Original article

Primary nursing in the intensive care unit

A qualitative analysis of an implementation process

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Editor's Choice

Abstract: *Background:* Primary nursing (Process Responsible Nursing; PRN) is a nursing organization model, practiced in intensive care units (ICUs), but implementation is challenging. This paper focuses on the qualitative process analysis of the development and implementation of PRN in an ICU at a German university hospital. *Aims:* Aim was to record the perception of changes in nursing practice due to the introduction of PRN and obtain information on implementation and further optimization perceived by nurses. *Method:* A qualitative process analysis was done. Data collection took place at three defined times (immediately before implementation and 6 and 12 months after) and each included a focus group interview (FG) and a 5-day ICU ward process analysis (WA) in the form of participant observation. The analysis of FG and WA was carried out according to Kuckartz's content-structuring qualitative content analysis. *Findings:* The main categories communication, care planning and integration of patients and relatives in care and 13 subcategories with a cross-sectional category could be identified. Positive effects of PRN were found, particularly concerning relatives. The optimization potential included handover, visit appointments, the documentation system and adjustments to the visiting times. *Conclusion:* The qualitative analysis was able to show changes during the introduction of PRN, e.g. in communication and care planning, but also challenges like visit appointments or the documentation system in nursing practice.

Keywords: change management, intensive care unit, patient care planning, primary nursing, qualitative research

Prozessverantwortliche Pflege auf der Intensivstation: eine qualitative Analyse eines Implementierungsprozesses

Zusammenfassung: *Hintergrund:* Primary Nursing (Process Responsible Nursing; PRN) wird international auf Intensivstationen (ITS) umgesetzt, wobei die Einführung herausfordernd sein kann. Diese Arbeit fokussiert die qualitative Prozessanalyse der Entwicklung und Implementierung von PRN auf einer ITS an einer deutschen Universitätsklinik. *Ziel:* Ziel war, Veränderungen in der Pflegepraxis durch die Einführung von PRN aufzuzeigen und weitere Optimierungspotenziale aus Sicht von Pflegenden zu identifizieren. *Methode:* Qualitative Prozessanalyse. Die Datenerhebung erfolgte zu drei definierten Zeitpunkten (vor Implementation sowie 6 bzw. 12 Mon. danach), wobei jeweils ein Fokusgruppeninterview (FG) sowie 5 Tage Stationsablaufanalyse (WA) in Form einer teilnehmenden Beobachtung durchgeführt wurden. Die Analysen der FG bzw. WA erfolgten nach der inhaltlich strukturierenden qualitativen Inhaltsanalyse nach Kuckartz. *Ergebnisse:* Es ließen sich die drei Hauptkategorien Kommunikation, Pflegeplanung sowie Integration von Patientinnen und Patienten und Angehörigen in die Pflege mit 13 Subkategorien mit einer gemeinsamen Querschnittskategorie identifizieren. Positive Effekte von PRN konnten v.a. in Bezug auf Angehörige aufgezeigt werden. Zum Optimierungspotenzial zählten u.a. die Übergabe, Visitentermine, das Dokumentationssystem sowie Anpassungen bei Besuchszeiten. *Schlussfolgerung:* Die qualitative Analyse konnte Veränderungen in der Pflegepraxis während der Einführung von PRN, z.B. in Bezug auf Kommunikation und Pflegeplanung, aber auch Herausforderungen wie Visitentermine oder das Pflegedokumentationssystem aufzeigen.

Schlüsselwörter: Change Management, Intensivstation, Pflegeplanung, Prozessverantwortliche Pflege, Qualitative Inhaltsanalyse

What is already known on the topic
Primary nursing is feasible in German intensive care units.

What this study adds
Changes in nursing organizational models from room nursing to primary nursing have an impact on communication, care planning and integration of patients and relatives.

Introduction

Nursing care in intensive care units (ICUs) in hospitals is complex and requires organization and training (Schindele et al., 2020). In the context of research projects, primary nursing (PN) in ICUs is reported internationally (Cederwall et al., 2023; Goode & Rowe, 2001; Manley, 1990) and also in German-speaking countries (Fröhlich et al., 2013; Rebitzer, 2013). In PN continuous responsibility for the care process and the quality of care for one particular patient is transferred to a single primary nurse for the entire stay via the case method, including direct communication around the clock (Parreira et al., 2021). In the primary nurse's absence, an associated nurse continues the planned care and reports to the primary nurse, e.g. if there are possible deviations or challenges (Parreira et al., 2021).

While e.g. the continuation of care (Goode & Rowe, 2001; Mefford & Alligood, 2011), coordination of nursing processes (Luton et al., 2018) or relationship to relatives or parents (Korhonen & Kangasniemi, 2014), compared to other nursing care models, are positive, stress due to long and intensive contact with patients and relatives can be a disruptive effect of PN (Goode & Rowe, 2001).

In Germany so called *area nursing* or *room nursing* (usual care) is used in most ICUs, and there is a lack of reporting and research projects in the context of PN. Parreira et al. (2021) describe this organizational model as an *individual method*. Nurses take responsibility for the patients assigned to them, who are usually cared for in one or two different rooms, for today's shift. The responsibility ends with the respective shift and is then handed over to another nurse. The head nurse bears overall responsibility for the care process and the quality of care provided (Parreira et al., 2021).

As a strategic decision in the context of the development of a new organizational and process organization in an ICU, the change process from usual care to PN was initiated in the Heart and Diabetes Center North Rhine-Westphalia (HDZ NRW), university hospital of the Ruhr University Bochum, Germany. The nursing organization model was called "Process Responsible Nursing" (PRN). The development and implementation process was evaluated by using quantitative and qualitative social research methods at three measurement time points (Krüger et al., 2023b).

This paper focuses on the qualitative process analysis as part of the overall research project.

Aims

The aim was to record the perception of changes in nursing practice as a result of the introduction of PRN and to obtain information on implementation and further optimization perceived by nurses.

Methods

The reporting of this study follows the consolidated criteria for reporting qualitative research (Tong et al., 2007). The complete research project was conducted according to the Medical Research Council framework for complex interventions and focused on the phases of development and piloting of the intervention (Skivington et al., 2021).

Ethical considerations

The ethics committee of the medical faculty of the Ruhr University Bochum, Germany, based in East Westphalia, approved the study (No. 2020–714). Afterwards the study was registered in the German register of clinical trials (DRKS-ID: DRKS00024612). The participation of all persons was voluntary and required signing written informed consent. All data were processed pseudonymously with consideration of the local law.

Setting and participants

The HDZ NRW has six ICUs of different disciplines. PRN was introduced in an ICU with 23 beds and a focus on thoracic and cardiovascular surgery. A nurse-to-patient ratio of 1:2 is provided by nurses of legal age with at least three years of education (registered nurses; RN). There is also a skill-grade mix, demonstrated through different further qualifications like a Bachelor's degree in nursing or a German state-approved training course in intensive and anesthesia nursing care (ICU education) and different work experience (Krüger et al., 2023b). Nurses work together in an interdisciplinary team with various professional groups, such as physicians and physiotherapists.

Intervention

PRN includes the four core elements of PN: Assumption of individual responsibility for the nursing process; continuity of daily nursing care according to the case method; direct communication; and implementation of planned care by the primary nurse (Manthey, 2011). The development and introduction of PRN, and the roles and nurses with (PR) and without process responsibility (N) took place in a PRN working group, which was formed on a mono-professional basis, considering the skill-grade-mix of the nursing

team. Content developed for the implementation of PRN was continuously coordinated and finally agreed upon with the whole nursing team in, among others, several small and one final consensus conferences, accompanied by a close coordination process with the entire multi-professional team of the ICU and the nursing management. The process of development and implementation lasted for two years (Krüger et al., 2023b) (Figure 1).

In contrast to PN, PRN does not start immediately, but from the third day in the ICU, and includes a social anamnesis, the management as well as active realization of the nursing process, for a maximum of two patients. The development, the successful implementation process and the detailed task portfolio of PR and N were published elsewhere (Krüger et al., 2023b).

Data collection and evaluation

Throughout the research project, data was collected by using a mixed-methods design at three measurement points: As-is analysis before the introduction of PRN (t_0) and evaluation after six (t_1) respectively twelve months (t_2) of implementation of PRN (Krüger et al., 2023b) (Figure 1). Quantitatively, the validated instrument for recording nursing systems (IzEP©) was used and qualitatively multiple focus group interviews (FGs) and respective ICU workflow analyses (WAs) were conducted at each measurement point (Krüger et al., 2023b) (Figure 1).

Focus group interviews

During department meetings and via email six nurses (plus two in addition to compensate for absence, e.g. in the event of illness) per group were invited to participate as a sample of the ICU considering the skill-grade mix. Based on the known evidence and the core elements of PN a pretested interview guide (see Electronic Supplementary Material ESM1) was prepared in advance with the three main categories of communication, care planning, and integration of patients and relatives in care, each with additional open questions, to ensure comparability of the data. The FGs took place in a separate and quiet room. They were moderated alone without field notes by a female researcher (FW) with a master's degree in nursing science and experience in conducting FGs and WAs. FW was not assigned to the ICU and was therefore not actively involved but interested in the development process of PRN and personally known to all participants. A digital recorder was used to record and then transcribe the interviews into a Microsoft Word document by FW. Data were not returned to participants for feedback.

ICU workflow analysis

WA was used on five different days in daily shifts at all three measurement points by using the method of participant observation to better illustrate the situation in nursing practice (Thierbach & Petschick, 2022). This was also carried out by FW. In this context, pseudonymized handwritten notes were taken on the observations by participating in the nursing practice. After each shift, the data obtained were transferred to a Microsoft Excel table and the written hand notes were disposed of in accordance with local data protection regulations.

Qualitative data analysis

Qualitatively collected data were merged into a Microsoft Excel table and analyzed independently by two people (LK & TM) according to the content-structured qualitative

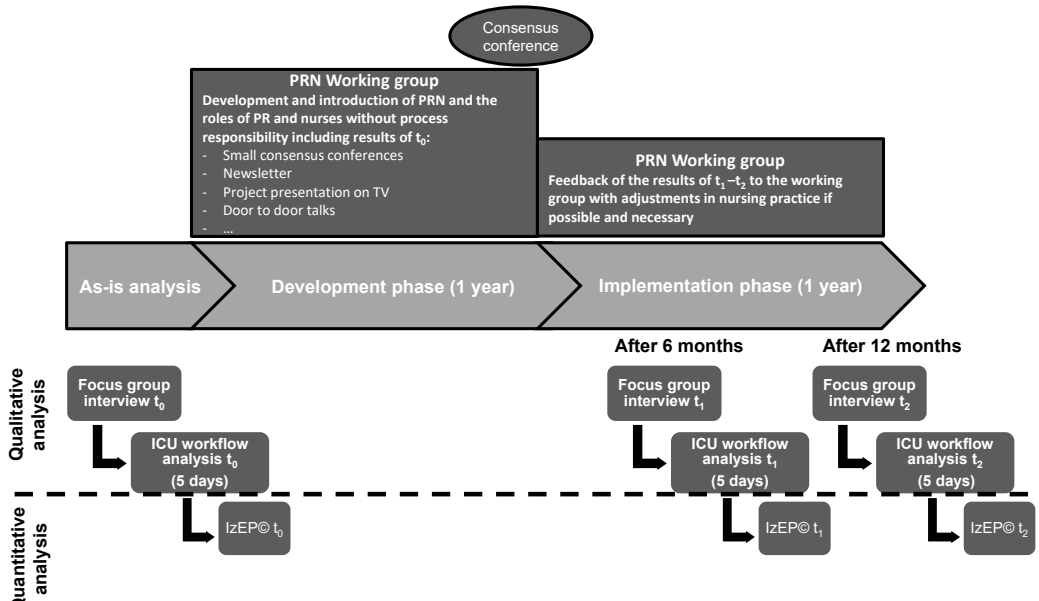

Figure 1. Process of development and implementation of Process Responsible Nursing (PRN). Abbreviations: ICU: Intensive Care Unit; IzEP©: Instrument for recording nursing systems; PR: Process Responsible nurses.

content analysis method developed by Kuckartz (2018). LK and TM were actively involved in the project. LK has a master's degree in nursing science and TM still studied nursing science. A continuous discussion and consensus on content with FW was ensured. If necessary, two persons with a doctorate degree and experience in qualitative research (CL & GL) supported the researchers. For analysis, the programs Microsoft Excel and Word were used.

After the initial text work, the transcribed data was first determined deductively using the three main categories from the interview guide. This was followed by the compilation of all text passages coded with the same main category and the inductive determination of subcategories. In the final step, the entire material was coded using the differentiated category system and then visualized (Kuckartz, 2018).

Table 1. Duration of focus group interviews & characteristics of participants. Abbreviations: ICU: Intensive Care Unit; PR: Process Responsible Nurse

	t_0	t_1	t_2
Focus group interview			
Duration (min)	52	53	39
Participants (n)	5	7	5
Female (n)	4	4	2
Work experience, qualifications and roles on ICU			
≤ 5 years (n)	3	3	1
> 5 – ≤ 10 years (n)	2	2	2
> 10 years (n)	0	2	2
ICU education (n)	1	3	1
Bachelor's degree (n)	3	1	2
Nurse educator (n)	1	2	0
Other further education (n)	1	0	1
PR (n)	0	1	1

Results

Duration of the FGs, the number, qualifications and professional experience of the participating nurses varied between t_0–t_2 (Table 1). The WAs on each measurement point took place on five consecutive days, each in three early and two late shifts.

According to the three main categories in the interview guide, 13 subcategories with a cross-sectional category across all three main categories were identified (Figure 2).

Categories

Communication

Implementation and impact of the physician's visit

In t_0–t_2 multidisciplinary ICU rounds were carried out daily involving senior surgeons, ICU specialists, specialized psychologists, and nurses (WA: 1–3). ICU physicians visited the patients additionally at least once daily, de-

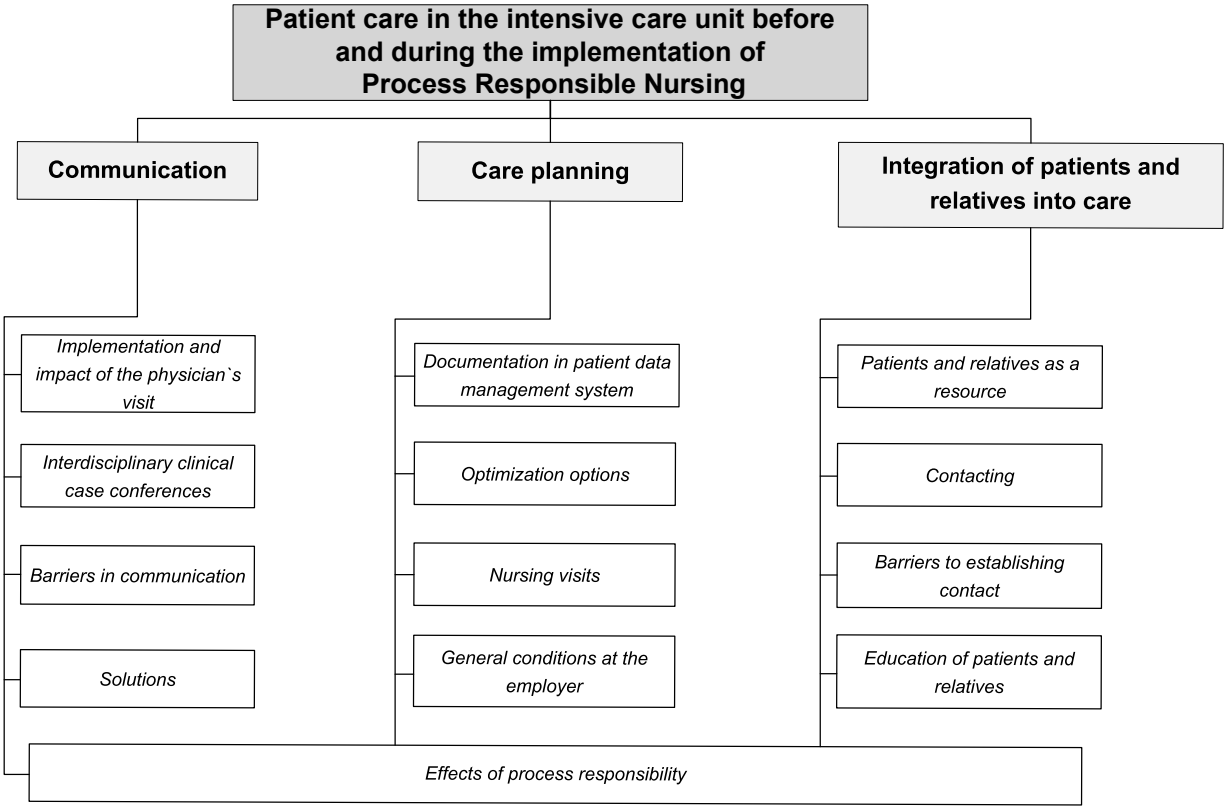

Figure 2. Overview of the categories and subcategories.

pending on their workload, which also had an impact on nursing procedures: "Sometimes you don't have any visits in the morning and that's always a bit difficult with the handover ..." (FG: 1, p. 2, l. 15–17). In t_1 PR and N were more involved in the general visit once a day with the senior physician, but there was usually also a further visit before with the assistant physician (WA: 2). In t_2 more senior physician visits took place in the morning, but not all topics could always be discussed (WA: 3).

Interdisciplinary clinical case conferences

In t_0 the implementation of interdisciplinary clinical case conferences (CCs) was not clearly regulated and depended on the senior physician (FG: 1, p. 7, l. 26–27). In t_1–t_2 implementation was planned, but could not be realized (WA: 2–3). In t_1 nurses emphasized the importance of CCs and an open culture again: "We also discussed this briefly today and I think it's very important" (FG: 2, p. 6, l. 7–8). There had already been positive experiences with ethical case discussions: "I ... attended [in] one and the conversation was really very helpful" (FG: 2, p. 5, l. 32–34). However, in t_2 these events seldom occur following the provision of feedback in in t_1: "... no fixed dates, but ... the [general] exchange has become much better than before" (FG: 3, p. 5, l. 20–25).

Barriers in communication

Communication barriers were particularly evident in the work processes and caused frustration among the nursing staff in t_0 which were due to frequently changing responsibilities in physicians (FG: 1, p. 4, l. 24–28). t_1 revealed challenges in communication with the physicians, and also nurses were named and shown as a potential cause of communicative barriers: "I believe that it's not just physicians and nurses but also nurses among themselves" (FG: 2, p. 8, l. 4). There was further need for improvement indicated in t_2: "I wouldn't necessarily say that much has changed now" (FG: 3, p. 2, l. 5).

Solutions

Especially suggestions for improvements in practice were mentioned since t_0. These included documentation of appointments with the physicians, e.g. in the digital patient file: "It would be nice if you could store the appointment somewhere .... Then you could use it as a guide" (FG: 1, p. 5, l. 21–22). Because of technical challenges no changes were possible in t_1–t_2 (FG: 2, p. 7, l. 11–25; WA: 2–3).

In addition, nurses stated in t_1 that an interdisciplinary handover would be helpful: "But what I would personally like to see is a handover with the physicians together as a team. So that everyone can contribute something. Like we *(nurses)* do at lunchtime, for example ..." (FG: 2, p. 6, l. 27–30). In t_2 this solution could not be realized, but were discussed again (WA: 3).

Care planning

Documentation in the patient data management system

Care planning was not carried out in t_0 unless a nursing visit took place (FG: 1, p. 8, l. 4–17). The nursing relevant information was located in different places in the patient data management system (PDMS), sometimes also in the hospital information system, e.g. wound documentation (WA: 1). As a finding, some information was only read to a limited extent: "This is more a proof of implementation, that's all it is in the end. Carried out yes or no" (FG: 1, p. 9, l. 16–18). Since t_1 a documented individual care plan in the PDMS (similar to a Microsoft Excel spreadsheet) existed, which was used during handover (WA: 2). The documentation of care planning is supported by text modules that facilitate care planning: "There are some criteria ... what you can then do, e.g. if someone has a lot of secretion. Then you can click on that" (FG: 2, p. 12, l. 1–4). The procedure is limited in scope, but was optimized in t_2 with further text modules. Some PR therefore printed out the current care plan and hung it up in the patient room (WA: 2). For technical reasons not only the current care plan per day but also all previous plans are currently displayed until t_2 (WA: 3).

Optimization options

Care plans in t_1 were described as too dry and scientifically oriented (FG: 2, p. 10, l. 13–24). Above all, it should be short and concise: "That's always nicer when it's really short and sweet. That's what I have to keep in mind in my job" (FG: 2, p. 10, l. 26–29). In t_2 care plans were shorter, but not always up to date, which is partly due to rapid change processes in the ICU: "What I have noticed is that it is sometimes so dynamic that the care plan is not necessarily always up to date" (FG: 3, p. 7, l. 17–20). To improve this, it was suggested that N should be able to enter written feedback for PR with suggestions for improvements in the care plan (FG: 3, p. 8, l. 14–24).

Nursing visits

Nursing visits were planned weekly and perceived as collegial counseling and support and included a written care plan (WA: 1–3). In t_0 nurses described the nursing visits as a useful instrument for individualized nursing orientation towards the patient and the integration of relatives: "And I think another big point is simply the nursing visit. I think many people are now simply starting to rethink their practiced care" (FG: 1, p. 11, l. 16–17). In t_1 nursing visits also took place and were mentioned as helpful for patient-centeredness in care planning (WA: 2). In t_2 nurses mentioned written care planning as a focus in nursing visits: "The care plan is also evaluated in the nursing visits and then discussed again with the PR" (FG: 3, p. 9, l. 3–4).

General conditions at the employer

The general conditions concerning the procurement of care utensils, e.g., were perceived as very positive in t_0 (WA: 1). There were no changes in t_1–t_2. Resources necessary and documented in the care plan in t_1–t_2 were available: " ... especially when it comes to materials ... If someone sees that something is needed for a patient, then you go, order and get it" (FG: 3, p. 10, l. 14–18). For example, five different systems were available for the fixation of an endotracheal tube (WA: 3).

Integration of patients and relatives into care

Patients and relatives as a resource

Patients and relatives were viewed differently as a resource. In t_0 relatives were rarely integrated into the care processes and patients were considered to be more important: "And it's primarily about the patient" (FG: 1, p. 18, l. 3). In t_1 relatives were increasingly involved in care (FG: 2, p. 18, l. 4–12). In t_2 relatives were also described as an important source for care-related information: "So you get information. You take them *(relatives)* with you. Of course, they can then have a completely different effect on the patient and support the care process and build up the patient" (FG: 3, p. 11, l. 25–31).

Contacting

The contact with relatives was assessed heterogeneously in t_0. Nurses mostly got in contact during their shift and especially during visiting times in the afternoon (2 p.m. – 6 p.m.) (WA: 1). Sometimes relatives asked for individual visiting times, which were feasible and realized if possible. Further contact was described with the help of phone calls: "Yes, or if they call over the phone, that you then speak to them. Some people also say I would like to speak to a nurse and not a doctor" (FG: 1, p. 13, l. 3–5). In t_1 PR got and stayed in contact personally during the visit or with the help of appointments via phone call, especially if a visit to the ICU was not possible, e.g. because of a long distance (FG: 2, p. 17, l. 33–36). In t_2 some individual visiting times in which PR got in contact with relatives were named and practiced, but these were not consistently taken into account (FG: 3, p. 13, l. 25–30).

Barriers to establishing contact

Different barriers in establishing contact with relatives were named in t_0. Due to the changing responsibilities of nurses, coordinating a visit on other days outside the traditional visiting times was not easy: "We can't tell them that my colleague might not like it the next day" (FG: 1, p. 15, l. 26–28). Nurses sometimes missed relatives because their breaks were fixed (WA: 1). In t_1 missing agreements within the interdisciplinary team delayed the establishment of contact between nurses and relatives if, e.g., the relatives informed the secretaries, but the information was not passed on to the nurses (FG: 2, p. 18, l. 1–2). In t_2 first improvements were shown, e.g. PR were informed directly after a call of relatives during their absence – personally or via PDMS (WA: 3).

Education of patients and relatives

The education of patients and relatives in t_0 has mainly taken place in the pre- and post-operative general care wards (FG: 1, p. 17, l. 5–12). An exception is the situation in connection with a ventricular assist device or a heart transplantation: "... they are also given advice on what they can eat and how they should behave ... the patients and relatives definitely receive a training program. This is offered really well here" (FG: 1, p. 17, l. 14–17). Since t_1 patients were more specifically involved in the care, were activated and the next steps were explained (WA: 2). Relatives were described as more informed in t_2 with fewer questions than before (FG: 3, p. 12, l. 1–5).

Cross-sectional category

Effects of process responsibility

In t_1–t_2 effects of PRN were named and shown in different contexts, compared to t_0 in usual care.

Since t_1 PRN positively affected communication with the professional groups in the interdisciplinary team (FG: 2, p. 2, l. 18–20). Short communication channels were positively emphasized. For example, it became apparent that the physicians made decisions together with the PR to ask the physiotherapist or psychology service for support in interdisciplinary treatment (WA: 2). The already good communication processes with e.g. the psychology service were further optimized: "Something has definitely changed with the psychology service. They also actively come to us as a PRN and then discuss things with us" (FG: 2, p. 2, l. 12–15). In t_2 also further challenges could be shown, e.g. in coordination processes with the physicians (FG: 3, p. 2, l. 9–10).

In t_0 written care planning was only used, if a nursing visit took place. Written care planning was introduced continuously through PR since t_1, which had an impact on daily practice: "Because you are simply informed about the patient and already know what [you should] do" (FG: 3, p. 3, l. 7–8). In t_2 the social anamneses were named as very helpful for care planning and daily practice (FG: 3, p. 6, l. 17–2).

In t_0 no continuous care of the patients and relatives by nurses was ensured (WA: 1). Both are more involved in care since t_1 and an improvement was observed in t_2: "I have the feeling that you can provide patients with much more individualized care ... And what I've noticed from my point of view is that relatives of course feel much, much, much better supported in some way" (FG: 3, p. 10, l. 9–29). Moreover, a very close and intimate exchange between the PR and relatives took place. Relatives felt connected to the PR and were actively involved in the care process (FG: 3, p. 11, l. 6–10).

Discussion

As part of a mixed-methods evaluation during the implementation of PRN in an ICU, this qualitative analysis aimed to identify the status before and changes during the implementation process. Three main categories with 13 subcategories, including one cross-sectional category, could be identified. As reported by nurses, positive effects were described especially in the involvement of relatives. Potential for optimization was revealed in different contexts, like the communication between physicians and PR.

In ICU settings, a well-structured and open communication culture is obligatory (Michalec et al., 2015), but a fast-paced shift can cause barriers in communication (Grant, 2015). The daily senior and assistant physician visit with

the interdisciplinary team are an important part of e.g. communication and joint planning in practice (Waydhas et al., 2023). Nurses in our analysis wanted the introduction of CCs, which were not regularly practiced. In the case of PRN, the nursing and physician management should identify possible realization options for CCs. As a part of change management, they have to support the team (Harrison et al., 2021). Furthermore, Al-Haddad et al. (2018) indicated a potential for improvement with a possible influence on the education of the medical staff with the help of morbidity and mortality case reviews.

Conflicts in ICU, e.g. between physicians and nurses, are described in the international context and have their origins in goals of care (Paul Olson et al., 2013), communication between departments (Michalec et al., 2015), or lack of understanding of the other profession (Pecanac & Schwarze, 2018). Barriers in both communication between the different professions and also mono-professionally between nurses were shown in t_0–t_2. In the medium term, practical solutions to how the communication strategy could be optimized should be found between the professions. The suggested CCs are recommended in ICU (Waydhas et al., 2023) and have shown positive effects (Al-Haddad et al., 2018). Furthermore, it could be a strategy to make the perspectives of the respective professions more transparent. However, there are several points to consider, such as different working hours and adaptation of other work processes, and this takes time. Altogether, further training courses for the interdisciplinary team should be planned in the future (Grant, 2015).

Since 2020, the nursing process has been a reserved nursing task in Germany, regulated by local law (§ 4 PflBG) and a main part of the PRN concept (Krüger et al., 2023b). Nurses used the documented care plan but also identified challenges in the limited possibilities of the current digital documentation program and the way care problems can be described. In 2025 an update of the PDMS is scheduled. It is necessary to consider a comprehensive nursing documentation and joint documentation with the physicians and further staff (Riessen et al., 2024). Digitally documented appointments for physician visits and feedback options for nurses may also be feasible. The implemented nursing visits (Krüger & Mannebach, 2022) were described as helpful in rethinking in nursing and used as an instrument to evaluate the written care plan together with the PR or N. Moreover, Johnen et al. (2024) concluded in a further evaluation study that nursing visits support the implementation of PRN and patient-centered care in the ICU. Maybe both the positively rated conditions of the employer and the nursing visits also influenced the consistently positive perception of nursing quality.

The integration of patients and especially relatives into the treatment is important (Hoffmann et al., 2022). Nurses reported relatives as an important source in t_2. Different aspects could have influenced that: maybe the implementation of PRN, but also various effects of the COVID-19 pandemic (Krewulak et al., 2022). Nurses contacted relatives in different ways. In t_1–t_2 appointments via telephone were shown and reported. Barriers were shown in the responsibilities of nurses and visiting times. Hoffmann et al. (2022) pointed out, that open or flexible visiting times are necessary for a better integration of relatives. Both are practiced in the ICU, but more flexibility might be helpful in the future.

Altogether, effects of the implementation of PRN were also positive. Improvements in interdisciplinary communication were achieved and written care plans improved and helped to individualize care by leading to a better transfer of information. Cocchieri et al. (2023) also studied positive effects of PN on nursing documentation. Moreover, PN can cause more individualized care (Cocchieri et al., 2023) and also reduces missed nursing care (Moura et al., 2020). The integration of patients and especially relatives was described as positive. However, described challenges can be compared with statements by Grant (2015) and were discussed in context with PN by Goode and Rowe (2001). In such cases, customized solutions are required. Possible patient-related effects of PRN were determined in a further study (Krüger et al., 2023a, 2024).

Strengths and limitations

The use of FGs and WAs on five days at every data recording timepoint is a strength of our qualitative data analysis. Nurses in the FGs represented the skill-grade-mix of the ICU. Possible bias in the data recording could be reduced, because it was done by FW who was not a member of the ICU and was not involved in the implementation process.

Our analysis has limitations. The qualitative part of the mixed-methods design is presented rather descriptively and consisted of only three FGs with nurses and without participants of the interdisciplinary team. Moreover, only five nurses were able to participate in t_0 and t_2. Most of the WAs took place in the early shift, while relatives often used the late shift for visiting. A different distribution might have generated even more information. Further FGs could have led to data saturation. During the WAs the Hawthorne effect could have caused a bias in the findings (Döring & Bortz, 2016) because the interdisciplinary team knew that an analysis was being conducted. The generalizability of the findings is also limited in the context of the ICU treatment focus.

Conclusion

Our qualitative analysis was able to show different positive changes during the introduction of PRN, e.g. in communication with the interdisciplinary team and care planning with social anamnesis. Challenges like visit appointments of relatives or the documentation system in nursing practice were also shown. Future research should address patient- and relative-related effects of PRN.

Electronic Supplementary Materials

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1024/1012-5302/a001015.

ESM1. Interview guide for focus group interviews.

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