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RESEARCH ARTICLE

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Introducing the National Early Warning Score – A qualitative study of hospital nurses' perceptions and reactions

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Abstract

Aim: The aim of this study was to explore hospital nurses' perceptions and reactions to the National Early Warning Score during an introduction programme.

Design: A qualitative case study approach with participatory observations was used for this study.

Methods: In total, nine seminars and 23 simulation sessions attended by nurses were observed. An activity theory system analysis was applied to interpret the material.

Results: The findings revealed four tensions related to the working context: (a) tension between using a standardized tool and relying on clinical judgement (the tool could be either an aid or a barrier to patient assessment); (b) tension in the community of practice (the tool could be beneficial or increase stress and anxiety); (c) tension related to rules and compliance (the tool could be perceived as optional or compulsory); and (d) tension related to the division of labour (nurses feared more work).

KEYWORDS

early warning score, general hospital ward, introduction, nurse, nursing

1 | INTRODUCTION

Patient safety relies on nurses' timely assessment and actions (Massey, Chaboyer, & Anderson, 2017). The Early Warning Score (EWS) has been recommended and implemented to enhance patient safety by ensuring that patient deterioration is recognized and addressed in health care (Smith, Prytherch, Meredith, Schmidt, & Featherstone, 2013). Despite the use of the EWS, there are still problems in nurses' detection of patient deterioration and of errors in the EWS and non-adherence to referral protocols has been highlighted (Mok, Wang, & Liaw, 2015; Odell, 2015; Robb & Seddon, 2010). It is argued that the effectiveness of the EWS is dependent on its users (Downey, Tahir, Randell, Brown, & Jayne, 2017; Le Lagadec & Dwyer, 2017). Factors influencing the use of the EWS have been highlighted, such as motivation, clinical relevance, meaningfulness (Bunkenborg, Poulsen, Samuelson, Ladelund, & Åkeson, 2016), recording of vital signs, communication, practitioner engagement (Downey et al., 2017), ward culture, staffing, skills and knowledge (Odell, 2015). A review by Connolly, Byrne, Lydon, Walsh, and O'Connor (2017) provides insights into the barriers and facilitators related to the implementation of an EWS system and concludes that the implementation process must be given attention to realise the benefits of such a system. Successful implementation must address the social and work contexts in which the system is to be implemented (Connolly et al., 2017). Despite some studies of the EWS implementation process (Bunkenborg et al., 2016; Connolly et al., 2017; Niegsch, Fabritius, & Anhøj, 2013), little is known about how hospital nurses perceive and react to the EWS in the early stage of its introduction in clinical practice and how the working context, such as community of practice and division of labour, is influenced. By exploring the introduction of the EWS to nursing practice, with a focus on nurses' perceptions and reactions as potential factors that affect the use of such a system,

gaps in knowledge of the implementing the EWS system will be illuminated. Therefore, the aim of this study was to explore hospital nurses' perceptions of and reactions to the National Early Warning Score (NEWS) during an introduction programme that included seminars and simulation sessions.

1.1 | Background

Early Warning Score systems are based on vital signs as important indicators that ward nurses can use to recognize and respond to clinical deterioration (Massey et al., 2017). Hospitals have employed different types of systems to improve both the early identification and management of patient deterioration (Hillman et al., 2005; McGaughey et al., 2007). In 2012, in an attempt to standardize the EWS systems in hospitals, the British Royal College of Physicians recommended NEWS for the routine clinical assessment of all adult patients. A score is assigned to each of the following physiological observations: respiratory rate, oxygen saturation, use of supplemental oxygen therapy, systolic blood pressure, heart rate, temperature and level of patient consciousness. An increase in the total score suggests that a patient's condition has worsened (Royal College of Physicians, 2012). NEWS has been introduced to Norwegian healthcare practice as a part of the Norwegian Patient Safety Programme (Norwegian Ministry of Health & Care Services, 2016) following recommendations from the Royal College of Physicians.

A large and growing body of literature on the EWS is available. Results of a review by Saab et al. (2017) indicate that EWS education is effective for users, particularly nurses, in enhancing their knowledge and clinical performance, showing that vital sign recording and EWS calculations were improved. The EWS is found to empower nurses to call for help when the score is high (McGaughey, O'Halloran, Porter, & Blackwood, 2017). An increase in full vital sign monitoring and documentation has also been shown (Bunkenborg et al., 2016; Hammond et al., 2013). Others, however, have found that compliance with EWS protocols is sometimes poor and that the tool does not always work as intended in practice (Considine, Trotter, & Currey, 2016; Hands et al., 2013; Ludikhuize, Smorenburg, deRooij, & deJonge, 2012; Niegsch et al., 2013). The recording and documentation of full sets of vital signs have been found to be incomplete (Cardona-Morrell et al., 2016; Ludikhuize et al., 2012) and a study by Hands et al. (2013) found partial adherence to the vital sign monitoring protocol, hourly differences in observation frequency and improper performance of repeated assessments. The impact of the EWS on nurses' competence to identify and manage deteriorating patients has been found to be beneficial yet contradictory and there is a concern that the EWS may potentially deskill nurses and undermine clinical judgement (Jensen, Skår, & Tveit, 2018). This concern has highlighted the risk of overlooking clinical cues and subtle changes in patients when using the EWS that reduce complex clinical conditions to a single number (Petersen, Rasmussen, & Rydahl-Hansen, 2017). Factors influencing ward nurses' recognition of and responses to patient deterioration are reported in several studies. For example, an integrative review found that the issue is complex and nurses' assessments and knowledge of patients, education and environmental factors are involved, as well as non-technical skills, access to support and negative emotional responses influence the response to patient deterioration (Massey et al., 2017).

According to Connolly et al., (2017), the process of implementing EWS systems must address the social context in which the system is to be implemented to understand user-related changes and changes to the working context to best use the system. The implementation of an EWS system has been evaluated and the staff perceived clinical relevance and meaning as crucial (Bunkenborg et al., 2016; Niegsch et al., 2013). Nevertheless, studies evaluating the implementation of EWS systems do not report in detail how nurses perceive and react to a new tool in the clinical setting. When exploring hospital nurses' perceptions and reactions to the introduction of a new tool in clinical practice, a theoretical framework can be used to include and address the working context. Activity theory (Engeström, 2001, 2015) addresses the working context and was thus used as a framework to study the introduction of NEWS as a developmental process in which tensions are central driving forces of change and development.

2 | METHODS

This study is part of a larger qualitative case study (Yin, 2013) investigating the introduction of and experiences with NEWS in a general hospital. To obtain new knowledge about nurses' perceptions of NEWS at an early stage, participatory observation of the introduction of the tool in seminars and simulation sessions was used. Both the formal reactions of nurses – namely their comments during the seminars and simulations – and their more informal exchanges in pairs and smaller groups were noted. The focus was on how nurses perceived the new tool during the introduction programme. A theoretical framework based on activity theory is used to gain insight into how nurses perceive the new tool and how it might have an impact on their work context as an activity system.

2.1 | Activity theory as an analytical tool

According to Engeström (2015), an activity system is a complex network consisting of elements such as a subject, object, tools, rules, community and division of labour, which are analysed in terms of relational interactions (Figure 1). An activity system is dynamic, and the elements have an impact on each other. In this study, nurses' work context in general hospital wards is described as an activity system. Using activity theory as an analytical tool provides insight into how changes, such as introducing a new tool to clinical practice, impact on the different elements and how they mutually affect each other. An activity system is a community of multiple points of view, traditions and interests and involves constantly working with contradictions within and/or between its elements and/or with interacting activity systems (Engeström, 2001). Tensions or contradictions are central driving forces for change and development in

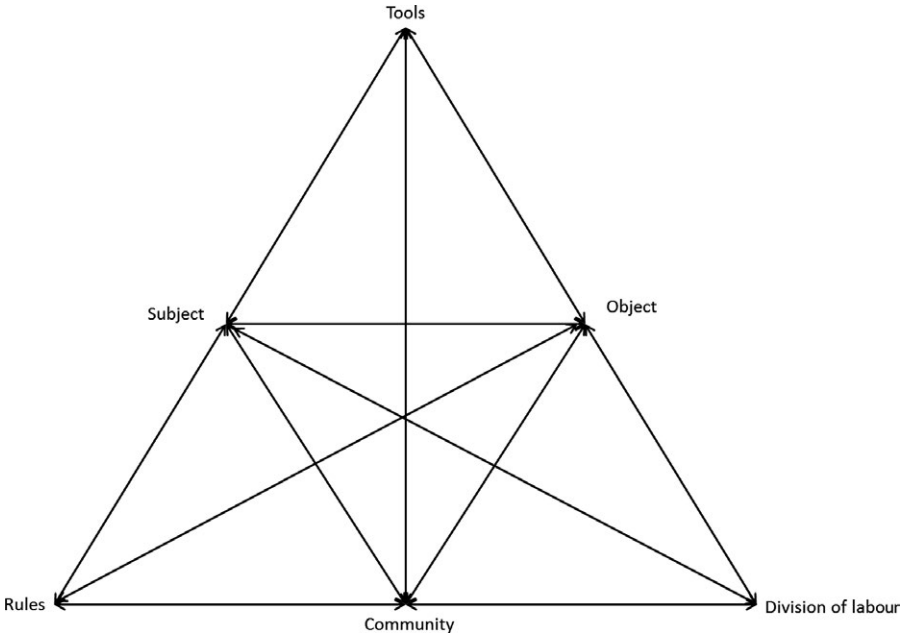

FIGURE 1 Activity system model adapted from Engeström (2015)

activity theory and should be seen as opportunities for development rather than as obstacles (Engeström, 2001). According to Engeström (2001), contradictions are manifested as problems, tensions, conflicts or breakdowns within an activity system or between different systems. Bridging tensions allows the system to be transformed and for practices to develop (Murphy & Rodríguez-Manzanares, 2014). In this study, activity theory emerged as a suitable method for analysing nurses' perceptions and reactions to the introduction of NEWS. Activity theory was applied to the study material due to the focus on elements and tensions in an activity system during introduction of a new tool.

2.2 | Study setting

The study was conducted at a state-funded hospital in Norway, with eight units participating from medical, surgical and rheumatology wards. The participating nurses all have a 3-year bachelor's degree in nursing. Their ages span a wide range – from early 20s–50s – and consequently their experience varies from newly qualified to about 25 years of experience. Hospital management made the decision to implement NEWS in 2016 in response to the National Patient Safety Programme. The introduction of NEWS was planned by a group of doctors and nurses and consisted of a 4-hr training programme, consisting of seminars with patient cases for some groups and seminars with simulation sessions for other groups. Simulation sessions were held by qualified simulation facilitators using patient cases prepared by the group who planned the programme. In both the seminars and simulation sessions, the nurses trained using the tool to assess and discuss cases were patients had problems such as chest pain, infection and deterioration in respiration. The seminars and simulation sessions were arranged in the various units, which meant that the participants knew each other. The introduction followed a recommendation by the Royal College of Physicians' guidelines from 2012. The programme covered four themes: how to use NEWS, using the new charts, calculating a score and responding based on a score combined with vital sign physiology.

2.3 | Data collection

The introduction of NEWS was observed by the first author, and data were collected in autumn 2016. The eight participating units organized their own seminars and simulations to ensure that all nurses, 296 in total, took part in the programme. Nine seminars with 79 nurses and 23 simulation sessions with 52 nurses were included. Each group was small and consisted of five to 19 nurses. Most of the nurses were women, with only six male nurses participating in the activities. The first author participated in the sessions and took field notes on nurses' activities and interactions, as well as on their comments, questions and discussions, both formally and more informally. In order to facilitate and focus the data collection, an observation guide was used. Immediately after the sessions, the field notes were reviewed and supplemented with additional notes, which in total (109 pages) constituted the material subject of the analyses.

2.4 | Data analysis

The data analysis began with a thematic content analysis following the method described by Braun and Clarke (2006), with a view to obtaining an overview and identifying patterns or concurrent themes in the data. The thematic analysis method consists of becoming familiar with the data, generating codes,

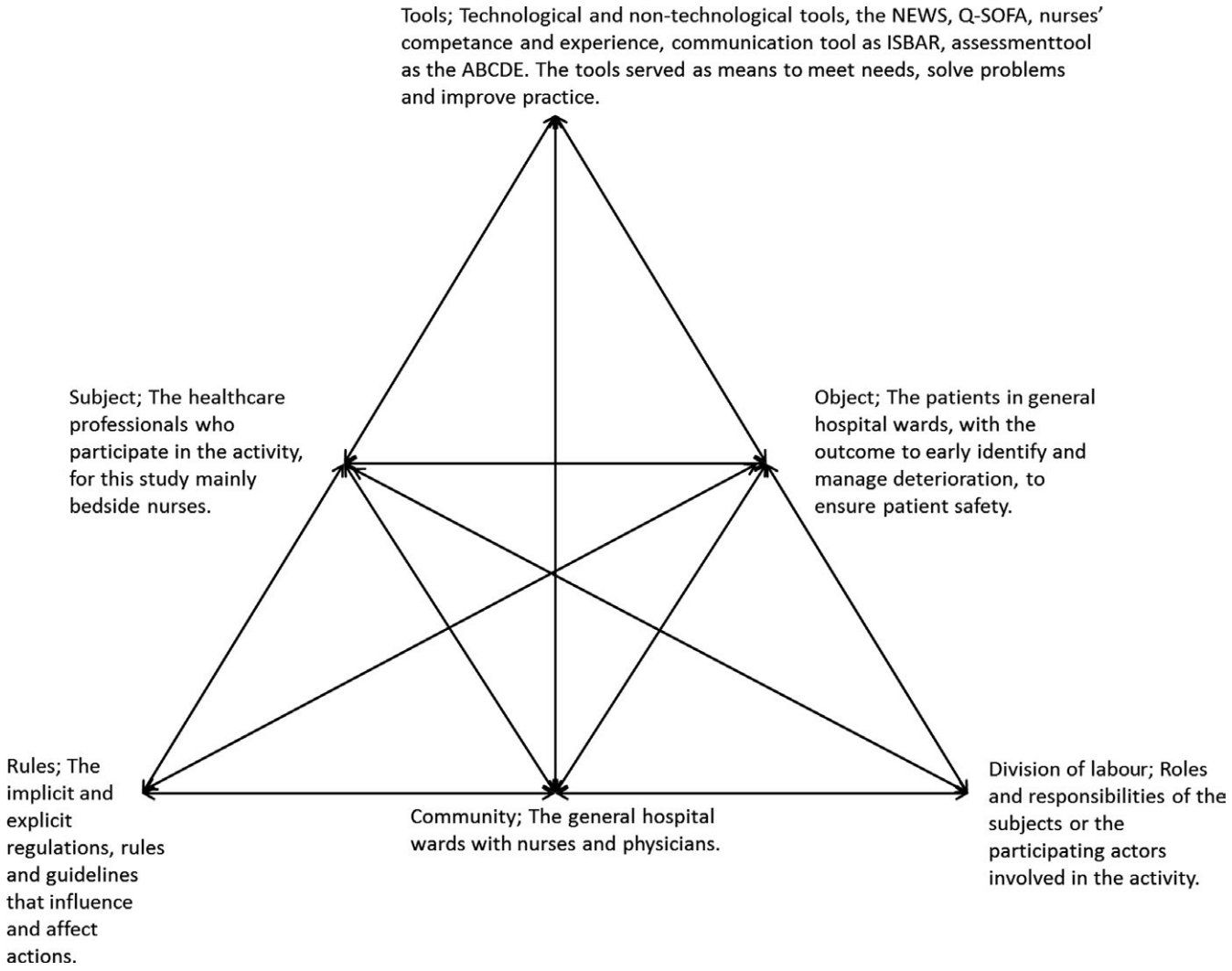

FIGURE 2 The activity system for this study

searching for themes and reviewing themes. Familiarity with the data was achieved through repeated reading. First, initial codes and preliminary themes describing the content were identified and marked in the text; these were derived from the data and the theoretical framework. Second, as recommended by Yamagata-Lynch (2010) these codes and preliminary themes were subsequently reorganized into elements according to the activity system model, as subject, object, tools, rules, community and division of labour. As the data analysis progressed and the codes and preliminary themes within each element of the activity system were reviewed, tensions within or between these elements emerged. In the further stages of analysis, attention was directed towards these tensions, which are thematized as findings in this study. The themes were named in terms of tensions revealed in relation to particular elements in the activity system model. The elements of the activity system are presented in Figure 2. The system consists of a shared aim of practice, which is to work with the patient (the object) to achieve specific goals and outcomes. It also includes the nurses (the subjects) who work with patient care, the instruments used in the work to meet needs and solve problems (the tools), the implicit and explicit regulations and guidelines that influence actions (the rules), the general hospital wards with nurses and doctors (the community of practitioners) and the organization of personnel and the responsibilities of those involved in the activity (the division of labour). The authors (JJ, RS & BT) conducted the analysis and discussed the themes and their relation to the elements in the activity theory system. Finally, a consensus was obtained on how to understand and report the findings.

2.5 | Ethics

This study was registered with and approved by the Norwegian Centre for Research Data (NSD). The researchers received written permission from the current director of the hospital, who also granted access. Information regarding the study was given to the heads of the different units and to the participants before each seminar and simulation. Any information that might have revealed the identity of participants was altered in the field notes and during the study process to prevent any possibility of recognition.

3 | RESULTS

Four tensions emerged as themes in the analysis of the nurses' perceptions and reactions to the introduction of NEWS based on the different elements in their work context. These themes were identified as follows: tension between using standardized tools and relying on clinical judgement, tension in the hospital ward's community of practice, tension related to rules and compliance and tension related to NEWS and the division of labour.

3.1 | Tension between using standardized tools and relying on clinical judgement

During the sessions, it became apparent that the participating nurses had quite different opinions about NEWS. In most seminars, the nurses expressed that NEWS could help identify changes in a patient's vital signs and they talked about how NEWS clarified which vital signs should be measured and verified if a patient was deteriorating. However, it was widely acknowledged that the need for NEWS was linked to experience. One of the nurses' statements exemplifies this: "*NEWS can be a help when you are unsure of deterioration; it might be good for new nurses to have*." However, there were also some concerns about the emphasis placed on NEWS. Some nurses believed that NEWS was incomplete and they were worried that the attention to the vital measurements connected with NEWS would be at the expense of other observations such as skin status, pain, urine output, facial expressions and conversations and general contact with patients. The nurses' concerns were based on experiences with other standardized tools already in use at the hospital. This is illustrated in a seminar field note:

> One of the nurses, called Gina, starts talking about a recent patient they had in the unit. Gina describes her perception of the situation. She says that the doctors were preoccupied with the measurement and that the patient did not score high enough on the SOFA criteria. Gina considered the patient to be ill, she observed changes in skin colour and increasing confusion and she described how she was really worried. Gina felt that the observations she conveyed were not listened to by the doctors because the patient did not score high enough on the SOFA criteria. Gina pointed out that the doctors must pay attention to nurses' observations. Several other nurses nodded in agreement at Gina's descriptions.

The tool referred to is the Sequential Organ Failure Assessment (SOFA) score, which numerically quantifies the number and severity of failed organs in patients with suspected sepsis. Based on similar experiences to Gina's, several nurses expressed uncertainty with regard to using standardized tools to obtain scores before deciding on a further response to a patient. According to the nurses, using a score in some situations could undermine the use of their own clinical judgement. The following statement from a nurse illustrates this: "*I am afraid in the future that some of our observations will not be applicable. Everything is going to be standardized*." Some nurses feared that NEWS could prevent their opinion from being heard, especially when concerns about their patients were based on experience and judgements rather than objective measurements. One participant commented, "*I believe that the sense that something is happening could be more difficult to convey if no measurements are affected*." Some nurses said that they used their professional competence and experience when they assessed patients in daily practice and they could see when a patient was at risk of deterioration. The following quote illustrates how some nurses perceived NEWS to be more or less unnecessary: "*I do not see the benefit of this [NEWS]; after all, experienced nurses have this 'in their bones' and it is basic nursing knowledge*."

3.2 | Tension in the hospital ward's community of practice

Observations of the nurses during the sessions showed how they engaged and interacted with each other and the instructor. During the simulation sessions in particular, it became apparent how the nurses collaborated and constantly supported each other with advice. Some nurses assumed that NEWS could help the unit to obtain an overview of the patients in the practice community and to identify which patients needed to be closely monitored. Others expressed concern that the level of stress and anxiety in their practice community would increase after implementation of NEWS, especially when seeing a red (extreme) score on the NEWS chart:

> The seminar instructor distributed the pocket cards with the NEWS score. It remained quiet for a while as the nurses looked at the card they had received. Then one nurse commented [on] how NEWS will lead nurses to quickly become alarmed and get stressed, particularly when there is a red score and the requirement is continuous monitoring. Other nurses followed up by pointing out that during shifts with fewer nurses in the ward, especially the night shift, feeling alarmed and stressed could be pertinent. The instructor allowed the nurses to talk about it and asked about their current practice of taking measurements (seminar field notes).

The practice community in hospital wards includes doctors and some nurses expressed that implementing NEWS would have an impact on the collaboration with doctors. Some expressed hope that the focus on vital signs might help them to communicate more succinctly with the doctors, while others feared that the communication might be reduced to a summarized score in which the underlying objective vital signs would not be reported. The nurses

were taught in all the seminars that an anaesthesiologist should be summoned when the score requires it. Some of the nurses found it reassuring to know that an anaesthesiologist could be contacted, while others feared that they could be criticized for contacting a busy anaesthesiologist.

3.3 | Tension related to rules and compliance

During the seminars, the nurses were taught that NEWS could help improve the system and structure for patient assessments. This is illustrated in a seminar field note:

> The instructor introduced the changes in the guidelines that point out which measurements are to be taken, how they are to be taken and how to write them in the new chart and in the observation scheme. One of the nurses commented that NEWS would help them to structure activities that are not performed very systemically today.

There seemed to be a general consensus that NEWS could provide a better structure and system for assuring the quality of vital sign measurements as well as raising awareness of their importance. In addition, nurses expressed that NEWS could help to achieve a more uniform assessment of patients that was not dependent on nurses' experience or subjective evaluations. However, the simulation sessions revealed how nurses assessed patients differently and that many forgot to measure the respiratory rate. In the simulation session debriefings, the participants discussed this and admitted that they did not comply with NEWS. The nurses seemed to agree to place a greater emphasis on respiratory rate, showing each other techniques for carrying out the measurement. The discussions illustrated how NEWS response and escalation recommendations were perceived in a variety of ways. Some nurses thought they were compulsory, while others believed they were optional depending on the situation.

3.4 | Tension related to news and the division of labour

A common view among the participating nurses at the time of the study was that they worked independently and took responsibility to correct symptoms and vital signs that were affected. During several simulation session debriefings, they talked about how they would treat patients and undertake prescribed actions that they had at their disposal before referring patients to doctors. Some nurses expressed concern that introducing NEWS would cause problems in nurses' professional practice. This is illustrated in a seminar field note:

> The instructor has presented the NEWS pocket cards and the nurses are talking about their practice in the unit and how several patients will have a bad [high] score that will lead to frequent calls to the doctor, increased monitoring frequency and more work. One of the nurses commented that they will have to call and pester the doctors and use resources that are intended for both the doctors and the nurses themselves. Another nurse described how some patients would have an elevated score, even though some of the vital sign measurements are "normal" and acceptable in the given situation.

Some nurses feared an increase in the frequency of measurements, particularly in relation to a "normal" patient condition, for example as in chronic obstructive pulmonary disease (COPD). However, they also mentioned how NEWS could lead to high scores and frequent measurements and referrals among other patients with chronic diseases and the elderly. Several nurses discussed how the doctors' tasks would be affected by NEWS. A common view among the nurses was that if they were going to use NEWS, they would need to adapt it in some cases and use individual parameters to assess changes in patients' vital signs. The nurses feared that doctors would not provide adequate plans for observing the patients with individually accepted values and that the nurses would be unable to comply with the response recommendations.

4 | DISCUSSION

This study has explored hospital nurses' perceptions and reactions to the introduction of NEWS in the working context. In the following section, we will discuss our findings and their potential impact on the use of NEWS under the headings "NEWS and professional competence" and "Compliance with NEWS."

4.1 | National Early Warning Score and professional competence

The overall impression gained from observing the nurses was that they appeared to have a strong commitment to patient safety and placed considerable emphasis in their role to recognize and respond to early signs of patient deterioration. This is in line with findings of other studies, such as a recent study exploring the role of nurses in recognizing and responding to deteriorating postoperative patients (Mohammmed Iddrisu, Hutchinson, Sungkar, & Considine, 2018). The nurses in our study underlined the particular utility value of NEWS for new and inexperienced nurses and described it as a tool that could enable them to more readily identify deteriorating patients. However, it is interesting to note the ambivalence that the nurses displayed towards NEWS. On the one hand, they welcomed the tool as a helpful aid in the assessment of patients and as a reminder of the importance of vital signs in clinical practice. On the other hand, they seemed concerned that using a standardized tool like NEWS would affect and somehow hamper their ability to rely on and use their professional competence in the assessment of patients. According to the Royal College of Physicians (2012), NEWS should be used as

objective data to aid clinical decision-making and concern about a patient's clinical condition should override NEWS. The nurses in our study seemed to perceive the situation in a somewhat less harmonious light. It seems that some nurses' experiences with other tools, such as SOFA, influenced their ambivalence towards using standardized tools in general and their reaction to the implementation of NEWS in particular. Their reactions were partly linked to the possibility that nurses might somehow become too dependent on numeric tool scores and hence undervalue their own clinical judgement of a situation. The nurses also said that they feared that doctors would emphasize measurements at the expense of nurses' observations and clinical judgements. These findings correspond with the findings of a recent study that suggested that when using a tool, nurses relied on the numerical escalation of the system to identify deteriorating patients rather than their own clinical judgement and consequently, the participants found it challenging to escalate care when a score was low (Dalton, Harrison, Malin, & Leavey, 2018).

4.2 | Compliance with National Early Warning Score

The effectiveness of NEWS is dependent on user engagement with the tool and compliance (Le Lagadec & Dwyer, 2017). The first step is for nurses to actually perform the measurements and record vital signs and ensure that the measurements and score calculation are performed accurately. The second and this is the crucial point, is for nurses to perform according to the recommended response. During the professional training in the simulation sessions, the nurses became more aware of the importance of vital sign measurements. This is in line with findings by Bliss and Aitken (2018). In particular, the respiratory rate was emphasized as significant, especially since the simulation sessions revealed that quite a few nurses tended to pay little attention to and overlook the respiratory rate. Other studies have found that an increased focus on respiratory rate improves the recording and documentation of this vital sign (Considine et al., 2016; Odell et al., 2007). Compliance and adherence to monitoring frequency and escalation recommendations are crucial to the functioning of NEWS. Previous studies have shown that adherence to recommended monitoring frequency may sometimes fall by the wayside during busy periods due to prioritization of other tasks, a lack of monitoring equipment and different understandings of how to apply escalation recommendations (Elliott et al., 2015; Smith & Aitken, 2016). Our findings indicate that the possible reasons for non-compliance are more complex and are related to nurses' beliefs regarding the role of their professional competence and judgement and their opinions on the reliability of NEWS. Some nurses in our study thought that NEWS might overestimate the severity of the clinical condition of some patients and cause "false" elevated scores. These results are partly in line with other research that found that when selecting the appropriate vital sign measurements and responding to these measurements nurses appears to be influenced by their clinical judgement of competing demands rather than adhering to a mandated policy (Cardona-Morrell et al., 2016).

4.3 | Trustworthiness

Several strategies were used to ensure the trustworthiness and credibility of this study's findings (Creswell & Miller, 2000; Lincoln & Guba, 1985). The first validity procedure employed entailed researchers disclosing their own assumptions and beliefs (Creswell & Miller, 2000). A preconception of the first author was that NEWS would be a helpful tool for nurses' decision-making. This might have led to an emphasis on findings confirming this. The two other researchers had not worked for several years in a general hospital ward like those in the study and thus did not share the first author's preconceptions and were able to approach the study data with an open mind. The second validity procedure employed entailed staying at the research site for a prolonged period (Creswell & Miller, 2000). As a nurse in one of the units, the first author knows the field as an insider and is familiar with the group being studied (Mercer, 2007). This insider status facilitated access and was important for assembling data and conducting analyses. However, too much familiarity can also create "taken-for-granted" assumptions and blindness in terms of what is actually occurring. The other researchers (RS and BT) therefore read and discussed the research processes and findings to protect the report from such influence. The third validity procedure employed was member checking, where data, analytic themes and interpretations were presented back to some of the participants for them to confirm the credibility of the information (Creswell & Miller, 2000; Lincoln & Guba, 1985). The first author arranged two sessions, each lasting 45 min, with two groups of participants who were given the opportunity to respond to the researchers' reconstructions; they found these reconstructions recognizable.

4.4 | Limitations

This study was conducted at a hospital in Norway, and observations were made of general hospital ward nurses participating in seminars and simulation sessions. This study may indicate common categories or links between the setting observed and similar settings. The knowledge established by researcher observations is situated, locally and partially. Participatory observation could have been supplemented with other data; however, the observations of many small groups gave insight into both the formal reactions of nurses and their more informal reactions, in addition to how the nurses interacted with each other during the introduction programme. The participants in this study were directly observed and were aware of being studied; however, this did not appear to influence them. An implication of such awareness is the possibility that participants may change their behaviour and actions in line with researcher expectations.

5 | CONCLUSIONS AND RELEVANCE

This study has explored hospital nurses' perceptions of and reactions to the introduction of NEWS. Four themes were identified: tension between using standardized tools and relying on clinical

judgement, tension in the hospital ward's community of practice, tension related to rules and compliance and tension related to NEWS and the division of labour. The tensions we identified may affect nurses' competence and compliance and hence the sustainability of NEWS. These tensions shed light on potential factors that may influence how NEWS is used. The tensions found in this study could help shape future in-service training programmes and simulation sessions in a way that addresses possible tensions, with the purpose of improving the implementation and use of NEWS in general hospital wards. Our study suggests that when NEWS is introduced in general hospital ward practices, the community of practice is an important factor for collaboration and for the development, interpretation and management of, as well as compliance with, the new tool.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

JJ and BT: Study design. JJ: Data collection. JJ, RS and BT: Data analysis and interpretation of the data. JJ manuscript drafting. RS: Manuscript reading and provide oral feedback. BT: Critical revisions to the paper. All authors agreed upon the final version of the manuscript.

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