MEDICAL STUDENT AND FACULTY PERCEPTIONS OF UNDERGRADUATE SURGICAL TRAINING: A COMPARISON BETWEEN SOUTH AFRICA AND SWEDEN

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DECLARATION

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LIST OF ABBREVIATIONS AND TERMINOLOGY

UCT	University of Cape Town
KI	Karolinska Institutet
MBChB	Bachelor of Medicine and Surgery
Registrar/Resident	A medical practitioner who is undergoing specialist training
Consultant/Attending	A medical practitioner who has completed all of his/her specialist training
Fellow	A specialist who is undertaking additional sub-specialty training in a specific field

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ABSTRACT

INTRODUCTION: There is a paucity of literature comparing the views and perceptions of medical students and surgical faculty regarding the surgical curriculum. Additionally, little evidence is available illustrating the prevalence of surgical mentors and role models, as well as their specific characteristics. Comparing the learning climates and current state of mentorship during undergraduate surgical training between developing and developed countries may offer insight into curricular improvement, and may shed light on methods to improve and stimulate surgical interest amongst medical students globally.

METHODOLOGY: An electronic, online questionnaire was anonymously distributed to medical students and surgical faculty at the University of Cape Town, South Africa, and Karolinska Institutet, Sweden. The questionnaire explored the perceptions of medical students and surgical faculty regarding the current undergraduate surgical curriculum, existing clinical and theoretical instructional methods, as well as mentorship and role models within the surgical discipline.

RESULTS: A total of 120 students (response rate of 24.4%) and 41 faculty (response rate of 74.5%) responded. Compared to South African faculty, Swedish faculty were predominantly male and were significantly older (p=0.009). Medical students desired more hours of instruction compared to faculty (p=0.017). South African students expected to study more hours compared to Swedish students (p=0.029). There was general agreement that 'small-group tutorials' was the area students learn the most from, whereas students reported 'lectures' least helpful. Registrars were reported as the first person students should consult regarding patient care. A large proportion (42.5%) of medical students believed that faculty viewed students as an inconvenience, and 35.0% of students believed that faculty would rather not have students on the clinical team. Faculty believed the current surgical curriculum was less adequate compared to medical students (p=0.010). A total of 41 (34.2%) students stated they had a mentor during their surgical training, which was significantly different to the perception of faculty that students ought to have a mentor during their undergraduate surgical training (p<0.001). A significant difference was found between students from South Africa and Sweden in the number reported to have had a mentor (p<0.001). The majority of respondents believed that registrars were the best role model. With regards to the most important qualities of a mentor, students rated

encouragement, adequate supervision, setting of fair expectations, and teaching skills significantly higher compared to faculty (p=0.037, p=0.007, p=0.002, and p=0.010 respectively).

CONCLUSIONS: Significant differences exist between surgical faculty and medical student perceptions of undergraduate surgical training and mentorship, as assessed in cohorts from a developing and a developed country. In order to increase surgical interest amongst undergraduate medical students, it is imperative for surgical educators to be aware of these differences, and to find specific strategies to bridge this gap.

CHAPTER 1

INTRODUCTION AND PROBLEM STATEMENT

1.1 INTRODUCTION

The surgical rotation in an undergraduate medical degree is often the first introduction to surgery for medical students. It is during this period that their experience may positively or negatively affect their decision to pursue a career in surgery.[1] By creating a positive learning environment, which has been shown to be a critical aspect of successful education, medical students may obtain greater satisfaction during their surgical rotation.[2] A positive learning environment has been reported to be facilitated by improved quality of student-instructor communication, active participation by the student in the learning process, realistic academic expectations, and an atmosphere of learning that is safe and respectful.[3]

In general, undergraduate medical education brings about transition in many ways, such as the often anxious arrival at medical school, frequent changes in clinical settings, and the adoption of increased clinical responsibility for patient care. Although the basic objective of the undergraduate medical and surgical curriculum is to prepare students to enter the practice of medicine, the manner in which they are taught is rapidly evolving, especially in the discipline of surgery.[4] It has even been suggested that the historic apprenticeship-like training no longer exists in the modern era of surgical education.[5] The current surgical curriculum focuses on several educational methods and environments, which include lectures, small-group tutorials, the operating theatre and teaching ward-rounds.[6] With the ever changing demographic profile of medical students and surgical trainees, there needs to be a focus on implementing more effective and efficient educational curricula.[7]

Though many factors may play a role in stimulating medical students' interest in surgery, past literature has illustrated a positive influence from surgical mentors and role models.[8] A previously published literature review focussing on mentors and role models in surgery highlighted the key difference between these two concepts.[9] A mentor plays an active role in guiding and communicating with a junior colleague, whereas a role model may not have an overt role in the guidance of a learner, however their actions and attitudes may be consciously or unconsciously emulated. Despite encouragement for surgeons to take a more active role in education and mentoring of medical students, evidence continues to suggest that surgical faculty are not active enough, in part due to

clinical and research obligations in an often time-constrained environment.[10] Furthermore, despite the importance of mentoring in medical curricula, many countries do not offer any form of formal mentorship programme to medical students.[11]

1.2 PROBLEM STATEMENT

Although a number of studies have addressed the views and perceptions of medical students regarding undergraduate surgical training, there is a paucity of literature comparing their views and perceptions with those of surgical faculty. Furthermore, little evidence is available on the prevalence of surgical mentors and role models, as well as the specific characteristics of mentoring relationships between faculty and medical students. Finally, it is well established that sub-Saharan Africa has one of the largest surgical disease burdens, yet one of the lowest concentrations of surgical providers.[12] An in-depth assessment and comparison of learning environments in the surgical rotation between developing and developed countries may shed light on methods to improve surgical interest amongst medical students globally.

1.3 AIM

To evaluate and compare medical student and faculty perceptions of undergraduate surgical training, and to compare results between a South African and a Swedish institution.

1.4 OBJECTIVES

- To identify the demographics of medical students and surgical faculty from the University of Cape Town (UCT), South Africa, and Karolinska Institutet (KI), Sweden.
- To evaluate and compare perceptions amongst medical students and surgical faculty from UCT and KI under the following headings:
    - Undergraduate surgical training
    - Mentorship and role models

CHAPTER 2

LITERATURE REVIEW

2.1 SEARCH STRATEGY

A literature review was conducted to explore the perceptions of both medical students and surgical faculty regarding undergraduate surgical education and training. The search utilised the following key phrases relevant to the topic of interest: ‘‘surgical curriculum OR surgical training OR surgical education’’, ‘‘medical student AND surgical faculty’’, ‘‘perceptions AND surgical training”, “mentorship AND surgical training”, “role model AND surgical training”. The search was conducted using the following search engines: *Cochrane, PubMed*, *EBSCOhost* and *Google Scholar*.

Articles published from 2004 to current were analysed. The reference lists of all included articles were searched for additional studies. Studies identified by the search strategy were initially screened by title and abstract. Articles were retrieved in full if insufficient data were available to make a determination based on title or abstract. Articles that did not explicitly address perceptions of both medical students and surgical faculty were excluded. Furthermore, articles not written in English, abstracts only, and any article not available through the online databases, were excluded.

2.2 RESULTS

After duplicate articles were removed, a total of 297 articles were available for screening. Forty-seven articles were assessed for eligibility of which 38 were excluded (Figure 1). Reasons for article exclusion included focussing on individual perceptions of medical students or surgical faculty, examining differences in other medical specialties, as well as only assessing the factors that affect medical students in pursuing a career in surgery.

Table 1 shows a summary of the included articles. The sections that follow highlight the themes and trends of the current literature comparing student and faculty perceptions of undergraduate surgical training.

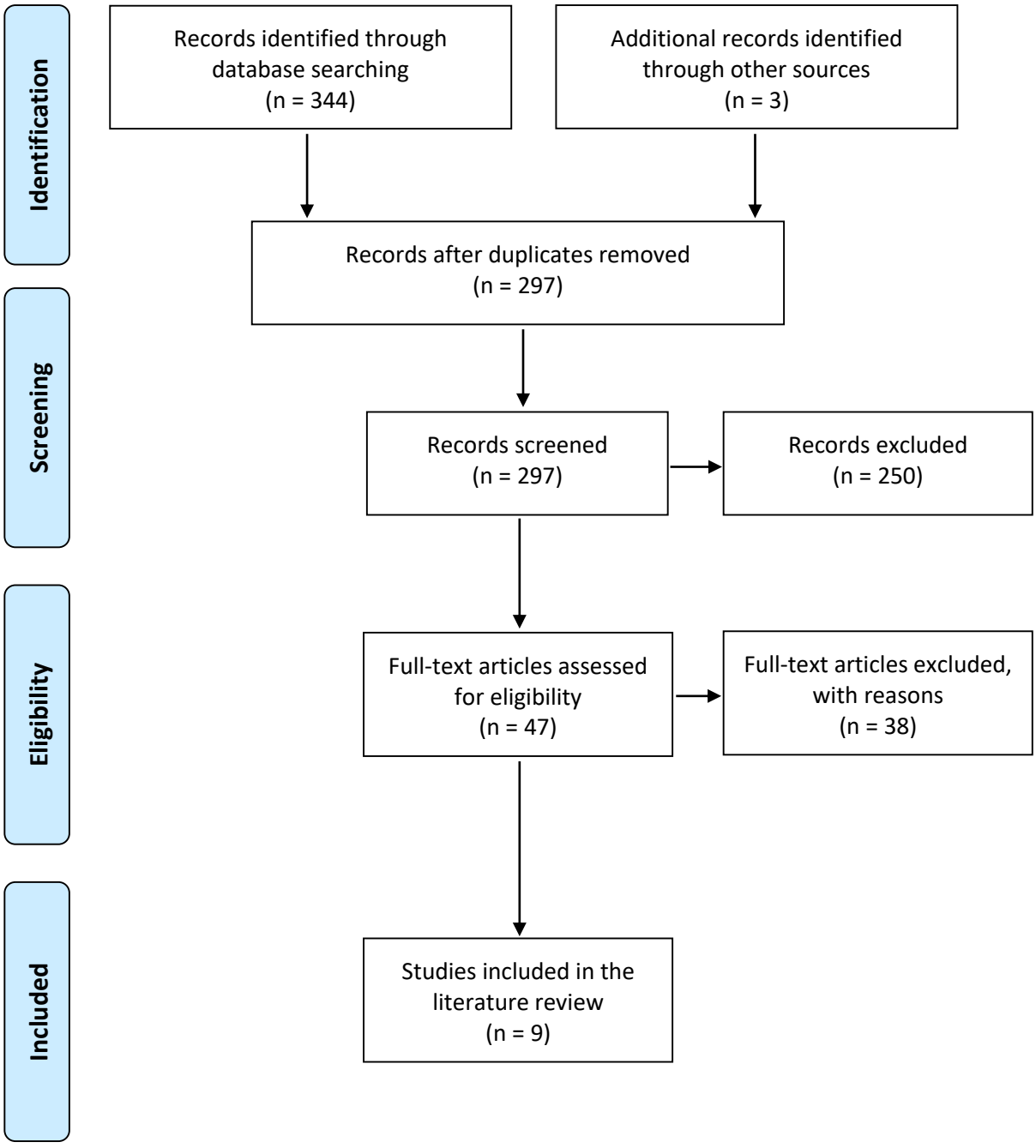

Figure 1: Literature review search strategy as adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[13]

2.2.1 Perceptions and expectations of undergraduate surgical training

There is a paucity of literature which examines the differences and similarities of medical students and surgical faculty regarding their perceptions and expectations of undergraduate surgical training. This is highlighted further by the limited data on this topic in developing countries, such as South Africa.

There is significant variation in the level on which undergraduate teaching takes place. In some settings it is common for registrars, or surgeons-in-training, to take much of the responsibility in teaching undergraduate students. However, despite less exposure to the day-to-day training of medical students, it is consultants, or surgical specialists, who ultimately evaluate the students at the end of their surgical rotation.[14]

Of the evidence available, anecdotal results exist of surgical faculty and medical student perceptions and expectations of undergraduate surgical education. A study conducted by De et al.[1] illustrated that medical students desired significantly more hours of instruction compared to surgical faculty. Contrastingly, a study by Quillin et al.[15], who developed their questionnaire based on De et al.[1], found that students and surgical faculty reported similar expectations on the number of hours of surgical instruction per week. Both studies reported agreement between students and surgical faculty with regard to the essential skills that students should acquire before the conclusion of the surgical rotation. Additionally, medical students reported that registrars were the primary source of teaching and expressed general satisfaction on the quality of registrar instruction.

Two related findings of the abovementioned studies, however, were that nearly half of the medical student cohort believed they were an inconvenience to the clinical service, and that the feedback they received was rated significantly poorer compared to the assessment of surgical faculty.[1] It has been well documented that the environment in which students learn, as well as the interactions between students and educators, are paramount to the establishment of a positive learning climate.[2] The fact that students may feel that they are an inconvenience to the clinical team may result in disruption of the learning climate, and thereby negatively affect their perceptions and expectations of learning during the surgical rotation. It has been suggested that, in general, feedback is still not being provided effectively by medical educators.[16] A lack of constructive and timely feedback may also add strain to a positive learning environment.

Despite the significant findings in both studies, caution must be exercised when analysing results. A single class from a single institution was utilised in both instances, which may have introduced sampling bias. Furthermore, the response rate was low for surgical faculty in both studies which limits the validity of findings. With the rapid development of the surgical curriculum over the last decade, the value of advancing the current curriculum, based on the findings of the two cited studies, respectively 15 and five years old, can be questioned.

2.2.2 Preferred learning styles of medical students and faculty

For the training of medical students and surgical trainees to be efficient and effective, consideration of not only what is being taught, but how it is being taught, is becoming increasingly important.[17] This aspect is easily neglected in the time-constrained clinical environment which has been shown to have a negative impact on student supervision, teaching, and feedback.[18,19] Understanding the basic components of medical education requires in-depth exploration of learning and teaching styles and preferences.

Of the studies included in the literature review, two assessed the preferred learning and teaching styles of medical students versus surgical faculty.[7,20] Both studies utilised the Kolb Learning Style Inventory[21], which is a validated and well-established assessment tool for evaluating predominant learning styles.[22] The model has, however, previously been criticised for not being applicable in all situations, as well as not focussing enough on reflection and cultural learning differences.[7]

Engels and de Gara[7] reported significant differences in learning styles between students and faculty. Where students preferred an 'assimilating' learning style (a combination of abstract conceptualisation and reflective observation), the surgical faculty preferred a 'converging' teaching style (a combination of abstract conceptualisation and active experimentation). A second study by Jack et al.[20], found the most commonly reported learning and teaching style for both students and surgical faculty to be 'converging'. However, a significant number of surgical faculty did report a preference for the 'assimilating' teaching style. Interestingly, these results illustrate a learning and teaching style that is not uncommon in current medical schools. Abstract conceptualisation may be compared to the current problem-based learning style, often taught in the pre-clinical years of undergraduate training. Active experimentation is the transition into the clinical environment where students are offered the opportunity to be more hands-on with regard to clinical care of patients. Finally, reflective observation has become an important tool for assessment of personal development as a learner or teacher.

Though both studies reported similar response rates from surgical faculty, a large discrepancy was seen in the proportion of medical student responses. Important in the context is that both studies originated from North America, and results may not apply to medical schools globally. Determining whether these results are similar in other countries, especially in developing countries such as South Africa, is an important avenue for future research.

2.2.3 The role of the operating theatre in undergraduate surgical training

The operating theatre has become an increasingly important component of undergraduate surgical teaching. However, it has been suggested that medical students are both intimidated and dissatisfied in the operative environment.[23] In a study conducted in the United Kingdom[24], it was shown that 59% of medical students attended less than half of surgical theatre opportunities, with students reporting unspecified learning objectives and being unsure of what was expected of them as major shortcomings. Although a large proportion of the literature is focussed on student perspectives, there are limited studies which include the views of the surgical faculty.[25]

A descriptive study conducted by O'Neill et al.[6] illustrated that both students and faculty believed that the operating theatre was an essential platform for undergraduate surgical training. However, the majority of faculty thought that the main role of the operating theatre was to teach students the clinical applications of medical knowledge, whereas students believed it was to teach students how to perform surgical skills and procedures. Furthermore, while most surgical faculty thought it beneficial to have a medical student in the operating theatre, the majority of students believed that their participation was not needed or beneficial and in fact perceived themselves to be bothersome to the faculty by asking questions. Although interesting, the results of this study were only displayed in descriptive format and no statistical methods were utilised to determine whether any significant differences exist between groups. Furthermore, the single institutional design and overall response rate of 12% decrease the validity and increase the risk of potential biases.

Zundel et al.[26] explored the role of the operating theatre in surgical education by conducting a qualitative study. Their findings showed similar themes of students feeling intimidated and anxious. Furthermore, students had difficulty determining their learning objectives which resulted in a sense of insecurity during the time spent in the operating theatre. When exploring the views of the surgical faculty, it was noted that faculty believed that well-instructed students were able to focus better with less interference during standard proceedings. This highlights the importance of detailed instructions and learning outcomes for both student and educator before commencing teaching in the operating theatre. Positively, both students and faculty thought that students benefitted more if they were exposed to the pre- and post-operative care of the patients undergoing surgery. As all focus groups in data collection run the risk of researcher bias, important themes may have been overlooked in this study. Additionally, as this study utilised voluntary sampling, there is an additional risk of selection bias. Despite these limitations, the authors were able to utilise a qualitative approach to increase the existing knowledge and understanding of teaching in the operating room.

2.2.4 Mentorship and role models in undergraduate surgical training

There is a considerable difference between a mentor and role model. A mentor plays an active role in guiding and communicating with the junior colleague, whereas a role model may not have an overt role in the guidance of the learner, however their actions and attitudes may be consciously or unconsciously emulated. Although separated by differences in specific roles and ideals, it has been argued that good role models should also strive to be good mentors.[9]

Mentorship within the surgical discipline is a key component to the success of young surgeons, and provides them with an opportunity to shape their surgical careers.[27] The presence of role models and mentors have been shown to influence medical students in their future career choice, choice of specialty, as well as promoting interest in the surgical discipline.[28] However, evidence continues to suggest that surgical faculty are not active enough in their duties as role models and mentors.[10]

When attempting to determine whether student and faculty perceptions regarding mentorship and role-modelling are aligned, the literature is scarce. Two studies evaluated perspectives on mentorship in medical students rotating through plastic surgery and compared their views with specialist plastic surgeons.[29-30] The initial study focussed on descriptive views of the medical student, or mentee, whereas the follow-up study evaluated and compared the perceptions with surgical faculty, or mentors. Over 77% of medical students were found to have identified with a mentor during their surgical training. Interestingly, mentors preferred to meet less frequently and in less personalised formats when compared to mentees. Additionally, mentors reported time constraints and a lack of exposure to medical students as barriers to suitable mentorship. Approximately one third of female students reported a lack of female mentors as a barrier to mentorship, underpinning the importance of gender in mentoring relationships. However, despite the majority of mentees and mentors being male, as well as female mentors being underrepresented in these studies, it was shown that female mentors were responsible for mentoring a higher proportion of female medical students. The lack of female role models and mentors that female students can identify with may result in decreased interest in surgery as a career option.[9,31]

Published research analysing mentoring relationships between student and faculty in the developing world is sparse. A qualitative study from Uganda[32] explored student and faculty experiences and perceptions of the mentorship programme in the Health Sciences faculty of Makerere University. Twenty-three students from five departments, including surgery, and eight faculty members from various departments were included. Focus group discussions and key informant interviews were conducted which resulted in several key points being identified. Encouragingly, both mentees and

mentors had similar definitions for the role of a mentor which included providing holistic guidance, motivating and encouraging the mentee, as well as aiding mentees realise their strengths and weaknesses. Similarly, both mentees and mentors reported the characteristics of a mentoring relationship to be based on mutual trust and respect, shared interests, and being free of intimidation. The manner in which the mentoring relationship is established was another important consideration for both mentee and mentor, with both stating that the relationship was more likely to be successful if the mentee chose their mentor instead of being pre-selected. Finally, both groups described the barriers to effective mentorship to include a lack of formalised structural programmes, a lack of clarity regarding roles and expectations, as well as time constraints. This study included various departments which may have improved variability and allowed for inclusion of multiple perspectives on mentorship. However, by utilising voluntary recruitment of participants with varying exposure to mentorship, results may have been skewed. Nevertheless, the points highlighted in this qualitative study offer insight into mentoring relationships, supplementing the objective data obtained by quantitative studies.

2.3 CONCLUSION

The areas on which this literature review focussed illustrate a general discrepancy in the views and perceptions of medical students and surgical faculty regarding the surgical curriculum, as well as mentorship and role models. Even though the evidence is scant, considering these findings in curriculum planning and structuring of faculty-student interaction will facilitate the creation of a positive learning climate. Creating a positive environment in surgical training is a prerequisite for equipping medical students with required surgical knowledge and skills to be competent physicians, as well as stimulating interest in surgery as a speciality. This will best be achieved by creating a supportive teaching atmosphere that allows faculty to effectively educate and realise the potential of every medical student.

Table 1: Articles included in the review of medical student and surgical faculty perceptions of undergraduate surgical training

Author	Year of publication	Institution	Method of evaluation	Sample size (response rate)	Description
De SK, Henke PK, Ailawadi G, et al.[1]	2004	University of Michigan Medical Center, USA	Paper survey	n=59 attendings (50%) n=38 residents (32%) n=107 medical students (66%)	To clarify the perceptions and expectations of attendings, residents, and medical students on the third-year surgical clerkship experience.
Quillin RC, Pritts TA, Tevar AD, et al.[15]	2013	University of Cincinnati, USA	Paper survey	n=22 surgical faculty (31%) n=29 surgical residents (53%) n=127 medical students (84%)	To evaluate the perceptions and expectations of third-year medical students on the surgery clerkship and identify if these expectations were consistent with those of the surgical residents and faculty.
Jack MC, Kenkare SB, Saville BR, et al.[20]	2010	University of North Carolina, USA	Kolb Learning Style Inventory[21]	n=61 surgical faculty (62%) n=96 residents (74%) n=183 medical students (46%)	To determine the preferred learning and teaching styles of surgical faculty, residents, and medical students, to determine whether differences exist, and to determine whether a specific association exists between preferred learning and teaching styles.

Author	Year of publication	Institution	Method of evaluation	Sample size (response rate)	Description
Engels PT, de Gara C.[7]	2010	University of Alberta, Canada	Kolb Learning Style Inventory[21]	n=44 surgical faculty (64%) n=40 surgical residents (78%) n=157 medical students (75%)	To define the predominant learning styles of medical students, general surgery residents, and general surgery faculty, and to show any differences between these groups.
O'Neill R, Shapiro M, Merchant A.[6]	2018	Rutgers-New Jersey Medical School, USA	Electronic survey	n=9 attending surgeons (16%) n=9 surgical residents (16%) n=25 medical students who completed their third-year surgical clerkship (44%) n=14 medical students who did not complete their third-year surgical clerkship (25%)	To determine the role the operating room plays in medical student education and how these roles are perceived by attending surgeons, surgical residents, and third-year medical students.

Author	Year of publication	Institution	Method of evaluation	Sample size (response rate)	Description
Zundel S, Wolfa I, Christen H, et al.[26]	2015	University Hospital of Tuebingen, Germany	Focus groups	n=17 students (N/A) n=10 surgeons (N/A)	To investigate factors which influence learning in the operating room in its entirety.
Barker JC, Rendon J, Janis JE[29]	2016	Ohio State University Medical Center, USA	Electronic survey	n=103 residents (76%) n=242 attendings (23%)	To evaluate mentorship of plastic surgery medical students from the attending surgeon's perspective, and compare results from a previous publication evaluating mentorship from the medical student's perspective.
Janis JE, Barker JC[30]					
Ssemata AS, Gladding S, John CC, et al.[32]	2017	Makerere University, Uganda	Focus group discussions and key informant interviews	n=23 students (N/A) n=8 faculty members (N/A)	To explore the experiences and perceptions of student mentees and senior faculty mentors, and identify the key factors defined by mentees and mentors as necessary for a successful mentorship programme.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 BACKGROUND

The UCT Faculty of Health Sciences is the oldest medical school in sub-Saharan Africa. The UCT Bachelor of Medicine and Surgery (MBChB) programme accepts approximately 220 medical students each year. The degree comprises six years of full-time academic and clinical study. Years one to three form the foundation in which the basic sciences are taught, whereas years four to six consist predominantly of clinical teaching in the various medical and surgical disciplines. It is during the fifth year of study that medical students rotate through the various surgical disciplines, including general, orthopaedic, trauma, neuro- and paediatric surgery. During the surgical rotation, UCT medical students are trained at various academic hospitals including Groote Schuur Hospital, a tertiary facility, and a number of secondary hospitals: New Somerset Hospital, Victoria Hospital, Mitchell's Plain District Hospital and George Hospital.

KI is the only purely medical university in Sweden and accepts approximately 320 medical students per year. Medical school is five and a half years of study, and the course "Clinical Medicine - surgery" occupies the seventh semester. This course comprises the disciplines of surgery, anaesthesiology, orthopaedics, and oncology, offering students both clinical and theoretical training. Medical students are trained at various hospitals in Stockholm, including two university hospitals, Karolinska University Hospital Solna and Karolinska University Hospital Huddinge, and two secondary hospitals, Stockholm South General Hospital and Danderyd Hospital.

3.2 STUDY DESIGN

A descriptive, cross-sectional design was selected as it would provide a 'snapshot' of the perceptions amongst medical students and faculty. The advantages of using such a design include being time-efficient, low cost, easy to conduct, and allowing for the analysis of multiple variables. The disadvantages include the inability to comment on changes over time, as well as the potential for bias.

3.3 POPULATION AND SAMPLING

Medical student clinical exposure varies between the different surgical disciplines in both South Africa and Sweden. In order to maintain homogeneity, only the general surgery rotation was evaluated. Additionally, only general surgery consultants and fellows were recruited in the faculty sample as registrars are in training themselves and may have confounded the results.

Therefore, the population studied included:

- Enrolled medical students from UCT and KI, who completed their respective undergraduate general surgery rotation, at UCT during the fifth year of undergraduate study and at KI during the fourth year. A total of 202 and 290 questionnaires were administered to medical students from UCT and KI respectively.
- Consultants and fellows in general surgery at the abovementioned UCT and KI affiliated hospitals. A total of 20 and 35 questionnaires were administered to surgical faculty involved in clinical teaching at UCT and KI respectively.

Medical students and surgical faculty were recruited on their respective medical campuses during a single academic year. A simple, randomised sampling method was utilised.

3.3.1 Inclusion criteria

- Any medical student, enrolled in the UCT undergraduate MBChB programme, who completed the fifth year general surgery rotation.
- Any medical student, enrolled in the KI medical school, who completed the fourth year general surgery rotation.
- Any staff member, consultant or fellow, employed in the Department or Divisions of General Surgery at UCT and KI.
- All participants were over the age of 18 years.

3.3.2 Exclusion criteria

- Any participant who was unable to understand the informed consent form, or the questionnaire.

3.4 INSTRUMENT

As there are limited published questionnaires regarding clinical training, role models and mentors in surgery, which are reliable or validated, a study-specific questionnaire was designed. However, the questionnaire was modelled on the work of De, et al.[1]

The questionnaire consisted of demographic data including age, gender, nationality, and stage of training. Multiple choice questions, true or false questions, and five-point Likert scale questions on perceptions of clinical training, mentorship and role models were used. In addition, medical students and surgical faculty were asked to rate the most important qualities of a surgical mentor. The clinical teacher and mentor characteristics and qualities, as shown in Table 2, were grouped into clusters based on investigations by Ullian, et al.[33] and Cochran, et al.[34]

To increase reliability, the same questionnaire was distributed to medical students and faculty except for a change in wording to correctly address the participants. The questionnaires were distributed in English for participants from UCT, and in Swedish for participants from KI.

Table 2: Characteristics of the clinical teacher and mentor as adapted from Ullian, et al.[33] and Cochran, et al.[34]

Clinician	Supervisor	Teacher	Personal
Attitude/enthusiasm	Student encouragement	Teaching skills	Supportive
Clinical competence	Provides feedback	Commitment to teaching	Caring/considerate
Empathy	Supervised adequately	Availability	Friendly
Fund of knowledge	Set fair expectations	Inspirational ability	Fun to work with

3.5 PROCEDURE

The questionnaires were designed on SurveyMonkey (SurveyMonkey Inc., San Mateo, CA), a secure, online survey development tool in English and Swedish (Appendices 8.1 to 8.4). Questionnaires were distributed with a covering letter with information on the aim of the study, an invitation to participate, and a page for signed informed consent (Appendices 8.5 and 8.6). All answers were anonymous. To limit non-response bias, a reminder email was sent to all participants.

3.6 DATA MANAGEMENT AND ANALYSIS

Only the principal investigators and supervisors were able to access data. Data were stored in electronic form on password-protected devices and data analysis was performed on a computer under password-protection. After transcription of the data, all questionnaires will be deleted within one year.

After the data collection process, data were entered into Microsoft Excel 2016 (Microsoft Corp, Redmond, WA), and descriptive analysis was performed. Data were imported into SPSS 24 (Version 24.0. Armonk, NY: IBM Corp.) for inferential analysis. Pearson Chi-square or Fisher exact tests were utilised for categorical data. Student's *t*-test and Mann-Whitney U test were utilised for parametrical and non-parametrical numerical data respectively. A *p*-value of ≤ 0.05 was considered significant.

3.7 ETHICAL AND LEGAL CONSIDERATIONS

Ethical approval was obtained from the UCT Human Research Ethics Committee (HREC Ref: 107/2017 and 014/2019) (Appendices 8.7 and 8.8). No ethical approval was required from KI.

This study adhered to the ethical principles outlined in the Declaration of Helsinki from 2013.[35]

3.7.1 Informed consent

Informed consent was obtained. All participants were free to decline to participate and could contact the project leaders at any time.

3.7.2 Beneficence

There were no direct or immediate benefits, such as reimbursement, to participate in this study. However, knowledge gained from this research may benefit students and faculty in improving the surgical curriculum in the future.

3.7.3 Non-maleficence

There were no foreseen risks to participate in this study.

3.7.4 Autonomy

To maintain autonomy in this study, participation was purely voluntary. Participants were free to decline completing the questionnaire, withdraw from the study at any point, or refuse to answer some or all questions.

3.7.5 Justice

The results of this study are of value as it furthered the understanding of medical student and faculty perceptions of surgical training. Furthermore, it fostered collaboration within the international medical and surgical community.

3.7.6 Confidentiality

Confidentiality was assured and no specific opinions were disclosed to a third party other than the researchers. Electronic copies were stored on a computer under password-protection. The questionnaires will be deleted one year after completion of data transcription.

3.8 RESOURCES

No sponsorship or funding was used for this research.

CHAPTER 4

RESULTS

4.1 DEMOGRAPHICS

A total of 120 (response rate of 24.4%) students responded, of whom 71 (59.2%) were from KI and 67 (55.8%) were female. The median age of the student cohort was 25.7 (range 21-40) years. No statistical differences in gender were found between students, however KI students were significantly older than UCT students (p=0.004).

Forty-one (response rate of 74.5%) surgical faculty members responded, with 28 (68.3%) based at KI. Among faculty, 30 (73.2%) were male, and the median age was 46.4 (range 34-64) years. KI faculty were significantly older than UCT faculty (p=0.009).

A summary of student and faculty demographic data is shown in Table 3.

4.2 UNDERGRADUATE SURGICAL TRAINING

As displayed in Table 4, significant differences were found in the number of hours of clinical teaching reported by faculty, and the number of hours of clinical teaching students reported having received (p<0.001). Furthermore, students believed they ought to receive significantly more teaching when compared to faculty (p=0.017). The expectations of the number of hours students should study outside of clinical duty were similar between students and faculty. However, students from UCT expected to study significantly more when compared to students from KI (p=0.029).

As depicted in Figure 2, students from UCT, as well as faculty from both KI and UCT, stated that 'small-group tutorials' was the area of training that medical students learnt the most from (71.4%, 64.3% and 53.8% respectively). The most commonly reported area of training for KI students was 'one-on-one' (38.0%). The area that students believed to be the worst area of training was 'lectures', whereas faculty reported 'outpatient clinic' as the worst area of training for medical students.

Table 3: Summary of student and faculty demographic data

Medical students (n=120)	UCT (n=49)	KI (n=71)	*p*-value
Gender - n (%)			
Male	19 (38.8)	34 (47.9)	0.323
Female	30 (61.2)	37 (52.1)	
Median age - years	24.5	26.4	0.004*
Surgical faculty (n=41)	**UCT (n=13)**	**KI (n=28)**	***p*-value**
Gender - n (%)			
Male	7 (53.8)	23 (82.1)	0.057
Female	6 (46.2)	5 (17.9)	
Median age - years	41.6	48.7	0.009*
Level of training - n (%)			
Consultant	10 (76.9)	26 (92.9)	0.304
Fellow	3 (23.1)	2 (7.1)	
Years in surgical practice - n (%)			
0 - 2	2 (15.4)	0 (0.0)	
Male	2 (100.0)	0 (0.0)	
Female	0 (0.0)	0 (0.0)	
3 - 5	2 (15.4)	0 (0.0)	
Male	1 (50.0)	0 (0.0)	
Female	1 (50.0)	0 (0.0)	
6 - 8	2 (15.4)	3 (10.7)	
Male	0 (0.0)	2 (66.7)	
Female	2 (100.0)	1 (33.3)	
9 - 11	4 (30.7)	6 (21.4)	
Male	2 (50.0)	5 (83.3)	
Female	2 (50.0)	1 (16.7)	
≥ 12	3 (23.1)	19 (67.9)	
Male	2 (66.7)	16 (84.2)	
Female	1 (33.3)	3 (15.8)	

*$p \leq 0.05$ by the Mann-Whitney U test

Figure 3 illustrates the differences in student and faculty views of the various skills absolutely necessary for a medical student to have acquired by the end of the surgical rotation. Obtaining a proper surgical history was a skill deemed significantly more important by faculty when compared to students (p=0.005). Contrastingly, identifying surgical problems (p=0.026) and complications (p=0.006), the ability to suture (p<0.001), assisting in theatre (p<0.001), as well as knowledge of a sterile technique (p=0.001) were skills all reported significantly more important to acquire by students, compared to faculty.

Table 4: Student and faculty perceptions of undergraduate clinical and theoretical surgical instruction

	Mean (± SD)	*p*-value
[a] Number of hours of individual/small group clinical instruction received (students) and given (faculty) during the surgical rotation per week.		
UCT students (n=49)	3.63 (± 1.27)	0.408
KI students (n=71)	3.51 (± 1.44)	
UCT faculty (n=13)	2.62 (± 1.12)	0.134
KI faculty (n=28)	2.18 (± 1.34)	
Total students (n=120)	3.56 (± 1.37)	< 0.001*
Total faculty (n=41)	2.32 (± 1.27)	
[a] Number of hours of individual/small group clinical instruction students ought to receive during the surgical rotation per week.		
UCT students (n=49)	4.49 (± 0.85)	0.984
KI students (n=71)	4.37 (± 0.85)	
UCT faculty (n=13)	4.08 (± 0.86)	0.870
KI faculty (n=28)	3.93 (± 1.12)	
Total students (n=120)	4.42 (± 0.85)	0.017*
Total faculty (n=41)	3.98 (± 1.08)	
[b] Number of hours students are expected to spend studying when not on duty per week.		
UCT students (n=49)	2.88 (± 0.97)	0.029*
KI students (n=71)	2.49 (± 1.13)	
UCT faculty (n=13)	2.08 (± 0.64)	0.178
KI faculty (n=28)	2.50 (± 0.88)	
Total students (n=120)	2.62 (± 1.08)	0.116
Total faculty (n=41)	2.37 (± 0.83)	

[a] Possible responses: 1 = 0-1 hours; 2 = 1-2 hours; 3 = 2-3 hours; 4 = 3-4 hours; 5 = >4 hours
[b] Possible responses: 1 = 0-5 hours; 2 = 6-10 hours; 3 = 11-20 hours; 4 = 21-30 hours; 5 = >30 hours
*$p \leq 0.05$ by the Mann-Whitney U test

The majority of UCT students (59.2%), KI faculty (57.2%), and UCT faculty (69.2%), stated that the 'registrar' should be consulted first if medical students have theoretical or clinical questions about the care of patients (Figure 4). The majority of KI students (35.2%) stated that the 'intern' should be consulted first. All groups reported the 'nurse' as the least likely to be consulted first.

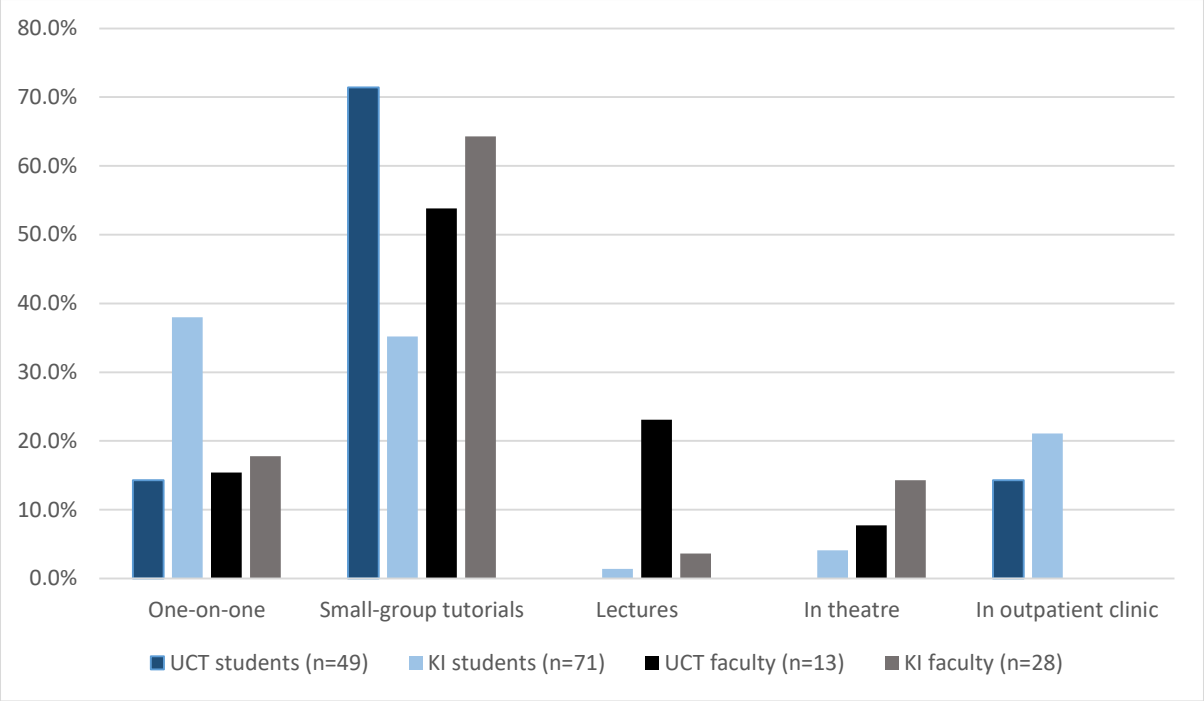

Figure 2: Area of training from which medical students learn the most

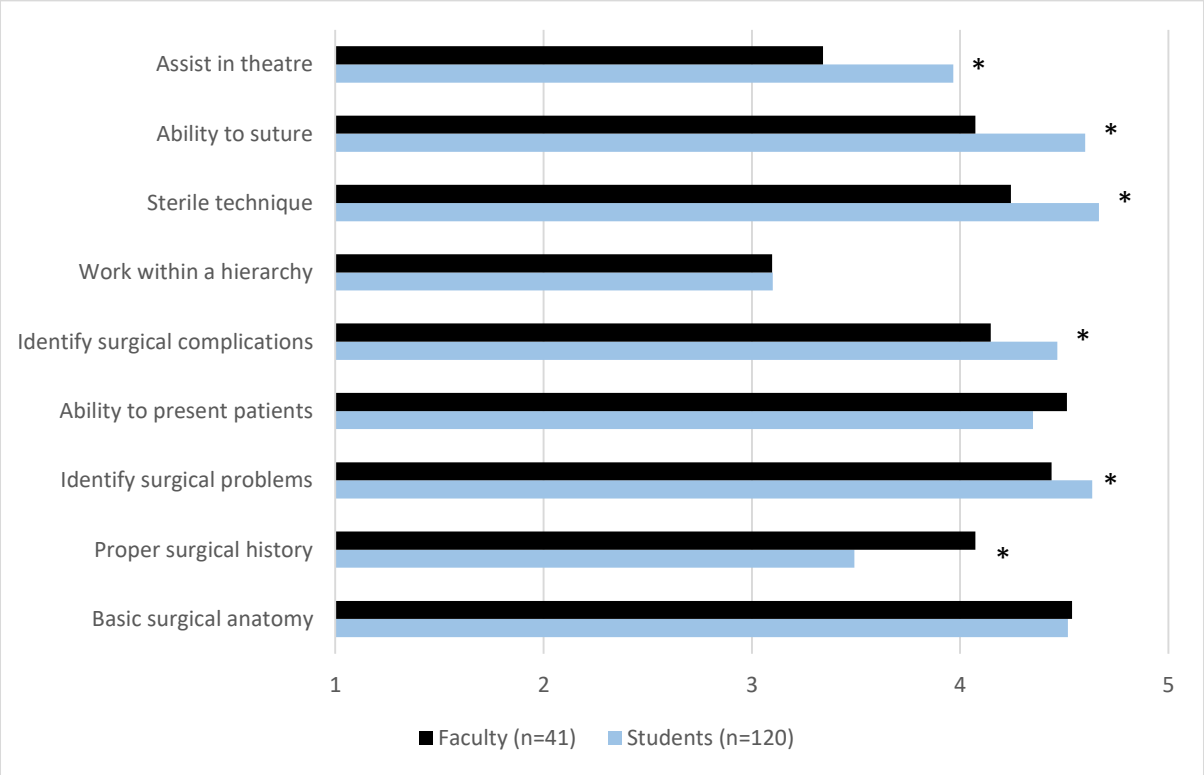

Figure 3: Skills absolutely necessary for a medical student to have learnt by the end of his/her surgical rotation. Likert items included: 1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree. Data are represented as means. *$p \leq 0.05$ by the Mann-Whitney U test

Of the total student cohort, 51 (42.5%) believed that faculty viewed students as an inconvenience in their day-to-day responsibilities. Furthermore, 42 (35.0%) believed that faculty would rather not have students on the surgical team. Significant differences were found when comparing both statements with views from the total faculty cohort (p=0.039 and p=0.001 respectively). When comparing KI and UCT students, a significantly higher proportion of UCT students believed that faculty viewed students as an inconvenience, compared to KI students (p=0.020). Contrastingly, no differences were found in both statements when comparing KI and UCT faculty.

As shown in Table 5, UCT students were significantly less likely to pursue a career in surgery, when compared to KI students (p=0.028). Faculty reported a significantly more negative view on the current undergraduate surgical curriculum when compared to students (p=0.010). A significant difference was also found between student groups, with UCT students reporting a more negative outlook on the current surgical curriculum when compared to KI students (p<0.001).

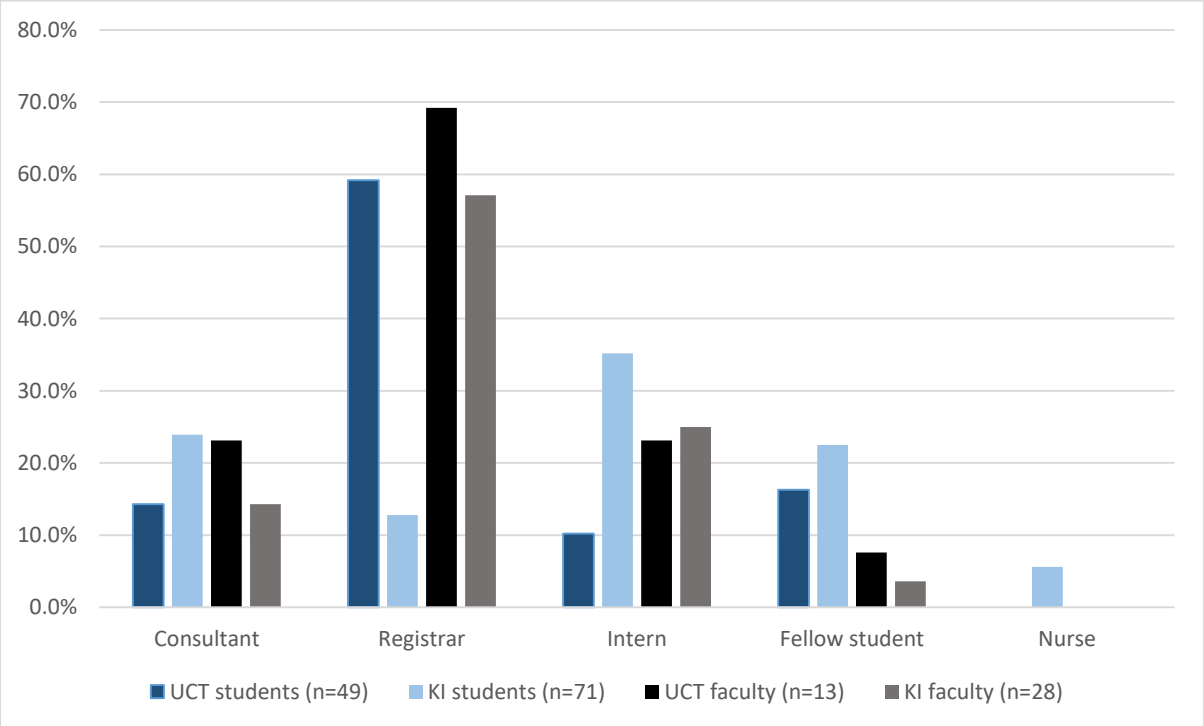

Figure 4: Whom medical students should consult first if they have theoretical or clinical questions about the care of patients

Table 5: Student and faculty perceptions of undergraduate surgical training

	Mean (± SD)	*p*-value
I am planning to pursue a career in general surgery or a surgical sub-specialty.		
UCT students (n=49)	2.73 (± 1.29)	0.028*
KI students (n=71)	3.27 (± 1.29)	
Total students (n=120)	3.05 (± 1.31)	
I believe the current surgical curriculum is adequate.		
UCT students (n=49)	2.88 (± 1.18)	< 0.001*
KI students (n=71)	3.75 (± 0.91)	
UCT faculty (n=13)	2.77 (± 1.01)	0.385
KI faculty (n=28)	3.07 (± 0.86)	
Total students (n=120)	3.39 (± 1.11)	0.010*
Total faculty (n=41)	2.98 (± 0.91)	
I believe medical students play an important role in the clinical team.		
UCT students (n=49)	3.59 (± 1.09)	0.046*
KI students (n=71)	3.27 (± 0.93)	
UCT faculty (n=13)	3.08 (± 0.84)	0.472
KI faculty (n=28)	3.43 (± 1.12)	
Total students (n=120)	3.40 (± 1.01)	0.578
Total faculty (n=41)	3.32 (± 0.93)	
Surgical faculty plays an important role in shaping the career of a medical student.		
UCT students (n=49)	4.00 (± 0.87)	0.479
KI students (n=71)	4.14 (± 0.74)	
UCT faculty (n=13)	3.31 (± 0.85)	0.776
KI faculty (n=28)	3.32 (± 0.90)	
Total students (n=120)	4.08 (± 0.79)	< 0.001*
Total faculty (n=41)	3.32 (± 0.88)	
I am very consistent with the methods that I use to evaluate students.		
UCT faculty (n=13)	3.69 (± 0.48)	0.005*
KI faculty (n=28)	3.07 (± 0.66)	
Total faculty (n=41)	3.27 (± 0.67)	
I always give feedback to students throughout their surgical rotation, even if unsolicited.		
UCT faculty (n=13)	2.85 (± 0.80)	0.061
KI faculty (n=28)	3.36 (± 0.83)	
Total faculty (n=41)	3.19 (± 0.84)	

Likert items included: 1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree

*$p \leq 0.05$ by the Mann-Whitney U test

Both faculty and students thought that medical students played an important role in the medical team. However, UCT students reported significantly higher agreement with this statement when compared to KI students (p=0.046). Students from both KI and UCT believed that faculty plays a significantly larger role in shaping the career of a medical student, when compared to faculty (p<0.001). UCT faculty reported significantly higher consistency in the methods of evaluating students when compared to KI faculty (p=0.005). Furthermore, differences were found between UCT and KI faculty in the feedback that is given to students throughout the surgical rotation, however, this was not significant.

4.3 MENTORSHIP AND ROLE MODELS

Of the total faculty cohort, 31 (75.6%) and 33 (80.5%) believed that, during undergraduate surgical training, students should have a mentor as well as identify with a role model respectively. Significant differences were found when compared to the total student cohort, with 41 (34.2%) students stating they had a mentor during their training, and 70 (58.3%) students reporting that they had identified with a role model (p<0.001 and p=0.011 respectively).

No significant differences were found between faculty from UCT and KI in their belief that students ought to have a mentor and identify with a role model during undergraduate surgical training. A significant difference was found between students, with 5 (10.2%) UCT students reporting they had a mentor, compared to 36 (50.7%) KI students (p<0.001). Of the students at UCT reporting they had a mentor, 3 (60.0%) were female, compared to 15 (41.7%) females at KI.

No significant difference was found between UCT and KI students when identifying with a role model during undergraduate surgical training. Furthermore, of the students at UCT and KI that did identify with a role model, 23 (56.1%) and 16 (55.2%) were female respectively. However, of the students at UCT that did not identify with a role model, 14 (70.0%) were female, compared to 14 (46.7%) females at KI.

Of the students who had a mentor during their undergraduate surgical training, the majority (10.8%) communicated with their mentor on a monthly basis. Contrastingly, when asked how often students should communicate with their mentors, the majority of faculty (48.8%) reported weekly communication.

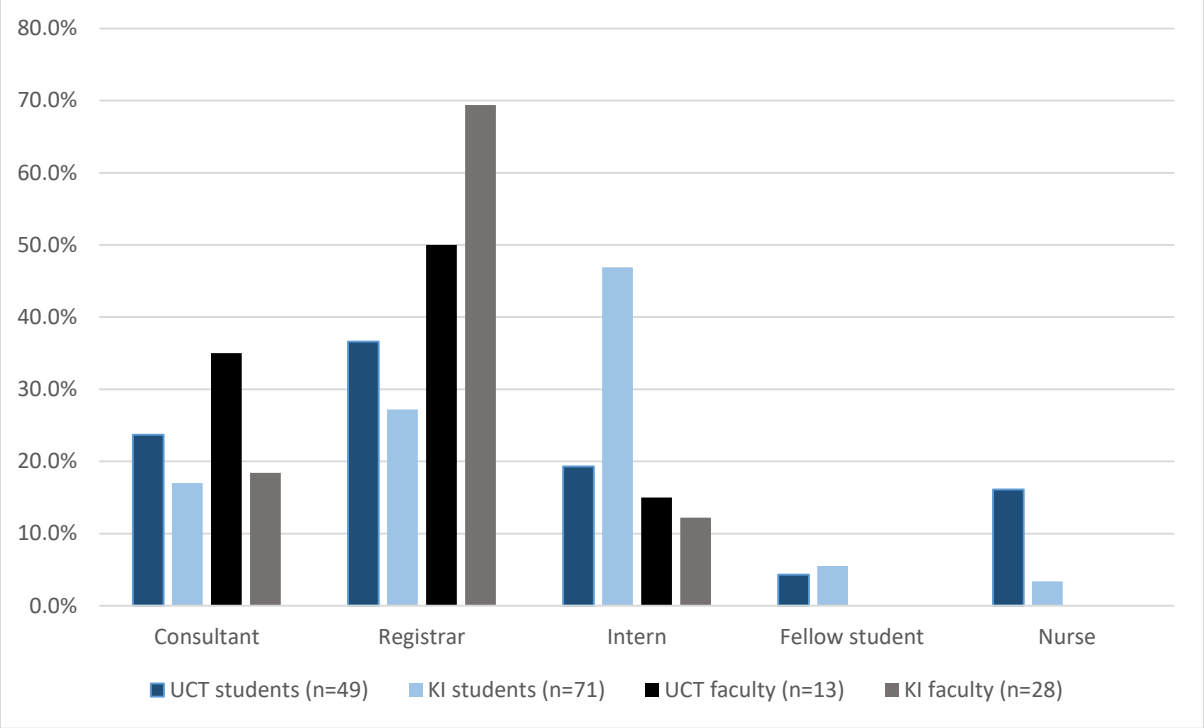

Figure 5: The best role model for medical students

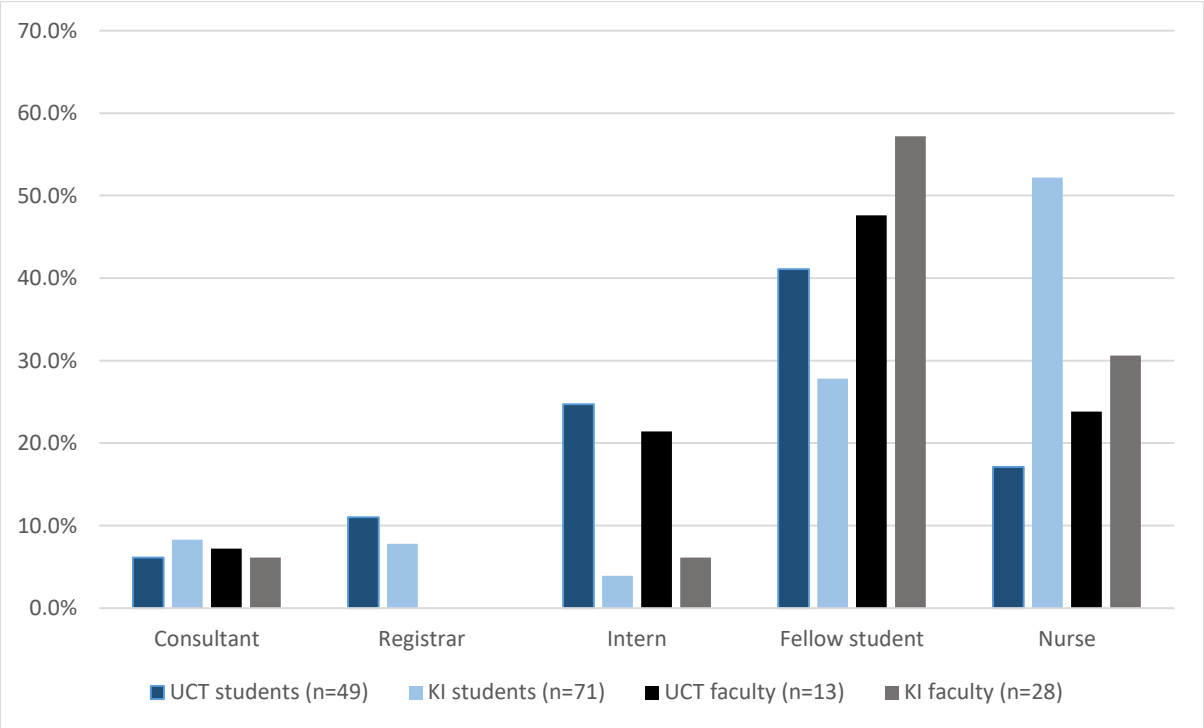

Figure 6: The worst role model for medical students

Figure 5 and Figure 6 depict the best and worst role models as perceived by students and faculty. The majority of faculty from both UCT (50.0%) and KI (69.4%), as well as UCT students (36.6%), believed that the 'registrar' was the best role model for medical students during their undergraduate surgical training. The majority of KI students (46.9%) stated that the 'intern' was the best role model for medical students. 'Fellow student' was most commonly reported as the worst role model for medical students by faculty from both UCT (47.6%) and KI (57.1%), as well as UCT students (41.1%). The majority of KI students (52.2%) stated that the 'nurse' was the worst role model for medical students.

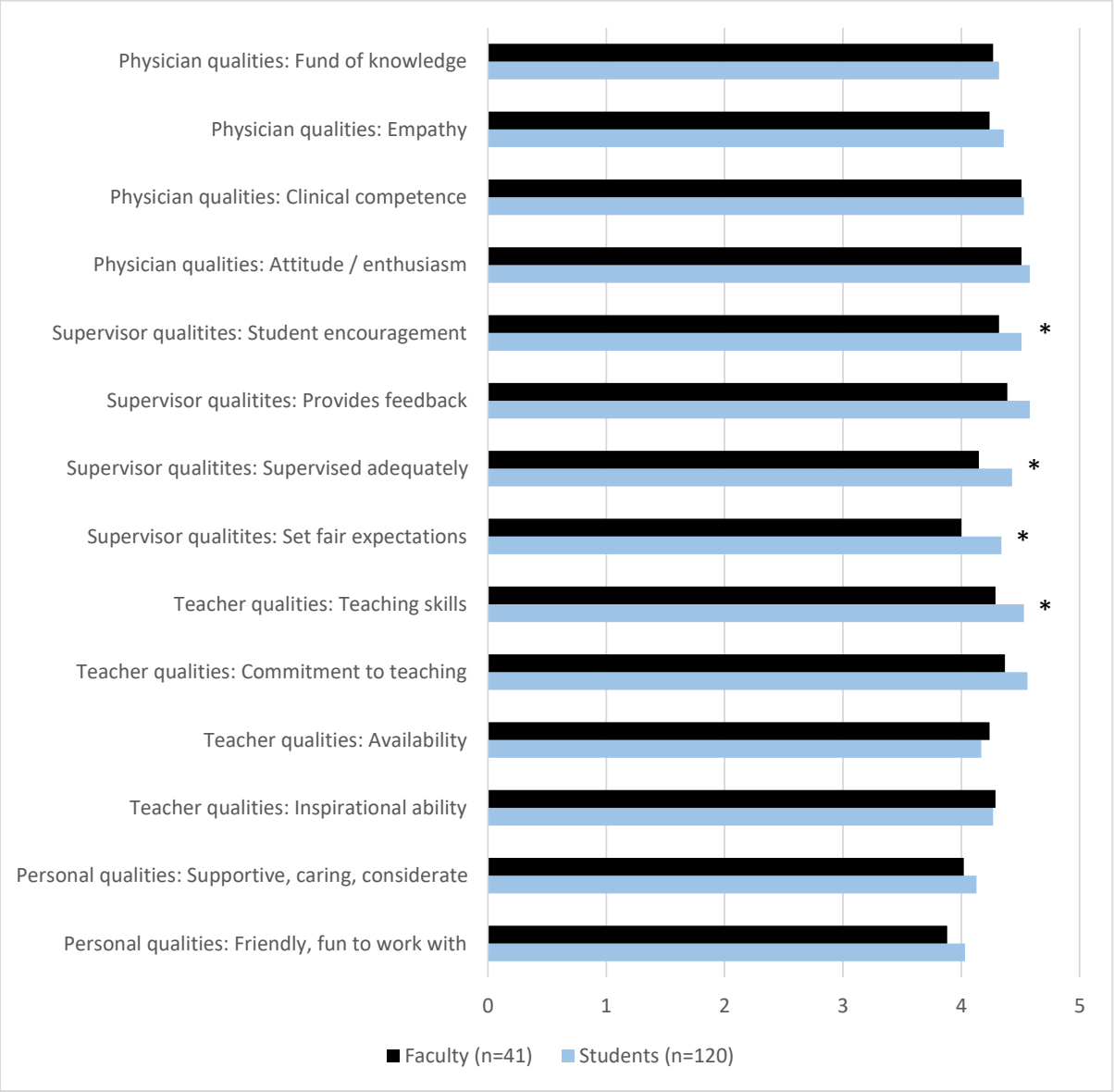

Figure 7: Student and faculty perceptions of the most important characteristics of a clinical teacher and mentor. Likert items included: 1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree. Data are represented as means. *$p \leq 0.05$ by the Mann-Whitney U test

Figure 7 displays the responses of students and faculty when asked to rate the most important characteristics of a clinical teacher and mentor. No significant differences were found between student and faculty perceptions in the clusters of 'Physician' and 'Personal'. In the cluster of 'Supervisor', students rated 'Student encouragement', 'Supervised adequately', and 'Set fair expectations' significantly higher when compared to faculty (p=0.037, p=0.007 and p=0.002 respectively). Similarly, 'Teacher skills' was rated significantly higher by students when compared to faculty (p=0.010).

CHAPTER 5

DISCUSSION

The results of this study illustrate important differences in the views and perceptions of the surgical curriculum, not only between medical students and surgical faculty, but between students and faculty from institutions based in developing and developed countries.

5.1 DEMOGRAPHICS

Students at the two institutions in this study were similar in terms of gender, however KI students were significantly older. Compared to medical students commencing medical training immediately after completing secondary schooling, mature medical students often have more experience and display varying strengths and weaknesses. It is possible that contrasting levels of maturity between UCT and KI student cohorts may have had an added influence on the differences in perceptions seen in the current study.

When compared to UCT faculty, the faculty from KI were significantly older, reported being in surgical practice longer, and were predominantly male. It has been shown that despite similar numbers of males and females graduating from medical school and completing specialist training, females still make up lower percentages in most surgical disciplines.[36] This is corroborated by the demographic finding in this study where, compared to UCT faculty, an inequality of gender in consultant positions exist within the KI faculty cohort, especially in those who have practiced surgery longer.

5.2 UNDERGRADUATE SURGICAL TRAINING

Surprisingly, the total student cohort reported a significantly higher number of hours of clinical training received when compared to the number of hours the surgical faculty reported they actually had taught. This difference may be due to a higher proportion of the student-faculty interaction time interpreted as actual clinical training by students compared to faculty. Increased responsibility on registrars to undertake teaching of medical students, compared to consultants, may also play a role

as registrars have been shown to be ideally placed to deliver teaching and clinical supervision to medical students, with studies in both developed and developing countries illustrating its benefits.[14,37-38] Furthermore, it is postulated that surgical registrars are in fact the primary educators of medical students as both clinical and research commitments limit the teaching responsibilities of more senior faculty such as surgical consultants.[10] The total student cohort also believed they ought to receive significantly more clinical instruction when compared to the surgical faulty, corroborating findings of previous studies which found that medical students desired more clinical teaching when compared to faculty perceptions.[1,15]

Though no difference was found between the total number of students and faculty, UCT students expected to spend a significantly greater number of hours studying when compared to KI students. A large body of research has evaluated the changes in student perceptions and attitudes to medical education across different generations.[39] The emergence of the Millennial generation, or Generation Y, has created a change in learning styles and climates, as described by Engels and de Gara.[7] It has been proposed that with the arrival and ease of digital technology in the last decade, medical students have altered the way they think and in which they process information, resulting in "difficulty in excelling in classrooms using outdated teaching methods commonly used in medical education today".[40] Therefore, students from a developed nation such as Sweden may have the perception that conventional methods of education and study are becoming old-fashioned, especially when compared to students from a developing nation.

Except for KI students, the results of the current study support the perception that medical students learn most from small-group tutorials. KI students most commonly reported one-on-one training as the best medical student educational method. It is possible that with the ratio of medical students to faculty at medical schools in developed countries being less than that of developing countries, there may be more opportunity to teach in a one-on-one format. Conversely, students from both KI and UCT believed that formal lectures were the area that students learnt the least from. It has been shown in recent years that there has been a desire to move away from the commonly utilised lecture and slide presentation, and more toward small-group sessions in medical education.[41] In a study where 33 didactic lectures in general surgery were reduced to eight small-group sessions, medical students in the small-group sessions obtained significantly higher examination scores.[42] Furthermore, the faculty reported a positive stance on the change of teaching method, despite requiring more time to prepare for the small-group sessions.

UCT faculty considered formal lectures an area that medical students learn well from. This is not surprising as a large proportion of the UCT fifth year undergraduate general surgery rotation is lecture-

based. Of concern is that despite the reported positive impact the operating theatre has been shown to have on the learning outcomes of medical students,[6] no UCT student reported the operating theatre as an area from which medical students learn well. Whether this was due to limited exposure, or inadequate teaching while in the operating theatre, is a topic for future research. Additionally, neither KI nor UCT faculty reported the outpatient clinic as an effective learning area for teaching medical students. The limited time in a busy clinic setting, as well as the often perceived disruption to faculty workload, may be some of the reasons for this finding.[42] These results indicate that a change to the curriculum may be warranted, as illustrated in UCT student preferences. However, change may be difficult to effect due to logistical and financial constraints most medical schools are facing, especially in the developing world.

Whereas students and faculty generally agreed that certain skills need to be acquired by a medical student prior to the end of their undergraduate surgical rotation, there were significant differences between the student and faculty groups in prioritising the skills. Faculty prioritised history-taking and the ability to appropriately present patients, whereas students regarded practical skills, such as sterile technique and the ability to suture, as more important. Similar differences were reported in comparative studies.[1,15] As all these skills are important, reconciliation of difference in perspectives and expectations, by establishing clear goals and clear motivation for the need to acquire certain skills, is likely to improve skills development.

The majority of respondents believed that medical students should first consult with registrars if any questions arise regarding the care of patients, which is in keeping with previous literature reports.[1] It has been shown that South African registrars spend up to 40% of their day teaching undergraduate medical students.[43] Despite this large proportion of time spent in educating students, registrars have limited, if any, formal teaching in education.[44] Therefore, many institutions have developed Registrar-(or Resident)-as-Teacher programmes aiming to improve their teaching skills. Recent results of such programmes have confirmed its positive impact.[14] It stands to reason that as medical students spend a significant amount of time with registrars, it should be logical for academic institutions to invest in improving their teaching skills, by providing them with formal teacher training.

One of the most disconcerting findings in the current study was student perceptions that they were an inconvenience when attending to clinical responsibilities and the belief that faculty would rather not have students on the surgical team. These views amongst medical students have been reported previously.[1,9,45] These perceptions, often accompanied by feelings of helplessness, may create adversity to surgery as a discipline during the undergraduate surgical rotation. Despite this negative perception by students, both faculty and student cohorts agreed that medical students play an

important role in the surgical team. However, the exact role probably needs to be defined more specifically. It has been suggested that medical students may not be critical in day-to-day care of surgical patients, but that focus should be on learning the pathophysiology of the surgical patient, and how to be a contributing member of the surgical team.[46] To more effectively accommodate students in the clinical setting, it was proposed that specific ward-related tasks be created for students to complete, and to more clearly outline student roles during the surgical rotation.[15] It has also been suggested that specific clinical education wards be created, where most clinical tasks, when appropriate, may be performed by students under faculty guidance.[47]

In the current study, the overall response of students planning to pursue a career in surgery was ambiguous. Recent evidence suggests that interest in general surgery is declining amongst undergraduate medical students in both developing and developed countries.[48-50] However, fostering surgical interest can be achieved through specific strategies, such as alleviating negative perceptions of surgery, increasing exposure to surgery, as well as increasing contact with surgical mentors and role models.[51]

One of the most important results from the current study is the negative outlook UCT students and faculty had on the adequacy of the current surgical curriculum when compared to perceptions from KI. Additionally, the combined faculty cohort from both institutions viewed the curriculum in a more negative light when compared to the combined student cohort. A study from the United Kingdom[52] reported a generally low level of satisfaction regarding surgical sciences teaching, with less than half of medical students stating they were prepared for dealing with emergency general surgery patients when they graduated as junior doctors. Evidence showed that both students and tutors perceived the medical curriculum as misaligned, and that misalignment caused resentment amongst medical students.[53] Surgical training is an essential aspect of the undergraduate curriculum and therefore medical schools and surgical educators are challenged to create effective partnerships with the aim of delivering effective surgical teaching for medical students.

Another factor that has been shown to influence medical student perceptions of surgery is faculty evaluation and feedback. Seen as an essential skill required for learner improvement, effective feedback may support the learner in accomplishing defined goals.[16] In one of a few studies evaluating perceptions of undergraduate surgical training amongst medical students in the developing world, a study from Nigeria[54] reported that just over half of students believed that feedback on their performance was adequate. The current study found UCT faculty to be significantly more consistent in evaluating students when compared to KI faculty. However, UCT faculty were less likely to give feedback to students. This result, which may contribute to the negative perceptions of medical

students about their surgical rotation, is in keeping with previous literature which found that faculty were frequently indifferent about their feedback to students.[1] Constructive feedback is an important aspect of the responsibilities of an educator. It has been suggested that increased accountability for inadequate quality of teaching would resolve many issues that students and faculty may experience.[42]

Similar to findings from previous studies,[1,8] the current study demonstrated general agreement amongst all respondents that surgical faculty play an important role in shaping the career of a medical student. However, students from both UCT and KI reported significantly higher agreement compared to faculty. In a survey of medical students and surgical faculty, Quillin et al.[8] reported that surgical faculty often failed to recognise their influence on medical students. Once more, this perception may influence medical student views of surgery, and ultimately have implications for choosing a potential surgical career.

5.3 MENTORSHIP AND ROLE MODELS

Mentorship during undergraduate surgical training has been shown to positively influence medical students, especially through formal mentoring programmes.[9-11,55-57] Numerous studies have reported that mentorship increases interest in surgery,[10,45,55,58-59] improves student confidence,[55-56] and has a positive impact on career planning and academic research.[11] Role models, both positive and negative, have also been shown to influence medical students in their career choice.[60] Personality, attitude, clinical competence, clinical skills, and teaching ability, have all been shown to be a determinant of a surgeon being deemed a positive or negative role model.[9] Crucial to improving surgical interest amongst medical students, positive surgical role models significantly influence the decision of medical students to pursue a career in surgery.[31,58] Conversely, negative surgical role models may deter a medical student from following a surgical career option.[28] Another postulated reason for reduced interest in surgery, especially in females, is the lack of same-gender role models.[31] Despite a higher proportion of female surgical faculty at UCT compared to KI, the current study found little difference in female students identifying with a surgical role model at the two institutions. However, of the students at UCT that did not identify with a surgical role model, 70% were female. This may corroborate previous reports of females continuously being challenged to find surgical mentors and role models.[9,61] Gender is an important aspect to developing mentoring relationships as both the mentor and mentee often have similar interests and goals.[62] Females have also been shown to prefer specialties with a higher proportion of women, which has historically been a criticism of the surgical

workplace.[63] Encouragingly, the gender-gap within the surgical field is narrowing, with increasing numbers of females entering surgical posts, as well as more females in senior surgical and academic positions, increasing access to mentorship.[62]

The current study found that just over a third of the total student cohort had a mentor during their undergraduate surgical training, which was significantly different to the perceptions of surgical faculty. Anecdotal evidence exists in determining the number of medical students that are in surgical mentoring relationships at an undergraduate level. Studies conducted in North America[10,29] and the United Kingdom[59] have shown the number of students identifying with surgical role models and having mentors to be as high as 60-80%. In contrast, a study in Ireland[28] reported that 80% of senior medical students did not have a surgical mentor. These circumstantial findings are not isolated to the developed world. A study in Nigeria[64] showed that 84% of medical students believed they had identified with a surgical role model, whereas a study conducted in Rwanda[65] found that only 35% of respondents had a positive mentoring relationship with surgical faculty. Although outside the scope of the current study, several studies have also described a lack of surgical mentors amongst junior doctors and surgical trainees.[28,66-67] Interestingly, the current study illustrated significant differences between students from UCT and KI having a surgical mentor. However, the paucity of literature to which this finding can be compared to makes it difficult to make specific extrapolations. The evidence does however point to a lack of standardised and accessible mentoring relationship formats throughout the surgical curriculum, as well as an insufficient number of positive surgical role models for medical students.

Medical students and surgical faculty in the current study reported contrasting views on the preferred communication intervals between mentors and mentees. Studies have demonstrated similar findings where mentees have desired communication that occurs more frequently and on a more personal level, compared to mentor opinion.[11, 30] Additionally, many instances of communication in the mentoring relationship have been reported to be informal.[28,68] Students from both developing and developed countries have a desire for formal mentoring programmes.[28,32] Mentoring programmes that are structured and formalised have been shown to be highly effective in improving student academic performance, increasing research productivity, growing interest in specialties, as well as providing the student with an increased sense of support and overall well-being during undergraduate training.[68] Despite these well-established benefits, Healy, et al.[9] argued that unless there is early interest and agreed involvement from both mentor and mentee, little will be gained from compulsory encounters within formal mentoring programmes in terms of personal and professional development. Therefore, as long as both mentee and mentor have clear determinants for active participation in the relationship, mentorship may be structured or loose, and may be dynamic and continuously renewed.

Surgical registrars, or residents, are ideally suited to be primary teachers, role models, and mentors to medical students due to the extent of their daily interaction, as well as their understanding of the challenges that graduating medical students are soon to face.[8-10,55,69-70] This is corroborated by results of the current study where the majority of medical students and surgical faculty from both UCT and KI believed that registrars are the best role models during undergraduate surgical training. However, studies have shown that registrars are often disregarded as mentors, with institutions failing to acknowledge the impact and influence they have on medical students.[8,10,71] This again highlights the importance of academic institutions encouraging and training registrars to acquire the necessary skills to be able to adequately mentor medical students during their undergraduate education.

Ullian, et al.[33] have described the characteristics of an outstanding clinical teacher and mentor. Their findings illustrated that medical students emphasised 'Teacher' qualities. A decade later, Cochran, et al.[34], asking medical students to rate the same characteristics and compare resident and attending surgeon mentors, found that medical students similarly viewed 'Teacher' qualities as being most important. Interestingly, 'Teacher' qualities were deemed important in attending surgeon mentors, whereas 'Personal' qualities were regarded most important for resident mentors. This is perhaps not surprising as students may relate to registrars on a more personal level as compared to consultants. In the current study, 'Personal' qualities were rated least important by students and faculty from both UCT and KI, which may be attributable to the fact that only consultants and fellows were recruited in the faculty cohort. In a study conducted by Nguyen and Divino[10], who used similar methodology and outcome measures to Cochran et al.[34], students rated residents significantly higher in 12 of the 14 characteristics. However, attending surgeons were rated higher by medical students in the 'Physician' qualities. This finding is comparable to results of this study where students and faculty from both UCT and KI perceived 'Physician' qualities to be the most important. Once again, this may reflect the surgical faculty sample in our study as students often recognise the fund of knowledge and clinical competence that experience of a consultant usually brings to their teaching.

In a study conducted by Ravindra and Fitzgerald,[59] respondents believed that surgical role models should be a good teacher first, followed by being an effective clinician, personable, and finally be a good supervisor. Interestingly, the current study found significant differences between students and faculty in the clusters of 'Supervisor' and 'Teacher', including qualities such as encouraging students, adequate supervision, setting of fair expectations, and teaching skills. It has been purported that there are elements of supervision within the surgical discipline that are different to mentoring. However, there are also similarities, such as teaching.[72] It is vital to the success of the student trainee that these roles are fulfilled. It has also been argued that students look for close supervision, encouragement and adequate feedback when performing daily tasks, such as suturing and other surgical procedures.[10] As

consultants often spend less time with students in these activities, it may offer some insight into the reasons for these significant differences. It is important to note that the perceptions of surgical trainees regarding the characteristics of a surgical mentor and role model may change as they progress through their career. Furthermore, despite being ranked for statistical purposes, as well as to isolate areas in which to focus, all of the qualities reported are important and should be included in strategies to improve surgeons themselves as role models and mentors.

5.4 STUDY LIMITATIONS

A number of methodological limitations in the current study have been identified. The descriptive, cross-sectional study design that was used inherently compromises validity, and fails to report on individual changes over time. The overall response rate of medical students was low compared to that of surgical faculty, which may also limit the validity of results. There is no consensus on what constitutes an adequate response rate, as it has been shown that it partially depends on the way in which data is utilised.[73] For example, Nulty[74] describes that even one response that provides information in a teaching evaluation survey has served its purpose in bringing about potential improvements. Furthermore, it has even been suggested that lower response rates do not automatically equate to poorer study validity.[75]

Although based on previous research, the questionnaire used in this study was not validated. However, to date no validated questionnaire exists for evaluating the efficacy of mentorship in medical students, which causes an inherent limitation. It has also been shown that respondents who have been asked to explore their views on mentorship are often subject to two response biases: acquiescence bias, the tendency to give positive responses to 'positive' characteristics regardless of item content, and the halo effect, rating characteristics highly because of an overall positive impression of the mentor. However, these biases have been reported to be uncommon when using Likert-type scales, as applied in the current study.[76]

Despite conducting this study at two institutions which include several teaching hospitals, only one academic year was evaluated, which may have introduced population bias. As registrars were not included in this study, results may have been confounded as students may have found it problematic in reporting on teaching solely done by consultants and fellows. Finally, a meta-analysis reported that the accuracy of medical student self-assessment may be questioned as they tend to either over- or under-estimate responses depending on the assessment.[77] Regardless, the importance of determining

the perceptions of medical students and surgical faculty in improving the surgical curriculum, as well as overall surgical interest, is paramount.

CHAPTER 6

FUTURE RECOMMENDATIONS AND CONCLUSION

6.1 FUTURE RECOMMENDATIONS

The current study provided insight into the views and perceptions of medical students and surgical faculty regarding the existing curriculum and current state of surgical training, mentorship and role models during undergraduate surgical training. However, there are considerations, not specifically addressed in this thesis, that may further our understanding of the subject, and facilitate change in academic institutions to better train, support and guide medical students.

One of the main themes highlighted in this study is the role of the registrar in both training and mentoring of students. Although the literature illustrates the benefits of registrars taking a more active role, one must be cautious in placing further responsibility on those that are in training themselves, and who are already time-constrained with their own studies and the burden of clinical duties. However, medical students would profit immensely if academic institutions were able to balance the potential added strain with adequate education training of registrars to facilitate and improve their role as clinical teachers and surgical mentors.

To improve the current surgical curriculum, future studies may need to focus on some of the important findings in this study. For example, further assessment may shed light on which teaching styles and environments, which style of student-faculty communication, and whether clearer defining of which clinical skills should be mastered on an undergraduate level, may improve student outcomes. Additionally, future research should also probe factors underlying gender and minority discrimination in order to overcome obstacles and bring about equal and equitable surgical training for all students.

With regards to surgical mentoring and role-modelling, surgical faculty may need to adopt a more active role to maximise the described benefits for medical students. Furthermore, early intervention may instil a mentoring mentality in medical students, which may potentially assist in mentoring students as future registrars. Academic institutions should also consider introducing formal mentoring programmes, focussing on the characteristics that make a good mentor and role model. With the paucity of literature assessing mentoring of medical students, especially within the surgical discipline, it is imperative that future studies concentrate on aspects that may increase surgical interest, as well

as encourage the pursuit of surgery as a career option. Barriers and promoters of mentorship within surgery in both developed and developing countries, which were not assessed in the current study, should also be explored in future research.

6.2 CONCLUSIONS

Significant differences exist in the perceptions of medical students and surgical faculty regarding undergraduate surgical training and mentorship in both South Africa and Sweden. These differences may have negative implications for the fostering of surgical interest amongst medical students, as well as the potential for students to pursue a career in surgery. The differences observed in students and surgical faculty in developing and developed countries illustrate potential dissimilarities in teaching and learning styles, areas of focussed teaching, and overall roles and expectations of medical students within the current undergraduate surgical curricula. Furthermore, a lack of surgical mentors and role models, as well as the underestimation of their value, may add to the perception of surgery as an unattractive career choice.

Most surgical faculty members aspire to be effective teachers and role models, and aim to ensure that the medical students they teach become knowledgeable and competent medical practitioners. However, a number of factors may frustrate their efforts, such as weaknesses in the institutional curriculum, cultural differences and environmental changes, as well as the current lack of focus on role models and mentors in undergraduate surgical training. By focussing on aspects that may dispel the negative and misaligned perceptions of surgical training and mentoring between medical students and surgical faculty, along with valuing the student-centred and problem-orientated approaches to learning and mentoring, medical students may be equipped with crucial surgical skills and knowledge, as well as a reaffirmed interest in surgery.

CHAPTER 7

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CHAPTER 8

APPENDICES

8.1 STUDENT QUESTIONNAIRE: ENGLISH

Age:	**Gender:**	Male	Female	Other
How many hours of individual/small group clinical instruction per week did you receive during your surgical rotation?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4
How many hours of individual/small group clinical instruction per week do you think you ought to receive during your surgical rotation?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4
How many hours do you think you are expected to spend studying when not on duty per week?				
0 - 5	6 - 10	11 - 20	21 – 30	> 30
How many times per week did you practice procedural skills (suturing, etc.) at your university surgical skills training centre?				
0	1 - 2	2 - 4	4 - 6	> 6
Do you think you had adequate opportunity to practice procedural skills on patients (in theatre, clinic, trauma, etc.)?			Yes	No
What area of training do you think medical students learn the most from?				
One-on-one	Small-group tutorials	Lectures	In theatre	In outpatient clinic

I believe the following skills are absolutely necessary for a medical student to have learnt by the end of his/her surgical rotation.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Basic surgical anatomy					
Proper surgical history					
Identify surgical problems					
Ability to present patients					
Identify surgical complications					
Work within a hierarchy					

Sterile technique	
Ability to suture	
Assist in theatre	

If you have theoretical or clinical questions about the care of patients, who should you consult first?

Consultant Registrar Intern Fellow student Nurse

Faculty view medical students as an inconvenience to day-to-day responsibilities.	True	False
Faculty would rather not have a medical student on the medical team.	True	False
I found faculty to be respectful to patients.	True	False
I found faculty to be respectful to medical students.	True	False

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I believe the current surgical curriculum is adequate.					
I am planning to pursue a career in general surgery or a surgical sub-specialty.					
I believe medical students play an important role in the clinical team.					
In general, I believe consultants do well in teaching medical students.					
In general, I believe registrars do well in teaching medical students.					
Surgical faculty play an important role in shaping the career of a medical student?					

During my surgical rotation, I had a mentor.	True	False
I communicated with my mentor every: Day Week Month Quarter Semester Year Never NA		
I identified a role model during my surgical rotation.	True	False
In my surgical rotation, I found the best role model to be: Consultant Registrar Intern Fellow student Nurse		
In my surgical rotation, I found the worst role model to be: Consultant Registrar Intern Fellow student Nurse		

In my opinion, the most important characteristics of clinical teacher and mentor/role model are:					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Physician qualities: Attitude/enthusiasm Clinical competence Empathy Fund of knowledge Supervisor qualities: Student encouragement Provides feedback Supervised adequately Set fair expectations Teacher qualities: Teaching skills Commitment to teaching Availability Inspirational ability Personal qualities: Supportive/caring/Considerate Friendly/Fun to work with					

8.2 STUDENT QUESTIONNAIRE: SWEDISH

Ålder:	**Kön:**	Man	Kvinna	Annan

Hur många timmar av individuell eller smågruppsundervisning per vecka hade du under din kirurgiska placering?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4

Hur många timmar av individuell eller smågruppsundervisning per vecka tycker du att du borde fått under din kirurgiska placering?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4

Hur många timmar per vecka tror du det förväntas av dig att studera när du ej jobbar?				
0 - 5	6 - 10	11 - 20	21 – 30	> 30

Hur många gånger per vecka tränade du på praktiska färdigheter (suturering, etc) på universitetets kliniska/kirurgiska träningscentrum?				
0	1 - 2	2 - 4	4 - 6	> 6

Tycker du att du hade adekvata möjligheter att träna på praktiska färdigheter på patienter (på operation, kliniken, trauma, etc)?	Ja	Nej

Av vilken utbildningsform anser du att läkarstudenter lär sig mest?				
En-och-en	Smågruppsse minarier	Föreläsningar	På operation	På öppenvårdsmottagning

Jag tror att följande färdigheter är absolut nödvändiga för en läkarstudent att ha lärt sig under dennes kirurgiska placering.

	Håller verkligen inte med	Håller inte med	Varken håller med eller inte	Håller med	Håller helt med
Grundläggande kirurgisk anatomi					
Kirurgiskt anamnestagande					
Identifiera kirurgiska problem					
Att kunna presentera patienter					
Identifiera kirurgiska komplikationer					
Arbeta inom en hierarki					
Sterilitet					
Att kunna suturera					
Att kunna assistera på operation					

Om du har teoretiska eller kliniska frågor om patientvård, vem konsulterar du i första hand?				
Överläkare	ST-läkare	AT-läkare	Annan student	Sjuksköterska

Personalen ser läkarstudenter som ett besvär i den kliniska vardagen.	Sant	Falskt
Personalen skulle hellre inte ha läkarstudenter i det medicinska teamet.	Sant	Falskt
Jag tycker personalen visar patienter respekt.	Sant	Falskt
Jag tycker personalen visar läkarstudenter respekt.	Sant	Falskt

	Håller verkligen inte med	Håller inte med	Varken håller med eller inte	Håller med	Håller helt med
Jag tycker de kirurgiska lärandemålen är adekvata.					
Jag planerar att göra karriär i allmänkirurgi eller en kirurgisk sub-specialitet.					
Jag tycker läkarstudenter är en viktig del av kliniska teamet.					
Generellt sett tycker jag överläkare är bra på att utbilda läkarstudenter.					
Generellt sett tycker jag ST-läkare är bra på att utbilda läkarstudenter.					
Kirurgisk personal spelar en viktig roll i att påverka en läkarstudents karriär.					

Jag hade en mentor under min kirurgiska placering.	Sant	Falskt
Jag pratade med min mentor varje:		
Dag Vecka Månad Kvartal Termin År Aldrig N/A		
Jag hittade en förebild under min kirurgiska placering.	Sant	Falskt
Under min kirurgiska placering var de bästa förebilderna:		
Överläkare ST-läkare AT-läkare Annan läkarstudent Sjuksköterska		
Under min kirurgiska placering var de sämsta förebilderna:		
Överläkare ST-läkare AT-läkare Annan läkarstudent Sjuksköterska		

Enligt min åsikt är de viktigaste karakteristika för en klinisk lärare och mentor/förebild:					
	Håller verkligen inte med	Håller inte med	Varken håller med eller inte	Håller med	Håller helt med
Läkaregenskaper: Attityd/entusiasm Klinisk skicklighet Empati Kunskap Handledaregenskaper: Studentuppmuntrande Ger feedback Adekvat handledning Rättvisa förväntningar Utbildningsegenskaper: Utlärandeskicklighet Vilja att lära ut Tillgänglighet Inspirerande förmåga Personliga egenskaper: Stöttande, omsorgsfull, omtänksam Vänlig, rolig att arbeta med					

8.3 FACULTY QUESTIONNAIRE: ENGLISH

Age:	**Gender:**	Male	Female	Other
Level of training:	Consultant		Fellow	
Years in surgical practice:				
0 – 2	3 - 5	6 - 8	9 – 11	> 12
How many hours of individual/small group clinical instruction per week do you give medical students during their surgical rotation?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4
How many hours of individual/small group clinical instruction per week do you think medical students ought to receive during their surgical rotation?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4
How many hours do you think medical students are expected to spend studying when not on duty per week?				
0 - 5	6 - 10	11 - 20	21 – 30	> 30
How many times per week did you think medical students get to practice procedural skills (suturing, etc.)?				
0	1 - 2	2 - 4	4 - 6	> 6

Do you think medical students have adequate opportunity to practice procedural skills on patients (in theatre, clinic, trauma, etc.)?	Yes	No

What area of training do you think medical students learn the most from?				
One-on-one	Small-group tutorials	Lectures	In theatre	In outpatient clinic

I believe the following skills are absolutely necessary for a medical student to have learnt by the end of his/her surgical rotation.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Basic surgical anatomy					
Proper surgical history					
Identify surgical problems					
Ability to present patients					
Identify surgical complications					
Work within a hierarchy					
Sterile technique					
Ability to suture					
Assist in theatre					

If medical students have theoretical or clinical questions about the care of patients, who should they consult first?				
Consultant	Registrar	Intern	Fellow student	Nurse
I find teaching medical students an inconvenience to my day-to-day responsibilities.			True	False
If I had a choice, I would rather *not* have a medical student on my medical team.			True	False

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I believe the current undergraduate surgical curriculum is adequate.					
I believe medical students play an important role in the clinical team.					
In general, I believe consultants and fellows do well in teaching medical students.					
I am very consistent with the methods that I use to evaluate students.					
I always give feedback to students throughout their surgical rotation, even if unsolicited.					
I play an important role in shaping the career of a medical student.					

I believe a medical student should have a mentor during their surgical rotation.						True	False
Medical students should communicate with their mentor every:							
Day	Week	Month	Quarter	Semester	Year	Never	NA
I believe a medical student should identify a role model during their surgical rotation.						True	False
I believe the best role model for medical students are:							
Consultant	Registrar	Intern	Fellow student	Nurse			
I believe the worst role models for medical students are:							
Consultant	Registrar	Intern	Fellow student	Nurse			

In my opinion, the most important characteristics of a clinical teacher and mentor/role model are:					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Physician qualities: Attitude/enthusiasm Clinical competence Empathy Fund of knowledge Supervisor qualities: Student encouragement Provides feedback Supervised adequately Set fair expectations Teacher qualities: Teaching skills Commitment to teaching Availability Inspirational ability Personal qualities: Supportive/caring/Considerate Friendly/Fun to work with					

8.4 FACULTY QUESTIONNAIRE: SWEDISH

Ålder:	**Kön:**	Man	Kvinna	Annan
Specialiseringsnivå:	Överläkare		Specialist	
År av kirurgisk tjänstgöring:				
0 – 2	3 - 5	6 - 8	9 – 11	> 12
Hur många timmar av individuell/gruppbaserad utbildning ger du per vecka till läkarstudenter under deras kirurgiska placering?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4
Hur många timmar av individuell/gruppbaserad utbildning tycker du läkarstudenter borde erhålla under deras kirurgiska placering?				
0 - 1	1 - 2	2 - 3	3 – 4	> 4
Hur många timmar per vecka tror du läkarstudenter förväntas studera när de ej har klinisk placering placering?				
0 - 5	6 - 10	11 - 20	21 – 30	> 30
Hur många gånger per vecka tror du läkarstudenter får träna på praktiska kliniska färdigheter (suturering, etc)?				
0	1 - 2	2 - 4	4 - 6	> 6

Tycker du läkarstudenter har tillräckligt med möjligheter att träna på praktiska kliniska färdigheter på patienter (på operation, kliniken, trauma, etc)?	Ja	Nej

Av vilken utbildningsform anser du att läkarstudenter lär sig mest?				
En-och-en	Smågruppsse minarier	Föreläsningar	På operation	På öppenvårdsmottagning

Jag tror att följande färdigheter är absolut nödvändiga för en läkarstudent att ha lärt sig under dennes kirurgiska placering.

	Håller verkligen inte med	Håller inte med	Varken håller med eller inte	Håller med	Håller helt med
Grundläggande kirurgisk anatomi					
Kirurgiskt anamnestagande					
Identifiera kirurgiska problem					
Att kunna presentera patienter					
Identifiera kirurgiska komplikationer					
Arbeta inom en hierarki					
Sterilitet					
Att kunna suturera					
Att kunna assistera på operation					

Om läkarstudenter har teoretiska eller kliniska frågor om patientvård, vem borde de konsultera i första hand?				
Överläkare	ST-läkare	AT-läkare	Annan student	Sjuksköterska

Jag tycker läkarstudenter är ett besvär i den kliniska vardagen.	Sant	Falskt
Om jag fick välja, skulle jag hellre inte ha läkarstudenter i mitt medicinska team.	Sant	Falskt

	Håller verkligen inte med	Håller inte med	Varken håller med eller inte	Håller med	Håller helt med
Jag tycker de kirurgiska lärandemålen är adekvata.					
Jag tycker läkarstudenter är en viktig del av kliniska teamet.					
Generellt sett tycker jag överläkare och ST-läkare är bra på att utbilda läkarstudenter.					
Jag är mycket konsistent med metoderna jag använder för att utvärdera studenter.					
Jag ger alltid feedback till studenter under deras kirurgiska placering, även om inte bedd om det.					
Jag spelar en viktig roll i att påverka en läkarstudents karriär.					

Jag anser att läkarstudenter ska ha en mentor under deras kirurgiska placering.	Sant	Falskt

Läkarstudenter bör prata med sin mentor varje:							
Dag	Vecka	Månad	Kvartal	Termin	År	Aldrig	N/A

Jag anser att läkarstudenter bör hitta en förebild under deras kirurgiska placering.	Sant	Falskt

Jag tycker den bästa förebilden för läkarstudenter är:				
Överläkare	ST-läkare	AT-läkare	Annan läkarstudent	Sjuksköterska
Jag tycker den värsta förebilden för läkarstudenter är:				
Överläkare	ST-läkare	AT-läkare	Annan läkarstudent	Sjuksköterska

Enligt min åsikt är de viktigaste karakteristika för en klinisk lärare och mentor/förebild:					
	Håller verkligen inte med	Håller inte med	Varken håller med eller inte	Håller med	Håller helt med
Läkaregenskaper: Attityd/entusiasm Klinisk skicklighet Empati Kunskap Handledaregenskaper: Studentuppmuntrande Ger feedback Adekvat handledning Rättvisa förväntningar Utbildningsegenskaper: Utlärandeskicklighet Vilja att lära ut Tillgänglighet Inspirerande förmåga Personliga egenskaper: Stöttande, omsorgsfull, omtänksam Vänlig, rolig att arbeta med					

8.5 INFORMED CONSENT FORM: ENGLISH

Informed consent

Medical student and faculty perceptions of undergraduate surgical training: a comparison between South Africa and Sweden

Good day

My name is Alex Scott and I am student from the University of Cape Town (UCT). You are invited to participate in a study evaluating and comparing medical student and faculty perceptions of undergraduate surgical training between South Africa and Sweden.

For the student perspective, currently enrolled medical students from UCT and Karolinska Institutet (KI) who have completed their respective undergraduate general surgery rotation, will be studied. For the faculty perspective, currently employed staff in the Department of General Surgery, both consultants and fellows, at UCT and KI affiliated hospitals will be studied.

The study has been approved by the UCT Human Research Ethics Committee and permission for interviewing students and faculty staff has been granted.

If you agree to participate, you will be required to complete an online questionnaire via SurveyMonkey, a secure, online survey development format. You will be asked demographical information such as age and gender, as well as questions regarding your perceptions on the current surgical curriculum, and finally, regarding mentorship and role models within your faculty.

The questionnaire will be administered anonymously to all participants at UCT and KI. Participants will be free to decline to participate. Furthermore participants will also be free to decline completing the questionnaire, withdraw from the study at any point, or refuse to answer any questions, and shall have the opportunity to contact the authors at any time. All electronic data will be stored on the university password protected server and data analysis will be performed on password-protected devices. After data collection and transcription of the data, all questionnaires will be deleted within one year.

Potential Benefit

There is no direct benefit to you, however knowledge gained from this research will give further insight into potentially improving the surgical curriculum at both UCT and KI.

Potential risks

There are no risks associated with this study.

Cost and compensation

There will be no payments made to you for participating in this study.

Confidentiality

All the information gathered during this study will be completely confidential. You will only be known by a number. Though the results of this study will be published or presented at a medical meeting, no information will be included that will make it possible for you to be identified.

Whom to contact with questions

If you would like to have more information, or you have questions regarding this study, you may contact me, Dr Alex Scott at +2721 406 6328 or +2783 629 8792. You may also contact the UCT Human Research Ethics Committee at +2721 406 6626. Please leave your name and number and I will contact you back.

Consent statement

I have read the information provided above. I have had the opportunity to ask questions and am satisfied with the answers and explanations I have received.

I understand that my participation is by free choice. I now understand all of the information and consent to participate in the study.

Participant signature: …… Date: ……

Participant name: ……

Witness signature: …… Date: ……

Witness name: ……

8.6 INFORMED CONSENT FORM: SWEDISH

Informerat samtycke

Läkarstudenters och medicinska universitetslärarkårers uppfattningar av grundläggande kirurgisk utbildning: en jämförelse mellan Sydafrika och Sverige

God dag

Mitt namn är Alex Scott och jag är student på University of Cape Town (UCT). Du är inbjuden till att delta i en studie som utvärderar läkarstudenters och medicinska universitetslärarkårers uppfattningar av grundläggande kirurgisk utbildning.

För studentperspektivet kommer för närvarande inskrivna läkarstudenter UCT och Karolinska Institutet (KI) som har avslutat sina respektive grundutbildningsplaceringar i allmän kirurgi studeras. För fakultetsperspektivet kommer för närvarande anställd personal på avdelningarna för allmän kirurgi, såväl överläkare som sub-specialister, på UCT- samt KI-anslutna sjukhus studeras.

Studien har blivit godkänd av UCT Human Research Ethics Committee och tillstånd för att intervjua studenter och fakultetspersonal har beviljats.

Om du samtycker till att delta, kommer du att få fylla i ett frågeformulär online via SurveyMonkey, ett säkert, webbaserat verktyg för enkätutveckling. Du kommer att få frågor om demografisk information såsom ålder och kön, såväl som frågor om dina uppfattningar av den nuvarande utbildningsplanen i kirurgi, och slutligen, rörande mentorskap och förebilder inom din fakultets lärarkår.

Frågeformuläret kommer att distribueras anonymt till alla deltagare på UCT och KI. Deltagare kommer vara fria att avböja att delta. Vidare kommer deltagare även att vara fria att avböja att fullfölja frågeformuläret, dra sig ur studien när helst de önskar, eller vägra att svara på några frågor och har rätt att kontakta författarna när som helst. All elektronisk data kommer lagras på en lösenordskyddad universitetsserver och dataanalys kommer utföras på lösenordskyddade enheter.

Efter datainsamling och transkribering av datan, kommer samtliga frågeformulär att raderas inom ett år.

Potentiella fördelar

Det finns ingen direkt fördel för dig, emellertid kommer kunskap erhållen från denna studie ge ytterligare förståelse som potentiellt kan leda till att förbättra utbildningsplanerna för kirurgi på både UCT och KI.

Potentiella risker

Det finns inga risker kopplade till denna studie.

Kostnad och kompensation

Inga utbetalningar kommer att göras till dig för deltagandet i denna studie.

Sekretess

All information insamlad under tiden som studien pågår kommer vara fullständigt konfidentiell. Du kommer endast vara känd som ett nummer. Även om den här studiens resultat kommer publiceras eller presenteras i framtida medicinska sammanhang, kommer ingen information inkluderas som gör det möjligt för dig att bli identifierad.

Vem kontaktas vid frågor

Om du skulle vilja ha mer information, eller har frågor som rör denna studie, kan du kontakta mig, Dr Alex Scott på +2721 406 6328 eller +2783 629 8792. Du kan också kontakta UCT Human Research Ethics Committee på +2721 406 6626. Var vänlig och lämna ditt namn samt telefonnummer så kontaktar jag dig.

Samtyckesutlåtande

Jag har läst ovanstående information. Jag har haft möjligheten att ställa frågor och jag är nöjd med svaren och förklaringarna jag har fått.

Jag förstår att mitt deltagande är frivilligt. Jag har förstått all information och samtycker till att delta i studien.

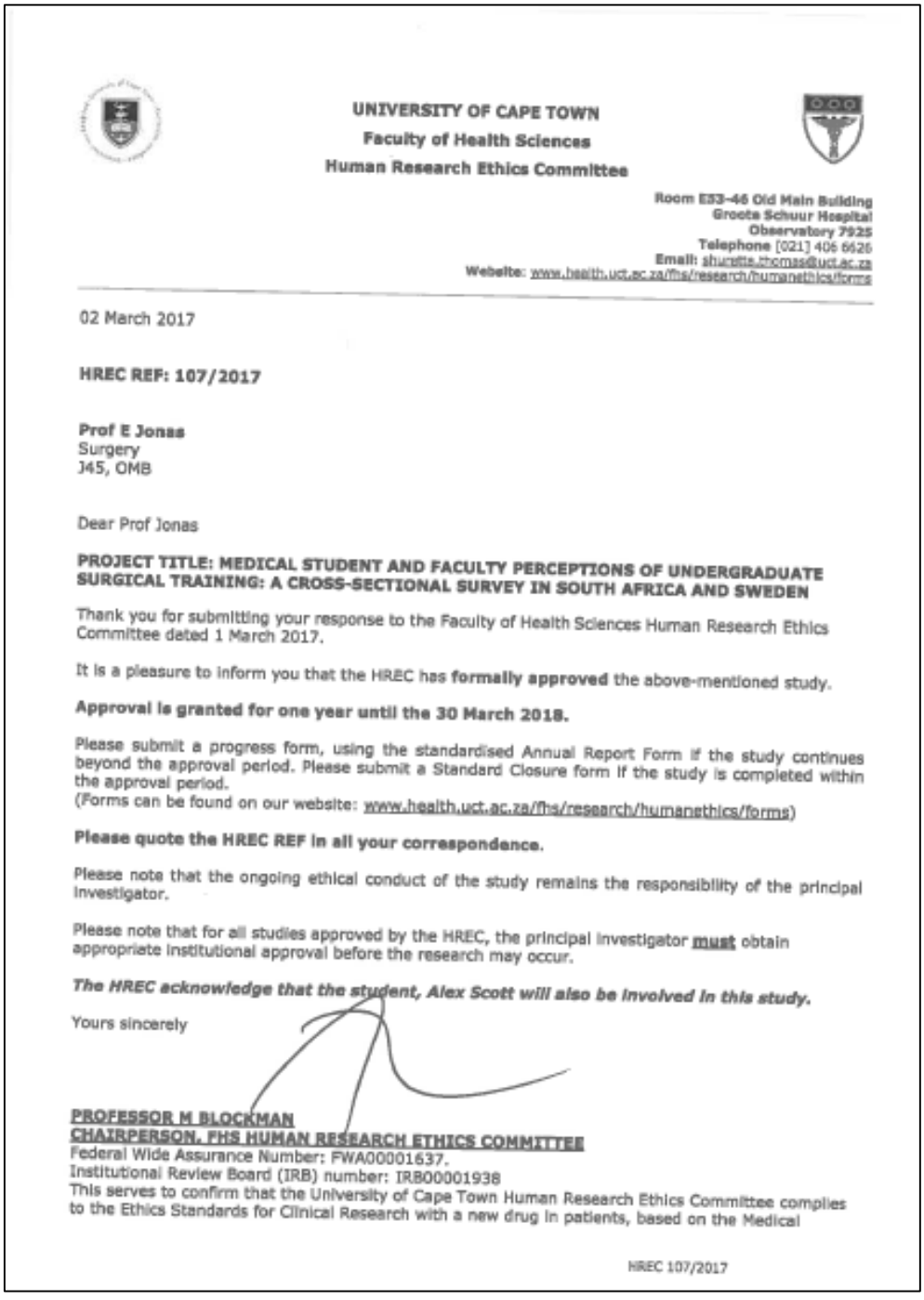
Deltagares underskrift: …… Datum: ……

Deltagares namn: ……

Vittnes underskrift: …… Datum: ……

Vittnes namn: ……

8.7 UCT HUMAN RESEARCH ETHICS COMMITTEE APPROVAL LETTER



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room E53-46 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6626
Email: shurette.thomas@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

02 March 2017

HREC REF: 107/2017

Prof E Jonas
Surgery
J45, OMB

Dear Prof Jonas

PROJECT TITLE: MEDICAL STUDENT AND FACULTY PERCEPTIONS OF UNDERGRADUATE SURGICAL TRAINING: A CROSS-SECTIONAL SURVEY IN SOUTH AFRICA AND SWEDEN

Thank you for submitting your response to the Faculty of Health Sciences Human Research Ethics Committee dated 1 March 2017.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 30 March 2018.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval before the research may occur.

The HREC acknowledge that the student, Alex Scott will also be involved in this study.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE
Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938
This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical

HREC 107/2017

8.8 UCT HUMAN RESEARCH ETHICS COMMITTEE APPROVAL LETTER

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room E53-46 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: sumayah.ariefdien@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

17 January 2019

HREC REF: 014/2019

Prof E Jonas
Department of Surgery
E23, Room 37
NGSH

Dear Prof Jonas

PROJECT TITLE: MEDICAL STUDENT AND FACULTY PERCEPTIONS OF UNDERGRADUATE SURGICAL TRAINING: A COMPARISON BETWEEN SOUTH AFRICA AND SWEDEN (MPHIL CANDIDATE - DR A SCOTT) SUB-STUDY LINKED TO 107/2017

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 30 January 2020.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the student: Dr Alex Scott will also be involved in this study.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

8.9 DEPARTMENTAL RESEARCH COMMITTEE APPROVAL LETTER

UNIVERSITY OF CAPE TOWN

Department of Surgery
Departmental Research Committee
Dr Timothy Pennel
D24 Office, Groote Schuur Hospital
Observatory 7925
South Africa
Tel (021) 404 3430
Email: tim.pennel@uct.ac.za

3 Nov 2018

Dr A Scott

Department of Surgery
University of Cape Town

Dear Dr Scott

RE: Project 2018/129

PROJECT TITLE: Medical Student And Faculty Perceptions Of Undergraduate Surgical Training: A Comparison Between South Africa And Sweden

The above protocol has been reviewed by the Department of Surgery Research Committee. I am pleased to inform you that the committee approved the scientific merit of the study, and endorse the protocol for submission to the relevant ethics committee.

Although this letter serves as confirmation that the above protocol has successfully passed through the surgical DRC, respective ethics committees still require DRC chair signature before submission.

Please use the above project number in all future correspondence,

Yours sincerely

DR TIMOTHY PENNEL
CHAIRMAN: RESEARCH COMMITTEE

"OUR MISSION is to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society."

8.10 UCT DEPARTMENT OF STUDENT AFFAIRS APPROVAL LETTER FOR STUDENT ACCESS

	RESEARCH ACCESS TO STUDENTS	DSA 100

NOTES

1. This form must be **FULLY** completed by all applicants who want to access UCT students for the purpose of research or surveys.
2. Return the fully completed **(a) DSA 100** application form **by email**, in **the same word format**, together with **your: (b) research proposal inclusive of your survey, (c) copy of your ethics approval letter / proof (d) informed consent letter** to: Moonira.Khan@uct.ac.za. You application will be attended to by the Executive Director, Department of Student Affairs (DSA), UCT.
3. The turnaround time for a reply is **approximately 10 working days**.
4. NB: It is the responsibility of the researcher/s to apply for and to obtain **ethics approval and to comply with amendments that may be requested;** as well as **to obtain** approval to access UCT staff and/or UCT students, from the following, at UCT, respectively: (a) **Ethics**: Chairperson, Faculty Research Ethics Committee' (FREC) for ethics approval, (b) **Staff access:** Executive Director: HR for approval to access UCT staff, and (c) **Student access:** Executive Director: Student Affairs for approval to access UCT students.
5. **Note:** UCT Senate Research Protocols requires compliance to the above, **even if prior approval has been obtained from any other institution/agency. UCT's research protocol requirements applies to *all* persons, institutions and agencies from UCT and external to UCT who want to conduct research on human subjects for academic, marketing or service related reasons at UCT.**
6. **Should approval be granted to access UCT students for this research study, such approval is effective for a period of one year from the date of approval (as stated in Section D of this form), and the approval expires automatically on the last day.**
7. **The approving authority reserves the right to revoke an approval based on reasonable grounds and/or new information.**

SECTION A: RESEARCH APPLICANT/S DETAILS

Position	Staff / Student No	Title and Name	Contact Details (Email / Cell / land line)
A.1 Student Number	SCTALE001	Mr Alex Scott	scottaj13@gmail.com
A.2 Academic / PASS Staff No.			
A.3 Visitor/ Researcher ID No.			
A.4 University at which a student or employee	UCT	Address if *not* UCT:	
A.5 Faculty/ Department/School	Health Sciences Faculty		
A.6 APPLICANTS DETAILS If different from above	Title and Name	Tel.	Email

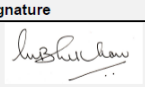
SECTION B: RESEARCHER/S SUPERVISOR/S DETAILS

Position	Title and Name	Tel.	Email
B.1 Supervisor	Professor Eduard Jonas	021-4043042	eduard.jonas@uct.ac.za
B.2 Co-Supervisor/s			

SECTION C: APPLICANT'S RESEARCH STUDY FIELD AND APPROVAL STATUS

C.1 Degree – if applicable	MBChB
C.2 Research Project Title	Medical student and faculty perceptions of undergraduate surgical training: a cross-sectional survey in South Africa and Sweden
C.3 Research Proposal	Attached: Yes ■ No ☐
C.4 Target population	MBChB students who have completed their respective undergraduate general surgery rotation
C.5 Lead Researcher details	If different from applicant:
C6. Will use research assistant/s	Yes ☐ No ■ yes- provide a list of names, contact details and ID no.
C.7 Research Methodology and Informed consent:	**Research methodology**: Questionnaire **Informed consent:** Advised before commencement of research.
C.8 Ethics clearance status from UCT's Faculty Ethics in Research Committee /Chair (EiRC)	Approved by the UCT EiRC: Yes ■ With amendments: Yes ■ No ☐ (a) Attach copy of your UCT ethics approval. Attached: Yes ■ No ☐ (b) State date / Ref. No / Faculty of your UCT ethics approval: 02/03/2017 Ref. /Faculty.: HREC 107/2017

SECTION D: APPLICANT/S APPROVAL STATUS FOR ACCESS TO STUDENTS FOR RESEARCH PURPOSE
(To be completed by the UCT - ED, DSA or Nominee)

D.1 APPROVAL STATUS	Approved / With Terms / Not	* Conditional approval with terms		Applicant/s Ref. No.:
	(i) Approved ■ ~~(ii) With terms~~ ~~(iii) Not approved~~	(a) Access to students for this research study must only be undertaken after written ethics approval has been obtained. (b) In event any ethics conditions are attached, these must be complied with before access to students.		SCTALE001 / Mr Alex Scott
D.2 APPROVED BY:	Designation	Name	Signature	Date of Approval
	Executive Director Department of Student Affairs	*Dr Moonira Khan*		*8 March 2017*

8.11 UCT DEPARTMENT OF STUDENT AFFAIRS APPROVAL LETTER FOR STAFF ACCESS

HR194	**ACCESS TO UCT STAFF FOR RESEARCH PURPOSES**	**UNIVERSITY OF CAPE TOWN** ISIKHUNGUSETHI SASEKAPA • UNIVERSITEIT VAN KAAPSTAD

NOTES

- Forms must be downloaded from the UCT website: http://forms.uct.ac.za/forms.htm
- This form must be completed by applicants who are requesting to access UCT staff for the purpose of research.
- A copy of the research proposal as well as the Ethics Committee approval must be attached.
- It is the **responsibility of the researcher/s to apply for ethical clearance** from the relevant Faculty's Research in Ethics Committee (REC).
- If you are requesting staff information, you are required to complete the HR Information Request Form (HR190) and submit it together with all the required documentation.
- The turnaround time for a reply is **approximately 10 working days unless specified as urgent.**
- Return the completed application form and all the above documentation to Joy Henry via email: joy.henry@uct.ac.za; or deliver to: For the Attention: Executive Director, Human Resources Department, Bremner Building, Room 214, Lower Campus, UCT.

SECTION A: APPLICANT DETAILS

Eduard Jonas

Title	Mr	Name	Alex Scott
Telephone number	0836296792	Email address	scottal13@gmail.com
Student number	SCTALE 001	Staff number	N/A
Visiting researcher ID / passport number	N/A		
Faculty Officer contact details			
University or institution at which employed or a registered student	University of Cape Town		
Faculty or department in which you are employed or work	Health Sciences Faculty		
Address (if not UCT)			

SECTION B: SUPERVISOR DETAILS

	Title and name	Telephone number	Email address
Supervisor	Professor Eduard Joans	021-4043042	eduard.jonas@uct.ac.za
Co-Supervisor			

SECTION C: APPLICANT'S FIELD OF STUDY (if applicable) / TITLE OF RESEARCH PROJECT / STUDY

Degree	MBChB	
Research project or title	Medical student and faculty perceptions of undergraduate surgical training: a cross-sectional survey in South Africa and Sweden	
Research proposal attached	☒ Yes	☐ No
Target population (number of UCT staff)	10	
Amount of time required for an interview and/or questionnaire	10 minutes	
Lead Researcher details	Alex Scott, 6th year MBChB student	
Proof of ethical clearance status attached	☒ Yes	☐ No

SECTION D: FOR OFFICE USE (Approval status to be completed by the Executive Director, Human Resources or Nominee)

Support or approval			Role	Signature	Date
Supported?	☒ Yes	☐ No	Joy Henry (Office Co-Ordinator)		23/03/17
Approved?	☒ Yes	☐ No	Miriam Rosea (Executive Director: HR)		24/03/17