

# A survey of the perceptions and knowledge of anaesthesia and anaesthetists among Grade 12 learners in four Johannesburg districts

PA Talane,  A Mamoojee,  N Madima

Department of Anaesthesia, School of Clinical Medicine, University of the Witwatersrand, South Africa

Corresponding author, email: [pulanemoloantoa@yahoo.com](mailto:pulanemoloantoa@yahoo.com)

**Background:** William Morton conducted the first anaesthetic in 1846 using ether. Since then, advances in pharmacology and technology have radically improved modern anaesthesia and have allowed for advancements in surgery as well. Despite the radical growth of this speciality, public knowledge about anaesthetists' expertise and their role in healthcare delivery remains poor.

**Methods:** A cross-sectional study was carried out between June and September 2021 among Grade 12 learners in four Johannesburg districts. A questionnaire consisting of 26 questions was used to assess the learners' knowledge of the role of anaesthetists, their insight into anaesthesia as a speciality, and their interest in the field.

**Results:** Of the 595 learners who participated, 56.3% were aware that the anaesthetist administers anaesthesia in the operating room. However, 57.8% believed that nurses monitored the patient's vital signs during surgery. Only 16% could identify the duties of the anaesthetist outside of the theatre environment. Overall, participants fared poorly, achieving an average score of 14% for the questionnaire. There was a statistically significant correlation between participants from a high socioeconomic background and awareness that the anaesthetist administers anaesthesia. Knowledge regarding the intraoperative duties of the anaesthetist was still poor, regardless of the socioeconomic background of the participant. Previous exposure to anaesthesia did not improve awareness about anaesthesia among the participants.

**Conclusion:** Awareness regarding anaesthesia and anaesthetists among participants is poor despite the radical growth in the field. Despite faring poorly, 58.5% of participants believed that good medical education could reduce the burden of healthcare costs and medicolegal consequences; while 70% of them would request an anaesthetist to provide information about their anaesthetic before surgery. Despite a lack of awareness, the participants displayed interest and willingness to learn about anaesthesia. Grade 12 learners would be a formidable target group for anaesthetic education campaigns, resulting in these learners becoming health savvy adults who can perpetuate this information in their communities.

**Keywords:** awareness, knowledge, learners, anaesthesia

## Introduction

Anaesthesia as a speciality is one of the youngest branches of medicine and has made impressive advances in the medical field.<sup>1</sup> William Morton conducted the first anaesthetic in 1846 using ether.<sup>2</sup> Since the introduction of modern anaesthesia in 1846, there have been vast improvements in drug safety profiles and patient monitoring systems, which have translated into an advancement in surgery as well. Complex surgery can be undertaken safely and in a humane manner due to the safety profile of modern anaesthesia.<sup>2,3</sup> Anaesthetists have transcended the borders of theatre and are now actively involved in hospital resuscitation teams, trauma units, pain clinics and intensive care units (ICU).<sup>1,4,5</sup>

Studies have shown that the general population does not possess an awareness either of anaesthetists or of anaesthesia as a discipline.<sup>6,7</sup> In fact, in some instances, anaesthesia is not perceived as a distinct medical speciality and anaesthetists are not seen as medical doctors.<sup>6</sup> According to Uma and Hanji,<sup>6</sup> this can be attributed to anaesthetists not being at the forefront of patient management.

The public are generally unaware that the anaesthetist's role is not limited to theatre.<sup>8,9</sup> One reason cited for this is that the surgeon is the first person to have contact with the patient,<sup>5,6</sup> followed by the anaesthetist, who then assesses the patient. This results in the anaesthetist being viewed as the surgical assistant.<sup>10</sup>

As an annual awareness initiative, 16 October is celebrated as World Anaesthesia Day. This is intended to educate and improve the perception of the public with regards to anaesthesia. However, there have been few marked improvements in the general public's awareness about anaesthesia.<sup>11</sup>

There is an abundance of readily available and accessible information about anaesthesia on the Internet, facilitated by search engines. Ironically, while the public can be viewed as health conscious and always looking for means to improve their health knowledge as well as their physical health, anaesthesia remains one of the least recognised branches of medicine.

Research done among undergraduate medical students has revealed a disappointing lack of knowledge about anaesthesia and, according to Gqiba et al.,<sup>12</sup> interest in anaesthesia as a

speciality was still poor among final-year South African medical students in 2017, as anaesthesia was viewed with trepidation and as a 'behind the scenes' career.

The aim of our study was to assess the perceptions and knowledge of anaesthesia and anaesthetists among Grade 12 learners in four Johannesburg districts. Unlike previously published studies that looked at patient perceptions about anaesthesia and anaesthetists,<sup>13-16</sup> our study targeted a sector of the general public (Grade 12 learners) who are a slightly younger population group within the community, some of whom may have never encountered an anaesthetist in their lives.

## Methods

A cross-sectional study was carried out between June and September 2021 among Grade 12 learners in four Johannesburg districts.

A two-stage cluster sampling method was used. Cluster sampling is a probability sampling method that is similar to stratified random sampling but takes advantage of natural clusters (groups) of population units that have similar characteristics.

The study population was divided into clusters (according to schools) and the researcher used the convenience sampling method to collect data from participants.

A list of public schools in four Johannesburg districts was obtained from the Gauteng Department of Education. To define the sample size, the StatCalc<sup>®</sup> sample size programme for cluster sample surveys was used, with assistance of the statistician assigned to the study.

Using a 95% confidence interval (CI), it was found that the total number of clusters to be used was 17 clusters/schools ( $\sqrt{578}$ ). Three more clusters (schools) were added to the total cluster number to allow for sampling of five clusters from each district. The total number of clusters thus was 20. A simple random sampling method was employed in the selection of schools.

Grade 12 learners attending public schools in Johannesburg East, South, West and North were included.

Learners who did not wish to participate were excluded. Furthermore, Grade 12 learners from private schools were excluded in order to limit the sample size given that the researcher personally conducted the data collection herself, presenting a resource and time limitation. In 2021, 897 163 candidates undertook the National Senior Certificate examination, of which 733 198 were full-time candidates and 163 965 were part-time candidates.<sup>17</sup> In contrast, according to the Independent Examinations Board, the (private school) Grade 12 class of 2021 only consisted of 12 857 full-time and 968 part-time candidates across southern Africa.<sup>18</sup> Therefore, as the majority of Grade 12 learners in this country attend public schools, the researcher is of the opinion that this population would be more representative of the 'general population' of learners in South Africa.

## Data collection

A questionnaire consisting of 26 questions was handed out at the schools. The questionnaire had three parts: the first part collected non-identifying demographic information; the second part consisted of questions related to anaesthesia and anaesthetists; and the third part addressed potential interest of the participants in learning more about anaesthesia. The information leaflet and questionnaire were issued to the participants at the convenience of both the researcher and the participants. The questionnaire was adapted from a similar study conducted in Romania in 2017,<sup>19</sup> with permission from the authors.

Following the introduction of the study, the aim and objectives were explained, followed by distribution of the information letter and the questionnaire. To ensure accuracy of the responses, the questionnaire was modified so that the questions were easily understood by the Grade 12 learners, facilitating the capture of pertinent information relevant to this study in the South African context. Responses were awarded one point for each correct answer.

## Data interpretation

To enter and analyse the data, the Statistical Package for Social Sciences (SPSS) software (IBM Corp., USA) was used. Frequency tables were used to display demographic data. Frequencies and percentages were used to describe categorical variables; and continuous variables were described using means and standard deviations (SDs). To compare the means, the student's t-test and analysis of variance (ANOVA) were used. The CI was set at 95% ( $p$ -value < 0.05).

The primary objectives of this study were the following:

- Describe the knowledge Grade 12 learners had regarding anaesthesia and anaesthetists.
- Describe the perceived role of the anaesthetist in the perioperative period (i.e. before, during and after surgery).
- Describe the perceived role of the anaesthetist outside of the operating room environment.

The secondary objective of this study was the following:

- Determine factors associated with knowledge of anaesthesia and anaesthetists.

## Results

### Demographics

The study population comprised 595 participants. The majority of the participants were aged 15–20 years (95%), with only 19 participants (3.2%) aged 21–25 years. Females comprised 63.2% of the study population and black learners made up the majority (87.1%) of the study population. Only 88 participants (14.8%) had a surgical history.

The response rate varied from 30.2% (question 10) to 99.7% (question 2). The missing values were included in the frequencies

calculation but not in the inferential tests and did not influence the average outcome.

Table I further describes the demographic information and socioeconomic background of the study population cohort.

**Table I:** Demographic information and socioeconomic background of the study population

Measure	Item	Count	Percentage
Age	Missing	11	1.8
	15–20 years	565	95
	21–25 years	19	3.2
Gender	Missing	7	1.2
	Male	212	63.2
	Female	376	35.6
Place of residence	Missing	15	2.5
	Informal settlement	49	8.3
	Suburb	194	32.6
	Township	337	56.6
Household income	Missing	23	3.9
	Social grant	168	28.2
	Wages/salary	287	48.2
	Wages/salary and social grant	117	19.7
Highest level of education of caregivers	Missing	28	4.7
	Primary school	44	7.4
	Grade 8–12	352	59.2
	College certificate	51	8.5
	University degree	120	20.2
Previous surgery	Missing	3	0.5
	No	504	84.7
	Yes	88	14.8

### **Knowledge regarding anaesthesia and anaesthetists (primary objective)**

#### *Awareness about the administration of anaesthesia*

More than half the participants (56.3%) were aware that the anaesthetist administers anaesthesia in the operating room, while 25.7% did not know who administers anaesthesia, 10.3% thought it was the role of the surgeon, 5% thought it was the role of a nurse and 1% thought it was the role of a technician.

#### *Relationship between the surgeon and the anaesthetist during surgery*

A little more than a quarter of the participants (25.9%) were not aware of the relationship between the surgeon and the anaesthetist in the operating room, while 43.5% believed they worked as team and 11.6% believed the team was led by the surgeon. Only 13.3% of the participants were aware that the surgeon and the anaesthetist have different roles.

#### *Measurement of vital signs during surgery*

More than half of the participants (57.8%) believed that the nurse monitors the patient's vital signs during surgery and only 11.9% of the participants were aware that it is the anaesthetist's duty to monitor vital signs. Of the participants, 67% thought the surgeon monitors the vital signs and 21.8% did not know who monitored the patient's vital signs during surgery.

#### *Performance of anaesthesia in the operating room*

Just over half of the participants (51.1%) were aware that the anaesthetist induces the patient in the operating room, while 15.1% believed it was the surgeon's duty and 7.4% believed the nurse induced the patient.

#### *Monitoring bleeding and initiating blood transfusion*

Only 7.6% of the participants indicated that intraoperative blood loss monitoring and blood transfusion were the responsibility of the anaesthetist, while 29.9% thought this was a nurse's duty and 29.7% thought it was the responsibility of the surgeon. Most participants (30.9%) did not know whose responsibility it is.

#### *Intraoperative patient resuscitation*

Regarding the responsibility of resuscitation during a cardiac arrest, 23.9% of the participants thought it is the nurse's responsibility, while 37% admitted to not knowing whose responsibility it was and 10% believed it was the anaesthetist's duty. Intraoperative resuscitation was thought to be the duty of the surgeon by 27.1% of the participants.

#### *Patient safety in the recovery room postoperatively*

Regarding postoperative care, 49.9% of the participants believed that the safety of the patient in recovery room immediately after the operation was ensured by the nurse and 23.4% did not know whose responsibility it is. Only 10.3% of the participants indicated it was the anaesthetists' responsibility to ensure the patient's safety in the recovery area, while 15.1% thought it was the role of the surgeon.

#### *Postoperative monitoring within the first 24 hours after surgery*

Only 5.4% of the participants were aware that the anaesthetist is involved in the postoperative monitoring of the patient within the first 24 hours after surgery, while 71.6% thought it was the nurse's responsibility and 5.7% thought it to be the role of the surgeon.

#### *Pain management within the first 24 hours after surgery*

Regarding pain management, 12.8% of the participants were aware this role is fulfilled by anaesthetists, while more than half of the participants (57%) believe that the nurse manages postoperative pain and 10.6% thought the surgeon is responsible for pain management.

#### *The anaesthetist's role in the hospital*

Only 16% of the participants could correctly identify all the duties of the anaesthetist outside of the theatre environment (i.e. duties in the ICU, pain clinics and hospital resuscitation teams), while 49.9% were only aware of the theatre duties of the anaesthetists. The rest of the participants could only identify one area of duty that anaesthetists are involved in.

The mean score for section B was 14.74%.

**Socioeconomic factors associated with knowledge of anaesthesia and anaesthetists (secondary objective)**

*Place of residence*

Of the 595 participants, 56.6% lived in townships, 32.6% in suburban areas and 8.2% in informal settlements.

There was a statistically significant correlation between a participant living in a suburban area and the following:

- Their awareness that the anaesthetist provides anaesthesia ( $\chi^2 = 65.8; p < 0.001$ ).
- Their awareness that the anaesthetist and the surgeon play different roles in the operating room ( $\chi^2 = 54.8; p < 0.001$ ).
- Their awareness that it is the anaesthetist's duty to monitor the patient intraoperatively ( $\chi^2 = 18.9; p < 0.001$ ).
- Their awareness about postoperative pain management being the duty of the anaesthetist ( $\chi^2 = 8.9; p < 0.03$ ).

*Household income*

Of the 595 participants, 48.2% had caregivers who were employed and earned wages/salaries, 28.2% had caregivers who depend on social grants and 19.7% had caregivers who received a salary and a social grant.

There was a statistically significant correlation between participants who had caregivers that earned salaries independent of social grants and the following:

- Their awareness that the anaesthetists provide anaesthesia ( $\chi^2 = 46.9; p < 0.001$ ).
- Their awareness that the surgeon and anaesthetist play different roles in theatre ( $\chi^2 = 26.4; p < 0.033$ ).
- Their awareness that the anaesthetist is still responsible for the patient during the first 24 hours postoperatively ( $\chi^2 = 29.8; p < 0.001$ ).
- Their awareness that the anaesthetist is responsible for management of the patient's postoperative pain ( $\chi^2 = 21.1; p < 0.04$ ).
- Their awareness of whose role it is to monitor the patient's vital signs intraoperatively ( $\chi^2 = 28.9; p < 0.004$ ).

*Highest level of education of caregiver*

Regarding the level of education of the participants' caregivers, 7.4% only completed primary school, 59.2% had Grade 12, 8.5% held a college certificate, and 20.2% had a university degree.

There was a statistically significant correlation between respondents having caregivers with university degrees and the following:

- Their awareness that the anaesthetist provides anaesthesia ( $\chi^2 = 31.1; p < 0.001$ ).
- Their awareness that the surgeon and anaesthetist play different roles in theatre ( $\chi^2 = 48.3; p < 0.001$ ).
- Their awareness that the anaesthetist monitors vital signs during the intraoperative period ( $\chi^2 = 30.3; p < 0.016$ ).

- Their awareness that the anaesthetist is still responsible for the patient 24 hours after the surgery ( $\chi^2 = 49.4; p < 0.001$ ).

*Role of previous surgery*

Of the 595 participants, only 14.8% had undergone previous surgery, while 87.4% had no prior surgical experience.

There was no statistically significant correlation between participants who had undergone a previous surgical operation and the following:

- Their awareness that the anaesthetist administers anaesthesia ( $\chi^2 = 3.31; p < 0.19$ ).
- Their awareness about the relationship between the surgeon and the anaesthetist ( $\chi^2 = 7.159; p < 0.710$ ).
- Their awareness of the anaesthetist's responsibility to monitor blood loss and transfuse blood ( $\chi^2 = 5.16; p < 0.773$ ).
- Their awareness of the role of the anaesthetist during a resuscitation ( $\chi^2 = 1.09; p < 0.58$ ).
- Their awareness about the role of the anaesthetist in the post-anaesthetic care unit/recovery room ( $\chi^2 = 2.3; p < 0.31$ ).
- Their awareness of all the roles of the anaesthetist in the hospital ( $\chi^2 = 2.7; p < 0.251$ ).
- Their awareness of who oversees the patients' wellbeing during the first 24 hours postoperatively ( $\chi^2 = 3.34; p < 1.88$ ).

There was, however, a statistically significant correlation between participants who had previous surgery and their awareness of the anaesthetists' intraoperative duty to monitor the patient's vital signs ( $\chi^2 = 11.5; p < 0.003$ ) as well as their awareness that the anaesthetist is responsible for pain management during the first 24 hours after surgery ( $\chi^2 = 6.8; p = 0.032$ ).

**Data describing interest in anaesthesia**

Figure 1 shows that the majority of participants (73%) had not researched anaesthesia and anaesthetics; 14.4% did not respond to this question. Of the participants who had previously

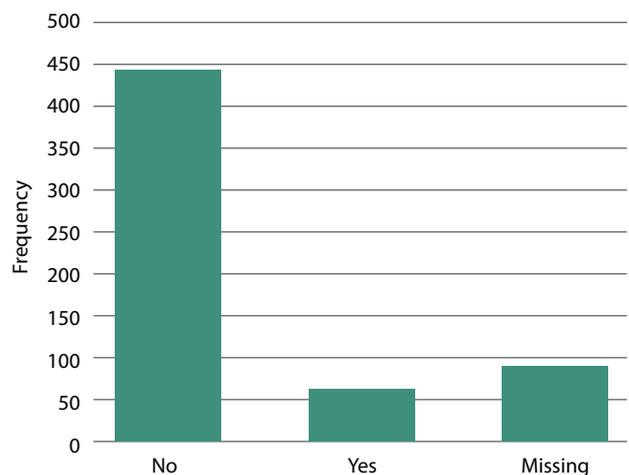


Figure 1: Previous learner-directed research about anaesthesia – responses to question posed: 'Have you ever done any research about anaesthesia?'

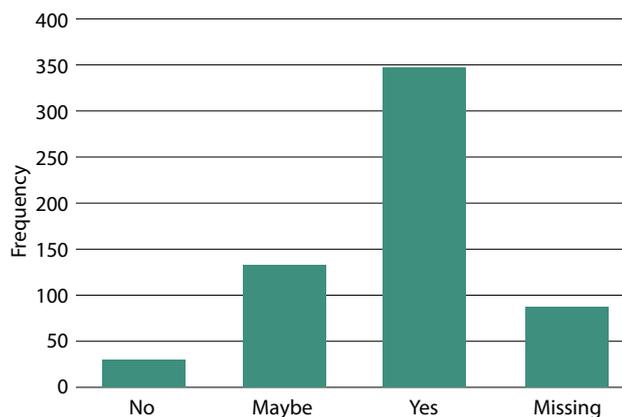


Figure 2: Impact of public medical education on healthcare costs – responses to question posed: 'Do you consider that good medical education of the public can help reduce healthcare costs and lawsuits?'

researched this topic (12.6%), 86.5% did so by using the Internet, while 13.5% had heard about anaesthesia from family members.

When the participants were asked what means were thought to be useful for updating the public about anaesthesia and anaesthetists, television and the Internet were the most favoured by 23.2% and 27.6% of the participants, respectively; while 19% of the participants wanted it to be part of the school curriculum.

Most of the participants (58.5%) believed that good public medical education can help reduce healthcare costs and medicolegal problems faced by anaesthetists, and the majority of the participants (70%) wanted an anaesthetist to provide them with detailed information about anaesthesia if they were to undergo surgery.

## Discussion

This study investigated the perceptions and knowledge of anaesthesia and anaesthetists among Grade 12 learners in four Johannesburg districts. The results showed that, overall, knowledge in this regard is lacking, and where knowledge was present, it was superficial at best.

Anaesthesia is a relatively new speciality and anaesthetists are regarded as 'hidden' doctors. Therefore, Grade 12 learners, as a subsection of the general public, are unlikely to be aware of who anaesthetists are, and are less likely to have an interest in and/or look up the role of anaesthetists.

Regarding the intraoperative duty of anaesthetists, only 11.9% of the participants were aware that the anaesthetist monitors the patient throughout surgery, a result similar to a study done by Gurunathan and Jacob<sup>8</sup> in 2004, where only 25% of the study population were aware that vital signs were monitored by the anaesthetist.

Only 7.6% of the participants thought that intraoperative monitoring of blood loss and blood transfusion was the anaesthetist, echoing results from the study by Sagün et al.<sup>9</sup> in Saudi Arabia, where only 4.8% of the study population

were aware that blood transfusion is the responsibility of the anaesthetist.

Only 10% of the study population was aware that the anaesthetist is responsible for the resuscitation of the patient during surgery, while 37% of the participants thought this was the nurses' duty and 27.1% thought the surgeon is responsible for intraoperative resuscitation. This is in contrast to the study done by Onutu et al.,<sup>19</sup> where 46.2% of the study population viewed resuscitation as a combined effort of the surgeon and anaesthetist.

In our study, only 10.3% of the participants believed that safety of the patient in the recovery unit is ensured by the anaesthetist, in contrast to a study done by Swinhoe and Groves<sup>20</sup> at The Royal Hallamshire Hospital in the United Kingdom, where the majority (55%) of the study population believed the same. The reasons for this could be multifactorial. The socioeconomic dynamics of the two countries are different. The United Kingdom is a first world country and South Africa a hybrid of first and third world elements. Arguably, public hospitals represent the third world component while the private health sector represents the first world component. This has implications on funding of health facilities, ratio of nursing staff to patients, and number of anaesthetists. It is possible that the United Kingdom has a more favourable ratio of anaesthetists to patients and, therefore, post-anaesthetic care units may be staffed with an anaesthetist overseeing nursing staff. This is in contrast to a South African system where nurses predominantly manage the recovery area, where they receive and care for postoperative patients en route to their postoperative destination.

Just over half of the participants in our study (57%) believed that nurses are in charge of the patient's postoperative pain management within the first 24 hours after surgery. This may be attributed to the fact that nurses are stationed in hospital wards where they attend to patients and carry out doctors' orders, including issuing of analgesia according to prescriptions written by doctors. Patients may be unaware that the nurse dispenses the medication which was specifically prescribed by the anaesthetist.

In our study, participants' knowledge about the roles of anaesthetists outside of the operating room was lacking. Only 16% of the participants could correctly identify all the other duties of the anaesthetists in the hospital, such as pain clinics, ICU management and intubation/resuscitation of patients in the wards and emergency rooms. This result is in keeping with a study done by Uma and Hanji<sup>6</sup> and was an expected outcome. In addition to anaesthetists being viewed as 'behind the scenes' doctors, they are also thought of as assistants to the surgeon or working under the guidance of the surgeon as the primary doctor with whom the patient is familiar. Therefore, the concept of anaesthetists working independently from surgeons is poorly understood by the public.

In our study, 88 participants (14.8%) had previously undergone surgery. However, a history of previous surgery and anaesthetic

exposure did not increase awareness about anaesthesia and anaesthetists. This was in agreement with studies by Prasad and Suresh<sup>21</sup> and Prakash et al.,<sup>11</sup> where the study populations who, despite having undergone anaesthesia themselves and interacting with an anaesthetist, still had poor understanding and knowledge about the discipline.

In contrast, in the study done in Ethiopia by Arefayne et al.,<sup>22</sup> 134 participants (43.6%) had previous surgeries and this exposure to anaesthesia did increase the level of awareness about anaesthesia and anaesthetists. Possible reasons for this discrepancy could be the fact that our study was aimed at a younger population group, with less likelihood of having undergone anaesthesia, and if they had, may have been too young to remember the event. Further, their legal guardians would have been involved in the pre-anaesthetic assessment and consent process to a greater degree. In the case of Prakash et al.<sup>11</sup> and Prasad and Suresh,<sup>21</sup> the importance of a pre-anaesthetic assessment that is not only aimed at ascertaining the patient's physical status, but also at patient enlightenment and awareness, regardless of their age, is emphasised. This is a standard that must be upheld by all anaesthetists.<sup>11,21</sup>

It was reassuring to note that the participants displayed the desire to know more about anaesthesia as a discipline. The onus rests on the anaesthetic fraternity to create awareness about the speciality.

### Study limitations

We could not extrapolate data from this study to represent the knowledge of all Grade 12 learners in Johannesburg as learners from private schools have been excluded from the study. Similarly, we could not extrapolate the data to represent the views of all Grade 12 learners in the rest of South Africa as there may be provincial differences.

A survey involving both private and public school learners is an area for future research and may yield an interesting comparative result to this study. Similarly, a countrywide study may reveal interesting provincial differences in knowledge.

The researcher relied on the honesty of the learners in completing the questionnaire.

### Conclusion

This study has shown that awareness regarding anaesthesia and anaesthetists is still lacking despite the radical growth in the field. This lack of awareness cannot be ignored; education of the general public should be intensified in order to empower people to ask the right questions as well as make informed decisions about their perioperative anaesthetic care. More than half of the participants in this study (58.5%) believed that good medical education can reduce the burden of healthcare costs and medicolegal consequences, while 70% of the respondents would request an anaesthetist to provide them with detailed information about their anaesthesia before the start of surgery. Therefore, despite lack of awareness, the majority of the par-

ticipants displayed an interest and willingness to know more about anaesthesia. Grade 12 learners would be a formidable target group for anaesthetic education campaigns.

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### Conflict of interest

The authors declare no conflict of interest.

### Ethical approval

Ethical approval for this study was obtained from the Department of Human Ethics of the University of the Witwatersrand (WITS) with clearance certificate number M210238 MED21-01-092. All participants involved signed an informed consent form.

### ORCID

PA Talane  <https://orcid.org/0000-0002-8122-0579>

A Mamoojee  <https://orcid.org/0000-0003-2334-3076>

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