Career choice of anaesthetists in a department of anaesthesiology

Grace Rajan Manjooran

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg in partial fulfilment of the requirements for the degree of Master of Medicine in the branch of Anaesthesiology.

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Declaration

I, Grace Rajan Manjooran declare that this research report is my own unaided work. It is being submitted for the Degree of Master of Medicine in the branch of Anaesthesiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

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Abstract

Background

Choosing a career in anaesthesiology depends on factors that are inherent to the profession as well as factors related to the individual. Awareness of these factors in anaesthesiology is necessary to allow recruitment based on the needs of the specialty and expectations of the individual.

Methods

A prospective, contextual, descriptive study design was followed using convenience sampling. A self-administered questionnaire from the USA was used after permission from the author was granted; and was modified for the South African context. The questionnaire was then completed by anaesthetists at the University of the Witwatersrand.

Results

Anaesthesiology was chosen as a career by 38.5% of participants whilst working as a medical officer. The main factor that influenced this choice was dealing with one patient at a time, which was chosen by more than half of the participants. Of the 130 participants, 94.6% were satisfied with their career choice and 89.2% would choose anaesthesiology as a career again.

Conclusion

The three to five-year period after medical school is crucial for doctors to develop an interest in anaesthesiology, the main factor that influenced the career choice of anaesthesiology was dealing with one patient at a time and most participants were satisfied with their career choice of anaesthesiology. This information can guide plans for recruitment in anaesthesiology, especially amongst medical students. This study provides a foundation for further research investigating these factors, and possible gender differences that were not explored in this study.

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Abbreviations

Wits	University of the Witwatersrand
PhD	Doctor of Philosophy
DA	Diploma of Anaesthesiology
FCA	Fellow of the College of Anaesthetists

Statement

The Research Report consists of a literature review, draft article, study proposal and appendices. The study proposal is included for background reference and is not for examination.

The formatting of this Research Report complies with the University of the Witwatersrand's Style Guide for Theses, Dissertations and Research Reports. The formatting of the draft article may differ from the rest of the Research Report in order to comply with the author guidelines of the South African Journal of Anaesthesia and Analgesia, the journal to which it is intended to be submitted.

Section 1: Review of the literature

1.1 Introduction

Anaesthesiology is a branch of medicine that comprises of the peri-operative management of patients and includes pain medicine and critical care (1). All surgical specialities require services from anaesthesiology to function effectively.

A career choice is defined as the selection of a type of profession (2). It depends on an individuals' personal preferences, abilities, aspirations and expectations of the profession (3). These are shaped by certain factors that influence the individual prior to making the decision to choose a career. Awareness of these factors is necessary to allow recruitment based on the needs of the specialty and expectations of the individual (4).

The Lancet Commission on Global Surgery (5) in 2015 stated that about 5 billion people out of 7 billion do not have access to safe surgical and anaesthetic treatment. The Commission recommended a ratio of 20 surgical specialists (surgeons, anaesthetists, obstetricians) per 100 000 population, to be achieved by 2030, but does not state the proportions of each discipline. In 2017 the World Federation of Societies of Anaesthesiologists (6) published a survey that was conducted globally; and recommended a minimum of 5 anaesthesiologists per 100 000 population. A study by Davies et al. (7) published in 2018, used global maternal mortality statistics and suggested a minimum standard of 4 anaesthesiologists per 100 000 population in low and middle income countries. Both the World Federation of Societies of Anaesthesiologists (6) and Davies et al. (7) consider anaesthesiologists as doctors that have further specialised in anaesthesiology (specialist anaesthetists).

South Africa is classified as an upper middle income country according to data from the World Bank (8) and has a ratio of 11.5 surgical specialists per 100 000 population (9). Personal communication with Zimmelman (CEO, South African Society of Anaesthetists) on 26 July 2019, established that South Africa has an average of 0.9 anaesthesiologists per 100 000 in the public sector, with an overall of 2.51 anaesthesiologists per 100 000 population. These statistics assume that

90% of anaesthesiologists are registered with South African Society of Anaesthetists and a South African population of 54.4 million. It does not account for doctors who are in a training program or practice anaesthesiology without a specialist qualification. This is due to the lack of accurate databases available from which to source this information.

Anaesthesiology is a discipline with low visibility due to its intrinsic nature (10); and this, coupled with South Africa's shortage of anaesthetists, necessitates recruitment to attract individuals to the specialty.

1.2 Definitive timing of choosing anaesthesiology a career choice

There is limited data on exactly when anaesthesiology as a career choice is definitively chosen. The United Kingdom Medical Careers Research Group conducts longitudinal cohort studies amongst medical school graduates of specific years in the United Kingdom (11). Surveys are conducted at regular intervals and the questions posed are about career intentions, career progression and factors that influence their choices (11). Numerous publications have arisen from the data collected. In 2005 Turner et al. (12) showed that 7.7% of graduates chose anaesthesiology at one year after graduation and 8.1 % of graduates chose anaesthesiology at three years after graduation. In addition, the percentage of graduates selecting anaesthesiology as a career choice one year after qualification increased from 5 – 12% over the 28-year study period. In 2018 Lambert et al. (13) showed a further increase in this percentage to 15.8% amongst the graduates of 2015. Goldacre et al. (14) reported that of the doctors who were anaesthesiologists at 10 years after graduation 52.5%, 81.4% and 92.6% had chosen anaesthesia as their first choice at 1, 3 and 5 years after leaving medical school. They concluded that final career destinations were more likely to match chosen fields at three and five years after leaving medical school, and that the larger increase was at three years thus demonstrating the key period of formation of career choices amongst doctors (14). These findings were echoed by Emmanouil et al. (15) in 2017 where 60%, 80% and 92.6% of anaesthesiologists at 10 years after medical school, had chosen the specialty at 1, 3 and 5 years after graduation.

A study conducted in Delhi, India by Tyagi et al. (16), published in 2012, found that 80% of anaesthesiology trainees had chosen anaesthesiology as a career at the end of internship (16). There is no literature identified in South Africa regarding when the career choice of anaesthesiology was definitively made.

There are two studies from South Africa that were conducted amongst final year medical students that focused on their future career intentions. In 2003, Dambisya (17) reported only 1.2% of final year medical students at Walter Sisulu University chose anaesthesiology as a specialty preference. In 2017, Gqiba et al. (18) published a study that was conducted amongst medical students at the University of Kwa-Zulu Natal in South Africa. The authors reported that anaesthesiology ranked as number four in popularity as a future career choice (18).

1.3 The factors that influence career choice

Numerous factors influencing career choice in anaesthesiology have been described. Most of the literature has focused on career choices of graduating medical students. The majority of factors identified by trainees in anaesthesiology, were related to the intrinsic nature of anaesthesiology, such as “hands-on” (44 – 95%), immediate gratification with the work as results are seen almost immediately (31 – 85%) as well as the applicability of physiology and pharmacology (21 – 62.8%) (16, 19-24).

Exposure to specific role models and mentors within the field has been identified as a contributing factor in career choice, both in anaesthesiology and other specialties (21, 25-27). It has played a more important role amongst undergraduate than postgraduate students (16, 22, 23). Some studies have, however, reported that role models were not identified as an influence (16, 22). In South Africa, Gardner et al. (28) reported that significantly more men stated a role model as an influence in choosing anaesthesiology as a career.

Several studies found that undergraduate and postgraduate exposure to the specialty was an important factor (12, 15, 18, 21, 25, 29-32). Studies conducted in low and middle income countries have also found that increased exposure to anaesthesiology at an undergraduate level, as well as during internship, improved

the likelihood of choosing anaesthesiology as a career (16, 30, 33). This is in keeping with findings from other specialties that found prior exposure to be an important factor (26, 34).

Remuneration and prestige were not found to be significant factors in an Australian study (25). Earning potential was found not to be a significant factor in British, Canadian and American studies (12, 19-22, 24). This is in contrast to a study done in India where 67.7% of respondents chose anaesthesiology for its earning potential (16). A study from Pakistan also identified financial considerations as the second most influential factor but did not specify a percentage (23). Reasons for these findings were not explored in the studies.

Time off work and acceptable working hours were two factors that became increasingly popular reasons given by doctors over the years (12, 15, 21, 24). The implementation of duty hour restrictions at the Mayo Clinic in 2001 resulted in time off work becoming a less important factor in a study by Augustin et al (19). This was attributed to residents feeling that they needed more clinical time as trainees.

Other factors that were identified in a study in Scotland amongst anaesthesiology trainees showed that job satisfaction, support and enthusiasm from senior colleagues, structured training and the nature of work were important (21).

Differences between gender have been identified, with women increasingly opting for specialties allowing for part-time work (25, 28, 35). An Australian study in 2002 surveying 488 individuals found that a significantly greater number of women (39.7%) compared to men (8.7%) chose anaesthesiology because of controllable working hours, with specific emphasis on the ability to work part-time (25). A 2016 study conducted in Switzerland found that more female anaesthesiologists worked part-time than full-time due to family obligations (35). An Indian study also found that 66% of females considered time with family when choosing anaesthesiology as a career (16). This contrasts with studies done in the UK, published in 2005, 2017 and 2018, that reported an increase in men choosing anaesthesiology (12, 13, 15). Emmanouil et al. (15) stated acceptable hours as a major influence amongst men. Turner et al. (12) also reported anticipated working hours as an influential factor in both men and women.

On the African continent as well as in other developing countries, studies have focused on anaesthesiology as a career choice (16, 23, 30-33, 36). Their findings are similar to those in developed countries (12, 19-21). In South Africa, limited studies were identified that described factors that influence the choice of anaesthesiology as a career. A study, published in 2017, conducted amongst medical students at the University of Kwa-Zulu Natal in South Africa ranked anaesthesiology as number four in popularity as a future career choice (18). A study by Dambisya (17), published in 2003, reported only 1.2% of final year medical students at Walter Sisulu University chose anaesthesiology as a specialty preference. De Vries et al. (37) conducted a study amongst all final year medical students in South Africa between 2007 and 2008. The study reported “plans to have a family”, “acceptable hours of practice” and “intellectual challenge” as the top three factors that influence choice of specialty. Gardner et al. (28) conducted a study amongst South African anaesthetists and found that anaesthesiology as a career was chosen because of its academic appeal and career opportunities. They reported that significantly more women chose anaesthesiology due to better family life suitability, and significantly more men chose anaesthesiology due to the influence of a role model (28).

1.4 Satisfaction with choice of career

An employee’s positive sense towards their job can be defined as job satisfaction (38). Job satisfaction has been shown to improve the well-being of the individual doctor as well as improving the doctor-patient relationship and work outcomes (36). Various factors affect job satisfaction of anaesthetists. Positive factors were associated with the intrinsic nature of anaesthesiology, good working environment, productive interactions with patients, colleagues and management (39-41), as well as a good work-life balance (39). Negative factors include time constraints, adverse working environments, poor working relationships with colleagues and management and a lack of autonomy in the workplace (39-41).

Multiple studies have been conducted focusing on job satisfaction amongst anaesthetists. The identified studies, all using questionnaires or surveys, are summarised in Table 1 for comparison. Despite the stressful nature of

anaesthesiology (10, 30, 42), these studies have described high rates (70 – 98%) of job satisfaction. Gardner et al. (28) reported career satisfaction amongst South African anaesthetists in 1999 as 82% in females and 90% in males. Sixty-five percent of South African anaesthetists reported being satisfied with their career, in a study published in 2018 (43).

There are, however, studies that have described low rates of job satisfaction within anaesthesiology. An Iranian study published in 2019 by Mousavi et al. (44) reported a mean job satisfaction of 38.36 out of 70 (54.8%). Studies conducted in Ethiopia (45-47), Nigeria (48), Pakistan (49) and China (50) have reported lower rates of job satisfaction. The authors of these studies have attributed their findings to poor working conditions (45, 47, 48, 50), low remuneration (44-46, 49, 50) and minimal recognition of work (44, 45, 49). Of note, two studies in Ethiopia described the lack of further career advancement as a contributor to low levels of job satisfaction (45, 46). Mousavi et al. (44) discovered a significant association between anaesthesiologists' job satisfaction and the intention to leave current employment.

Table 1. Studies on job satisfaction

Author Year of publication, Place	Participants	Reported job satisfaction
Dercq et al (51) 1998, Belgium	Anaesthesiologists	70%
Wass et al (20) 1999, USA	Trainees	98%
Jenkins and Wong (52) 2001, Canada	Anaesthetists	75%
Gardner et al (28) 2002, South Africa	Anaesthetists	86%
Kluger et al (39) 2003, Australia	Anaesthesiologists	71%
Lindfors et al (53) 2007, Finland	Anaesthesiologists	71%
Nyssen and Hansez (42) 2008, Belgium	Anaesthetists	80%
Shidhaye et al (54) 2011, India	Anaesthetists	78%
Koshy et al (55) 2011, India	Anaesthetists	82.6%
Singh et al (36) 2013, India, Ghana	Anaesthetists	78%
Gaszynska et al (41) 2014, Poland	Anaesthesiologists	71.32%
Bakshi et al (56) 2017, India	Anaesthetists	83%
Bocanegra-Rivera et al (57) 2018, Columbia	Anaesthesiologists	73%
Kisten and Kluyts (43) 2018, South Africa	Anaesthetists	65.6%
Shetti et al (58) 2018, India	Anaesthesiologists	81%
Looseley et al (59) 2019, UK	Anaesthetists	75.2%

1.5 Anticipated career paths

A career path is defined as a sequence of jobs that allow an individual to achieve their career goal (60). Career paths in anaesthesiology can take various forms. In South Africa, healthcare institutions are divided into public sector and private sector institutions. Anaesthesiology can be practised in either or both sectors; and can be divided into clinical or non-clinical work. Clinical work can include academic work. Non-clinical work can be divided into academic or non-academic entities. Academic anaesthesiology is mainly based at university affiliated hospitals which can be either public or private sector institutions. Non-clinical, non-academic anaesthetists do not practise anaesthesiology and are involved in roles such as management.

An academic anaesthesiologist works in a practice that forms part of a university medical school. The academic medical centres also have doctors working as clinical academic anaesthesiologists and clinical anaesthesiologists. The focus of an academic anaesthesiologist is mainly research and teaching, with a small proportion of time spent on clinical activities. A clinical academic anaesthesiologist spends a sizable portion of time in clinical activities associated with teaching of students, registrars and others, as well as caring for patients. Clinical anaesthesiologists spend all their time in service delivery and are not involved in any academic activities. All three anaesthetists are essential to the department in achieving the goals of patient care as well as completing academic obligations. All three are dependent on each other to achieve the centre’s missions of clinical service, teaching and research (61). These job descriptions are, however, not relevant to the South African setting. Anaesthesiologists working in university affiliated hospitals are employed by the hospital, resulting in service delivery being the foremost priority. South African universities do not provide academic tenure positions. Academic work is mostly done during the individuals own time. Awareness of these differentiations is important in understanding the dynamics between senior and junior anaesthesiologists; with junior anaesthesiologists completing more clinical work than senior anaesthesiologists.

An academic career can provide essential training and teaching for the next generation, the opportunity to conduct research and to practice the best care possible for patients. Academics also have job flexibility with regard to the roles they play at different periods of their career (62). Studies have focused on factors that may influence graduate's choice of a career path into academia and several themes have been identified. These can be broadly categorised as having prior exposure to research, opportunities for career progression and adequate career support (63-65).

Straus et al. (63) published a systematic review in 2006 which reported that the most influential factor that attracts candidates to academic medicine, is a medical degree that included research as part of its training requirements at either an undergraduate or postgraduate level. Research in the training period makes the individual cognisant of research while not actively pursuing it (66). Thus, having an interest in conducting research propels them towards an academic career. Khan et al. (65) reported that 34% of anaesthesiology residents were interested in pursuing research in the future. Gurunathan et al. (67) reported that time constraints were the most cited reason for not performing research amongst anaesthetists in Australia and New Zealand. This study stated that only 29% of participants were involved in research at the time. Tyagi et al. (16) reported that 28.7% of trainees in their study chose anaesthesiology for its research potential. Wass et al. (24) found a statistically significant difference in the number of postgraduate anaesthesiology students wanting to conduct research between 1995 – 1996 and 2000 – 2001 cohorts, with the latter less interested in research. Augustin et al. (19) published a study that included the same cohorts, and reported even fewer students were interested in research in the 2010 – 2011 cohort. A 2019 study conducted in Singapore by Truong et al. (68) reported the lack of time and lack of mentorship as the main barriers in conducting research amongst anaesthesiology trainees. The study reported that 90% of trainees indicated that they had some level of interest in research, however, when asked to give reasons for taking part in research, 71.7% of trainees stated that they were doing it because they were required to.

Career progression can be interpreted as the development of an individual's career towards preconceived goals and entails gaining experience in a field of interest (69). A Canadian study published in 2015 reported that the desire to pursue a fellowship greatly impacted on a trainee's decision to work in an academic centre after qualifying (65). Other positive factors, identified by Straus et al. (63), that may influence career path are the person's desire to teach and the need for intellectual stimulation provided by their trainees. They reported that a mentor or role model and the person's stage of training could influence their decision to stay in the academic field. This review also reported that more senior trainees had diminished interest in staying in academia, particularly more female than male trainees.

Career support and clear career pathways positively influence the decision to enter academic practice (64). Mentorship has been observed to positively influence both career satisfaction and development (70-75). This can lead to improved recruitment and retention of individuals in an academic institution (71, 76).

Factors that can negatively affect the decision to follow an academic career were the perceived lack of autonomy, absence of career flexibility and lower financial rewards (63). These factors are also associated with lack of academic staff retention and a decline in the number of medical doctors who intend to practice in the academic sector (77).

1.6 Summary

It is important to know the factors influencing the choice of anaesthesiology as a career. This review has described the body of literature surrounding the definitive timing of choice of anaesthesiology as a career, the factors that influence that choice as well as job satisfaction and anticipated career paths in anaesthesiology.

These factors have been well described in the international literature, however, there is a paucity of data in South Africa. South Africa has a different healthcare setting and international findings may not necessarily be extrapolated locally. There are limited studies both internationally and locally about when the career choice to do anaesthesiology was made. This study will help to describe factors

that influence the decision to become an anaesthesiologist, and the timing of that decision in South Africa. This information will help guide recruitment and retention strategies that can be put in place when undertaking future workforce planning in our setting.

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All articles should include an abstract. The structured abstract for an Original Research article should be between 200 and 230 words and should consist of four paragraphs labeled Background, Methods, Results, and Conclusions. It should briefly describe the problem or issue being addressed in the study, how the study was performed, the major results, and what the authors conclude from these results. The abstracts for other types of articles should be no longer than 230 words and need not follow the structured abstract format.

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Acknowledgements

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Cite references in numerical order in the text, in superscript format (Format> Font> Click superscript). Please do not use brackets or do not use the foot note function of MS Word.

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The following are sample references:

1. Jun BC, Song SW, Park CS, Lee DH, Cho KJ, Cho JH. The analysis of maxillary sinus aeration according to aging process: volume assessment by 3-

dimensional reconstruction by high-resolutional CT scanning. Otolaryngol Head Neck Surg. 2005 Mar;132(3):429-34.

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Section 3: Draft article

Career choice of anaesthetists in a department of anaesthesiology

Grace Manjooran, MBBCh, DA (SA), FCA (SA)

Juan Scribante, PhD

Helen Perrie, MSc

Cara Redelinghuys, MBBCh, DA (SA), FCA (SA), MMed (Anaes)

Department of Anaesthesiology, School of Clinical Medicine, Faculty of Health Sciences, University of the Witwatersrand

Corresponding Author

Dr G Manjooran

Department of Anaesthesiology
Chris Hani Baragwanath Academic Hospital
26 Chris Hani Rd
Diepkloof, Soweto
Johannesburg
1860

gracemanjooran@gmail.com

011 933 1843

Key words: Career path, career choice, anaesthetists, anaesthesiologists

Abstract

Background

Choosing a career in anaesthesiology depends on factors that are inherent to the profession as well as factors related to the individual. Awareness of these factors in anaesthesiology is necessary to allow recruitment based on the needs of the specialty and expectations of the individual.

Methods

A prospective, contextual, descriptive study design was followed using convenience sampling. A self-administered questionnaire from the USA was used after permission from the author was granted; and was modified for the South African context. The questionnaire was then completed by anaesthetists at the University of the Witwatersrand.

Results

Anaesthesiology was chosen as a career by 38.5% of participants whilst working as a medical officer. The main factor that influenced this choice was dealing with one patient at a time, which was chosen by more than half of the participants. Of the 130 participants, 94.6% were satisfied with their career choice and 89.2% would choose anaesthesiology as a career again.

Conclusion

The three to five-year period after medical school is crucial for doctors to develop an interest in anaesthesiology, the main factor that influenced the career choice of anaesthesiology was dealing with one patient at a time and most participants were satisfied with their career choice of anaesthesiology. This information can guide plans for recruitment in anaesthesiology, especially amongst medical students. This study provides a foundation for further research investigating these factors, and possible gender differences that were not explored in this study.

Introduction

Career choice is defined as the selection of a type of profession.[1] It depends on an individuals' personal preferences, abilities, aspirations and expectations of the profession.[2] These are shaped by certain factors that influence the individual prior to making the decision to choose a career.

Numerous factors influencing career choice in anaesthesiology have been described. Previously personality and intrinsic aspects of the job were marked as important influences in choosing anaesthesiology as a career.[3, 4] Recent literature has seen the emergence of a manageable lifestyle and better working conditions as more important.[5, 6] Other key influences noted were under-graduate and post-graduate exposure to the specialty, and role models within the specialty.[3, 6] Additional factors identified have to do with the intrinsic nature of anaesthesiology, such as being "hands-on" and practical, immediate gratification with the work, as results are seen almost immediately, as well as the applicability of physiology and pharmacology.[4, 6-8] Differences between gender have been identified, with women increasingly opting for specialties allowing for part-time work.[3, 9]

On the African continent as well as other developing countries, studies have focused on anaesthesiology as a career choice.[10-15] These countries have a severe shortage of anaesthetists. Their findings are similar to those in developed countries.[6-8, 16] Studies have found that increased exposure to anaesthesiology at an under-graduate level as well as during internship, improved the likelihood of choosing anaesthesiology as a career choice.[11, 15]

In South Africa, limited studies were identified that described factors that influence the choice of anaesthesiology as a career. A study in 2017 conducted amongst medical students at a university in South Africa found that anaesthesiology ranked as number four in popularity as a future career choice.[17] The study also found increasing exposure to anaesthesiology at an under-graduate level can improve the perceptions of medical students.[17] Another study found lifestyle factors to be an important factor when considering a specialty as a career.[18] Gardner et al.[9] found that anaesthesiology as a career was chosen because of its academic appeal or career opportunities.

An in-depth study describing factors that influence the decision to become an anaesthesiologist, and the timing of that decision, has not been researched in South Africa. The aim of this study was to describe the career choice of anaesthetists in the Department of Anaesthesiology at the University of the Witwatersrand (Wits).

Methods

Approval to conduct this study was obtained from the Wits Human Research Ethics Committee (Medical) and other relevant authorities. A prospective, contextual, descriptive research design was followed in this study.

The study population consisted of all anaesthetists working in the Department of Anaesthesiology at Wits in Johannesburg, South Africa. A convenience sampling method was used and the sample size was realised by the response rate. Questionnaires were administered to the entire accessible population. The total staff complement of the department is 208. A minimum response rate of 60% (125) was considered acceptable.[19] Interns were excluded from the study.

Following a literature review, a self-administered questionnaire that was developed by Wass et al.[8] in 1999 and most recently used in 2013[7] was identified. Permission was obtained from the authors to use and adapt the questionnaire. Parts of the questionnaire were modified to contextualise it to the South African setting. The questionnaire was then reviewed by three anaesthesiologists to achieve face and content validity, after which minor adjustments were made. The questionnaire contained three parts. Part A consisted of demographic questions. Part B comprised of eight questions pertaining to career choice. Part C contained three questions that focused on the career path of the anaesthetist

Anaesthetists were informed of the study and invited to participate at academic meetings. Those willing to participate were given the information sheet and the questionnaire. The author (GM) was available to answer any queries. The completed questionnaires were returned into a sealed data collection box which was placed at the exit of the venue. Blank and incomplete questionnaires (the

sections on factors influencing choice of career were not completed) were used for response rate calculation but were not included in the statistical analysis of Part B.

Data was captured onto a Microsoft Excel spreadsheet and analysed in consultation with a biostatistician using Stata version 15 (StataCorp, USA). Descriptive and inferential statistics were used. Categorical data were described using numbers and percentages. For the Likert scale data, major and minor positive were grouped together as were major and minor negative. The choice of neutral was removed from the analysis for the comparisons. Comparisons were done using Chi-square tests. A p-value of <0.05 was considered statistically significant.

Data from Question 1 and 2 in Part C (reasons for choice of location of practice) will be categorised based on the description of the answer, i.e. academic interest for self, academic interest for others (teaching at under-graduate and post-graduate level), renumeration, quality of life, other, etc). Only qualifications that are recognised by a university or the Health Professions Council of South Africa were included in the analysis of Question 3, Part C. Incomplete questionnaires will be included in the study for response rate calculation and in the analysis of sections A and C, if completed. They will however not be included in the statistical analysis of Section B of the questionnaire.

Results

A total of 133 questionnaires were distributed of which 130 (97.7%) completed questionnaires were returned. This represents 62.5% of anaesthetists in the department. Table I shows participant characteristics.

Table I. Participant characteristics

Professional designation	Medical officer n (%)	Registrar n (%)	Consultant n (%)	Total n (%)
Number	17 (13.1)	57 (43.8)	56 (43.1)	130 (100)
Age (n=130)				
• 25 – 35	14 (82.4)	48 (84.2)	14 (25.0)	76 (58.5)
• 36 – 45	3 (17.6)	8 (14.0)	23 (41.0)	34 (26.1)
• 45 – 55	0 (0)	1 (1.8)	9 (16.1)	10 (7.7)
• 56+	0 (0)	0 (0)	10 (17.9)	10 (7.7)
Gender (n=130)				
• Male	8 (47.1)	16 (28.1)	22 (39.3)	46 (35.4)
• Female	9 (52.9)	41 (71.9)	34 (60.7)	84 (64.6)
University of undergraduate training (n=130)				
• Witwatersrand	5 (29.4)	30 (52.6)	32 (57.1)	67 (51.5)
• Cape Town	1 (5.9)	3 (5.3)	4 (7.1)	8 (6.2)
• Kwa-Zulu Natal	3 (17.6)	2 (3.5)	3 (5.4)	8 (6.2)
• Pretoria	3 (17.6)	12 (21.1)	9 (16.0)	24 (18.6)
• Free State	2 (11.8)	2 (3.5)	1 (1.8)	5 (3.9)
• Stellenbosch	0 (0)	2 (3.5)	1 (1.8)	3 (2.3)
• Walter Sisulu*	0 (0)	3 (5.3)	1 (1.8)	4 (3.0)
• Sefako Makgatho†	2 (11.8)	1 (1.7)	3 (5.4)	6 (4.6)
• Other	1 (5.9)	2 (3.5)	2 (3.6)	5 (3.8)
Level of hospital for internship (n=129)				
• District	0 (0)	1 (1.7)	2 (3.6)	3 (2.3)
• Regional	4 (23.5)	7 (12.3)	7 (12.7)	18 (13.9)
• Tertiary	7 (41.2)	14 (24.6)	13 (23.7)	34 (26.4)
• Central	5 (29.4)	32 (56.1)	27 (49.1)	64 (49.6)
• Other	1 (5.9)	3 (5.3)	6 (10.9)	10 (7.8)

*Formerly known as Unitra; † formerly known as Medunsa

All participants had performed internship, only 1 (0.8%) participant did not specify the institution. Of the 120 (92.3%) participants who had been exposed to anaesthesiology during internship, 87 (72.5%) participants had received 2 months of anaesthesiology exposure. The exposure to anaesthesiology during internship ranged from 0 to 7 months. Ninety-eight (76%) participants had performed internship at tertiary and central hospitals.

During community service, 67 (51.5%) participants worked in anaesthesiology. Of those, 62 (92.5%) responses indicated the institution and how much exposure they had. Six (9.7%) participants had worked at a district hospital, 21 (33.9%) at a regional hospital, 29 (46.7%) at a tertiary hospital and 5 (8.1%) at a central hospital. One (1.6%) participant worked at 1 Military Hospital. Eleven (17.7%) participants had less than 6 months of exposure and 51 (82.3%) had 6 – 12 months. Sixty-three (48.5%) participants did not participate in community service or were not exposed to anaesthesiology during community service.

It was indicated by 102 (78.5%) participants that they had given anaesthestics as a medical officer, of which 1 (0.9%) did not specify the institution where this time was spent. Some participants had worked at more than 1 hospital; thus, the total number of hospitals was 120. Five (4.9%, n=101) participants worked at a district hospital, 27 (26.7%) at a regional hospital, 24 (23.8%) at a tertiary hospital, 59 (58.4%) at a central hospital and 5 (4.9%) worked at 1 Military Hospital and other international hospitals. Of the 102 participants, 90 (88.2%) participants specified how many months of exposure they had experienced; 12 (13.3%) had 1 – 6 months, 40 (44.4%) had 7 – 12 months, 23 (25.6%) had 13 – 24 months and 15 (16.7%) had more than 25 months of experience. Table II shows when anaesthesiology as a career was definitively chosen by the 130 participants.

Table II. When anaesthesiology as a career was definitively chosen

Professional designation	Number (%)
Medical officer	50 (38.5)
Intern	38 (29.2)
Community service medical officer	24 (18.5)
Medical student	11 (8.5)
Registrar in another field	4 (3.0)
General practitioner	2 (1.5)
Specialist in another field	1 (0.8)

Figure 1 shows the factors that influenced career choice and was completed by 120 (92.3%) participants.

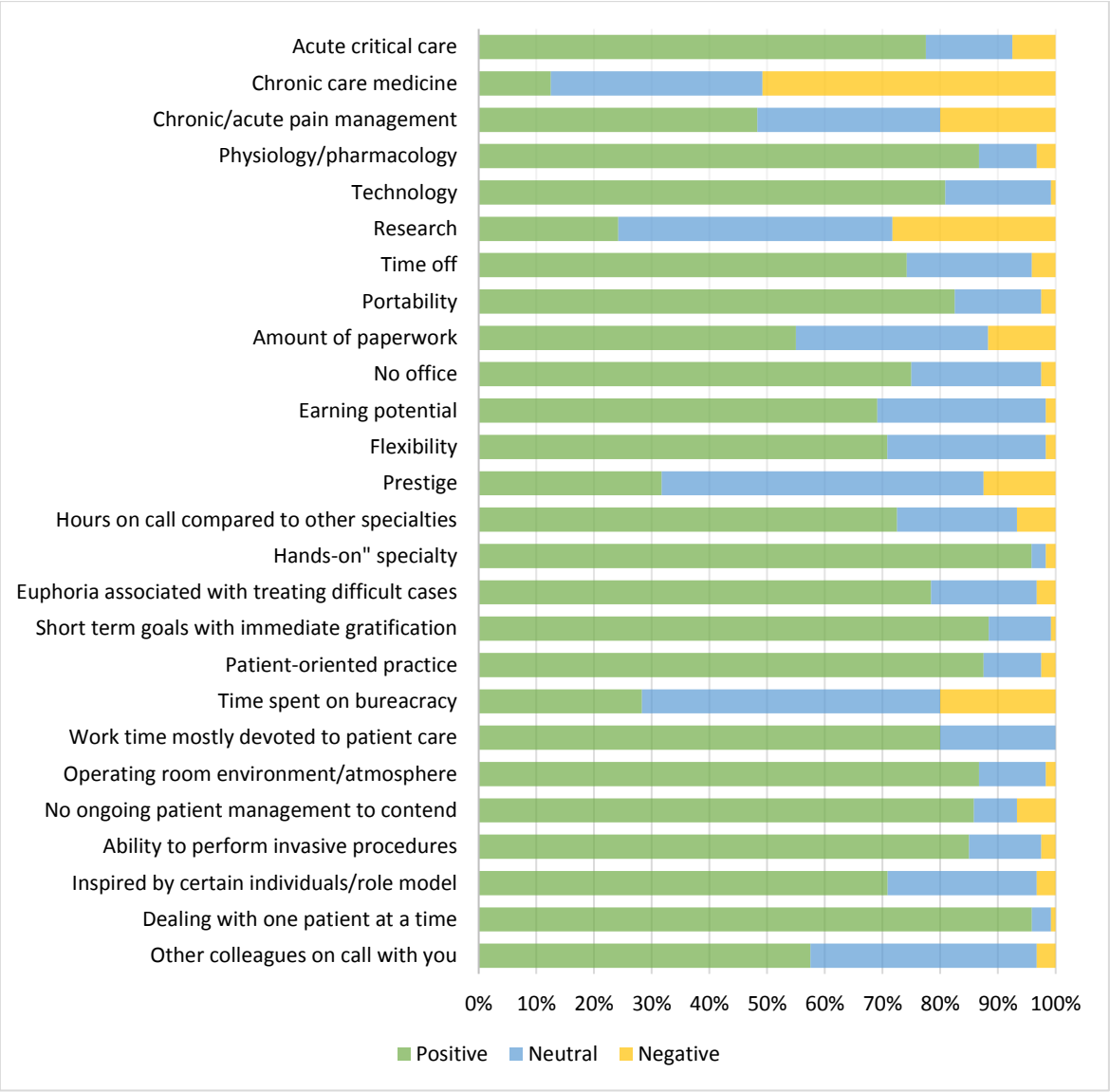

Figure 1. Factors that influence career choice

Participants were asked to choose 3 factors, from the factors they chose as positive, that they felt were the most influential in selecting anaesthesiology as a career. Four female participants did not answer the question. Table III shows the factors selected by participants. Twenty-four of the 26 factors presented to the participants were chosen. Six (4.8%) participants responded with “Lifestyle” as an option which is encompassed by eight individual factors. No other factors were added by participants.

Table III. Top factors influencing the selection of anaesthesiology as a career

Factors	Male n=46 n (%)	Female n= 80 n (%)	Total n=126 n (%)
Dealing with one patient at a time	24 (52.2)	46 (57.5)	70 (55.6)
No ongoing patient management to contend with	16 (34.8)	21 (26.3)	37 (29.4)
“Hands-on” specialty	11 (23.9)	22 (27.5)	33 (26.2)
Physiology/pharmacology	11 (23.9)	12 (15.0)	23 (18.3)
Patient-oriented practice	6 (13.0)	16 (20.0)	22 (17.5)
Operating room environment/atmosphere	5 (10.9)	17 (21.3)	22 (17.5)
Acute critical care	8 (17.4)	13 (16.3)	21 (16.7)
Short term goals with immediate gratification of one’s own work	7 (15.2)	13 (16.3)	20 (15.9)
Inspired by certain individual/role model	5 (10.9)	11 (13.8)	16 (12.7)
Hours on call compared to other specialties	6 (13.0)	10 (12.5)	16 (12.7)
Euphoria associated with treating difficult cases	6 (13.0)	9 (11.3)	15 (11.9)
Time off	3 (6.5)	10 (12.5)	13 (10.3)
Flexibility to work as a group/job sharing	6 (13.0)	5 (6.3)	11 (8.7)
Ability to perform invasive procedures	2 (4.3)	5 (6.3)	7 (5.6)
Degree of portability	3 (6.5)	4 (5.0)	7 (5.6)
Lifestyle	4 (8.7)	2 (2.5)	6 (4.8)
Prestige	2 (4.3)	3 (3.8)	5 (3.9)
Immediate earning potential upon starting private practice	1 (2.2)	4 (5.0)	5 (3.9)
Technology applied to patient management	2 (4.3)	3 (3.8)	5 (3.9)
Chronic/acute pain management	2 (4.3)	2 (2.5)	4 (3.2)
No office to maintain	1 (2.2)	2 (2.5)	3 (2.4)
Amount of paperwork	2 (4.3)	0 (0)	2 (1.6)
Chronic care medicine	0 (0)	1 (1.3)	1 (0.8)
Time spent on bureaucracy	0 (0)	1 (1.3)	1 (0.8)
Work time mostly devoted to patient care	1 (2.2)	0 (0)	1 (0.8)

One hundred and twenty-three (94.6%) participants said they were satisfied with their career choice, with 1 (0.8%) participant answering “sometimes” and 6 (4.6%) that were not satisfied. Of the male participants, 44 (95.7%) were satisfied, as were 79 (94.0%) females. Anaesthesiology as a career would be chosen again by 116 (89.2%) participants: 42 (91.3%) males and 74 (88.1%) females.

Figure 2 shows the setting where the participant worked or would like to work upon qualification. Eighteen participants did not answer the question: 1 (1.8%) consultant, 15 (26.3%) registrars and 2 (11.8%) medical officers. No participants chose to work at a public non-academic setting. One registrar (1.8%) and 2 medical officers (11.8%) chose “Other” as an option; 1 was undecided while 2 specified private public partnership.

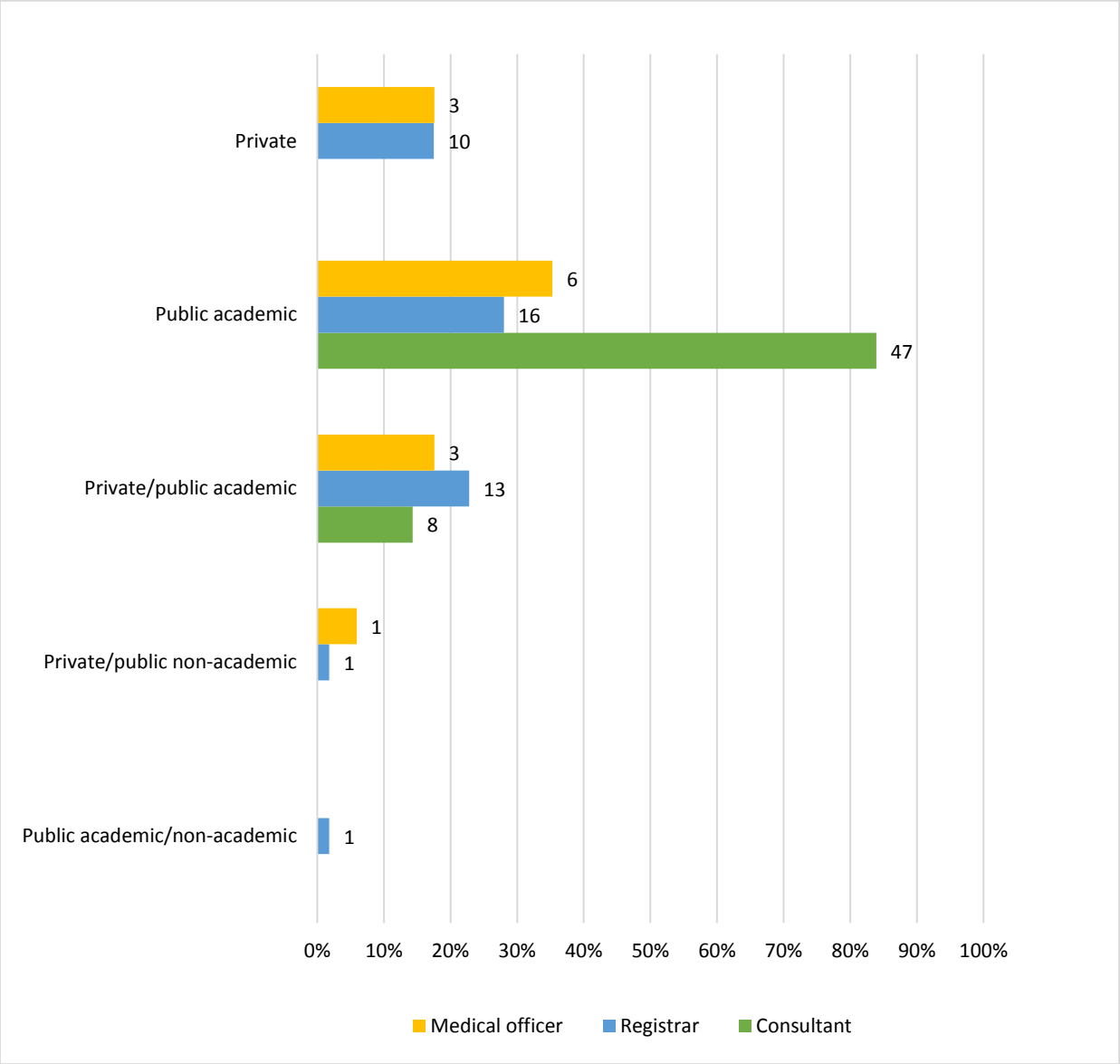

Figure 2. Place of work upon qualification

Table IV lists the reasons for choosing why participants would work in a specific setting upon qualification. The same 18 participants did not answer the question.

Table IV. Reasons for choice of place of work upon qualifying

Reason	Consultant n=55 n (%)	Registrar n=42 n (%)	Medical Officer n=15 n (%)
Personal career improvement	23 (41.8)	11 (26.2)	7 (46.7)
Academic profile of workplace	15 (27.3)	3 (7.1)	3 (20.0)
Exposure to variety of medical disciplines/cases	12 (21.8)	4 (9.5)	2 (13.3)
Teaching/pay it forward	11 (20.0)	15 (35.7)	3 (20.0)
Money/stable income	8 (14.5)	9 (21.4)	3 (20.0)
Support of colleagues	6 (10.9)	5 (11.9)	2 (13.3)
Control of hours	5 (9.1)	7 (16.7)	3 (20.0)
Easy to stay on	5 (9.1)	0 (0)	0 (0)
Family interests	4 (7.3)	3 (7.1)	1 (6.7)
Research	4 (7.3)	2 (4.8)	0 (0)
Ability to do work independently	1 (1.8)	0 (0)	0 (0)
Job security	1 (1.8)	0 (0)	0 (0)
Work environment	0 (0)	5 (11.9)	2 (13.3)
Serving community	0 (0)	5 (11.9)	2 (13.3)
No senior staff	0 (0)	2 (4.8)	1 (6.7)
Choose own colleagues	0 (0)	2 (4.8)	1 (6.7)
No racial tension	0 (0)	1 (2.4)	0 (0)
Curriculum vitae (for emigration purposes)	0 (0)	1 (2.4)	0 (0)
No stress of supervising others	0 (0)	1 (2.4)	0 (0)
Fear of litigation	0 (0)	0 (0)	1 (6.7)
Possible implementation of National Health Insurance	0 (0)	0 (0)	1 (6.7)

Figure 3 shows the different postgraduate qualifications that the participants have done or would like to do. “Other” included qualifications that were non-medical. This question was answered by 27 (48.2%) consultants, 30 (52.6%) registrars and 10 (58.8%) medical officers.

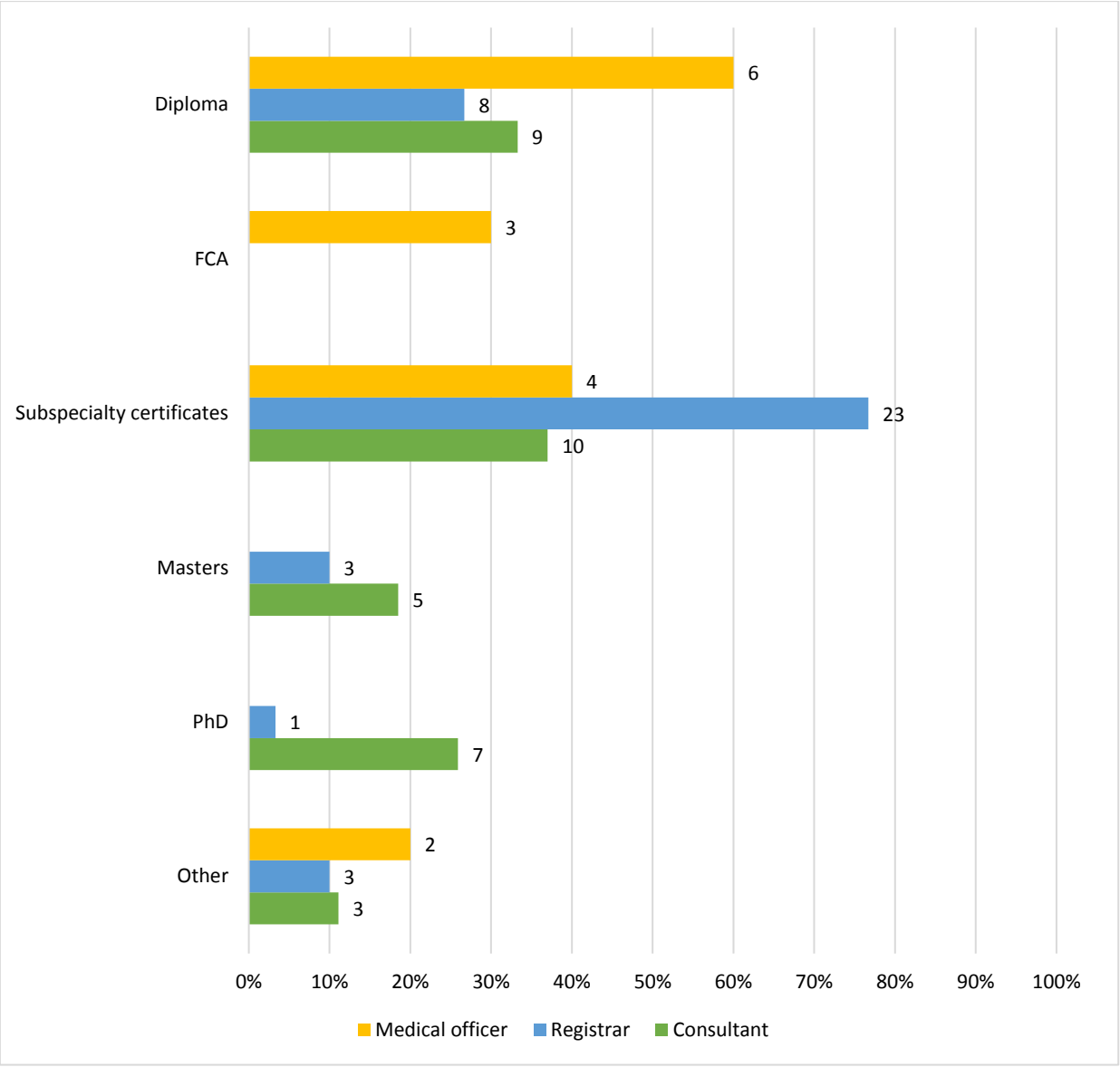

Figure 3. Postgraduate qualifications that participants indicated they have done or would like to do

Table V compares the factors that influenced career choice between male and female participants. Only questionnaires that were filled in completely were used for this analysis, therefore 1 (2.2%) male and 9 (10.7%) female participants' questionnaires were excluded.

Table V. Factors that influenced career choice in male and female participants

Factors	Males (n=45)	Females (n=75)	p-value
Aspects of anaesthesiology care	**Positive (%) / Negative (%)**		
Acute critical care	34 (75.6)/3 (6.7)	59 (78.7)/6 (8.0)	0.848
Chronic care medicine	9 (20.0)/17 (37.8)	6 (8.0)/44 (58.7)	0.010
Chronic/acute pain management	24 (53.3)/6 13.3)	34 (45.3)/18 (24.0)	0.153
Physiology/pharmacology	41 (91.1)/1 (2.2)	63 (84.0)/3 (4.0)	0.540
Technology applied to patient management	35 (77.8)/0 (0)	62 (82.7)/1 (1.3)	0.528
Research	12 (26.7)/9 (20.0)	17 (22.7)/25 (33.3)	0.291
Lifestyles of anaesthesiologists			
Time off	35 (77.8)/0 (0)	54 (72.0)/5 (6.7)	0.208
Degree of portability	39 (86.7)/0 (0)	60 (80.0)/3 (4.0)	0.353
Amount of paperwork	25 (55.6)/6 (13.3)	41 (54.7)/8 (10.7)	0.868
No office to maintain	34 (75.6)/0 (0)	56 (74.7)/3 (4.0)	0.382
Immediate earning potential upon starting private practice	29 (64.4)/0 (0)	54 (72.0)/2 (2.7)	0.295
Flexibility to work as a group/job sharing	32 (71.1)/0 (0)	53 (70.7)/2 (2.7)	0.535
Prestige	14 (31.1)/2 (4.4)	24 (32.0)/13 (17.3)	0.107
Hours on call compared to other specialties	30 (66.7)/2 (4.4)	57 (76.0)/6 (8.0)	0.211
Nature of the specialty			
“Hands-on” specialty	41 (91.1)/2 (4.4)	74 (98.7)/0 (0)	0.101
Euphoria associated with treating difficult cases	35 (77.8)/1 (2.2)	59 (78.7)/3 (4.0)	0.828
Short term goals with immediate gratification in one’s own work	37 (82.2)/1 (2.2)	69 (92.0)/0 (0)	0.178
Patient-oriented practice	39 (86.7)/2 (4.4)	65 (86.7) /1 (1.3)	0.553
Time spent on bureaucracy	14 (31.1)/10 (22.2)	20 (26.7)/14 (18.7)	0.697
Work time mostly devoted to patient care	36 (80.0)/0 (0)	60 (80.0)/0 (0)	1.000
Operating room environment/atmosphere	38 (84.4)/1 (2.2)	66 (88.0)/1 (1.3)	0.747
No ongoing patient management to contend with	39 (86.7)/2 (4.4)	64 (85.3)/6 (8.0)	0.696
Ability to perform invasive procedures	40 (88.9)/1 (2.2)	62 (82.7)/2 (2.7)	0.637
Inspired by certain individuals/role model	36 (80.0)/0 (0)	49 (65.3)/4 (5.3)	0.122
Dealing with one patient at a time	44 (97.8)/1 (2.2)	71 (94.7)/0 (0)	0.129
Other colleagues on call with you	24 (53.3)/1 (2.2)	45 (60.0)/3 (4.0)	0.608

Discussion

This is the first South African study to our knowledge that has focused on career choice in anaesthesiology in medical doctors. The study was conducted amongst anaesthetists working in university affiliated hospitals (central, tertiary and regional level public hospitals) in the Department of Anaesthesiology at Wits. Anaesthesiology as a career was chosen whilst a medical officer by 38.5% of participants, followed by internship (29.2%) and then as a community service medical officer (18.5%). Studies in the United Kingdom have shown that anaesthesiology as a career was chosen increasingly at three[5, 16, 20] and five years[5, 20] after graduation from medical school. This is in keeping with the results of this study, because in South Africa a doctor can only become a medical officer three years after graduation from medical school. A study in India, however, showed that most participants chose this career at the end of internship.[15] Interestingly, very few participants (8.5%) in our study chose anaesthesiology as a medical student. This may be due to the insufficient exposure to the discipline during undergraduate training. This concurs with other studies that reported an increased exposure to the discipline resulting in it being chosen as a future career.[3, 5, 6, 13-16] In addition, studies performed solely on medical students showed that anaesthesiology was infrequently indicated as a career choice; this was attributed to insignificant exposure during undergraduate training.[11, 12, 17, 21, 22] Increasing undergraduate exposure to anaesthesiology should be considered to improve the visibility of the discipline amongst medical students.

A notable finding in our results was that the 76% of participants had performed internship at a tertiary or central hospital, 54.8% had been in anaesthesiology at tertiary or central hospitals during community service, and 82.2% had some exposure during medical officer time at tertiary or central hospitals. The higher standard of anaesthesiology care provided at these hospitals might be a reason these participants chose anaesthesiology as a career.

The top five factors reported in this study as most influential in choosing anaesthesiology are dealing with one patient at a time (55.6%), no ongoing patient management to contend with (29.4%), “hands-on” specialty (26.2%), physiology/pharmacology (18.3%) and patient-oriented practice (17.5%) or

operating room environment (17.5%). These factors are related to the practice of anaesthesiology. This is in keeping with prior studies that found factors related to the intrinsic nature of the discipline to be the most influential in choosing anaesthesiology as a career.[3, 4, 6-8, 15, 23, 24] A study by Gardner et al.[9] in 2002, reported academic appeal and career opportunity as the most influential reasons for career choice amongst South African anaesthetists. These were not factors included in the questionnaire in this study, but none of the respondents indicated these as additional factors when asked to add any other factors.

Of note, two factors were not chosen at all: other colleagues on call with you and research. Anaesthetists in the hospitals where this study was conducted always have someone else available for advice and assistance. This is possibly the reason why having other colleagues on call with you was not considered an influential factor. Research was seen by 24.2% of respondents as a positive influence, however no participants had chosen research as one of their top three influences in choosing anaesthesiology as a career. This finding is in keeping with other studies that reported lower numbers of residents showing an interest in conducting research.[7, 24-27] Time constraints have been cited as the most common reason for not pursuing research in these studies. The low levels of interest in research found in our study is concerning and warrants further investigation.

Prestige and earning potential were found to not be substantial influences when choosing a career in anaesthesiology; as were other lifestyle factors such as time off and hours on call. This is in keeping with findings from developed countries.[3, 4, 6-8, 16, 24] In contrast, studies from India[15] and Pakistan[23] found earning potential and remuneration to be highly influential factors. Tyagi et al.[15] and Khan et al.[23] did not elaborate on their findings, but it may possibly be due to different remuneration systems in those countries.

Being inspired by an individual or role model was cited by only 12.7% of participants as a positive influence. There is conflicting literature on this notion. Some studies[3, 6] report it to be an influential factor, however, other studies have found it not to be as influential as expected[4, 15, 23]. Gardner et al.[9] found that significantly more men stated a role model as an influence in choosing

anaesthesiology as a career. No significant differences were observed between male and female participants in our study.

Chronic care medicine is not generally associated with anaesthesiology. Although anaesthetists must be aware of the various chronic disease states and their impact on patients, they are not directly involved in the long-term management of the disease. Anaesthesiology is predominantly involved in the acute perioperative setting. A significant difference between men and women was only found with regards to chronic care medicine, where more women viewed it as a negative factor. This factor was not mentioned to have a substantial influence on career choice in other studies.[7, 8, 24] The statistically significant difference between men and women in our study could not be explained.

Of the 130 participants, 94.6% participants were satisfied with their career choice and 89.2% participants would choose anaesthesiology as a career again. This result is in keeping with other studies that have high rates of satisfaction with anaesthesiology as a career.[8, 9, 24, 28] Satisfaction between males and females were comparable and was in keeping with the findings of other studies.[9, 28, 29]

Of the 56 consultant anaesthesiologists that participated, 83.9% worked in the public academic setting upon qualification. The group cited personal career improvement as the prime reason for their choice of work setting. Personal career improvement can include research and subspecialty training. Nineteen (33.9%) consultants indicated that they would like to or have studied towards other diplomas or subspecialty certificates. Five (8.9%) stated that they would like to or have achieved a master's degree while 7 (12.5%) reported that would like to or have attained a doctoral degree. The registrar group chose to work between private practice and the public academic setting, either alone or together. Reasons for these choices, in order of majority, were teaching for others, personal career improvement and money/income related. Twenty-three (40.4%) registrars indicated that they would like to do a subspecialty certificate and only 1 (1.8%) stated wanting to do a PhD. An American study found that 46% of trainees went into subspecialty fellowship training after qualification[30] while a Canadian study reported that 57% of trainees want to stay in an academic setting[25]. Our findings are in keeping with these studies.

No participants chose to work at a non-academic public setting upon qualification. This is worrying as recruitment into the discipline and further education is most needed in these hospitals that are known to be staffed mainly by medical officers.

The Diploma of Anaesthesiology (DA) was not mentioned by any participants in the consultant group although it is well known that most of them do have the qualification. The DA is compulsory for all registrars and medical officers in the department but only four registrars and three medical officers mentioned DA at all. Only three medical officers mentioned Fellowship of the College of Anaesthetists (FCA) as a degree that they would like to complete. No registrars and consultants cited FCA as a degree that they have done or would like to do. This could be attributed to the fact that it is assumed that as a consultant you have an FCA and as a registrar in training, the aim is to obtain an FCA.

This study must be read in the context of certain limitations. Factors affecting career choice were only described in this study. More in-depth evaluation with regards to the factors would be desirable in order to plan strategies in recruiting doctors into the specialty. The study was conducted amongst anaesthetists working in public sector hospitals affiliated with a university, therefore the results may not be generalisable to other contexts.

Anaesthesiology is a discipline with low visibility due to its intrinsic nature and this, coupled with South Africa's shortage of anaesthetists, necessitates recruitment to attract individuals to the specialty. The information from this study can guide strategies for senior administrators to improve recruitment in anaesthesiology, especially amongst medical students. Furthermore, this study provides a foundation for further studies in this field to explore the details around each factor, and possible gender differences that were not explored in this study.

Conclusion

This study described many aspects influencing career choices in anaesthesiology at various levels of seniority in the discipline. We showed that the three to five year period after medical school is crucial for doctors to develop an interest in

anaesthesiology. The main factor that influenced the career choice of anaesthesiology was dealing with one patient at a time and an overwhelming majority of participants were satisfied with their career choice of anaesthesiology.

Conflict of interest

The authors declare that we have no financial or personal relationships which may have inappropriately influenced us in writing this paper.

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Section 4: Proposal

Career choice of anaesthetists in a department of anaesthesiology

Grace Manjooran

0201761D

Supervisor	Juan Scribante Department of Anaesthesiology
Co-supervisor	Helen Perrie Department of Anaesthesiology
Co-supervisor	Cara Redelinghuys Department of Anaesthesiology

4.1 Introduction and problem statement

Career choices is defined as the selection of a type of profession (1). It depends on an individuals' personal preferences, abilities, aspirations and expectations of the profession (2). These are shaped by certain factors that influence the individual prior to making the decision to choose a career.

Numerous factors influencing career choice in anaesthesiology have been described. Previously personality and intrinsic aspects of the job were marked as important influences in choosing anaesthesiology as a career (3, 4). Recent literature has seen the emergence of a manageable lifestyle and better working conditions as more important (5, 6). Other key influences noted were under-graduate and post-graduate exposure to the specialty, and role models within the specialty (3, 6). Additional factors identified have to do with the intrinsic nature of anaesthesiology, such as being "hands-on" and practical, immediate gratification with the work as results are seen almost immediately as well as the applicability of physiology and pharmacology (4, 6-8). Differences between gender have been identified, with women increasingly opting for specialties allowing for part-time work (3, 9).

On the African continent as well as other developing countries, studies have focused on anaesthesiology as a career choice (10-15). These countries have a severe shortage of anaesthetists. Their findings are similar to those in developed countries (6-8, 16). Studies have found that increased exposure to anaesthesiology at an under-graduate level as well as during internship, improved the likelihood of choosing anaesthesiology as a career choice (11, 15).

In South Africa, limited studies were identified that described factors that influence the choice of anaesthesiology as a career. A study in 2017 conducted amongst medical students at a university in South Africa found that anaesthesiology ranked as number four in popularity as a future career choice (17). The study also found increasing exposure to anaesthesiology at an under-graduate level can improve the perceptions of medical students (17). Another study found lifestyle factors to be an important factor when considering a specialty as a career (18). Gardner et

al. (9) found that anaesthesiology as a career was chosen because of its academic appeal or career opportunities.

An in-depth study describing factors that influence the decision to become an anaesthesiologist, and the timing of that decision, has not been researched in South Africa.

4.2 Aim and objectives

4.2.1 Aim

The aim of this study is to describe the career choice of anaesthetists in the Department of Anaesthesiology at the University of the Witwatersrand (Wits).

4.2.2 Objectives

The primary objectives of this study are to describe:

- when anaesthesiology as a career choice was definitively made
- the factors that influenced the career choice
- satisfaction with choice of career
- anticipated career paths.

The secondary objective of this study is to compare the factors that influenced the career choice between male and female anaesthetists.

4.3 Research assumptions

The following definitions will be used in this study.

Anaesthetist: is any qualified doctor working in the Department of Anaesthesiology including medical officers, registrars and consultants.

Medical officer: is a qualified doctor practising in the Department of Anaesthesiology under specialist supervision. Medical officers with more than 10 years of experience are career medical officers and are regarded as consultants.

Registrar: is a qualified doctor who is registered with the Health Professional Council of South Africa as a trainee anaesthetist.

Anaesthesiologist: is a specialist anaesthetist, registered as such with the Health Professions Council.

Consultant: is an anaesthesiologist or career medical officer.

Incomplete questionnaire: is a questionnaire in which the sections on factors influencing choice of career have not been completed.

4.4 Demarcation of study field

The study will be conducted in the Department of Anaesthesiology, affiliated to the Faculty of Health Sciences at Wits. The staff complement of the department is 74 consultants, 112 registrars and 22 medical officers. The study will be conducted at the following hospitals that are affiliated to the university.

- Charlotte Maxeke Johannesburg Academic Hospital, a 1200-bed central hospital.
- Chris Hani Baragwanath Academic Hospital, a 2888-bed central hospital.
- Helen Joseph Hospital, a 500-bed tertiary hospital.
- Rahima Moosa Mother and Child Hospital, a 338-bed regional hospital.
- Wits Donald Gordon Medical Centre, a 190-bed private teaching hospital.

4.5 Ethical considerations

Approval to conduct the study will be obtained from the Human Research Ethics Committee (Medical) and the Graduate Studies Committee of the Wits. Permission from the Head of Department of Anaesthesiology, Wits (Appendix A) has been granted.

This study will use a self-administered questionnaire (Appendix B). The researcher will approach participants at departmental academic meetings, explain the study and invite them to take part. If they agree to participate, the researcher will give them an information sheet (Appendix C) with the questionnaire. Consent is implied on the return of the completed questionnaire.

To ensure anonymity data will be collected without identifying information and each completed questionnaire will be assigned a study number. Confidentiality will be guaranteed as only the researcher and supervisors will have access to the raw data. Completed questionnaires will be placed in sealed data collection boxes at the exit of the meeting room.

Data will be securely stored in a locked cupboard for six years after the completion of the study.

The study will be conducted according to the principles of the Declaration of Helsinki ((19)) and the South African Guidelines for Good Clinical Practice (20).

4.6 Research methodology

4.6.1 Research design

A prospective, contextual, descriptive research design will be followed in this study.

A prospective study is one in which a predefined group is followed over time to observe an outcome (21). This study is prospective as data will be collected at the time the study takes place.

A contextual study alludes to a specific group or population. De Vos et al. (22) defines it as a “small-scale world”. This study is contextual as the research will be conducted with the anaesthetists working in the Department of Anaesthesiology.

A descriptive study is a design used when a group of variables, within a population, are only described, and no attempt to establish reasons for the relationship is made (21). This study is descriptive as factors influencing career choice of anaesthetists will be described.

4.6.2 Study population

The study population will consist of all anaesthetists working in the Department of Anaesthesiology.

4.6.3 Study sample

Sample size

The sample size will be realised by the response rate. Questionnaires will be administered to the entire accessible population. The total staff complement of the department is 208. A minimum response rate of 60% (125) will be considered acceptable (23).

Sampling method

In this study a convenience sampling method will be used. Convenience sampling, or availability sampling, entails using subjects that are conveniently available to the researcher (24). All anaesthetists attending academic meetings will be approached to participate in the study.

Inclusion and exclusion criteria

The inclusion criterion in this study is all the anaesthetists currently working in the Department of Anaesthesiology.

The exclusion criteria for this study are:

- interns
- anaesthetists that refuse to participate.

4.6.4 Data collection

Questionnaire development

Following a literature review, a questionnaire that was developed by Wass et al. (8) in 1999 and most recently used in 2013 (7) was identified. Permission has been requested from the authors to use and adapt the questionnaire (Appendix D). Parts of the questionnaire were modified to contextualise it to the South African setting. The questionnaire was then reviewed by three anaesthesiologists to achieve face and content validity, after which minor adjustments were made.

The self-administered questionnaire (Appendix B) consists of three parts.

Part A consists of demographic questions and will include:

- age
- gender
- professional designation
    - medical officer
    - registrar and year of training
    - consultant
- years of anaesthetic experience
- institute of under-graduate education and exposure to anaesthesiology
- institution of internship and exposure to anaesthesiology
- institution of community service and exposure to anaesthesiology
- institution of medical officer time and exposure to anaesthesiology.

Part B contains questions pertaining to career choice and comprises of eight questions. Question 1 identifies the point at which anaesthesiology was chosen as the participants choice of career. Questions 2 is a list of possible influential factors with a 5-point Likert scale ranging from “major positive” to “major negative”. Question 3 and 4 are open ended questions. Question 3 allows the participant to state any other factor that affected their choice, not covered in Question 2. Question 4 requires participants to list the top three factors they regard as most influential to their choice. Questions 5 and 6 assess satisfaction with the choice made.

Part C of the questionnaire focuses on the career path of the anaesthetist. It comprises of three questions. Question 1 is only for consultants and enquires where they worked after qualification and the reason for their choice. Question 2 is the same as Question 1 but is aimed at medical officers and registrars only. Question 3 focuses on career paths. Participants are asked to elaborate on any post-graduate education that has been done already or that they anticipate will be done in the future.

Data collection

The researcher will approach the convenors at the academic meetings, and request to address the meeting. Anaesthetists will be informed of the study and invited to participate. Those willing to participate will be given the information sheet

(Appendix C) and the questionnaire (Appendix B). The researcher will be available to answer any queries. The completed questionnaires will be returned into a sealed data collection box which will be placed at the exit of the venue. Blank and incomplete questionnaires will be used for response rate calculation but will not be included in data analysis.

4.6.5 Data analysis

Data will be captured onto a Microsoft Excel spreadsheet and analysed in consultation with a biostatistician using Stata version 15 (StataCorp, USA). Descriptive and inferential statistics will be used. Categorical data will be described using numbers and percentages. For the Likert scale data, major and minor positive will be grouped together as will major and minor negative. The choice of neutral will be removed from the analysis for the comparisons. Comparisons will be done using Chi-square or Fisher's exact tests. A p-value of <0.05 will be considered statistically significant.

Data from Question 1 and 2 in Section C (reasons for choice of location of practice) will be categorised based on the description of the answer, i.e. academic interest for self, academic interest for others (teaching at under-graduate and post-graduate level), renumeration, quality of life, other, etc)

Incomplete questionnaires will be included in the study for response rate calculation and in the analysis of sections A and C, if completed. They will however not be included in the statistical analysis of Section B of the questionnaire.

4.7 Significance of the study

It is important to know the factors influencing the choice of anaesthesiology as a career. These factors have been well described in international literature, however there is a paucity of data in South Africa. South Africa has a different healthcare setting and international findings may not necessarily be extrapolated locally. This information will help guide recruitment and retention strategies that can be put in place when undertaking future workforce planning in a South African setting.

4.8 Validity and reliability of the study

The validity of a study refers the degree of accuracy to which an outcome represents a true value (24). The consistency to which the same outcomes are achieved is referred to as reliability (21).

The validity and reliability of this study will be maintained by:

- using an appropriate research design
- a previously validated questionnaire was adapted for the context and further face and content validity was achieved by three senior anaesthesiologists reviewing the questionnaire
- no identifying information will be requested and completed questionnaires will be placed in a sealed data collection box thereby ensuring anonymity
- researcher will be present to answer any questions
- checking 10% of data to be analysed to ensure accuracy of data entry
- analysis of data will be done in consultation with a biostatistician.

4.9 Potential limitations

Restrictions that may reduce the generalisation of the findings to the overall population are called limitations (21).

The potential limitations of this study are:

1) the study is contextual and therefore the findings may not be generalisable to other departments

convenience sampling will be used, and this may not accurately represent all the anaesthetists in the department.

4.10 Project outline

4.10.1 Time frame

Activity	June 2018	July 2018	Aug 2018	Sept 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019
Proposal preparation											
Proposal submission											
Ethics approval											
Post-graduate approval											
Data collection											
Data analysis											
Draft article											
Submission											

4.10.2 Budget

Item	**Number required**	**Cost per item**	**Total**
Printing	1200	R1/page	R1200
Binding	3	R200	R600
Grand total			R1800

The Wits Department of Anaesthesiology will incur the costs of paper and printing.

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4.12 Appendices

Appendix A: Letter from HOD, Anaesthesiology, University of the Witwatersrand

WITS UNIVERSITY

DEPARTMENT OF ANAESTHESIOLOGY
UNIVERSITY OF THE WITWATERSRAND,
JOHANNESBURG
Tel.(011)933-9334/5 / Fax (011)933-1843

FACULTY OF HEALTH SCIENCES

18 July 2018

Ms Zanele Ndlovu
Administrative Officer
Human Research Ethics (Medical)

RE: DR GRACE MANJOORAN STUDENT NUMBER 0201761D

I herewith grant permission to Dr Grace Manjooran to conduct the study titled "Career choice of anaesthetists in a department of anaesthesiology" in the University of the Witwatersrand Department of Anaesthesiology. This will entail distributing an anonymous self-administered questionnaire at the departmental meetings.

Yours sincerely,

Prof Christina Lundgren
Head of Dept of Anaesthesiology
University of the Witwatersrand

Clinical Head, Dept of Anaesthesiology
Chris Hani Baragwanath Academic Hospital

Phone: +27 825574605
Fax: +27 865532529

Appendix B: Questionnaire

Part A: Demographics

1) How old are you?

   ☐ 25 – 35

   ☐ 36 – 45

   ☐ 46 – 55

   ☐ 56 +

2) Gender

   ☐ Male

   ☐ Female

3) Professional Designation

   ☐ Medical Officer

   ☐ Registrar Year of training: _____

   ☐ Consultant

4) Institute of under-graduate training

   _____

5) How much exposure to anaesthesiology did you have as an under-graduate student?

   _____

6) At which institution did you do your internship? How much exposure to anaesthesiology did you get?

_____

7) Did you do anaesthesiology as a community service medical officer? If yes, state name of institution and how much time you spent in anaesthesiology.

_____

8) Have you done any medical officer time in anaesthesiology prior to starting training? If yes, state name of institution and how much time you did anaesthesiology for?

_____

Part B: Selecting a Career

1) When did you definitively decide that anaesthesiology was going to be your chosen career path?

- ☐ Medical student
- ☐ Internship
- ☐ Community service medical officer
- ☐ Medical officer
- ☐ Other: Specify _____

2) Please rate how the following features influenced you to choose a career in anaesthesiology.

Aspects of anaesthesiology care

	Major positive	Minor positive	Neutral	Minor negative	Major negative
Acute critical care	☐	☐	☐	☐	☐
Chronic care medicine	☐	☐	☐	☐	☐
Chronic/acute pain management	☐	☐	☐	☐	☐
Physiology/pharmacology	☐	☐	☐	☐	☐
Technology applied to patient management	☐	☐	☐	☐	☐
Research	☐	☐	☐	☐	☐

Lifestyles of anaesthesiologists

	Major positive	Minor positive	Neutral	Minor negative	Major negative
Time off	☐	☐	☐	☐	☐
Degree of portability	☐	☐	☐	☐	☐
Amount of paperwork	☐	☐	☐	☐	☐
No office to maintain	☐	☐	☐	☐	☐
Immediate earning potential upon starting private practice	☐	☐	☐	☐	☐
Flexibility to work as a group/job sharing	☐	☐	☐	☐	☐
Prestige	☐	☐	☐	☐	☐
Hours on call compared to other specialties	☐	☐	☐	☐	☐

Nature of the specialty

	Major positive	Minor positive	Neutral	Minor negative	Major negative
"Hands-on" specialty	☐	☐	☐	☐	☐
Euphoria associated with treating difficult cases	☐	☐	☐	☐	☐
Short term goals with immediate gratification in one's own work	☐	☐	☐	☐	☐
Patient-oriented practice	☐	☐	☐	☐	☐
Time spent on bureaucracy	☐	☐	☐	☐	☐
Work time mostly devoted to patient care	☐	☐	☐	☐	☐
Operating room environment/atmosphere	☐	☐	☐	☐	☐
No ongoing patient management to contend with	☐	☐	☐	☐	☐
Ability to perform invasive procedures	☐	☐	☐	☐	☐
Inspired by certain individuals/role model	☐	☐	☐	☐	☐
Dealing with one patient at a time	☐	☐	☐	☐	☐
Other colleagues on call with you	☐	☐	☐	☐	☐

3) Please indicate any other features which influenced you to choose a career in anaesthesiology.

_____
_____
_____

4) From those that you rated as a major or minor positive influence in the list above, what were the three most influential features that led you to choose anaesthesiology as a career?

1._____
2._____
3._____

5) Are you satisfied with your choice of career in anaesthesiology?

☐ Yes
☐ No

6) In retrospect, knowing what you know now, would you still choose anaesthesiology?

☐ Yes
☐ No

Part C: Career path

1) Only to be completed by consultants:

Where did you work on completion of your training?

☐ Private
☐ Public: Academic
☐ Public: Non-academic
☐ Other, please specify: _____

Please state the reasons for your choice.

_____
_____
_____
_____
_____

2) **Only to be completed by medical officers and registrars:**
Where would you like to work on completion of your training?

- ☐ Private
- ☐ Public: Academic
- ☐ Public: Non-academic
- ☐ Other, please specify: _____

Please state the reasons for your choice.

_____
_____
_____
_____
_____

3) What further post-graduation education have you done or are planning to do in the future, please specify.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Thank you for taking your time to complete the questionnaire.

Appendix C: Information sheet

Dear colleague

My name is Grace Manjooran, and I am a registrar in the Department of Anaesthesiology at Wits. I would like to invite you to participate in my MMed research study titled “Career choice amongst anaesthetists at a department of anaesthesiology”. This study has been approved by the Human Research Ethics Committee (Medical) (certificate number).

The study aims to identify factors responsible when selecting a career in anaesthesiology. Completion of the questionnaire will assist in identifying factors that can be used in planning for the future workforce in anaesthesiology in South Africa.

Participation is voluntary, and consent is implied upon completion of the questionnaire. There is no penalty for not participating in this study. All information supplied will remain strictly confidential and anonymous. No identifying information is required when completing the questionnaire.

All questionnaires should be placed in the sealed box by the exit door, whether it has been completed or not. The questionnaire should not take longer than 15 minutes to complete. Each questionnaire will be given a study number to estimate a response rate but will not be able to be traced back to the participant. Only my supervisors and I will have access to the completed questionnaires, thus ensuring confidentiality. No incentives will be provided for completing the questionnaire and it has no direct benefit to you.

Please ensure you understand the above information before completing the questionnaire.

Any questions regarding this study can be directed to the following people:

- Prof C Penny (chairperson of the HREC): 011 717 2301
- Grace Manjooran (researcher): 072 373 1267
- Mrs J Scribante (supervisor): 011 488 4365

Thank you for taking the time to read this letter.

Sincerely,

Grace Manjooran

Appendix D: Permission to use questionnaire

Grace Manjooran

From:	Grace Manjooran
Sent:	Tuesday, 17 July 2018 8:17 AM
To:	'wass.thomas@mayo.edu'
Subject:	Re Article titled "Recruitment of house staff into anesthesiology: a longitudinal evaluation of factors responsible for selecting a career in anesthesiology and an individual training program"

Good day Professor Wass

My name is Dr Grace Manjooran. I am a resident in Anaesthesiology at the University of Witwatersrand in Johannesburg, South Africa. I am currently doing a Master of Medicine, and my topic is Career choices amongst anaesthetists. I came across your work on the subject while doing a review of the literature.

Would it be possible for me to use your most recent survey instrument, from the article titled Recruitment of house staff into anaesthesiology: a longitudinal evaluation of factors responsible for selecting a career in anaesthesiology and an individual training program, in the Journal of Clinical Anaesthesia, published in 2013. I would need to adapt some of the questions to our context in South Africa.

Kindly let me know if you would be able to give me permission.

Regards,

Grace Manjooran

Section 5: Annexures

5.1 Ethics approval

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Drs G Manjooran & C Redelinghuys; Ms H Perrie

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M180801

NAME: (Principal Investigator)	Drs G Manjooran & C Redelinghuys; Ms H Perrie
DEPARTMENT:	School of Clinical Medicine Department of Anaesthesiology Chris Hani Baragwanath Academic Hospital
PROJECT TITLE:	Career choice of anaesthetists in a department of anaesthesiology
DATE CONSIDERED:	31/08/2018
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Professor J Scribante
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	31/10/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on 3rd floor, Phillip V Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date of the meeting when the study was initially reviewed. In this case, the study was initially reviewed in **August** and will therefore reports and re-certification will be due early in the month of **August** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

5.2 Graduate studies approval

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

11 September 2018
Person No: 0201761D
PAG

Dr GR Manjooran
5 Baltimore Village
1 Bassoon Street
Radiokop
Roodepoort
1724
South Africa

Dear Dr Grace Manjooran

Master of Medicine: Approval of Title

We have pleasure in advising that your proposal entitled *Career choice of anaesthetists in a department of anaesthesiology* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

5.3 Permission from author to use questionnaire

-----Original Message-----
From: Thomas Wass <wass.thomas@gmail.com>
Sent: Thursday, 20 September 2018 1:48 PM
To: Grace Manjooran <grace.manjooran@wits.ac.za>
Subject: Survey Instrument

Good morning Grace:

I am flattered you would like to use our survey instrument and apologize for the delay. Yes, you have my permission to use it for research endeavors. The person to contact would be one of my co-authors (Darrell Schroeder), as he is your best bet to procure an actual copy. I'm guessing his email address is schroeder.darrell@mayo.edu. Best of luck with your project.

Have a great day,
C. Thomas Wass, M.D.

Sent from my iPhone

5.4 Turnitin report

0201761d:TURNITIN_26AUGUST.docx

ORIGINALITY REPORT

8%	4%	5%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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1	Submitted to University of Witwatersrand Student Paper	2%
2	www.science.gov Internet Source	1%
3	Homer Yang, Kristine Wilson-Yang, Karen Raymer. "Recruitment in anaesthesia: results of two national surveys", Canadian Journal of Anaesthesia, 1994 Publication	1%
4	AL Gqiba, PD Gopalan, CA Evans. "Perceptions of final-year UKZN medical students about anaesthesia as a specialty choice", Southern African Journal of Anaesthesia and Analgesia, 2017 Publication	<1%
5	Ian D. Augustin, Timothy R. Long, Steven H. Rose, C. Thomas Wass. "Recruitment of house staff into anesthesiology: a longitudinal evaluation of factors responsible for selecting a career in anesthesiology and an individual	<1%

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

26th August, 2019

The Chairperson
Graduate Studies Committee
Faculty of Health Sciences
University of the Witwatersrand

Dear Madam,

Re: M Med: **Career choice of anaesthetists in a department of anaesthesiology.**

Dr Grace Manjooran, student number: 0201761D, has submitted her research report to Turnitin which revealed a similarity index of 8%. These similarities appear not to be plagiarism but mainly the use of common terminology and phrases specific to the topic of the research.

Yours sincerely,

Juan Scribante
Supervisor

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