UiT The Arctic University of Norway

Faculty of Health Sciences

Medical school and self-reported practical skills: How do the UiT medical students acquire practical competence in emergency medicine skills?

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Preface

As part of the Student Research Program at the University of Tromsø, I was already involved with the Anesthesia and Critical Care Research Group when it was time to write my master's thesis. It was important for me to choose a topic that interested me in order to keep myself motivated throughout the writing period. After several meetings and discussions with my main supervisor Knut Fredriksen, we landed on a topic that motivated us both by combining to subjects I felt excited for – emergency medicine and practical skills.

During my years at the Faculty of Health sciences, I have overheard and been part of several discussions with my peers regarding the lack of practical and procedural training that we receive during our medical education. I myself believe that this is a valid concern, and thus it made for an interesting topic of investigation. Is there any truth to these concerns?

I would like to thank Tom Wilsgaard for being of great assistance regarding the statistical workouts for this project. I would also like to thank Knut Fredriksen and Frode Sørensen – my main and assistant supervisors – as well as the rest of my coworkers at the research group for engaging discussions, constructive criticism and feedback, as well as brainstorming with me along the way.

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Abstract

Aims: To investigate how extracurricular healthcare-related (ECHR) work experience influenced University of Tromsø – The Arctic University of Norway's medical students' and graduates' achieved level of practical training and their self-perceived confidence in selected practical skills believed to be important for emergency medicine.

Materials and methods: Medical students and graduates answered a Likert-based questionnaire probing their amount of training within selected skills relevant for emergency medicine, as well as their self-perceived confidence with these skills. Work experience and other potential confounding factors were recorded as well. Cronbach's alpha was calculated to test internal consistency. Descriptive statistics were conducted for data visualization, and analysis of covariance and linear mixed models were applied to adjust for confounder effects.

Results: 70% of all invited participants answered the questionnaire, of which 81% had ECHR work experience. High Cronbach's alpha was achieved for questions probing each of the two main outcomes (.927 and .919, respectively). A positive correlation between training amount and confidence level for all respondents was found, and participants with work experience scored significantly higher for both outcomes. Year of study and participation in Tromsø Acute Medicine Students' Association (TAMS) affected the outcomes significantly more than the other confounders. Work experience accounted for 6.7% and 3.6% of the total variance in the two outcome variables respectively, adjusted for the potential confounders. Estimated marginal means showed that respondents with work experience yielded significantly higher scores than non-workers for both outcomes.

Conclusion: Students and graduates with extracurricular healthcare-related work experience had more training and more self-perceived confidence in performing basic skills relevant for emergency medicine, compared to students without such experience. However, other factors such as year of study, previous education, military medic-training as well as TAMS participation had significant impact on how students scored themselves on amount of training and self-perceived confidence level.

Keywords: Medical education, practical skills, emergency medicine, healthcare-related work experience

Abbreviations and definitions

AAMC	Association of American Medical Colleges
ANCOVA	Analysis of covariance
Composite score	Combined score of several Likert items measuring the same outcome
ECHR work	Extracurricular healthcare-related work
Likert item	A single question in the questionnaire
MSOP	Medical School Objectives Project
OSCE	Objective structured clinical examination
TAMS	Tromsø Acute Medicine Students' Association (the university students' association for emergency medicine)
UiT	University of Tromsø – The Arctic University of Norway
UNN	University Hospital of North Norway

1 Introduction

1.1 Background

The primary objective of medical school is to prepare the students for residency. Thus, teaching and maintaining practical skills required for the practicing physician is an important part of the training. According to a report by Faustinella et al. from 2018, practical skills in recently graduated doctors have deteriorated substantially during the last decades (1). The Association of American Medical Colleges (AAMC) responded to these concerns by establishing the Medical School Objectives Project (MSOP) in 1996. The MSOP objective was to develop a consensus-based list of key procedures that all graduating medical students should be able to perform independently (2). Unfortunately, results from subsequent studies suggest that the goal of achieving undergraduate proficiency for these skills still remains unmet (3-5). More worrying, students' performance level with basic practical skills seems to be below stakeholders' expectations (6-9), and students themselves report a discrepancy between desired and actual competence they have with selected skills (3). Practical skills related to emergency medicine are no exception; several studies report inadequate first aid and basic life support skills in students across several different medical institutes and countries (6, 10-13). This is unfortunate, as such skills should be part of every practicing physician's repertoire. Practical skill level among Norwegian medical students was investigated as well in the 80's and 90's by Hunskår et al. and Falck et al. They found inadequate self-perceived skill level in several practical procedures for both medical students and graduates, suggesting low quality of practical training in Norwegian universities at that time. They did however find significantly increased practical skill level between graduates at the beginning and at the end of their rotational training, arguing that postgraduate training might be equally important as undergraduate training for practical skills development (14-17).

The medical training program varies between schools and countries, but all students should be sufficiently prepared for medical practice after graduation. This includes the necessary practical skills. At the medical school at the University of Tromsø - the Arctic University of Norway (UiT), the acquisition of practical skills, including procedural skills, takes place during all six years in various degree. Many students at UiT School of Medicine have extracurricular healthcare-related (ECHR) work alongside their studies. The motivation for this is both economical and to acquire additional practical clinical experience, which is

important when applying for postgraduate jobs. However, another obvious result of having such work is the exposure to clinical procedures. ECHR work may therefore influence how and when practical skills are acquired. In addition to practical work as an arena for learning, some students have started or even finished other healthcare studies prior to medical school, and others again have gone through military medic-training when serving with the Norwegian Armed Forces Medical Corps. In addition, a popular campus-based student organization for emergency medicine – Tromsø Acute Medicine Students' Association (TAMS) – provides lectures, skills training and teaching activities related to emergency medicine. All these arenas may provide extracurricular opportunities for acquiring practical skills.

We aimed to investigate how ECHR work experience influenced the UiT medical students' achieved level of practical training and their self-perceived confidence in selected practical skills believed to be important for emergency medicine. We also studied how the year of study, previous education, previous military medic-training and participation with the TAMS influenced the same outcomes. The null hypothesis was no reported difference in practical skill level and confidence between those with ECHR work experience, and those without. The alternative hypothesis was that students and graduates with such experience have a higher practical skill level than those who do not have this kind of experience.

1.2 Limiting the project

Only students and graduates from the UiT medical school were included in the study, in order to make the project feasible. Although it could have been desirable to include more institutions, the differences in study programs would have disturbed the interpretation of results, as different medical schools teach practical skills differently and at different times during the programs.

In addition, we chose to use self-reported experience and confidence, as neither practical procedure counts nor skills performance quality is recorded, and practical skills testing to objectively rate skills quality would have been outside the time limitations of this project.

2 Materials and methods

2.1 Study participants and setting

The study population was all medical students enrolled at UiT from year 2013 to year 2019. This included students who graduated in 2019. The UiT School of Medicine is a six-year program. The first year covers basic sciences, while the second to fourth years gradually incorporate integrated preclinical and clinical teaching. The fifth year comprise almost seven months of clinical clerkship, while the sixth year is dedicated to the final clinical teaching necessary to qualify for a medical degree. Emergency medicine is being taught in the first year (one week, first aid including basic life support), fourth year (four weeks emergency medicine, together with anesthesia and critical care), and a four-week module during the sixth year. Furthermore, TAMS provides students from all study years an opportunity to learn and maintain practical emergency medicine skills.

Central practical skills and procedures for medical schools were defined several years ago by a national working group, and the medical programs in Norway have used this consensus list of procedures to define compulsory components of the training. However, to our knowledge, there does not exist any formal quality control of skills performance, except for a limited objective structured clinical examination (OSCE) during year three, as well as practical exams in selected topics at the end of the final year. A complete collection of listed procedures and practical skills, and when they are expected to be acquired is not known to the students.

2.2 Questionnaire

A new questionnaire was designed, with questions probing the amount of training the students and graduates had within selected skills relevant for emergency medicine, as well as their self-perceived confidence with these skills (Appendix A and B). The questions were designed as 5-point Likert items. Year of study, amount of ECHR work, previous healthcare-related education, previous military medic-training from the Norwegian Armed Forces Medical Corps and TAMS participation were recorded as well.

Most questionnaires were handed out in paper in between lectures. In order to increase response rate, the respondents were invited to participate in a lottery with modest prizes by

including their email on a separate piece of paper when they handed in the questionnaire. Participation was voluntary, and measures were taken to ensure anonymity. Most students answered the questionnaire at time of hand out; however, a few students handed it in at a later time. The questionnaire required around 10 minutes to answer.

Fifth-year students as well as graduates were off campus and therefore received an electronic version of the questionnaire. To enable these participants to compete for prizes, they were asked to send a screenshot of the web page at the end of the questionnaire to the research team. This confirmed their participation without compromising their responses.

All students were informed about the data collection at least one day in advance through the university's information channels and social media. They also received two subsequent notifications, encouraging remaining students to contact the research team to give their answers. Prior to data collection, the questionnaire was piloted to a selected, few students from various study years with varying experience within emergency medicine. Feedback from the pilots was integrated in the final version. Data was gathered between November 2019 and February 2020. Times for data collection for each study year were carefully chosen to ensure as many respondents as possible.

2.3 Statistics

All questionnaire responses were entered into IBM SPSS Statistics (ver. 26.0.0.1, IBM Corporation (https://www.ibm.com/analytics/spss-statistics-software)). The alternatives for each Likert item were assigned values from 0 to 4, and an ID number assigned each case to its respective questionnaire to simplify the potential necessity for backtracking. The two main outcome variables were mean training amount and mean self-perceived confidence level for each respondent. These variables were defined as the composite score for each of the two outcomes, which was found by calculating the mean of the responses to all the associated Likert items. Composite scores were calculated to allow for the data to be treated as interval, and Cronbach's alpha was calculated for both scores for reliability analyses. Separate analyses on the various Likert items were conducted as well.

ECHR work experience was the main predictor variable. The magnitude of work experience in regard to both length and time was analyzed, as well as number of workplaces. Previous education or healthcare-related work, previous military medic-training from the Norwegian Armed Forces Medical Corps, participation in TAMS and year of study were analyzed as potential confounders.

Descriptive statistics were conducted for data visualization and assumption testing prior to inferential analyses. Analysis of covariance (ANCOVA) was applied to compare the scores of students with and without ECHR work, adjusted for potential confounders. However, assumptions regarding homogeneity of variance between the groups were violated, confirmed by a significant Levene's test. The sample sizes within the two predictor variable groups also differed. The ANCOVA is considered a robust test, but regardless, a linear mixed model was conducted as well. The results from these two tests were compared to each other to investigate the potential effects of the violated assumptions.

2.4 Ethical considerations and consent

All students were invited to participate in the study voluntarily, no questions probed health data or otherwise sensitive topics, and all answers were anonymous. Approval was gathered from all relevant lecturers. Based on this, it was deemed unnecessary to apply for approval from the regional ethical committee.

3 Results

The six medical school classes comprised 689 students that were invited to participate together with 77 recent graduates. Of these 766 individuals, 539 answered the questionnaire, giving a response rate of 70%. The majority of the respondents had some ECHR work experience, and more than half reported experience from more than one workplace. The most frequently reported workplaces were nursing homes, hospitals and home healthcare services (Figure 1). In addition, 8.5% of respondents had previously commenced healthcare-related education, and 4.8% had completed a degree. 13% had previous medic-training from the Norwegian Armed Forces Medical Corps, and 66% had been involved with the student's association, TAMS (Table 1).

Table 2 shows median self-rated experience and confidence for the probed skills. Only automatic blood pressure measurement reached the highest possible median value for both outcomes. We found a positive correlation between training amount and confidence level for all respondents (Pearson coefficient of .873). Among all the respondents, half reported that they had checked level of consciousness in real-life situations at least once, and 40% had placed a patient in recovery position. Close to one third (31.9%) had observed cardiopulmonary resuscitation (CPR) being performed at least once in a real-life situation, and 15.6% had participated actively in CPR. Among those without ECHR work experience, these figures were lower (29.1%, 28.4%, 16.5% and 3.9%, respectively, see table 3).

We tested internal consistency in the training and confidence data and obtained high Cronbach's alpha (.927 and .919, respectively). Items 18-20 (see appendix B) were excluded in the latter analysis due to low answer rates. Removal of any items did not change Cronbach's alpha significantly, suggesting all items to be of equal importance.

Mean amount of practical training and confidence level for respondents with and without ECHR work experience were compared with independent samples t-tests, and respondents with work experience scored significantly higher for both variables. Further t-tests showed a gradual increase in both outcomes with increasing work experience, though with varying levels of significance. Experience from more than one workplace also increased both outcomes significantly. Year of study gradually increased both the self-reported levels of

training and confidence as well. The largest gaps were observed between years 2 and 3, and years 4 and 5 (Table 1).

Study year, previous education, military medic-training and TAMS participation were included in the analyses as potential confounders. We selected ANCOVA to investigate the individual confounder's contribution to the total variance in the main outcomes, adjusted for the effect of the concurrent factors. Because the data violated assumptions required by the ANCOVA, the analysis was repeated using linear mixed models' analysis (Table 4). Both models yielded almost equal results, suggesting the ANCOVA to be sufficiently robust regardless of the violated assumptions (Appendix C and D). Year of study and participation in TAMS affected the outcome significantly more than the other confounders. Work experience accounted for 6.7% and 3.6% of the total variance in the two outcome variables, respectively. In the linear mixed model analysis, estimated marginal means showed that participants with work experience yielded significantly higher scores than non-workers for both outcomes (Table 4).

4 Discussion

Our data represent a snapshot of UiT's medical students' training amount and self-perceived confidence level with regard to basic emergency medicine-related procedures, and analyses performed support the theory that extracurricular experience is beneficial to increase practical skill level. As expected, students in the later years of medical school estimated their own training amount and confidence level as far better than students in earlier study years. However, and quite interestingly, active participation in the student's organization TAMS was the most important contributor for both outcomes, apart from year of study. In addition, military medic-training, previous healthcare-related education and ECHR work experience increased both training amount in the selected emergency medicine-related procedures, and student confidence in own proficiency in these skills. Each of these factors were independently important, as shown by an ANCOVA, where effects of the concurrent factors were adjusted for. These results were in line with reports from other studies (12, 18-21), although some have found no such relationship (3).

For year of study, the largest increase in both training amount and self-perceived confidence was seen between the fourth- and fifth-year students. The data was gathered around the end of the fifth-year students' clerkship period. This serves as a reasonable explanation for the observed gap and argues that the clerkship period incorporated in UiT's study program is an important arena for practical skill learning and development. Also interesting was the almost equally large gap observed between students at the second and third study year. Third year students at UiT receive an increased frequency of bedside teaching at the hospital wards, and they have to complete a mandatory OSCE. Exams direct student priorities and based on the present results it may be plausible that a more extensive use of OSCEs could raise the awareness of practical skills among the students. The UiT program objectively assess practical skills only after the third and the final year. The predominance of theoretical exams might undermine some students' perception of the importance of practical training. We believe that these students might risk being suboptimally prepared for clerkship and postgraduate work.

Surprisingly, ECHR work had only a modest influence on both training amount and self-perceived confidence. The degree of exposure to practical skills through work will however depend on type of work. Our study focused primarily on procedures important for emergency

medicine, and it is thus reasonable to believe that work in ambulance and district general practice surgeries were more likely to provide exposure to this particular kind of skills. However, several of the included skills could be practiced in other workplaces as well. Regardless of the modest influence ECHR work experience accounted for, the findings were significant, even after adjusting for the included confounders.

Military medic-training undoubtedly provide better opportunities for practical training in emergency medicine-related procedures than most ECHR workplaces. All Norwegian military personnel receive level 1 first aid training, a 40-hour course on CPR training, lecturing and practical training with a manikin. Military medics receive level 2 training, a 96-hour course expanding the training sessions included in level 1 training, as well as incorporating other elements such as basic airway adjuncts and introduction to tension pneumothorax needle decompression (22). Among our participants, 10 had level 1 training, 39 level 2 training and 23 level 3 training, which consists of additional training expanding from level 2. The majority of the participants did not have any military sanitary experience (Table 1).

It was even more surprising that previous healthcare-related education had only modest effect on the outcomes. Most participants with previous education were nurses, but physiotherapists, bioengineers, dentists, ambulance technicians, healthcare assistants, pharmacists and radiographers were represented as well. A priori, we had expected that a healthcare-related degree would be sufficient to achieve higher outcome scores than those without such prior education. However, only a small proportion of the respondents reported having a degree of particular relevance for emergency medicine, and for this reason, our data might not have been able to reveal any effect.

The student's association TAMS offers various ways of practicing first aid and emergency medicine for the students. Students at early years may participate in practical workshops covering topics such as airway control and CPR-training, including using a defibrillator, and they may participate in teaching basic life support to laypeople and other healthcare students. Students with more experience from the organization may also have participated in workshops covering more advanced topics such as advanced cardiac life support, and they may have been assistant trainers on student courses. From the data presented here, it is evident that a substantial proportion of the UiT medical school students had participated in

TAMS to some extent, and this had a substantial impact on the outcomes. TAMS offers frequent and longitudinal practical training for all participating students, and this is known to be important for learning and maintaining practical skill level (1, 19, 23). This was also supported by a strong correlation between training amount and self-perceived confidence level in the present study.

It was somewhat unexpected that only automated blood pressure measurement received the highest possible median value in both outcomes. Checking for level of consciousness, placing someone in a recovery position and performing basic CPR are skills introduced during the first month at the UiT medical school, and the training is repeated several times throughout the program. Due to this, we expected these skills to receive a higher score. However, fear of causing harm by not mastering these skills properly in a real-life situation might have contributed to the low level of confidence. Another contribution might have been too little retraining throughout the education. Nevertheless, these are examples of essential and potentially life-saving skills that should be mastered by all practicing physicians, and it might be beneficial to objectively assess the individual student's competence with these skills during the education.

For the more advanced skills included in the questionnaire, many respondents reported low amount of training and self-perceived confidence, similar to results from other studies (3, 24). This was expected; taking an arterial blood gas, placing an intraosseous line and using a multi-monitor in an emergency situation are skills that are not introduced until year 4 and 5. Prior to this, students would have to acquire these skills elsewhere. However, these particular skills displayed several of the strongest correlations between training amount and self-perceived confidence that we observed, emphasizing the importance of volume training in regard to performance level. Similar findings have also been reported in other studies (3, 21).

Some of our results differed from what other similar studies have found. Dehmer et al published a paper in 2013 on competence and confidence with basic procedural skills of final year medical students at the University of North Carolina in the US (3). 38% of their students had never placed an intravenous line, while 100% of the final-year students at UiT had done so at least once. 28% of Dehmer's students felt insecure with the procedure, compared to 1.4% of UiT's students that reported the lowest level of confidence. 30% of Dehmer's

students had never done an arterial puncture and 43% felt insecure, while only 1.4% of UiT's last year students had never done this skill, and 4.2% felt the least confident. When comparing these results, it is important to note that Dehmer's students seemingly only reported amount of practice performed on actual patients, whereas no distinction between practicing on manikins and performing on actual patients were made in our paper. For Dehmer's students, total training amount including practice situations might therefore be higher. This illustrates that comparison with other studies is not straightforward. Furthermore, UiT has a six-year medical education, whereas The University of North Carolina has a four-year program, which may make such comparisons even more demanding.

Among respondents with former military medic-training, the least experienced respondents reported surprisingly high levels of self-perceived confidence. Respondents with level 1 training reported significantly higher confidence level than respondents with level 2 training. A similar trend was seen for training amount, although not statistically significant. No clear explanation for this was found, but it might be due to the Dunning-Kruger effect, a cognitive bias where someone overestimates their own abilities (25). Respondents with level 2 training will likely have more experience from realistic scenario training and real-life situations, and thus have a better idea as to what can go wrong when performing these skills in the field. This knowledge might not yet have been acquired by those within the level 1 subgroup, which would make them more prone to overestimate their own skills. It is also plausible that the medics that have chosen to serve in the armed forces are a selected group of people, with a cognitive bias that may be difficult to adjust for.

Study year had a bigger impact on confidence level than it did on training amount. This was opposite to the rest of the predictors, which all affected amount of training the most. This might be explained by the increased level of theoretical knowledge inherited by students at higher study years. Furthermore, students at higher study years have more patient interaction, which might cause an increased level of confidence.

The final question in need of addressing is how the UiT School of Medicine actually offers training in the skills and practical procedures that have been investigated in the present study. Previous research conducted on Norwegian students suggested inadequate focus on practical training during education at the time of their publication. However, as of today, there is still

no publicly available comprehensive list of practical items that should be addressed during the six years in training, and at what time they should be learned. A few years ago, a national initiative that included the four schools of medicine in Norway listed a number of essential procedures that should be part of the curriculum. This national list served as a base for the Norwegian programs and is said to be implemented at all four universities offering medicine programs (according to personal communication, The UiT School of Medicine). We believe that making such a list publicly available and easily accessible for UiT medical students might ease their acquisition of these practical skills. We also believe that a more thorough assessment of the individual student's ability to perform the listed skills might increase their preparedness for postgraduate work and benefit the study program as a whole.

4.1 Limitations

There are some limitations to this study. The questionnaire was created by the authors and thus not validated externally. However, Cronbach's alpha values over 0.9 suggest that the items maintained a high internal consistency. Respondent age and gender was not recorded – data which could potentially give valuable insight. This was omitted in order to ensure anonymity of the participants.

It is well known that people may tend to over- or underestimate their own skills. The actual performance level of the respondents was not objectively evaluated, and thus self-reporting bias cannot be excluded, due to the Dunning-Kruger effect (25). Lastly, it is important to note that the study included students from one single institution, which may limit the external validity of the findings.

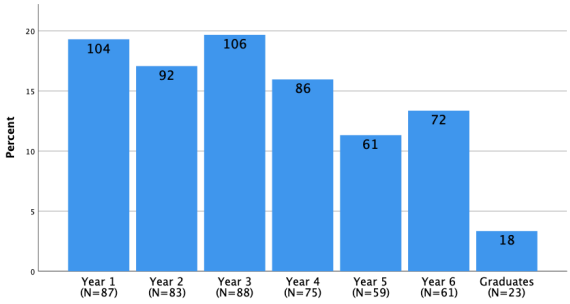
5 Conclusion

This study supports the theory that students with ECHR work experience have more training and more confidence in performing basic skills within emergency medicine, compared to students without such experience. However, other factors, as year of study, previous education, military medic-training, as well as TAMS participation have significant impact on how students score themselves on amount of training and self-perceived confidence level as well. A structured approach to practical skills performance would be beneficial in order to ensure sufficient skill acquisition for all students. This can be achieved through increased student awareness and exposure to practical training, and formal assessment of competency to ensure sufficient skill acquisition for all students.

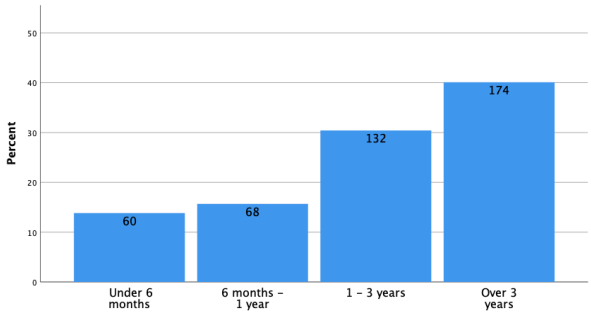
6 Figures and Tables

6.1 Figure 1. Descriptive statistics spread over six tables

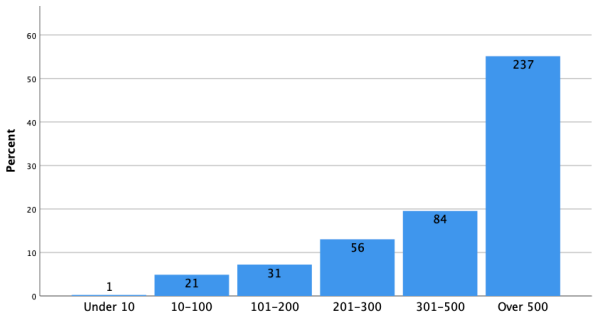
1a. Study year



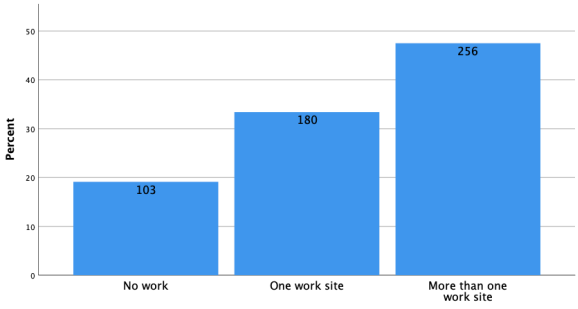
1b. Work experience



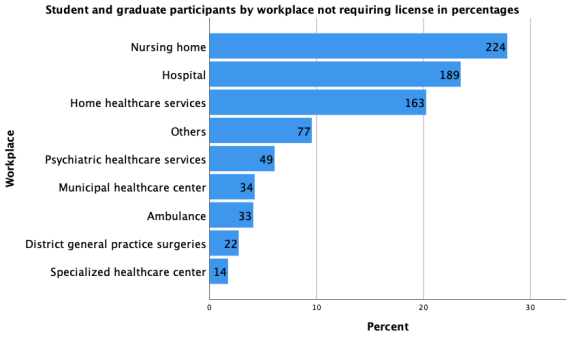
1c. Hours of work



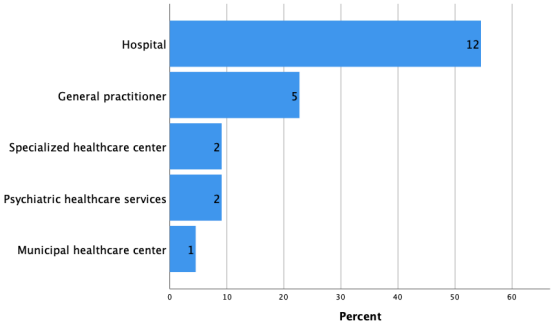
1d. Number of workplaces



1e. Work not requiring license to practice



1f. Work requiring license to practice



1a shows the number of students from each study year that answered the questionnaire. N shows the respondent rate in percentage for the respective year. 1b and 1c shows the amount of ECHR work the respondents had. 1d shows the different workplaces, while 1e and 1f shows the workplaces the respondents had experience from.

6.2 Table I. Training and confidence in practical skills

		Training amount			Confidence level		
	No.	Mean	SD	p-value	Mean	SD	p-value
Work experience							
No	103	1.01	0.48		1.33	0.63	
Yes	436	1.81	0.76	.000	2.13	0.77	.000
Total	539	1.66	0.78		1.97	0.81	
Work (length)							
<6 mo.	60	1.23	0.53		1.50	0.71	
6 mo.–1 yr.	68	1.68	0.60	.000	2.07	0.74	.000
1 yr.–3 yrs.	132	1.72	0.68	.677	2.06	0.71	.910
>3 yrs.	174	2.13	0.79	.000	2.41	0.71	.000
Total	434	1.81	0.76		2.13	0.77	
Work (hours)							
<10 hrs.	1	1.22			1.35		
10–100 hrs.	21	0.99	0.39	.562	1.24	0.67	.867
101–200 hrs.	31	1.20	0.46	.085	1.53	0.68	.130
201–300 hrs.	56	1.50	0.57	.016	1.89	0.66	.019
301–500 hrs.	84	1.69	0.63	.061	2.00	0.71	.363
>500 hrs.	237	2.09	0.75	.000	2.40	0.71	.000
Total	430	1.81	0.76		2.13	0.77	
Workplaces (number)							
1	180	1.44	0.62		1.78	0.74	
>1	256	2.07	0.74	.000	2.37	0.71	.000
Total	436	1.81	0.76		2.13	0.77	
Study year							
Year 1	104	1.05	0.54		1.20	0.53	
Year 2	92	1.18	0.52	.089	1.36	0.53	.037
Year 3	106	1.55	0.61	.000	1.92	0.54	.000
Year 4	86	1.73	0.67	.047	2.16	0.61	.004
Year 5	61	2.24	0.60	.000	2.72	0.49	.000
Year 6	72	2.49	0.57	.014	2.85	0.46	.125
Graduates	18	2.60	0.39	.477	2.89	0.38	.736
Total	539	1.66	0.78		1.97	0.81	
Previous education							
No	492	1.62	0.75		1.94	0.80	
Yes, unfinished	20	1.53	0.78	.593	1.75	0.83	.288
Yes, finished	26	2.45	0.89	.001	2.67	0.81	.000
Total	538	1.66	0.78		1.97	0.81	
Military medic-training							
No	467	1.64	0.78		1.97	0.81	
Level 1	10	1.78	0.72	.559	2.34	0.74	.158
Level 2	39	1.53	0.69	.304	1.70	0.77	.022
≥Level 3	23	2.27	0.68	.000	2.28	0.73	.005
Total	539	1.66	0.78		1.97	0.81	
TAMS**							
0	181	1.32	0.71		1.71	0.81	
1	60	1.47	0.74	.166	1.75	0.81	.728
2-5	160	1.68	0.71	.056	1.98	0.76	.052
6-10	71	2.01	0.65	.001	2.30	0.66	.002
> 10	67	2.33	0.69	.005	2.53	0.68	.055
Total	539	1.66	0.78		1.97	0.81	

Descriptive data for the respondents and mean (and SD) for amount of training and level of confidence for practical emergency medicine relevant procedures. The mean scale ranges from 0-4. SD: standard deviation. TAMS: Tromsø Acute Medicine Students' Association (the university students' association for emergency medicine).
**Significance level between the associated and the prior subgroup, as calculated by independent samples t-tests.*
***The subgroups represent the number of TAMS-related events participated in.*

6.3 Table II. Self-perceived training amount and confidence level

Items	Median training amount	Median confidence level	Correlation between training amount and confidence level
Checking for level of consciousness	11-30	Agree	.485
Placing someone in a recovery position	11-30	Agree	.456
Performing basic CPR	11-30	Agree	.414
Using a pocket mask	1-5	Neutral	.808
Using a bag-valve-mask	1-5	Disagree	.808
Automatic blood pressure measurement	>30	Strongly agree	.799
Manual blood pressure measurement	11-30	Agree	.818
Managing and controlling a traumatic bleeding	6-10	Neutral	.584
Writing a vital parameter chart	1-5	Neutral	.918
Interpreting a vital parameter chart	N/A	Agree	
Placing an intravenous line	6-10	Disagree	.792
Placing an intraosseous line	0	Strongly disagree	.863
Taking an arterial blood gas	0	Strongly disagree	.897
Interpreting an arterial blood gas	N/A	Neutral	
Withdrawing medication from a glass ampule	1-5	Disagree	.879
Taking a 12-lead ECG	1-5	Neutral	.871
Interpreting a 12-lead ECG	N/A	Neutral	
Using a CorPuls3 multimonitor	0	Strongly disagree	.812
Using an EMS radio terminal	0	Strongly disagree	.742
Using ultrasound in an acute situation	N/A	Strongly disagree	

Median values reported by all respondents together. Median training amount displays number of times each procedure has been performed. Spearman correlations between the training amount and confidence level for each specific item are shown in the right column. All correlations are significant at the .01 level.
N/A: Not included in the questionnaire.

6.4 Table III. Real-life exposure to selected procedures

Items	ECHR work	No ECHR work	All respondents
Checking for level of consciousness	55,3%	29,1%	50,3%
Placing someone in a recovery position	42,7%	28,4%	40,0%
Observing CPR	35,6%	16,5%	31,9%
Performing CPR	18,3%	3,9%	15,6%

Number of respondents with real-life experience with selected skills, shown in percentages both with and without work experience, respectively, as well as all respondents combined.

6.5 Table IV. Confounder effects on total variance

	Mean training amount	Mean confidence level
Confounder	Total variance explained (Partial Eta Squared)	Total variance explained (Partial Eta Squared)
Work experience	6.7%	3.6%
Previous education	8.3%	5.2%
Previous military medic-training	9.8%	5.4%
TAMS-participation	23,8%	11.8%
Study year	46,3%	54.8%
Group	Estimated marginal means	Estimated marginal means
Work experience	2.47±0.07	2.69±0.07
No work experience	2.13±0.09	2.43±0.09
Between-groups difference	0.34	0.26

Results from both the ANCOVA and linear mixed models analyses. The top half shows the total variance in the main outcome variables explained by each confounder, after having adjusted for the other confounders included in the model. The bottom half displays estimated marginal means, which are the means in outcomes for each of the two groups after having adjusted for the other confounding variables in the model. All analyses were significant at p<.001.

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8 Appendices

8.1 Appendix A. Likert items in the questionnaire addressing training amount

Theme	No.	Items ("How many times have you…)
Level of consciousness	1	…checked the level of consciousness in a patient according to ABC in a training situation?"
	2x	…done such a check in a real situation?"
Recovery position	3	…put someone in the recovery position in a training situation?"
	4x	…done so in a real situation?"
CPR	5	…given basic CPR in a training situation?"
	6x	…observed (without participating) basic CPR in a real situation?"
	7x	…actively participated in giving basic CPR in a real situation?"
Airway management	8	…used a pocket mask?"
	9	…used a bag-valve-mask?"
Blood pressure measurement	10	…used an automatic BP-device?"
	11	…used a manual BP-device?"
Bleeding control	12	…controlled a traumatic bleeding from either head or extremity?"
Vital signs chart	13	…written a chart over vital parameters?"
IV-line placement	14	…placed an IV-line?"
IO-line placement	15	…placed an IO-line?"
Arterial blood gas	16	…taken an arterial blood gas?"
Withdrawing medication	17	…withdrawn medication from a glass ampule?"
12-lead ECG	18	…taken a 12-lead ECG?"
Multimonitor	19	…used the CorPuls3 multimonitor as assistance?"
Radio terminal	20	…used a radio terminal connected to the public safety networks?"

The respondents recorded their answers on a 5-point scale: 0 = 0 times, 1 = 1-5 times, 2 = 6-10 times, 3 = 11-30 times, 4 = over 30 times. Questions probing real-life experience, labelled with an x, had a different scale: 0 = 0 times, 1 = 1 time, 2 = 2-5 times, 3 = 6-10 times, 4 = over 10 times. If not otherwise specified, respondents were encouraged to include both training and real situations, and both successful and unsuccessful attempts.

8.2 Appendix B. Likert items in the questionnaire addressing confidence level

Theme	No.	Items ("I feel confident…)
Level of consciousness	1	…doing a proper control of level of consciousness."
Recovery position	2	…placing someone in a proper recovery position."
CPR	3	…giving proper, basic CPR with good technique."
Airway management	4	…using a pocket mask properly during CPR."
	5	…using a bag-valve-mask properly during CPR."
Blood pressure measurement	6	…measuring a correct blood pressure with an automatic device."
	7	…measuring a correct blood pressure with a manual device."
Bleeding control	8	…controlling a traumatic bleeding from either head or extremity effectively."
Vital signs chart	9	…writing a chart over vital parameters correctly. "
	10	…interpreting a chart over vital parameters."
IV-line placement	11	…placing an IV-line in a correct manner."
IO-line placement	12	…placing an IO-line in a correct manner."
Arterial blood gas	13	…taking an arterial blood gas."
	14	…interpreting an arterial blood gas."
Withdrawing medication	15	…withdrawing medication from a glass ampule."
12-lead ECG	16	…taking a 12-lead ECG."
	17	…interpreting a 12-lead ECG."
Multimonitor	18y	…using the CorPuls3 as assistance in an emergency situation."
Radio terminal	19y	…using a radio terminal correctly* in an emergency situation."
Ultrasound	20y	…using ultrasound as assistance in an emergency situation."

The respondents recorded their answers on a 5-point scale: 0 = strongly disagree, 1 = disagree, 2 = neutral, 3 = agree, 4 = strongly agree. Items labelled with an y were only to be answered if the respondent had any prior knowledge about the respective theme.

**Correct usage was specified as knowing how to physically use the terminal, as well as possessing knowledge about which rules apply when speaking in the public safety network, both in general and when conveying patient sensitive information.*

8.3 Appendix C. Analyses of parameter estimates on training amount

C1. Parameter estimates on mean_training by ANCOVA

Parameter Estimates

Dependent Variable: Mean_training

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	2.596	.132	19.645	.000	2.336	2.855	.421
[Work_experience=0]	-.426	.068	-6.291	.000	-.559	-.293	.069
[Work_experience=1]	0[a]	.	.	.	.	.	.
[Study_year=1]	-1.332	.147	-9.056	.000	-1.621	-1.043	.134
[Study_year=2]	-1.322	.145	-9.104	.000	-1.607	-1.037	.135
[Study_year=3]	-.979	.143	-6.832	.000	-1.261	-.698	.081
[Study_year=4]	-.837	.145	-5.760	.000	-1.123	-.552	.059
[Study_year=5]	-.299	.151	-1.987	.047	-.595	-.003	.007
[Study_year=6]	-.095	.148	-.646	.519	-.386	.195	.001
[Study_year=7]	0[a]	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

This table shows the parameter estimates for work experience with mean training amount as the dependent variable in an ANCOVA.

C2. Parameter estimates on mean_training by linear mixed models

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	2.595760	.138877	428.620	18.691	.000	2.322795	2.868726
[Work_experience=0]	-.440888	.056807	248.331	-7.761	.000	-.552773	-.329003
[Work_experience=1]	0[b]	0	.	.	.	.	.
[Study_year=1]	-1.301927	.151496	478.170	-8.594	.000	-1.599607	-1.004247
[Study_year=2]	-1.308350	.151007	459.173	-8.664	.000	-1.605100	-1.011600
[Study_year=3]	-.984209	.149531	450.429	-6.582	.000	-1.278074	-.690344
[Study_year=4]	-.853982	.152131	442.438	-5.613	.000	-1.152971	-.554993
[Study_year=5]	-.313500	.156522	462.935	-2.003	.046	-.621082	-.005917
[Study_year=6]	-.095319	.155068	433.173	-.615	.539	-.400098	.209460
[Study_year=7]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Mean_training.

b. This parameter is set to zero because it is redundant.

This table shows the parameter estimates for work experience with mean training amount as the dependent variable in a linear mixed model.

8.4 Appendix D. Analyses of parameter estimates on self-perceived confidence level

D1. Parameter estimates on mean_confidence by ANCOVA

Parameter Estimates

Dependent Variable: Mean_confidence

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
Intercept	2.892	.122	23.622	.000	2.651	3.132	.512
[Work_experience=0]	-.305	.063	-4.864	.000	-.428	-.182	.043
[Work_experience=1]	0[a]	.	.	.	.	.	.
[Study_year=1]	-1.536	.136	-11.275	.000	-1.804	-1.269	.193
[Study_year=2]	-1.462	.135	-10.868	.000	-1.727	-1.198	.182
[Study_year=3]	-.923	.133	-6.949	.000	-1.184	-.662	.083
[Study_year=4]	-.712	.135	-5.283	.000	-.976	-.447	.050
[Study_year=5]	-.128	.140	-.914	.361	-.402	.147	.002
[Study_year=6]	-.035	.137	-.259	.796	-.304	.233	.000
[Study_year=7]	0[a]	.	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

This table shows the parameter estimates for work experience with mean confidence level as the dependent variable in an ANCOVA.

D2. Parameter estimates on mean_confidence by linear mixed model

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	2.891813	.123982	429.034	23.325	.000	2.648126	3.135500
[Work_experience=0]	-.307385	.060470	202.077	-5.083	.000	-.426618	-.188153
[Work_experience=1]	0[b]	0	.	.	.	.	.
[Study_year=1]	-1.531311	.137448	475.299	-11.141	.000	-1.801392	-1.261229
[Study_year=2]	-1.460844	.136007	453.168	-10.741	.000	-1.728127	-1.193562
[Study_year=3]	-.925037	.134308	445.415	-6.887	.000	-1.188993	-.661080
[Study_year=4]	-.714561	.136297	437.943	-5.243	.000	-.982438	-.446684
[Study_year=5]	-.126146	.141065	453.539	-.894	.372	-.403367	.151076
[Study_year=6]	-.035154	.138590	431.731	-.254	.800	-.307549	.237241
[Study_year=7]	0[b]	0	.	.	.	.	.

a. Dependent Variable: Mean_confidence.

b. This parameter is set to zero because it is redundant.

This table shows the parameter estimates for work experience with mean confidence level as the dependent variable in a linear mixed model.

8.5 Appendix E. Adjusted effects of work experience on main outcome variables

E1. ANCOVA analysis on mean training amount including confounders

Tests of Between-Subjects Effects

Dependent Variable: Mean_training

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	217.104[a]	16	13.569	64.223	.000	.664	1027.570	1.000
Intercept	220.060	1	220.060	1041.561	.000	.667	1041.561	1.000
Work experience	7.881	1	7.881	37.299	.000	.067	37.299	1.000
Study year	94.967	6	15.828	74.914	.000	.463	449.484	1.000
Previous education	10.025	2	5.012	23.724	.000	.083	47.448	1.000
Sanitary experience	11.896	3	3.965	18.769	.000	.098	56.306	1.000
TAMS participation	34.350	4	8.588	40.646	.000	.238	162.582	1.000
Error	110.077	521	.211					
Total	1807.055	538						
Corrected Total	327.181	537						

a. R Squared = .664 (Adjusted R Squared = .653)

b. Computed using alpha = .05

This table shows the ANCOVA analysis of the main predictor variable as well as all recorded potential confounders' effect on the mean training amount.

E2. ANCOVA analysis on mean confidence level including confounders

Tests of Between-Subjects Effects

Dependent Variable: Mean_confidence

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	238.670[a]	16	14.917	67.633	.000	.675	1082.124	1.000
Intercept	273.201	1	273.201	1238.691	.000	.704	1238.691	1.000
Work experience	4.279	1	4.279	19.401	.000	.036	19.401	.993
Study year	139.070	6	23.178	105.090	.000	.548	630.541	1.000
Previous education	6.263	2	3.131	14.198	.000	.052	28.396	.999
Sanitary experience	6.546	3	2.182	9.893	.000	.054	29.680	.998
TAMS participation	15.321	4	3.830	17.366	.000	.118	69.466	1.000
Error	114.910	521	.221					
Total	2445.675	538						
Corrected Total	353.579	537						

a. R Squared = .675 (Adjusted R Squared = .665)

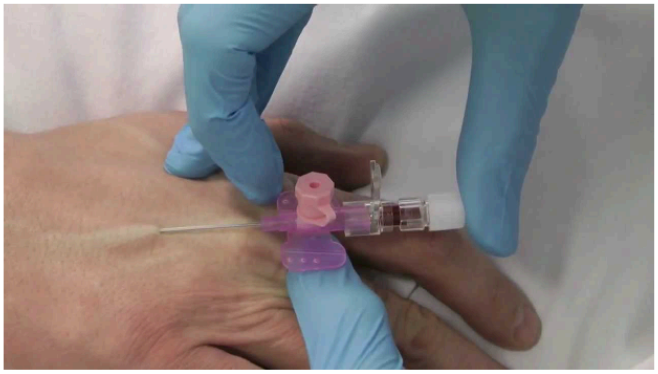
b. Computed using alpha = .05

This table shows the ANCOVA analysis of the main predictor variable as well as all recorded potential confounders' effect on the mean confidence level.

8.6 Appendix F. Copy of the questionnaire distributed to the participants

SVAR PÅ BEGGE SIDER

Spørreundersøkelse vedrørende praktiske ferdigheter hos medisinstudenter ved UiT



Hei! Dette er en kort spørreundersøkelse tilknyttet et masteroppgaveprosjekt. Vi ønsker å kartlegge nivået av praktiske ferdigheter blant medisinstudenter på alle kull på UiT, samt nyutdannede leger, vedrørende en rekke prosedyrer som er sentrale innen akuttmedisin. Relevant arbeidserfaring kartlegges også. Spørreskjemaet er ikke en kunnskapstest – vi ber deg krysse av for alternativene som passer best for **deg**. Vi ber deg svare på samtlige spørsmål, og så ærlig som mulig. Deltakelsen er anonym, og vi kan ikke spore svarene tilbake til deg!
NB: Undersøkelsen er kun for medisinstudenter, ikke odontologistudenter.

Varighet er estimert til omtrent fem minutter, og alle som svarer vil ha mulighet til å delta i trekning av følgende premier:

- **5 x middagskort i MH-kantina** (verdi kr 690,-)
- **10 x gavekort Adlibris,** kan brukes på nett (verdi kr 500,-)

Vi håper du vil bidra! På forhånd, takk!
Vennlig hilsen,
Remi William Scott, Frode Sørensen og Knut Fredriksen
Akuttmedisinsk-anestesiologisk forskningsgruppe, IKM, UiT

I. Hvilket kull tilhører du? Dersom du har forskningsår, velg ditt nye kull:

☐MK/ODO 19 ☐MK17 ☐MK15 ☐MK13
☐MK/ODO 18 ☐MK16 ☐MK14

II. Har du utdanning innen helsesektoren fra før? Gjelder fagbrev eller universitetsutdanning.

☐Nei ☐Ja ☐Påbegynt, men ikke fullført

Hvis ja/påbegynt, utdyp: _____

III. Har du sanitetserfaring fra Forsvaret? Hvis ja, kryss av for høyeste nivå bestått.

☐Nei ☐Nivå 1 ☐Nivå 2 ☐Nivå 3 eller høyere

IV. Har du (hatt) arbeid innen helsesektoren før/under medisinstudiet? Kryss av for én eller flere: NB: Førstegangstjenesten medregnes ikke her

☐Nei ☐Annet (utdyp)
☐Ambulanse ☐Hjemmetjeneste ☐Sykehus (utdyp) ☐Helsehuset
☐Legevakt ☐Sykehjem ☐Spesialisttjeneste (utdyp) ☐Psykiatri (utdyp)

Utdyp (hvis relevant): _____

V. Hvis ja, svar på følgende: NB: Førstegangstjenesten medregnes ikke her

a. Hvor lenge har du samlet sett jobbet innen helsesektoren?
☐Under 6 mnd ☐6 mnd-1 år ☐1-3 år ☐Over 3 år

b. Hvor mange arbeidstimer har du totalt sett innen helsesektoren? Gi ditt beste estimat!
☐Under 10 ☐10-100 ☐101-200 ☐201-300 ☐301-500 ☐Over 500

Nedenfor følger noen spørsmål og påstander om din treningsmengde og selvsikkerhet vedrørende gjennomføring av en rekke praktiske ferdigheter og prosedyrer.

- Med trening menes samlet trening via studiet, jobb, frivillig arbeid og annet
- Dersom du selv har undervist i noen av ferdighetene, regnes det også som trening
- Legg merke til at noen spørsmål skiller mellom trening og reelle situasjoner
- Etter alle påstandene bes du rangere din enighet på en skala som går fra «helt uenig» til «helt enig». «Verken eller» er midtpunktet og betyr «verken enig eller uenig»

Bevissthetskontroll (Plan BLÅ/GCS)

1. Hvor mange ganger har du undersøkt bevisstheten til en person i henhold til enten plan BLÅ (bevissthet, luftveier, åndedrett) eller Glasgow Coma Scale i en treningssituasjon?
   ☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30
2. Hvor mange ganger har du gjennomført en slik bevissthetskontroll i en reell situasjon?
   ☐0 ☐1 ☐2-5 ☐6-10 ☐Over 10

3. «Jeg føler meg trygg på å kunne gjennomføre en korrekt bevissthetskontroll»:
   ☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Stabilt sideleie

4. Hvor mange ganger har du lagt en annen person i stabilt sideleie i en treningssituasjon?
   ☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30
5. Hvor mange ganger har du lagt en annen person i stabilt sideleie i en reell situasjon?
   ☐0 ☐1 ☐2-5 ☐6-10 ☐Over 10
6. «Jeg føler meg trygg på å kunne legge en person i korrekt stabilt sideleie»:
   ☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Hjerte-lunge-redning (HLR)

7. Hvor mange ganger har du gjennomført basal (vanlig) HLR i en treningssituasjon?
   ☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30
8. Hvor mange ganger har du observert (uten å delta selv) HLR i en reell situasjon?
   ☐0 ☐1 ☐2-5 ☐6-10 ☐Over 10
9. Hvor mange ganger har du aktivt bidratt med HLR i en reell situasjon?
   ☐0 ☐1 ☐2-5 ☐6-10 ☐Over 10
10. «Jeg føler meg trygg på å kunne gjennomføre korrekt, basal HLR med god teknikk»:
    ☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Luftveiskontroll

11. Hvor mange ganger har du brukt en pocketmaske (trening og reelt)?
    ☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

12. «Jeg føler meg trygg på å kunne bruke pocketmaske under pågående HLR»:
    ☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig
13. Hvor mange ganger har du brukt en maske-bag (trening og reelt)?
    ☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

14. «Jeg føler meg trygg på å kunne bruke maske-bag under pågående HLR»:
    ☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Blodtrykksmåling

15. Hvor mange ganger har du brukt et automatisk blodtrykksapparat (trening og reelt, med og uten suksess)?
    ☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

16. «Jeg føler meg trygg på å kunne måle et blodtrykk automatisk»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

17. Hvor mange ganger har du brukt et manuelt blodtrykksapparat (trening og reelt, med og uten suksess)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

18. «Jeg føler meg trygg på å kunne måle et blodtrykk manuelt»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Blødningskontroll*

*Blødningskontroll betyr her å stoppe en pågående blødning fra hodet eller ekstremiteter (armer/bein), for eksempel i henhold til fire-trinns blødningskontroll: Hev, klem av, stapp, bandasjér.

19. Hvor mange ganger har du utført blødningskontroll (trening og reelt, med og uten suksess)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

20. «Jeg føler meg trygg på å effektivt kunne utføre blødningskontroll»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Føre kurve over vitalparametere

21. Hvor mange ganger har du ført kurve over vitalparametere (trening og reelt)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

22. «Jeg føler meg trygg på å kunne føre en korrekt kurve over vitalparametere»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

23. «Jeg føler meg trygg på å kunne tolke en kurve over vitalparametere»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Perifer venekanylering (PVK)

24. Hvor mange perifere venekateter har du satt (trening og reelt, med og uten suksess)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

25. «Jeg føler meg trygg på å kunne sette et perifert venekateter»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Intraossøs kanylering (IO) – boring i bein

26. Hvor mange ganger har du etablert en intraossøs tilgang (trening og reelt, med og uten suksess)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

27. «Jeg føler meg trygg på å kunne etablere en intraossøs tilgang»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Blodgass

28. Hvor mange ganger har du tatt en arteriell blodgass (trening og reelt, med og uten suksess)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

29. «Jeg føler meg trygg på å kunne ta en arteriell blodgass»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

30. «Jeg føler meg trygg på å kunne tolke en arteriell blodgass»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Opptrekk av medikamenter

31. Hvor mange ganger har du trukket opp medikamenter (trening og reelt, med og uten suksess)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

32. «Jeg føler meg trygg på å kunne trekke opp medikamenter»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

12-avlednings EKG

33. Hvor mange ganger har du tatt et 12-avlednings EKG (trening og reelt, med og uten suksess)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

34. «Jeg føler meg trygg på å kunne koble opp et 12-avlednings EKG»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

35. «Jeg føler meg trygg på å kunne tolke et 12-avlednings EKG mtp. akutte iskemiske tegn»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

CorPuls (multimonitor som brukes prehospitalt i UNN HF)

36. Kjenner du til CorPuls?

☐Nei ☐Ja

Hvis ja, svar på følgende:

37. Hvor mange ganger har du benyttet CorPuls som et hjelpemiddel (trening og reelt)?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

38. «Jeg føler meg trygg på å kunne bruke CorPuls i en akuttsituasjon»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Ultralyd

39. Har du hatt kurs i bruk av ultralyd (eksempelvis eFAST) i en akuttsituasjon?

☐Nei ☐Ja

Hvis ja, svar på følgende:

40. «Jeg føler meg trygg på å kunne ultralyd som hjelpemiddel i en akuttsituasjon»:

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

Nødnett og radiokommunikasjon

41. Har du noen kjennskap til nødnettet og tilhørende radioterminal?

☐Nei ☐Ja

Hvis ja, svar på følgende:

42. Hvor mange ganger har du benyttet deg av radioterminal tilknyttet nødnettet?

☐0 ☐1-5 ☐6-10 ☐11-30 ☐Over 30

43. «Jeg føler meg trygg på å kunne bruke radioterminal korrekt* i en akuttsituasjon»:

*Med korrekt menes rent fysisk hvordan radioterminalen fungerer, men også reglement tilknyttet tale og talegrupper inkludert formidling av pasientsensitiv informasjon

☐Helt uenig ☐Uenig ☐Verken eller ☐Enig ☐Helt enig

TAMS (Tromsø Akuttmedisinske studentforening)

44. Har du deltatt i TAMS utenom timeplanfestet undervisning (førstehjelpsuka og akuttkurset)?

☐Nei ☐Ja

45. Hvis ja, hvor mange arrangementer* i regi av TAMS har du vært med på i løpet av studietiden (gjelder som deltaker og instruktør)?

☐1 ☐2-5 ☐6-10 ☐Over 10

*Arrangementer inkluderer kurs, workshops, casekvelder, undervisninger på og utenfor UiT, Distriktssykehus og instruktørutdanning (N1, N2, N3)

Kurs med fokus på praktisk trening

46. Har du tatt kurs* utenfor timeplanfestet undervisning på medisinstudiet og TAMS som tar for seg praktisk trening av en eller flere av ovennevnte ferdigheter eller prosedyrer?

*Eksempler er kurs i regi av Røde kors, Norsk folkehjelp, Redningsselskapet, PHTLS, AMLS, eFAST, FORF osv. Kurs tatt gjennom ev. tidligere utdanning regnes med. Trafikalt grunnkurs medregnes ikke. NB: Dette er ingen komplett liste.

☐Nei ☐Ja

Hvis ja, utdyp: _____

_____

Takk for din deltakelse! ☺

Dersom du vil være med i trekning av premier, ber vi deg skrive navn og e-post nedenfor, rive løs dette bakerste arket og levere det inn separat. På denne måten vet vi at du har deltatt og kan kontakte deg dersom du vinner, samtidig som det sikrer at anonymiteten vedrørende svarene dine blir bevart.

Det trekkes om følgende premier:

- **5 x middagskort i MH-kantina** (verdi kr 690,-)
- **10 x gavekort Adlibris** (verdi kr 500,-)

Dersom du ikke har tilhørighet i Tromsø, kan du velge bort middagskort til fordel for gavekort hos Adlibris dersom du vinner.

SKRIV MED BLOKKBOKSTAVER

Navn: _____

E-post: _____

Spørsmål og andre henvendelser kan sendes til remi.scott@uit.no.

9 GRADE evaluations

<table>
<tr><td colspan="3">Reference: Dehmer JJ, Amos KD, Farrell TM, Meyer AA, Newton WP, Meyers MO. Competence and confidence with basic procedural skills: the experience and opinions of fourth-year medical students at a single institution. Acad Med. 2013;88(5):682-7.</td><td>Design: Cross sectional study
Grade - quality **</td></tr>
<tr><td>Purpose</td><td>Material/methods</td><td>Results</td><td>Discussion/comments/checklist</td></tr>
<tr><td>To characterize graduating students' self-reported competence and confidence about certain basic medical procedures.
Conclusion
1) Most skills included had been performed infrequently, and participants rated themselves mostly as being unable to perform them independently. For more advanced skills, students were more likely to report low levels of competence and confidence.

2) Strategies need to be implemented in order to improve student experience and competence regarding procedural skills.
Country
United States.
Year of data collection
2011</td><td>Population:
All fourth-year medical students at the University of North Carolina at Chapel Hill at year of data collection.

Data collection:
An online survey quiring the students' competence and confidence with nine procedural skills.

Main outcome variables:
1) If and how many times each procedure had been performed.
2) Confidence level in performing each procedure.
3) Competence in performing each procedure.
4) Desired competence in performing each procedure.

Important confounding variables:
1) Prior experience with medical procedures.
2) Career intentions and individual student motivation.
3) Gender and age.

Statistical methods:
Simple contrasts, and mixed-model ANOVA analyses, with post hoc Student t tests by group for each procedure.</td><td>134 students (86%) answered the survey. Only two of the included procedures had been performed more than twice by over 50% of the participants. For five of the procedures, a significant amount of the students (37-83%) had never performed them.

Four procedures had more than half of the students rating their confidence as average or above, while more than 40% reported no or minimal confidence in the other five.

For actual competence, the reported need of either no or only minor assistance ranged from 11-93% for the various procedures. For all skills, the students suggested a desired level of competence that was statistically significantly higher than their actual level.

A direct correlation was seen between the number of times a procedure had been performed, and the participants' self-reported confidence for all skills but two.</td><td>Checklist*:
Is the purpose clearly described? Yes.
Was the population the sample was selected from clearly defined? Yes, all students in the population were invited to participate.
Was the sample representative for the population group? There might be underlying unknown factors in the individuals in the population that make them more or less likely to participate in the study. However, due to the high response rate, we can assume that the sample is representative.
Was the data sampling standardized? The whole population was given the opportunity to participate. However, due to all participants being from a single study year at a single institution, the sampling is not standardized.
Was the response rate high enough? Yes.
Are objective criteria used for assessment of outcomes? (Classification bias)
No. Outcomes rely on self-reported data from the participants.
Were adequate methods used in data analysis? Yes.
Were the inclusion criteria clearly defined? Yes.
Are there any prognostic / confounding factors described / taken into account in design/analysis?
Separate analyses were conducted on level of confidence based on the collected confounder variables.
Other literature supporting the results? The authors compare their findings with a couple previous studies, with both similarities and differences. They also refer other papers with similar results as themselves.

What the authors discuss as:
Strengths
The high response rates.
Their included procedures mirrored those identified by the AAMC as skills that students should be able to perform on graduation.
Weaknesses
The data is based on students from just one study year at a single institution.
The possibility of reporting bias.</td></tr>
</table>

*Source for checklist: https://www.fhi.no/globalassets/dokumenterfiler/skjema/brukererfaring/k-handbok_11_vedlegg2_sjekklister.pdf

Reference: Abbas A, Bukhari SI, Ahmad F. Knowledge of first aid and basic life support amongst medical students: a comparison between trained and un-trained students. J Pak Med Assoc. 2011;61(6):613-6			**Design: Cross sectional study** Grade - quality: *
Purpose	**Material/methods**	**Results**	**Discussion/comments/checklist**
To assess and compare the knowledge of first aid and basic life support in trained and untrained medical students. **Conclusion** 1) Trained students appeared to have more knowledge regarding first aid than untrained students. However, mean number of correct answers was less than 50% in trained students, deemed as unsatisfactory. 2) First aid knowledge should be reinforced yearly to avoid declination of skill. **Country** Pakistan. **Year of data collection** Not specified.	**Population:** The sample of 125 trained and 125 untrained students of the first four years was taken from three private medical colleges of Karachi. **Data collection:** A pre-tested self-administered questionnaire consisting of 13 questions regarding basic first aid and life support **Main outcome variables:** Mean number of correct responses on questionnaire. **Important confounding variables:** 1) Whether the students were previously trained or not. 2) Number of trained students that had received training from the respective institution. **Statistical methods:** A pre-tested self-administered questionnaire consisting of 13 questions was used to gather data. Chi-square test and Independent samples t-test were applied.	All 250 students answered the questionnaire. 79% of trained students had received training at their university. For six of the questioned procedures, trained students scored significantly higher than untrained students. For the rest of the procedures, no significant differences were seen between the two groups. The mean number of correct responses was 6.13 ± 2.1 for the trained and 4.94 ± 2.06 for the untrained students, with a significant difference reported. No students answered all 13 questions correctly.	**Checklist:** Is the purpose clearly described? *No. The authors describe the objective as assessing and comparing knowledge in first aid between trained and untrained medical students. The level of first aid performance that is investigated is not specified until the methods section.* Was the population the sample was selected from clearly defined? *Partly. They clearly specify what kind of population they sample from, and from where they are sampling. However, they don't specify what they consider a "trained" medical student, and they don't list any inclusion criteria in their paper to help the reader develop their own idea. Year of data collection are not specified either.* Was the sample representative for the population group? *Unlikely. The sampling was specified done as a convenience sampling, likely to ensure equal group sizes. This kind of sampling runs a risk of getting a selection bias, where underlying factors influence the participants' motivation to agree to participate. To add to this, the authors don't specify the total amount of students in the population investigated, and thus we as readers can't know whether the investigated group consists of most of the population, or only a portion of it. Furthermore, the students are sampled from four different study years. The authors don't specify the samples' spread among these four years, or whether there is an equal representation of the various study years in both groups investigated. Uneven distributions are likely to skew the results.* Was the data sampling standardized? *No, one should be careful in generalizing results of data gathered from a convenience sample.* Was the response rate high enough? *Don't know. All included students answered, but they don't specify how many they had to ask.* Are objective criteria used for assessment of outcomes? (Classification bias) *No. Outcome rely on self-reported data from the participants.* Were adequate methods used in data analysis? *Yes.* Were the inclusion criteria clearly defined? *No.* Are there any prognostic / confounding factors described / taken into account in design/analysis? *Besides comparing trained and untrained students, no confounders are discussed.* Other literature supporting the results? *They compare their results with other studies with similar findings regarding knowledge of trained versus untrained students.* **What the authors discuss as:** Strengths and weaknesses? *None discussed.*

Reference: Lai NM, Sivalingam N, Ramesh JC. Medical students in their final six months of training: progress in self-perceived clinical competence, and relationship between experience and confidence in practical skills. Singapore Med J. 2007;48(11):1018-27			**Design: Panel study (prospective observational study)** Grade - quality ****
Purpose	**Material/methods**	**Results**	**Discussion/comments/checklist**
To evaluate final-year's medical students' self-perceived competence in a range of common practical skills before and after a six-month internship. **Conclusion** 1) Most skills saw improvements of varying degree in both experience and confidence during the final stages of medical training. 2) Dedicated training sessions should be provided to cover skills showing inadequate improvement after internship period. **Country** Malaysia **Year of data collection** August 2005 – February 2006	**Population:** 65 participants were sampled from final-year medical students at the International Medical University of Malaysia **Data collection:** A Likert item-based survey consisting of 44 items regarding practical and personal skills was administered at the beginning and end of the students' internship period. **Main outcome variables:** 1) Change in self-perceived competence 2) Change in experience in performing common procedures 3) Correlation between prior experience and confidence 4) Change in personal skills 5) Perception of the most daunting part of being a doctor 6) Change in readiness for work **Important confounding variables:** Additional confounders are included in the discussion as potential variables to investigate in further. **Statistical methods:** Cronbach's alpha for reliability analysis, as well as Mann-Whitney U test and Spearman's correlation	64 and 63 students returned the first and second survey, respectively. When comparing the surveys, authors saw significant increases in all their outcome variables for many of the skills includes. Many items had a positive trend, although not significant at their determined 0.01 level, and a few items had minimal improvement, either due to a high score in their first survey, or lack of practice in their internship. Significant, but moderate correlations were seen between experience and self-perceived competence for all common practical skills included. At the end of the internship period, the students were more prepared for clinical work.	**Checklist:** Is the purpose clearly described? *Yes.* Was the population the sample was selected from clearly defined? *Yes.* Was the sample representative for the population group? *Way of sampling or percentage of total population are not mentioned.* Were all participants at the same stage of education? *Yes.* Was the data sampling standardized? *Can't tell.* Was the response rate high enough? *98 and 97% respectively from the two surveys, so yes.* Are objective criteria used for assessment of outcomes? (Classification bias) *No, outcome rely on self-reported data from participants.* Were adequate methods used in data analysis? *Yes.* Were the inclusion criteria clearly defined? *None were mentioned besides being a final-year medical student.* Was the study prospective? *Yes.* Are there any prognostic / confounding factors described / taken into account in design/analysis? *They attempt to adjust for the various outcome variables in order to better explain their findings.* Other literature supporting the results? *Their results are compared with those published from other medical schools, with similar results.* What does the findings mean for change of practice? *The authors ask for implementation of programs meant to offer students dedicated training in skills which are reported as inadequate.* **What the authors discuss as:** Strengths *Their questionnaire underwent assessment of content validity, internal reliability and pilot testing before distribution, and they investigate a wide range of skills.* Weaknesses *Self-reports and the following risk of personal bias. More objective measures might be more useful indicators to measure.*

Reference: de Ruijter PA, Biersteker HA, Biert J, van Goor H, Tan EC. Retention of first aid and basic life support skills in undergraduate medical students. Med Educ Online. 2014;19:24841			**Design: Cohort study** Grade - quality **
Purpose	**Material/methods**	**Results**	**Discussion/comments/checklist**
To assess retention of skills in first aid (FA) and basic life support (BLS) in first-year medical students one and two years after going through a newly implemented FA and BLS course. **Conclusion** Long-term retention of skills related to FA and BLS after a compulsory course in the first study year is poor. However, their ability to conduct an adequate check for vital signs as well as to commence CPR correctly was retained longer. **Country** The Netherlands **Year of data collection** 2006-2009(?)	**Population:** 349 first-year medical students who attended their compulsory FA- and BLS-course at Radboud University in Nijmegen, the Netherlands(?), from which 120 students from two different student cohorts undergoing the course at different times were randomly sampled. **Data collection:** Participants were randomly assigned to various practical stations covering various aspects of FA- and BLS-skills, and their performance were assessed by trained student-instructors according to a standard checklist. Each student started at the highest possible score, and points were subtracted when a practical part of the station was conducted inadequately. **Main outcome variables:** The primary outcomes were whether the students passed or failed the testing stations: 1) Passed all stations 2) Passed FA but failed BLS 3) Passed BLS but failed FA 4) Failed all stations Other outcomes were the separate scores at the skills stations at 1- and 2-years follow-up.	At the first follow-up, only 2% of the 94 students passed all stations, while 68% failed all stations. At the second follow-up, 5% of the 66 students passed all stations, while 50% failed all. However, among those who failed the first follow up, more than 90% could adequately perform as assessment of ABC. The main reasons for failure at the BLS station were inadequate ventilation and compression depth. The success rated of both FA and BLS stations were significantly lower than the initial test scores. A significant decline in scores were seen between the initial test and the two follow-ups. However, no significant differences between the two follow-up tests were seen. No significant differences were seen between the two cohorts at the initial assessments. However, at the first follow-up, the first cohort scored significantly lower than the second. No differences were seen in the second follow-up.	**Checklist:** Is the purpose clearly described? *Yes.* Were the cohorts sampled from the same population? *Yes.* Were the groups comparable regarding important background factors? *Yes.* Was the population the sample was selected from clearly defined? *Partly. The paper doesn't specify from which university the students are sampled from, and thus the reader has to make a qualified guess based on the affiliation of the authors.* Was the sample representative for the population group? *Yes, the sampling was conducted at random.* Were all participants at the same stage of education? *All participants were at the same study year, however the two cohorts went through the initial assessment at two different times.* Was the data sampling standardized? *Yes.* Was the response rate high enough? *Yes. 34% of the population was asked to participate in the follow-up courses. 78% of the asked students participated in the first follow-up, and 70% of those who participated in the first follow-up, also took part in the second follow-up.* Are objective criteria used for assessment of outcomes? (Classification bias) *Partly. The authors specify that the instructors scored the participants according to a standard checklist, based on the ABCDE approach and the ERC guidelines from 2005. However, the possibility of the scoring being afflicted in some degree by subjectivity of the instructors can't be ruled out.* Were the exposition and outcomes measured similarly for both groups? *No, there were four months between initial assessments of the two gropus.* Were adequate methods used in data analysis? *Yes.* Were the inclusion criteria clearly defined? *No particular inclusion criteria are mentioned; however, they include a study flow-chart covering causes of exclusion.* Was the study prospective? *Yes* Are there any prognostic / confounding factors described / taken into account in

	Important confounding variables: Age, gender, previous academic courses done at the university. **Statistical methods:** Power analysis before sampling. Unpaired t-tests, chi-square tests and Mann-Whitney U-tests were conducted to compare student demographics and assessment scores. Kruskal-Wallis was used to compare the success rates between the initial test-scores and follow-up test-scores to assess long-term retention. The two student cohorts were also compared to investigate the effect of different time intervals between the initial course and the two follow-up sessions.		design/analysis? *Yes, they discuss demographic factors as potential confounders for retention of the skills investigated, however they specify that age and gender were not significantly different between the cohorts.* Other literature supporting the results? *They compare their findings with existing literature with similar results, however with lower retention that what is reported elsewhere, explained by the lack of clinical exposure in the first year, as well as the long interval period and the strict criteria for scoring.* What do the findings mean for change of practice? *The authors suggest based on the results that the BLS and FA courses should emphasize practical skills and procedural tasks, which are the areas where deterioration is the greatest. They also recommend shorter intervals for repetitive training and early exposure of undergraduate medical students.* **What the authors discuss as:** Strengths *The paper has a significantly lower follow-up and interval time compared to other studies.* Weaknesses *The study design did not allow the authors to analyze the improvement of skills beyond pre-training level, due to this not being assessed in the study. Furthermore, there was a possibility that the participants prepared themselves before the test in order to improve their performance.*

Reference: Falck G, Brattebo G, Brinchmann-Hansen A, Ebbing M. [Self-reported level of skills in practical procedures following internship in general practice]. Tidsskr Nor Laegeforen. 2003;123(16):2265-7.			**Design: Panel study (prospective observational study)**
			Grade - quality ******
Purpose	**Material/methods**	**Results**	**Discussion/comments/checklist**
To investigate the development in self-perceived level of skill in practical procedures among newly graduated doctors from Norway working in rural areas, with focus on gender, degree of guidance, educational institute and the size of their rural area. **Conclusion** During rotational training of newly graduated doctors, the quality of work in rural areas are significantly better than hospitals in more areas, including better guidance. Combined practice of both hospital training and training in rural areas seems necessary for sufficient practical training. **Country** Norway **Year of data collection** 1996-1999	**Population:** All graduated doctors from Norwegian universities between 1996-99 with completed rural rotation. 439/575 doctors gave their answers, giving a respondent rate of 76%. **Data collection:** A Likert item-based survey consisting of items regarding practical skills, general medical competence, skill level in treating emergency-related conditions and general procedures was administered. Variables such as gender, educational institute and size of their rural area of practice was questioned as well. **Main outcome variables:** Self-perceived skill level in practical procedures **Important confounding variables:** Gender, degree of guidance, educational institute and size of rural area of work. **Statistical methods:** Paired samples t-test was conducted to investigate the development of practical skills, while an unpaired samples t-test was used to compare the practical skill level between groups.	All newly graduated doctors scored significantly better on self-perceived practical procedures during their rotation in rural areas compared to hospital rotations. The largest improvement was seen in gynecology and obstetrics, ENT, eye, general public work and laboratory work. 88% of doctors in rural rotation received a personal mentor, compared to 73% in internal medicine and 65% in surgery rotations. The guidance from mentors was deemed significantly better in rural areas, compared to hospitals. No significant difference was found in practical skill level among doctors from different educational institutes, or between gender. The skill development was not dependent on the size of the rural area of work.	**Checklist*:** Is the purpose clearly described? *Yes.* Was the population the sample was selected from clearly defined? *Yes.* Was the sample representative for the population group? *Yes, the whole population group was invited to participate.* Were all participants at the same stage of education? *Yes.* Was the data sampling standardized? *Yes, all participants were sampled the same way* Was the response rate high enough? *Yes, 76% is deemed a high respondent rate.* Are objective criteria used for assessment of outcomes? (Classification bias) *No, outcome rely on self-reported data from participants.* Were adequate methods used in data analysis? *Yes.* Were the inclusion criteria clearly defined? *None were mentioned besides being a newly graduated doctor.* Was the study prospective? *Yes.* Are there any prognostic / confounding factors described / taken into account in design/analysis? *They attempt to adjust for other included variables such as gender, degree of guidance, educational institute and size of rural area of work.* Other literature supporting the results? *Their results are compared with similar research, as well as earlier research conducted in Norway on practical skills in the medical education.* What do the findings mean for change of practice? *The authors ask for improved guidance during the hospital rotations for newly graduated doctors.* **What the authors discuss as:** Strengths *The authors discuss no particular strengths to their study.* Weaknesses *Self-reports and the following risk of personal bias. More objective measures might be more useful indicators to measure.*