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Medical students' clerkship experiences and self-perceived competence in clinical skills

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Abstract

Introduction—In a traditional curriculum, medical students are expected to acquire clinical competence through the apprenticeship model using the Halstedian “see one, do one, and teach one, approach”. The University of Zambia School of Medicine used a traditional curriculum model from 1966 until 2011 when a competence-based curriculum was implemented.

Objective—To explore medical students' clerkships experiences and self-perceived competence in clinical skills

Methods—A cross-sectional survey was conducted on 5th, 6th, and 7th year medical students of the University of Zambia, School of Medicine two months prior to final examinations. Students were asked to rate their clerkship experiences with respect to specific skills on a scale of 1 to 4 and their level of self-perceived competence on a scale of 1 to 3. Skills evaluated were in four main domains: history taking and communication, physical examination, procedural, and professionalism, team work and medical decision making. Using Statistical Package for Social Scientist (SPSS), correlations were performed between experiences and self-perceived competence on specific skills, within domains and overall.

Results—Out of 197 clinical students 138 (70%) participated in the survey. The results showed significant increase in the proportion of students performing different skills and reporting feeling

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ETHICAL CONSIDERATION

The survey was conducted as part of monitoring and evaluation activities under the school, therefore an ethical waiver was obtained from the University of Zambia School of Medicine Biomedical Research Ethics Committee. Waiver reference number is 017.01.14.

CONFLICT OF INTEREST

Authors declare no conflict of interests.

very competent with each additional clinical year. Overall correlations between experience and self-perceived competence were moderate (0.55). On individual skills, the highest correlation between experience and self-perceived competence were observed on mainly medical and surgical related procedural skills with the highest at 0.82 for nasal gastric tube insertion and 0.76 for endotracheal intubation.

Conclusion—Despite the general improvement in skills experiences and self-perceived competence, some deficiencies were noted as significant numbers of final year students had never attempted common important procedures especially those performed in emergency situations. Deficiencies in certain skills may call for incorporation of teaching/learning methods that broaden students' exposure to such skills.

Keywords

Clerkship experiences; self-perceived competence; medical students

INTRODUCTION

The ultimate goal of medical education is to prepare students to become clinically competent doctors^{1, 2}. Clinical competence has been defined as “habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of individuals and community being served”³. In a traditional curriculum, medical students are expected to acquire clinical competence through the apprenticeship model using the Halstedian “see one, do one, teach one” approach⁴ as they rotate through clinical clerkships of medical and surgical disciplines. In a competence-based curriculum, essential competencies are identified and learning activities and strategies developed to facilitate attainment of those competencies⁵.

From 1966 to 2011, the University of Zambia School of Medicine (UNZA-SOM) used a traditional curriculum model. In 2011 the School implemented a competence-based curriculum. Implementation of the competence-based curriculum followed the School's self-evaluation against the World Federation of Medical Education International Basic Medical Education Standards (WFME --IBMES)⁶. This shift from traditional medical education model to competence-based education also reflects a global paradigm shift towards competence-based education^{3, 7}. Despite the shift from traditional to competence-based curricula, it was not known how undergraduate medical students of the University of Zambia progressed in clinical skills acquisition through the different clinical years as the matter had not been investigated.

In the literature, it is contentious whether or not students are actually competent in essential skills by the time of graduation as discrepancies have been observed in terms of skills students are expected to learn in a particular clerkship compared to what they actually learn⁸. For example, Colberly and Goldenhar⁸ indicated that out of the six recommended basic procedures; arterial puncture, insertion of NG tube, phlebotomy, IV catheter insertion, lumbar puncture and Foley catheter insertion), the vast majority of Fourth-Year Students reported not performing four (phlebotomy, IV catheter insertion, lumbar puncture and Foley catheter insertion) during their acting intern rotation at Cincinnati University-United States

of America (USA). These discrepancies between what students are expected to learn and what they learn have resulted in a lack of competency in certain clinical skills with a resultant negative impact on patients, medical students, junior doctors and the medical profession^{7, 9}. In this regard, Lai Sivalingam and Ramesh⁷ have suggested that it is important for medical schools to examine the progress in clinical competence of medical students near the point of exit as this provides good indication both of their ability as housemen and in the effectiveness of the curriculum. In addition, exploring the relationship between students' exposure to, and confidence on a range of practical skills might review specific strengths and deficiencies in their acquisition of these skills, and the identification of these relationships could help improve the effectiveness of the curriculum⁷. The aim of this survey was therefore to explore students' clerkship experiences and self-perceived competence in clinical skills prior to the implementation of the competence-based curriculum, and the introduction of simulation methodology into the curriculum at the University of Zambia, Medical School.

METHODS

Population description

UNZA's medical program is 7 years in duration resulting in a Bachelor's Degree in Medicine and a Bachelor's in General Surgery (MBChB). The first 2 years are pre-medical, followed by 2 years of basic biomedical sciences and 3 years of clinical medicine. In the 5th year which is the first clinical year, students have their first set of clerkships in Internal Medicine, General Surgery, Obstetrics and Gynaecology as well as Paediatrics and Child health. In the second clinical year, clerkships are in Psychiatry, Ophthalmology, Community Medicine, Dermatology, Orthopaedics, Ear, Nose and Throat and Maxillofacial and Radiology. In the 7th and final year students have their final set of clerkships to consolidate their skills in Internal Medicine, and General Surgery, Obstetrics and Gynecology, and Paediatrics.

Design & Sampling procedures

The data stem from a medical student based survey conducted in February 2012. A survey questionnaire was distributed to students two months prior to completion of 5th, 6th and 7th year, which are the clinical years of the undergraduate medical education programme at the University of Zambia, School of Medicine. Using a sampling frame that consisted of 5th (N=73), 6th (N=64), and 7th (N=60) year medical students, a convenient sample of all consenting clinical medical students completed the survey.

Instrument

A questionnaire was administered to all eligible and willing clinical medical students which obtained information on socio-demographic data, students' year of study and clinical clerkships that the student had completed. In addition, students were asked to rate their clerkship experiences with respect to specific clinical and procedural skills on a scale of 1 to 4 as follows: i) never taught and never performed, ii) taught but never performed, iii) performed once, iv) performed two or more times.

Furthermore, the students were asked to rate their level of confidence (self-perceived competence) in performing the skills using the Likert Scale where 1=Not confident, 2=fairly confident, 3= very confident. The skills evaluated were in the following domains: history taking and communication skills, physical examination, procedural skills in Medical, Surgical, Obstetrics and Gynaecology, Paediatrics and Psychiatry. Other areas evaluated included professionalism, team work, medical decision making, and decision on appropriate drug/other therapies. The major clinical skills and procedures of focus were based on study conducted in 2004 at the University Teaching Hospital, Lusaka, which identified and listed a number of commonly encountered procedures¹⁰. The top 10 were; intravenous cannula insertion, urethral catheterization, examination of placenta, nasogastric intubation/lavage, abdominal/ascetic tap, lumbar puncture and vaginal examination. Others were ear, nose and throat examination, per rectal examination and venous cut down. It is expected that by the end of the undergraduate training, at least every student should have attempted these commonly performed procedures.

Prior to the administration of the survey questionnaire, four clinical experts representing the Departments of Internal Medicine, Surgery, Paediatrics, and Obstetrics and Gynaecology reviewed the list of clinical skills. The clinical experts are academic staff of the university and are all involved in the clinical teaching of medical students. They identified other practical procedural skills and clinical skills, in addition to those described by Banda¹⁰. Therefore, the final list was based on consensus among the four experts. Validity of the survey questionnaire was determined by the four clinical experts who considered and adjusted both the content and structure as indicated above. To test for internal consistency, reliability analysis test was performed for all test items using SPSS and Cronbach's alpha was 0.956.

Analysis

Data was analysed using the Statistical Package for Social Sciences (SPSS) for windows version 11.0 (SPSS Inc. Chicago, Illinois). Descriptive statistics and multivariate analysis were done and complex sample design used to take into consideration the design effect (year of study taken as primary cluster). Percentages were calculated for clerkship experiences and level of confidence for each skill across different clinical years. For tables 1 and 2, Likert scales were collapsed to create dichotomous variables as follows: (A) Performed a skill more than once versus never or only once and (B) Very confident versus all other responses. Chi-square or Fisher's exact tests were applied to determine significance of associations between (i) clerkship experience (number of times a skill was performed) and year of training (Table 1A and 2A) and (ii) level of confidence and year of training (Table 1B and 2B). These p values tested for significant differences across the 3 grade years but did not compare any 2 years directly. Unless identified with Letter (F), P values are based on chi square.

For Table 3, "Never taught, never performed" and "Taught, never performed" were collapsed into one exposure category "Never performed". Correlation coefficients and Spearman's test were used to correlate level of exposure (3-point Likert scale) vs. confidence (3-point Likert scale) for all final (7th) year students on a selected number of procedural skills (Table 3).

The level of significance was set at 0.05 for all items, therefore all associations for which the P-value was smaller than 0.05 were considered significant.

In addition, overall correlation between experience and confidence using Spearman rho was computed for all skills, and within each domain. Furthermore, correlations between experience and level confidence/self-perceived competence were computed for selected procedural skills for the final (7th) year students. Using previous literature we determined that self-reported competence will be high if 70% or more students reported being very competent in that skill, moderate if 50 to 69% and low if below 50%¹¹. Similarly exposure to a skill is high if 70% or more students reported having practiced two or more times, moderate if 50 to 69% and low if below 50%. Correlations' between experience and confidence were assessed using Spearman's rho Correlation Coefficient.

RESULTS

Participation and distribution

Out of 197 clinical students 138 participated in the survey, giving a response rate of 70%. The highest response rate was among the 7th year where out of 60 students, 53 participated in the study giving a response rate of 88%. The high response rate among the 7th years can possibly be attributed to the 7th year students being in their final year of undergraduate training thus being more interested in evaluating their experiences and confidence in clinical skills compared to other classes. The lowest response rate was among sixth year students where out of 64, 34 participated giving a response rate of 53%. For 5th year students 53 participated out of 73 giving a response rate of 70%.

Regarding clerkship placement, all 5th year students had their first set of clerkships in Internal Medicine, General Surgery, Obstetrics and Gynaecology and Paediatrics and Child Health as defined by the curriculum. In addition to the first set of clerkships, all finalist students reported having had their third and final clerkships in Internal Medicine and General Surgery and second and final clerkships in Obstetrics and Gynaecology and Paediatrics and Child Health. Students' self-reported experience and confidence with selected physical examination skills are shown in Table 1.

For basic examination skills, such as cardiac auscultation for S1, S2, respiratory auscultation, and abdominal examination, there were high levels of exposure across all years of training, with 90-100% reporting performing the skill at least 2 times. The proportion of students who had identified S3 and S4, diastolic murmurs, pericardial rub and breast nodules 2 or more times increased with each additional year of training. As expected, for all skills the proportion of students feeling very confident with the various skills was highest among 7th year students.

It is however worth noting that for a number of skills—identifying S1, S2, and systolic murmurs, tactile fremitus, and general abdominal examination—6th year students demonstrated less confidence than 5th year students. Greater than 80% of 7th year students nearing graduation, reported feeling very confident with auscultation of S1, S2, tactile fremitus, pulmonary auscultation, abdominal examination, and examination of the breast to

detect nodules. On the other hand, less than 30% reported feeling very confident with auscultation for S3, S4, diastolic murmurs, or pericardial friction rubs.

Among the 12 listed procedural skills, venipuncture and cannulation had the highest proportion of exposure (>90% performed at least 2 times) followed by vaginal delivery, where (> 85% performed at least 2 times) (Table 2). For most procedural skills, there was an increase in the experiences of students with each additional clinical year and a corresponding increase in the proportion reporting feeling very confident. Between 6th and 7th years, increasing proportions of students had performed on multiple occasions the following procedures: bladder catheterization (52.9 to 90.6%), abdominal paracentesis (35.3 to 75.5%), nasogastric intubation (2.9 to 54.7%), and suturing (17.6 to 45.3%), with very similar increases in confidence levels. Other skills, such as vaginal delivery, lumbar puncture, and CPR, showed a gradual progression of experience from 5th to 6th to 7th year.

The highest level of confidence was in conducting vaginal deliveries, where 98.1% of 7th year students felt very confident. However, less than one third of final year students were very confident in five out of the 12 listed common procedural skills, the lowest being in use of a defibrillator (0%), followed by Advanced Cardiac Life Support (9.4%), endotracheal intubation (15.1%), Cardiopulmonary resuscitation (20.8%), and suturing (28.3%).

Table 3 shows the detailed breakdown of exposure to different procedural skills; never taught, taught but never performed, performed once or performed two or more times for final year students (7th year). In addition, table 3 shows the correlations between the number of times different procedural skills were performed and the level of self-perceived competence among 7th year medical students. The lowest correlation was with vein puncture and cannulation at 0.058 and the highest with nasogastric tube insertion at 0.82.

In addition the correlations presented in table 3, overall correlation between experience and confidence for all skills across different clinical years was 0.55. Within domains the correlation ranged from 0.15 for professionalism, teamwork and medical decision domain to 0.53 for medical and surgical related procedural skills. Correlations in other domains were; mental state examination 0.21, history and communication skills 0.34, physical examination skills 0.47, and Obstetrics and Gynaecology related skills 0.52. additional data revealed a general improvement in self-confidence in professionalism, team work and medical decision making with each additional clinical year. However less than half (42.3%) of the final year students reported to be very confident in making decisions on appropriate drugs/other therapies.

It is worth noting that a significant proportion of final year students had never performed a number of common procedural skills, including suturing (20%), cardiopulmonary resuscitation (22%), endotracheal intubation (39%), performing advanced Cardiac Life Support (75.0%) or using a defibrillator (94%).

DISCUSSION

There were substantial and significant increase in the levels of confidence and proportion of students performing different skills with each additional clinical year especially for

procedural skills. Among the 12 listed procedural skills, vaginal deliveries and vein puncture and cannulation were the most performed (table 2). Similarly a large proportion of students across clinical years felt very confident in conducting vaginal deliveries and vein puncture and cannulation. From this survey, it was gratifying that by the end of the first year of clinical clerkship (5th year), all those surveyed reported to have performed more than once an intravenous cannula insertion which is the first on the top 10 encountered procedures at the University Teaching Hospital. Similarly, among the final year students, all had performed the procedure at least once.

Proportions reported in this survey for intravenous cannula insertion are higher than those from previous studies; for example an audit of clinical skills conducted among final year medical students in Nigeria at University of Port Harcourt reported that a small percentage 4.8% of finalist students had never inserted an intravenous cannula¹². In the United States, Colberly and Goldenhar⁸ reported that vast majority of Fourth-Year Students reported not performing intravenous cannula catheter insertion during their acting intern rotation at Cincinnati University -United States of America.

While majority of final year students had performed two or more times procedures like vein puncture and cannulation, bladder catheterization, normal vaginal deliveries, and examination of the new born, the survey showed that a good proportion had never performed some common procedural skills; cardiopulmonary resuscitation, advanced cardiac life support ,nasogastric tube insertion, endotracheal intubation and suturing. This may be a curriculum implementation gap which needs to be addressed. In addition and of further concern, a large proportion of final year students had never used a defibrillator. These findings should concern educators of undergraduate medical students and prompt them to find ways of firstly establishing a functioning skills monitoring system and secondly finding ways of addressing the gaps whilst training is going on. Other studies have also reported a number of either final year medical students or newly graduated doctors not attempting common procedural skills such as Basic Life Support (BLS), nasogastric tube insertion, simple wound suturing, lumbar puncture (LP), endotracheal intubation and thoracentesis^{8, 12}.

It is worth noting that majority of the skills that students never attempted are performed in emergency situations in which trial and error by students is not acceptable due to its negative implications on patient outcomes. To improve on the skills experience of undergraduate medical students, Goldacre and colleagues¹³suggested the use of log books and skills laboratories. Skills laboratories allow students to learn clinical skills in a safe, standardized and controlled environment that encourages trial and error with the ability to rewind, rehearse and practice without negative patient outcomes thus expanding on students' hand-on experiences^{14, 15}. A recommendation would be to incorporate simulation methodology as an integral part of clinical years' medical education to allow students practice such skills on simulators. Training in skills laboratories enables students to attain a specified level of confidence prior to practice on actual patients^{14, 15}.

Correlation between experience and confidence in procedural skills among final year students was high in nasogastric tube insertion followed by endotracheal intubation, suturing

and bladder catheterization (Table 3). However, overall correlation for all skills across clinical years was moderate. Within domains, there were also moderate correlations for medical and surgical related procedural skills, and Obstetrics and Gynaecology related skills. On the other hand, low correlations were observed for history and communication skills, and physical examination. These findings suggest that increasing the students' experiences may not necessarily result in a corresponding increase in self-confidence, a similar observation made by Lai, Sivalingam and Ramesh⁷.

On the other hand, high correlations between experience and confidence were observed among procedural skills implying that increasing the number of times a student performs a procedure may result in improved self-confidence. There is literature that supports repetitive practice in building confidence among medical residents in certain procedural skills. For certain skills such lumbar puncture, Internal Medicine residents reported needing 6-10 LP experiences to reach a "comfortable threshold" defined as the number of procedures at which two thirds of the house staff reported being comfortable or very comfortable performing¹⁶. Other factors that have been suggested to facilitated development of self-confidence include direct supervision and feedback and deliberate practice^{2,7}.

LIMITATIONS OF THE STUDY

One limitation of this study was that self-reports of competence were used as opposed to objectively measure competence. It is generally accepted that competency may be better assessed using Objective Structure Clinical Examination (OSCE) as self-reports are more subjective. Medical students have also been shown to both overestimate and underestimate their clinical performance¹⁷. As suggested by Eva and Regehr¹⁸, the fundamental cognitive limitation in the ability of humans to know themselves as others see them restricts the usefulness of self-assessment results. In addition, in assessing their level of experience, students were only asked whether they had performed a given skill up to 2 or more times upon which they were requested to determine their confidence. The number of times students were requested to rate themselves could have been expanded to determine if the level of confidence would continue to increase or if there is a threshold after which further increase may not result in any further improvement in confidence. Thus, the minimum level of exposure to ensure confidence could not be determined. Notwithstanding the above limitations, this comprehensive survey has marked out the progression of students with regard to clinical skills experiences and confidence across the three years of clinical medical education as a basis for future comparison.

CONCLUSION

In this article, we have reported on the levels of confidence of medical students performing different skills with a demonstrated increase in confidence with each additional clinical year especially for procedural skills. However, despite this general progress, some deficiencies were noted in that a significant number of final year students had never attempted common important procedures including Basic Life Support, nasogastric tube insertion, suturing, endotracheal intubation and use of a defibrillator, findings that should arouse concern. Worthy noting however is that the majority of the skills that students never attempted are

performed in emergency situations in which trial and error by students is not accepted due to its negative implications on patient outcomes.

We therefore recommend the incorporation of simulation methodology as an integral part of clinical years medical education to allow students practice life-saving skills on simulators and task trainers in order to improve their confidence and motivation to try such on actual patients with minimal errors. Simulation based medical education must therefore be looked at as an important and critical interventional strategy for improved health outcomes. This further calls for appropriate and focused investments in training if this is to be realised.

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Table 1

Medical Students' clerkship experience (number of times a clinical skill was performed) and self-perceived competence on physical examination skills, by year of medical school at the University of Zambia, School of Medicine (2012)

Physical Examination skills	(A) Percentage reporting performing 2 times				(B) Percentage reporting feeling very confident			
	5 th year n = 51	6 th year n =34	7 th year n =53	P value	5 th year n=51	6 th year n =34	7 th year n =53	P value
Cardiovascular examination and identifying/detecting:								
S1, S2	51 (100)	32 (94.1)	53 (100)	0.059 (F)	36 (70.6)	19 (55.9)	44 (83.0)	0.023
S3 ,S4	25 (49.0)	18 (52.9)	39 (73.6)	0.026	4 (7.8)	4 (11.8)	15 (28.3)	0.013
Diastolic murmur	23 (45.1)	18 (52.9)	37 (69.8)	0.035	8 (15.6)	2 (5.9)	14 (26.4)	0.044
Systolic murmurs	43 (84.3)	27 (79.4)	49 (92.5)	0.200	22 (43.1)	10 (29.4)	38 (71.7)	<0.001
Pericardial rub	13 (25.5)	15 (44.1)	32 (60.4)	0.002	8(15.7)	7 (20.6)	20 (27.7)	0.027
Respiratory examination and performing:								
Tactile -fremitus	48 (94.1)	31 (91.2)	48 (90.6)	0.782	36 (70.6)	21 (61.8)	44 (83.0)	0.080
Auscultation to detect (crackles, rhonchi, consolidation)	50 (98.0)	31 (91.2)	53 (100)	0.062 (F)	34 (66.7)	22 (64.7)	46 (86.8)	0.024
General Abdominal examination	51 (100)	33 (97.1)	53 (100)	0.246 (F)	47 (92.2)	25 (73.5)	51 (96.2)	0.003
Breast examination to detect nodules	40 (78.4)	29 (85.3)	51 (96.2)	0.025	27 (52.3)	18 (52.9)	46 (86.8)	<0.001

Note: Unless identified with Letter (F), p values are based on chi squared test of (A) association between year of training and performing a skill 2 times, and (B) association between year of training and feeling very confident.

(F) indicates that Fisher's exact test was used to calculate p value.

Table 2

Medical Students' clerkship experience (number of times a procedure was performed) and self-perceived competence on 12 common clinical practical procedures, by year of medical school at the University of Zambia, School of Medicine (2012)

Clinical practical procedure	(A) reporting performing skill 2				(B) Percentage reporting feeling very confident			
	5 th year n = 51	6 th year n = 34	7 th year n = 53	P value	5 th year n = 51	6 th year n = 34	7 th year n = 53	P value
Vaginal delivery	45 (88.2)	34 (100)	53 (100)	0.005	33 (64.7)	25 (73.5)	52 (98.1)	<0.001
Vein puncture and cannulation	51 (100)	32 (94.1)	51 (96.2)	0.236 (F)	47 (92.2)	24 (70.6)	48 (90.6)	0.009
Bladder catheterization	23 (45.1)	18 (52.9)	48 (90.6)	<0.001	21 (41.2)	12 (35.3)	43 (81.1)	<0.001
Examining the new-born	33 (64.7)	33 (97.1)	48 (90.6)	<0.001	21 (41.2)	18 (52.9)	32 (60.4)	0.144
Abdominal paracentesis	12 (23.7)	12 (35.3)	40 (75.5)	<0.001	11 (21.6)	11 (32.4)	34 (64.2)	<0.001
Nasogastric tube insertion	6 (11.8)	1 (2.9)	29 (54.7)	<0.001	3 (5.9)	1 (2.9)	23 (43.4)	<0.001
Lumbar puncture	2 (3.9)	7 (20.6)	28 (52.8)	<0.001	2 (3.9)	7 (20.6)	21 (39.6)	<0.001
Suturing	3 (5.9)	6 (17.6)	24 (45.3)	<0.001	2 (3.9)	4 (11.8)	15 (28.3)	0.002
CPR	7 (13.7)	5 (14.7)	18 (34.0)	0.023	2 (3.9)	5 (14.7)	11 (20.8)	0.037
Endotracheal intubation	0 (0)	2 (5.9)	12 (22.6)	<0.001	1 (2.0)	3 (8.8)	8 (15.1)	0.059
ACLS	1 (2.0)	0 (0.0)	7 (13.2)	0.012	0 (0)	0 (0)	5 (9.4)	0.027 (F)
Use of a defibrillator	0 (0)	0 (0)	1 (1.9)	1.0 (F)	0 (0)	0 (0)	0 (0)	--

Note 1: Unless identified with letter (F), p values are based on chi squared test of (A) association between year of training and performing a procedure 2 times, and (B) association between year of training and feeling very confident with procedure.

Note 2: (F) indicates that Fisher's exact test was used to calculate p value.

Note 3. CPR = Cardiopulmonary Resuscitation, ACLS= Advanced Cardiac Life Support

Table 3

Correlation of number of times performing selected procedures and level of confidence among finalist (7th year) students at the University of Zambia, School of Medicine

Practical skill	Confidence level	Never performed	Performed once	Performed 2 times	Correlation (rho)	p-value
Nasogastric tube insertion n=51	Not confident	8 (100)	2 (14.3)	0	0.818	<0.001*
	Fairly confident	0	11 (78.6)	7 (24.1)		
	Very confident	0	1 (7.1)	22 (75.9)		
Endotracheal intubation n=49	Not confident	15 (79.0)	2 (11.1)	0	0.757	<0.001*
	Fairly confident	4 (21.0)	14 (77.8)	6 (50.0)		
	Very confident	0	2 (11.1)	6 (50.0)		
Suturing n=51	Not confident	8 (80.0)	4 (23.5)	0 (0)	0.742	<0.001*
	Fairly confident	2 (20.0)	12 (70.6)	10 (41.7)		
	Very confident		1 (5.9)	14 (58.3)		
Bladder catheterization n=52	Not confident	1 (100)	1 (25.0)	1 (2.1)	0.721	<0.001*
	Fairly confident	0	3 (75.0)	3 (6.4)		
	Very confident	0	0	43 (91.5)		
Lumbar puncture n=49	Not confident	2 (40.0)	5 (29.4)	0	0.637	<0.001*
	Fairly confident	2 (40.0)	11 (64.7)	8 (29.6)		
	Very confident	1 (20.0)	1 (5.9)	19 (70.4)		
Cardiopulmonary Resuscitation n=51	Not confident	5 (45.5)	5 (22.7)	0	0.578	<0.001*
	Fairly confident	6 (54.5)	15 (68.2)	9 (50.0)		
	Very confident	0	2 (9.1)	9 (50.0)		
Advanced Cardiac Life Support n=48	Not confident	23 (63.9)	1 (20.0)	1 (14.3)	0.542	<0.001*
	Fairly confident	13 (36.1)	4 (80.0)	1 (14.3)		
	Very confident	0	0	5 (71.4)		
Examining the new-born n=53	Not confident	0	1 (20.0)	1 (2.1)	0.421	0.002*
	Fairly confident	0	4 (80.0)	15 (31.3)		
	Very confident	0	0	32 (66.7)		
Abdominal paracentesis n=52	Not confident	2 (66.7)	0	1 (2.6)	0.357	0.009*
	Fairly confident	0	6 (60.0)	9 (23.1)		
	Very confident	1 (33.3)	4 (40.0)	29 (74.4)		
Use of a defibrillator n=49	Not confident	39 (84.8)	1 (50.0)	1 (100.0)	0.113	0.440
	Fairly confident	7 (15.2)	1 (50.0)	0		
	Very confident	0	0	0		
Vein puncture and cannulation n=52	Not confident	0	0	0	0.058	0.684
	Fairly confident	0	0	4 (8.0)		
	Very confident	0	2 (100)	46 (92.0)		

() indicates column percentage for particular skill.

Correlation coefficients and p values are based on Spearman's test of correlation for level of exposure (3-point Likert scale) vs. confidence (3 point Likert scale)