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# BMJ Open

## A longitudinal team training program in a surgical ward: A qualitative study of nurses' and physicians' experiences with teamwork skills

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3 **A longitudinal team training program in a surgical ward: A**  
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6 **qualitative study of nurses' and physicians' experiences with**  
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9 **teamwork skills**  
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## ABSTRACT

**Objectives:** Teamwork and interprofessional team training are fundamental to ensuring continuity of care and high-quality outcomes for patients in a complex clinical environment. Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) is an evidence-based team training program intended to facilitate healthcare professionals' teamwork skills. The aim of this study is to describe healthcare professionals' experiences with teamwork in a surgical ward prior to- and during the implementation of a longitudinal interprofessional team training program

**Design:** A qualitative descriptive study based on follow-up focus group interviews.

**Setting:** A combined gastrointestinal surgery and urology ward at a hospital division in a Norwegian hospital trust.

**Participants:** A convenience sample of 11 healthcare professionals divided into three professionally based focus groups consisting of physicians (n=4), registered nurses (n=4) and certified nursing assistants (n=3).

**Interventions:** The TeamSTEPPS® program was implemented in the surgical ward from May 2016 to June 2017. The team training program included the three phases: 1) assessment and planning, 2) training and implementation, and 3) sustainment.

**Results:** Prior to implementing the team training program, healthcare professionals were essentially satisfied with the teamwork skills within the ward. During the implementation of the program they experienced that team training led to a greater awareness and knowledge of their common teamwork skills. Improved teamwork skills were described in relation to a more systematic interprofessional information exchange, consciousness of leadership-

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3 balancing activities and resources, use of situational monitoring tools and a common  
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5 understanding of accountability and transparency.  
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8 **Conclusions:** The team training program provided healthcare professionals with a set of  
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10 tools and terminology that supported teamwork behavior, and improved communication in  
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12 daily clinical practice.  
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19 **Trial registration:** The study is part of a larger study<sup>1</sup> with a study protocol registered  
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21 retrospectively on 05.30.17, with trial registration number ISRCTN13997367.  
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23

24 See published study protocol.<sup>1</sup>  
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30 **Keywords:** interprofessional team training, intervention, hospital, patient safety, teamwork,  
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32 qualitative study  
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## 35 36 **Article Summary**

### 37 38 **Strength and limitation of the study**

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- 43 • In this study, the sample of both nursing staff and physicians contribute to  
44 interprofessional experiences in the implementation of a team training program in a  
45 surgical ward.  
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  - 48 • The study intervention was based on an evidence-based team training program with a  
49 standardized curriculum.  
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  - 52 • A longitudinal design enables data collection on three occasions.  
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  - 55 • The sample size was small, which led to a relatively limited number of participants in  
56 the focus group interviews.  
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## INTRODUCTION

Teamwork is fundamental to ensuring a continuity of care and high-quality outcomes for patients in a complex clinical environment, necessitating the need to train across professional silos.<sup>2,3</sup> Team training has been described as a learning strategy in which a learner or group of learners systematically acquire(s) teamwork knowledge, skills, and abilities to impact cognitions, affect, and behaviors of a team<sup>4</sup> Teamwork is found to positively affect clinical performance.<sup>5</sup>

In hospitals, a substantial degree of adverse events is connected to surgery.<sup>6-8</sup> A systematic review by Johnston et al.<sup>9</sup> documents that a delayed escalation of patient care after surgical complications is associated with higher mortality rates, identifying poor communication, hierarchical barriers and high workloads as causal factors. Previous research provides evidence for strategies such as team training to improve the surgical culture<sup>10</sup>, and to have a positive effect on postoperative patient outcomes.<sup>11-13</sup>

Several team training programs have been developed in healthcare.<sup>14</sup> In this paper, we study the implementation of the Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) in a surgical ward. TeamSTEPPS® is a publicly released, evidence-based program based on teamwork theory<sup>15</sup> and change theory.<sup>16</sup> The program was developed by the Agency for Healthcare Research and Quality (AHRQ) in collaboration with the US Department of Defense, and released in 2006.<sup>17,18</sup> TeamSTEPPS®, which is transferable to any healthcare setting, intends to facilitate healthcare professionals' teamwork by optimizing team structure and the team's communication, leadership, situation monitoring and mutual support skills. The basic assumption of the program is that these five teamwork principles are critical for safe patient care.<sup>17</sup>

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3 Systematic reviews have confirmed that team training affects outcomes related to the team  
4 knowledge, attitudes, behaviors of healthcare professionals,<sup>4 19-21</sup> and results e.g. improved  
5 quality.<sup>4</sup> Furthermore, an increased confidence and motivation to apply learned teamwork  
6 skills in daily practice have been experienced by healthcare professionals.<sup>22</sup>  
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13 Quantitative studies of the TeamSTEPPS® program have confirmed improvements in  
14 teamwork and communication,<sup>23 24</sup> patient safety culture,<sup>25-28</sup> efficiency in patient care,<sup>25 26 29</sup>  
15 complications and mortality,<sup>30</sup> falls,<sup>24</sup> and frequency of wrong site/site/person surgery.<sup>23</sup>  
16  
17 Most of the TeamSTEPPS® studies are carried out in the US<sup>31</sup> without any longitudinal  
18 follow-up, and there are currently only a few qualitative studies,<sup>19</sup> e.g., in surgical and  
19 pediatric intensive care,<sup>26</sup> and in cardiothoracic surgery-telemetry.<sup>32</sup> However, there is still a  
20 need for qualitative studies in a surgical ward setting, as the team structure in wards is  
21 different from e.g. the ICU setting, in that physicians are not situated in the ward for extended  
22 periods of time, thus restricting the possibilities for interprofessional reflections.<sup>33</sup>  
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34 The aim of this study is therefore to describe healthcare professionals' experiences with  
35 teamwork in a surgical ward prior to- and during the implementation of a longitudinal  
36 interprofessional team training program. The following research question guided the study:  
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38 How do healthcare professionals experience the teamwork skills communication, leadership,  
39 situation monitoring and mutual support prior to- and during the implementation of an  
40 interprofessional team training program?  
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## METHODS

### Design

The study used a qualitative descriptive design<sup>34</sup> based on semi-structured focus group interviews with healthcare professionals at three time intervals.

### Setting

The study was carried out in a 20-bed combined gastrointestinal surgery and urology ward at a hospital division (198 beds) in a Norwegian hospital trust. The study took place from April 2016 to June 2017. At baseline (November 2015 to March 2016), the ward statistics indicated an average bed occupancy rate of 87%, a mean patient length-of-stay value of 3.18 days, and an admissions rate of 192.2 patients per month. Moreover, the ward's number of full-time positions was 11.5 physicians, 19.3 registered nurses (RNs), 3.1 certified nursing assistants (CNAs), 1.0 head nurses and 1.0 clinical nurse specialists.

The patient care was organized in two interprofessional teams, where the primary members were RNs, CNAs and physicians. The composition of the teams and their duties were predetermined by a daily worklist for the nursing staff, while the physicians had their own worklist, clarifying weekly duties such as surgery, polyclinic and doctors' rounds.

### Sample

A convenience sample<sup>35</sup> of 11 healthcare professionals divided into three professionally based focus groups consisting of physicians (n=4), RNs (n=4) and CNAs (n=3) were recruited from the surgical ward. A request with information about the study and the

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3 researchers was distributed to all healthcare professionals at the ward, where 11 confirmed  
4  
5 their participation, thus constituting the study sample. The sample consisted of eight women  
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7 and three men with varying work experiences and employment within the ward. To secure  
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9 the participants' anonymity, no specification of their background is presented.  
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## 16 **Team training program**

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19 The longitudinal interprofessional team training program was planned and implemented  
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21 according to the TeamSTEPPS®-recommended "Model of Change," and organized into three  
22  
23 phases<sup>17</sup> (see Table 1 and Table 2). A research group initiated the program as part of a larger  
24  
25 research project<sup>1</sup>. Two nurses (one leader) and two physicians (leaders) from the surgical  
26  
27 ward had the main responsibility for the training and implementation of the program. Ahead  
28  
29 of the training, the four healthcare professionals conducted the TeamSTEPPS® 2.0 Master  
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31 Training Course, and were therefore certified as instructors. A more detailed description of  
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33 the program can be found in Aaberg et al. (2019).<sup>36</sup>  
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**Table 1: The team training program based on TeamSTEPPS®**

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- Phase 1) Set the stage and decide what to do – Assessment and Planning** (January 2016 – April 2016)
- Site assessment.
  - A lesson about teamwork in relation to promoting patient safety was conducted with all nurses and physicians to create an awareness of the need for improvement.
  - A training and implementation plan was developed.
- Phase 2) Making it happen – Training and Implementation** (May 2016 – December 2016)
- One day of interprofessional team training in a simulation center was completed for all healthcare professionals in the surgical ward, consisting of six hours of classroom training (lectures, videos, role-plays and discussions) and two hours of a high-fidelity simulation.
  - A change team with members from all ward professions and a former patient was assigned.
  - An action plan was established, based on identified patient safety issues in the ward.
  - One TeamSTEPPS® tool was systematically implemented every month (see Table 2).
- Phase 3) Making it stick – Sustainment** (January 2017 – June 2017)
- The initiatives from the action plan were coached, monitored and integrated.
  - Implementation of a monthly TeamSTEPPS® tools continued.
  - Small victories were celebrated.
  - TeamSTEPPS® refresher courses were held after four (nurses and physicians) and 11 months (nurses).
-

**Table 2:** Implementation of tools at Phase 2 and Phase 3 of the team training program

Phase 2			Phase 3		
2016	Tools	Implementation arena	2017	Tools	Implementation arena
May	Closed-loop <i>Communication</i>	Exchange of critical information	Jan	Debriefs <i>Leadership</i>	Once a week – manager with nursing staff
				Task assistance <i>Mutual Support</i>	Distribution of workload
Jun	ISBAR <sup>1</sup> <i>Communication</i>	Communicating critical information	Feb	STEP <sup>2</sup> <i>Situation Monitoring</i>	Updated in electronic care plan
Aug	Briefs <i>Leadership</i>	Start of every shift	Mar	Two-Challenge Rule <i>Mutual Support</i>	When an initial assertive statement is ignored
Sept	Huddles <i>Leadership</i>	At patient safety whiteboards meeting	May	I-PASS <sup>3</sup> <i>Communication</i>	Handoffs with focus on patient safety risks
Oct	Cross-monitoring <i>Situation Monitoring</i>	Double control by i.v. medication administration			

<sup>1</sup>ISBAR=Introduction, Situation, Background, Assessment, Recommendation

<sup>2</sup>STEP=Status of the patient, Team members, Environment, Progress toward the goal

<sup>3</sup>I-PASS=Illness severity, Patient summary, Action list, Situation awareness and contingency planning

## Data collection

Focus group interviews of healthcare professionals were conducted prior to the team training implementation (baseline=T0), with follow-up interviews after six months (T1) and 12 months (T2) (see Figure 1).

Insert Figure 1 about here.

**Figure 1** An overview of participants, times of the interviews in relation to implementation of a team-training program; N=11 healthcare professionals (four physicians, four RNs and three ANs)

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5 All the interviews took place in a meeting room at the hospital during the daytime. A pilot  
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7 interview was conducted to validate the semi-structured interview guides developed from a  
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9 literature review on teamwork (Supplementary File 1 and 2). The interviews were conducted  
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11 as a dialogue and started with a clarification of the aim of the study, and then followed up  
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13 with questions from the semi-structured interview guide, where the participants were  
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15 encouraged to an open collective activity with a reflection on common experiences<sup>37</sup>. The  
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17 same questions were posed to all focus groups, and follow-up questions were used in order to  
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19 encourage the participants to elaborate and/or clarify their responses<sup>38</sup>. One moderator and  
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21 one observer (made field note) were responsible for conducting the interviews, with the third  
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23 author (AV) as a moderator at T0 and the first author (RB) as a moderator at T1 and T2. At  
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25 T0, the interview referred to generic questions about teamwork at the ward (see Additional  
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27 file 1), while at T1 and T2 interview questions referred to learned teamwork skills based on  
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29 the TeamSTEPPS® framework (see Additional file 2). The field note was approved by  
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31 participants after each interview. The interviews lasted from 25 to 60 minutes (mean= 33  
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33 minutes). All interviews were digitally recorded and transcribed verbatim, and anonymized  
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35 prior to the analysis.  
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## 48 **Data analysis**

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51 A deductive manifest content analysis approach based on Elo and Kyngäs<sup>39</sup> was used to  
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53 analyze the data according to the TeamSTEPPS® framework,<sup>40 41</sup> focusing on the four  
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55 teamwork skills of communication, leadership, situation monitoring and mutual support.  
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6 The analysis process was organized according to three phases: preparation, organizing and  
7 reporting. The first (RB) and third (AV) author conducted the first two phases with input  
8 from the second author (KA), while all three authors conducted the third phase. In the  
9  
10 *preparation phase*, each interview was defined as one unit of analysis, and data from T0, T1  
11 and T2 were analyzed separately. All interviews were read several times in order to become  
12 familiar with the data, and guided by the aim and research questions the researchers obtained  
13 an intimate knowledge of the participants' experiences with teamwork skills. In the  
14  
15 *organization phase*, the authors established a structured analysis matrix, with columns  
16 representing the categories of communication, leadership, situation monitoring and mutual  
17 support. All data was then reviewed for content, and coded according to the four teamwork  
18 categories (without software) (see examples from codebook at T1 in Table 3). The matrix  
19 ended up with 514 codes representing the four teamwork categories. In the *reporting phase*,  
20 results were described using the contents of each of the four teamwork categories. Quotations  
21 were used to enhance and illuminate the categories<sup>42</sup>. To help secure a presentation of results  
22 representing the information provided by the participants, a continuous discussion among the  
23 authors was prominent throughout the reporting phase. Lastly, results have been reported in  
24 accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ)<sup>43</sup>  
25 (Supplementary File 3).  
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**Table 3:** Codebook examples from the qualitative deductive content analysis at T1

Communication	Leadership	Situation Monitoring	Mutual Support
T1:RN,24. Everyone participates in using a closed loop.	T1:RN,94. We allocate the tasks now so that they are distributed more evenly.	T1:RN,80. We have become more vigilant about medication administration.	T1:RN,35. When you know the purpose, you have a greater understanding for reporting a second time concern.
T1:CNA,5. On the classroom training day, we learned to repeat messages, e.g., when we take the phone, which is already done.	T1:CNA,36. The ward management is aware that the whiteboard meetings will take place.	T1:CNA,30. The most important thing about the whiteboard meetings is that there is a proper review of patients after the doctor's rounds.	T1:CNA,56. It's not so easy to speak up if it is something we disagree about compared to when it is something positive.
T1:Ph1,26. Seemed like the nurses were confident about how to present patient information to us.	T1:Ph2,84. If one is to think we are a team, it is natural that the physician who does the round is the leader.	T1:Ph1,69. Whiteboard meetings generate awareness about, e.g., safety routines, nutrition, medication administration, etc., i.e., such things that are good to check.	T1:Ph,43. It is now easier to ask each other, since we know each other better after being in classroom training together.

## Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

## RESULTS

### Teamwork at T0

The healthcare professionals' experiences of the four teamwork skills in the surgical ward prior to the team training program (T0) are described in Table 4.

**Table 4:** Teamwork skills at T0

Teamwork skills categories	
<b>Communication</b>	All healthcare professionals were mostly <b>satisfied with the information exchange</b> within the ward, with the nurse team leader possessing a central position. A busy schedule allowed the RNs, who often had patient responsibility within both teams, to <b>acquire patient information in different ways</b> , from participation in regular team meetings to ad hoc meetings with the team leaders. The CNAs appreciated the “quiet handover” used between shifts. When calling up the physicians on duty, the RNs often <b>checked the phone list ahead of the phone call to be prepared</b> , which means that some physicians needed to have more background information than others do. The physicians also emphasized the importance of proper and relevant information from the RNs who can be trusted.
<b>Leadership</b>	The two core teams each had a <b>team leader throughout the week</b> , which gave the team leader the opportunity to become better acquainted with a patient’s medical history, thereby increasing <b>continuity</b> and simplifying the hospital discharge. Not all of the RNs enjoyed being team leaders due to a heavy workload; however, the physicians were satisfied with the arrangement.
<b>Situation monitoring</b>	The physicians became familiar with the patients during <b>rounds</b> and through the patient’s medical record, mostly discussing patient-related issues in physicians’ meetings. Similarly, the RNs discussed issues related to patients' care in nurse meetings, although this may also have resulted in contact with the physicians. Both RNs and CNAs had an active role in the <b>observation of the patients</b> and updating each <b>patient’s care plan</b> , and they were encouraged to stay bedside during the rounds. The Modified Early Warning Score ( <b>MEWS</b> ) was recently applied, and the physicians were pleased with the new routines, which was highlighted as an excellent tool to quickly determine the degree of illness of a patient. Moreover, the ward was in the initial phase of using a <b>patient safety whiteboard</b> ; thus, these meetings did not work optimally with a frequent absence of the physicians.
<b>Mutual support</b>	The RNs and the CNAs stated that they were flexible in <b>helping each other</b> in the event of an uneven distribution of work, both within the team and between the two teams. However, the teamwork was dependent on openness, and that team members <b>spoke out</b> when they needed help. They felt listened to and respected by the physicians. All three healthcare professionals groups stated that <b>to know each other and have fun together</b> strengthened a good working environment and good teamwork. The physicians highlighted that for the best interest of the patient, good teamwork requires nurses with medical knowledge, clinical experience and continuity with the patient. Nonetheless, the RNs experienced that they did not always have the expected response from the physicians, and the physicians stressed that a large workload requires a prioritization of multiple issues at one time, which may affect the teamwork. According to the RNs, this rarely causes <b>conflicts</b> among the healthcare professionals in the ward. Still, there have been real conflicts, and some have been perceived as a personal attack.

### Teamwork during the 12-month (T1-T2) interprofessional team training program

A summary of healthcare professionals’ experiences with the four teamwork skills during the 12-month team training program are described in Table 5.



**Table 5:** Experiences with teamwork skills at T1 and T2 of the team training program

Categories	T1 (six months)	T2 (12 months)
<b>Communication</b>	<p>Increased awareness in using the closed loop and ISBAR tools.</p> <p>Challenges with using ISBAR when communicating critical information (RNs).</p> <p>The included tools are seen as a common initiative for promoting patient safety.</p>	<p>*</p> <p>—————→</p> <p>RNs more confident in information exchange using ISBAR.</p> <p>ISBAR forms a basis for a more active role for RNs in decision-making.</p> <p>Challenges still exist when using ISBAR during busy shifts.</p> <p>—————→</p> <p>Misunderstandings in work practice are discovered when using the tools.</p> <p>The tools provide information in a more systematic manner.</p> <p>Handoff not properly incorporated.</p>
<b>Leadership</b>	<p>Distribution of work tasks using huddling.</p> <p>RN team leader runs the midday nurse meeting.</p> <p>Physician runs the interprofessional patient safety whiteboard meeting when present, otherwise a RN.</p>	<p>—————→</p> <p>Midday nurse meeting replaced with patient safety whiteboard meeting.</p> <p>RN runs the interprofessional patient safety whiteboard meetings.</p> <p>Head nurse runs the Friday debriefing, evaluating the weekly activities.</p>
<b>Situation monitoring</b>	<p>Double control in i.v. medication administration by use of cross-monitoring.</p> <p>Risk assessment at whiteboard meeting provides awareness of new and/or important patient issues.</p> <p>Nursing plans less prioritized due to patient safety whiteboard meetings.</p> <p>MEWS score prioritized.</p>	<p>—————→</p> <p>Risk assessment at interprofessional patient safety whiteboard meeting established on weekdays, challenges on weekends.</p> <p>—————→</p> <p>MEWS a well-established routine.</p>
<b>Mutual support</b>	<p>Transparency and openness across the healthcare team.</p> <p>Legitimate to express safety concerns.</p> <p>Use of Two-Challenge Rule to resolve disagreements.</p>	<p>—————→</p> <p>—————→</p> <p>—————→</p> <p>Increased awareness of speaking up for the patients.</p> <p>Increased awareness of giving and receiving feedback.</p>

\*The arrow expresses continuity in healthcare professionals' experiences throughout T1 and T2

## Communication, T1 –T2

The RNs experienced having a common set of tools that promote patient safety. Everyone emphasized the “closed loop” tool as important to ensure a common understanding within the team. By using the tool, the RNs detected misunderstandings that could have caused consequences for the patient. Both the CNAs and RNs emphasized that after the 12-month implementation of the team program they used the “closed loop.” They perceived the tool as important, simple to use and promoting patient safety, as exemplified by a CNA:

*If there is a phone call and you receive a message then you repeat the message... to make sure you have got it right – don't you? (T2:CNA,2)*

The RNs found it valuable to have a common understanding of communication skills with physicians at the surgical ward. However, they experienced that physicians from other wards, who were not included in the TeamSTEPPS® program, expressed the feeling that the RNs were criticizing them when using the “closed loop.”

During the implementation period, both the physicians and CNAs experienced the RNs as being more confident in their information exchange, and found "ISBAR" useful when communicating important or critical information over the phone. The RNs experienced the use of “ISBAR” as somewhat challenging, but easier to use when they had enough time. The physicians highlighted that their medical education taught them how to provide information in a systematic manner. In spite of that, they became more aware of systematic communication and repeating messages:

*Well I think everyone... everyone involved has reflected..... and raised one's consciousness regarding it [communication] to a greater extent than if they didn't attend the course. (T2: Ph,11)*

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3 With “ISBAR,” it had become more natural for the RNs to take an active part in patient  
4 treatment. They referred to common, established expectations toward a more active  
5 participation, with “ISBAR” focusing on their perception of the problem and how to handle  
6 it. One RN said:  
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13 *When we call about a deteriorating patient... I previously thought I shouldn't mention*  
14 *anything regarding my ideas on the causes of deterioration. I always thought that was*  
15 *the physician's task. (T2:RN,13)*  
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21 The "Handoff" tools for information exchange during shifts had been introduced late, and  
22 were not properly integrated at the ward. One RN said:  
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26 *Well, then at least you will need sufficient time to reflect before starting to use them*  
27 *[tools]... and that is not always the case, right (T2:RN,45).*  
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31 *Even though it is an easy... an easy tool, I actually think it is one of the hardest as*  
32 *well. (T2: RN,46)*  
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## 39 **Leadership, T1 – T2**

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42 The RNs experienced that TeamSTEPPS® had led to an increased awareness in using  
43 “huddling” and “briefing” at the patient safety whiteboard meetings. One RN explained:  
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48 *We use huddling at the patient safety whiteboard meetings regarding the*  
49 *redistribution of tasks if anyone feels they have too much work, while others have*  
50 *available capacity. (T2:RN,58)*  
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56 The redistribution of work tasks resulted in a more even workload between the two core  
57 teams at the ward.  
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3 At T1, the midday nurse meeting was led by the RN team leaders, whereas the physicians  
4 initially led the interprofessional patient safety whiteboard meetings. The RNs experienced it  
5 as natural that the physicians led the meetings whenever they were present. However, at T2  
6 the midday nurse meeting was replaced with the interprofessional patient safety whiteboard  
7 meeting, led by the RN team leader. The physicians could not always attend the patient safety  
8 whiteboard meeting due to activities in the operating theater, being called for, etc. While  
9 whiteboard meetings took place daily, the weekly “debriefing” took place on Fridays. The  
10 ward head nurse usually led the “debriefing,” which was experienced as useful, as  
11 exemplified by a CNA:  
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24 *It is good to talk things through, expressing issues that are on your mind when it has*  
25 *been a busy week ... also experiencing that debriefing can be fundamental for change.*  
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29 (T3: CNA,30)  
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32 The physicians were more uncertain whether the team training program had led to an  
33 increased awareness of team leadership.  
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## 40 **Situation Monitoring, T1 – T2**

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43 The use of the term “situation monitoring” was new for the healthcare professionals. The  
44 RNs realized that they had always monitored the work system without being aware of the  
45 term. By using the tools, they detected patient safety incidents that could have resulted in  
46 unnecessary harm to the patients. A cross-monitoring of the intravenous medication  
47 administration had been implemented. The RNs experienced that the use of situation  
48 monitoring skills depended on their role in the team. As team leaders, they had to scan what  
49 was going on at the ward, while if situated inside the patient room, they lost sight of other  
50 ongoing issues.  
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3 Six months into the team training program, healthcare professionals experienced a better  
4 functioning of the patient safety whiteboard meetings, though still not optimal since  
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6 physicians did not always attend. After 12 months, everyone experienced the meeting as a  
7  
8 useful and well established arena for monitoring patient risks. They also experienced that the  
9  
10 meeting created an awareness of tasks that needed attention, as described by a physician:  
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15 *Yes, fall prevention, nutrition, medication reconciliation. Well, that's the type of issue*  
16  
17 *that.... it's convenient to check, reminding us of issues that need attention. (T1:*  
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19 *Ph1,69)*  
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23 Despite the benefit of the whiteboard meetings, they were not prioritized on busy shifts  
24 during weekends. Both the RNs and the CNAs were responsible for updating the patient  
25 safety whiteboard according to their patients' needs, and realized that the increased  
26  
27 whiteboard focus negatively affected the updating of the nursing plans.  
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32 During the team training program, the "MEWS" score became a well-established and  
33 systematic routine appreciated by all healthcare professionals. Nevertheless, the physicians  
34 experienced that some nurses did not relate the "MEWS" measurements to the patient's  
35 condition, only using "MEWS" as a recipe. Some experienced that the RNs called them  
36 without getting into the patient's anamnesis from the medical record seen as their common  
37 information exchange system. It was expected that both RNs and CNAs scored their patients  
38 with "MEWS," and exchanged the results with the team leader. They now measured the  
39 patient's pulse and blood pressure more frequently, even though it was described that the  
40 parameters might be overlooked, as pointed out by one CNA:  
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54 *Well, it is worth mentioning regarding MEWS that people tend to forget to measure*  
55  
56 *the pulse themselves. They see the number and then refer to this..... without*  
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3 *acknowledging that the pulse can be as irregular and deviating as ever. (T2:*  
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5 *CNA,47)*  
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## 10 11 **Mutual Support, T1 –T2**

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15 The RNs perceived mutual support to be the teamwork skill creating the most influential  
16 changes at the ward, also considered the most effective to implement. At T1, RNs  
17 experienced increased transparency and openness across the healthcare team. Colleagues  
18 raised problems more directly. It became more legitimate to express concerns and speak up  
19 because the contents could be addressed in relation to the tools and strategies of the training  
20 program. With a common understanding in place, it was easier to use a tool like, e.g., the  
21 "Two-Challenge Rule." A physician referred to an episode, where the RN clearly disagreed  
22 with him and used the tool:  
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34 *There was a patient with.... urine retention with 300 ml of residual urine and you are*  
35 *not supposed to send them home without a catheter... but on that occasion I meant*  
36 *that we could do so. And she [RN] was absolutely right in her judgement..... there are*  
37 *routines for not having that much [residual urine], and since I thought it was right I*  
38 *tried to explain it. (T1: Ph2,61)*  
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46 Moreover:

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49 *It was of course ok, she did what she was supposed to do and it is commendable that*  
50 *they raise it, that they are not afraid of voicing it. (T1: Ph2,62.)*  
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54 The physicians emphasized that it became easier to collaborate on patient treatment with a  
55 mutual and open communication, and they felt that the team program had impacted this. At  
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3 T2, the "Two-Challenge Rule" was used frequently, a strategy they probably used prior to the  
4  
5 program, but as a RN expressed it:  
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8 *Yes we did it [open communication, Two-Challenge Rule]... it was just that we did*  
9  
10 *not have a notion for it. (T2:RN,40)*  
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13 Hence, an increased awareness of using different mutual support tools had been created:  
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16 *You don't accept the response you are given; you rather rephrase the question once*  
17  
18 *or twice if necessary. (T2:RN,102.)*  
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22 Both the RNs and CNAs had become more aware of the importance of feedback. They  
23  
24 evaluated the tools as useful when adverse events occurred, and in that context experienced a  
25  
26 high degree of support across the interprofessional team. They experienced colleagues being  
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28 less concerned with raising issues through feedback, and according to RNs the "go to the  
29  
30 leader" mentality when dissatisfied was less prominent. The RNs had also seen inexperienced  
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32 RNs who now dared to speak up for the patient. Yet, they still felt that healthcare  
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34 professionals held back on different occasions, implying a continued room for improvement  
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36 within giving and receiving feedback.  
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## 45 **DISCUSSION**

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48 The aim of this study was to describe healthcare professionals' experiences with teamwork in  
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50 a surgical ward prior to- and during the implementation of a longitudinal interprofessional  
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52 team training program. The results describe that RNs, CNAs and physicians were highly  
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54 satisfied with the teamwork at the ward prior to the team training program. Nevertheless, they  
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56 experienced that the implementation of the program, where they were trained together, led to  
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58 a greater awareness and knowledge of their common teamwork skills. Changes were  
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3 described related to a more systematic information exchange, an increased consciousness of  
4 team leadership balancing activities and resources, an increased use of situation monitoring  
5 tools and a common understanding of accountability and transparency.  
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## 11 **Communication - towards a systematic information exchange**

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17 When RNs used the communication tool “ISBAR,” the physicians experienced a more  
18 systematic exchange of patient information, which was highly appreciated. The RNs  
19 experiencing challenges with the use of the tool in the first phase, eventually became more  
20 confident. This finding is in accordance with results from a study in surgical wards, where  
21 both nurses and physicians perceived “SBAR” as effective in obtaining a structure of the  
22 contents of patient reports.<sup>44</sup> Nurses and physicians traditionally communicate using different  
23 styles appropriate to the needs and processes of their respective professions.<sup>45 46</sup> This gap may  
24 be bridged by the use of “ISBAR,” establishing a common communication style. Hierarchical  
25 culture has been experienced by nurses as having a negative effect on interactions with some  
26 physicians.<sup>32</sup> According to De Meester et al.,<sup>47</sup> the use of “ISBAR” may flatten the hierarchal  
27 structure by nurses experiencing being empowered, thereby resulting in more effective  
28 communication channels. The RNs in our study referred to a positive change with  
29 expectations towards a more active participation in patient decision-making. An open  
30 communication with a common language of how to present key patient information can  
31 prevent misunderstandings and communication failures.<sup>48</sup> Interprofessional teamwork is  
32 generally found to motivate and empower staff when team members feel their roles are  
33 acknowledged.<sup>49</sup>  
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## **Leadership – balancing activities and resources**

Leadership was seen as an essential teamwork skill to increase the continuity of patient care, with an even distribution of work tasks and debriefing as essential activities. According to Salas et al.,<sup>15</sup> team leadership provides the ability to coordinate and organize team members' activities. Considering that the team leader possesses knowledge of team resources,<sup>50</sup> they have the opportunity to “balance the workload within the team”.<sup>17</sup> In this study, the redistribution of work tasks was completed at the daily patient safety whiteboard meeting led by the RN team leader. At these meetings, the use of the tool “huddling” was implemented and found useful when balancing work tasks within- and between the two ward teams, which is the intention with the use of huddles.<sup>17</sup> The leader's overview of team activities is essential, with the weekly debriefing meeting described as “fundamental for change” due to the opportunity for healthcare professionals to share their experiences related to patient care as a basis for improvement in procedures or work routines.

## **Situation monitoring - towards a conscious use of tools and interprofessional meetings**

Our study confirmed that the use of the term “situation monitoring” was new for healthcare professionals at the surgical ward, even though they realized they had previously used the skill unconsciously. According to Benner,<sup>51</sup> knowledge development in healthcare consists of spreading practical knowledge and the mapping of existing practical knowledge developed through clinical experience, which the team training program may have contributed to. RNs, CNAs and physicians all experienced an increased attention towards situation monitoring skills throughout the use of MEWS, and at the daily interprofessional patient safety whiteboard meetings established during the team training program period. These meetings

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3 were experienced as useful opportunities for monitoring patients, and for creating an  
4 awareness of necessary tasks. This is in accordance with Sehgal et al.,<sup>52</sup> where nurses were  
5 seen as responsible for accurate and updated information on whiteboards, whereas the goals  
6 for the day should be created jointly by nurses and physicians. The physicians in the current  
7 study appreciated that the nursing staff referred to MEWS when calling them. Early warning  
8 scores are known to have a good prognostic value for patient deterioration, and have been  
9 shown to improve patient outcomes, partly due to their facilitation of communication  
10 between healthcare professionals.<sup>53</sup> Like the physicians, the nurses also saw the importance  
11 of gathering the MEWS scores, while at the same time emphasizing the importance of using  
12 their clinical eye and mind. In their integrative review, Massey et al.<sup>54</sup> found that assessing  
13 and knowing the patient, nurse education and the use of specialized equipment were all  
14 factors with an impact on ward nurses' ability to recognize patient deterioration.  
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### 34 **Mutual support - towards accountability and transparency**

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37 In our study, mutual support was considered as the most effective teamwork skill to  
38 implement, and according to the RNs, contributed to the most comprehensive positive change  
39 at the ward during the team training program. This was despite the fact that healthcare  
40 professionals referred to a ward culture with open communication, including prior to the  
41 training program. Mayer et al.<sup>26</sup> found that by using pre- and post-implementation interviews  
42 of staff in surgical intensive care units, the informants described an overall improved mutual  
43 support with a more positive team morale across physicians and nurses post-implementation.  
44 In a qualitative study conducted by Baik and Zierler,<sup>32</sup> the nurses reported improved changes  
45 in interprofessional relationships, and being more satisfied with their work because they felt  
46 included as a member of an interprofessional team training intervention. In our study, both  
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3 physicians and nurses experienced that when having a common understanding, it was easier  
4 to use tools such as the “Two-Challenge Rule.” Both RNs and CNAs described that they had  
5 become more aware of giving each other feedback. When adverse events took place, they  
6 experienced a high degree of support across the interprofessional team, which is in  
7 accordance with Weller et al.,<sup>55</sup> who interviewed a surgical team in an operating room,  
8 describing a positive change in information sharing and improved confidence, as well as a  
9 greater awareness of the other team members and the working environment, after conducting  
10 a simulation-based team training program.  
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## 25 **Limitations**

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28 There are several limitations in our study that need to be recognized, as the results may be  
29 influenced by the relatively limited number of participants in the focus group interviews. Due  
30 to time pressure and workload in their daily practice at the surgical ward, the healthcare  
31 professional had to repeatedly change their interview times, which may have affected the  
32 results. Two groups of two physicians participated in the interviews after six months, whereas  
33 only one physician had the opportunity to participate after 12 months. A larger group of  
34 physicians may have provided other experiences with the teamwork skills, which may also  
35 have impacted the results that it was mostly the nursing staff attended the refresher courses.  
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## 50 **CONCLUSION**

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53 Our study suggests that during a team training program, healthcare professionals were  
54 provided with a set of tools and terminology that promoted a common understanding of  
55 teamwork, hence affecting behavior and communication in their daily clinical practice at a  
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3 surgical ward. The findings contribute to the qualitative evidence base of the implementation  
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5 of team training programs. More specifically, the study has documented the role of a  
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7 systematic information exchange, a consciousness of leadership and situation monitoring  
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9 skills and the importance of creating a culture of accountability and transparency in a surgical  
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11 ward. Further research should study the long-term sustainability of team training programs on  
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13 healthcare professionals' behavior.  
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24  
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26  
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## 34 **Authors Contributions**

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37 RB (female), KA (female) and AV (female) were responsible for the study design. RB and  
38  
39 AV performed the data collection. RB, KA and AV contributed to the analysis of the data, to  
40  
41 drafting the manuscript, to critically revising it for important intellectual content and to give  
42  
43 final approval of the version to be published. All the authors read and approved the final  
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45 manuscript.  
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## Competing interests

None declared.

## Ethics approval

The study was approved by the Norwegian Center for Research Data (Ref. 46872), the Regional Committees for Medical and Health Research Ethics (2016/78), and permission was given by the head administration in the participating hospitals. Information and an invitation to participate in the study were given to healthcare professionals in written and verbal form, referring to the principle of autonomy addressed by confidentiality and voluntariness. Written consent was obtained from the healthcare professionals, who agreed to participate. The study was conducted in accordance with the principles of the Helsinki Declaration <sup>56</sup>.

## Consent for publication

“Not applicable.”

## Data sharing statement

No additional unpublished data are available from this study.

## REFERENCES

1. Ballangrud R, Husebø SE, Aase K, et al. "Teamwork in hospitals": a quasi-experimental study protocol applying a human factors approach. *BMC Nursing* 2017;16(1):34.
2. Institute of Medicine. Best care at lower cost: The path to continuously learning health care in America. Washington, DC: The National Academies Press 2012.
3. Weller J, Boyd M, Cumin D. Teams, tribes and patient safety: overcoming barriers to effective teamwork in healthcare. *Postgrad Med J* 2014;90(1061):149-54.
4. Hughes AM, Gregory ME, Joseph DL, et al. Saving lives: A meta-analysis of team training in healthcare. *Journal of Applied Psychology* 2016;101(9):1266.
5. Schmutz JB, Meier LL, Manser T. How effective is teamwork really? The relationship between teamwork and performance in healthcare teams: a systematic review and meta-analysis. *BMJ open* 2019;9(9):e028280.
6. de Vries EN, Ramrattan MA, Smorenburg SM, et al. The incidence and nature of in-hospital adverse events: a systematic review. *Qual Saf Health Care* 2008;17(3):216-23.
7. Härkänen M, Ahonen J, Kervinen M, et al. The factors associated with medication errors in adult medical and surgical inpatients: a direct observation approach with medication record reviews. *Scand J Caring Sci* 2015;29(2):297-306.
8. Zegers M, de Bruijne MC, de Keizer B, et al. The incidence, root-causes, and outcomes of adverse events in surgical units: implication for potential prevention strategies. *Patient Safety in Surgery* 2011;5(1):13.
9. Johnston MJ, Arora S, King D, et al. A systematic review to identify the factors that affect failure to rescue and escalation of care in surgery. *Surgery* 2015;157(4):752-63.
10. Sacks GD, Shannon EM, Dawes AJ, et al. Teamwork, communication and safety climate: a systematic review of interventions to improve surgical culture. *BMJ Qual Saf* 2015;24:458-67.
11. Howell A-M, Panesar SS, Burns EM, et al. Reducing the Burden of Surgical Harm: A Systematic Review of the Interventions Used to Reduce Adverse Events in Surgery *Annals of surgery* 2014;259(4):630-41.
12. Sun R, Marshall DC, Sykes MC, et al. The impact of improving teamwork on patient outcomes in surgery: A systematic review. *International Journal of Surgery* 2018;53:171-77.
13. Young-Xu Y, Neily J, Mills PD, et al. Association between implementation of a medical team training program and surgical morbidity. *Arch Surg* 2011;146(12):1368-73.
14. Teamwork and Communication Working Group. Improving patient safety with effective teamwork and communication: Literature review needs assessment, evaluation of training tools and expert consultations Edmonton (AB): Canadian Patient Safety Institute 2011.
15. Salas E, Sims DE, Burke CS. Is there a "big five" in teamwork? *Small Group Research* 2005;36(5):555-99.
16. Kotter JP. Leading change. Boston: Harvard Business Press 1996.
17. AHRQ. TeamSTEPPS 2.0 : Core Curriculum Rockville, MD. USA: Agency for Healthcare Research and Quality; 2014 [Available from: <http://www.ahrq.gov/professionals/education/curriculum-tools/teamstepps/instructor/index.html> accessed 15.01.2019.
18. King HB, Battles J, Baker DP, et al. TeamSTEPPS™: Team Strategies and Tools to Enhance Performance and Patient Safety. In: Henriksen K, Battles JB, Keyes MA, et

- al., eds. *Advances in Patient Safety: New Directions and Alternative Approaches*. Rockville (MD): Agency for Healthcare Research and Quality 2008.
19. Reeves S, Clark E, Lawton S, et al. Examining the nature of interprofessional interventions designed to promote patient safety: a narrative review. *International Journal for Quality in Health Care* 2017;29(2):144-50.
  20. Weaver SJ, Dy SM, Rosen MA. Team-training in healthcare: a narrative synthesis of the literature. *BMJ Qual Saf* 2014;23(5):359-72.
  21. O'dea A, O'connor P, Keogh I. A meta-analysis of the effectiveness of crew resource management training in acute care domains. *Postgrad Med J* 2014;90(1070):699-708.
  22. Eddy K, Jordan Z, Stephenson M. Health professionals' experience of teamwork education in acute hospital settings: a systematic review of qualitative literature. *JBIR Database of Systematic Reviews and Implementation Reports* 2016;14(4):96-137.
  23. Rhee AJ, Valentin-Salgado Y, Eshak D, et al. Team Training in the Perioperative Arena: A Methodology for Implementation and Auditing Behavior. *American Journal of Medical Quality* 2017;32(4):369-75.
  24. Spiva L, Robertson B, Delk ML, et al. Effectiveness of Team training on Fall Prevention. *Nurs Care Qual* 2014;29(2):164-73. doi: 10.1097/NCQ.0b013e3182a9824
  25. Capella J, Smith S, Philp A, et al. Teamwork Training Improves the Clinical Care of Trauma Patients. *Journal of Surgical Education* 2010;67(6):439-43.
  26. Mayer CM, Cluff L, Lin WT, et al. Evaluating Efforts to Optimize TeamSTEPPS Implementation in Surgical and Pediatric Intensive Care Units. *The Joint Commission Journal on Quality and Patient Safety* 2011;37(8):365-84.
  27. Thomas L, Galla C. Building a culture of safety through team training and engagement. *BMJ Qual Saf* 2013;22(5):425-34.
  28. Jones KJ, Skinner AM, High R, et al. A theory-driven, longitudinal evaluation of the impact of team training on safety culture in 24 hospitals. *BMJ Qual Saf* 2013;22:394-404.
  29. Deering S, Rosen MA, Ludi V, et al. On the Front Lines of Patient Safety: Implementation and Evaluation of Team Training in Iraq. *The Joint Commission Journal on Quality and Patient Safety* 2011;37(8):350-56.
  30. Forse RA, Bramble J, McQuillan R. Team training can improve operating room performance. *Surgery* 2011;150(4):771-78.
  31. Baik D, Abu-Rish Blakeney E, Willgerodt M, et al. Examining interprofessional team interventions designed to improve nursing and team outcomes in practice: a descriptive and methodological review. 2018:1-9.
  32. Baik D, Zierler B. Clinical nurses' experiences and perceptions after the implementation of an interprofessional team intervention: A qualitative study. *J Clin Nurs* 2019;28(3-4):430-43.
  33. O'Leary K, Ritter C, Wheeler H, et al. Teamwork on inpatient medical units: assessing attitudes and barriers. *Quality and Safety in Health Care* 2010;19(2):117-21.
  34. Sandelowski M. Focus on research methods. Whatever happened to qualitative description? *Research in Nursing & Health* 2000;23(4):334-40.
  35. Polit DF, Beck CT. *Nursing research. Generating and Assessing Evidence for Nursing Practice*. Philadelphia: Wolters Kluwer 2017.
  36. Aaberg OR, Hall-Lord ML, Husebø SE, et al. A complex teamwork intervention in a surgical ward in Norway. *BMC Research Note* 2019;12:582.
  37. Kitzinger J. Focus group research: using group dynamics to explore perceptions, experiences and understandings. In: Holloway I, ed. *Qualitative Research in Health Care*. New York, USA: Open University Press 2005:56-69.



- 1
- 2
- 3 38. Kvale S. *Doing interviews*. London: SAGE 2007.
- 4 39. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs* 2008;62(1):107-
- 5 15.
- 6 40. Alonso A, Baker DP, Holtzman A, et al. Reducing medical error in the Military Health
- 7 System: How can team training help? *Human Resource Management Review*
- 8 2006;16(3):396-415.
- 9 41. Alonso A, Dunleavy D. Building teamwork skills in healthcare: The case for
- 10 communication and coordination competencies. In: Frush K, Salas E, eds. *Improving*
- 11 *patient safety through teamwork and team training*. New York: Oxford University
- 12 Press 2012:41-58.
- 13 42. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts,
- 14 procedures and measures to achieve trustworthiness. *Nurse Education Today*
- 15 2004;24(2):105-12.
- 16 43. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research
- 17 (COREQ): a 32-item checklist for interviews and focus groups. *International Journal*
- 18 *for Quality in Health Care* 2007;19(6):349-57.
- 19 44. Blom L, Petersson P, Hagell P, et al. The Situation, Background, Assessment and
- 20 Recommendation (SBAR) Model for Communication between Health Care
- 21 Professionals: A Clinical Intervention Pilot Study. *International Journal of caring*
- 22 *Sciences* 2015;8(3):530-35.
- 23 45. Leonard M, Graham S, Bonacum D. The human factor: the critical importance of
- 24 effective teamwork and communication in providing safe care. *Qual Saf Health Care*
- 25 2004;13(suppl 1):i85-i90.
- 26 46. Haig KM, Sutton S, Whittington J. SBAR: A Shared Mental Model for Improving
- 27 Communication Between Clinicians. *Joint Commission Journal on Quality and*
- 28 *Patient Safety* 2006;32(3):167-75.
- 29 47. De Meester K, Verspuy M, Monsieurs K, et al. SBAR improves nurse–physician
- 30 communication and reduces unexpected death: A pre and post intervention study.
- 31 *Resuscitation* 2013;84(9):1192-96.
- 32 48. Stewart KR, Hand KA. SBAR, communication, and patient safety: An integrated
- 33 literature review. *Medsurg Nurs* 2017;26(5):297-305.
- 34 49. Cunningham U, Ward M, De Brún A, et al. Team interventions in acute hospital contexts:
- 35 a systematic search of the literature using realist synthesis. *BMC health services*
- 36 *research* 2018;18(1):536.
- 37 50. Zaccaro SJ, Rittman AL, Marks MA. Team leadership. *The Leadership Quarterly*
- 38 2001;12(4):451-83.
- 39 51. Benner P. *From novice to expert: excellence and power in clinical nursing practice*.
- 40 Upper Saddle River, N.J.: Prentice Hall 2001.
- 41 52. Sehgal NL, Green A, Vidyarthi AR, et al. Patient whiteboards as a communication tool in
- 42 the hospital setting: A survey of practices and recommendations. *J Hosp Med*
- 43 2010;5(4):234-39.
- 44 53. Downey C, Tahir W, Randell R, et al. Strengths and limitations of early warning scores:
- 45 A systematic review and narrative synthesis. *International Journal of Nursing Studies*
- 46 2017;76:106-19.
- 47 54. Massey D, Chaboyer W, Anderson V. What factors influence ward nurses' recognition of
- 48 and response to patient deterioration? An integrative review of the literature. *Nursing*
- 49 *Open* 2017;4(1):6-23.
- 50 55. Weller J, Civil I, Torrie J, et al. Can team training make surgery safer? Lessons for
- 51 national implementation of a simulation-based programme. *New Zealand Medical*
- 52 *Journal* 2016;129(1443):9-17.
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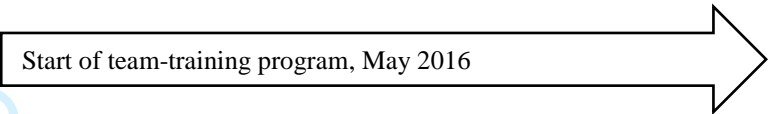


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3 56. World Medical Association. WMA Declaration of Helsinki. Ethical principles for medical  
4 research involving human subjects. In: World Medical Association, ed.: World  
5 Medical Association, 2008.  
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For peer review only

Interview (T0), April 2016	Interview follow-up after six months (T1), November 2016	Interview follow-up after 12 months (T2), June 2017
Profession (n)	Profession (n)	Profession (n)
RNs (4)	RNs (3)	RNs (3)
ANs (2)	ANs (2)	ANs (2)
Physicians (3)	Physicians (2)	Physicians (1)
	Physicians (2)	



Start of team-training program, May 2016

**Figure 1** An overview of participants, times of the interviews in relation to implementation of a team-training program; N=11 healthcare professionals (four physicians, four RNs and three ANs)

**Additional file 1.** Interview guide T0: Team-training program in a surgical ward. A Human Factors approach.

Interview questions (T0)	
Introduction	Clarification of the study aim Short information of the term “teamwork” Time of interviews (T0, T1 and T2) Roles of the moderator and the observer Ethical issues
Interview questions	<ul style="list-style-type: none"> <li>• Who are you that work together to give the best treatment and care to the surgical patient in the surgical ward?</li> <li>• How do you organize the work in the ward to give treatment and care to the surgical patient?</li> <li>• How is your experience of working together “...”, etc.?</li> <li>• How (in what way) do you registered nurses/assistant nurses/physicians organize your work to expedite the treatment and care for patients? (Please describe how you work together while on duty)               <ul style="list-style-type: none"> <li>- What does good teamwork between registered nurses/assistant nurses/physicians mean?</li> <li>- What challenges can you meet?</li> <li>- What promotes good teamwork?</li> <li>- What prevents good teamwork?</li> </ul> </li> <li>• How (in what way) do you organize work together with the registered nurses/assistant nurses/physicians?               <ul style="list-style-type: none"> <li>- What defines good teamwork with the nurses/assistant nurses/physicians?</li> <li>- What challenges can you meet?</li> <li>- What promotes good teamwork?</li> <li>- What prevents good teamwork?</li> </ul> </li> <li>• How (in what way) do you experience the teamwork with other units in patient care, e.g., post-operative, intensive or other units?               <ul style="list-style-type: none"> <li>- What does a good teamwork mean?</li> <li>- What challenges can you meet?</li> <li>- What promotes good teamwork?</li> <li>- What prevents good teamwork?</li> </ul> </li> </ul>
Summary	Summary of the interview

**Additional file 2.** Interview guide T1 and T2: Team-training program in a surgical ward. A Human Factors approach.

Interview questions (T1, T2)	
Introduction	Clarification of the study aim Ethical issues
Interview questions	<p><b>Communication</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about the importance of good communication?</li> <li>• How do you experience communication in the unit?</li> <li>• Do you experience challenges while communicating in the unit? In case of yes: Can you describe these?</li> <li>• Which initiatives (tools, strategies) have thus far been implemented to improve team communication?</li> <li>• How has your communication been improved?</li> <li>• How can you further improve your communication?</li> </ul> <p><b>Leadership</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about team leadership?</li> <li>• What does good team leadership mean?</li> <li>• What measures (tools, strategies) have already been implemented to promote leadership in teams?</li> <li>• How has your team leadership been improved?</li> <li>• How can you further improve your team leadership?</li> </ul> <p><b>Situation monitoring</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about situation monitoring?</li> <li>• How does situation monitoring work in teams you are involved in?</li> <li>• How can a team reach a common understanding of situation monitoring, and how can this be implemented?</li> <li>• How has your situation monitoring been improved?</li> <li>• How can you further improve your situation monitoring?</li> </ul> <p><b>Mutual support</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about mutual support?</li> <li>• How does mutual support affect team processes?</li> <li>• Can you say anything about what can promote mutual support (for example, helping each other with tasks, feedback) within a team?</li> <li>• How has your mutual support been improved?</li> <li>• How can you further improve your mutual support?</li> </ul>
Summary	Summary of the interview

## COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
<b>Domain 1: Research team and reflexivity</b>			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
<b>Domain 2: Study design</b>			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the interview or focus group?	
Duration	21	What was the duration of the interviews or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
<b>Domain 3: analysis and findings</b>			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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# BMJ Open

## A longitudinal team training program in a Norwegian surgical ward: A qualitative study of nurses' and physicians' experiences with teamwork skills

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## ABSTRACT

**Objectives:** Teamwork and interprofessional team training are fundamental to ensuring the continuity of care and high-quality outcomes for patients in a complex clinical environment. Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) is an evidence-based team training program intended to facilitate healthcare professionals' teamwork skills. The aim of this study is to describe healthcare professionals' experiences with teamwork in a surgical ward before and during the implementation of a longitudinal interprofessional team training program

**Design:** A qualitative descriptive study based on follow-up focus group interviews.

**Setting:** A combined gastrointestinal surgery and urology ward at a hospital division in a Norwegian hospital trust.

**Participants:** A convenience sample of 11 healthcare professionals divided into three professionally based focus groups comprising physicians (n=4), registered nurses (n=4) and certified nursing assistants (n=3).

**Interventions:** The TeamSTEPPS® program was implemented in the surgical ward from May 2016 to June 2017. The team training program included the three phases: 1) assessment and planning, 2) training and implementation, and 3) sustainment.

**Results:** Before implementing the team training program, healthcare professionals were essentially satisfied with the teamwork skills within the ward. During the implementation of the program, they experienced that team training led to greater awareness and knowledge of their common teamwork skills. Improved teamwork skills were described in relation to a more systematic interprofessional information exchange, consciousness of leadership-

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3 balancing activities and resources, the use of situational monitoring tools and a shared  
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5 understanding of accountability and transparency.  
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8 **Conclusions:** This study suggests that the team training program provides healthcare  
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10 professionals with a set of tools and terminology that promotes a common understanding of  
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12 teamwork, hence affecting behavior and communication in their daily clinical practice at the  
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14 surgical ward.  
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18 **Trial registration:** The study is part of a larger study with a study protocol registered  
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20 retrospectively on 05.30.17, with the trial registration number ISRCTN13997367.  
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24 Study protocol: [doi.org/10.1186/s12912-017-0229-z](https://doi.org/10.1186/s12912-017-0229-z).  
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30 **Keywords:** interprofessional team training, intervention, hospital, patient safety, teamwork,  
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32 qualitative study  
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## 35 **Article Summary**

### 36 **Strength and limitation of the study**

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- In this study, the sample of both nursing staff and physicians contributes to interprofessional experiences in the implementation of a team training program in a surgical ward.
  - The study intervention was based on an evidence-based team training program with a standardized curriculum.
  - A longitudinal design enables data collection on three occasions.
  - The sample size was small, leading to a relatively limited number of participants in the focus group interviews.

## INTRODUCTION

Teamwork is fundamental to ensuring the continuity of care and high-quality outcomes for patients in a complex clinical environment, necessitating training across professional silos.<sup>1 2</sup>

Team training has been described as a learning strategy in which a learner or group of learners systematically acquire(s) teamwork knowledge, skills, and abilities to impact cognition, affect, and behaviors of a team.<sup>3</sup> Teamwork is found to positively affect clinical performance.<sup>4</sup>

In hospitals, many adverse events are associated connected to surgery.<sup>5-7</sup> A systematic review by Johnston et al.<sup>8</sup> documented that a delayed escalation of patient care after surgical complications is associated with higher mortality rates, identifying poor communication, hierarchical barriers and high workloads as causal factors. Previous research has provided evidence for strategies such as team training to improve the surgical culture<sup>9</sup> and have a positive effect on postoperative patient outcomes.<sup>10-12</sup>

Several team training programs have been developed in healthcare.<sup>13</sup> In this paper, we studied the implementation of the Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) in a surgical ward. TeamSTEPPS® is a publicly released, evidence-based program based on teamwork theory<sup>14</sup> and change theory.<sup>15</sup> The program was developed by the Agency for Healthcare Research and Quality (AHRQ) in collaboration with the US Department of Defense and was released in 2006.<sup>16 17</sup> TeamSTEPPS®, which is transferable to any healthcare setting, intends to facilitate healthcare professionals' teamwork by optimizing team structure and the team's communication, leadership, situation monitoring and mutual support skills. The basic assumption of the program is that these five teamwork principles are critical for safe patient care.<sup>16</sup>

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3 Systematic reviews have confirmed that team training affects outcomes related to the team  
4 knowledge, attitudes, behaviors of healthcare professionals<sup>3 18-20</sup> and results in improved  
5 quality.<sup>3</sup> Furthermore, increased confidence and motivation to apply learned teamwork skills  
6 in daily practice have been experienced by healthcare professionals.<sup>21</sup>  
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13 Quantitative studies of the TeamSTEPPS® program have confirmed improvements in  
14 teamwork and communication,<sup>22 23</sup> patient safety culture,<sup>24-27</sup> efficiency inpatient care,<sup>24 25 28</sup>  
15 complications and mortality,<sup>29</sup> falls,<sup>23</sup> and frequency of wrong-site/side/person surgery.<sup>22</sup>  
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17 Most of the TeamSTEPPS® studies are carried out in the US<sup>30</sup> without any longitudinal  
18 follow up, and there are currently only a few qualitative studies<sup>18</sup>—for example, in surgical  
19 and pediatric intensive care<sup>25</sup> and cardiothoracic surgery telemetry.<sup>31</sup> However, a need  
20 persists for qualitative studies in surgical ward settings because the team structure in wards is  
21 different from that in ICU settings; physicians are not situated in the ward for extended  
22 periods, thus restricting the possibilities for interprofessional reflections.<sup>32</sup> This study is a part  
23 of a larger research project, comprising mainly substudies with a quantitative design, to  
24 evaluate an interprofessional team training intervention in a surgical ward.<sup>33 34</sup> In this  
25 context, a qualitative study will provide in-depth knowledge of healthcare professionals'  
26 experiences with learned teamwork skills in a longitudinal perspective.  
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43 We aimed to describe healthcare professionals' experiences with teamwork in a surgical ward  
44 before and during the implementation of a longitudinal interprofessional team training  
45 program. The following research question guided the study: How do healthcare professionals  
46 experience teamwork skills communication, leadership, situation monitoring and mutual  
47 support before and during the implementation of an interprofessional team training program?  
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## METHODS

### Design

The study used a qualitative descriptive design<sup>35</sup> based on semistructured focus group interviews with healthcare professionals at three time intervals.

### Setting

The study was carried out at a 20-bed combined gastrointestinal surgery and urology ward at a hospital division (198 beds) in a Norwegian hospital trust. The surgical ward was selected based on practical issues and the management's interest and motivation for improvement initiatives after experiencing several patient safety incidents. The study occurred from April 2016 to June 2017. At baseline (November 2015 to March 2016), the ward statistics indicated an average bed occupancy rate of 87%, a mean patient length-of-stay value of 3.46 days, and an admissions rate of 192.2 patients per month. Moreover, the ward's number of full-time positions was 13 physicians, 17.25 registered nurses (RNs), 4.95 certified nursing assistants (CNAs), 1.0 head nurse and 1.0 clinical nurse specialist.

The patient care was organized into two interprofessional teams, where the primary members were RNs, CNAs and physicians. The composition of the teams and their duties were predetermined by a daily worklist for the nursing staff, while the physicians had their worklist, clarifying weekly duties such as surgery, polyclinic and doctors' rounds.

## Sample

A convenience sample<sup>36</sup> of 11 healthcare professionals divided into three professionally based focus groups comprising physicians (n=4), RNs (n=4) and CNAs (n=3) were recruited from the surgical ward. The inclusion criterion for participation in the study was that healthcare professionals from the surgical ward had participated at a minimum of 1 day of the interprofessional team training program (41 participants). The ward management decided which professional groups participated in the TeamSTEPPS® training program. A request for information about the study and researchers was distributed to all healthcare professionals, where 11 confirmed their participation, thus constituting the study sample. The sample comprised eight women and three men with varying work experiences and employment within the ward. To secure the participants' anonymity, no specification of their background is presented.

## Team training program

The longitudinal interprofessional team training program was planned and implemented according to the TeamSTEPPS®-recommended "Model of Change" and was organized into three phases<sup>16</sup> (see Tables 1 and 2). A research group initiated the program as part of a larger research project.<sup>34</sup> Two nurses (one leader) and two physicians (leaders) from the surgical ward had the main responsibility for the training and implementation of the program. Before the training, the four healthcare professionals conducted the TeamSTEPPS® 2.0 Master Training Course and were certified as instructors. A more detailed description of the program can be found in Aaberg et al. (2019).<sup>37</sup>

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3 **Table 1: Team training program based on TeamSTEPPS®**  
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5 **Phase 1) Set the stage and decide what to do—Assessment and Planning** (January 2016–April 2016)

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- 7 • Site assessment.
  - 8 • A lesson about teamwork in relation to promoting patient safety was conducted with all nurses and  
9 physicians to create an awareness of the need for improvement.
  - 10 • A training and implementation plan was developed.
- 11

12 **Phase 2) Making it happen—Training and Implementation** (May 2016–December 2016)

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- 14 • One day of interprofessional team training in a simulation center was completed for all healthcare  
15 professionals (n=41) in the surgical ward, comprising six hours of classroom training (lectures,  
16 videos, role plays and discussions) and two hours of high-fidelity simulation.
  - 17 • A change team with members from all ward professions and a former patient was assigned.
  - 18 • An action plan was established, based on identified patient safety issues in the ward.
  - 19 • The TeamSTEPPS® tool was systematically implemented every month (see Table 2).
- 20

21 **Phase 3) Making it stick—Sustainment** (January 2017–June 2017)

- 22
- 23 • The initiatives from the action plan were coached, monitored and integrated.
  - 24 • Implementation of a monthly TeamSTEPPS® tools continued.
  - 25 • Small victories were celebrated.
  - 26 • TeamSTEPPS® refresher courses were held after four (nurses and physicians) and 11 months  
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**Table 2:** Implementation of tools at Phase 2 and Phase 3 of the team training program

Phase 2			Phase 3		
2016	Tools	Implementation arena	2017	Tools	Implementation Arena
May	Closed-loop <i>Communication</i>	Exchange of critical information	Jan	Debriefs <i>Leadership</i>	Once a week—manager with nursing staff
				Task assistance <i>Mutual Support</i>	Distribution of workload
Jun	ISBAR <sup>1</sup> <i>Communication</i>	Communicating critical information	Feb	STEP <sup>2</sup> <i>Situation Monitoring</i>	Updated in electronic care plan
Aug	Briefs <i>Leadership</i>	Start of every shift	Mar	Two-Challenge Rule <i>Mutual Support</i>	When an initial assertive statement is ignored
Sept	Huddles <i>Leadership</i>	At patient safety whiteboard meetings	May	I-PASS <sup>3</sup> <i>Communication</i>	Handoffs with focus on patient safety risks
Oct	Cross-monitoring <i>Situation Monitoring</i>	Double control by i.v. medication administration			

<sup>1</sup>ISBAR=Introduction, Situation, Background, Assessment, Recommendation

<sup>2</sup>STEP=Status of the patient, Team members, Environment, Progress towards the goal

<sup>3</sup>I-PASS=Illness severity, Patient summary, Action list, Situation awareness and contingency planning

## Data collection

Ten focus group interviews of healthcare professionals were conducted before the team training implementation (baseline=T0), with follow-up interviews after six months (T1) and 12 months (T2) (see Figure 1).

Insert Figure 1 about here.

**Figure 1:** An overview of participants, and times of the interviews in relation to the implementation of a team-training program; N=11 healthcare professionals (four physicians, four RNs and three CNAs)

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3 All the interviews occurred in a meeting room at the hospital during the daytime. A pilot  
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5 interview was conducted to validate the thematic interview guides developed from a literature  
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7 review on teamwork (Supplementary files 1 and 2). The interviews were conducted as a  
8  
9 dialogue and started with a clarification of the study aim. The thematic interview guides,  
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11 including the four teamwork skills at T1 and T2, were used to ensure that all themes were  
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13 explored during each focus group interview. The participants were encouraged to complete  
14  
15 an open collective activity with a reflection on common experiences.<sup>38</sup> The same questions  
16  
17 were posed to all focus groups, and follow-up questions were used to encourage the  
18  
19 participants to elaborate and/or clarify their responses.<sup>39</sup> One moderator and one observer  
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21 (who made field notes) were responsible for conducting the interviews, with the third author  
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23 (AV) as a moderator at T0 and the first author (RB) as a moderator at T1 and T2. At T0, the  
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25 interview referred to generic questions about teamwork at the ward (see Supplementary file  
26  
27 1); at T1 and T2, the interview questions referred to learned teamwork skills based on the  
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29 TeamSTEPPS® framework (see Supplementary file 2). The field notes were approved by the  
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31 participants after the interview. The interviews lasted from 25 to 60 minutes (mean= 33  
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33 minutes). All the interviews were digitally recorded, transcribed verbatim and anonymized  
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35 before the analysis.  
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## 46 **Data analysis**

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49 Based on the aim and research question of our study focusing on healthcare professionals'  
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51 experiences with teamwork skills during a team training program, a deductive manifest  
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53 content analysis approach grounded on Elo and Kyngäs<sup>40</sup> was used. The data were analyzed  
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55 according to the TeamSTEPPS® framework,<sup>41 42</sup> focusing on the four teamwork skills of  
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communication, leadership, situation monitoring and mutual support. The description of the four teamwork skills is shown in Table 3.

**Table 3:** Description of the four TeamSTEPPS® teamwork skills

Communication	Structured process by which information is clearly and accurately exchanged among team members
Leadership	Ability to maximize the activities of team members by ensuring that team actions are understood, changes in information are shared and team members have the necessary recourses
Situation monitoring	Process of actively scanning and assessing situational elements to gain information or understanding, or to maintain awareness to support team functioning
Mutual support	Ability to anticipate and support team members' needs through accurate knowledge about their responsibilities and workload

AHRQ. TeamSTEPPS 2.0: Core Curriculum.<sup>16</sup>

The analysis process was organized according to three phases: preparation, organizing and reporting. The first (RB) and third (AV) authors conducted the first two phases with input from the second author (KA), while all three authors conducted the third phase. In the *preparation phase*, each interview was defined as one unit of analysis, and data from T0, T1 and T2 were analyzed separately. All the interviews were read several times by all three authors to become familiar with the data, and, guided by the aim and research questions, the researchers obtained intimate knowledge of the participants' experiences with teamwork skills. In the *organization phase*, the authors established a structured analysis matrix, with columns representing the categories of communication, leadership, situation monitoring and mutual support. Based on the conceptual description of each TeamSTEPPS teamwork skill in the TeamSTEPPS program (see Table 3),<sup>16</sup> all the data were reviewed for content and coded according to the four teamwork categories (without using any software tool), first individually by RB and AV, and then together by all three authors until agreement was reached. Examples from the codebook at T1 are shown in Table 4. The matrix revealed 514 codes representing the four teamwork categories. In the *reporting phase*, the results were described using the contents of each of the four teamwork categories. Quotations were used

to enhance and illuminate the categories<sup>43</sup>. To help secure a presentation of results representing the information provided by the participants, continuous discussion among the authors was prominent throughout the reporting phase. Finally, the results were reported according to the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Supplementary File 3).<sup>44</sup>

**Table 4:** Codebook examples from the qualitative deductive content analysis at T1

Communication	Leadership	Situation Monitoring	Mutual Support
T1:RN,24. Everyone participates using a closed loop.	T1:RN,94. We allocate the tasks now so that they are distributed more evenly.	T1:RN,80. We have become more vigilant about medication administration.	T1:RN,35. When you know the purpose, you have a greater understanding for reporting a second time concern.
T1:CNA,5. On the classroom training day, we learned to repeat messages—e.g., when we take the phone—which is already done.	T1:CNA,36. The ward management is aware that the whiteboard meetings will take place.	T1:CNA,30. The most important thing about the whiteboard meetings is that there is a proper review of patients after the doctor's rounds.	T1:CNA,56. It's not so easy to say so if there is something that we disagree about, compared to when there is something positive.
T1:Ph1,26. Seemed like the nurses were confident about how to present patient information to us.	T1:Ph2,84. If one is to think we are a team, it is natural that the physician who does the round is the leader.	T1:Ph1,69. Whiteboard meetings generate awareness about—e.g., safety routines, nutrition, medication administration, etc.—i.e., such things that are good to check.	T1:Ph,43. It is now easier to ask each other since we know each other better after being in classroom training together.

## Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting, or dissemination plans of our research.

## RESULTS

## Teamwork at T0

The healthcare professionals' experiences of the four teamwork skills in the surgical ward before the team training program (T0) are described in Table 5.

**Table 5:** Teamwork skills at T0

Teamwork skills categories	
<b>Communication</b>	All healthcare professionals were mostly <b>satisfied with the information exchange</b> within the ward, with the nurse team leader possessing a central position. A busy schedule allowed the RNs, who often had patient responsibility within both teams, to <b>acquire patient information in different ways</b> , from participation in regular team meetings to ad-hoc meetings with the team leaders. The CNAs appreciated the “quiet handover” used between shifts. When calling up the physicians on duty, the RNs often <b>checked the phone list ahead of the phone call to be prepared</b> , indicating that some physicians needed to have more background information than others. The physicians also emphasized the importance of proper and relevant information from the RNs who can be trusted.
<b>Leadership</b>	The two core teams each had a <b>team leader throughout the week</b> , allowing the team leader to become better acquainted with a patient's medical history and thereby increasing <b>continuity</b> and simplifying the hospital discharge. Not all of the RNs enjoyed being team leaders due to a heavy workload; however, the physicians were satisfied with the arrangement.
<b>Situation monitoring</b>	The physicians became familiar with the patients during <b>rounds</b> and through the patient's medical record, mostly discussing patient-related issues in physicians' meetings. Similarly, the RNs discussed issues related to patients' care in nurse meetings, although this may also have resulted in contact with the physicians. Both RNs and CNAs had an active role in the <b>observation of the patients</b> and updating each <b>patient's care plan</b> , and they were encouraged to stay bedside during the rounds. The Modified Early Warning Score ( <b>MEWS</b> ) <sup>*</sup> was recently applied, and the physicians were pleased with the new routines, which was highlighted as an excellent tool to quickly determine the degree of illness of a patient. Moreover, the ward was in the initial phase of using a <b>patient safety whiteboard</b> ; thus, these meetings did not work optimally with a frequent absence of physicians.
<b>Mutual support</b>	The RNs and CNAs stated that they were flexible in <b>helping each other</b> in the event of an uneven distribution of work, both within the team and between the teams. However, the teamwork was dependent on openness and that team members <b>spoke out</b> when they needed help. They felt listened to and respected by the physicians. All three healthcare professionals groups stated that <b>knowing each other and having fun together</b> strengthened a good working environment and good teamwork. The physicians highlighted that, for the best interest of the patient, good teamwork requires nurses with medical knowledge, clinical experience and continuity with the patient. Nonetheless, the RNs experienced that they did not always have the expected response from the physicians, and the physicians stressed that a large workload requires prioritization of multiple issues at one time, which may affect the teamwork. According to the RNs, this rarely causes <b>conflicts</b> among healthcare professionals in the ward. Nevertheless, there have been real conflicts, and some have been perceived as a personal attack.

\*MEWS is a tool for bedside evaluation of the systolic blood pressure, pulse rate, respiratory rate, temperature and AVPU score (Alert, Reacting to Voice, Reacting to Pain, Unresponsive).<sup>45</sup>

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3 **Teamwork during the 12-month (T1-T2) interprofessional team training program**  
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6 A summary of healthcare professionals' experiences with the four teamwork skills during the  
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8 12-month team training program is described in Table 6.  
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For peer review only

**Table 6:** Experiences with teamwork skills at T1 and T2 of the team training program

Categories	T1 (six months)	T2 (12 months)
<b>Communication</b>	<p>Increased awareness in using the closed loop and ISBAR tools.</p> <p>Challenges with using ISBAR when communicating critical information (RNs).</p> <p>The included tools are seen as a common initiative to promote patient safety.</p>	<p>*</p> <p>—————→</p> <p>RNs are more confident in information exchange using ISBAR.</p> <p>ISBAR forms a basis for a more active role for RNs in decision-making.</p> <p>Challenges still exist when using ISBAR during busy shifts.</p> <p>—————→</p> <p>Misunderstandings in work practice are discovered when using the tools.</p> <p>The tools provide information in a more systematic manner.</p> <p>Handoff not properly incorporated.</p>
<b>Leadership</b>	<p>Distribution of work tasks using huddling.</p> <p>RN team leader runs the midday nurse meeting.</p> <p>Physician runs the interprofessional patient safety whiteboard meeting when present, otherwise an RN.</p>	<p>—————→</p> <p>Midday nurse meeting replaced with patient safety whiteboard meeting.</p> <p>RN runs the interprofessional patient safety whiteboard meetings.</p> <p>Head nurse runs the Friday debriefing, evaluating the weekly activities.</p>
<b>Situation monitoring</b>	<p>Double control in i.v. medication administration using cross-monitoring.</p> <p>Risk assessment at whiteboard meetings provides awareness of new and/or important patient issues.</p> <p>Nursing plans less prioritized due to patient safety whiteboard meetings.</p> <p>MEWS score prioritized.</p>	<p>—————→</p> <p>Risk assessment at interprofessional patient safety whiteboard meetings established on weekdays, challenges on weekends.</p> <p>—————→</p> <p>MEWS a well-established routine.</p>
<b>Mutual support</b>	<p>Transparency and openness across the healthcare team.</p> <p>Legitimate to express safety concerns.</p> <p>Use of the Two-Challenge Rule to resolve disagreements.</p>	<p>—————→</p> <p>—————→</p> <p>—————→</p> <p>Increased awareness of speaking up for the patients.</p> <p>Increased awareness of giving and receiving feedback.</p>

\*The arrow expresses continuity in healthcare professionals' experiences throughout T1 and T2

## Communication, T1 –T2

The RNs experienced a common set of tools that promote patient safety. Everyone emphasized the “closed loop” tool as important to ensure a common understanding within the team. Using the tool, the RNs detected misunderstandings that could have caused consequences for the patient. Both the CNAs and RNs emphasized that, after the 12-month implementation of the team program, they used the “closed loop”. They perceived the tool as important, simple to use and promoting patient safety, as exemplified by a CNA:

*If there is a phone call and you receive a message then you repeat the message... to make sure you have got it right—don't you? (T2:CNA,2)*

The RNs found it valuable to have a common understanding of communication skills with physicians at the surgical ward. However, they experienced that physicians from other wards, who were not included in the TeamSTEPPS® program, expressed the feeling that the RNs were criticizing them when using the “closed loop”.

During the implementation period, both the physicians and CNAs experienced the RNs as being more confident in their information exchange and found "ISBAR" useful when communicating important or critical information over the phone. The RNs experienced the use of “ISBAR” as somewhat challenging but easier to use when they had enough time. The physicians highlighted that their medical education taught them how to provide information systematically. However, they became more aware of systematic communication and repeating messages:

*Well, I think everyone... everyone involved has reflected..... and raised one's consciousness regarding it [communication] to a greater extent than if they didn't attend the course. (T2: Ph,11)*



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3 With “ISBAR”, it had become more natural for the RNs to take an active part in patient  
4 treatment. They referred to common, established expectations toward more active  
5 participation, with “ISBAR” focusing on their perception of the problem and how to handle  
6 it. One RN said:  
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13 *When we call about a deteriorating patient... I previously thought I shouldn't mention*  
14 *anything regarding my ideas on the causes of deterioration. I always thought that was*  
15 *the physician's task. (T2:RN,13)*  
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20 The "Handoff" tools for information exchange during shifts had been introduced late and  
21 were not properly integrated at the ward. One RN said:  
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26 *Well, then at least you will need sufficient time to reflect before starting to use them*  
27 *[tools]... and that is not always the case, right (T2:RN,45).*  
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31 *Even though it is an easy... an easy tool, I actually think it is one of the hardest as*  
32 *well. (T2: RN,46)*  
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## 40 **Leadership, T1–T2**

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42 The RNs experienced that TeamSTEPPS® had led to an increased awareness in using  
43 “huddling” and “briefing” at the patient safety whiteboard meetings. One RN explained:  
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48 *We use huddling at the patient safety whiteboard meetings regarding the*  
49 *redistribution of tasks if anyone feels they have too much work, while others have*  
50 *available capacity. (T2:RN,58)*  
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55 The redistribution of work tasks resulted in a more even workload between the two core  
56 teams at the ward.  
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3 At T1, the midday nurse meeting was led by the RN team leaders, whereas the physicians  
4 initially led the interprofessional patient safety whiteboard meetings. The RNs experienced it  
5 as natural that the physicians led the meetings whenever they were present. However, at T2,  
6 the midday nurse meeting was replaced with the interprofessional patient safety whiteboard  
7 meeting, led by the RN team leader. The physicians could not always attend the patient safety  
8 whiteboard meeting due to activities in the operating theater, being called for, etc. While  
9 whiteboard meetings occurred daily, the weekly “debriefing” occurred on Fridays. The ward  
10 head nurse usually led the “debriefing”, which was experienced as useful, as exemplified by a  
11 CNA:  
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24 *It is good to talk things through, expressing issues that are on your mind when it has*  
25 *been a busy week ... also experiencing that debriefing can be fundamental for change.*  
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29 (T3: CNA,30)  
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32 The physicians were more uncertain whether the team training program had led to an  
33 increased awareness of team leadership.  
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## 40 **Situation Monitoring, T1–T2**

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43 The use of the term “situation monitoring” was new for healthcare professionals. The RNs  
44 realized that they had always monitored the work system without being aware of the term. By  
45 using the tools, they detected patient safety incidents that could have resulted in unnecessary  
46 harm to the patients. Cross-monitoring of the intravenous medication administration had been  
47 implemented. The RNs experienced the use of situation monitoring skills depended on their  
48 role in the team. As team leaders, they had to scan what was going on at the ward; however,  
49 if they were situated inside the patient room, they lost sight of other ongoing issues.  
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3 Six months into the team training program, healthcare professionals experienced a better  
4 functioning of the patient safety whiteboard meetings, though still not optimal because  
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6 physicians did not always attend. After 12 months, everyone experienced the meeting as a  
7  
8 useful and well-established arena to monitor patient risks. They also experienced that the  
9  
10 meeting created an awareness of tasks that needed attention, as described by a physician:  
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15 *Yes, fall prevention, nutrition, medication reconciliation. Well, that's the type of issue*  
16  
17 *that.... it's convenient to check, reminding us of issues that need attention. (T1:*  
18  
19 *Ph,69)*  
20  
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23 Despite the benefit of the whiteboard meetings, they were not prioritized on busy shifts  
24 during the weekends. Both the RNs and CNAs were responsible for updating the patient  
25 safety whiteboard according to their patients' needs and realized that the increased  
26  
27 whiteboard focus negatively affected the updating of the nursing plans.  
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31  
32 During the team training program, the "MEWS" score became a well-established and  
33 systematic routine appreciated by all healthcare professionals. Nevertheless, the physicians  
34 experienced that some nurses did not relate the "MEWS" measurements to the patient's  
35 condition, only using "MEWS" as a recipe. Some experienced that the RNs called them  
36 without getting into the patient's anamnesis from the medical record seen as their common  
37 information exchange system. It was expected that both RNs and CNAs scored their patients  
38 with "MEWS" and exchanged the results with the team leader. They now measured the  
39 patient's pulse and blood pressure more frequently, although it was described that the  
40 parameters might be overlooked, as pointed out by one CNA:  
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54 *Well, it is worth mentioning regarding MEWS that people tend to forget to measure*  
55  
56 *the pulse themselves. They see the number and then refer to this..... without*  
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3 *acknowledging that the pulse can be as irregular and deviating as ever. (T2:*  
4  
5 *CNA,47)*  
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## 10 11 **Mutual Support, T1–T2**

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14 The RNs perceived mutual support to the teamwork skill creating the most influential  
15 changes at the ward, also considered the most effective to implement. At T1, RNs  
16 experienced increased transparency and openness across the healthcare team. Colleagues  
17 raised problems more directly. It became more legitimate to express concerns and speak up  
18 because the contents could be addressed in relation to the tools and strategies of the training  
19 program. With a common understanding in place, it was easier to use a tool such as the  
20 "Two-Challenge Rule". A physician referred to an episode, where the RN disagreed with him  
21 and used the tool:  
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34 *There was a patient with.... urine retention with 300 ml of residual urine and you are*  
35 *not supposed to send them home without a catheter... but on that occasion I meant*  
36 *that we could do so. And she [RN] was absolutely right in her judgment..... there are*  
37 *routines for not having that much [residual urine], and since I thought it was right I*  
38 *tried to explain it. (T1: Ph,61)*  
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46 Moreover:

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49 *It was, of course, ok, she did what she was supposed to do and it is commendable that*  
50 *they raise it, that they are not afraid of voicing it. (T1: Ph,62.)*  
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54 The physicians emphasized that it became easier to collaborate on patient treatment with  
55 mutual and open communication, and they felt that the team program had impacted this. At  
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3 T2, the “Two-Challenge Rule” was used frequently, a strategy they probably used prior to the  
4 program, but as an RN expressed it:  
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7  
8 *Yes we did it [open communication, Two-Challenge Rule]... it was just that we did*  
9  
10 *not have a notion for it. (T2:RN,40)*  
11  
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13 Hence, increased awareness of using different mutual support tools had been created:  
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16 *You don't accept the response you are given; you rather rephrase the question once*  
17  
18 *or twice if necessary. (T2:RN,102.)*  
19  
20

21 Both the RNs and CNAs had become more aware of the importance of feedback. They  
22 evaluated the tools as useful when adverse events occurred and, in that context, experienced a  
23 high degree of support across the interprofessional team. They experienced colleagues being  
24 less concerned with raising issues through feedback, and, according to RNs, the “go to the  
25 leader” mentality when dissatisfied was less prominent. The RNs had also seen inexperienced  
26 RNs who now dared to speak up for the patient. However, they still felt that healthcare  
27 professionals held back on different occasions, implying a continued room for improvement  
28 within giving and receiving feedback.  
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## 45 DISCUSSION

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48 We aimed to describe healthcare professionals' experiences with teamwork in a surgical ward  
49 before and during the implementation of a longitudinal interprofessional team training  
50 program. The results described that RNs, CNAs and physicians were highly satisfied with the  
51 teamwork at the ward before the team training program. Nevertheless, they experienced that  
52 the implementation of the program, where they were trained together, led to greater  
53 awareness and knowledge of their common teamwork skills. Changes were described related  
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3 to more systematic information exchange, increased consciousness of team leadership  
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5 balancing activities and resources, increased use of situation monitoring tools and a common  
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7 understanding of accountability and transparency.  
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### 10 11 12 13 14 **Communication—towards a systematic information exchange** 15 16

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18 When RNs used the communication tool “ISBAR”, the physicians experienced a more  
19  
20 systematic exchange of patient information, which was highly appreciated. The RNs  
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22 experiencing challenges using the tool in the first phase and eventually became more  
23  
24 confident. This finding is in accordance with results from a study in surgical wards, where  
25  
26 both nurses and physicians perceived “ISBAR” as effective in obtaining a structure of the  
27  
28 contents of patient reports.<sup>46</sup> Nurses and physicians traditionally communicate using different  
29  
30 styles appropriate to the needs and processes of their respective professions.<sup>47 48</sup> This gap may  
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32 be bridged using “ISBAR”, establishing a common communication style. Hierarchical culture  
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34 has been experienced by nurses as having a negative effect on interactions with some  
35  
36 physicians.<sup>31</sup> According to De Meester et al.,<sup>49</sup> the use of “ISBAR” may flatten the hierarchal  
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38 structure by nurses experiencing being empowered, thereby resulting in more effective  
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40 communication channels. The RNs in our study referred to a positive change with  
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42 expectations towards more active participation in patient decision-making. Open  
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44 communication with a common language of how to present key patient information can  
45  
46 prevent misunderstandings and communication failures.<sup>50</sup> Interprofessional teamwork is  
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48 generally found to motivate and empower staff when team members feel their roles are  
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50 acknowledged.<sup>51</sup>  
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## **Leadership—balancing activities and resources**

Leadership was seen as an essential teamwork skill to increase the continuity of patient care, with an even distribution of work tasks and debriefing as essential activities. According to Salas et al.,<sup>14</sup> team leadership coordinates and organizes team members' activities.

Considering that the team leader possesses knowledge of team resources,<sup>52</sup> they have the opportunity to “balance the workload within the team”.<sup>16</sup> In this study, the redistribution of work tasks was completed at the daily patient safety whiteboard meeting led by the RN team leader. At these meetings, the use of the tool “huddling” was implemented and found useful when balancing work tasks within and between the two ward teams—the intention using huddles.<sup>16</sup> The leader's overview of team activities is essential, with the weekly debriefing meeting described as “fundamental for change” due to the opportunity for healthcare professionals to share their experiences related to patient care as a basis for improvement in procedures or work routines.

## **Situation monitoring—towards a conscious use of tools and interprofessional meetings**

Our study confirmed that using the term “situation monitoring” was new for healthcare professionals at the surgical ward, although they realized they had previously used the skill unconsciously. According to Benner,<sup>53</sup> knowledge development in healthcare consists of spreading practical knowledge and the mapping of existing practical knowledge developed through clinical experience, to which the team training program may have contributed. RNs, CNAs and physicians all experienced increased attention towards situation monitoring skills throughout the use of MEWS, as well as at the daily interprofessional patient safety whiteboard meetings established during the team training program period. These meetings

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3 were experienced as useful opportunities to monitor patients and create an awareness of  
4 necessary tasks. This finding is in accordance with Sehgal et al.,<sup>54</sup> where nurses were seen as  
5 responsible for accurate and updated information on whiteboards, whereas the goals for the  
6 day should be created jointly by nurses and physicians. The physicians in the current study  
7 appreciated that the nursing staff referred to MEWS when calling them. Early warning scores  
8 are known to have a good prognostic value for patient deterioration and have been shown to  
9 improve patient outcomes, partly because they facilitate communication among healthcare  
10 professionals.<sup>55</sup> Like the physicians, the nurses also saw the importance of gathering the  
11 MEWS scores but also emphasizing the importance of using their clinical eye and mind. In  
12 their integrative review, Massey et al.<sup>56</sup> found that assessing and knowing the patient, nurse  
13 education and the use of specialized equipment were all factors with an impact on ward  
14 nurses' ability to recognize patient deterioration.  
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### **Mutual support—towards accountability and transparency**

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37 In our study, mutual support was considered the most effective teamwork skill to implement  
38 and, according to the RNs, contributed to the most comprehensive positive change at the  
39 ward during the team training program. This was despite healthcare professionals referring to  
40 a ward culture with open communication, including before the training program. Mayer et  
41 al.<sup>25</sup> found that, by using pre- and postimplementation interviews of staff in surgical intensive  
42 care units, the informants described an overall improved mutual support with a more positive  
43 team morale across physicians and nurses postimplementation. In a qualitative study  
44 conducted by Baik and Zierler,<sup>31</sup> the nurses reported improved changes in interprofessional  
45 relationships and being more satisfied with their work because they felt included as a member  
46 of an interprofessional team training intervention. In our study, both physicians and nurses  
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3 experienced that when having a common understanding, it was easier to use tools such as the  
4  
5 “Two-Challenge Rule”. Both RNs and CNAs described that they had become more aware of  
6  
7 giving each other feedback. When adverse events occurred, they experienced a high degree of  
8  
9 support across the interprofessional team, a situation that is in accordance with Weller et al.,<sup>57</sup>  
10  
11 who interviewed a surgical team in an operating room and described a positive change in  
12  
13 information sharing and improved confidence, as well as a greater awareness of the other  
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15 team members and working environment, after conducting a simulation-based team training  
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17 program.  
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## 25 **Limitations**

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28 There are several limitations in our study that need to be recognized. The results may be  
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30 influenced by the relatively limited number of participants in each of the focus group  
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32 interviews and a possible bias in the sample of participants based on possible positive  
33  
34 perceptions of teamwork at the surgical ward. The study is not suitable for generalization;  
35  
36 however, the results based on our qualitative design provide a deeper understanding of the  
37  
38 health professionals' experiences with learned teamwork skills that may be relevant at other  
39  
40 hospital wards. Due to time pressure and workload in their daily practice at the surgical ward,  
41  
42 the healthcare professionals had to repeatedly change their interview times, which may have  
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44 affected the results. Two groups of two physicians participated in the interviews after six  
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46 months, whereas only one physician had the opportunity to participate after 12 months. A  
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48 larger group of physicians might have provided other experiences with the teamwork skills  
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50 that may also impact the results because mostly the nursing staff attended the refresher  
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52 courses. The results may also be influenced by the patient safety initiatives recently initiated  
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3 at the ward ahead of the team training program, such as the MEWS score and patient safety  
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5 whiteboard meetings.  
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## 10 11 **CONCLUSION** 12

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15 Our study suggests that, during a team training program, healthcare professionals were  
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17 provided with a set of tools and terminology that promoted a common understanding of  
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19 teamwork, hence affecting behavior and communication in their daily clinical practice at a  
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21 surgical ward. The findings contribute to the qualitative evidence base of the implementation  
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23 of team training programs. More specifically, the study documented the role of a systematic  
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25 information exchange, a consciousness of leadership and situation monitoring skills and the  
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27 importance of creating a culture of accountability and transparency in a surgical ward.  
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30 Further research should study the effect of the implementation of the TeamSTEPPS program  
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32 in hospitals, including various departments. Moreover, a study on the long-term sustainability  
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34 of team training programs on healthcare professionals' behavior is necessary.  
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## 41 **Acknowledgments** 42

43  
44 The authors would like to acknowledge the nurses and physicians for their participation in the  
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46 focus group interviews. We would like to acknowledge the Norwegian Nurses Organization  
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48 for their financial support.  
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## Contributors

RB, KA and AV were responsible for the study design. RB and AV performed the data collection. RB, KA and AV contributed to the analysis of the data, drafting of the manuscript, critical revision of the manuscript for important intellectual content and final approval of the version to be published. All the authors read and approved the final manuscript.

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## Competing interests

None declared.

## Ethics approval

The study was approved by the Norwegian Center for Research Data (Ref. 46872), and permission was given by the head administration in the participating hospitals. The Committee for Medical and Health Research Ethics of South-East Norway reviewed the study (Ref. 2016/78) and responded that approval was not necessary according to Norwegian law, since the study did not involve patients. Information and an invitation to participate in the study were given to healthcare professionals in written and verbal forms, referring to the principle of autonomy addressed by confidentiality and voluntariness. Written consent was

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3 obtained from the healthcare professionals who agreed to participate. The study was  
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5 conducted in accordance with the principles of the Helsinki Declaration.  
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### 11 **Consent for publication**

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15 Not applicable.  
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### 18 **Data sharing statement**

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21 No additional unpublished data are available from this study.  
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## REFERENCES

1. Institute of Medicine. Best care at lower cost: The path to continuously learning health care in America. Washington, DC: The National Academies Press 2012.
2. Weller J, Boyd M, Cumin D. Teams, tribes and patient safety: overcoming barriers to effective teamwork in healthcare. *Postgrad Med J* 2014;90(1061):149-54.
3. Hughes AM, Gregory ME, Joseph DL, et al. Saving lives: A meta-analysis of team training in healthcare. *Journal of Applied Psychology* 2016;101(9):1266.
4. Schmutz JB, Meier LL, Manser T. How effective is teamwork really? The relationship between teamwork and performance in healthcare teams: a systematic review and meta-analysis. *BMJ open* 2019;9(9):e028280.
5. de Vries EN, Ramrattan MA, Smorenburg SM, et al. The incidence and nature of in-hospital adverse events: a systematic review. *Qual Saf Health Care* 2008;17(3):216-23.
6. Härkänen M, Ahonen J, Kervinen M, et al. The factors associated with medication errors in adult medical and surgical inpatients: a direct observation approach with medication record reviews. *Scand J Caring Sci* 2015;29(2):297-306.
7. Zegers M, de Bruijne MC, de Keizer B, et al. The incidence, root-causes, and outcomes of adverse events in surgical units: implication for potential prevention strategies. *Patient Safety in Surgery* 2011;5(1):13.
8. Johnston MJ, Arora S, King D, et al. A systematic review to identify the factors that affect failure to rescue and escalation of care in surgery. *Surgery* 2015;157(4):752-63.
9. Sacks GD, Shannon EM, Dawes AJ, et al. Teamwork, communication and safety climate: a systematic review of interventions to improve surgical culture. *BMJ Qual Saf* 2015;24:458-67.
10. Howell A-M, Panesar SS, Burns EM, et al. Reducing the Burden of Surgical Harm: A Systematic Review of the Interventions Used to Reduce Adverse Events in Surgery *Annals of surgery* 2014;259(4):630-41.
11. Sun R, Marshall DC, Sykes MC, et al. The impact of improving teamwork on patient outcomes in surgery: A systematic review. *International Journal of Surgery* 2018;53:171-77.
12. Young-Xu Y, Neily J, Mills PD, et al. Association between implementation of a medical team training program and surgical morbidity. *Arch Surg* 2011;146(12):1368-73.
13. Teamwork and Communication Working Group. Improving patient safety with effective teamwork and communication: Literature review needs assessment, evaluation of training tools and expert consultations Edmonton (AB): Canadian Patient Safety Institute 2011.
14. Salas E, Sims DE, Burke CS. Is there a “big five” in teamwork? *Small Group Research* 2005;36(5):555-99.
15. Kotter JP. Leading change. Boston: Harvard Business Press 1996.
16. AHRQ. TeamSTEPPS 2.0 : Core Curriculum Rockville, MD. USA: Agency for Healthcare Research and Quality; 2014 [Available from:

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58  
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60
- <http://www.ahrq.gov/professionals/education/curriculum-tools/teamstepps/instructor/index.html> accessed 15.01.2019.
17. King HB, Battles J, Baker DP, et al. TeamSTEPPS™: Team Strategies and Tools to Enhance Performance and Patient Safety. In: Henriksen K, Battles JB, Keyes MA, et al., eds. *Advances in Patient Safety: New Directions and Alternative Approaches*. Rockville (MD): Agency for Healthcare Research and Quality 2008.
  18. Reeves S, Clark E, Lawton S, et al. Examining the nature of interprofessional interventions designed to promote patient safety: a narrative review. *International Journal for Quality in Health Care* 2017;29(2):144-50.
  19. Weaver SJ, Dy SM, Rosen MA. Team-training in healthcare: a narrative synthesis of the literature. *BMJ Qual Saf* 2014;23(5):359-72.
  20. O'dea A, O'connor P, Keogh I. A meta-analysis of the effectiveness of crew resource management training in acute care domains. *Postgrad Med J* 2014;90(1070):699-708.
  21. Eddy K, Jordan Z, Stephenson M. Health professionals' experience of teamwork education in acute hospital settings: a systematic review of qualitative literature. *JBIC Database of Systematic Reviews and Implementation Reports* 2016;14(4):96-137.
  22. Rhee AJ, Valentin-Salgado Y, Eshak D, et al. Team Training in the Perioperative Arena: A Methodology for Implementation and Auditing Behavior. *American Journal of Medical Quality* 2017;32(4):369-75.
  23. Spiva L, Robertson B, Delk ML, et al. Effectiveness of Team training on Fall Prevention. *Nurs Care Qual* 2014;29(2):164-73.
  24. Capella J, Smith S, Philp A, et al. Teamwork Training Improves the Clinical Care of Trauma Patients. *Journal of Surgical Education* 2010;67(6):439-43.
  25. Mayer CM, Cluff L, Lin WT, et al. Evaluating Efforts to Optimize TeamSTEPPS Implementation in Surgical and Pediatric Intensive Care Units. *The Joint Commission Journal on Quality and Patient Safety* 2011;37(8):365-84.
  26. Thomas L, Galla C. Building a culture of safety through team training and engagement. *BMJ Qual Saf* 2013;22(5):425-34.
  27. Jones KJ, Skinner AM, High R, et al. A theory-driven, longitudinal evaluation of the impact of team training on safety culture in 24 hospitals. *BMJ Qual Saf* 2013;22:394-404.
  28. Deering S, Rosen MA, Ludi V, et al. On the Front Lines of Patient Safety: Implementation and Evaluation of Team Training in Iraq. *The Joint Commission Journal on Quality and Patient Safety* 2011;37(8):350-56.
  29. Forse RA, Bramble J, McQuillan R. Team training can improve operating room performance. *Surgery* 2011;150(4):771-78.
  30. Baik D, Abu-Rish Blakeney E, Willgerodt M, et al. Examining interprofessional team interventions designed to improve nursing and team outcomes in practice: a descriptive and methodological review. 2018:1-9.
  31. Baik D, Zierler B. Clinical nurses' experiences and perceptions after the implementation of an interprofessional team intervention: A qualitative study. *J Clin Nurs* 2019;28(3-4):430-43.
  32. O'Leary K, Ritter C, Wheeler H, et al. Teamwork on inpatient medical units: assessing attitudes and barriers. *Quality and Safety in Health Care* 2010;19(2):117-21.
  33. Aaberg OR, Ballangrud R, Husebø SIE, et al. An interprofessional team training intervention with an implementation phase in a surgical ward: A controlled quasi-experimental study. *Journal of Interprofessional Care* 2019:1-10.
  34. Ballangrud R, Husebø SE, Aase K, et al. "Teamwork in hospitals": a quasi-experimental study protocol applying a human factors approach. *BMC Nursing* 2017;16(1):34.

- 1
- 2
- 3
- 4 35. Sandelowski M. Focus on research methods. Whatever happened to qualitative
- 5 description? *Research in Nursing & Health* 2000;23(4):334-40.
- 6 36. Polit DF, Beck CT. Nursing research. Generating and Assessing Evidence for Nursing
- 7 Practice. Philadelphia: Wolters Kluwer 2017.
- 8 37. Aaberg OR, Hall-Lord ML, Husebø SE, et al. A complex teamwork intervention in a
- 9 surgical ward in Norway. *BMC Research Note* 2019;12(1):582
- 10 38. Kitzinger J. Focus group research: using group dynamics to explore perceptions,
- 11 experiences and understandings. In: Holloway I, ed. *Qualitative Research in Health*
- 12 *Care*. New York, USA: Open University Press 2005:56-69.
- 13 39. Kvale S. *Doing interviews*. London: SAGE 2007.
- 14 40. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs* 2008;62(1):107-
- 15 15.
- 16 41. Alonso A, Baker DP, Holtzman A, et al. Reducing medical error in the Military Health
- 17 System: How can team training help? *Human Resource Management Review*
- 18 2006;16(3):396-415.
- 19 42. Alonso A, Dunleavy D. Building teamwork skills in healthcare: The case for
- 20 communication and coordination competencies. In: Frush K, Salas E, eds. *Improving*
- 21 *patient safety through teamwork and team training*. New York: Oxford University
- 22 Press 2012:41-58.
- 23 43. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts,
- 24 procedures and measures to achieve trustworthiness. *Nurse Education Today*
- 25 2004;24(2):105-12.
- 26 44. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research
- 27 (COREQ): a 32-item checklist for interviews and focus groups. *International Journal*
- 28 *for Quality in Health Care* 2007;19(6):349-57.
- 29 45. Subbe C, Kruger M, Rutherford P, et al. Validation of a modified Early Warning Score in
- 30 medical admissions. *Qjm* 2001;94(10):521-26.
- 31 46. Blom L, Petersson P, Hagell P, et al. The Situation, Background, Assessment and
- 32 Recommendation (SBAR) Model for Communication between Health Care
- 33 Professionals: A Clinical Intervention Pilot Study. *International Journal of caring*
- 34 *Sciences* 2015;8(3):530-35.
- 35 47. Leonard M, Graham S, Bonacum D. The human factor: the critical importance of
- 36 effective teamwork and communication in providing safe care. *Qual Saf Health Care*
- 37 2004;13(suppl 1):i85-i90.
- 38 48. Haig KM, Sutton S, Whittington J. SBAR: A Shared Mental Model for Improving
- 39 Communication Between Clinicians. *Joint Commission Journal on Quality and*
- 40 *Patient Safety* 2006;32(3):167-75.
- 41 49. De Meester K, Verspuy M, Monsieurs K, et al. SBAR improves nurse-physician
- 42 communication and reduces unexpected death: A pre and post intervention study.
- 43 *Resuscitation* 2013;84(9):1192-96.
- 44 50. Stewart KR, Hand KA. SBAR, communication, and patient safety: An integrated
- 45 literature review. *Medsurg Nurs* 2017;26(5):297-305.
- 46 51. Cunningham U, Ward M, De Brún A, et al. Team interventions in acute hospital contexts:
- 47 a systematic search of the literature using realist synthesis. *BMC health services*
- 48 *research* 2018;18(1):536.
- 49 52. Zaccaro SJ, Rittman AL, Marks MA. Team leadership. *The Leadership Quarterly*
- 50 2001;12(4):451-83.
- 51 53. Benner P. *From novice to expert: excellence and power in clinical nursing practice*.
- 52 Upper Saddle River, N.J.: Prentice Hall 2001.
- 53
- 54
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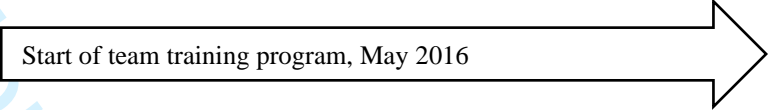


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2  
3 54. Sehgal NL, Green A, Vidyarthi AR, et al. Patient whiteboards as a communication tool in  
4 the hospital setting: A survey of practices and recommendations. *J Hosp Med*  
5 2010;5(4):234-39.  
6  
7 55. Downey C, Tahir W, Randell R, et al. Strengths and limitations of early warning scores:  
8 A systematic review and narrative synthesis. *International Journal of Nursing Studies*  
9 2017;76:106-19.  
10  
11 56. Massey D, Chaboyer W, Anderson V. What factors influence ward nurses' recognition of  
12 and response to patient deterioration? An integrative review of the literature. *Nursing*  
13 *Open* 2017;4(1):6-23.  
14  
15 57. Weller J, Civil I, Torrie J, et al. Can team training make surgery safer? Lessons for  
16 national implementation of a simulation-based programme. *New Zealand Medical*  
17 *Journal* 2016;129(1443):9-17.  
18  
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For peer review only



<b>T0</b>	<b>T1</b>	<b>T2</b>
Interview, April 2016	Interview follow up after six months, November 2016	Interview follow up after 12 months, June 2017
Profession (focus groups 1–3)	Profession (focus groups 4–7)	Profession (focus groups 8–10)
RNs (n=4)	RNs (n=3)	RNs (n=3)
CNAs (n=2)	CNAs (n=2)	CNAs (n=2)
Physicians (n=3)	Physicians (n=2)	Physicians (n=1)
	Physicians (n=2)	



**Figure 1** An overview of participants and times of the interviews in relation to the implementation of a team training program; N=11 healthcare professionals (four physicians, four RNs and three CNAs)

**Supplementary File 1.** Interview guide T0: Team-training program in a surgical ward. A Human Factors approach.

Interview questions (T0)	
Introduction	Clarification of the study aim Short information of the term “teamwork” Time of interviews (T0, T1 and T2) Roles of the moderator and the observer Ethical issues
Interview questions	<ul style="list-style-type: none"> <li>• Who are you that work together to give the best treatment and care to the surgical patient in the surgical ward?</li> <li>• How do you organize the work in the ward to give treatment and care to the surgical patient?</li> <li>• How is your experience of working together “...”, etc.?</li> <li>• How (in what way) do you registered nurses/assistant nurses/physicians organize your work to expedite the treatment and care for patients? (Please describe how you work together while on duty)               <ul style="list-style-type: none"> <li>- What does good teamwork between registered nurses/assistant nurses/physicians mean?</li> <li>- What challenges can you meet?</li> <li>- What promotes good teamwork?</li> <li>- What prevents good teamwork?</li> </ul> </li> <li>• How (in what way) do you organize work together with the registered nurses/assistant nurses/physicians?               <ul style="list-style-type: none"> <li>- What defines good teamwork with the nurses/assistant nurses/physicians?</li> <li>- What challenges can you meet?</li> <li>- What promotes good teamwork?</li> <li>- What prevents good teamwork?</li> </ul> </li> <li>• How (in what way) do you experience the teamwork with other units in patient care, e.g., post-operative, intensive or other units?               <ul style="list-style-type: none"> <li>- What does a good teamwork mean?</li> <li>- What challenges can you meet?</li> <li>- What promotes good teamwork?</li> <li>- What prevents good teamwork?</li> </ul> </li> </ul>
Summary	Summary of the interview

**Supplementary File 2.** Interview guide T1 and T2: Team-training program in a surgical ward. A Human Factors approach.

Interview questions (T1, T2)	
Introduction	Clarification of the study aim Ethical issues
Interview questions	<p><b>Communication</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about the importance of good communication?</li> <li>• How do you experience communication in the unit?</li> <li>• Do you experience challenges while communicating in the unit? In case of yes: Can you describe these?</li> <li>• Which initiatives (tools, strategies) have thus far been implemented to improve team communication?</li> <li>• How has your communication been improved?</li> <li>• How can you further improve your communication?</li> </ul> <p><b>Leadership</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about team leadership?</li> <li>• What does good team leadership mean?</li> <li>• What measures (tools, strategies) have already been implemented to promote leadership in teams?</li> <li>• How has your team leadership been improved?</li> <li>• How can you further improve your team leadership?</li> </ul> <p><b>Situation monitoring</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about situation monitoring?</li> <li>• How does situation monitoring work in teams you are involved in?</li> <li>• How can a team reach a common understanding of situation monitoring, and how can this be implemented?</li> <li>• How has your situation monitoring been improved?</li> <li>• How can you further improve your situation monitoring?</li> </ul> <p><b>Mutual support</b></p> <ul style="list-style-type: none"> <li>• In what way has the program raised awareness about mutual support?</li> <li>• How does mutual support affect team processes?</li> <li>• Can you say anything about what can promote mutual support (for example, helping each other with tasks, feedback) within a team?</li> <li>• How has your mutual support been improved?</li> <li>• How can you further improve your mutual support?</li> </ul>
Summary	Summary of the interview

## COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
<b>Domain 1: Research team and reflexivity</b>			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
<b>Domain 2: Study design</b>			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the interview or focus group?	
Duration	21	What was the duration of the interviews or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
<b>Domain 3: analysis and findings</b>			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

**Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.**