Ph.D. Research protocol

Implementing a TeamSTEPPS® team-training program in a Bachelor of Nursing program to enhance teamwork attitudes and skills

Implementering av TeamSTEPPS®2.0 team-trenings program i en bachelorutdanning i sykepleie for å forbedre holdninger og ferdigheter i teamarbeid

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Contents

Introduction

Teamwork performance is a core competency regardless of professional discipline to meet the needs of the twenty-first-century health system (National Research Council, 2003) and to offer safe and effective health care (WHO, 2011). The healthcare system is rapidly changing, and development of new technology, increased complexity and specialization create a need to work in teams (Meld. St. nr. 10, 2012, Meld. St. nr. 13, 2012, Disch, 2017). Team processes have to be focused already on theoretical and practical studies in nursing education (Aase and Hansen, 2018). The focus in this Ph.D. thesis is to improve the students' teamwork attitudes and skills in a Bachelor of Nursing curriculum.

Background

Effective team performance might have an immediate and positive impact on patient safety (Baker et al., 2005, Manser, 2009). According to the World Health Organization (*WHO*), *Patient safety* is described as the reduction or risk of unnecessary harm associated with healthcare to an acceptable minimum (Runciman et al., 2009). WHO has acknowledged that a redesigning process of care is needed to improve healthcare(WHO, 2011). Norway has developed a national program «I trygge hender 24-7» that has put the patient safety on the agenda in both municipal health services and hospital settings (Helse og omsorgsdepartementet, 2017).

It has been estimated that approximately 70% of adverse events in medical settings are due to a breakdown in teamwork (Joint Commission on Accreditation of Healthcare Organizations, 2005). One essential element to prevent adverse events and create a patient safety culture is having effective team players, which is one of 11 topics in WHO's Patient Safety Curriculum Guide Multi-professional Edition (WHO, 2011). A *team* can be defined as *" a distinguishable set of two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have each been assigned specific roles or functions to perform, and who have a limited life-span membership"* (Salas et al., 1992 p 4). The patient has a key role as part of the team (WHO, 2011). Team *performance* refers to the actual *behavior* enacted by the team (Rosen et al., 2010).

Team training is a systematic method to optimize teamwork skills that combine specific content with opportunities to practice, formative feedback and tools to support the transfer of training to the daily care (Weaver et al., 2014). The ultimate goal of team training and education is to improve patient safety and quality of patient care (Reeves et al., 2017), as well as to develop a culture of safety (Weaver et al., 2013). Both simulation and classroom-based team-training interventions can improve teamwork processes, but learning to be an effective team player requires the learners to

practice teamwork actively. Merely lecturing about the importance of teamwork is not sufficient (McEwan et al., 2017). Implementation of team-training has been associated with improvements in patient safety outcomes (Weaver et al., 2014). Studies with interprofessional teams have been conducted in municipal healthcare (Bridges et al., 2011, Roman et al., 2016), hospital wards (Aase et al., 2016, Oxelmark et al., 2017, Gordon et al., 2017) and acute care settings (Harvey et al., 2013), or as a part of interprofessional education (Anderson, 2016).

Teamwork skills, e.g., communication is included in the framework plan for the Norwegian bachelor of nursing curriculum, expressed as "*nurses shall have learned to be team players and be able to cooperate with users and other professions*" (Ministry of Education and Research, 2008 s 4). Aase et al. (2013) found that all nursing schools in Norway had learning outcomes related to teamwork, but there are still far from all educational institutions that have implemented both theoretical and practical team training. Team-performance is highlighted as a fundamental core competency needed by all health professions to deliver holistic and coordinated care to the patients (UHR, 2015). Research on teamwork with students in a bachelor of nursing curriculum is limited. Some studies have been carried out with bachelor of nursing students and measure parts of teamwork skills as communication skills (Husebø et al., 2011), attitudes to teamwork (Maguire et al., 2015) and self-efficacy (Coppens et al., 2017). Measuring the complexity of team performance requires a broad approach to team processes that lead to effective and safe patient care (Rosen et al., 2010).

Team Strategies to Enhance Performance and Patient Safety (TeamSTEPPS®2.0) is an evidence-based framework and team-training program to improve team performance. The curriculum focuses on the *team structure* and four core TeamSTEPPS®2.0 skills; c*ommunication, leadership, situation monitoring*, and mutual *support*. Each of the four skills is mutually supporting and equally crucial to team success (AHRQ, 2017a). Emphasis is placed on defining team skills, demonstrating the tools and strategies team members can use to gain proficiency in the skills, and identification of tools and strategies that can be used to overcome common barriers to achieve the desired outcome (King et al., 2008).

Using simulation as an approach to training give students the opportunity to practice clinical skills, teamwork, and communication without causing any harm to real patients during training (Bjørk, 2017). Clapper and Kong (2012) claim that TeamSTEPPS®2.0 framework may be a part of any simulation training. Reed et al. (2017) reported significant improvement in both knowledge and team- performance as well as self-efficacy about interprofessional teamwork, by using TeamSTEPPS®2.0 curriculum and simulation as one learning approach. Nursing students showed

positive effects on attitudes toward teamwork after attending TeamSTEPPS®2.0 curriculum and team training within a simulated patient care environment (Maguire et al., 2015).

Rationale

Professional healthcare providers, and nurses in this context, need teamwork skills. Teamwork skills are essential in a patient safety perspective as well as to meet the demands of the Norwegian healthcare service. Team training education and practice are only to a limited extent implemented in the bachelor of nursing curriculums, and there is limited research in a nursing education context. The evidence-based TeamSTEPPS® 2.0 team training framework is not implemented in any bachelor of nursing curriculum in Norway.

Overall and specific aims

The overall aim of the Ph.D. project is to evaluate students' attitudes toward teamwork and team performance after implementing a team-training program in a bachelor of nursing curriculum.

The thesis includes two parts and three papers.

Part 1

The aim of paper 1 is to test the validity and reliability of TeamSTEPPS Teamwork Attitude Questionnaire (T-TAQ) in a nursing student context.

Part 2

The aim of paper 2 is to evaluate the impact of implementing a team-training program concerning nursing students' self-reported attitudes towards teamwork.

The aim of paper 3 is to evaluate nursing student's teamwork performance in a simulated scenario and to describe nursing students' perception of teamwork training and their teamwork skills in clinical practice.

Framework for evaluation

Kirkpatrick's four-level model (1996) of training evaluation criteria has been adapted to assessment in higher education (Praslova, 2010) and will be used for evaluating nursing students teamwork skills. Level one, *reaction* criteria, measures student satisfaction, motivation, and interest in learning. *Level two, learning* criteria, measures change in attitudes due to training, skills improvement and measures of knowledge acquired. Level three, *behavior* criteria, measures to what extent the students transfer the learning to practical behavior due to training. Level four, *results* criteria, measures outcomes that occur due to training (Kirkpatrick, 1996), such as the effect on adverse events, patient satisfaction, mortality and morbidity (Rosen et al., 2012).

This project will evaluate level one, two and three of Kirkpatrick's four levels of evaluation of training.

Method

Part 1

Paper 1

Design: This study has a cross-sectional design.

Sample: Approximately 1500 bachelor of nursing students from year 1-3 from three campuses' will be invited to participate in the study.

Data collection: T-TAQ will be used to collect data. The questionnaire will be transformed electronically into a Questback program to facilitate the data collection. Data collection from 1. semester students will be collected by paper version of the questionnaire. The questionnaire consists of 30 items in five dimensions. The dimensions are team structure, communication, leadership, situation awareness and mutual support. The T-TAQ uses a five-point Likert scale with response options from "strongly disagree" to "strongly agree". The questionnaire is tested for validity and reliability (Baker et al., 2010). The questionnaire is translated into Norwegian and tested for psychometric property in a hospital and interprofessional context (Ballangrud et al., 2019). Study participants demographics, such as age, gender, former higher education and working experience will be collected.

Analysis: The data will be analyzed using confirmatory factor analysis using IBM SPSS statistics 25.0 and AMOS statistics (IBM, 2017)

Part 2

Intervention.

The intervention will be based on the TeamSTEPPS® 2.0 implementing guide (AHRQ, 2017b) as implementing the TeamSTEPPS® 2.0 team-work program requires a thorough plan to succeed (Horsley et al., 2016, Clapper and Kong, 2012, Clapper and Ng, 2013).

Preparation:

- A project group of faculty members is established.
- Two faculty members will attend a master training course in TeamSTEPPS®2.0.
- The faculty has to be informed about TeamSTEPPS® 2.0 concepts and the aim of the study.
- The faculty has to be motivated and trained as instructors.
- Learning outcomes will be determined.

- A timetable for implementation will be made with details of what part of the TeamSTEPPS®2.0 curriculum fits best in each semester. The implementation will start at the beginning of the students' bachelor program.

Action:

- The pedagogic methods are based on the TeamSTEPPS® 2.0 curriculum. This will be done in collaboration with the project group and carried out by the faculty members.

Evaluation:

- Kirkpatrick's level one of evaluation of training, *reaction to training*, will be measured with questionnaire and qualitative focus group interviews in study 3.
- Kirkpatrick's level two of evaluation of training, *learning*, will be measured using T-TAQ in paper 2.
- Kirkpatrick's level three of evaluation of training, *behavior,* will be measured using TPOT and focus group interviews in study 3.

Design: The design is a quasi-experimental study with pre- and post-test.

Sample: We will recruit an intervention group from a bachelor of nursing program with students starting their full-time study autumn 2018 in one campus of a multi-campus university in Norway.

We will recruit a control group from a bachelor of nursing program with students in a similar bachelor of nursing program in two different campuses of the same university.

To detect a mean difference between groups of 0,2(between pre-test and final test) of the construct "situation monitoring". A sample of 129 students in each group will be needed(Alpha <0,5,power 80 and standard deviation 0,54) to find a significant difference (Polit and Beck, 2016 p 396, Brock et al., 2013).

Data collection: The data is collected using T- TAQ. The questionnaire will be transformed electronically into a Questback program to facilitate the data collection. Data collection from 1. semester students will be collected by paper version of the questionnaire. The baseline measurement will be collected before the team-work program starts (1.semester), one at the end of the 2. semester and the last measurement at the end of the 4. semester. Study participants' demographics will be collected, such as age, gender, former higher education and working experience.

Analysis: The data from T-TAQ will be analyzed through descriptive and inferential statistics using IBM SPSS statistics (IBM, 2017).

Paper 3

Design::Mixed methods with explanatory sequential design(Polit and Beck, 2016 p 585). A structured observational design study(Polit and Beck, 2016 p 285) of a simulated scenario using Team Performance Observation Tool (TPOT) and a qualitative interview study will be used.

Simulation-based training: The students will get a mandatory team training started in their 1. semester. In their 4. semester, they will attend a full- scale simulation patient scenario which is a mandatory part of their clinical studies. The students will attend the simulation training in groups of 10-15 students during their clinical practice period. The students will be devided into teams of 3-5 students who will participate in the simulated scenario. The simulated case is designed to require teamwork to achieve the learning outcome safely and effectively. The debriefing will focus on teamwork skills to achieve the learning outcome.

3a: Observational explorative design study of a simulated scenario with expert raters' assessment versus self-assessment.

Sample 3a: 100 bachelor of nursing students in their 4. semester and 3. clinical practice period. The students will attend mandatory simulation-based training in groups of 10-15.

Data collection 3a: TeamSTEPPS®2.0 Team Performance Observation Tool (TPOT) will be used to rate the team performance. TPOT is a 25 item instrument developed by Agency of Healthcare Research and Quality(AHRQ) and United States Department of Defense (DoD) (Agency for Healthcare Research and Quality, 2014) and evaluate 5 domains of team performance. The domains are team structure, leadership, situation monitoring, mutual support, and communication. The TPOT uses a 5-point Likert scale that ranges from 1(very poor) to 5(excellent). The maximum score possible on TPOT is 125 points (Maguire et al., 2014).This has been psychometric tested (Maguire et al., 2014) and will be translated into Norwegian (Brislin, 1970).

- The scenario will be video recorded, two experts in teamwork will independently rate the teams with TPOT.
- The students in the intervention group will be asked to fill in a self-evaluation of the team performance using TPOT before the debriefing session.

- After completing the simulation, the students will be invited to answer a questionnaire to measure Kirkpatrick's level one evaluation, reactions to training. This will be made with Likert scale-rating items based on questionnaire from Weaver et al.

Analysis 3a:

- The data will be analyzed using IBM SPSS statistics program(2017) interrater reliability, test-retest, interrater agreement, and interrater consistency will be used for reliability testing (Zhang et al., 2015, Valentine et al., 2015, Polit and Beck, 2016).
- A comparison analyses will be made between the student's self-evaluation and the expert rater score of the team performance.

3b: A qualitative interview study.

Sample 3b: The intervention group is the same students as in paper 2 in the 4. semester. A convenient sample of 25 students will be recruited to take part in 5 focus-group interviews. (Polit and Beck, 2016) .

Data collection 3b: The students who have attended the team-training program through four semesters and during their 3. clinical practice period. The students are invited to participate in a focus group- interview after the debriefing session of the simulated scenario. The focus of the interviews is perceptions of teamwork training, and experience of using their teamwork skills in clinical practice.

Analysis 3b: The data will be analyzed based on Elo and Kyngäs (2008) qualitative content analysis process. "Content analysis is extremely well-suited to analyzing the multifaceted, sensitive phenomena characteristic of nursing"(Elo and Kyngäs, 2008 p 114)

Ethical perspectives

We will conduct the study according to the Helsinki declaration for ethical principles of research (WMA, 2013). The studies will be applied for approval by the Norwegian Social Science Data Service(NSD) and by the university involved. The departments included in the studies will be informed of and approve the survey and implementation. We will inform the students with the study objectives and the option to withdraw at any point. Attending the education activities in part two will be mandatory,but answering the questionnaires and attending the interview's will be voluntary. The participants will be asked to sign informed consents to use video-recording of the scenario for research purpose.

Relevance and benefits to society

This Ph.D. project will provide the framework and resources to improve nursing education to equip nursing students with the teamwork competencies required in a changing healthcare system. Offering nursing students, the opportunity to develop teamwork skills before they enter the workforce may enhance patient safety.

Publication and communication results

The Ph.D. project will result in an article-based thesis, including three publications in peer-reviewed journals.

Paper 1 : Validation of Team Attitude Questionnaire(T-TAQ) to bachelor of nursing students. The study will be applied for publication in *Nursing Open*. A level 1 open access publication.

Paper 2: Nursing students' attitudes towards teamwork. A longitudinal study. The study will be applied for publication in Nurse Education Today. A level 1 open access publication

Paper 3: Nursing students' team-work performance in a simulated scenario and their perception of their own teamwork skills in clinical practice.. A mixed method study. The study will be applied for publication in Nurse Education Today, a level 1 open access publication.

Results from the studies will be presented at a local research conference in Innlandet, National learning festival NTNU and an international conference in nursing, NETNEP 2020. Half-day seminar to colleges in TeamSTEPPS®2.0 team training program will be conducted. Midtseminar" according to P.hD education will also be a part of the presentation plan.

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Framdriftsplan Tore Karlsen, PhD studie. 1.11.2017- 31.10.2021
Implementering av TeamSTEPPS® 2.0 teamtrenings rammeverk i Bachelor i Sykepleie utdanningen for å fremme teamarbeids holdninger og ferdigheter

Timeframe/milestones	2018V	2018H	2019V	2019H	2020V	2020H	2021V	2021H
Implementation								
Project plan	x							
TeamSTEPPS master training course two days	x							
Apply NSD and institution board included in the studies	x							
Paper 1 Validation of T-TAQ to nursing students								
Detail planning	X							
Recruit students and data collection		x						
Data analysis			x					
Submit paper 1				x				
Paper 2 Attitudes towards teamwork- among nursing students								
Developing implementation strategy	x	x						
Implementation of TeamSTEPPS to curriculum		x	x	x	x			
Recruit students		x						
Data collection with T-TAQ			x		x			
Data analysis					x	x		
Submit paper 2						x		
Paper 3 Nursing students perception of teamtraining in a bachelor of nursing curricullum								
Developing reactions to team training questionnaire				x				
Detail planning					x			
Developing scenarios designed to challenge students in teamwork skills				x				
Translation of TPOT		x	x					
Pilot testing of scenario and TPOT				x				
Recruit students					x			
Data collection simulation and video					x			
Data analyzis of video and students self-assessement of teamwork in a simulated scenario						x		
Data collection 5 Focus group interviews with 15-20 students from week 13-23					x			

Data transcription and analysis						x		
Submit paper 3							x	
Writing Ph.D. thesis					x	x	x	x
International research exchange						x		
Presentation at international conferences						x	x	
Residence duty 25%	x	x	x	x	x	x		
Ph.D. courses								
DSV 350 (10 ect) UIS utvalgte fordypnings-områder i pasientsikkerhet	x	X eksamen						
Smed8004(5 ect) NTNU medisinsk forskning i teori og praksis,				x				
SMED8015 – (7,5 ect) Kvalitative forskningsmetoder		x						
MF9130 (8 ect) UIO innføring i statistikk			x					
SMED8005(3ect) NTNU forskningsformidling			x					
Midtveisevaluering 50%				x				