted the lack of supervision of CSDs.<sup>1,14</sup> In the Free State and in KwaZulu-Natal, the lack of supervision and training of rural doctors other than CSDs has also been highlighted. In some rural hospitals, doctors are expected to perform other tasks whilst administering obstetric anaesthesia.<sup>14</sup> Despite this feedback, very little has been done to enforce the guidelines regarding the safe administration of anaesthesia during community service.

Adequate support for CSDs is vital. Different methods of support are available and can include in-reach training, outreach visits and telephonic support. A study carried out in the Eastern Cape showed a favourable response to support in the form of a phone call, and this might be an option to support CSDs in remote areas.<sup>15</sup>

Confidence is defined as a feeling or belief that you can do something well, or succeed at something. Confidence is subjective, relies on self-assessment of skills, and is not necessarily a marker of performance or patient outcomes. However, lack of confidence may affect job satisfaction and may lead to poor performance. In this study, most of the CSDs felt adequately trained and confident in performing obstetric anaesthesia. It is not enough for CSDs to feel confident in performing spinal anaesthesia; they also need to feel confident in the management steps of associated emergencies. We did not ask about this in our study, but a previous study by Nkabinde *et al.* showed that CSDs did not feel confident in managing these emergencies.<sup>11</sup> Spinal anaesthesia is falsely perceived as safe, which has led to an increasing number of anaesthetic deaths related to spinal anaesthesia.<sup>10</sup> This is likely due to the inappropriate selection of patients and the inappropriate management of complications related to spinal anaesthesia.<sup>14</sup>

The confidence levels for other cases, especially general anaesthesia, was much lower. Just over half the respondents felt comfortable in anaesthetising a patient with an ectopic pregnancy. This is concerning as some of the district hospitals are remote, and transferring a patient for surgery might result in delays and inappropriate management of the patient. More than 80% of the same group of doctors felt confident in administering a general anaesthesia as assessed at the end of their intern rotation.<sup>12</sup> This level of confidence has not been maintained through to community service.

Doctors who did anaesthesia in the second year of their internship felt slightly more confident in performing anaesthesia during community service than doctors who did anaesthesia in the first year. The authors reviewed this in a previous study, and did not find a difference in confidence of first- vs. second-year interns at the end of their intern block. Accordingly, these results suggest a decline in confidence during community service amongst doctors who did their anaesthesia in the first intern year. The reason for the improved confidence of the second-year group might be due to better retention of knowledge, with less time between the intern anaesthesia rotation and community service. Alternatively, the more mature student may benefit from the same training to a greater extent.

Whilst most doctors felt that they did sufficient cases during internship, half of them felt that the rotation was too short. The reason for the discrepancy of these answers is not clear. It may highlight the problem of using trainee feedback to design a training curriculum.

### Conclusion

Community service doctors are still working largely unsupervised, especially in rural hospitals. It is essential that the HPCSA enforces guidelines for the administration of anaesthesia, especially by CSDs. This will ensure adequate supervision of CSDs and improved outcomes. Alternative methods of support for anaesthesia provision at rural hospitals need to be actively explored and developed.

This study looked at experiences of CSDs who did their internship anaesthesia training in Pietermaritzburg. The CSDs who rotated through anaesthesia in their second year of internship felt more confident providing anaesthesia. It is important that the intern anaesthesia training objectives should be changed to meet the needs of CSDs.

Based on this study the authors make the following suggestions:

- (1) The intern anaesthesia rotation should be done in the second year of internship.
- (2) The duration of the anaesthesia rotation should be increased, especially for doctors who are to do community service in rural areas.
- (3) The number of cases interns perform during their rotation should be standardised, as increasing the number of cases may lead to better skills.
- (4) There needs to be an emphasis during intern training of anaesthesia on the performance of general anaesthesia for common surgical emergencies and the management of anaesthesia-related emergencies.

Limitations: This survey included only CSDs who did their internship in Pietermaritzburg. Although intern training is partially standardised, there might be differences in outcomes between different intern training programs.

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