AN ANALYSIS OF THE PRACTICAL EXPERIENCES AND CONFIDENCE IN PERFORMING EMERGENCY MEDICAL SKILLS IN SOUTH AFRICAN MEDICAL INTERNS

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfilment of the requirements for the degree

of

Master of Science in Medicine in Emergency Medicine.

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DECLARATION

I, Mark Allen, declare that this research report is my own work. It is being submitted for the degree of Master of Science in Medicine (Emergency Medicine) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

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DEDICATION

This work is dedicated to my parents and my wife.

"*Fear! There, I said it. Procedures scare me. Not all of them, but many of them. Never in the practice of a health care professional have we had more opportunity to do direct, obvious, "no hiding from it" damage to a patient. It is even possible to kill a patient with the various blades and objects we use to treat them. If that does not strike fear into your heart, then you have a problem*"[1]

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ABSTRACT

This study was designed to investigate how confident South African medical interns are to perform emergency medical procedures and to investigate how their experiences or demographic differences might influence these confidences. A transverse descriptive study using a cross sectional questionnaire was undertaken. A combination of the paper-based and electronic questionnaires were distributed to doctors currently performing their internship in South Africa. The data were analysed using a Fishers exact test and applying a Bonferroni correction where necessary. The study showed a high level of confidence in the majority of procedures studied and identified some points of influence on this confidence. The confidence of South African interns compares favourably with international colleagues at a similar qualification level.

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DEFINITIONS AND ABBREVIATIONS

Internship in South Africa is currently defined as a two year period where South African and other graduates are provided with in-service training in surgery, medicine, paediatrics and obstetrics as well as orthopaedics, anaesthetics, family practice or primary health care and includes exposure to mental health. This period is spent in accredited hospitals or groups of hospitals which provide adequate patient exposure, intern supervision and support services such as X-rays and laboratories.[2]

Abbreviations

BVM	Bag-valve mask
CPR	Cardio-pulmonary resuscitation
LMA	Laryngeal mask airway
ET Tube	Endotracheal tube
Drip	Peripheral venous line
Drain	Intercostal drain
Cath	Urinary catheter
DPL	Diagnostic peritoneal lavage
US	Ultrasound
NG	Nasogastric tube
HPCSA	Health Professions Council of South Africa

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CHAPTER 1 INTRODUCTION

1.1 Motivation and rationale for this research

The ability to perform any skill relies on both competence and confidence. There has been some research conducted in the competence of South African interns but there is a paucity of data about confidence.[3, 4] This study sought to provide some insight into the self-perceived confidence of South African interns and factors that might influence the development of that confidence. This could help in evaluating the preparedness of South African interns for community service and further unsupervised practice.

1.1 Statement of the problem

Internship in South Africa, as in many other countries, forms the bridge between the end of a formal university examinations and the HPCSA (Health Professions Council of South Africa) licence to practice independently as a medical practitioner. In South Africa, newly qualified medical practitioners are expected to perform a year's community service on completion of their 2 year internship. There is no formal examination during or after the internship period to determine competence. The community service often takes place in an environment where there is limited medical supervision and backup. These new practitioners may be required to perform emergency procedures of different degrees of difficulty and complexity in situations where expert experienced support from more senior clinicians is essentially absent. The extent to which these medical practitioners feel confident to perform safely and effectively is investigated in the study.

1.2 Aim and objectives of the study

1.2.1 Study aim

This study aimed to assess how confident South African medical interns are about their ability to perform a range of emergency procedures and if this confidence is related to their training and practical experiences.

1.2.2 Study objectives

In pursuit of the aim, the objectives of the study are as follows:

i) to describe the self-perceived confidence of interns to perform a selected group of emergency medical procedures

ii) to quantify the experience that interns have had in their training and performance of a selected group of emergency medical procedures

iii) to explore the relationship between the confidence each intern has in their ability to perform each emergency medical procedure and their training to perform that procedure

CHAPTER 2 LITERATURE REVIEW

Medical interns are expected to be able to carry out a number of life-saving emergency medical skills (LSEMS). This expectation is generated not only by the medical schools which train the prospective interns[5], but also by members of the public themselves.[6,7] South African interns, as compared to their European colleagues at a similar professional level[8], are expected to manage more complex procedures in an emergency situation.

The public, in particular, expects that interns, as qualified doctors, be proficient in performing LSEMS. Television series featuring the provision of emergency medical skills such as *ER*, *Grey's Anatomy* and *Holby City* lead to an increased public expectation of LSEMS proficiency for medical practitioners[6,7] albeit often unrealistically high.[9] The successful CPR training campaigns around the world have fuelled this expectation, leading to for example, an expected CPR success rate of greater than 60% in most cases as compared to reality - only 10 to 15% of people with cardiopulmonary arrest ultimately survive to discharge in developed countries[9]. Newspapers similarly promote this perception by reporting successful emergency medical interventions.[10] Expectations are also generated by the wealth of detailed information on the internet at sites such as *The Doctors Channel* (http://www.thedoctorschannel.com), *WebMD* (http://www.webmd.com) and even locally based sites such as *Health24* (http://www.health24.com).

These increased expectations of the public have led to debates within the medical community about the extent to which practitioners are becoming risk averse because of the high rates of litigation related to these raised expectations.[11]

Medical boards have therefore mandated the limits to which medical practitioners as interns and later as fully qualified professionals can perform medical procedures. The Health Professions Council of South Africa has, in its booklet[12] on the guidelines for good practice in the healthcare professions made similar statements. These guidelines have been echoed in South African Law[13]. The relevant section states, “A practitioner shall perform, except in an emergency, only a professional act -(a) for which he or she is adequately educated, trained and sufficiently experienced;”. There is no clear definition of the term *adequately* or the term *sufficiently* in the previous line. The statements of other international regulatory bodies follow similar lines. The General Medical Council of the United Kingdom in its publication “Good Medical Practice”[14] states at the beginning of the document (page 6), “Good Doctors make the care of the patients their first concern: they are competent, keep their knowledge and skills up-to-date, establish and maintain good relationships with patients and colleagues, are honest and trustworthy, and act with integrity. Later in the same document (page 11), it states, “In an emergency, where ever it arises, you must offer assistance, taking into account your own safety, your competence, and the availability of other options for care”.

The quotes above highlight the concept of the medical professional’s self-assessment of their own competence. The Australian Medical Council (AMC) states this more clearly in their code of conduct, also termed Good Medical Practice.[15] The AMC states that (page 2) “Professionalism embodies all the qualities described here, and includes self-awareness and self-reflection. Doctors are expected to reflect regularly on whether they are practising effectively…”, and

goes on to say (page 5) that “Good medical practice involves: recognising and working within the limits of your competence and scope of practice” and further “Good medical practice involves offering assistance in an emergency that takes account of your own safety, your skills, the availability of other options and the impact on any other patients under your care; and continuing to provide that assistance until your services are no longer required.” All of these statements embrace the concept that medical practitioners need both insight and confidence to perform vital skills, especially during an emergency.

In South Africa, all medical graduates must complete a year of community service following their internship.[16] This is a relatively recent innovation in South Africa, first introduced in 1998 following the Health Professions Amendment Act (Act 1 of 1998).[17] The emphasis in this legislation for this period is on the word "service" and reflects the intention of the National Department of Health to ensure improved provision of health services to the country.

This newly established community service is predicated upon a sound clinical supervisory system. A 2001 study[16] found a variable level of supervision of these doctors, depending on where community service was done. The study was based on a descriptive design and used semi-structured interviews. Opinions of those interviewed varied, ranging from the opinion that community service provided an opportunity to develop "an enormous amount of confidence" to others who felt that the lack of supervision made them feel unsure of the correctness of what they had done.

In a service situation such as the provision of medical care, low self-confidence affects not only the provider, but the recipient of the service as well, leading to a distrust of the provider's expertise.[18] Confidence is not a static phenomenon and is influenced both positively and negatively by factors such as the contextual setting, intrinsic and extrinsic loci of control and previous experiences such as praise and encouragement.[18] This analysis identified a number of attributes which can affect self-confidence. These were divided into positive and negative attributes. The positive attributes include emotional intelligence and competence, resilient attitude, cognitive ability, trust and intuition. Negative attributes included narcissism, depression, doubt, uncertainty and negativity.

Stress also plays a role in confidence. Research on surgeons has shown that while in most skills testing environments there is a limited or known amount of stress, in the real-world situation there is an upsurge of the "fight or flight" sympathetic nervous system response which further impacts on confidence.[19] This effect seems to be attenuated by repeated practice and adequate preparation as well as the ability to control the environment. In order to control the environment, good teamwork skills and the ability to control anger or impatience are vital ingredients that need to be mastered. This was summarised by one surgeon as the three Cs: confidence, competence and composure.[19]

There is no clear relationship between confidence and competence and in certain situations an inverse relationship has been documented.[20] This relationship has a strong gender bias with more men than women overestimating their competence. Previous training and assessment also played a role in the overconfidence.

In the development (or acquisition) of skills, Peyton[21,22] suggested a number of stages which are to be progressively followed through in order to achieve mastery. An individual would begin at the point at which they have no awareness of what skills are actually needed to perform a procedure. This is known as unconscious incompetence. The individual would then progress to the stage of conscious incompetence where they become aware of their lack of skills. Through learning they progress to the point of becoming consciously competent where they know how to perform the skill and are able to do it with concentration. The final stage is unconscious competence where a skill can be performed automatically in the correct manner demonstrating expertise. Figure 2.1 illustrates these concepts graphically.

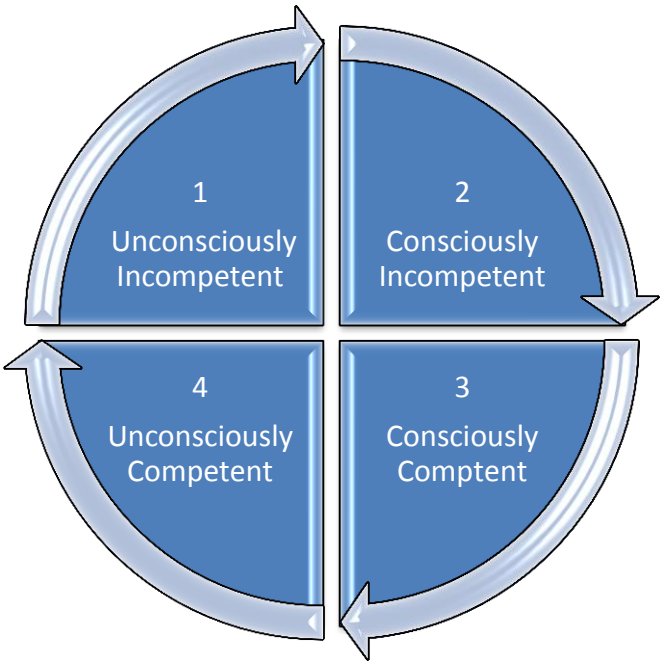

Figure 2.1: Peyton's cycle of skills development

A very similar model using slightly different terminology was developed by a Gordon Training Institute employee, Noel Birch.[23] This model echoed a similar four stage cycle.

I would argue that the period of internship covers stages two and three and is meant to facilitate the mentored move from conscious incompetence to conscious competence in the ability to perform medical skills with confidence.

Medical skills have been defined and described in different ways. Procedural skills have been defined as “the learned manual skills necessary to perform diagnostic and therapeutic procedures within the domain of the [internist]” (Benson, 1983 cited in Amin, 2009).[24] When reviewing the literature the term “clinical skills” has been used as an alternate term to “procedural skills.[25] This present study revolves around the perceived confidence that interns have in their own ability rather than the competence they display in the execution of the skills being researched.

The goals of holistic education extend beyond skills. Bloom’s taxonomy describes a hierarchy of levels of knowledge and was originally a classification of objectives which could be set as goals to be achieved by learners and therefore tested. Bloom later formalised his objectives in the book *Taxonomy of educational objectives: the classification of educational goals*.[26] Bloom’s original classification divided the objectives into three learning domains: cognitive, affective and psychomotor which could also be roughly translated into knowing, feeling and doing. The ability to perform skills is part of the psychomotor domain as referred to in Bloom’s Taxonomy.[6,8]

In the 1990s the group led by Lorin Anderson, a former student of Bloom, revisited the initial definitions and published a revised taxonomy along with David Krathwohl, one of Bloom's original collaborators.[27] In this revision the major concepts remained the same but different terms were used to describe these concepts. The domains were renamed dimensions. The taxonomy describes a hierarchy of activities which must be performed in each of the dimensions in order to achieve mastery of the learning objective. They range from basic recall to the creation of brand-new concepts. Figure 2.2 below, shows the progression of objectives in the cognitive dimension in a graphical format, starting at the base of the pyramid and progressing to the apex.

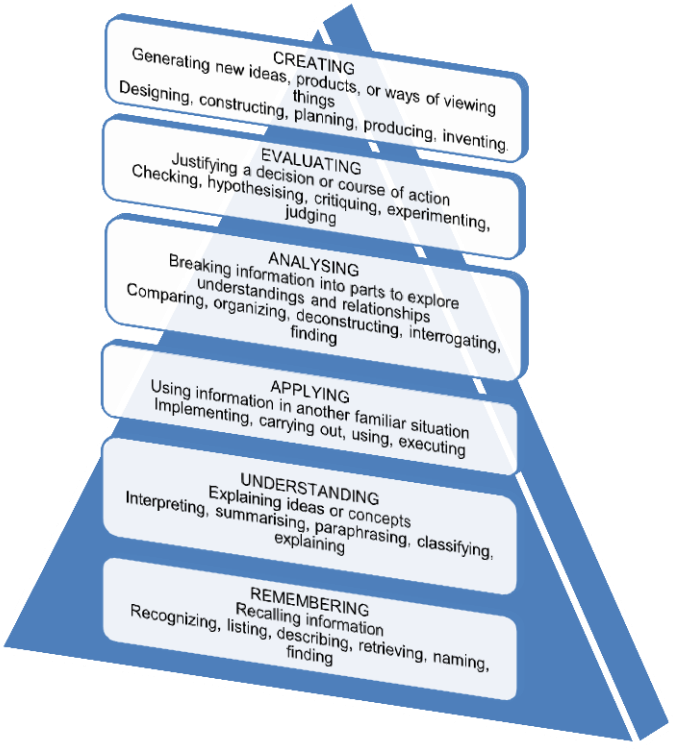

Figure 2.2: Bloom's revised taxonomy 'The cognitive dimension'

The knowledge dimension is also divided into subcategories. The four subcategories are factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge. The progression through these subcategories is illustrated as follows. Firstly, obtain a number of basic facts about the topic to be learnt. Secondly, learn how these facts function together and how they fit into the bigger picture. Thirdly, apply this knowledge by completing a procedure, for example performing a medical procedure. Lastly, understanding thinking processes generally and one's own thinking process specifically. Self-evaluation of one's own competence falls into the cognitive dimension.

Competence to perform a skill is influenced by all three domains (or dimensions) and depends on a hierarchy of skills development.[28] Supervised practice and repetition remains the mainstay of perfecting these skills.[29] Kovacs[30] suggests the following progression in the development of a psychomotor skill: "learn *n*, see *n*, practice *n*, do *n*" where *n* is the number of opportunities to become involved with each step of the process. This concept has been confirmed by a study which indicated that repeated exposure to learning opportunities has a direct impact on the abilities to perform a skill and on the retention of knowledge about that skill.[31] Any investigation of clinical skills abilities, and thus confidence, therefore needs to consider how many opportunities each individual student has had to improve their skills.

The use of mannequins is confidence building, especially where high-fidelity patient simulators are available.[32] Mannequins are valuable in their ability to simulate rapid patient decompensation and allow recurrent efforts to master a skill which needs to be applied to real patients within an extremely limited time. The

use of mannequins is most helpful in the situation where there is an opportunity for directed education, both before and after the simulation training rather than self-practice and as such needs to be closely integrated with the learning and not just for revision or testing purposes.

Mannequins perform a useful function but clinical exposure remains the mainstay of medical training. South African medical interns are expected to serve time in medical, surgical and paediatric wards. This research into interns' skills includes procedures performed on patients in these different clinical environments. The research does not reflect the opportunities offered to practice skills in varying disciplines but merely those opportunities which were taken up by the medical interns.

Emergency skills, by definition, need to be performed without preparatory revision time and possibly without supervision. Interns therefore need to be both competent and feel confident about their abilities to perform these skills in a manner that maximises patient safety. Studies have investigated the confidence of interns to perform LSEMS in other countries[25] but a national study in South Africa has not yet been conducted.

The University of the Witwatersrand has established a "skills competencies" document[33] which outlines the skills needed by final year medical students, and how proficient students need to be with those skills. Differences in training between medical schools have been shown to play a role in the confidence of junior doctors.[34] In that study, the term 'preparedness' was used instead of the term 'confidence'. Results reflected that there was a difference in preparedness

related to sex and age of the participant. Other studies have shown that there are differences in the performance of skills relating to the age of the patient[35] comparing performance on adult and paediatric patients. This may be another factor influencing confidence and competence in emergency clinical skills.

In a British study of procedural confidence[36] which used a graded Likert scale as an assessment tool, it was noted that there seemed to be an all-all-nothing inflection point, which the researchers termed the “threshold effect”, where practitioners were either “not at all confident” or “very confident”. The researchers suggested that this might be as a result of concerns about complications and the ethical principle of non-maleficence.

While some studies have used a Likert scale to grade confidence[37], direct questions may be more valuable in obtaining consistent data.[38] As in other countries[39], there is no standardised set of skills which are required in order to register as an intern in South Africa and this study might provide impetus to the development of national consensus regarding skills training. The closest approximation of a national formal skills list available to the researcher was the logbook for internship training produced by the HPCSA[40], which includes skills that should be either witnessed or performed.

A 2002 study by Burch, et al[41] on the actual competence demonstrated by newly qualified doctors who were about to enter their internship in South Africa, showed a poor level of competence in a similar list of skills to that being assessed in this present study. That study looked at a group of doctors about to enter service in a teaching hospital who originated from all of the South African medical schools.

It is acknowledged that self-assessment does not necessarily correlate with actual competence[37,42,43] and the results of that study may not indicate the actual levels of competence of the interns surveyed, but rather the perceived confidence levels.

In conclusion, this chapter has considered why confidence as well as competence are important in the development of clinical skills and has examined factors that play a role in the development of confidence. The next chapter will address the ethics and methodology used in this present study.

CHAPTER 3 MATERIALS AND METHODS

3.1 Ethics

This research was approved by the Human Research Ethics Committee of the Faculty of Health Sciences of the University of the Witwatersrand (protocol approval number MI20479 - see Appendix 2). As approved by the ethics committee, indirect informed consent was obtained from the participants in the study. To this end, interns were offered the options of returning incomplete surveys or not returning the survey (see Appendix 4). This was similarly stated as "By filling in the survey, you are granting consent for your answers to be included in the study and your answers are completely confidential" in the electronic invitation to complete the survey (see Appendix 5).

Approval of the Deputy Registrar: Academic of the University of the Witwatersrand was granted to allow use of the Wits Alumni Relations Department database (see Appendix 3).

Further approval was gained from the research committees and the superintendents of the two hospitals in which the paper-based survey was undertaken. This approval was given either by email or verbally and has therefore not been included in this document. There was a request from the research committees that the identity of the hospitals in question remain anonymous until the results of the survey had been reviewed by the institutions concerned.

3.2 Study Design

The research was designed as a transverse descriptive study using a cross sectional questionnaire to gain a snapshot of the self-assessed confidence of two groups of interns over a limited period of time.

Skills that would possibly be required in an emergency were included in the questionnaire. The range of skills selected was sourced from the HPCSA Intern logbook. Gynaecological skills have been excluded for two reasons. Firstly, there is a paucity of literature comparing gynaecological skills to other skills and secondly, this makes the survey shorter and more likely to be completed.

3.3 Study Setting and Population

The population investigated comprised all interns currently serving in South African hospitals at the time of the survey (2012 to 2013). A dual approach to data collection was used in order to get the maximum amount of data. Both a paper based and an online version of the questionnaire was used and as a result of the data collection methods the distribution of the population varied in terms of the hospital where the internship was being done. The study site was therefore, in the case of the online questionnaire, the entire country and in the case of the paper-based questionnaire, two hospitals in the Johannesburg area.

3.4 Data Collection Instrument

Data were collected using a questionnaire utilising tick boxes. The form was used in both a paper based and an electronic version. The questionnaire was divided

into three sections. The first section sought demographic information including age, gender, year of internship, medical school of origin and current hospital. The second section surveyed the experiences that the intern had gained in a number of procedures and the last section interrogated how confident each intern was in performing the previous procedures. The full questionnaire is available as Appendix 1.

The range of experience investigated was divided into the modes (listed below) in which learning could take place. Exposure to learning opportunities was categorised by time as well as mode of experience. Respondents were therefore questioned on exposure to learning opportunities both as medical students and as interns. Where relevant, both paediatric and neonatal exposure were investigated.

The various modes of experience investigated were as follows:

a) attending a lecture
b) seeing a demonstration on a “dummy” or simulation manikin
c) seeing a demonstration on a patient
d) demonstrating a skill on a patient under supervision
e) doing a procedure (using a skill) on a patient without supervision

The self-perceived confidence of the interns was rated using direct questions rather than a Likert scale in order to avoid the need to validate the reliability of such a scale.

3.5 Data Collection

3.5.1 **Online survey**

The electronic versions of the survey were sent out on four occasions.

The first two sets of invitations were sent out to the 2010 and 2011 medical (MBBCh) graduates of the University of the Witwatersrand by the University of the Witwatersrand Alumni Relations Department. The recipient pool or assessed population should have been approximately 360 interns.

An invitation was sent out on my behalf by the Junior Doctors Association of South Africa (JUDASA). This was sent out at the end of 2012 and again at the beginning of 2013. The invitation was sent out by means of a post on the JUDASA Facebook page as well as a calendared “event” to the entire Facebook group of more than 200 interns.

The invitation which was sent out has been included as Appendix 4. The invitation contained a link to an online survey tool Survey Monkey. The link was made available as both a readable, clickable text link and a QR code.[44] A QR (Quick Response) code is a two-dimensional barcode currently widely used to provide the ability for camera enabled devices such as smart phones and computing tablets to access online links. The QR code used can be seen as the included image in Appendix 5.

3.5.2 **Paper-based survey**

The paper-based survey was handed out to individual interns at two Johannesburg public academic hospitals. Several methods were used in order to distribute the questionnaires as widely as possible. Interns were visited in the wards and were given questionnaires and at the same time were requested to give questionnaires to their colleagues who were not currently present. These questionnaires were collected in the wards after a period of 2 to 3 days. Where there were intern meetings, I attended the meetings and once again handed out questionnaires. These meetings generally took place at the beginning of a year and interns' data was therefore regarded as being relative to the previous year. These questionnaires were collected in a marked container to provide additional anonymity.

3.5.3 Outcome Measures

A total of 99 surveys were collected. Three replies were returned from the Wits Alumni Relations generated invitation and a further 40 replies from the JUDASA generated invitation.

3.5.4 Data Analysis

A $p < 0.05$ was considered to be significant for all statistical tests except for those specifically noted where a correcting factor was applied.

3.6 Software

The online version of the questionnaire was hosted at SurveyMonkey® (SurveyMonkey Europe Sarl). This tool can be found at http://www.surveymonkey.net. Although commercial access to this website was used, an option of free access is available. The free access option limits surveys to 10 questions per survey and 100 responses per survey.

All data were entered and stored in a Microsoft Excel® (Microsoft Office 2010, Microsoft Corporation) spreadsheet. All analyses were conducted using StatSoft, Inc. (2008) STATISTICA® (data analysis software system), version 8.0. http://www.statsoft.com.

Graphics were generated using Microsoft Excel® and Microsoft PowerPoint® (Microsoft Office 2010, Microsoft Corporation).

Fishers exact test add-in for Microsoft Excel was downloaded from http://www.obertfamily.com/software/fisherexact.html and extended Fishers exact tests were performed online at http://www.vassarstats.net/fisher2x3.html and http://www.vassarstats.net/fisher2x4.html

3.7 Methodological limitations of this study

The online version of the survey gathered too few responses as a percentage of the total population of 360 to be used as an indicator of the opinions of the total population. Thus a paper-based survey was required to survey a larger percentage of the population. This resulted in a geographically limited sample. The

geographic limit was seen not only in the area surveyed, but also in the origin of the respondents surveyed.

No specific inclusion or exclusion criteria were used but some interns might have been excluded as a consequence of the data collection tools used. In the online survey, interns who were not ex-University of the Witwatersrand students or JUDASA members were excluded.

CHAPTER 4 RESULTS OF THE STUDY

4.1 Introduction

A total of 99 surveys were collected. Of these, 43 were collected using the online tool and 56 were collected using the paper-based survey. Of the total number of surveys returned, 52 were incomplete; 26 of the surveys were incomplete as a result of the respondents just beginning their internship and therefore having no experience as interns to report on. The paper based surveys which had some level of incompleteness seemed to be as a result of mistake rather than intent as the elements which were not completed were sparse and showed no discernible pattern. These elements of incompleteness were however not analysed. Of online surveys, 48.8% were incomplete and in these, there was a definite pattern of increasing incompleteness towards the end of the survey. This could be attributed to a number of factors including the perception of increased anonymity, the estimation of available time to complete the survey being incorrect (even though stated at the beginning of the survey) or the instability of network connections.

4.2 Demographic Spread

The largest group of the respondents had just completed or were completing the first year of internship. They comprised 53.5% of the total sample collected. The group who were just entering their internship comprised of 33.3% of the total and the remaining 13.2% were those who were completing the second year of their internship.

Most of the respondents were in the 20 to 29 year-old age range (92.9%) and only just more than 7% of the total (7 individuals) were in the 30 to 39-year-old age range. There were no respondents outside of these two age ranges

Table 4.1: Distribution of male and female Interns by year of internship, medical school and hospital

	Male	Female
Interns starting year 1	12	21
Interns ending year 1	16	37
Intern ending year 2	7	6
MedSchool 1	2	1
MedSchool 2	8	16
MedSchool 3	3	4
MedSchool 4	4	4
MedSchool 5	0	5
MedSchool 6	1	1
MedSchool 7	15	30
MedSchool 8	0	2
MedSchool 9	2	1
Hospital A	2	13
Hospital B	13	26

The gender split over the total study was 35.4% male compared to 64.6% female. The detailed analysis shown in Figure 4.1 demonstrates a similar split in those starting internship and in the first year of internship (36.4% vs. 63.6% and 30.2% vs. 69.8%) while the ratio in the second year of internship was more even (53.8% vs. 46.2%).

Table 4.1 shows the distribution of male and female interns as compared to other demographic indicators in the study. It should be remembered that these numbers relate to the sample only and not the entire population.

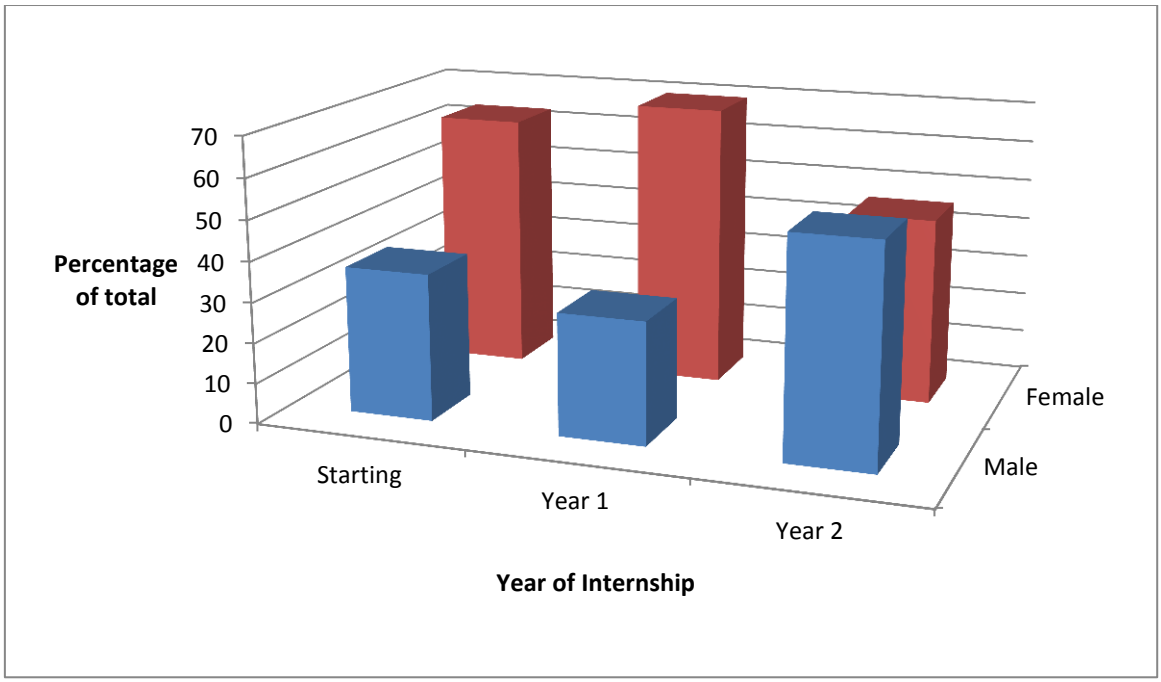

Figure 4.1: Comparison of gender by intern year as percentage of total numbers per group

Respondents replied from 26 of the possible 60 hospitals or hospital complexes who host interns in South Africa. Two interns chose the option “Other” as their hospital, but this was most likely the result of negligence as the rest of these particular surveys were very poorly completed. Only two hospitals had more than five respondents and therefore only these were considered when doing comparisons between facilities.

All of the medical schools in South Africa were represented in the survey. Additionally, three responding interns had qualified outside of the country. This is illustrated in Figure 4.2.

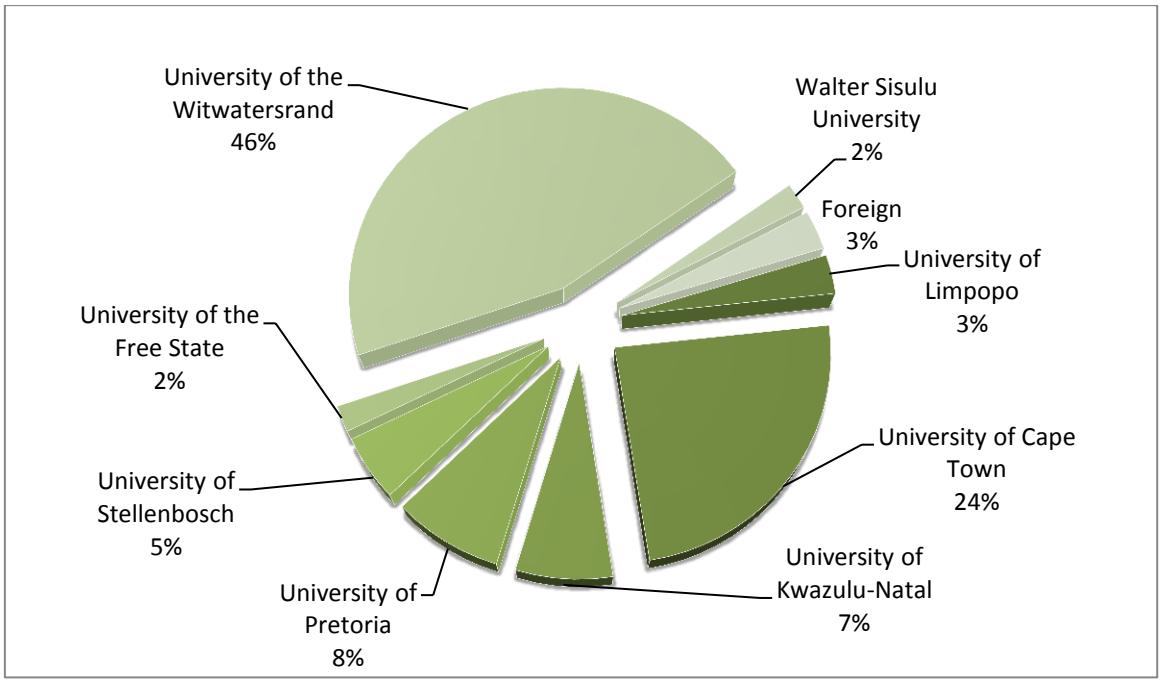

Figure 4.2: Medical schools represented as a percentage of the total sample

4.3 Description of Confidence

In the tables below, numbers have been used to indicate the degree of confidence in performing procedures. The descriptions that the numbers refer to are as follows

[1] -I am very comfortable with this procedure

[2] - I am somewhat comfortable performing this procedure but would prefer to do it with supervision

[3] - I am uncomfortable performing this procedure but would attempt it in an emergency

[4] - I would not attempt this procedure at present

Table 4.3 shows the frequencies of the levels of confidence in the identified adult procedures, while Table 4.4 shows the frequencies of the levels of confidence in paediatric or neonatal patients. An explanation of the labels used in these and following tables and figures is given in Table 4.2.

Table 4.2: Labels used in tables and figures

Labels used in following tables and figures to designate procedures	Procedures referred to
CPR_ad	Adult cardiopulmonary resuscitation
BVM_ad	Adult bag-valve mask usage
CentralLine_ad	Placement of a central or subclavian line in an adult
Drip_ad	Placement of a peripheral line in an adult
ETTube_ad	Placement of an endotracheal tube in an adult
LMA_ad	Placement of a laryngeal mask airway in an adult
Drain_ad	Placement of a thoracic or intercostal drain in an adult
Defib_ad	Electrical correction of an arrhythmia (defibrillation) in an adult
Cath_ad	Insertion of a urinary catheter in an adult
DPL_ad	Performing a diagnostic peritoneal lavage in an adult
US_ad	Performing an abdominal ultrasound in an adult
NG_ad	Placement of a nasogastric tube in an adult
CPR_pd	Paediatric cardiopulmonary resuscitation
CPR2_pd	Neonatal cardiopulmonary resuscitation
BVM_pd	Paediatric bag-valve mask usage
BVM2_pd	Neonatal bag-valve mask usage
Drip_pd	Placement of a peripheral line in a paediatric patient
IntraOs_pd	Placement of an intra-osseous line in a paediatric patient
Confidence is indicated by a numeral after the label e.g. CPR_ad_1	

The terms used in the questionnaire cover a continuum of concepts which can be illustrated graphically. For statistical purposes, options [1] and [2] will be analysed together as the single concept of 'Confident', while options [3] and [4] will be analysed together as the concept 'Not Confident'.

Table 4.3: Confidence per adult procedure (N=72)

Procedures performed on	Level of Confidence			
adults	[1]	[2]	[3]	[4]
Cardiopulmonary resuscitation	24	33	13	2
Bag-valve mask usage	47	20	5	0
Placement of a central or subclavian line	16	24	16	16
Placement of a peripheral line	67	3	2	0
Placement of an endotracheal tube	17	34	18	3
Placement of a laryngeal mask airway	25	30	15	2
Placement of a thoracic or intercostal drain	25	27	15	5
Electrical correction of an arrhythmia (defibrillation)	4	34	25	9
Insertion of a urinary catheter	68	3	1	0
Performing a diagnostic peritoneal lavage	12	9	16	35
Performing an abdominal ultrasound	13	24	18	17
Placement of a nasogastric tube	58	12	2	0

Table 4.4: Confidence per paediatric or neonatal procedure (N=75)

Procedures performed on	Level of Confidence			
paediatric and neonatal patients	[1]	[2]	[3]	[4]
Paediatric cardiopulmonary resuscitation	12	33	22	8
Neonatal cardiopulmonary resuscitation	16	31	20	8
Paediatric bag-valve mask usage	29	29	12	5
Neonatal bag-valve mask usage	32	29	10	4
Placement of a peripheral line in a paediatric patient	48	18	8	1
Placement of an intra-osseous line in a paediatric patient	6	15	30	24

4.4 Overall influences on confidence

The experiences that the interns had gained were compared to confidences and those that showed a significant correlation (using Fisher's exact test) are highlighted below.

A comparison of whether the intern had more than five exposures to each experience, and whether the intern was confident in performing the related skill was done.

Demonstration on a paediatric patient while an intern affected confidence in performing bag valve mask ventilation (p=0,00492). Both demonstration on a paediatric patient as an intern (p=0,00791) and in inserting a peripheral line (drip) unsupervised on a paediatric patient as an intern (p=0,00553) affected confidence in placement of a peripheral line on a paediatric patient. Inserting an endotracheal tube under supervision both as a medical student (p=0,00274) and as an intern (p=0,00319) affected the related skill. In the case of the placement of a laryngeal mask airway, demonstration on a patient both as a medical student (p=0,00658) and as an intern (p=0,00354) were significant.

The confidence in performing an ultrasound examination was affected by both supervised practice (p=0,00004) and unsupervised performance (p=0,00013) as an intern. Similarly the confidence in performing a diagnostic peritoneal lavage was affected by supervised performance of the skill (0,00643) as well as unsupervised performance of the skill (p= 0,00203) as an intern. Demonstration of

the diagnostic peritoneal lavage procedure on a patient was also significant (p=0,00035).

4.5 The relationship between confidence and demographics

The relationships between the confidence in performing a skill and the demographic details highlighted above are shown below, ordered by demographic groupings. Not all of the data gathered is used in every comparison. Where the sample numbers were very small, the data and comparison have not been shown because of probable statistical bias.

4.5.1 Data by year of internship

Due to the small numbers of second year intern responders, only the interns beginning and ending the first year of internship are compared.

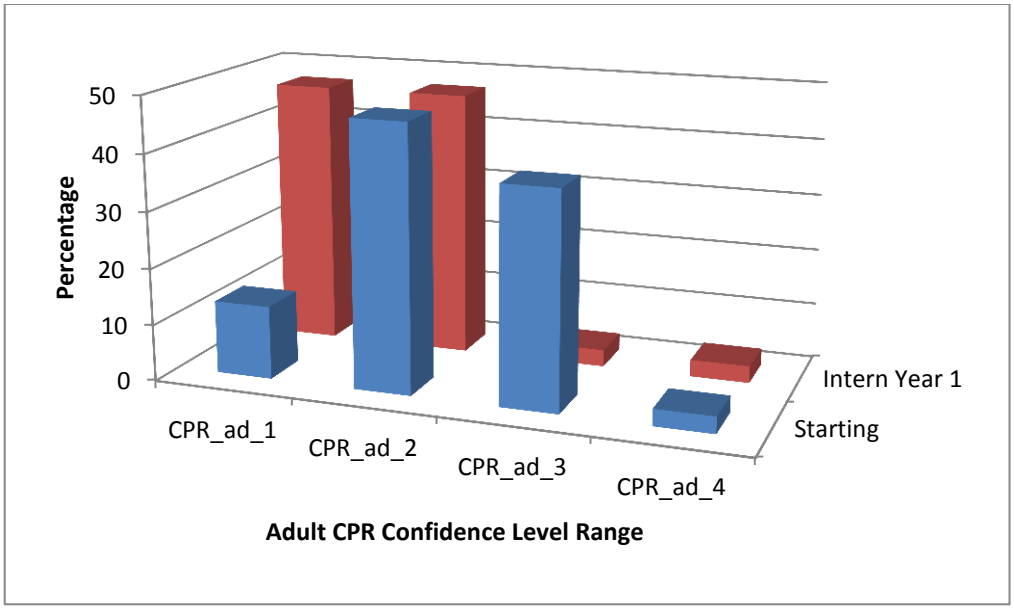

Figure 4.3: Comparison of adult CPR confidence range by intern year (as percentage of total)

The first comparisons are shown between basic modalities of primary resuscitation and airway management.

Figure 4.3 shows that as a percentage of totals, there is an increase in confidence in performing CPR on adults as the interns' progress in their time in clinical training. What should be noted is that 2% of the interns sampled would not attempt CPR in any event by the end of their first year. The division of confidence by intern year (Table 4.5) confirms this.

Table 4.5: Comparison of adult CPR confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	19	30	0,00118
Not Confident	13	2	

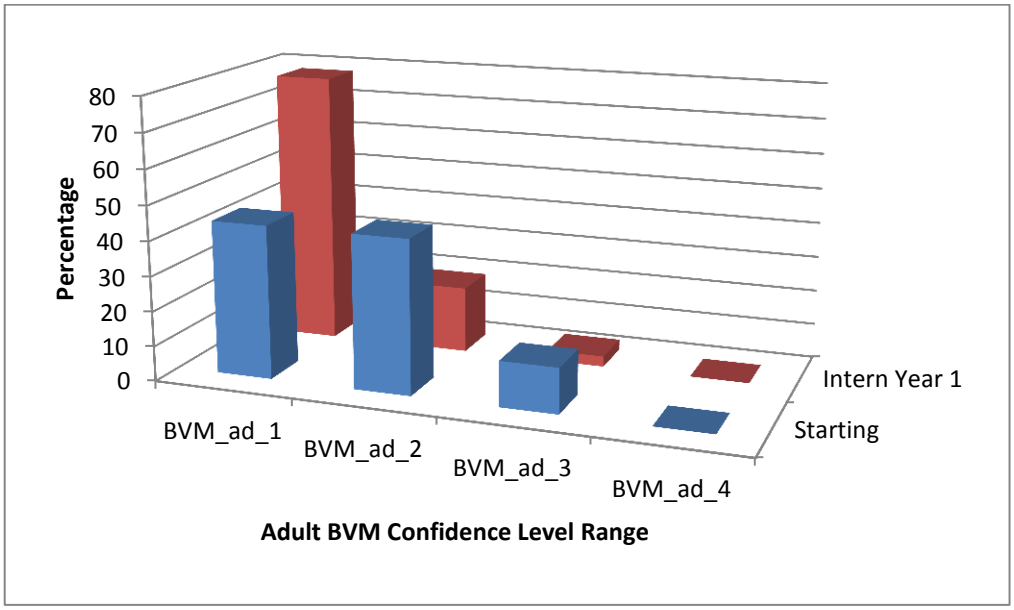

Figure 4.4: Comparison of adult BVM confidence by intern year (as percentage of total)

The trend of increasing confidence was repeated in the use of the bag valve mask (Figure 4.4) and in the LMA (Laryngeal Mask Airway) (Figure 4.5) although the

Fisher's exact test does not indicate significant p-values in the in the direct comparison of confidence (Tables 4.6 and 4.7).

Table 4.6: Comparison of adult BVM usage confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	28	31	0,17734
Not Confident	4	1	

Table 4.7: Comparison of adult LMA usage confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	21	26	0,12870
Not Confident	11	6	

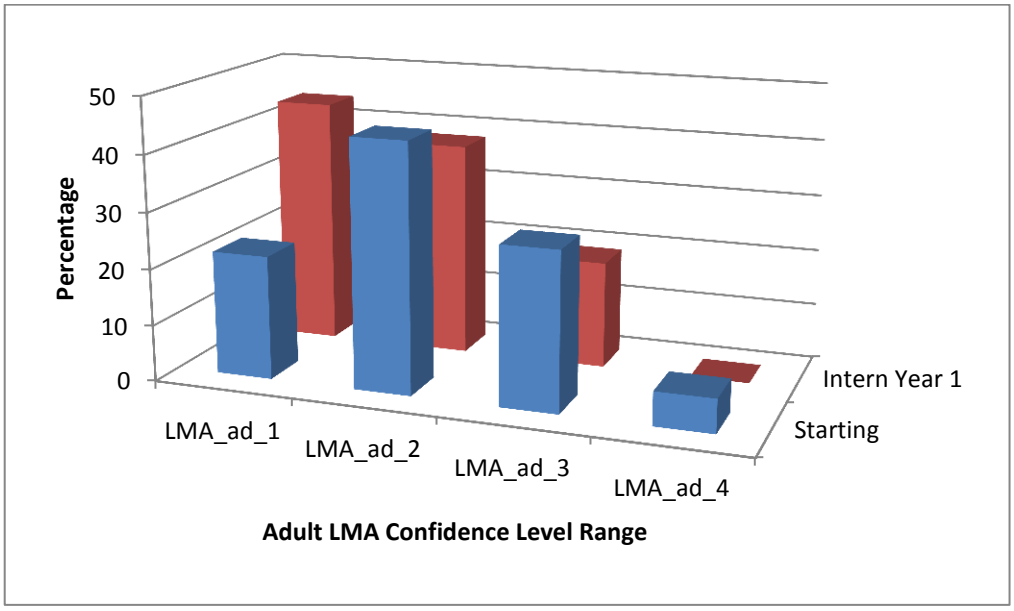

Figure 4.5: Comparison of adult LMA confidence by intern year (as percentage of total)

The trend of increasing confidence was also seen in ET Tube (Endotracheal tube) usage (Figure 4.6) and this time was confirmed in the direct comparison of confidence (Table 4.8).

Table 4.8: Comparison of adult ET Tube usage confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	17	26	0,01597
Not Confident	15	6	

The trend for paediatric and neonatal CPR was different in that interns felt that more supervision was needed (Figures 4.7 and Figure 4.8). The use of the bag valve mask in paediatric and neonatal patients (Figures 4.9 and Figure 4.10) followed the same trend of increasing confidence as that in adults.

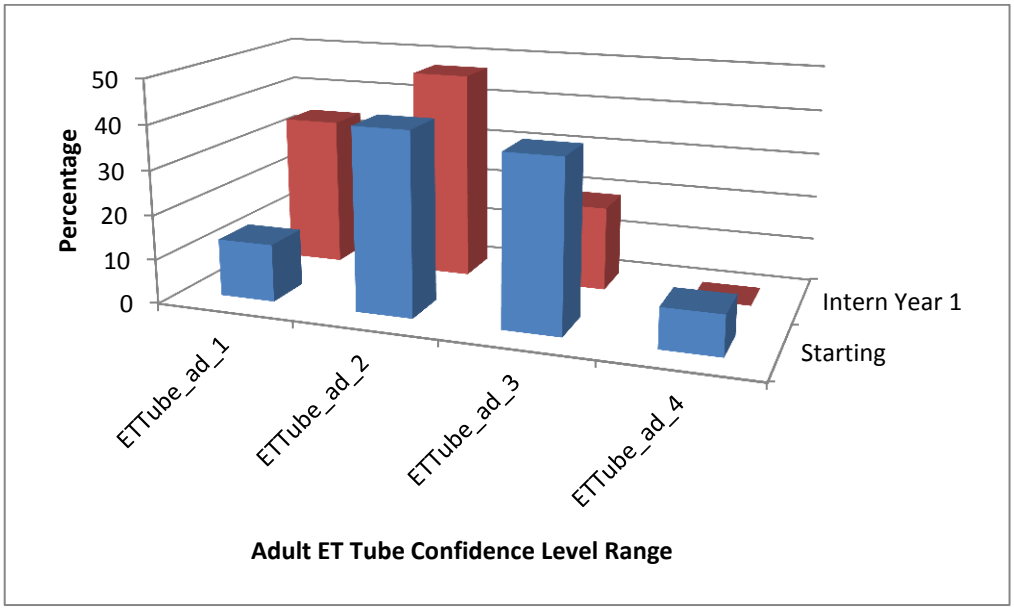

Figure 4.6: Comparison of adult ET tube confidence by intern year (as percentage of total)

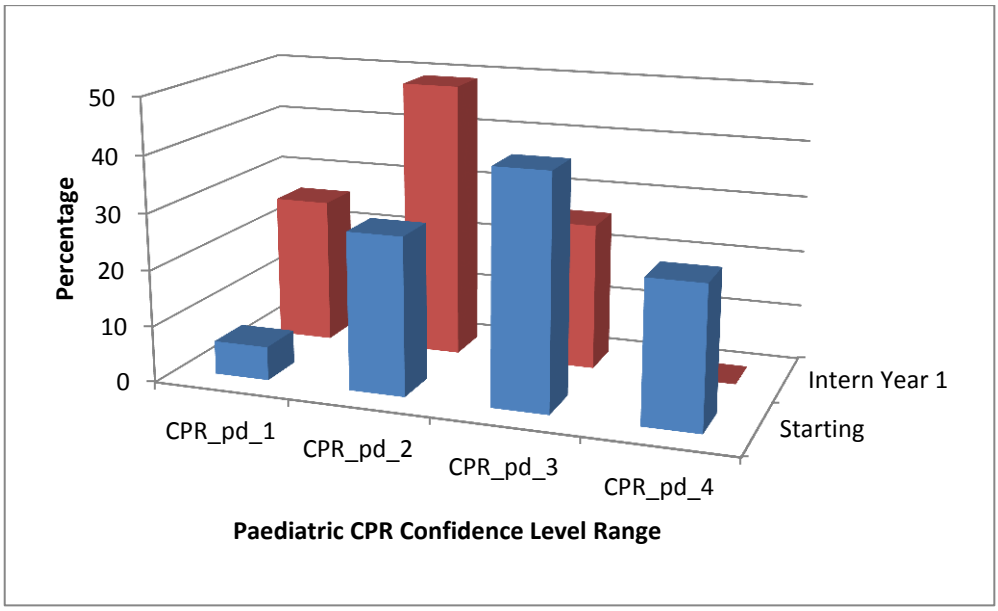

Figure 4.7: Comparison of paediatric CPR confidence by intern year (as percentage of total)

Table 4.9: Comparison of paediatric CPR confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	11	26	0,00108
Not Confident	21	9	

The relevant p-values are shown in Tables 4.9 to 4.12

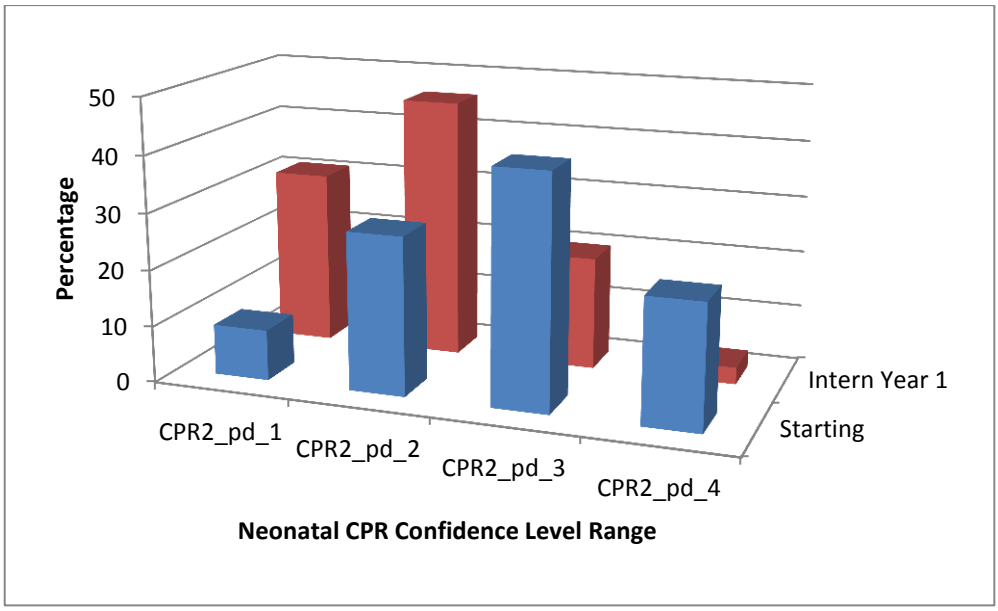

Figure 4.8: Comparison of neonatal CPR confidence by intern year (as percentage of total)

Table 4.10: Comparison of neonatal CPR confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	12	27	0,00107
Not Confident	20	8	

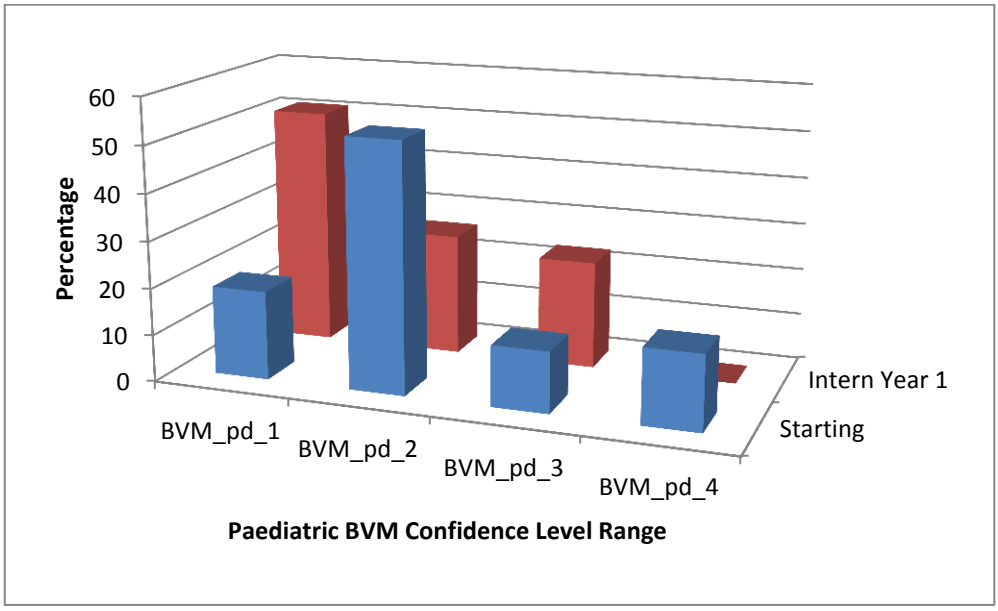

Figure 4.9: Comparison of paediatric BVM confidence by intern year (as percentage of total)

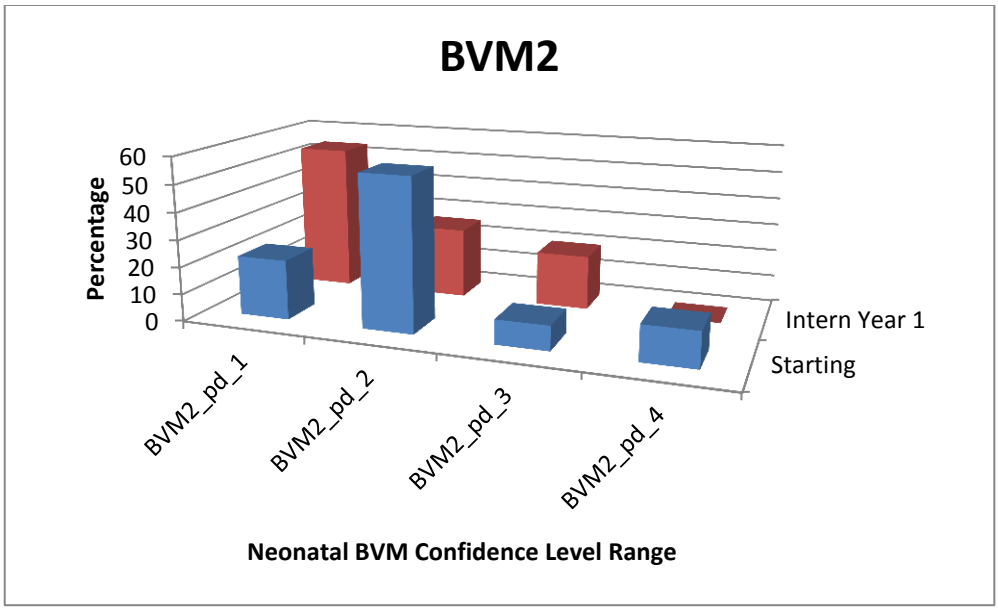

Figure 4.10: Comparison of neonatal BVM confidence by intern year (as percentage of total)

Table 4.11: Comparison of paediatric BVM usage confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	23	27	0,41477
Not Confident	9	8	

Table 4.12: Comparison of neonatal BVM usage confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	25	28	0,54343
Not Confident	7	7	

There was no statistical validation of a difference in the "confident / not confident" comparison between starting and ending the first year of internship when BVM (bag valve mask) usage was considered.

The next group of comparisons show the trends in establishing vascular access.

By the time of entering internship, most of the interns were confident to place a standard venous line (Figure 4.11), even though 9% felt that they needed supervision. A few interns (3%) still only felt confident enough to attempt placing a line in an emergency, even at the end of their first year. This did not cause a statistical difference between the two time periods compared (Table 4.13)

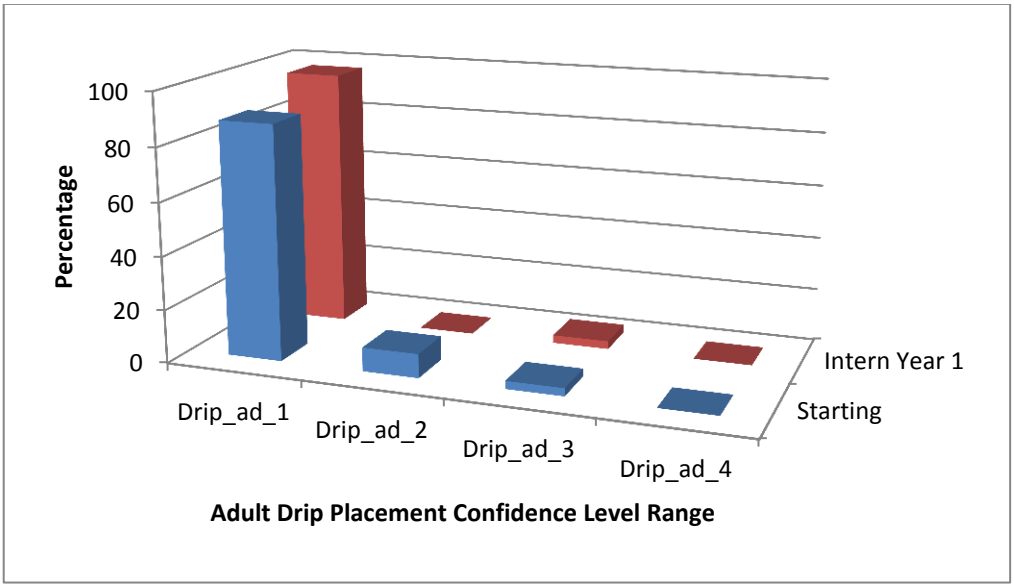

Figure 4.11: Comparison of adult drip placement confidence by intern year (as percentage of total)

Table 4.13: Comparison of adult drip placement confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	31	31	0,75397
Not Confident	1	1	
Missing	*1*	*21*	

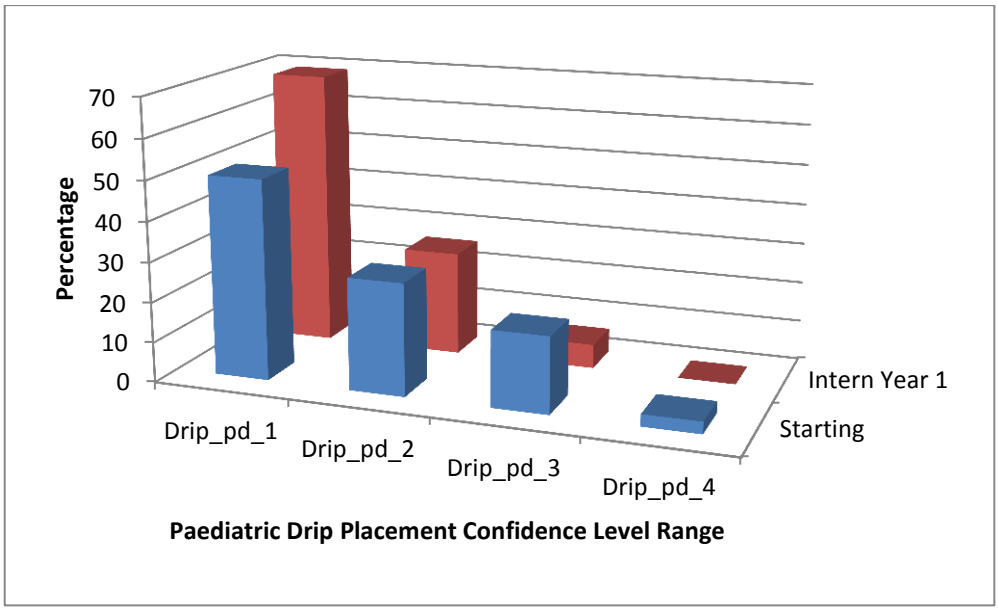

Figure 4.12: Comparison of paediatric drip placement confidence by intern year (as percentage of total)

Table 4.14: Comparison of paediatric drip placement confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	25	33	0,05610
Not Confident	7	2	
Missing	*1*	*18*	

The reported confidence in placement of a peripheral venous line in paediatric patients (Figure 4.12) increased significantly (Table 4.14) as internship progressed as did the placement of an intra-osseous line (Figure 4.13), albeit with lesser overall confidence and significance (Table 4.15).

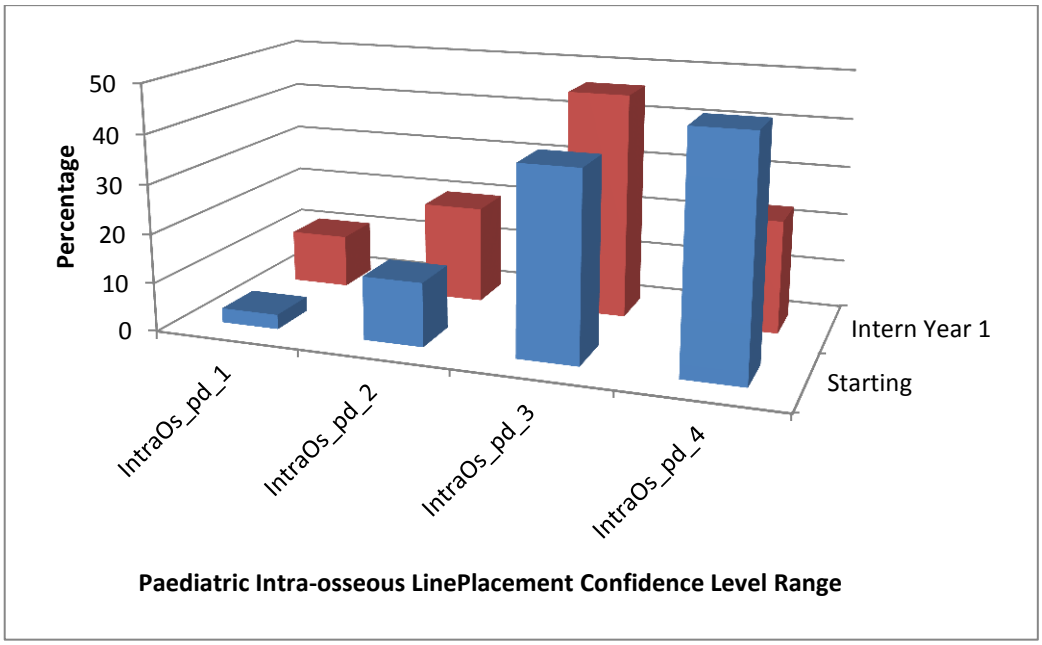

Figure 4.13: Comparison of paediatric Intra-osseous line placement confidence by intern year (as percentage of total)

Table 4.15: Comparison of paediatric intra-osseous line placement confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	5	11	0,10910
Not Confident	27	24	
Missing	*1*	*18*	

The trend in confidence was repeated significantly when looking at placing a central line (Figure 4.14 and Table 4.16).

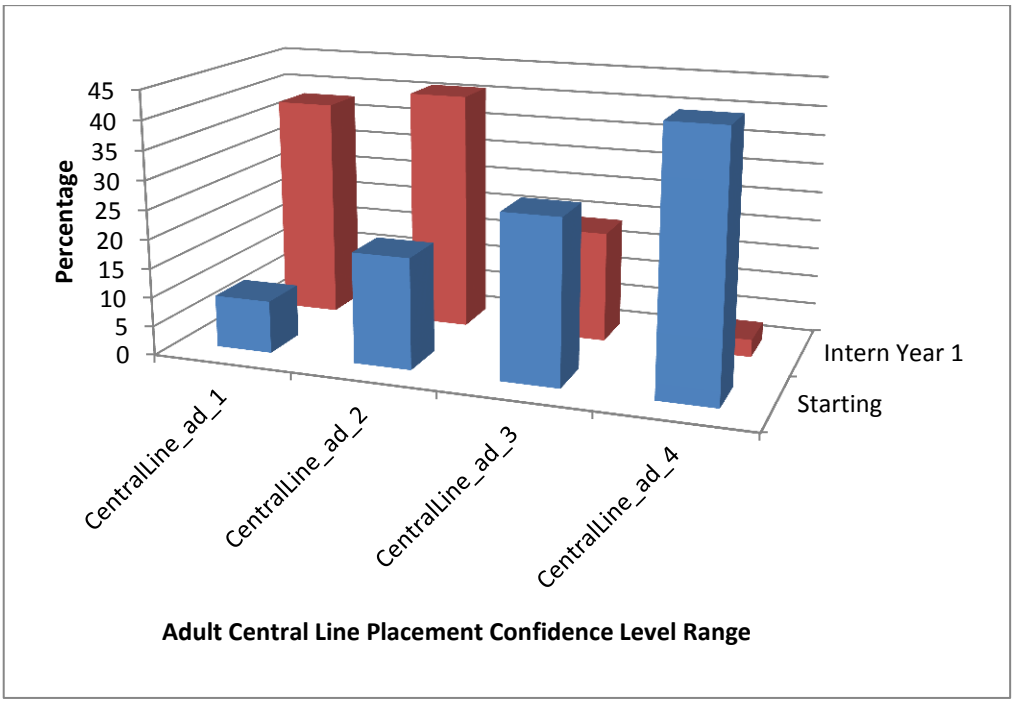

Figure 4.14: Comparison of central line placement confidence by intern year (as percentage of total)

Table 4.16: Comparison of adult central line placement confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	9	25	0.00006
Not Confident	23	7	
Missing	*1*	*21*	

The final comparison shows the rest of the procedures investigated.

There is a high level of confidence in placement of a urinary catheter (Figure 4.15) and of a nasogastric (NG) tube (Figure 4.16), but with no significant increase over the year (Table 4.17 and 4.18).

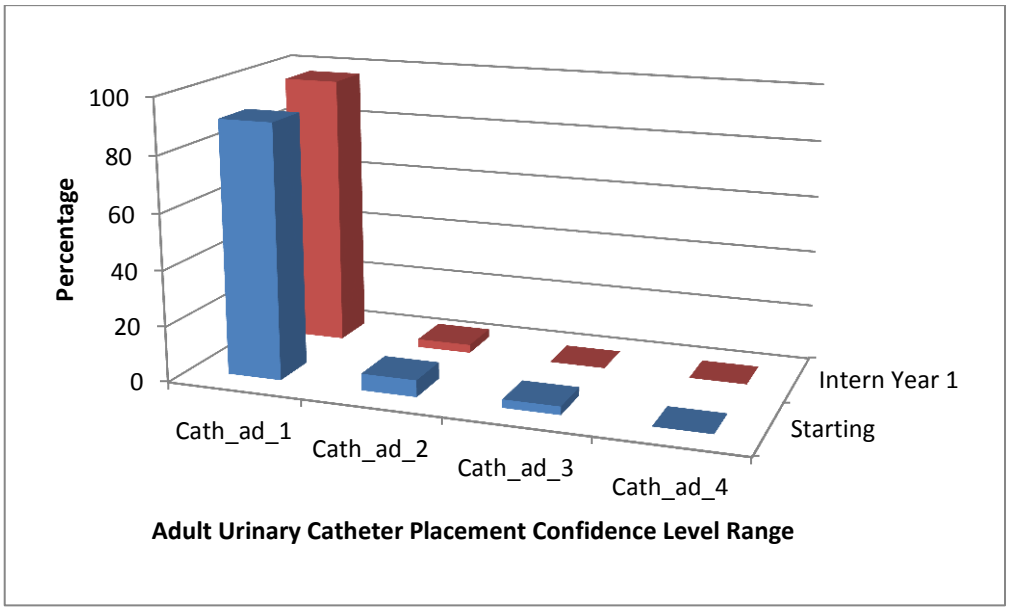

Figure 4.15: Comparison of urinary catheter placement confidence by intern year (as percentage of total)

Table 4.17: Comparison of Urinary Catheter Placement Confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	31	32	0,50000
Not Confident	1	0	
Missing	*1*	*21*	

Table 4.18: Comparison of Nasogastric Tube Placement Confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	30	32	0,24603
Not Confident	2	0	
Missing	*1*	*21*	

These two procedures were included in the survey to provide both, comparison to other studies at a later stage, and as a measure of accuracy in filling out the survey. I had expected a high level of confidence in both.

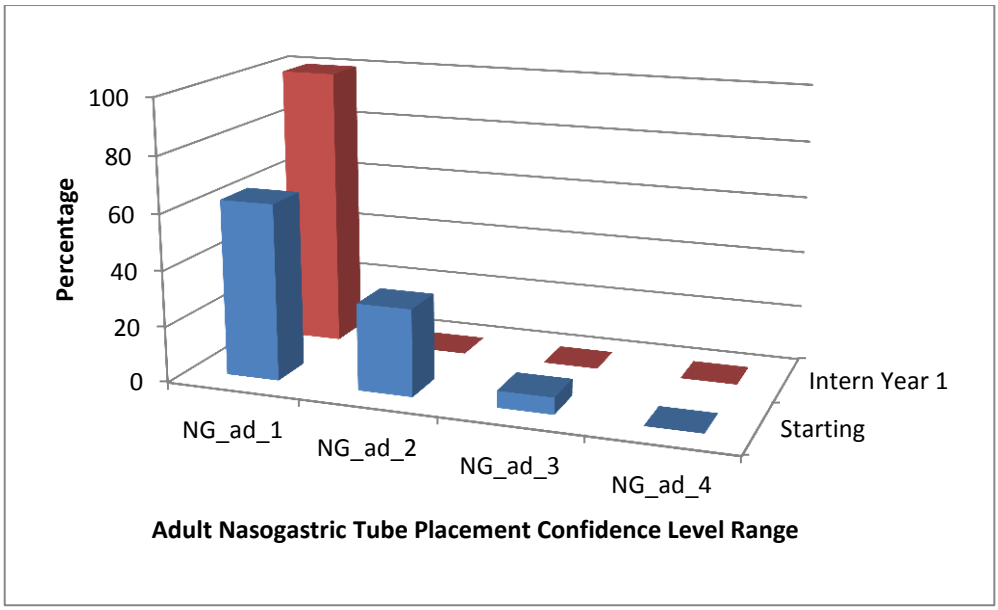

Figure 4.16: Comparison of nasogastric tube placement confidence by intern year (as percentage of total)

Defibrillation (Figure 4.17) also shows a statistically confirmed (Table 4.19) trend of increasing confidence over time, but there are very low levels of confidence (6% or less) in performing the procedure unassisted.

Table 4.19: Comparison of defibrillation confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	11	21	0,01185
Not Confident	21	11	
Missing	*1*	*21*	

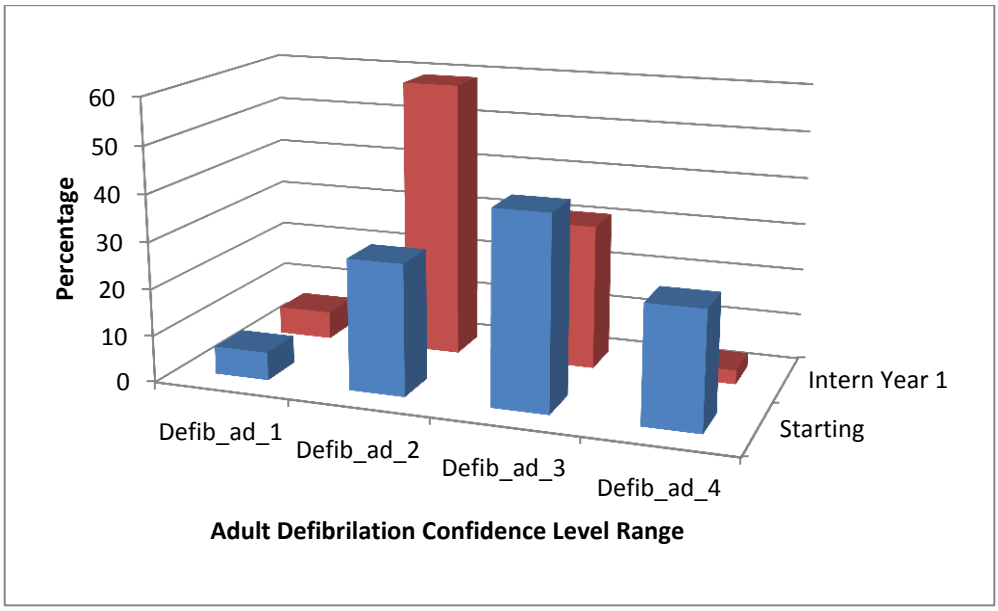

Figure 4.17: Comparison of defibrillation confidence by intern year (as percentage of total)

There is a low confidence in performing diagnostic peritoneal lavage (Figure 4.18). More than 40% of interns would still not perform the procedure by the end of the first year of internship. There is however a significant increase in confidence (Table 4.20) during the year.

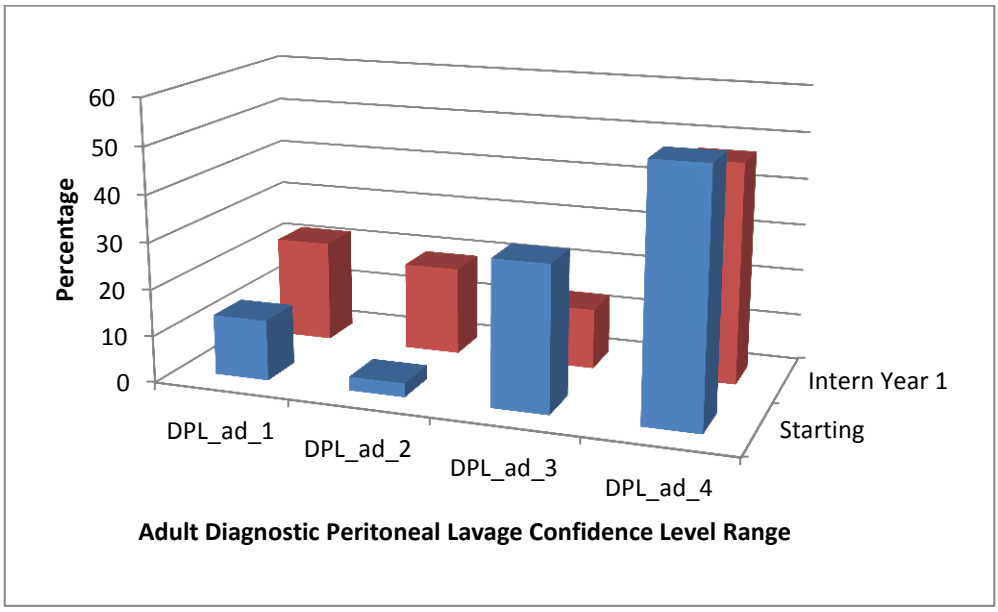

Figure 4.18: Comparison of diagnostic peritoneal lavage confidence by intern year (as percentage of total)

Table 4.20: Comparison of diagnostic peritoneal lavage confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	5	13	0,02500
Not Confident	27	19	
Missing	*1*	*21*	

Both Figure 4.19 and Table 4.21 show that the confidence in performing abdominal ultrasound is relatively evenly distributed with no significant difference in the interns who responded.

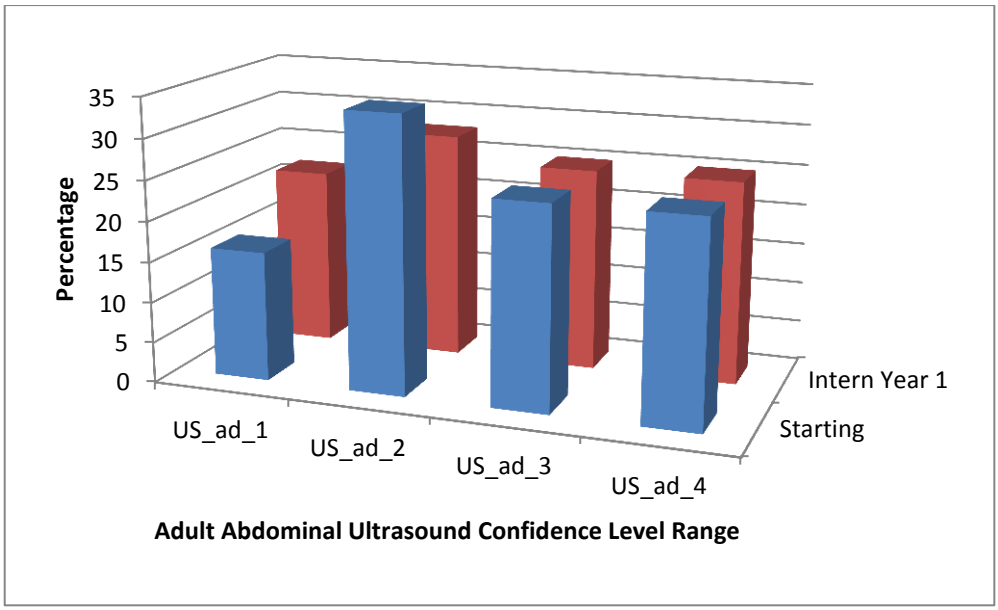

Figure 4.19: Comparison of adult abdominal ultrasound confidence by intern year (as percentage of total)

Table 4.21: Comparison of adult abdominal ultrasound confidence by intern year

	Starting Year 1	Ending Year 1	Fisher's exact p value
Confident	16	16	0,59857
Not Confident	16	16	
Missing	*1*	*21*	

4.5.2 Data by Age

As mentioned previously, 7 of the 99 interns fell into an older group (30 to 39 years old) than the rest of the interns (20 to 29 years old). The distribution of the older interns was however relatively limited with four coming from the University of the Witwatersrand, and two from non-South African universities. A single intern had completed the second year and two were just starting internship. They were spread out amongst five hospitals. As a result of the small numbers and spread of other demographic data no further investigation was done on the influence of age.

4.5.3 Data by Gender

Of the interns sampled, 35 were male and 64 were female. Table 19 shows the distribution of male interns versus female interns within the other demographic indicators.

Table 4.22: Comparison of Paediatric Drip Placement Confidence by Gender for first year interns

	Male	Female	Fisher's exact p value
Confident	22	36	0,02073
Not Confident	0	9	
Missing	*6*	*13*	

The only significant difference between males and females (in the first year of internship) was in the confidence in placing paediatric drips (Table 4.22), where male interns were more confident than female interns.

4.5.4 Data by Hospital

The data of only 2 of the possible 60 hospitals were compared because only these 2 hospitals had large enough samples for comparison (15 and 39). The hospitals are not identified at their request. There was a significant difference (Table 4.23) between the hospitals in doing adult ultrasonography as was the confidence in doing both paediatric and neonatal CPR (Tables 4.24 and 4.25).

Table 4.23 : Comparison of Adult Ultrasound by Hospital for first year interns

	Hospital 1	Hospital 2	Fisher's exact p value
Confident	2	23	0,00181
Not Confident	12	13	

Table 4.24 : Comparison of Paediatric CPR by Hospital for first year interns

	Hospital 1	Hospital 2	Fisher's exact p value
Confident	11	14	0.01766
Not Confident	4	24	

Table 4.25 : Comparison of Neonatal CPR by Hospital for first year interns

	Hospital 1	Hospital 2	Fisher's exact p value
Confident	11	16	0,03955
Not Confident	4	22	

4.5.5 Data by Medical School

As can be seen in Table 4.26, only two of the medical schools sampled contributed 10% or more to the total number of interns sampled and these two together accounted for just less than 70% of all of the interns who responded.

Table 4.26: Number of Respondents per Medical School

Medical School	Number of respondents who replied
1	3
2	21
3	7
4	6
5	5
6	0
7	39
8	2
9 (non-South African Medical School)	3
Total	86

The only significant differences between these two medical schools was in the confidence in performing adult CPR (p=0,02830) and in performing ultrasound investigations (p=0,00298).

4.6 The relationship between confidence and experience

The experiences of interns were compared where there were significant differences between the self-expressed confidences within the demographic groupings investigated. An extended Fishers exact test (2 X 4) was used because

of the small sample numbers and a Bonferroni correction was applied to get a more accurate significant p-value[45]. After the adjustment, a p-value of 0,0127415 or lower was considered as significant rather than a value of 0,05.

The ranges of experiences were compared in the areas where demographic data showed significant differences. The data for experience gained during internship was ignored because of the inability to do comparisons. The group who were just starting their internship obviously could not fill in this part of the survey. The experiences gained as medical students were therefore compared.

In the comparison between those just starting internship and those ending the first year there was a significant difference in the confidence in performing a number of skills as highlighted previously. The experience related to CPR in all age groups (adult, paediatric and neonatal) was investigated.

Table 4.27 : Experiences as a medical student related to CPR showing significant differences compared by intern group (starting intern year 1 vs. ending intern year 1).

Experience	Fisher's exact p value
Demonstration on a dummy	0,0062
Demonstration on an adult patient	0,0046
Demonstration on a paediatric patient	0,0015
Demonstration on a neonatal patient	0.0052
Performing CPR on a paediatric patient under supervision	0,0102

The experiences that showed significant differences between the groups for this skill are shown in Table 4.27 with experiencing the demonstration of CPR on a

paediatric patient showing the most significant difference between the groups (p=0,0015). There were no significant differences between the two groups in the experiences related to placement of an ET tube or performing a diagnostic peritoneal lavage. Only attending a related lecture showed some significant difference (p=0,0079) in the experiences related to performing defibrillation. The experiences related to inserting a CVP line that showed significant differences were demonstration on a dummy (p=0,001), demonstration on a patient (p=0,0018) and performing the procedure on a patient under supervision (p=0,0053).

The only skill where there was a gender difference was the insertion of peripheral lines (drips) in paediatric patients. Experiences with both adults and paediatric patients while at medical school were investigated as the influence of experience with adult patients on paediatric drip insertion confidence is not clear. The experiences with significant differences are shown in Table 4.28.

Table 4.28 : Experiences as a medical student related to drip insertion showing significant differences as compared by gender

Experience	Fisher's exact p value
Lecture about drip insertion	0,0016
Demonstration on a dummy	0,0017
Demonstration on an adult patient	0,0013
Demonstration on a neonatal patient	0.0085
Inserting a drip on a paediatric patient under supervision	0,0102
Inserting a drip on an adult patient under supervision	0,0102
Inserting a drip on a paediatric patient unsupervised	0,0083

The experience as an intern was also compared for this group as there was a sample of 39 who completed this part of the survey. Demonstration on a paediatric patient (p=0,0016), supervised drip insertion (p=0,0069) and unsupervised drip insertion (p=0,0020) on a paediatric patient as an intern showed significant differences in experience between the genders.

The only significant differences between the confidences expressed by interns working in the two hospitals studied were, as highlighted above, in performing ultrasound investigations and in performing paediatric and neonatal CPR. The only medical school experience where there was a significant difference between the two hospitals in the confidence in performing an ultrasound examination was in performing an ultrasound examination under supervision (p=0,0107). Where CPR was concerned there was a significant difference in performing paediatric CPR under supervision (p=0,0032).

Table 4.29 : Experiences as a medical student related to CPR showing significant differences compared by medical school where intern trained.

Experience	Fisher's exact p value
Demonstration on a dummy	0,0026
Demonstration on an adult patient	0,0064
Demonstration on a paediatric patient	0,0058
Performing CPR on an adult patient under supervision	0,0017

When the interns originating from the two medical schools best represented were compared, only the confidence in performing CPR on adults and in performing an

ultrasound examination showed any significant differences. The areas of experience in CPR that also showed significant differences are shown in Table 4.29. For ultrasound experience, only supervised patient examination showed any significant difference (p=0,0050).

In summary, 99 surveys were collected from 26 hospitals. The majority of surveys returned were from respondents working in to academic hospitals in Johannesburg. The surveys collected included respondents who had been trained in all of the South African medical schools although the majority of respondents came from only two universities. There were approximately twice as many female as male respondents and slightly more than half the respondents were finishing the first year of the internship. On average there was a high level of confidence in performing most procedures. The areas where there was a lower level of confidence are discussed below as reflected in the data analysis.

CHAPTER 5 DISCUSSION

The results of this study showed some significant differences within the population investigated but also highlighted some deficiencies in the data collection methods used. This chapter therefore mostly revolves around those areas of the research where significant differences were highlighted and also includes discussion of the sampling techniques used.

As the first part of the research was to gather data, data gathering techniques will be discussed first. Both electronic and paper based methods were used to gather the data. Two methods were used to gather data in electronic format. The surveys were directly emailed to possible participants by a third party and an invitation to participate was placed on a social networking Internet site dedicated to interns. The return rate from the direct emailing was extremely low. Exact numbers of invitations sent out were unknown because of the third party's concern about anonymity but estimated return rates were below 5%. Anecdotally, return rates on Internet based surveys are low. This is contradicted by a meta-analysis[46] which found only an 11% decrease in return rates using web surveys on average as compared to other survey modes. A possible explanation for the discrepancy in return rates between the two methods of online recruitment was raised in this meta-analysis. The result might relate to the perceptions of the soliciting agency. The higher return rate was from a voluntary grouping of interns with a recommendation from the organising body and the lower return rate was from a university alumni organisation. Another moderating influence that was raised in the analysis was that response rates decrease with increasing numbers of contacts from the surveyors for online surveys as compared to conventional survey modes.

The results of this survey were skewed in the direction of academic hospitals. Replies were received from just over 43% of the institutions listed on the questionnaire. These are the South African hospitals that accept interns. The numbers of responses per hospital was low (generally only one or two replies per hospital) except for the two Johannesburg academic hospitals which were polled using the paper-based surveys. There is evidence that people who complete their internship in academic hospitals remain in the academic environment rather than entering the rural environment.[47,48] There might be differences in confidence of interns choosing non-academic or rural hospitals rather than academic hospitals for their choice of internship but there is insufficient data in the survey to examine this possibility.

In South Africa, final year medical students apply for internship posts to the National Department of Health. Students choose from a list of approved hospitals and are made aware of the number of available posts at each hospital. Students apply for a number of posts in an order of preference. Motivations for specific posts may be made based on social issues. The posts in South Africa are assigned by the National Department of Health. The process of intern application and acceptance differs from country to country with varying levels of hospital involvement. In the United Kingdom, internship has been incorporated into a two year Foundation Program, with a sub-program called the Academic Foundation Program for those interns who intend to subsequently pursue an academic career[49].

Eligible applicants need to provide references as well as undergo a selection assessment to apply for posts. Institutions providing places for the Foundation

Program are involved in selection. In the United States of America, institutions actively vie for interns with the best potential. In the past, the practice of accepting interns even before they had completed their final exams[50], led to a more standardised application process. There is still competition to attract the best candidates for internship and studies have been done to see what attracts appropriate candidates[51] as well as how the market adapts to changes[52]. The studies show that intern choice relates not only to the immediate job but also to possibilities for future training. Internship is seen as the first step in specialist training[48]. There is no current evidence to suggest that this is not the case in South Africa and considering that the majority of respondents from this current South African study came from the two largest Johannesburg (and therefore University of the Witwatersrand) teaching hospitals, the results obtained might not be generalizable to the larger group of South African interns.

In general, this study showed a high level of self-perceived confidence in most of the procedures studied with confidence increasing during the progress of the internship. When the procedures studied were grouped together into “confident/not confident” pairs, at least 50% of the interns studied were confident in all but two procedures. Only 30% of the interns were confident in their ability to perform a diagnostic peritoneal lavage and slightly less than 30% were confident in their ability to place an intra-osseous line in paediatric patients. This compares well with other studies of confidence in medical professionals at similar levels of development, that is to say, in the first two years following primary qualification. It is difficult to do a general comparison as different procedures are investigated in each study.[36, 37] In one study, the doctors at a similar level were only confident in

performing a single procedure on average (median value at a 95% confidence index), even though some were confident in performing up to 5 procedures.[36]

A review of the individual features of educational interventions that impact on the competence (not confidence) to perform a single technique showed that any impact was maximal when starting from a low baseline and that repeated sessions as part of daily work have a small additional effect.[53] This could explain the results of this study which showed few statistically relevant influences on overall confidence and might therefore relate to an overall higher baseline of confidence.

As stated previously, a high level of confidence does not indicate competence but increased competence leads to a higher level of confidence. A study of first year post graduation doctors (interns) showed overconfidence relative to a standardised skills assessment.[37] The confidence levels documented in this study therefore also probably do not indicate equivalent competence.

Overall, the experience with simulation on a manikin showed no significant impact on confidence. Interestingly, one study showed that the confidence gained by simulation-based assessment could lead to an overestimation of self-confidence.[54] As the availability and level of simulation training in all South African medical schools is unknown, this particular question in the survey would have to be revised as the fidelity of the manikin responses in different skills laboratories vary and this could affect confidence levels generated.

It is difficult to compare the overall range of procedures being studied with similar investigations because of the different expectations of interns or the equivalent in

other countries.[25,49] In many other countries, interns do not do emergency procedures as these are done by registrars and the range of procedures is narrower than those investigated in this study.

Other studies showed a gender bias with males associated with an increased confidence level. This present study only found a significant gender bias in the placement of intravenous lines in paediatric patients with female interns being less confident than their male counterparts. There are an increasing number of female doctors graduating in South Africa as occurred in the current studies sample and they are expected to be as confident and competent as their male counterparts. The majority of the respondents in this study had however not completed their internship and might not have done their paediatric block at the time of survey and therefore might alter their confidence after the experience.

There were insufficient data to compare confidences across all South African medical schools as only two of the schools were sufficiently represented in the sample. The only significant differences in confidence were in performing CPR on adults and in performing ultrasound investigations. The factors that may have influenced these differences according to the responses were the number of times that CPR was demonstrated at medical school as well as the opportunity to perform CPR while being supervised. Interns are often the first doctors available to respond to emergency patients within the hospital and need to be able to utilise these skills from the first day of their internship. It is significant, as previously stated, that two of the interns surveyed had completed their first year of internship and were still not sufficiently confident in their ability to perform CPR and that almost half of the interns completing their first year would prefer supervision while

performing CPR. As CPR is a skill for which the lay public is also being trained, one would expect a high level of confidence within the medical fraternity and these results most likely indicate the need for increased exposure and training at a medical school level.

In the case of ultrasound examinations, supervised practice on a patient was the most significant factor. This might not relate purely to teaching but also to the availability of the equipment.

The only procedures that showed a low level of confidence on entering internship were performing CPR on paediatric and neonatal patients, inserting intra-osseous and central lines and performing defibrillation and diagnostic peritoneal lavage. If a national consensus on emergency skills necessary for interns is reached and these skills are part of those required then they might have to be some curriculum redesign and reprioritisation of training at medical school is strongly recommended.

The only procedures that did not show improvement in confidence were abdominal ultrasound and placement of a urinary catheter. There was little room for improvement in urinary catheterisation skills as a result of the initial high confidence levels. The confidence in performing abdominal ultrasound differed significantly between the two hospitals compared. There was insufficient data to compare the influence of hospital experience on this confidence, but the experience gained from supervised performance of the skill as a medical student was the only demonstrable influence on this skill.

Both abdominal ultrasound and diagnostic peritoneal lavage are important skills in the assessment of blunt abdominal trauma and in teaching hospitals, abdominal ultrasound, is the preferred mode of investigation.[55] This might lead to a decreased emphasis on the skill of performing a diagnostic peritoneal lavage. The author does not know the availability of ultrasound to community service doctors and therefore the impact this lack might have on the need to perform a diagnostic peritoneal lavage.

Even though there appears to be a high level of self-assessed confidence in most of the skills analysed, there is still room for improvement. Evidence suggests that a formal training programme would be of benefit in improving skills and the confidence to perform those skills.[29,39,41] The present study suggests that there is no single factor which influences confidence across the range of procedures studied but increasing experience is a common contributing factor. There has been discussion about how much experience is a minimum prerequisite for competence in each procedure[39,56] both before and during internship.

One possible solution is to use the data available from the intern logbooks to measure the minimum, maximum and mean experience gained across the country and therefore quantify what is happening at present and to contrast this with further research into confidence. Direct supervisors could give their opinion about randomly selected interns' competence in order to develop a competence / experience profile per procedure. This however imposes a burden on already busy clinicians who may not have had sufficient contact with the intern in order to render a valid judgement. A standardised direct test of competence would probably result in high confidence levels.

This study did not look at additional factors which might influence confidence such as training in communication skills and management of group dynamics[57] even though it is already a component of the curriculum in some South African medical schools.[33] Both assigning responsibilities to hospital staff for formal training during internship and explaining the motivation for this training to interns should have an additional impact on overall confidence.[53]

The relationship between confidence and competence is not linear.[41] There is a hypothesis that the more motivated an individual is, the more likely that they will take advantage of training opportunities.[58] In South Africa there are sufficient opportunities for extensive experiential learning and clinical practice and therefore those who feel the need for additional practice to improve their confidence have the ability to do so while those who already feel confident and who might not be competent would most likely not take advantage of the opportunity to practice. However, the effectiveness of this experiential learning is proportional to the degree of supervision, and clinical teaching and mentoring. The efficacy of the practical learning experience is predicated upon the presence of robust dedicated mechanisms to remediate any errors or omissions and time for reflection in order to consolidate this clinical learning. This requires experienced clinicians who can supervise and mentor the interns. These resources however are not always available. Thus, even more so, the basic foundational training must be comprehensive and sufficient to generate proficiency and confidence.

This study does not take into account the motivations for pursuing increased experience even though the underlying rationale was to judge the preparedness of interns to enter community service. Additional questions on motivation of interns

by mentors and supervisors might investigate the relationship between the amount of experience that interns gained and their perceived confidence and future needs.[59-61]

The results of this study are similar to the results of a recent study done at KwaZulu-Natal district hospitals.[3] The study did not examine confidence directly or specifically investigate emergency procedures, but rather looked into whether community services doctors felt that they had been adequately prepared for their current service by internship.

In summary, this study was limited by the data collection methods but showed a high level of confidence in most of the emergency medical skills investigated. The practical experience was generally sufficient to improve confidence, notably in the confidence to perform CPR.

CHAPTER 6 CONCLUSIONS AND RECOMENDATIONS

This study indicates that interns in the Johannesburg academic hospitals feel confident in the ability to perform most emergency skills. Some factors that influence the development of this confidence have been identified and the areas where the interns felt a lower level of confidence were identified. The study itself was limited by a number of factors initiating possibilities for further investigation which are highlighted below.

Electronic surveys while more convenient a medium for distribution and subsequent amalgamation of data are not without their limitations. Any future surveys should be performed using paper-based survey methods.

The results of this study could reasonably be extrapolated to the opinions of interns at other teaching hospitals but could not reasonably be extrapolated to the opinions of the interns at district and other hospitals. Interns who were surveyed in the study predominantly graduated from two of the eight medical schools in South Africa and a larger sample is necessary before generalising the results of this study all South African medical graduates.

The list of procedures that were investigated in the study could reasonably be assumed to be necessary in an emergency situation. This study could however be broadened to include all procedures covered by the Health Professions Council of South Africa Intern Handbook.

Fifty percent or more of the individuals completing the first year of internship were confident in the ability to perform the procedures investigated with the exception of

diagnostic peritoneal of lavage and placement of a paediatric intra-osseous line. This figure compares well to a similar international studies, even though other studies of individuals at a similar level did not investigate exactly the same range of procedures.

There was minimal evidence of gender bias in the study with only placement on a paediatric line showing a difference in confidence between males and females.

Demonstrations on models showed some influence on confidence and therefore ongoing access to models would most likely be of benefit to interns. This influence would be greater if high fidelity manikins were available with supervised feedback and remediation.

The only procedures that showed the general low level of confidence when entering internship were performing CPR or inserting intra-osseous lines on paediatric and neonatal patients and performing defibrillation and diagnostic peritoneal lavage on adults. These, excluding diagnostic peritoneal lavage, are amongst the most basic and fundamental life-saving skills and ought to be a reflexive part of any doctor’s armamentarium on entry to internship as there is a strong possibility that these skills might be necessary even on the first day of training.

All of the skills investigated showed improvement over the course of the first year of internship except for urinary catheterisation which was already had an extremely high level of confidence on entering internship, and abdominal

ultrasound. There was insufficient data to make conclusions about ultrasound skills.

Different experiences play a role in increasing confidence in performing procedures but there is no specific experience which has overriding influence.

While this study provides some insights into the confidence of South African medical interns it has also exposed a number of flaws in the original conception of the study as well as opening possibilities for further study.

As stated previously, an insufficient percentage of the overall intern cohort was sampled in order for the study to be generalisable to all South African interns. Possible valuable insights could be gained in repeating this study in district and community level institutions as well as studying a comparable group of doctors doing their community service. Some insights might also be gained by looking at the choices for internship placement by final year medical students and the reasons for these choices.

These results need to be looked at in comparison to competence levels. The intern logbooks could also provide a valuable comparison to the amount of experience gained in all skills during internship.

A study of the need for diagnostic peritoneal of lavage and the availability of abdominal ultrasound equipment during the community service period would shed light on how significant the data on these two procedures is.

The one critical factor exposed in this study is the need for increased training and testing of CPR skills prior to entering internship.

Even though this study has shown that there is a high level of confidence in most emergency procedures, ongoing monitoring and a wider evaluation of confidence as well as competence is necessary to ensure the provision of effective service to South Africa doctors doing their community service and following their further medical careers.

REFERENCES

(1) Herbert, M. Forward. In: Roberts and Hedges' clinical procedures in emergency medicine, ed.by R. James & R. Jerris. 6th ed. Philadelphia, PA: Saunders, 2010. p. xxi.

(2) Prinsloo, A. 2005. A two-year internship programme for South Africa. *SA Fam Pract*;47(5):3.

(3) Nkabinde, TC, Ross, A, Reid, S & Nkwanyana, NM. 2013. Internship training adequately prepares South African medical graduates for community service - with exceptions. *S Afr Med J*;103(12):930-934.

(4) Sein, N & Tumbo,J. 2012. Determinants of effective medical intern training at a training hospital in North West Province, South Africa. *Afr J Health Prof Educ*;4(1):10-14.

(5) University of the Witwatersrand. Faculty of Health Sciences. Graduate Entry Medical Program (GEMP). 2009. [Unpublished document].

(6) Diem, SJ, Lantos, JD & Tulsky JA. 1996. Cardiopulmonary resuscitation on television - miracles and misinformation. *N Engl J Med*;334(24):1578-1582.

(7) Van den Bulck, JJ. 2002. The impact of television fiction on public expectations of survival following inhospital cardiopulmonary resuscitation by medical professionals. *Eur J Emerg Med*;9(4):325-329.

(8) Hardcastle, TC & Goff, T. 2007. Trauma unit emergency doctor airway management. *S Afr Med J*;97(9):864-7.

(9) Lewis, RJ. 1999. Emergency medicine's "illusion of efficacy" and the public perception of resuscitation research. *Acad Emerg Med*;6(8):771-772.

(10) Sport24. Doc's fight in vain for rider. Available: http://www.sport24.co.za/OtherSport/Cycling/Docs-fight-in-vain-for-rider-20100323. [Accessed 3/21/2012].

(11) Ieraci, S: Public expectations of doctors need a reality check. Available: http://www.mjainsight.com.au/view?post=public-expectations-of-doctors-need-a-reality-check&post_id=296&cat=comment. [Accessed 12/2/2012].

(12) Health Professions Council of South Africa (HPCSA). Ethics / Professional Conduct. Available: http://www.hpcsa.co.za/hpcsa/default.aspx?id=152.[Accessed 25/04/2009].

(13) South Africa. Dept. of Health. 2006. Health Professions Act, 1974 (Act No. 56 of 1974). Ethical rules of conduct for practitioners registered under the Health Professions Act. Government Gazette; No 29079:717.

(14) Good medical practice. Available: http://www.gmc-uk.org/static/documents/content/GMP_0910.pdf. [Accessed 25/11/2012].

(15) Australian Medical Council. Working Party on the behalf of the medical boards of the Australian states and territories. Good medical practice: a code of conduct for doctors in Australia. Available: http://www.amc.org.au/images/Final_Code.pdf. [Accessed 25/11/2012].

(16) Reid, SJ. 2001. Compulsory community service for doctors in South Africa-an evaluation of the first year. *S Afr Med J*;91(4):329-336.

(17) South Africa. Medical, Dental and Supplementary Health Service Professions Amendment Act, No. 1 of 1998.

(18) Perry, P. 2011. Concept analysis: confidence/self-confidence. *Nurs Forum*;46(4):218-230.

(19) Wiggins-Dohlvik, K, Stewart, RM, Babbitt, RJ, Gelfond, J, Zarzabal, LA & Willis RE. 2009. Surgeons' performance during critical situations: competence, confidence, and composure. *Am J Surg*;198(6):817-823.

(20) Leopold, SS, Morgan, HD, Kadel, NJ, Gardner, GC, Schaad, DC & Wolf FM. 2005. Impact of educational intervention on confidence and competence in the performance of a simple surgical task. *J Bone Joint Surg Am*;87(5):1031-1037.

(21) Peyton, JWR. 1998. Teaching & learning in medical practice. Heronsgate Rickmansworth, Herts: Manticore Europe.

(22) Lake, FR & Hamdorf, JM. 2004. Teaching on the run tips 6: determining competence. *Med J Aust*;181(9):502-3.

(23) Adams L. 2011. Learning a new skill is easier said than done. Available: http://www.gordontraining.com/free-workplace-articles/learning-a-new-skill-is-easier-said-than-done/. [Accessed 10/10/2013].

(24) Amin, Z & Eng, KH. Basics in medical education. 2nd ed. Singapore: World Scientific; 2009.

(25) Premadasa, IG, Shehab, D, Al-Jarallah, KF & Thalib L. 2008. Frequency and confidence in performing clinical skills among medical interns in Kuwait. *Med Teach*;30(3):e60-5, DOI:10.1080/01421590801915652.

(26) Bloom, BS, Engelhart, MD, Furst, EJ, Hill, WH & Krathwohl, DR. Taxonomy of educational objectives: the classification of educational goals; Handbook I: cognitive domain. New York: Longmans, 1956.

(27) Anderson, L & Krathwohl, DA. A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives. New York: Longmans, 2001.

(28) Kogan, JR, Holmboe, ES & Hauer KE. 2009. Tools for direct observation and assessment of clinical skills of medical trainees: a systematic review. *JAMA*;302(12):1316-1326.

(29) Todd, SR, Fahy, BN, Paukert, J, Johnson, ML & Bass BL. 2011. Surgical intern survival skills curriculum as an intern: does it help? *Am J Surg*;202(6):713-719.

(30) Kovacs, G. 1997. Procedural skills in medicine: linking theory to practice. *J Emerg Med*;15(3):387.

(31) Osinaike, BB, Aderinto, DA, Oyebamiji, EO, Dairo, MD & Diya, KS. 2007. Evaluation of knowledge of doctors in a Nigerian tertiary hospital about CPR. *Niger Med Pract*;52(1):16-18.

(32) Okuda, Y, Bryson, EO, DeMaria, S, Jacobson, L, Quinones, J, Shen, B, *et al*. 2009. The utility of simulation in medical education: what is the evidence? *Mt Sinai J Med*;76(4):330-343.

(33) University of the Witwatersrand. Centre for Health Science Education. Objectives for GEMP 3&4 with index. [Unpublished document].

(34) Goldacre, M, Taylor, K & Lambert, T. 2010. Views of junior doctors about whether their medical school prepared them well for work: questionnaire surveys. *BMC Med Educ*;10:78, DOI:10.1186/1472-6920-10-78.

(35) Bankole, S, Asuncion, A, Ross, S, Aghai, Z, Nollah, L, Echols, H, *et al*. 2010. First responder performance in pediatric trauma: a comparison with an adult cohort. *Pediatr Crit Care Med*;12(4):e166-70, DOI:10.1097/PCC.0b013e3181f36f6e.

(36) Connick, RM, Connick, P, Klotsas, AE, Tsagkaraki, PA & Gkrania-Klotsas, E. 2009. Procedural confidence in hospital based practitioners: implications for the training and practice of doctors at all grades. *BMC Med Educ*;9:2, DOI:10.1186/1472-6920-9-2.

(37) Barnsley, L, Lyon, PM, Ralston, SJ, Hibbert, EJ, Cunningham, I, Gordon, FC, *et al*. 2004. Clinical skills in junior medical officers: a comparison of self-reported confidence and observed competence. *Med Educ*;38(4):358-367.

(38) Simon, H, Steele, D, Lewander, W, Linakis, J. 1994. Are pediatric emergency medicine training programs meeting their goals and objectives? A self-assessment of individuals completing fellowship training in 1993. *Pediatr Emerg Care*;10(4):208-212.

(39) Mirzazadeh, A & Afshari, A. 2005. Procedural skills training in the internal medicine residency in Iran: A national survey of recent graduates of residency programs. *J Med Educ*;7(1):6-11.

(40), Health Professions Council of South Africa. Medical and Dental Professions Board. 2005. Logbook for Internship Training, pp1-23.

(41) Burch, VC, Nash, RC, Zabow, T, Gibbs, T, Aubin, L, Jacobs, B & Hift, RJ. 2005. A structured assessment of newly qualified medical graduates. *Med Educ*;39(7):723-731.

(42) Davis, DA, Mazmanian, PE, Fordis, M, Van Harrison, R, Thorpe, KE & Perrier L. 2006. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA*;296(9):1094-1102.

(43) Morton, J, Anderson, L, Frame, F, Moyes, J & Cameron, H. 2006. Back to the future: teaching medical students clinical procedures. *Med Teach*;28(8):723-728.

(44) QR code.; Available: http://en.wikipedia.org/wiki/Qr_code, [Accessed 18/12/2012].

(45) Uitenbroek, DG. Bonferroni correction online. 1997; Available: http://www.quantitativeskills.com/sisa/calculations/bonfer.htm. [Accessed 30/8/2013].

(46) Manfreda, KL, Bosnjak, M, Berzelak, J, Haas, I & Vehovar, V. 2008. Web surveys versus other survey modes. *Int Market Res*;50(1):79-104.

(47) Sen Gupta, T, Murray, R, Hays, R & Woolley, T. 2013. James Cook university MBBS graduate intentions and intern destinations: a comparative study with other Queensland and Australian medical schools. *Rural Remote Health*;13(2):3013-2313.

(48) Koike, S, Kodama, T, Matsumoto, S, Ide, H, Yasunaga, H & Imamura, T. 2010. Residency hospital type and career paths in Japan: an analysis of physician registration cohorts. *Med Teach*;32(6):e239-47, DOI:10.3109/01421591003695311.

(49) UK Foundation Programme Office. 2013. editor. Rough guide to the academic foundation programme, 2nd ed, ed. by S. Carney. Available: http://www.foundationprogramme.nhs.uk. [Accessed 15/10/2013].

(50) Fitz, R. 1939. Concerning interns and internships. *Acad Med*;14(2):101-112.

(51) Decker, DL & Cohen, AS. 1981. Hospital postgraduate training: factors affecting prospective interns' ranking of a municipal hospital program in internal medicine. *Am J Med Sci*;281(3):122-129.

(52) Roth, AE. 1984. The evolution of the labor market for medical interns and residents: a case study in game theory. *J Polit Econ*;92(6):991-1016.

(53) Cherry, MG, Brown, JM, Neal, T & Ben Shaw, N. 2010. What features of educational interventions lead to competence in aseptic insertion and maintenance of CV catheters in acute care? *BEME Guide No. 15. Med Teach*;32(3):198-218.

(54) Liaw, SY, Scherpbier, A, Rethans, J & Klainin-Yobas, P. 2012. Assessment for simulation learning outcomes: a comparison of knowledge and self-reported confidence with observed clinical performance. *Nurse Educ Today*;32(6):e35-e39, DOI:10.1016/j.nedt.2011.10.006.

(55) Stengel, D, Bauwens, K, Rademacher, G, Ekkernkamp, A & Güthoff C. 2013. Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma. *Cochrane Database Syst Rev*;7:CD004446, DOI:10.1002/14651858.CD004446.pub3

(56) Abreu-Reis, P, Oliveira, GC, Curtarelli de Oliveira, A, Sadique, H, Nasr, A & Saavedra Tomasich, FD. 2012. Extra-curricular supervised training at an academic hospital: is 200 hours the threshold for medical students to perform well in an emergency room? *World J Emerg Surg*;7 Suppl 1:S12.

(57) Gerard O'Brien, G, Haughton, A & Flanagan, B. 2001. Interns' perceptions of performance and confidence in participating in and managing simulated and real cardiac arrest situations. *Med Teach*;24(4):389-395.

(58) Mathieu, JEM, Jennifer, W. 1993. Individual and situational influences on the development of self-efficacy: implications for training effectiveness. *Person Psychol*;46(1):125-147.

(59) Wei-Tao, T. 2006. Effects of training framing, general self-efficacy and training motivation on trainees' training effectiveness. *Personnel Review*;35(1):51-65.

(60) Martocchio, JJ. 1994. Effects of conceptions of ability on anxiety, self-efficacy, and learning in training. *J Appl Psychol*;79(6):819-825.

(61) Noe, RA. 1986. Trainees' attributes and attitudes: neglected influences on training effectiveness. *Acad Manage Rev*;11(4):736-749.

APPENDIX 1 Survey Tool / Questionnaire

Intern Confidence Survey

Dear Colleague,

I am Dr Mark Allen. I am researching the factors that influence the confidence of interns to perform some emergency procedures.

This survey should take no more than 5 minutes of your time.

This survey is being done to try and find out the level of confidence that you and your fellow interns have in their ability to perform certain emergency medical procedures and to try and find out whether your previous experience has played a role in your level of confidence.

The individual results of the survey will be kept confidential and only statistical data will be used when publishing information. The results of the survey will have no effect on your internship but may assist in curriculum planning for future students. Your valuable input may benefit future interns and your assistance will be greatly appreciated by me.

You may leave out any items that you do not wish to reveal, but please submit even incomplete surveys as even incomplete data may be of benefit to me.

Please do not submit the survey more than once as this will negatively influence my research.

If you have any queries, please contact me by email on mark.allen@wits.ac.za

This survey has received ethics clearance (number MI20479) from the Human Research Ethics Committee (Medical). If you want any information regarding your rights as a research participant, or complaints regarding this research study, you may contact Prof. Cleaton-Jones, Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC), which is an independent committee established to help protect the rights of research participants at (011) 717 2301.

Demographic Section

In this section I would like to find out a little about you while still allowing you to remain anonymous.
There are 6 questions in this first section.

How old are you?

◯	Younger than 20 years old
◯	20 to 29 years old
◯	30 to 39 years old
◯	40 to 49 years old
◯	50 years old or older

Are you male or female?

◯	Male
◯	Female

Which year of internship (housejob) are you in?

◯	1
◯	2

Which hospital (or hospital complex) are you currently working in?

◯	Othe / Not in this list	◯	Bongani Regional Hospital
◯	Charlotte Maxeke Academic Hospital	◯	Chris Hani Baragwanath Hospital
◯	DihIabeng(Betlelhem)Regional Hospital	◯	Dr.George Mukhari Hospital
◯	Durban Hospital Complex	◯	East London Hospital Complex
◯	Elim	◯	Far East Rand/Pholosong Complex
◯	Free State Hospital Complex	◯	George Hospital Complex
◯	Germiston,Tambo Memorial,Natalspruit Hospital Complex	◯	GF Jooste Trauma Complex
◯	Groote Schuur and Red Cross Complex	◯	Helderberg Hospital
◯	Helen Joseph/Rahima Moosa Mother and Child Complex	◯	Job Shimankana Tabane Provincial Hospital
◯	Kalafong Hospital	◯	Karl Bremer Hospital Complex
◯	Kimberley Hospital	◯	Klerksdorp/Tshepong Hospital Complex
◯	Ladysmith Provincial Hospital	◯	Kopanong/Sebokeng Complex
◯	Lebowa-Kgomo Hospital	◯	Leratong/Dr Yusuf Dadoo Hospital
◯	Letaba/Dr.CN Phatudi Hospital	◯	Madadeni/Newcastle Hospital Complex
◯	Mafikeng Provincial Hospital	◯	Manapo Mopedi/Elizabeth Ross Hospital Complex
◯	Mapulaneng Hospital	◯	McCord Hospital
◯	Mokopane Hospital	◯	Natalspruit Hospital
◯	New Somerset Hospital Complex	◯	Ngwelezana/Umphu Hospital
◯	Paarl Hospital Complex	◯	Pietermaritzburg Hospital Complex
◯	Pietersburg/Mankweng Hospital Complex	◯	Port Elizabeth Hospital Complex
◯	Port Shepstone.Murchison Complex	◯	Potchestroom Hospital
◯	Prince Mshiyeni Hospital	◯	RK Khan Hospital
◯	Rob Ferreira	◯	St Ritas Hospital
◯	Stanger Hospital	◯	Steve Biko Academic Hospital/Weskoppies/Tshwane DH
◯	Taung Hospital	◯	Tembisa Hospital
◯	Themba Hospital	◯	Tshilidzini Hospital
◯	Tygerberg Hospital Complex	◯	Uitenhage Provincial Hospital
◯	Umtata Hospital Complex	◯	Victoria Hospital Complex
◯	Warmbaths	◯	Windhoek/Katutura State Hospital
◯	Witbank Hospital	◯	Worcester Hospital Complex

Which medical school did you graduate from?

◯	University of Limpopo (MEDUNSA)
◯	University of Cape Town
◯	University of KwaZulu-Natal
◯	University of Pretoria
◯	University of Stellenbosch
◯	University of the Free State
◯	University of the Witwatersrand
◯	Walter Sisulu University
◯	Other medical School

If you have any queries, please contact me by email on mark.allen@wits.ac.za (70)

Questions about your experience

This section is about the procedures which you have actually seen and done and whether or not you were taught how to do these procedures at medical school.

Each line of the following question is trying to find out how many times (approximately) you performed or saw the procedure stated.

There are 26 questions in this middle section.

1) Regarding CPR (cardio pulmonary resuscitation) at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on an **adult** patient	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I saw this performed on a **neonatal** patient	◯	◯	◯	◯
I did this on an **adult** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on a **neonatal** patient under supervision	◯	◯	◯	◯
I did this on an **adult** patient without supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯
I did this on a **neonatal** patient without supervision	◯	◯	◯	◯

2) Regarding CPR (cardio pulmonary resuscitation) as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on an **adult** patient	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I saw this performed on a **neonatal** patient	◯	◯	◯	◯
I did this on an **adult** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on a **neonatal** patient under supervision	◯	◯	◯	◯
I did this on an **adult** patient without supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯
I did this on a **neonatal** patient without supervision	◯	◯	◯	◯

3) Regarding the use of a bag valve mask while at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on an **adult** patient	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I saw this performed on a **neonatal** patient	◯	◯	◯	◯
I did this on an **adult** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on a **neonatal** patient under supervision	◯	◯	◯	◯
I did this on an **adult** patient without supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯
I did this on a **neonatal** patient without supervision	◯	◯	◯	◯

If you have any queries, please contact me by email on mark.allen@wits.ac.za (72)

4) Regarding the use of a bag valve mask while as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on an **adult** patient	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I saw this performed on a **neonatal** patient	◯	◯	◯	◯
I did this on an **adult** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on a **neonatal** patient under supervision	◯	◯	◯	◯
I did this on an **adult** patient without supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯
I did this on a **neonatal** patient without supervision	◯	◯	◯	◯

5) Regarding the placement of a peripheral line (drip) at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on an **adult** patient	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I saw this performed on a **neonatal** patient	◯	◯	◯	◯
I did this on an **adult** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on an **adult** patient without supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯

If you have any queries, please contact me by email on mark.allen@wits.ac.za (73)

6) Regarding the placement of a peripheral line (drip) as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on an **adult** patient	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I saw this performed on a **neonatal** patient	◯	◯	◯	◯
I did this on an **adult** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on an **adult** patient without supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯

7) Regarding the placement of an intra-osseous line (drip) at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯

8) Regarding the placement of an intra-osseous line (drip) as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a **paediatric** patient	◯	◯	◯	◯
I did this on a **paediatric** patient under supervision	◯	◯	◯	◯
I did this on a **paediatric** patient without supervision	◯	◯	◯	◯

If you have any queries, please contact me by email on mark.allen@wits.ac.za (74)

9) Regarding the placement of an endotracheal tube at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

10) Regarding the placement of an endotracheal tube as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

11) Regarding the placement of an laryngeal mask airway at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

12) Regarding the placement of an laryngeal mask airway as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

If you have any queries, please contact me by email on mark.allen@wits.ac.za (75)

13) Regarding the placement of a central line at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

14) Regarding the placement of a central line as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

15) Regarding the placement of a thoracic drainage (chest) tube at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

16) Regarding the placement of a thoracic drainage (chest) tube as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

If you have any queries, please contact me by email on mark.allen@wits.ac.za (76)

17) Regarding the (electrical) defibrillation of an arrhythmia at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

18) Regarding the (electrical) defibrillation of an arrhythmia as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

19) Regarding the placement of a urinary catheter at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

20) Regarding the placement of a urinary catheter as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

If you have any queries, please contact me by email on mark.allen@wits.ac.za (77)

21) Regarding the performance of a diagnostic peritoneal lavage at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

22) Regarding the performance of a diagnostic peritoneal lavage as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

23) Regarding the performance of an abdominal ultrasound at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

24) Regarding the performance of an abdominal ultrasound as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

If you have any queries, please contact me by email on mark.allen@wits.ac.za (78)

25) Regarding the insertion of a nasogastric tube at medical school

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

26) Regarding the insertion of a nasogastric tube as an intern

	Never	1 to 5 times	5 to 10 times	More than 10 times
I attended a lecture	◯	◯	◯	◯
I attended a demonstration (on a **dummy**)	◯	◯	◯	◯
I saw this performed on a patient	◯	◯	◯	◯
I did this on a patient under supervision	◯	◯	◯	◯
I did this on a patient without supervision	◯	◯	◯	◯

Questions about your opinions

In this section, you are requested to say how confident you feel to perform the skills (procedures) listed. This is not about what you have done, but is about how you feel.

There are 2 questions in this final section

How comfortable are you to perform the following procedures on an **ADULT** patient?

	I am very comfortable with performing this procedure	I am somewhat comfortable performing this procedure and would prefer to do it with supervision	I am uncomfortable performing this procedure but would attempt it in an emergency	I would not attempt this procedure at present
Cardiopulmonary resuscitation (CPR)	◯	◯	◯	◯
Bag valve mask ventilation	◯	◯	◯	◯
Central line placement	◯	◯	◯	◯
Peripheral line placement	◯	◯	◯	◯
Endotracheal intubation	◯	◯	◯	◯
Placement of a laryngeal mask airway	◯	◯	◯	◯
Placement of thoracic drainage tube	◯	◯	◯	◯
Defibrillation of arrhythmias	◯	◯	◯	◯
Placement of a urinary catheter	◯	◯	◯	◯
Diagnostic peritoneal lavage	◯	◯	◯	◯
Abdominal ultrasound	◯	◯	◯	◯
Insertion of a nasogastric tube	◯	◯	◯	◯

How comfortable are you to perform the following procedures on a **PAEDIATRIC** patient?

	I am very comfortable with performing this procedure	I am somewhat comfortable performing this procedure and would prefer to do it with supervision	I am uncomfortable performing this procedure but would attempt it in an emergency	I would not attempt this procedure at present
Neonatal resuscitation (CPR)	◯	◯	◯	◯
Paediatric resuscitation (CPR)	◯	◯	◯	◯
Neonatal bag valve mask ventilation	◯	◯	◯	◯
Paediatric bag valve mask ventilation	◯	◯	◯	◯
Peripheral line placement	◯	◯	◯	◯
Intra-osseous infusion	◯	◯	◯	◯

Thank you for taking part in this survey. I really appreciate your contribution to my research.

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If you have any queries, please contact me by email on mark.allen@wits.ac.za (81)

APPENDIX 2 Human Research Ethics Committee clearance

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Mark Allen

CLEARANCE CERTIFICATE	**M120479**
PROJECT	An Analysis of the Practical Experience and Confidence in Performing Emergency Medical Skills in South African Medical Interns
INVESTIGATORS	Dr Mark Allen.
DEPARTMENT	Department of Family Medicine/Emergency Med
DATE CONSIDERED	04/05/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 13/08/2012 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr M Botha

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

APPENDIX 3 Approval document from Deputy Registrar : Academic (University of the Witwatersrand)

Deputy Registrar: Academic

Private Bag 3, Wits 2050, South Africa • Tel: +27 (0) 11 717-1204 • Fax: +27 (0) 86 553 3695 • E-mail: nita.lawton-misra@wits.ac.za

E-mail nita.lawton-misra@wits.ac.za
Fax 086 553 3695
Tel +27 (0)11 717-1204

10 August 2012

TO WHOM IT MAY CONCERN

"An Analysis of the Practical Experience and Confidence in Performing Emergency Medical Skills in South African Medical Interns"

It is hereby confirmed that the enclosed research material has been distributed in accordance with the University's approval procedures for such a project. Please be advised that it is your right to withdraw from participating in the process if you find the contents intrusive, too time-consuming, or inappropriate. The necessary ethical clearance has been obtained.

Should the University's internal mailing system be the mechanism whereby this questionnaire has been distributed, this notice serves as proof that permission to use it has been granted.

Students conducting surveys must seek permission in advance from Heads of Schools or individual academics concerned should surveys be conducted during teaching time.

Nlusra

Nita Lawton-Misra
Deputy Registrar: Academic

APPENDIX 4 Paper based survey introduction

Intern Confidence Survey

Dear Colleague,

I am Dr Mark Allen. I am researching the factors that influence the confidence of interns to perform some emergency procedures.

This survey should take no more than 5 minutes of your time.

This survey is being done to try and find out the level of confidence that you and your fellow interns have in their ability to perform certain emergency medical procedures and to try and find out whether your previous experience has played a role in your level of confidence.

The individual results of the survey will be kept confidential and only statistical data will be used when publishing information. The results of the survey will have no effect on your internship but may assist in curriculum planning for future students. Your valuable input may benefit future interns and your assistance will be greatly appreciated by me.

You may leave out any items that you do not wish to reveal, but please submit even incomplete surveys as even incomplete data may be of benefit to me.

Please do not submit the survey more than once as this will negatively influence my research.

If you have any queries, please contact me by email on mark.allen@wits.ac.za

This survey has received ethics clearance (number MI20479) from the Human Research Ethics Committee (Medical). If you want any information regarding your rights as a research participant, or complaints regarding this research study, you may contact Prof. Cleaton-Jones, Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC), which is an independent committee established to help protect the rights of research participants at (011) 717 2301.

APPENDIX 5 Electronic / online survey invitation

Dear Colleague,

My name is Mark Allen and I am registered as a student in the Division of Emergency Medicine of the Faculty of Health Sciences at the University of the Witwatersrand.

As part fulfilment for the degree of Master of Science in Medicine (Emergency Medicine), I am undertaking a research project to find out how confident you are to perform some emergency procedures and what might have influenced the development of your confidence.

I am doing this research by means of an online survey. The survey is completely anonymous. I would like some information about where you trained and where you are working now but you may leave out this information if you so wish. The results of the survey will not influence your current or future working environment but may play a role in the training of future interns.

By filling in the survey, you are granting consent for your answers to be included in the study and your answers are completely confidential.

The survey can be found at http://www.surveymonkey.com/s/Q2MTK77 , or can be accessed on your mobile by using the QR code below

If there are any queries that you wish answered, please do not hesitate to contact me at: mark.allen@wits.ac.za or 082-570-0635 for further clarification.

This survey has received ethics clearance (number MI20479) from the Human Research Ethics Committee (Medical). If you want any information regarding your rights as a research participant, or complaints regarding this research study, you may contact Prof. Cleaton-Jones, Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC), which is an independent committee established to help protect the rights of research participants at (011) 717 2301.

I would really like to thank you for taking the time to complete the survey and assist me in my research.

Sincerely,

Dr Mark Allen