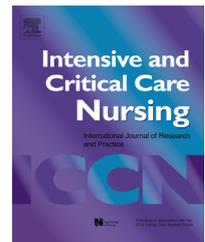




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ORIGINAL ARTICLE

# The need for predictability in coordination of ventilator treatment of newborn infants – A qualitative study

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## KEYWORDS

Collaboration;  
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care unit;  
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## Summary

**Objective:** New strategies for interprofessional collaboration are needed to achieve best practice in the care of ventilated newborns. This study explores what physicians and nurses believe to be important to improve collaboration during ventilator treatment.

**Methods:** Qualitative data collected from one focus group were analysed using Gittel's theory of relational coordination.

**Results:** To optimise communication about and coordination of ventilator treatment, six strategies were needed: (1) a pathway toward the goal for each newborn, (2) regular meetings, (3) accurate communication following an established pattern in the rounds conference, (4) collaboration to improve interprofessional level of knowledge, (5) courage to communicate one's own point of view, and (6) flexible responsibility in extubation situations.

**Conclusion:** By identifying weak areas in collaboration, nurses and physicians were inspired to suggest and discuss concrete improvements of work practices in the neonatal intensive care unit. Nurses and physicians can coordinate ventilator treatment by using a pathway and at the same time enhance nurses' involvement and responsibility in order to increase the flexibility of job boundaries, allowing the professions to cover for each other's work.

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### Implications for Clinical Practice

- There is a need for predictability in communication and coordination of ventilator treatment of premature and sick newborn infants.
- To achieve a uniform ventilator strategy, it is important to have the ability to individualise the care of the newborns and to balance the pathway between a strict protocol and much less precise guidelines.
- Nurses and physicians can coordinate ventilator treatment by using a pathway and at the same time enhance nurses' involvement and responsibility in order to increase the flexibility of job boundaries, allowing the professions to cover for each other's work.

## Introduction

Collaboration regarding oxygenation and ventilation in premature and sick newborns in neonatal intensive care units (NICUs) may require new strategies and interventions to achieve best practice (Solberg et al., 2013, 2014). This is especially important in terms of the survival of newborns with extremely low birth weight (Vento, 2011). The delivery of effective medical care depends on the professionals who deliver the care, and interprofessional collaboration should be exercised with mutual respect and appreciation (McCormack et al., 2009). Rapid, effective and respectful interprofessional communication is of importance in intensive care units (ICUs) (Storesund and McMurray, 2009). NICU nursing may be affected by personal attributes of physicians such as power, competitiveness, collegiality, beliefs and flexibility (Thomas et al., 2004). It has been suggested that patients' length of stay and hospitalisation costs could be reduced by using more effective medical care with higher levels of relational coordination (Gittell, 2002a; Gittell et al., 2000). One way to improve nurse–physician relationships is by treating their respective knowledge with mutual respect (Pullon, 2008). Better communication between nurses and physicians is fundamental, but existing hierarchies may be a barrier to improvement (Crawford et al., 2012). Communication is influenced by timeliness, preparations, interruptions and delayed or lacking responses (Crawford et al., 2012). Both interprofessional communication and the quality of patient care tend to be improved when using Gittell's theory of relational coordination (Havens et al., 2010; Manojlovich, 2010; Pullon, 2008).

Here, we present the third part of a study regarding the quality of care of ventilated newborns in a Norwegian NICU. The first part endeavoured to discover areas for potential quality improvement regarding oxygen and ventilator treatment and the second part explored how physicians and nurses experienced their collaboration when working with ventilator treatment. Results from the first two studies have been reported elsewhere (Solberg et al., 2013, 2014). The aim of the present study was to explore the views of physicians and nurses on ways to improve collaboration during ventilator treatment. The research questions were: (1) what do physicians and nurses believe to be important for improving communication when collaborating on ventilator treatment, and (2) which strategies do physicians and nurses identify as effective for better coordination of ventilator treatment?

## Theoretical perspective

In acute care, the work of professionals is interdependent and performed under time pressure during care of complex patients and when performing high-risk tasks. Consequently, high quality relationships are important to create collective identity and coordinate the work effectively (Gittell, 2009). The relationships that exist between the professionals in their collaboration of patients is influenced by how they communicate (Gittell, 2002b). We chose the Theory of Relational Coordination as our theoretical perspective for this study because it includes dimensions that characterise the quality of relational coordination between the people who collaborate (Table 1). These are elements used to identify weak areas in a unit (Gittell, 2009). Relational coordination has a strong effect on caregivers' process of preparation to provide and manage care, which promotes better outcomes for patients (Weinberg et al., 2007). In addition, Gittell describes how professionals may achieve and maintain high performance over time using 12 high-performance work systems that help strengthen the relations and systematically coordinate the work effectively (Gittell, 2009). In the following we present the Theory of Relational Coordination, and also focus on six high-performance work systems (Table 1).

### The theory of relational coordination

The theory of Relational Coordination is a "mutually reinforcing" process of interaction between communication and relationships carried out for the purpose of task integration (Gittell, 2002b) (p. 301). According to the theory, there are three dimensions of relationships fundamental to the process of coordination: shared goals, shared knowledge and mutual respect. High quality of communication should be characterised by frequent, timely and accurate communication and focused on problem solving (Gittell et al., 2000, 2008). Consistent with Gittell's thoughts, shared goals create powerful ties between caregivers and motivate them to achieve agreement in decision-making (Gittell, 2009). Caregivers must share knowledge regarding each other's tasks, clarify who needs to know what and emphasise the degree of urgency. In addition, mutual respect between professionals and acknowledgement of their expertise create powerful bonds in highly interdependent work processes

**Table 1** Essential elements of relational coordination based on Gittell's Theory (Gittell, 2009).

Characteristics of the quality of relational coordination	High performance work systems to strengthen relations
Dimensions of relations	
1. Shared goals	1. Measuring of team performance
2. Shared knowledge	2. Resolving conflicts proactively
3. Mutual respect	3. Making job boundaries flexible
Dimensions of communication	4. Creating boundary spanners
4. Frequent	5. Connecting through pathways
5. Timely	6. Broaden participation in patient rounds
6. Accurate	
7. Problem solving	

(Gittell, 2009). Consequently shared goals, knowledge and mutual respect reinforce and are reinforced by communication (Gittell, 2012). Frequent communication builds relationships through familiarity growing from repeated interactions, while timely communication is important in highly interdependent work because delayed communication may result in errors. Accurate communication is essential for effective decision-making and for trustworthiness.

### High performance work systems

In highly interdependent work processes, collective problems occur when professionals make judgments before they know enough about each other's decision-making processes (Gittell, 2009). Conflicts are common in highly interdependent and complex work processes involving a hindrance communication and weakening relationships. However, conflicts may be constructive when professionals share their views in a decision-making process. Conflicts can be resolved proactively if medical staff clarify their roles together, develop cross-functional protocols, build teams and establish monthly meetings.

Flexible boundaries between professionals who care for the same patient may improve the care and reduce patients' length of stay, because caregivers can cover for each other's work. Performance may increase through the use of a protocol to delineate focus and roles. Conversely, a protocol can also introduces rigidity in workflow because standardised and systematic work processes reduce the communication needs. However, when a protocol is developed as a pathway, flexible boundaries are created to guide care towards a goal, an approach that is more suitable for work with high degrees of uncertainty. In healthcare settings, boundary spanners (nurses) can coordinate the work effectively and gather information from professionals involved in patient care, bring the work together and pass timely information along to those who need to be informed. Regarding a broadening of participation in patient rounds, Gittell includes meetings which facilitate face-to-face-interactions that strengthens the communication (Gittell, 2009; Gittell et al., 2010).

## Methods

### Design

We used a qualitative design drawing on one focus group interview. The interview took place in October 2013 in the NICU at Oslo University Hospital, Rikshospitalet. As the present study is the last in a series of three connected studies, we wanted the participants to be well informed about results from study one and two prior to the interview. For this reason, the first author provided all of the nurses and physicians in the NICU with information about our previous findings regarding adherence to ventilation and oxygenation targets in the study NICU (Solberg et al., 2013) and on physicians' and nurses' perceptions on interprofessional collaboration concerning newborns on mechanical ventilation (Solberg et al., 2014).

### Participants and setting

The central professionals in Norwegian NICUs are physicians and nurses. The NICU employs 120 nurses (non-specialist nurses and specialist nurses in intensive, pediatric or neonatal care) and 10 physicians (seven consultants, two fellows and one house officer). In accordance with methodological recommendations found in previous literature (Barbour, 2007), we did not invite more than eight respondents to this focus group because the participants' levels of expertise was high and the topic we discussed was complicated. We used purposeful sampling to select information-rich participants (Patton, 2002) to use their expertise and experience. We included more nurses than physicians in the group because the nurses significantly outnumber physicians in the staff. We invited and included five nurses; two supervisors, two with very long experience and one team leader with important coordinating functions in the NICU. Three physicians volunteered, including one consultant and two fellows.

### Data collection

We conducted one focus group interview with all eight participants. This interview is a group discussion conducted to

explore specific issues and experiences or to uncover factors that influence behaviour or motivation (Krueger and Casey, 2009). We facilitated an open conversation using two open-ended questions based on a review of the literature regarding interprofessional collaboration and results of study 2 (Solberg et al., 2014). The first question concerned how clinicians could use each other's knowledge reciprocally. The second question was about how responsibility could be delegated and coordinated. The questions were validated in discussions with the co-authors. The first author served as the focus group moderator and the senior author observed and noted questions that were not comprehensively answered and brought these issues up again at the end of the focus group. The moderator attends to group dynamics that may affect answers and stimulates interactions and sharing of unexpected suggestions (Krueger and Casey, 2009). The focus group session lasted 90 minutes and was audiotaped and subsequently transcribed verbatim.

### Ethical approval

Permission to conduct the study was obtained from the data protection officer at Oslo University Hospital and from the director of the NICU. Participation was voluntary and informed in accordance with the Declaration of Helsinki. Approval by the regional committee for medical research ethics in Norway was not required, because this was a quality of care study. Written informed consent was obtained from all participants.

### Data analysis

A concept-driven content analysis was used. This involved reading the transcripts with codes developed from existing literature in the field (Kvale and Brinkmann, 2009). The transcribed text was read several times to gain insight into the content. The next step was to condense the text into units of meaning. In the analysis we included six of Gittel's work systems, which concerned the issues that nurses and physicians discussed. The units of meaning were then sorted in relation to the essential elements of relational coordination from Gittel's Theory (Table 1). In the last step, the meaning units were processed and abstracted to categories reflecting Gittel's main themes.

### Results

Both nurses and physicians recommended a change in the traditional way of managing ventilator treatment. The results are presented according to nurses' and physicians' experiences and main suggestions on how to promote collaboration. To ensure anonymity, references to individual participants' statements use a non-identifying number representing the profession and individual (e.g., physician 2).

#### Using a protocol with individual goals for the newborns

The predominant suggestion to improve coordination of ventilator treatment was the use of a protocol, which should be

individually adapted to each newborn. Both physicians and nurses agreed that the overall goal of ventilator treatment was based on evidence that recommended using as little peak pressure as possible when aiming for early extubation. The physicians described the current strategy of ventilator treatment as routinely lacking in planning, for example such as: "change the setting if problems occur", "with individual variations" and "assess the effect of ventilator treatment using unwritten guidelines." One physician specified: "When newborns are treated with mechanical ventilation, we often lack a common goal. We may agree in the pre-round conference, but may not be so uniform in practice" (physician 1). In addition nurses complained that current practice fell short in terms of prescribing target ranges.

Both professions agreed that NICU nurses' titrate oxygen and assess the effect and need for adjustments. The limited responsibility of nurses created frustrations, which from nurses' view was about the necessity of asking physicians every time they perceived a need to adjust the ventilator settings, while the physicians' were frustrated by the high volume of questions they received. Many nurses hesitated to ask physicians when they were busy. One nurse said: "It is frustrating to wait for the physician when we have a high workload and you have nobody to adjust the ventilator setting. If the physician is busy, nurses are allowed to adjust the setting on the basis of a telephone order, but not otherwise" (nurse 4).

Nurses and physicians communicated that a protocol could provide a basis for assessment in the ventilator treatment and shorten the time used for discussions, as some agreements would have been worked out beforehand. Nurses suggested that a protocol could contribute to constructive feedback, and one nurse reported good experiences from using a protocol in dopamine treatment: "Even if the blood pressure was not so high, I reduced the dosage three times during a nightshift. You would not phone the physician at night if there were small changes" (nurse 3). All participants were aware of the need to change the unit's traditional practice of ventilator treatment and reflected that such a change would require more flexible responsibility for nurses. They perceived nurses' knowledge level to be good enough to adjust the treatment because they already performed assessments and told physicians about adjustment needs. A protocol was also needed to guide the process when newborns need increased oxygen within a short time frame.

The participants were very animated when discussing how to better coordinate ventilator treatment. Nurses highlighted that an important element of a protocol should be to allow possibilities for nurses to identify newborns who were ready for extubation earlier than outlined by protocol. One physician noted: "... we could produce new intensive care charts with written protocols suggesting target ranges. Then physicians could specify how to apply this for the individual newborn. A protocol for ventilator treatment would ensure better practice in the NICU" (physician 3). To reach a common goal and to utilise nurses' competence, the physicians suggested ordering individual target ranges for PaCO<sub>2</sub>, tidal volume, maximum/minimum inspiration pressure, transcutaneous values and saturations on the intensive care chart.

## The need for regular meetings

There were two types of regular meetings in the unit: the pre-round and round conference. In the pre-round conference the physicians and nurse team leaders discuss all the patients. In the round conference each physician rounds on the newborns he/she follows and discusses the management with the newborns's nurse. The participants had different experiences of what the content of discussions were in the pre-rounds versus round conferences. There was no rule on where to discuss ventilator treatment, and discussions at pre-rounds were sometimes moved to the round conference, resulting in some issues potentially being overlooked. To improve communication about ventilator treatment, a physician stated: *"I think it is of importance that nurses participate in the pre-round conference because then they know about the decision-making process when physicians change the ventilator setting on the round conference"* (physician 3). The round conference was the only organised meeting where the responsible nurse and physician(s) could communicate about ventilator treatment. In general, nurses and physicians experienced the round conference to be unpredictable and unstructured. Physicians were interrupted by phone calls. Some nurses noted that physicians started the round conference by writing on the intensive care chart without speaking or by changing the ventilator settings without discussion. Nurses called for time to discuss and voiced the need for additional regular meetings: *"It is difficult to implement team meetings, but we need to meet outside the round conference. We have no time or space to communicate what we need to in a proper manner"* (nurse 2). The high workload was a recurring theme and was perceived as a barrier to frequent communication. Nurses wanted a special team meeting that could create opportunities for the exchange of information between the professions and utilise nurses' expertise. Fewer phone calls to physicians and less organisational work for nurses might be a positive spin-off from such meetings.

## Accurate communication in established patterns

In the opinion of the nurses there was a huge difference in how nurses and physicians perceived communication between them. The interprofessional communication was seen as imprecise and affected by their personalities, intentions, topic of discussion and the time of day or night. One physician's remark exemplified the discussion: *"You might be awakened by a telephone at night hearing: 'Sick baby in bed three', and suddenly the nurse cuts the telephone line. I would like to know more than that"* (physician 2). To achieve a higher level of accuracy in communication, the group agreed that caregivers needed communication training. Communication improvements in emergency situations could be to add 'acute extubation', thereby allowing the physician to gather his/her thoughts on the way to the patient.

We found that the basis for interprofessional communication problems differed between physicians and nurses. While the physicians experienced the communication as frequent, it was insufficient for the nurses. The physicians

claimed that the communication was characterised by too many and untimely questions from nurses to physicians. They assumed that nurses should know how to screen out exigent issues during times of high workload in the unit. In contrast to physicians, many of the communication problems were, in the nurses' view, linked to the round conference and the variable dynamics between the professions. Nurses perceived a high level of communication in the round conference when topics of importance and a common goal were established. They sometimes experienced that topics discussed in the round conference differed from what they had planned to cover. There was agreement that the round conference could be structured with a checklist and a regular pattern of both topics for discussion and turns in talking. One physician suggested: *"We could start with the topic of respiration. The nurse could begin the conversation, followed by the physician, then you state your agreement"* (physician 3).

The nurses considered how to reduce exigent questions: *"With a thorough round conference in an established pattern, together with a protocol for the ventilator treatment and creating more nurse responsibility, questions to physicians could be reduced"* (nurse 1). In the physicians' view it was acceptable for the nurses to ask questions of the physicians when they thought something was difficult. However, they also believed that many such questions could be equally well handled by nurse team leaders, who would be competent to answer. Equivalent to the case managers described in Gittel's theory, team leaders could coordinate and collect blood gas results and convey them to physicians in a timely fashion. As reported by nurses, the challenge was that team leaders were not used as intended because they were busy with administrative work.

## Collaborating to improve level of interprofessional knowledge

In our analysis, we found that physicians and nurses underestimated their experience-based knowledge. Although they suggested that extremely premature newborns could benefit from "two more days" on ventilator treatment, they followed evidence recommending early extubation. The NICU had a lack of resources and expertise even though 50 of the 120 nurses were competent to take care of critically ill newborns receiving ventilator treatment. The nurses were aware that their knowledge level formed the basis of their observation and assessment skills even when using new ventilators. They appreciated physicians who helped nurses to improve their knowledge level by asking specific questions in the round conference. To secure the quality of care, nurses designed a certification system in ventilator treatment. The physicians in training were also interested in raising their level of knowledge in emergencies, but frequently nurses' only called the consultant. One of the physicians stated: *"To achieve educational situations, both consultants and fellows/house officers should be phoned in emergency situations. They must be allowed to learn"* (physician 3). Nurses agreed, but they insisted on phoning the consultant first, then the fellow/house officer.

### Courage to communicate one's point of view

One improvement since our study 2 was that physicians had become more loyal in terms of adhering to the ventilator treatment determined by their colleagues. Lack of mutual respect was presented as a barrier to interprofessional communication. Nurses believed that the existing hierarchy, poor communication skills, and individual attitudes held by both nurses and physicians created a barrier to communication. As one nurse noted: *"Excessive respect makes it difficult to speak out and ask. It is not easy when you hear 'Why do you ask?' or 'How can you suggest that?' The communication tends to be good when your arguments are heard and respected and then you might have courage to ask another time"* (nurse 3). Many physicians valued nurses' knowledge when collaborating about the treatment, but nurses also experienced exclusion from the decision-making process. Nurses wanted agreements about how to secure communication around the newborn. There was serious engagement in the group as a nurse talked faster and louder: *"We often feel totally redundant. The physicians direct treatment while nurses only fetch medications and diapers"* (nurse 2). A physician stressed that excluding nurses was unacceptable. It was of importance that nurses took responsibility to be heard and voiced their opinions to the physicians in a proper way, repeatedly and regardless of response.

### Considering flexible boundaries in extubation situations

Extubation of newborns was considered complicated. The physicians had to prioritise and stabilised newborns might have to wait for extubation if they had to attend to critically sick newborns. Nurses experienced extubation processes as unstructured, and the newborn could be extubated after a brief evaluation period. A nurse reported how a physician, who just came on duty, might assume responsibility for unstable, recently-extubated newborns: *"When there are disagreements about the timing of extubation, the physician waits until the next morning and extubates as the last thing on 'his' shift. Then it is not 'his' problem anymore"* (nurse 5). Both nurses and physicians suggested that physicians should improve their collaboration and perform extubations in the evening if necessary. Conditional on physicians' presence in the unit, nurses wanted to perform extubation of newborns when they were ready for it instead of waiting for the physician. Often, nurses cared for newborns that only needed to wake up from anaesthesia and therefore rarely needed re-intubation. Nevertheless, they often had to wait for a physician to extubate. A physician supported increased responsibility to nurses if there was no doubt about the newborn's management of breathing, and the decision to extubate had been made.

### Discussion

A prominent finding in our study was that nurses and physicians recommended a protocol as a basis for assessments to increase coordination of ventilator treatment. Physicians

suggested target ranges in a protocol to give nurses more responsibility to titrate the ventilator settings. By using a protocol, NICU nurses would approach the role of nurses in ICUs and independently titrate the fraction of inspired oxygen and pressure support (Rose et al., 2011). In ICUs physicians selected initial ventilator settings and adjusted the level of positive end expiratory pressure, while nurses assessed ongoing titration of ventilation and determined when patients were ready for extubation (Rose et al., 2011). In a recent study ICU nurses were found to select the weaning method and recognise extubation readiness significantly more often than physicians (Haugdahl et al., 2014).

In line with Gittell (2009), nurses and physicians in this study agreed that increased nurse involvement and responsibility could expand the flexibility of job boundaries allowing them to cover for each other's work. In addition a protocol would increase the quality of care by delineating the focus and roles when managing the ventilator treatment. However, although the use of a protocol could mitigate uncertainty in ventilator treatment, it might also reduce the quality of ventilator treatment caused by rigidity. Gittell (2009) emphasised that by using a protocol communication needs reduces, but the NICU nurses wanted discussions and team meetings. Physicians and nurses clarified that they wanted an individualised protocol for each newborn, which is similar to what Gittell characterised as a pathway created with flexible boundaries to guide treatment. The benefit of a pathway might be the prevention of prolonged ventilation and early unsuccessful extubation followed by re-intubation, both of which are associated with poor outcomes (Shalish et al., 2014). Furthermore, a pathway delineating criteria for escalation of therapy could provide a solution to the participants' suggestions to adapt increased oxygen needs together with the ventilator treatment.

Constructing a pathway should involve the professionals who use it (Hewitt-Taylor, 2004). Nurses and physicians should be aware of the kind of pathway suggested by existing evidence. A formal pathway for respiratory support needs to be comprehensive, including issues such as support in the delivery room, intubation criteria, surfactant administration, specific ventilation settings, criteria for escalating therapy, weaning protocols, extubation criteria and post-extubation management (Sant'Anna and Keszler, 2012). Because pathways may have different foci, these foci and the sources of evidence employed should be made explicit when a pathway is created (Hewitt-Taylor, 2004). Weaning and extubation from ventilator treatment is an imprecise science (Sant'Anna and Keszler, 2012). There is limited evidence as to whether weaning protocols reduce the duration of mechanical ventilation (Blackwood et al., 2013b). The evidence strongly suggests early extubation, but predicting the necessary criteria for achieving the successful and safe extubation of newborns remains challenging. Consequently, when developing pathways professionals should also take into account their experience-based knowledge.

We found that the management of ventilator treatment was, to some extent, determined by individual preferences and lacking in coordination and collaboration. The ventilation of newborns depends largely on individual preferences

in NICUs, because there are several modes, techniques and strategies that complicate the treatment (Sant'Anna and Keszler, 2012). Although individual preferences are not uncommon in ventilator treatment of neonates, treatment based on such preferences is problematic because it leads to perceptions of "ownership" and "trade" (Lingard et al., 2004). To contribute to quality in ventilator treatment, physicians and nurses need a common ground to be able to communicate accurately (Hansen and Severinsson, 2007; Manojlovich et al., 2014). A weaning plan based on interprofessional understanding is necessary to avoid undesired variations in the treatment (Hansen and Severinsson, 2007). Though the treatment was characterised as individual, our study revealed that nurses and physicians wanted to improve the interprofessional knowledge level to support improved communication. Knowledge is fundamental to provide good quality care in ICUs. Sharing knowledge and experience increases the professionals' knowledge level and reinforces their need for ongoing learning (Storesund and McMurray, 2009). Across the nurse–physician hierarchy, both groups of professionals need to respect and balance individual and collective knowledge and responsibility. This means acknowledging that by actively using their own knowledge together with the knowledge of others, they will produce a collective knowledge that offers much more (Lingard et al., 2004).

The structure of the study NICU's rounds and possibilities for communication is similar to that in other ICUs. In medical–surgical units, nurses and physicians tend to have face-to-face communication in the morning, while little, if any, occurs in the afternoon (Manojlovich et al., 2014). This study showed that physicians and nurses wanted regular team meetings, a good strategy in line with Gittell (2009), as it builds relationships from repeated interactions. Frequent interprofessional team meetings in a NICU is found to encourage open and honest communication, improve information and an awareness of each other's patients, as well as creating willingness to hear constructive feedback (Brodsky et al., 2013). In their intervention they created three team-meetings; one brief, planned meeting at the beginning of every shift, reviewing current status and expected procedures. The second meeting was a spontaneous team update in anticipation of future events to increase awareness and determine appropriate responses in acute situations, but also to identify situations that might require extra assistance. The third meeting was a debriefing in response to specific events (Brodsky et al., 2013).

A notable finding of the present study is that nurses needed courage to present their points of view and sometimes experienced themselves as redundant in decision making. Conflicts are common responses to interdependence in work settings (Gittell, 2009), but if professionals feel that their assessments are worthless, it will create tensions (Lingard et al., 2004). In interprofessional decision-making processes, power affects decisions regarding treatment (Hansen and Severinsson, 2007; McCormack et al., 2009) and the care provided depends on the influence of the professionals (Blackwood et al., 2013a). The power and the decision-making authority is vested in the physicians, and it is important to acknowledge that many nurses can offer input although the physicians have to make the decisions (Lingard et al., 2012). To achieve successful

interprofessional collaboration, they have to manage conflicts with inclusive approaches (Blackwood et al., 2013a) in a responsible manner (Barbosa, 2013). Mutual respect is essential to generate effective coordination with powerful bonds between professionals in interdependent work processes (Gittell, 2009). Although the physicians in this study believed they were democratic and avoided hierarchical influence, similar to physicians in other ICUs (Lingard et al., 2012), their behaviour was nevertheless interpreted as hierarchical. As an improvement, professionals (nurses) may be empowered when they are asked to share their opinions (Brodsky et al., 2013) and when they are respected and valued in a way that promotes their dignity, sense of worth, and independence (McCormack et al., 2009).

In this study, it emerged that caregivers needed training in communication. Gittell (2009) highlighted accurate communication as essential for trustworthiness and for effective decisions, which are important in intensive care because of the many situations with high levels of acuity and complexity (Manojlovich et al., 2014). A group of neonatal fellows and nurses who had completed a training programme in communication skills recommended this programme as it significantly increased their competence in discussing various treatment options (Boss et al., 2013).

There are limitations to this study. We used only one focus group and the participants were from a single NICU. However, to facilitate the discussion of common views in this focus group with the experienced participants, we informed the staff about the results from studies 1 and 2 early in the study process to initiate a general discussion of collaboration in the NICU. In addition, our results supplement current discussions on interprofessional collaboration in the literature.

## Conclusion

In conclusion, our study showed that the NICU faced major challenges in building good relationships with evenly balanced interprofessional communication about ventilator treatment. By identifying weak areas in collaboration, nurses and physicians were inspired to suggest and discuss concrete improvements of work practices in the NICU. Nurses and physicians can coordinate ventilator treatment by using a pathway and at the same time enhance nurses' involvement and responsibility in order to increase the flexibility of job boundaries, allowing the professions to cover for each other's work. The findings in this study mirror some of the problems experienced in other countries. Further studies should therefore implement and evaluate the effects of suggested pathways, meeting structures, and communication patterns.

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## Conflict of interest

The authors have no conflict of interest to declare.

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