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RESEARCH ARTICLE

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Nursing students' perceived stress, self-efficacy, control and evaluation of a course in systematic clinical observation, physical assessment and decision-making: An observational study in Norway

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Abstract

Aim: Simulation-based nursing education interventions have a strong educational effect on psychomotoric skills, but students may experience physiological stress and anxiety during simulation. The aims of this study were to explore (1) nursing students' perceived stress, self-efficacy, control and evaluation before and after simulation as part a structured course in physical assessment, (2) whether factors such as gender, age or previous work experience were associated with perceived stress during simulation and (3) nursing students evaluation of the course.

Design: An observational, cross-sectional study before and after simulation and a course in physical assessment.

Methods: We utilized "the Self-Assessment Manikin for measuring emotion" before and after simulation, a questionnaire to identify symptoms of stress after simulation, and a questionnaire to evaluate the physical assessment course.

Results: A total of 59 students participated. Students perceived stress before simulation but reported a lower degree of activation, a more positive mood, increased feeling of control and self-efficacy after the simulation. They also felt more secure about their assessments. Even though students reported of several symptoms of stress before simluation, the course increased students' self-reported competence and feeling of security.

KEYWORDS
assessment, baccalaureate nursing education, competence, nursing, self-efficacy, simulation

1 | BACKGROUND

Worldwide, there is an extensive increase in the amount of older people, including a greater prevalence of chronic illness and multimorbidity (World Health Organization, 2015). In addition, the demand for emergency and critical care services is increasing (Schell et al., 2018) This leads to a mismatch between healthcare service resources and needs (Chatterji et al., 2015; Sommer et al., 2020; World Health Organization, 2015). The World Health Organization (WHO) claims that primary health care is central for the health system to

adapt and respond to the complex and rapidly changing world. (World Health Organization & Unicef, 2018). Consequently, emergency care is increasingly provided both in hospitals and in primary health care.

The OECD emphasizes nurses' role in improving access to care (Delamaire & Lafortune, 2010), and the need for a rise in educational programmes to train nurses to the required skills and competencies (Maier et al., 2017). Nurses need an ability to work independently, triage, assess, plan, implement and evaluate acute and chronic care and to communicate effectively (World Health Organization, 2020). Physical assessment is assumed a core competency in undergraduate nursing education (Laurant et al., 2018). Such assessments include differentiating between clinical situations needing immediate attention from those that are less acute (Price et al., 2017). Still, integrating physical assessment subjects in the undergraduate nursing curriculum remains challenging (Byermoen et al., 2021; Douglas et al., 2015). A recent study found that nurses perceive that students should learn both basic and advanced technical skills in the educational institution and then practise further in clinical practice (Leonardsen et al., 2020). In contrast, nurses report to receive training in technical procedures such as handling of ventilators, tracheostomia, palliation or dialysis, at work (Leonardsen et al., 2018). Hence, there is no consensus on where nursing students or nurses should learn what, and when.

The use of simulation as a strategy has been shown to improve nurses' ability to identify deteriorating patients (Bliss & Aitken, 2018). Studies indicate that simulation-based nursing education interventions have a strong educational effect on psychomotoric skills and student performance (Kim & Kim, 2015; Shin et al., 2015; Unsworth et al., 2016). Additionally, simulation-based learning has shown beneficial effects on cognitive and affective domains of learning in nursing education (Bliss & Aitken, 2018), and studies indicate that simulation-based learning is effective in improving nursing students' perceived competence, self-efficacy, and learning satisfaction (Hsu et al., 2015; Hung et al., 2021). The WHO describes nurses' professional competence as a framework of skills that reflects knowledge, attitudes as well as psyco-social and psycho-motoric elements (World Health Organization, 2009a). In contrast, self-efficacy is described as an optimistic perception that one believes one has the knowledge, skills or competence required to achieve specific goals and is one of the most common outcomes in evaluating the effects of simulation-based learning (Cant & Cooper, 2017). Hence, it would seem appropriate to include simulation in nursing education, whether in school or in practice, aiming for improving their competence in handling deteriorating patients.

However, studies indicate that students experience an increased physiological stress (cortisol level) and anxiety during simulation practice (McGuire & Lorenz, 2018; Nakayama et al., 2018). Students have also reported either moderate or high stress associated with simulation, even though they rate simulation as a valuable learning tool (Cantrell et al., 2017). Such negative feelings may hamper students' learning outcomes (Jung et al., 2019).

In Norway, nursing services are provided by either Registered Nurses (RNs) or Intellectual Disability Nurses (IDNs). These are both bachelor programmes over three years (180 European Credit Transfer and Accumulation System, ECTS) (Allen et al., 2019; Doody et al., 2013). To date, the difference between RNs and IDNs has not been specified (Auberry, 2018). Both RNs and IDNs need competence in systematic clinical observation, physical assessment and decision-making to be able to provide quality nursing services. The aims of this study were to explore (1) RN and IDN students' perceived stress, self-efficacy, control and evaluation before and after simulation as part a structured course in clinical observation, physical assessment and clinical decision-making, (2) whether factors such as gender, age or previous work experience were associated with perceived stress during simulation and (3) RN and IDN students' evaluation of the course.

2 | METHODS

The study presented here is an observational, cross-sectional study of RN and IDN students partaking a course in systematical clinical observation, physical assessment and clinical decision-making. The Norwegian Centre for Research Data (NSD) approved the study (reference no. REDACTED). In Norway, studies including healthcare personnel/students do not need approval from an ethics committee. The study was based on research ethical guidelines as presented in the Declaration of Helsinki (World Medical Association, 2015), and on confidentiality, anonymity and, on willing, informed consent to participate.

2.1 | Setting and participants

The study was conducted in a university college in Southeastern Norway.

We used a consecutive sampling procedure. Both RN (N = 162) and IDN (N = 59) students in their last semester of the educational programme were invited to partake the course and to participate in the study. Information about the study was presented on the students' class websites, as well as oral in their classrooms. Students were invited to sign up for the course through a digital survey programme (Questback®), and selection of the respondents was based on a first "first come, first served" principal. Beyond this, we had no inclusion or exclusion criteria. A letter of consent to participate was presented and signed prior to participation. All students who were willing to participate were invited to the course and included in the study.

2.2 | The course

The proAct course® was developed in 2013 by an ideal group of physicians and nurses in Norway and Sweden, experienced in emergency medicine and critical care (proAct Norge, 2020). The

purpose of the course is to introduce tools to healthcare personnel to ensure patient safety in illness deterioration or acute illness. The course has been implemented as mandatory for healthcare personnel in several primary and hospital healthcare services nationally.

Prior to the course participants are demanded to read a coursebook and to do a digital test to ensure that they are theoretically prepared. The course then consists of a theoretical part, practical skills training and simulations. The theoretical part, lasting for approximately 2,5 hours, includes a lecture containing:

- A-B-C-D-E-F (Airway- Breathing - Circulation - Disability - Exposure - Further care) evaluation of the patient (Olgers et al., 2017)
- NEWS 2 (National Early Warning score), an internationally acknowledged clinical risk score (Sperrin et al., 2020)
- Crisis resource management (CRM), which focuses on specific skills and competencies areas: communication, situational awareness, decision-making, problem-solving, teamwork and leadership (Salvetti et al., 2020)
- ISBAR (Identity, Situation, Background, Assessment, and Recommendation), best practice for standardizing communication in health care, structuring critical verbal information, as recommended by the World Health Organization (WHO) (World Health Organization, 2009b)
- Ethical considerations
- MIG (mobile intensive group—rapid response team), established with the purpose to identify high-risk patients in hospitals at an early stage in order to prevent deterioration in their condition and potentially improve their outcome (Jones et al., 2016)

The simulation consists of four different settings were participants "meet" patients with critical illness and are asked to systematically observe, score, assess and decide for actions in collaboration with others. Each simulation lasts 45 minutes, with 15 minutes in-between scenarios.

The proAct course was per May 2021 not offered to educational institutions in either Norway or Sweden.

2.3 | The study

As RN and IDN educators with long clinical experience as RNs/IDNs, we assumed that a proAct course would positively prepare the students for their working life as newly educated RNs/IDNs, and thereby increase patient safety and healthcare quality. Hence, we contacted proAct Norway and gained permission to conduct a student course. As recommended, one course include a maximum of 20 participants. Hence, we conducted the course three times in different days. Experienced proACT instructors from the hospital and primary health care conducted the courses.

After the lecture (2.5 hours) students were assigned into groups of five participants, for practical skills training (1 hour). The selected skills were airway handling (A), interventions to optimize breathing (B), intravenous access (C) and emergency equipment. The last section of the course consisted of four different simulations, all including a need for ABCDEF assessments and decision-making, and all lasting for 45 minutes each, with 15 minutes in-between simulations.

2.4 | Data collection

To measure students' perceived stress, self-efficacy and control in relation to the simulation, as well as their evaluation of the proAct course, we utilized different questionnaires:

1. The SelfAssessment Manikin for measuring emotion (SAM) (Bradley & Lang, 1994) was completed prior to and after the students' second simulation respectively (the nature of this spesific simulation varied between students). Here, we included four items from the SAM, which we assumed related to students' perception of stress and anxiety (Lugo et al., 2021), namely mood, activation, control and self-efficacy. The SAM also includes an evaluation, where respondents are asked how secure they feel about their own assessments. Items were scored from 1–9 (mood- 1 = negative and 9 = positive; activation- 1 = calm and 9 = excited; control- 1 = suppressed and 10 = dominating). Self-efficacy and evaluation were scored on a scale from 0–100, where 0 = not at all and 100 = completely. Prior to the simulation, students used five minutes to complete the pre-simulation SAM.
2. A questionnaire developed to identify symptoms of stress identified in international literature (Artwohl & Christiansen, 1997), was completed after the students' second simulation. The questionnaire consisted of 14 stress symptoms, which students were asked to report on a scale from 1–7, where 1 = totally disagree, 2 = disagree, 3 = partly disagree, 4 = neutral, 5 = partly agree, 6 = agree, and 7 = totally agree.
3. Three questions related to students' outcome of the second simulation; whether the student perceived that the simulation gave higher self-confidence, gave insight into the students' strengths and weaknesses, and whether the student thought knowledge about diseases is useful when assessing patients' health, scored from 1–5, where 1 = not at all and 5 = very much.

Questionnaires 1–3 were completed during lunch break, lasting for 45 minutes, after the second simulation.

4. A course evaluation questionnaire at the end of the course, including five questions about students' perceived outcome of the overall course, scored from 1 = no, not at all to 5 = yes, to a large extent.

Students also completed a form including gender, age, whether or not they had previous work experience (yes/no), as well as type of

work experience (hospital/nursing home/home-based nursing/other health services/not health services) before partaking the bachelor programme (=independent variables).

The questionnaires were distributed by study nurses not participanting in either lectures, skills training, simulation or analysis/presentation of results and completed in a room separated from where simulations were conducted. Students did not communicate with each others when responding to the questionnaires.

2.5 | Statistical analyses

The Statistical Package for the Social Sciences (SPSS) version 27 was used to analyse the data. Descriptives and frequencies were used to present students' gender, age, years of experience before the bachelor programme and type of work experience, as well as students' reported stress symptoms, evaluation of simulation and evaluation of the overall course. Data are presented as means with standard deviation (normally distributed variables), or as medians and interquartile range (not normally distributed variables) when appropriate. The chi-square test was used to compare students' mood, activation, control and self-efficacy pre- and postsimulation. Pearsons' correlation was used to explore associations between students' reported symptoms of stress and their gender, age and years of experience. All tests were two-sided, using a significance level below .05. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 26 (IBM Corporation, 2019) $P < .05$ was assumed statistically significant.

3 | RESULTS

A total of 59 students participated (N = 59, 26.7%). Their age ranged from 21–52 years, with a mean of 28.6 (standard deviation, SD = 7.5). Female students represented 88.1% of the participants. Table 1 gives a description of the participating students' previous work experience.

3.1 | Pre- and postsimulation

Table 2 gives an overview of students' mood, activation, control, self-efficacy and evaluation pre- and postsimulation.

TABLE 1 Descriptives of respondents' previous work experience (N = 59)

Previous work experience (%)	37.3
Type of work experience (%)	
Nursing home	31.8
Home-based nursing	22.7
Other health services	27.1
Other (not health services)	18.4

Note: Work experience = yes, I have previous work experience before starting on the bachelor programme, in per cent. Frequencies.

Table 2 shows that students experienced a significantly lower degree of activation after the simulation ($P = .04$). Even though not significant, students experienced a more positive mood ($P = .2$), increased feeling of control ($P = .7$) and being more self-efficient ($P = .4$) after the simulation than before. After simulation, students also felt significantly more secure on their assessments than before the simulation ($P = .01$).

3.2 | Reported symptoms after simulation

We chose to recode the values to either disagree (values 1–3), neither disagree or agree (value 4) nor agree (values 5–7). Table 3 gives an overview of students' reported symptoms of stress during simulation.

Table 3 shows that many students experienced symptoms of stress during simulation. The most frequent symptom was "increased pulse" (52.5%), followed by "palpipation" (42.4%). About one of four students also reported of an "uneasy feeling in the stomach" and "tunnel vision," and 20.3 per cent reported an inability to speak.

3.3 | Correlations

Table 4 presents significant correlations between students' previous work experience, age and gender (independent variables) on the stress symptoms reported (dependent variables).

Lacking work experience led to a significantly lower "ability to speak" ($P = .02$), as well as increased "nausea" ($P = .02$). Younger students reported of "dry mouth" more frequent ($P = .04$), and females reported more frequent "loss of fine motorics" ($P = .04$), "chills"($P < .01$) and "loss of hearing" ($P = .02$).

TABLE 2 Students' mood, activation, control, self-efficacy and evaluation pre- and postsimulation (N = 59)

	Presimulation	Postsimulation	
	Mean (SD)	Mean (SD)	*P*-value
Mood	7 (1.6)	7.4 (1.7)	.2
Activation	6 (1.8)	5.2 (2.4)	.04*
Control	5 (1.4)	5.2 (1.7)	.7
Self-efficacy	56.6 (16.3)	60 (19.9)	.4
Evaluation	60.7 (20.3)	73.9 (19.7)	<.01*

Note: Evaluation; How secure are you on your assessments? Scored from 0 = not at all to 100 = completely. Chi-square test, $P < .05$ = significant. *Significant differences. Questionnaire: Self-assessment manikin for self-efficacy and judgement of control. Scoring from 1–9, mood 1 = negative, 9 = positive, activation 1 = calm, 9 = excited, control 1 = suppressed, 10 = dominating. Self-efficacy presimulation: How self-efficient do you think you will be at this simulation? Scored from 0 = not at all to 100 = completely. Self-efficacy postsimulation: How self-efficient did you feel during this simulation? Abbreviation: SD, standard deviation.

3.4 | Evaluation of simulation

Table 5 presents students' evaluation of the simulation.

Table 5 indicates that students felt more self-confident and had gained insight into own strengths and weaknesses after simulation. Almost all students perceived that knowledge about diseases is useful when assessing patients' health.

3.5 | Evaluation of the course

Table 6 shows students' evaluation of the proAct® course.

Table 6 shows that students reported that the course was relevant and increased their competence and feeling of security when assessing and handling acutely ill patients.

4 | DISCUSSION

The aims of this study were to explore nursing students' perceived stress, self-efficacy, control and evaluation before and after simulation as part a structured course in physical assessment, whether factors such as gender, age or previous work experience were associated with perceived stress during simulation and nursing students' evaluation of the course. Results show that students' self-efficacy and control increased after simulation, and they felt more secure on their assessments. Even though students experienced symptoms of stress during the simulation, they appreciated positive outcomes both after the simulation and after the overall course.

Students' experienced a significantly lower degree of activation, a more positive mood, and increased feeling of control and self-efficacy after the simulation than before. After simulation, students also felt significantly more secure on their assessments than before the simulation. This is supported by several studies exploring the impact of clinical simulation on self-efficacy beliefs amongst preregistration and novice nurses (Franklin & Lee, 2014; Pike & O'Donnell, 2010). A recent study showed that the effect of simulation on self-efficacy could be influenced by students' initial perception of mood, activation and control (Lugo et al., 2021). Moreover, students who lack feeling of control and self-efficacy have been reported to experience higher stress levels and also lower learning

TABLE 3 Students' reported symptoms of stress during simulation (N = 59)

	Disagree (%)	Neither disagree nor agree (%)	Agree (%)
Dry mouth	71.2	15.3	13.6
Palpitation	52.5	5.1	42.4
Increased pulse	40.7	6.8	52.5
Ringing in the ears	88.1	5.1	6.8
Unable to speak	78	1.7	20.3
Uneasy feeling in your stomach	67.8	5.1	27.1
Nausea	91.4	1.7	6.9
Tunnell vision	72.4	3.4	24.1
Loss of fine motor skills	84.7	6.8	8.5
Time went slow	83.1	6.8	10.2
Chills	91.5	3.4	5.1
Hearing loss	98.3	–	1.7
Loss of gross motor skills	91.5	3.4	5.1
Muscle tensions	76.3	5.1	18.6

Note: Whether students disagreed or agreed experiencing these symptoms. Scoring: 1 = disagree (values 1–3), 2 = neither disagree or agree (value4), 3 = agree (values 5–7). Descriptive statistics.

TABLE 4 Significant correlations between students' work experience, age and gender (independent variables) on the stress symptoms (dependent variables) reported (N = 59)

	Unable to speak	*P*-value	Nausea	*P*-value
Work experience	0.32	.02	0.31	.02
	Dry mouth			
Age	−0.27	.04		

	Loss of fine motorics	*P*-value	Chills	*P*-value	Loss of hearing	*P*-value
Gender	0.27	.04	0.36	<.01	0.32	.02

Note: Pearsons' correlations, two-tailed. *P*-value significant at a .05 level.

TABLE 5 Evaluation of the simulation (N = 59)

	Median	IQ
To what extent has the simulation given you higher self-confidence?	3	2–4
To what extent has the simulation given you an insight into your strengths and weaknesses?	5	4–5
Do you think knowledge about diseases is useful when assessing patients' health?	5	5–5

Note: Scoring 1 = not at all, 5 = very much. Descriptive statistics.
Abbreviation: IQ, interquartile range.

TABLE 6 Students' assessment of the outcome of the proAct® course (N = 59)

Questions	Median	IQ
Did you find the course relevant?	5	5–5
Do you feel more competent to identify acutely ill patients?	5	4–5
Do you feel more secure in handling acutely ill patients?	4	4–5
Do you feel more secure to ask for help to assess and treat acute ill patients?	5	4–5
Do you know how to ask for help adequate and structured?	5	4–5

Note: Scoring: 1 = no, not at all 5 = yes, to a large extent. Descriptive statistics.
Abbreviation: IQ, interquartile range.

outcomes (Leigh, 2008). Still, studies indicate that simulations are effective in establishing learning environments that help learning outcomes and improve confidence (Norman, 2012). This is supported by findings in the current study.

In our study, many students experienced symptoms of stress such as increased pulse and palpitations during simulation. This is supported by studies indicating that students experience an increased physiological stress and anxiety during simulation practice (McGuire & Lorenz, 2018; Nakayama et al., 2018). In a study of medical students' stress, workload, stress coping skills and clinical performance during simulations, the authors concluded that students' clinical performance was negatively correlated with perceived stress and workload during the scenario ($P < 0.05$) (Anton et al., 2021). Flow during simulation practice has also been shown to be negatively correlated with stress (Kim & Park, 2018).

Moreover, in our study, gender, age and work experience were associated with symptoms of stress during simulation. We have not been able to identify studies exploring such associations. Nakayama et al. (2020) explored factors that may possibly alleviate stress during simulations. They found that, in the face-to-face scene involving vital sign measurements, the presence of peers did not objectively alleviate stress (Nakayama et al., 2020). Jung et al. (2019) found that providing prebriefing and considering students' level of simulation experience may help ensure a safe learning environment during simulations.

In our study, students felt more self-confident and had gained insight into own strengths and weaknesses after simulation. This is supported by several studies stating that simulation-based nursing educational interventions provide strong educational effects, especially in the pshycomotor domain (Kim et al., 2016; Shin et al., 2015; Unsworth et al., 2016). Hence, it is important to focus on factors that may alleviate students' perceived stress in relation to simulation, to optimize learning outcomes.

Students reported that the course was relevant and increased their competence and feeling of security when assessing and handling acutely ill patients. Earlier research indicate that nursing students do not apply all sets of physical assessment skills achieved in their nursing education (Byermoen et al., 2021; Cicoloini et al., 2015; Douglas et al., 2015; Egilsdottir et al., 2019). Barriers to such application are suggested to be the pedagogical methods used in the training, as well as the clinical contexts (Douglas et al., 2015; Egilsdottir et al., 2019; Zambas et al., 2016). Byermoen et al. (2021) has suggested that simulations may provide "reflection-in-action" and "reflection-on-action" that enable students to collect and adequately act upon cues. This is supported by, for example Immonen et al. (2019) who claimed that development in feedback practices and providing students with opportunities for reflection are important in supporting continuous learning processes. Hence, it is important to include time to reflect both during and after simulations.

The proAct® course includes acknowledged elements such as the ABCDEF evaluation approach, NEWS 2 score and ISBAR communication (Myrstad et al., 2020; Olgers et al., 2017; Royal Colleague of Physicians, 2012; World Health Organization, 2009a). Competency in the ABCDE approach is essential to identify unstable patients. Still a study found that this was used in only 33% of cases in an emergency department (Olgers et al., 2017). NEWS2 score has been shown to predict severe disease and in-hospital mortality, superior to other widely used clinical risk scores (Myrstad et al., 2020). Studies also indicate the use of ISBAR for structured communication leads to better flow of information, a reduction in omission of relevant information and an increase in personnel satisfaction (Møller et al., 2013; Nagpal et al., 2013; Petrovic et al., 2014; Reine et al., 2018). Based on our findings, as well as results from earlier research, we suggest that the proAct® course, or similar structured courses including acknowledged tools for clinical observation, assessment and decision-making, are included in the nursing education cirruculum.

4.1 | Limitations

Only 26.7% of the invited students participated. This may threaten the generalizability of our findings. The course was offered in the same period as when students wrote their bachelor thesis. This may have limited the number of participants prioritizing to partake a course including reading a course-book and taking a test, in addition to the course itself.

Only one of the questionnaires were validated. This may limit the validity of our findings. The study was conducted in a research

group consisting of six IDN/RN educators with clinical experience, as well as six RNs working clinically. The questionnaires were thoroughly discussed in the whole group, increasing the face and content validity.

Moreover, both IDN and RN students participated in the course. Due to anonymity issues, we chose not to register whether students were in the IDN or the RN programme. Such registration could have provided information about potential differences between the two different nursing programmes. Still, informal feedback after the three course days indicated that both RN and IDN students had similar experiences both during and after the course.

5 | CONCLUSIONS

Our findings show that students experienced symptoms of stress both before and during the simulation. However, students felt more self-confident and had gained insight into own strengths and weaknesses after simulation. In addition, students reported that the course was relevant and increased their competence and feeling of security when assessing and handling acutely ill patients, which underlines the importance of including such courses in undergraduate nursing education. To achieve an optimal learning outcome is essential that educators are aware that students may perceive stress in relation to simulations and facilitate pre- and debriefs and guide students to develop stress coping strategies.

5.1 | Implications

The proAct® course, or similar structured courses including acknowledged tools for clinical observation, assessment and decision-making, should be included in the nursing education cirruculum. Adaptive stress coping skills may allow nursing students to manage stressful situations and better maintain performance. Hence, such skills should also be included in the nursing education curriculum.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICAL APPROVAL

According to Norwegian legislations, ethical approval for research not including patients is not needed. This study was conducted in-line with research ethical guidelines: willing, informed, written consent to participate was provided, data were handled confidentially, and it is not possible to recognize individuals in the presentation of results.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request

REFERENCES

Allen, D., Purkis, M., Rafferty, A., & Obstfelder, A. (2019). Integrating preparation for care trajectory management into nurse education: Competencies and pedagogical strategies. *Nursing Inquiry*, *26*(3), e12289. https://doi.org/10.1111/nin.12289

Anton, N., Rendina, M., Hennings, J., Stambro, R., Stanton-Maxey, K., & Stefanidis, D. (2021). Association of medical students' stress and coping skills with simulation performance. *Simulation in Healthcare*, *16*(5), 327–333. https://doi.org/10.1097/SIH.0000000000000511

Artwohl, A., & Christiansen, I. (1997). *Deadly force encounters*. Paladin Press.

Auberry, K. (2018). Intellectual and developmental disability nursing: Current challenges in the USA. *Dovepress*, *8*, 23–28. https://doi.org/10.2147/NRR.S154511

Bliss, M., & Aitken, L. (2018). Does simulation enhance nurses' ability to assess deteriorating patients? *Nurse Education in Practice*, *28*, 20–26. https://doi.org/10.1016/j.nepr.2017.09.009

Bradley, M., & Lang, P. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry*, *25*(1), 45–59.

Byermoen, K., Brembo, E., Egilsdottir, Ö., Heyn, L., Moen, A., & Eide, A. (2021). Reflection on actions: Identifying facilitators of and barriers to using physical assessment in clinical practice. *Nurse Education in Practice*, *50*, 102913. https://doi.org/10.1016/j.nepr.2020.102913

Cant, R., & Cooper, S. (2017). Use of simulation-based learning in undergraduate nurse education: An umbrella systematic review. *Nurse Education Today*, *49*, 63–71. https://doi.org/10.1016/j.nedt.2016.11.015

Cantrell, M., Meyer, S., & Mosack, V. (2017). Effects of simulation on nursing student stress: An integrative review. *Journal of Nursing Education*, *56*(3), 139–144. https://doi.org/10.3928/01484834-20170222-04

Chatterji, S., Byles, J., Cutler, D., Seeman, T., & Verdes, E. (2015). Health, functioning, and disability in older adults-present status and future implications. *The Lancet*, *385*(9967), 563–575. https://doi.org/10.1016/s0140-6736(14)61462-8

Cicoloini, G., Tomietto, M., Simonetti, V., Comparcini, D., Flacco, M., Carvello, M., & Manzoli, L. (2015). Physical assessment techniques performed by Italian registered nurses: A quantitative study. *Journal of Clinical Nursing*, *24*, 3700–3706.

Delamaire, M., & Lafortune, G. (2010). *Nurses in advanced roles: Description and evaluation of experiences in 12 developed countries*. https://www.oecd-ilibrary.org/social-issues-migration-health/nurses-in-advanced-roles_5kmbrcfms5g7-en

Doody, C., Markey, K., & Doody, O. (2013). The experiences of registered intellectual disability nurses caring for older person with intellectual disability. *Journal of Clinical Nursing*, *22*(7–8), 1112–1123. https://doi.org/10.1111/jocn.12020

Douglas, C., Windsor, C., & Lewis, P. (2015). Too much knowledge for a nurse? Use of physical assessment by final-semester nursing students. *Nursing & Health Sciences*, *17*, 492–499.

Egilsdottir, H., Byermoen, K., Moen, A., & Eide, H. (2019). Revitalizing physical assessment in undergraduate nursing education- what skills are important to learn, and how are these skills applied during

clinical rotation? A cohort study. *BMC Nursing*, *18*, 41. https://doi.org/10.1186/s12912-019-0364-9

Franklin, A., & Lee, C. (2014). Effectiveness of simulation for improvement in self-efficacy among novice nurses: A meta-analysis. *The Journal of Nursing Education*, *53*(11), 607–614. https://doi.org/10.3928/01484834-20141023-03

Hsu, L., Chang, W., & Hsieh, S. (2015). The effects of scenario-based simulation course training on nurses' communication competence and self-efficacy: A randomized controlled trial. *Journal of Professional Nursing*, *31*, 37–49. https://doi.org/10.1016/j.profnurs.2014.05.007

Hung, C., Kao, H., Liu, H., Liang, H., Chu, T., & Lee, B. (2021). Effects of simulation-based learning on nursing students' perceived competence, self-efficacy and learning satisfaction: A repeat measurement method. *Nurse Education Today*, *97*, 104725. https://doi.org/10.1016/j.nedt.2020.104725

IBM Corporation. (2019). *USA: Armonk*.

Immonen, K., Oikarainen, A., Tomietto, M., Kääriäinen, M., Tuomikoski, A., & Kaucic, M. (2019). Assessment of nursing students' competence in clinical practice: A systematic review of reviews. *International Journal of Nursing Studies*, *100*, 103414. https://doi.org/10.1016/j.ijnurstu.2019.103414

Jones, D., Rubulotta, F., & Welch, J. (2016). Rapid response teams improve outcomes: Yes. *Intensive Care Medicine*, *42*, 593–595.

Jung, K., Min, F.-C., & Young, H. (2019). Psychological safety in nursing simulation. *Nurse Educator*, *44*(2), 6–9. https://doi.org/10.1097/NNR.0000000000000571

Kim, J., Park, J., & Shin, S. (2016). Effectiveness of simulation-based nursing education dependeing on fidelity: A meta-analysis. *BMC Medical Education*, *16*, 152. https://doi.org/10.1186/s12909-016-0672-7

Kim, M., & Kim, Y. (2015). Variables affecting nursing competency of clinical nurses. *Indian Journal of Science and Technology*, *8*(26), 1–9. https://doi.org/10.17485/ijst/2015/v8i26/80758

Kim, M. O., & Park, S. E. (2018). Associations of stress, self-esteem, and collective efficacy with flow in simulation among nursing students: A descriptive cross-sectional study. *Nurse Education Today*, *71*, 193–197. https://doi.org/10.1016/j.nedt.2018.09.033

Laurant, M., van der Boezen, M., Wijers, N., Watananirun, K., Kontopantelis, E., & van Vught, J. (2018). Nurses as substitutes for doctors in primary care. *Cochrane Database of Systematic Reviews*, *7*(7), CD001271. https://doi.org/10.1002/14651858.CD001271.pub3

Leigh, G. (2008). High-fidelity patient simulation and nursing students' self-efficacy: A review of the literature. *International Journal of Nursing Education*, *5*, 1–17.

Leonardsen, A., Bjerkenes, A., & Rutherford, I. (2018). Nurse competence in the interface between primary and tertiary healthcare services. *Nursing Open*, *6*(2), 482–492. https://doi.org/10.1002/nop2.230

Leonardsen, A., Blågestad, I., Brynhildsen, S., Olsen, R., Gunheim-Hatland, L., & Gregersen, A. (2020). Nurses' perspectives on technical skill requirements in primary and tertiary health care. *Nursing Open*, *00*, 1–7. https://doi.org/10.1002/nop2.513

Lugo, R., Hjelmeland, I., Hansen, M., Haug, E., Sütterlin, S., & Grønlien, H. (2021). Impact of initial emotional states and self-efficacy changes on nursing students' practical skills performance in simulation-based education. *Nurs Reports*, *11*(2), 267–278. https://doi.org/10.3390/nursrep11020026

Maier, C., Aiken, L., & Busse, R. (2017). *Nurses in advanced roles in primary care: Policy levers to implementation*. https://www.oecd-ilibrary.org/social-issues-migration-health/nurses-in-advanced-roles-in-primary-care_a8756593-en.

McGuire, K., & Lorenz, R. (2018). Effect of simulation on learner stress as measured by corticol: An integrative review. *Nurse Educator*, *43*(1), 45–49. https://doi.org/10.1097/nne.0000000000000393

Møller, T., Madsen, M., Fuhrmann, L., & Østergaard, D. (2013). Postoperative handover: Characteristics and considerations on improvement. A systematic review. *European Journal of Anaesthesiology*, *30*, 229–242.

Myrstad, M., Ihle-Hansen, H., Tveita, A., Andersen, E., Nygård, S., Tveit, A., & Berge, T. (2020). National Early Warning Score 2 (NEWS 2) on admission predicts severe disease and in-hospital mortality from COVID-19- a prospective cohort study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, *28*(1), 66. https://doi.org/10.1186/s13049-020-00764-3

Nagpal, K., Abboudi, M., Manchanda, C., Vats, A., Sevaldis, N., Bicknell, C., Vincent, C., & Moorthy, K. (2013). Improving postoperative handover: A prospective observational study. *American Journal of Surgery*, *206*(4), 494–501. https://doi.org/10.1016/j.amjsurg.2013.03.005

Nakayama, N., Arakawa, N., Ejiri, H., Matsuda, R., & Makino, T. (2018). Heart rate variability can clarify students' level of stress during nursing simulation. *PLoS One*, *13*(4), e0195280. https://doi.org/10.1371/journal.pone.0195280

Nakayama, N., Ejiri, H., Arakawa, N., & Makino, T. (2020). Stress and anxiety in nursing students between individual and peer simulation. *Nursing Open*, *00*, 1–8. https://doi.org/10.1002/nop2.680

Norman, J. (2012). Systematic review of the literature on simulation in nursing education. *The ABNF Journal*, *23*, 24–28.

Olgers, T., Dijkstra, R., Drost-de Klerck, A., & Ter Maaten, J. (2017). The ABCDE primary assessment in the emrgency department in medically ill patients: An observational pilot study. *The Netherlands Journal of Medicine*, *75*(3), 106–111.

Petrovic, M., Aboumatar, H., Scholl, A., Krenzischek, D., Camp, M., Senger, C., Deng, Y., Chang, T. Y., Xie, Y., Jurdi, Z. R., & Maryinez, E. (2014). The perioperative handoff protocol: Evaluating impacts on handoffs and provider satisfaction in adult perianesthesia care units. *Journal of Clinical Anesthesia*, *27*(2), 111–119. https://doi.org/10.1016/j.jclinane.2014.09.007

Pike, T., & O'Donnell, V. (2010). The impact of clinical simulation on learner self-efficacy in pre-registration nursing education. *Nursing Education Today*, *30*, 405–410.

Price, A., Zulkosky, K., White, K., & Pretz, J. (2017). Accuracy of intuition in clinical decision-making among novice clinicians. *Journal of Advanced Nursing*, *73*, 1147–1157.

proAct Norge. (2020). *Organisering (Organization of the proAct course)*. https://www.proactnorge.org/organisering

Reine, E., Manser, T., & Rustøen, T. (2018). Quality in postoperative patient handover. *Journal of Nursing Care Quality*, *0*(0), 1–8. https://doi.org/10.1097/NCQ.0000000000000318

Royal Colleague of Physicians. (2012). *National Early Warning Score (NEWS) 2. Standardising the assessment of acute-illness severity in the NHS*. https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news-2

Salvetti, F., Gardner, R., Minehart, R., Galli, C., & Bertagni, B. (2020). Crisis resource management in aviation and in healthcare. *International Journal of Advanced Corporate Learning*, *13*(2), 41–56. https://doi.org/10.3991/ijac.v13i2.17035

Schell, C., Wärnberg, M., Hvarfner, A., Höög, A., Baker, U., Castegren, M., & Baker, T. (2018). The global need for essential emergency and critical care. *Critical Care*, *22*, 284. https://doi.org/10.1186/s13054-018-2219-2

Shin, S., Park, J., & Kim, J. (2015). Effectiveness of patient simulation in nursing education: Meta-analysis. *Nurse Education Today*, *35*(1), 176–182. https://doi.org/10.1016/j.nedt.2014.09.009

Sommer, I., Larsen, K., Nielsen, C., Stenholt, B., & Bjørk, I. (2020). Improving clinical nurses' development of supervision skills through an action learning approach. *Nursing Research & Practice*, *2020*, 9483549. https://doi.org/10.1155/2020/9483549

Sperrin, M., Grant, S., & Peek, N. (2020). Prediction models for diagnosis and prognosis in COVID-19. *BMJ*, *369*, m1464. https://doi.org/10.1136/bmj.m1464

Unsworth, J., Melling, A., Tuffnell, C., & Allan, J. (2016). Improving performance amongst nursing students through the discovery of

discrepancies during simulation. *Nurse Education in Practice*, *16*(1), 47–53. https://doi.org/10.1016/j.nepr.2015.07.003

World Health Organization. (2009a). *Nursing and midwifery*. Human resources for health. http://www.who.int/hrh/nursing_midwifery_global

World Health Organization (2009b). *Human factors in patient safety*. Review of topics and tools. Report for methods and measures working group of WHO pateint safety. http://www.who.int

World Health Organization. (2015). *World report on ageing and health*. https://apps.who.int/iris/handle/10665/186463

World Health Organization. (2020). *Competencies for nurses working in primary health care*. https://www.euro.who.int/__data/assets/pdf_file/0004/441868/Competencies-nurses-primary-health-care-eng.pdf

World Health Organization, & UNICEF. (2018). *A vision for primary health care in the 21st century*. https://www.who.int/docs/default-source/primary-health/vision.pdf

World Medical Association (2015). *Declaration of Helsinki- Ethical principles for medical research involving human subjects*. http://www.wma.net/en/30publications/10policies/b3

Zambas, S., Smythe, E., & Koziol-McLaine, J. (2016). The consequences of using advanced physical assessment skills in medical and surgical nursing: A hermeneutic pragmatic study. *International Journal of Qualitative Studies on Health and Well-being*, *11*, 32090. https://doi.org/10.3402/qhw.v11.32090

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