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**To cite this article:** Karin Bölenius, Britta Vesterager Stenholt, Ida Torunn Bjørk, Inger Åse Reiersen, Karin Blomberg, Sissel Eikeland Husebø & Monika Ravik (04 Nov 2024): Practical skills taught in Scandinavian nursing education simulation centres: a cross-sectional survey, Scandinavian Journal of Educational Research, DOI: [10.1080/00313831.2024.2419511](https://doi.org/10.1080/00313831.2024.2419511)

**To link to this article:** <https://doi.org/10.1080/00313831.2024.2419511>



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Published online: 04 Nov 2024.



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# Practical skills taught in Scandinavian nursing education simulation centres: a cross-sectional survey

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## ABSTRACT

Practical nursing skills are complex actions that must be taught in bachelor nursing education. There is a lack of comparative research about what simulation-based skills are taught in Scandinavian countries, and this study aims to fill this gap. In 2019, a cross-sectional survey of nursing educators was conducted, and data were analysed using descriptive and non-parametric tests. The study revealed that eight categories of simulation-based practical skills (respiration, activity, elimination, nutrition, skin care, circulation, hygiene, and medication) were taught in all Scandinavian countries, but there were differences in what skills were prioritised within each category. Moreover, the study revealed that the amount of time spent on teaching simulation-based practical skills varied across countries and faculties, with Norway and Sweden spending more time teaching simulation-based practical skills than Denmark. The authors recommend that nursing education prioritise and standardise the practical skills taught in simulation centres in all Scandinavian countries.

## ARTICLE HISTORY



Received 29 June 2023  
Accepted 11 October 2024

## KEYWORDS

Cross-sectional; education; learning; nursing; practical skills; simulation centres

## Background

Over the two last decades, European bachelor nursing education has, through the Bologna Treaty Process, undergone a process to foster greater coherence of educational systems in Europe, seeking to bring more consistency to higher education systems across Europe (EU Directive, 2013/55). This initiative has the potential to benefit the nursing profession by facilitating cross-border mobility and increasing the quality of bachelor nursing education across countries (WHO, 2020). Patient safety is a priority and an essential component of quality nursing care internationally (Barnet et al., 2016; Kajander-Unkuri et al., 2014; Kane et al., 2019; Satu et al., 2013; WHO, 2020) and also in Scandinavian countries Denmark, Norway and Sweden (Helsedirektoratet, 2019; Sosialstyrelsen, 2016; Sundheds-og Ældreministeriet, 2016). A key component in bachelor of nursing education programming is providing students with the necessary support to facilitate learning and development of the

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nursing competence required to practice nursing safely and professionally when providing patient care (Axelsson et al., 2021; Leonardsen et al., 2020; Moradi et al., 2019).

In order to meet the complex needs of patients undergoing care and medical treatment, nurses are required to possess competence in practical nursing skills, as this is an essential part of nurses' daily practice (Ewertsson et al., 2015; Fukada, 2018). Examples of practical skills include inserting catheters, administering injections, and carrying out "bed bath, and mobilisation." Practical nursing skills are complex actions (Bjørk & Kirkevold, 2000; Gregersen et al., 2021; Massey et al., 2020), which incorporate theoretical and practical knowledge, technical aspects, the adjustment of caring intentions to both patient and environment, and the ethical and moral consideration necessary to perform practical skills proficiently (Bjørk & Kirkevold, 2000). The ability to perform practical nursing skills at high quality may impact patient well-being, diagnostic accuracy, and patient safety (Cooke et al., 2018; Ewertsson et al., 2017; Fakhri et al., 2013; Hunter et al., 2018; Liou et al., 2020).

Simulation is a well-established learning strategy in bachelor nursing education (Husebø et al., 2018; Koukourikos et al., 2021; Rajaguru & Park, 2021), designed to meet students' learning objectives (Miller et al., 2021). Simulation offers opportunities for practical skills learning (Axelsson et al., 2021; Cant & Cooper, 2017a; Hayden et al., 2014; Husebø et al., 2018; Lugo et al., 2021; Sørensen et al., 2017; Yilmaz & Sari, 2021). Simulation is an educational approach aiming to replicate clinical practice in a secure learning environment without compromising the patient's well-being (Lioce, 2020). Simulation-based practical skills learning refers to a variety of modalities such as task trainers, role-playing, and computer-simulated patients (Cant & Cooper, 2017b; Downing et al., 2016; Lioce, 2020; Morgaonkar et al., 2017; Nehring & Lashley, 2009; Ravik & Bjørk, 2023). As the simulation aims to replicate reality, a degree of realism is of importance (Ravik & Bjørk, 2023). Realism in simulation-based practical skills learning is reflected through contextual factors and the selection of simulation equipment (Koukourikos et al., 2021; Lioce, 2020; Ravik & Bjørk, 2023). Students learn practical skills in this mimicked reality in preparation to master skills in real professional settings and situations (Cant & Cooper, 2017b; Husebø et al., 2018; Miles, 2018; Ravik et al., 2015; Ravik & Bjørk, 2023), defined as transfer of learning (Marton, 2006). Transfer of learning is a fundamental aspect of appropriate education, and is not merely about the rote application of skills or knowledge from one setting to another (Marton, 2006). It involves a deep understanding of the underlying principles that allow students to adapt and apply their skills to various situations they may encounter in their professional practice. This is particularly crucial in nursing, where professionals often need to make decisions in diverse and unpredictable settings (Dale-Tam & Dale, 2024; Ravik & Bjørk, 2023). Although clinical practice is an important part of bachelor nursing education (EU Directive, 2013/55; Henriksen et al., 2020), providing high-quality practical skills learning experiences for nursing students in clinical practice is reported to be a challenge (Ravik et al., 2017; Ravik & Bjørk, 2021). Consequently, simulation is used widely in the training of student nurses and professionals (Aebersold, 2018; Koukourikos et al., 2021). This means that there is a need for knowledge about what simulation-based practical skills are taught in bachelor nursing educational programmes.

In the Scandinavian countries, the similarities between healthcare services and structures, language, the labour market, geography, sociopolitics, epidemiological environments, and the bachelor nursing education (Bleiklie & Michelsen, 2019; Löfmark et al., 2015) enable nurses to move and work across borders. However, there exists no similar regulation or accreditation agencies regarding the type of simulation-based practical skills or the number of hours required for simulation-based practical skills teaching within different nursing curricula (Husebø et al., 2018). Consequentially, which simulation-based practical skills are selected and taught in bachelor nursing education could vary across Scandinavian countries.

To date, there is no comparative research in bachelor nursing education concerning which practical skills are taught in simulation settings across Scandinavian countries (Husebø et al., 2018). Given the increasing international mobility of health care workers and the pivotal role the performance of practical skills plays in providing safe nursing care, there is a need for more detailed

knowledge regarding what practical skills nursing students have the opportunity to learn during their education, including their time frame for skills acquisition. Understanding these opportunities should be of common interest when it comes to teaching and incorporating simulation-based practical skills in bachelor nursing education curricula in Scandinavian countries.

## **Aim and research question**

The study aimed to describe and compare which practical skills in bachelor nursing education are taught in the academic simulation setting at universities and university colleges in Denmark, Norway, and Sweden. The following research questions were developed:

- Which practical skills are taught and practiced in simulation centres in Scandinavian universities and university colleges?
- How much time is allocated to nursing students' practical skills learning in these simulation centres?
- Is there a difference between Scandinavian countries regarding types of practical skills and time allocated to practice practical skills in simulation centres?

## **Methods**

The present study is part of the project Skill Practice in Nursing Education (SPiNE), which aims to create new knowledge about students' conditions for practical skill learning during bachelor nursing education (Reiersen et al., 2024).

## **Design**

A cross-sectional survey relying on quantitative methodology (Polit & Beck, 2020) was found to be appropriate to describe and compare practical skills in bachelor nursing education that are taught and practiced in simulation centres in Scandinavian countries.

## **Setting**

In the Scandinavian countries, Denmark, Norway and Sweden, simulation-based teaching is a part of bachelor nursing education. In Sweden and Norway, a three-year program in nursing education at a university college or university leads to a Bachelor of Science in Nursing, compared to Denmark, where the program lasts three and a half years. Graduates are eligible for the state examination for licensure as Registered Nurses (RNs) in all three countries. At universities and university colleges in Scandinavian countries, nursing students prepare using simulation-based practical skill learning before entering the clinical learning arena. European Union directives dictates that students must be placed in clinical practice for minimum of 2,300 h (90 ECTS) (Henriksen et al., 2020). In Norway and Sweden, this is equivalent to 50% of the 180 ECTS in bachelor nursing education, and in Denmark, to around 42% of the 210 ECTS in bachelor nursing education. In Norway and Sweden, simulation-based learning corresponds to 15 ECTS points, while it is not specifically scored in Denmark. Teaching is planned and conducted by faculty at each educational institution. This means that faculty nurse educators are responsible for selecting a variety of practical skills to implement in student instruction.

## **Participants**

In November 2019, universities and university colleges offering bachelor nursing education in Denmark ( $n = 6$ ), No ( $n = 14$ ), and Sweden ( $n = 27$ ) were informed about the study in an e-mail and

invited to participate. One university can comprise several faculties with one or several simulation centres. A total of 6 (100%) universities or university colleges from Denmark, covering 14 faculties; 10 (71%) universities or university colleges from Norway including 16 faculties; and 15 (56%) universities or university colleges from Sweden, covering 15 faculties agreed to participate in the study. Universities or university colleges were represented in all regions within each Scandinavian country (north, south, east, and west), and both large universities and smaller university colleges were represented in the sample.

### **Development of the questionnaire**

The self-reported questionnaire was developed by the RiNS members who had prior experience teaching practical skills at universities or university colleges and prior experience teaching students during their clinical placements. The questionnaire was developed based on six educational curricula (two from each country) pertaining to practical skills that were taught at universities or university colleges where the RiNS members were employed. In addition, several of the skills included in the questionnaire were reported as commonly practiced skills in nursing (Ewertsson et al., 2015). The RiNS members formulated questions in each language and discussed formulations through an iterative process. An iterative process aimed to describe the questions in each language and, if needed, in English to simplify understanding and reach a consensus on the meaning and content of each question. Step by step the questions were improved until a consensus was reached.

After identifying common practical skills in curricula and research, *face validity* was achieved through discussions between RiNS members. After consensus was reached in the research group, university faculty members, hospital staff, and nurse educators at simulation centres confirmed whether the types of skills were realistic to investigate, and whether the content of the questionnaire was reasonable. One question about heart and lung resuscitation was removed from the questionnaire due to comments pertaining to a lack of validity in its response alternatives.

After face validity was achieved, the final version of the questionnaire included questions on the number of minutes of training in the simulation centre, and practical skills were grouped into eight nursing skill categories; *activities, elimination, nutrition, skin, respiration, circulation, hygiene, and medication*. A few examples (2–6 examples) of skills within each category were included in the questionnaire, and it was up to the informant from the university/university college to add other practical skills that were taught at their specific university or university college.

### **Data collection**

Data were collected during spring 2019. The head of the nursing department at each university or university college suggested the person they considered to be the most knowledgeable in the domain to answer the questions. The person could be a subject manager or education manager or a main nurse educator in the simulation centre, with an overall responsibility and knowledge about practical skills learning in each university or university college. The referred person from each faculty was invited to participate in the study. After the participants had given informed consent, the questionnaire was distributed by e-mail. If participants had difficulties filling out the questionnaire, they could seek information from a relevant colleague. In addition, all participants were interviewed individually via telephone after they had answered the questionnaire to ensure that important content was not missing in the completed questionnaire. In telephone interviews, researchers could confirm that each informant had understood the questions in a similar manner, which was important when collecting data about, for example, teaching time.

### **Statistical analysis**

Data were added to the statistical package SPSS 22.0 for Windows and analysed with descriptive statistics and non-parametric tests. The statistical significance level was defined as  $p < 0.05$ , and

SPSS (Pallant, 2020) was used for all statistical analyses. For faculties to be credited for teaching a nursing skill category, it was sufficient that the participant ticked off at least one practical skill within each category. Categorical variables (types of skills) were reported as numbers and percentages. *To identify whether there were statistically significance differences between countries*, types of skills were analysed using Fischer's exact 2-sided test.

In order to report *how much time was used to support nursing students' practical skill learning* in simulation centres, the continuous variable "time slot" was reported as medians and quartiles for each category. Due to the group size, and the skew of the time variable, a non-parametric Kruskal – Wallis Test was used to compare scores on time for the three countries. In the Kruskal – Wallis Test, scores are converted to ranks, and the mean rank for each group is then compared. *To identify which country differed statistically significantly from another*, time slots were also analysed using the Mann Whitney U Test. All statistical analyses were confirmed by a statistician (see acknowledgement).

## **Ethics**

The study was approved by the countries' ethical authorities; Norwegian Social Science Data Service (no 365918), The Swedish Ethical Review Authority Dnr; 2021-06095-01, and followed the Declaration of Helsinki and The Danish Code of Conduct for Research Integrity. Participation in this study was voluntary, all participants gave their written consent to participate in the study, and confidentiality was guaranteed. Participants were informed that they had the right to withdraw from the project at any time without giving a reason. No sensitive data were handled in the study, and the only personal data that were handled were names and e-mail addresses. Answering questions might constitute a demanding situation for the participants and may involve some form of risk. In these questions there may be a risk that the person being asked may feel challenged in terms of their professional knowledge (Polit & Beck, 2020). Answering questionnaires can also lead to reflections and follow-up questions. Participants in the present study were offered the opportunity to ask questions after the interviews and were promised feed-back about the study results. It was judged that the benefits of the study outweighed the risk.

## **Results**

### ***Practical skills taught and practiced in Scandinavian simulation centres***

All eight categories of practical skills – respiration, activity, elimination, nutrition, skin care, circulation, hygiene, and medication – were taught and practiced in the simulation centres in all Scandinavian countries. However, faculties did not prioritise similar types of skills within each category (Appendix 1, Table 1).

The number of types of practical skills taught and practiced in the nursing faculties varied as follows: Denmark ( $n = 46$ ), Norway ( $n = 52$ ) and Sweden ( $n = 52$ ). In total, 54 practical skills were reported in the three countries. The types of skills that were most common and equally prioritised in teaching (>70% of faculties) included practicing respiration rate, personal hygiene, oral hygiene, blood pressure measurement, taking pulses, hand washing, administering injections, and urinary catheterisation. The types of skills that were most uncommon in practices (<30% of faculties) were mobilising a patient after a stroke, sampling urine and faeces, post-mortem care, doppler use, and administering eye medication (Appendix 1, Table 1).

### ***Similarities and differences between nursing faculties regarding types of practical skills taught***

At the category level, the only significant differences were found concerned *respiration* ( $p = 0.020$ ) where 71% of faculties in Denmark taught fewer practical respiration skills compared to both

Norway (at 100%) and Sweden (at 93%). There was no significant difference between the three countries related to 30 of the 54 types of practical skills. The 24 types of skills with significant differences between countries were analysed further. Overall, the nursing faculties in Denmark and Norway differed significantly from each other in eight of the types of skills analysed. In comparison, Denmark differed significantly from Sweden in 20 types of skills. Between Norway and Sweden, we found significant differences in 15 types of skills (Appendix 1, Table 1).

### ***Time allocated to supporting nursing students' practical skills development in the simulation setting***

In summary, the results showed differences in the total use of time in skills practice between the three countries (Denmark, Md 1395 min; Norway, Md 2110 min; and Sweden, Md 2055 min) ( $p = 0.041$ ). In addition, there were statistically significant differences in four out of eight categories between the three countries regarding time slots for; *skincare*, *circulation*, *hygiene*, and *medication*, and those skills were further analysed using Mann Whitney U Test (Appendix 2, Table 2).

### ***Differences between countries regarding use of practicing time***

In summary, both Norway and Sweden spent significantly more time on practical skills learning in simulation centres in contrast to Denmark. Faculties from Norway reported significantly more learning time regarding three categories: *circulation*, *hygiene*, and *medication* compared to Denmark. Also, Sweden reported more learning time in two categories of practical skills: *circulation* and *medication* compared to Denmark. Finally, Norway reported more learning time in the *skincare* practical skill category compared to Sweden (Appendix 3, Table 3).

## **Discussion**

We identified practical skills that were taught in Scandinavian bachelor nursing education simulation centres, and how much practice time was allocated to practical skills learning in the simulation centres. Our main finding showed that all eight categories of practical skills (respiration, activity, elimination, nutrition, skincare, circulation, hygiene, and medication) were taught and practiced in the simulation centres covered in this study. However, results showed that the faculties did not prioritise teaching the same types of skills within all categories. In addition, the median time spent teaching practical skills differed between Scandinavian countries.

In the present study, most of the Scandinavian faculties prioritised teaching skills such as blood pressure measurement, administering injections, taking pulses, and urine catheterisation in simulation centres. Our results are confirmed by Axelsson et al. (2021) who reported that those practical skills, in addition to central venous catheter care, peripheral venous catheter insertion, and venous sampling were prioritised in practice in Swedish bachelor nursing educations. However, not all Scandinavian countries in the present study prioritised teaching central venous catheter care or peripheral venous catheterisation in simulation centres and few faculties prioritised teaching skills such as stoma care, urine and faeces sampling, post-mortem care, and administering eye medication, etc. Thus, an interpretation is that there is a lack of a clear and consistent approach regarding how best to prioritise what practical skills should be taught in Scandinavian countries. Similar findings have also been identified in other countries. A study in Australia (Brown et al., 2015), reported a lack of a clear and consistent approach regarding which practical skills should be taught and practiced, and a wide range of practical skills were included in university programming curricula in bachelor nursing education, confirming our results. With shifting demands from the public and changes in health technologies and care delivery there is a need for a coherent curriculum content across educational institutions.

In the present study, Scandinavian faculties described that they frequently taught blood pressure measurement, how to take a pulse, and respiration rate observation at simulation centres.

Interestingly, a Norwegian study (Egilsdottir et al., 2019) reported that measuring blood pressure, taking pulses, and observing respiration rates are frequently practised by students in clinical placements, which is in addition to the present study's results. One interpretation is that certain practical skills are taught at both simulation centres and at clinical placements, while other practical skills are either taught not at all or very little. Egilsdottir et al. (2019) discussed that teaching and repeating the same set of practical skills every year might facilitate great progression in learning different types of practical skills. The same study also highlighted the importance of learning practical skills during direct patient care. Ravik and Bjørk (2023) reported that students who practised inserting a peripheral venous catheter on a fellow student at the simulation centre were more confident with the exercise compared to students who only practiced on a latex arm. One interpretation is that it can be more effective to learn in more realistic health care situations (like a real health care situation) and the prioritisation of resources could motivate moving some skills learning from simulation centres to clinical placements or vice versa. This could be a problem if teaching at clinical placements is haphazard, and universities lack control over what newly-qualified nurses have been taught in terms of practical skills. Nilsson et al. (2017) concluded that the socialisation process at the clinical placements is strong, and if clinical placements have weak learning environments this might negatively influence practical skills learning. A major aim of simulation in simulation centres is to prepare students in a safe environment that allows trial and error before clinical practice, as studies support the idea of knowledge transfer to clinical practice (Aebersold, 2018; El Hussein & Cuncannon, 2022). Barisone et al. (2019) reported nursing students' perceptions of web-based clinical skills learning and highlighted that interactivity, practical exercise, reviewing, and feedback were all associated with improved learning, which makes it reasonable to believe that the setting where teaching is performed is not the most important issue; rather the learning culture and lesson plans are more important when it comes to learning practical skills. Transfer of learning is, however, less explored in nursing education (Tung et al., 2022).

Teaching some types of practical skills, such as the application of sterile gloves, the use of infection equipment, and the administration of medication in infusions, were prioritised in half of the Scandinavian faculties. Both Egilsdottir et al. (2019) and Usher et al. (2018) discussed that skills that impact patient safety were considered important to practise in clinical learning arenas for students to develop confidence in predicting clinical findings that can ensure patient safety. Usher et al. (2018) reported that medication safety and infection control were profoundly important issues for students to understand. Another Australian study performed documentary analyses of university curricula and reported that frequently noted skills in the curricula were medication-related activities noted as medication, medication calculation, and intravenous medication (Brown et al., 2015). One suggestion could be that nursing practical skills reported to have a high influence on patient safety should be harmonised in simulation-based curricula, prioritised, and taught in all simulation centres in all Scandinavian countries so as to prepare students before practice in real patient situations.

Henriksen et al. (2020) argued that we need to teach practical skills that match future healthcare needs. Our results concern several skills that are important in both hospital and home-based healthcare. However, some skills in the category of *activity*, such as positioning and mobilising patients with stroke and helping someone who has fallen to the floor, might receive more attention in simulation centres. This is to meet the needs of home-based care, where nurses encounter these situations daily, including the need to mobilise patients in a variety of contexts and in constrained spaces. Surprisingly, only a few faculties in the present study prioritised teaching skills in the category of *elimination*, such as caring for patients with stoma and providing enemas and urine bottles. In addition, practical skills that are commonly performed in daily nursing care, such as measuring temperatures and blood sugar levels (Ewertsson et al., 2015) are only taught in a few faculty simulation centres in Scandinavian countries. However, preparing and performing infusions are also reported to be an everyday practice in healthcare (Ewertsson et al., 2015), and shown to be



prioritised and practiced at simulation centres in present study, in Sweden and Norway, but not in Denmark. This highlights the need for further research to map out the specific requirements for teaching practical skills concerning both hospital and home-based care settings.

Both Norway and Sweden spent significantly more time teaching practical skills learning in simulation centres in contrast to Denmark. In Denmark, practical skills instruction is moved to clinical practice to a higher degree compared to Sweden and Norway, which can explain the differences. In Denmark, clinical supervisors and/or clinical nurse educators are required to have training in clinical guidance corresponding to 10 ECTS points (Danish Ministry of Education and Research, 2022). Whether the current amount of time allocated for practical skills training in nursing education is sufficient to ensure that students are adequately prepared for the demands of the nursing profession is still unknown and merits research. It can be argued that there is not enough time devoted to practising practical skills, which might lead to inadequate preparation. However, more time for teaching practical skills does not necessarily mean better learning; it also depends on the quality of the teaching and the receptiveness of the learner in the learning process. In the present study, the median time spent teaching practical skills differed between Scandinavian countries and between faculties.

### **Strengths and limitations**

During the work involved in this study, we strived to adhere to the methodology as rigorously as possible. One strength of this study is that all Scandinavian countries are included in the study, and that >50% of the relevant universities and university colleges agreed to participate. We also developed the questionnaire in response to the practical skills taught in the educational curricula of six faculties. The participants were the staff members with the highest knowledge about the skills taught at each faculty, appointed by their respective managers. The participants were also allowed to ask colleagues to help them answer the questions and had the opportunity to complete the form after the interview, and during a follow-up telephone interview. All statistical analyses were performed in consultation with a statistician. However, some challenges were encountered, resulting in limitations to this study. A limitation of the present study is the small sample size, which might limit the transferability of statistical analyses. A methodological review reported that the most common limitation among original trials is related to small sample size, which risks overestimating statistical significance (Alvarez et al., 2021). However, our results are presented with a descriptive perspective. The results in this study cannot be generalised, but may be transferable to another similar context.

There was no validated instrument to investigate the practical skills in question, which might jeopardise the reliability of the collected data. The instrument used in the study was developed in response to earlier research and the practical skill curriculums of RiNS members' faculties, so there is a risk that some practical skills were not included. However, it was possible for participants to add specific skills to the instrument. Simulation with the use of high-fidelity simulators and heart and lung resuscitation were not included in the results of this study.

### **Conclusions and clinical implication**

To understand the opportunities nursing students have to be taught and to practise practical skills in bachelor nursing education in all Scandinavian countries, future research should also address practical skills learning during clinical placements. Our research group (RiNS) argues that faculties in the Scandinavian countries should, to a greater extent, harmonise which practical skills are taught in simulation centres. In response to the results of the present study, we would like to state that providing a more cohesive curricula across Scandinavian countries regarding which practical skills are included in simulation centres might enhance nursing education quality and ensure transparency as to what skills are taught where. We suggest developing a schedule of practical skills for

bachelor nursing education which might be a way of achieving a higher degree of harmonisation between countries, but we also need to explore what the chosen timeframe can mean for the quality of practical skills performance.

## Acknowledgements

The authors would like to express their gratitude to the nurse educators who participated in this study. The authors would like to thank Håkan Jonsson, docent and statistician for valuable statistical input. We will also thank Irene Sommer, participant in RiNS, and education and development nurse, Department of Cardiology, Aarhus University Hospital, Denmark, for valuable inputs and discussions during the project design, and Carsten Nielsen former faculty at VIA University College and former participant in the research group RiNS – Research in Nursing Skills, for participating in data collection. Finally, we would also like to thank all the RiNS members who are no longer part of RiNS but participated in the study design and in data collection.

## Disclosure statement

No potential conflict of interest was reported by the author(s).





## Data availability statement

The SPSS file supporting the results of this study is available from the corresponding author upon reasonable request.

## Authors' contributions

All RiNS members initiated the study and developed the original idea. All authors collected the data, and the first author conducted the statistical analysis in collaboration/discussion with a statistician. The first, second, and last authors wrote the manuscript, and the rest of the RiNS members actively and continuously participated as critical reviewers and discussion partners. All authors read the manuscript critically before approving the final draft.

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## Appendix

**Table A1.** Proportion of types of skills and differences between countries reported by faculties in Scandinavian countries.

Categories and types of practical skills	Dk	No	Swe	Dk, No, Swe	Dk, No	Dk, Swe	No, Swe
	<i>n</i> = 14 <i>n</i> (%)	<i>n</i> = 16 <i>n</i> (%)	<i>n</i> = 15 <i>n</i> (%)	<i>p</i>	<i>p</i>	<i>p</i>	<i>p</i>
Respiration	10 (71)	16 (100)	14 (93)	<b>0.020</b>			
Practicing respiration rate, observation/assessment of vital signs, auscultation	10 (71)	16 (100)	11 (73)	0.048			
Care of tracheostomy, nebuliser, and oxygen equipment	7 (50)	13 (81)	14 (93)	<b>0.029</b>	0.122	<b>0.014</b>	0.600
Suctioning the upper airways	0 (00)	7 (44)	14 (93)	<b>&lt;0.001</b>	<b>0.007</b>	<b>&lt;0.001</b>	<b>0.006</b>
Handling sputum samples	5 (36)	0 (00)	14 (93)	<b>&lt;0.001</b>	<b>0.014</b>	<b>0.002</b>	<b>&lt;0.001</b>
Measuring saturation	9 (64)	4 (25)	13 (87)	<b>0.002</b>	0.063	0.215	<b>0.001</b>
Activity, positioning, and mobilisation of patients	11 (79)	15 (94)	15 (100)	0.104			
Patients with respiration problems	6 (43)	2 (13)	0 (00)	<b>0.006</b>	0.101	<b>0.006</b>	0.484
Patients with stroke	0 (00)	2 (13)	2 (13)	0.526			
Helping someone who fell on the floor	1 (07)	4 (25)	8 (53)	<b>0.020</b>	0.336	<b>0.014</b>	0.149
Positioning patients in bed	12 (86)	11 (69)	14 (93)	0.204			
Mobilisation from bed to chair	10 (71)	6 (38)	14 (93)	<b>0.003</b>	0.081	0.169	<b>0.002</b>
Elimination	12 (86)	15 (94)	15 (100)	0.296			
Stoma care	1 (07)	5 (31)	2 (13)	0.233			
Sampling urine and faeces	3 (21)	2 (13)	2 (13)	0.773			
Urinary catheterisation	13 (93)	15 (94)	14 (93)	1.000			
Providing bedpan	9 (64)	11 (69)	3 (20)	<b>0.013</b>	1.000	<b>0.025</b>	<b>0.011</b>
Administering enema	2 (14)	5 (31)	0 (00)	0.044			
Providing urine bottle	5 (36)	5 (31)	2 (13)	0.373			
Nutrition	12 (86)	12 (75)	15 (100)	0.140			
Handling probes (V-sond Peg)	9 (69)	9 (56)	11 (73)	0.622			
Mapping nutrition	3 (21)	5 (31)	2 (13)	0.551			
Providing nutrition to an elderly person	1 (07)	3 (19)	12 (80)	<b>&lt;0.001</b>	0.602	<b>&lt;0.001</b>	<b>0.001</b>
Helping to eat	10 (71)	10 (63)	13 (87)	0.341			
Helping to eat (parental nutrition)	4 (29)	1 (06)	6 (40)	0.077			
Measuring blood sugar	6 (43)	1 (06)	8 (62)	<b>0.004</b>	0.031	0.449	<b>0.003</b>
Skin care	13 (93)	16 (100)	15 (100)	0.311			
Personal hygiene	12 (86)	14 (88)	12 (86)	1.000			
Prevention of decubitus	6 (43)	8 (50)	4 (29)	0.412			
Measuring temperature	11 (79)	8 (50)	4 (29)	0.050			
Oral hygiene	10 (71)	13 (81)	11 (79)	0.818			
Surgical wound care	7 (50)	9 (56)	8 (57)	1.000			
Basic hygiene routines	0 (00)	6 (38)	15 (100)	<b>&lt;0.001</b>	<b>0.019</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>
Post-mortem care	0 (00)	1 (06)	2 (14)	0.636			
Circulation	13 (93)	16 (100)	15 (100)	0.311			

(Continued)

**Table A1.** Continued.

Categories and types of practical skills	Dk n = 14 n (%)	No n = 16 n (%)	Swe n = 15 n (%)	Dk, No, Swe p	Dk, No p	Dk, Swe p	No, Swe p
Peripheral venous catheterisation	8 (57)	14 (88)	15 (100)	<b>0.006</b>	0.101	<b>0.006</b>	0.484
Blood pressure measurement	13 (93)	16 (100)	14 (93)	0.531			
Central venous catheter care	1 (07)	11 (69)	15 (100)	<b>&lt;0.001</b>	<b>0.001</b>	<b>&lt;0.001</b>	<b>0.043</b>
Taking pulse	13 (93)	15 (94)	14 (93)	1.000			
Compression therapy of venous ulcers	8 (57)	3 (19)	8 (53)	0.059			
Blood transfusion	4 (29)	2 (13)	10 (67)	<b>0.007</b>	0.378	0.066	<b>0.003</b>
Assessment and monitoring of ECG	1 (07)	2 (13)	5 (33)	0.176			
Venous blood specimen collection	0 (00)	1 (06)	12 (80)	<b>&lt;0.001</b>	1.000	<b>&lt;0.001</b>	<b>&lt;0.001</b>
Use of doppler	0 (00)	0 (00)	2 (13)	0.198			
Hygiene	11 (79)	14 (88)	14 (93)	0,489			
Making beds	1 (07)	10 (63)	8 (53)	<b>0.003</b>	<b>0.002</b>	<b>0.014</b>	0.722
Hand washing	11 (79)	15 (94)	13 (87)	0.409			
Handling of waste and textiles	2 (14)	5 (31)	5 (33)	0.484			
Application of sterile gloves	10 (71)	8 (50)	8 (53)	0.484			
Use of infection control equipment	6 (43)	7 (44)	9 (60)	0.607			
Medication	12 (86)	16 (100)	15 (100)	0.092			
Administering infusions	7 (50)	15 (94)	14 (93)	<b>0.004</b>	<b>0.012</b>	<b>0.014</b>	1.000
Administering injections	10 (71)	16 (100)	15 (100)	<b>0.007</b>	0.037	<b>0.042</b>	1.000
Administering opiates	0 (00)	1 (06)	8 (53)	<b>&lt;0.001</b>	1.000	<b>0.002</b>	<b>0.006</b>
Administering insulin	1 (07)	5 (31)	14 (93)	<b>&lt;0.001</b>	0.175	<b>&lt;0.001</b>	<b>0.001</b>
Administering medication in infusion	7 (50)	8 (50)	13 (87)	0.057			
Safe handling of drugs	0 (00)	3 (19)	14 (93)	<b>&lt;0.001</b>	0.228	<b>&lt;0.001</b>	<b>&lt;0.001</b>
Handling of pills	11 (79)	1 (06)	3 (20)	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>0.003</b>	0.333
Administering eye medication	2 (14)	0 (00)	1 (7)	0.193			
Administering inhalations	3 (21)	1 (06)	14 (93)	<b>&lt;0.001</b>	0.315	<b>&lt;0.001</b>	<b>&lt;0.001</b>
Application of cream	7 (50)	0 (00)	0 (00)	<b>&lt;0.001</b>	<b>0.002</b>	<b>0.002</b>	1.000

Dk: Denmark; No: Norway; Swe: Sweden.

Note: *p*-values showing differences between countries measured with Fisher's exact 2-sided. Probability test significant values <0.05 are highlighted in bold.**Table A2.** Differences and similarities in practical skills teaching time between Scandinavian countries.

	n (%)	Total time minutes/hours	Md time minutes	Q1;Q2 minutes	Range minutes	<i>p</i>
Activities						
Denmark	13 (93)	3805/85	235	180;450	90–540	0.156
Norway	16 (100)	3052/68	143	124;298	0–420	
Sweden	14 (93)	3540/79	240	180;275	60–720	
Elimination						
Denmark	14 (100)	2365/53	158	90;231	45–360	0.061
Norway	16 (100)	4110/91	233	180;360	0–405	
Sweden	15 (100)	2952/66	180	64;293	60–555	
Nutrition						
Denmark	14 (100)	1715/38	135	60;180	45–225	0.167
Norway	14 (88)	2742/61	180	101;287	0–390	
Sweden	15 (100)	3158/70	135	90;270	60–720	
Skincare						
Denmark	13 (93)	2725/61	255	135;270	90–315	<b>0.004</b>
Norway	16 (100)	5473/122	263	185;473	135–810	
Sweden	14 (93)	2145/48	128	90;229	64–270	
Respiration						
Denmark	14 (100)	2625/58	180	124;241	90–405	0.442
Norway	16 (100)	2715/60	180	114;225	15–360	
Sweden	14 (93)	3556/79	180	135;270	113–960	
Circulation						
Denmark	14 (100)	3910/87	180	180;408	90–810	<b>0.002</b>
Norway	16 (100)	7838/174	495	203;720	110–990	
Sweden	15 (100)	9279/206	608	450;780	180–1020	
Hygiene						
Denmark	12 (86)	1260/28	90	90;135	45–180	<b>0.029</b>
Norway	16 (100)	2865/64	165	135;240	60–315	

(Continued)

**Table A2.** Continued.

	<i>n</i> (%)	Total time minutes/hours	Md time minutes	Q1;Q2 minutes	Range minutes	<i>p</i>
Sweden	12 (80)	2732/61	128	113;285	90–900	
Medication						
Denmark	13 (93)	2630/58	180	135;288	90–315	<b>0.008</b>
Norway	16 (100)	5255/117	323	248;413	50–675	
Sweden	14 (93)	4505/100	303	248;416	135–515	
Summary						
Denmark	14 (100)	19670/437	1395	1238;2115	990–2330	<b>0.041</b>
Norway	16 (100)	34050/757	2110	1598;2618	1143–3441	
Sweden	15 (100)	31866/708	2055	2040;2656	840–3830	

Md time: Median time; Q1;Q2: Quartile 1 through Quartile 2. *p*-values measured with the non-parametric Kruskal–Wallis Test. Time is reported in minutes and hours, one hour is 45 min (teaching hour). Significant values <0.05 is highlighted in bold. Range minutes = lowest to highest.

**Table A3.** Differences in teaching time of practical skill categories between the Scandinavian countries.

	Dk/No		Dk/Sw		No/Sw	
	Md time in minutes	<i>p</i>	Md time in minutes	<i>p</i>	Md time in minutes	<i>p</i>
Skincare	255/263	0.066	255/128	0.104	263/128	<b>0.001</b>
Circulation	180/495	<b>0.036</b>	180/608	<b>&lt;0.001</b>	495/608	0.154
Hygiene	90/165	<b>0.003</b>	90/128	0.233	165/128	0.211
Medication	180/323	<b>0.003</b>	180/303	<b>0.020</b>	323/303	0.721
Summary	1395/2110	<b>0.013</b>	1395/2055	<b>0.010</b>	2110/2055	1.000

*p*-values measured with the non-parametric Mann–Whitney U Test. Significant values <0.05 is highlighted in bold. Md: Median time in minutes; Dk: Denmark; No: Norway; Sw: Sweden.