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Systematic implementation of evidence-based practice in a clinical nursing setting: a participatory action research project

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ABSTRACT

Aims and objectives: To describe the process of implementing evidence-based practice (EBP) in a clinical nursing setting.

Background: EBP has become a major issue in nursing, it is insufficiently integrated in daily practice and its implementation is complex.

Design: Participatory action research.

Method: The main participants were nurses working in a lung unit of a rural hospital. A multi-method process of data collection was used during the observing, reflecting, planning and acting phases. Data were continuously gathered during a 24-month period from 2010 to 2012, and analysed using an interpretive constant comparative approach. Patients were consulted to incorporate their perspective.

Results: A best-practice mode of working was prevalent on the ward. The main barriers to the implementation of EBP were that nurses had little knowledge of EBP and a rather negative attitude towards it, and that their English reading proficiency was poor. The main facilitators were that nurses wanted to deliver high-quality care and were enthusiastic and open to innovation. Implementation strategies included a tailored interactive outreach training and the development and implementation of an evidence-based discharge protocol. The academic model of EBP was adapted. Nurses worked according to the EBP discharge protocol but barely recorded their activities. Nurses favourably evaluated the participatory action research process.

Conclusions: Action research provides an opportunity to empower nurses and to tailor EBP to the practice context. Applying and implementing EBP is difficult for front-line nurses with limited EBP competencies.

Relevance to clinical practice: Adaptation of the academic model of EBP to a more pragmatic approach seems necessary to introduce EBP into clinical practice. The use of scientific evidence can be facilitated by using pre-appraised evidence. For clinical practice, it seems relevant to integrate scientific evidence with clinical expertise and patient values in nurses' clinical decision making at the individual patient level.

Keywords: Evidence-based practice, implementation, nursing, participatory action research

INTRODUCTION

The relevance of evidence-based practice (EBP) is widely recognized in health care today (Thomas *et al.* 2000). International and national social and political developments (Australian Nursing and Midwifery Council 2003, Nursing and Midwifery Council 2004, Dutch Ministry of Health, Welfare and Sport 2009) force nurses to base their practice on evidence. EBP has been defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients, and the integration of best research evidence with clinical expertise and patient values (Sackett *et al.* 2000). EBP is a process that consists of sequential steps: first, translating a clinical problem into answerable questions; second, tracking down, with maximum efficiency, the best research evidence; third, critically appraising the evidence for its methodological quality and usefulness; fourth, integrating the research evidence with clinical expertise and patient values and implementing it in practice; and fifth, evaluating the process and the result (Sackett & Rosenberg 1995, Sackett *et al.* 2000).

BACKGROUND

EBP is insufficiently implemented in routine practice (Schuster *et al.* 1998, Grol *et al.* 2004, Thompson *et al.* 2007, Squires *et al.* 2011). The time lag between the publication of research findings and their adoption in practice is estimated to be eight to thirty years (Bostrom & Wise 1994, Landrum 1998). In clinical decision-making, nurses primarily rely on informal and experiential resources, and less on scientific research and protocols (Spenceley *et al.* 2008, Rycroft-Malone *et al.* 2009, Traynor *et al.* 2010). Moreover, integrating the patient's perspective in EBP is challenging (Strauss & Jones 2004) and research on the effects of patient involvement in EBP is scarce (Nilson *et al.* 2006). Various factors at different levels stimulate or impede implementation (Wensing *et al.* 2010, Grol *et al.* 2013), including individual factors like nurses' basic research training, attitudes and beliefs (Thompson *et al.* 2007). Munten *et al.* (2010) published a review on the implementation of EBP, and concluded that implementation using action research was a promising approach, but that studies failed to explicitly report implementation strategies. Grimshaw *et al.* (2001) reviewed 41 systematic reviews on implementation strategies. They concluded that educational outreach and reminders might be promising, and that multifaceted interventions targeting different barriers to change are likely to be effective. Thompson *et al.* (2007) conducted a systematic review and concluded that education seemed to be effective, but only when combined with the education of local opinion leaders.

The literature thus shows that EBP is insufficiently integrated in routine nursing practice, and that its implementation is complex. While EBP is often implemented in an iterative and participatory manner, a systematic approach to its implementation is rare. As Rycroft-Malone *et al.* (2004) suggest, knowledge generation in EBP stems from four different types of evidence: research, clinical expertise, patients and local context of care. It is important to study the implementation of EBP in a natural context, as this yields information on all four types of evidence. The research question that arises is: How can EBP be systematically implemented jointly with front-line nurses in a clinical setting? The goal of this article is to describe the process of implementing EBP using participatory action research.

METHOD

The method used in this study was a participatory action research design with cyclical activities involving observing, reflecting, planning and acting. The observing and reflecting phases provided information for subsequent planning (Koshy *et al.* 2011). See table 1 for an overview of the specific methods used in the different phases of action research. To critically review the existing situation, we started the observing phase with a working group consisting of the researcher (AM), four nurses of the lung unit, the unit's manager and a staff member of the hospital's educational department. We reflected on the current practice situation and the barriers and facilitators for implementing EBP, in order to select strategies for implementing EBP addressing barriers and facilitators, and the particular contextual situation regarding EBP. The nurses intended to use the development and implementation of a unit-specific EBP protocol for nursing discharge as a vehicle to implement EBP. We continuously evaluated the process in the working group by means of observing and reflecting, and made a summative evaluation at the end of the project.

Rationale

We chose an action research approach because it was compatible with the participatory and developmental nature of the study. Action research acknowledges the nature of a research study as a complex social process, and yields knowledge based on studies conducted within practical contexts (Koshy *et al.* 2011). All those who participated in the study shared views, perceptions and ideas and contributed to change according to their expertise and knowledge.

Setting

The study was carried out in a lung unit of a rural hospital in the Netherlands. The lung unit has 18 beds and provides medium-complex care to patients with lung problems. Care is delivered to patients who need minor surgical procedures (e.g. thorax drainage), acute care (e.g. for acute exacerbations), chronic care (e.g. for chronic obstructive lung diseases) or palliative care.

Participants

We used two sampling strategies: total population sampling and purposive sampling (Polit & Beck 2012). Total population sampling was used for the implementation of EBP at the lung unit. All nurses of the lung unit (n=14), including the manager (n=1), participated in this study. Their ages ranged from 26 to 59 years. The mean age was 42 years. The number of years of work experience at this unit ranged from 5 to 43. All but four nurses worked part-time. All nurses were registered nurses with a medium-level vocational nursing training, which is lower than a bachelor's degree. None of the nurses had experience with or had been trained in applying EBP. A staff member of the educational department of the hospital also participated (n=1). Purposive sampling was used to gain information about the current state of affairs in the practice situation, and about the barriers and facilitators for implementing EBP at the beginning of the study. In addition to all nurses of the ward (n=14), information technology (IT) specialists (n=2) and nurses of external care partners (n=2), such as home care services and rehabilitation clinics, took part. Patient participants were drawn from the hospital's client council (n=8) and patients who had recently been discharged from the lung unit (n=2). The main informal caregivers (n=2) of the discharged patients were also interviewed.

All participants received information about the study and provided consent for their participation. The institutional board of Zuyd University and Laurentius Hospital Roermond gave permission to carry out the study.

Roles of the researcher, the working group and the research team

Together with the working group, the researcher (AM) worked to facilitate change and the implementation process. We reflected on the findings throughout the action phases, first within the working group and afterwards at the unit. These reflections and the subsequent planning and observations of actions were closely related to the problems encountered in the routine practice of implementing EBP at the lung unit.

The researcher's role varied between the stages of the research. She always functioned as a partner in the process. In addition, she carried out certain tasks, suggested solutions, analysed data, and sometimes had to function as the main driver for the project. The researcher also provided the link with the research team. The research team functioned as an advisory board and had four members, all of them experts in implementing EBP. They followed the study and were responsible for overseeing the process; they gave advice and reviewed several documents and tools produced by the project.

Data collection

The data were continuously collected during a 24-month period in 2010–2012. A multi-method process of data collection was used, which emphasized iteration between planning, acting, observing and reflecting, as recommended in action research. We reviewed the literature and collected qualitative data by means of in-depth interviews, focus group discussions, field notes of informal conversations and observations, e-mail conversations, and minutes of the working group meetings and the advisory meetings of the research group. The purpose of literature reviews in action research is to ascertain what is already known about a topic, as well as to generate ideas for changing practice (Mitchell *et al.* 2005, Koshy *et al.* 2011). Interviews and focus group discussions were tape-recorded and transcribed. Where this was not possible, extensive field notes were made. See table 1 for an overview of the data collection methods in the various action research phases.

Data analysis

We analysed qualitative data using an interpretive constant comparative approach (Charmaz 2006). We identified and explored emergent themes arising from the data and from participants' discussions during each iterative action phase in the EBP implementation process. The researcher developed the initial coding by identifying words, sentences or segments of data. This was followed by focused coding using the most significant or frequent initial codes to sort, synthesize, integrate and organize large amounts of data (Charmaz 2006). Next, the data were discussed in the working group and research team until stable themes developed. The findings were used to guide the implementation of EBP and inform subsequent activities. Multiple strategies were applied to ensure trustworthiness, see table 2.

FINDINGS

The main findings of the different phases of action research are described below as follows. For the observing phase: the initial situation, i.e. a description of the practice situation at the beginning of the project and literature on evidence-based discharge care and barriers and facilitators for the implementation of EBP. For the reflecting phase: project targets. For the planning phase: implementation strategies. For the acting phase: tailored interactive outreach training and an adapted EBP discharge protocol. Finally, we describe the main results of the summative evaluation.

Observing phase: The initial situation

Description of the practice situation: EBP and evidence-based discharge planning

The nurses explained in the interviews that they had little knowledge of EBP and little experience with its systematic implementation. Nurses wanted to implement EBP by developing and implementing a unit-specific EBP protocol for nursing discharge planning. The nurses themselves proposed to use the discharge protocol as a vehicle to implement EBP. Existing unit-specific protocols were rarely used on the ward, and discharge care was provided based on nurses' individual expertise, with much variation among nurses.

“We have a lot of protocols. I do not remember how many. They are in a file in our office but we rarely use them. For discharge planning every nurse has her own way of working. It differs a lot.”

(interview with nurse)

All current unit-specific protocols were based on best practice, mostly describing the current mode of working. There were 17 disease-specific protocols, and five of them included some information about discharge. The clinical problem which arose was that patients did not receive discharge care that had been standardized and found to be effective (step 1 of EBP).

The interviews with the patients and informal caregivers made it clear that they wanted to be informed about discharge at least 24 hours in advance, and that they had not received sufficient written and oral information. They often felt left alone with care issues in the home setting, like the prevention of secondary lung infections.

“Since I have been home from hospital I am not sure if I am allowed to take a walk. I was admitted for being short of breath. I am afraid I will catch a flu or pneumonia if I spend time outdoors. They [nurses] did not provide me with information on this. I feel quite left alone”

(interview with discharged patient)

External care partners said that information in the hand-over documents was partly incomplete and seemed to have been hastily written. Patients were insufficiently informed about after-care. Nurses at the lung unit and the manager said that the discharge process was unstructured, that the patients' discharge needs were insufficiently assessed, that the discharge procedure was not regularly evaluated and that there was no exit evaluation.

“Our patients just go home. There is no structured procedure the nurses follow. They do whatever they think is right. There is no exit interview, even worse, no evaluation of the discharge process at all.”
(interview with manager)

The IT specialists did not identify specific shortcomings but recommended using the electronic patient record as a vehicle for implementation.

Literature on evidence-based discharge care

We were unable to find literature focusing on discharge interventions for patients with lung problems. We found no guidelines, only one meta-analysis (Phillips *et al.* 2004), several systematic reviews (Parker *et al.* 2002, Richards & Coast 2003, Mistiaen *et al.* 2007, Shepperd *et al.* 2010) and a review (Bauer *et al.* 2009). These articles either related to specific health problems (e.g. congestive heart failure), or to specific populations (e.g. older people). Generic components which, according to the literature, seemed to be effective in evidence-based discharge care were: structured and comprehensive discharge intervention (Parker *et al.* 2002, Richards & Coast 2003, Phillips *et al.* 2004, Mistiaen *et al.* 2007, Shepperd *et al.* 2010), post-discharge care (Parker *et al.* 2002, Phillips *et al.* 2004, Mistiaen *et al.* 2007), educational interventions (Parker *et al.* 2002, Mistiaen *et al.* 2007) and participation of informal caregivers in the discharge process (Bauer *et al.* 2009).

Barriers and facilitators for implementation

The barriers and facilitators for the implementation of EBP among nurses are summarized in table 3. The main barriers were that nurses had little knowledge of EBP, and that their English reading proficiency was poor. Many nurses had a more or less negative attitude towards EBP. The main facilitators were that the nurses wanted to deliver high quality care and that they were critical, enthusiastic and open to innovation. The nurses were also enthusiastic about developing and implementing a discharge protocol. This made EBP more practice-oriented, whereas before they had perceived it as an abstract concept.

During the development of the discharge protocol, an additional barrier emerged: some nurses felt overruled by the scientific evidence and feared that their expertise was not valued.

“[name] reported in the meeting [of the working group] that she had had a talk with some nurses in the coffee corner last week. They felt that their expertise as nurses was being undermined by the discharge protocol. [name another nurse] nodded. She mentioned another occasion where two nurses expressed the same view.”

(field note from working group)

Reflecting phase: formulation of project targets

The reflecting phase resulted in three project targets, which were jointly formulated by the nurses and the researcher:

1. To develop a discharge protocol by integrating evidence from scientific literature, nurses' expertise, and patient experiences, tailored to the situation at the lung unit and applicable to all patient situations. This protocol should be developed in a format compatible with existing formats used at the hospital.

2. To disseminate and implement the discharge protocol at the lung unit and to integrate it in the electronic patient record.
3. To ensure that nurses at the lung unit are knowledgeable about the principles of EBP and know how to perform it.

Reflections on the additional barrier that emerged during the development of the discharge protocol, i.e. that some nurses felt overruled by the scientific evidence, resulted in adjustments to the first project target, specifically stating that a discharge protocol should be developed starting from the nurses' expertise with discharge, while subsequently incorporating aspects from the interviews and evidence from the literature.

Planning phase: Implementation strategies

Given the barriers and facilitators identified, the major implementation strategies planned were to develop and carry out a tailored interactive outreach training programme and to develop and implement an evidence-based discharge protocol.

Other implementation strategies that were planned included: members of the working group fostering a positive outlook on EBP and stimulating critical reflection in team meetings (Leadership), dinner vouchers as an incentive for high-quality feedback on EBP, continuous information exchange and communication concerning EBP, reminders, putting the implementation of EBP on the agenda of all team meetings (Structural intervention) and creating the necessary preconditions, for example using the electronic patient record as a vehicle to implement the EBP protocol. For an overview of all planned implementation strategies see table 3.

Acting phase: Executing major implementation strategies

Tailored interactive outreach training

The tailored interactive outreach training programme adopted the PI (Patient/Population and Intervention) method instead of the PICO (Patient/Population, Intervention, Comparison, Outcome) method in step 1 of the EBP process. Step 2 involved using national Dutch websites which published reliable nursing and multidisciplinary clinical practice guidelines, while less use was made of international publications like systematic reviews and the Cochrane data. In step 3, four critical appraisal questions derived from the Appraisal of Guidelines for Research & Evaluation (AGREE) instrument II (Brouwers 2009) were used to assess the quality of the evidence. Box 1 provides a description of the interactive outreach training.

Adjusted EBP discharge protocol

As a result of the adjusted first project target (*See Reflecting phase*), the adjusted discharge protocol was based on the nurses' best-practice mode of working, as well as on evidence from the literature and aspects that emerged in the interviews with representatives, patients, informal caregivers and external care partners.

See table 4 for the major components of the protocol. The protocol was linked to the electronic patient record.

Summative evaluation

Implementation of EBP

Several nurses remained reluctant about EBP. The main reasons were that they considered EBP to be "theoretical", that they were concerned that their professional expertise was being overridden,

and that they perceived a lack of time. Others mentioned time constraints and not seeing any benefit to their professional performance. Few nurses made use of the websites recommended in the outreach training programme.

At first, the nurses experienced EBP as very complicated and complex. After the outreach training programme, however, they felt confident about reviewing Dutch sources of guidelines. They explained that the project stimulated their critical thinking about EBP and care rituals. They were positive about using the learning-by-doing approach, which is inherent in action research, to design the discharge protocol. This helped them to apply EBP and implement it directly. It was concluded that the targets of this project had been partly met, although true implementation of EBP and fostering an EBP culture at the lung unit would require some further action.

“There is a long way to go to implement evidence-based practice. This project was only the beginning. There is a need to enact an EBP culture where nurses integrate science in their daily routines. We need a culture change away from solely relying on individual expertise.”

(minutes of working group meeting)

Implementation of the discharge protocol

The nurses carried out care activities in accordance with the discharge protocol, but did not register their activities in the electronic patient record immediately and according to the protocol. They registered care activities at the end of the day, while the electronic patient records of discharged patients were closed in the morning. The registration of discharge care activities in the electronic patient record was perceived as complex.

“Discharge registration has become quite difficult. We must open a lot of additional windows and enter a lot of ticks. In some instances it is not clear to me where I should find the right window and what I need to tick. In view of the time I need to find the right windows, I do not register at all.”

(focus group session with nurses)

The patient exit evaluation on the ward was performed shortly before the patient left, and nurses had to organize some discharge care activities at the last minute, which were not registered either.

Finally, the summative evaluation also resulted in plans to continue EBP. This involved, firstly, one nurse taking over the lead and continuing the working group sessions; secondly, using a tool to review existing protocols based on the principles of EBP in order to adapt existing protocols step-by-step towards the EBP approach; and finally starting the development of another protocol based on EBP.

DISCUSSION

We used a participatory action research design to explore the implementation of EBP. Munten *et al.* (2010) state that action research might be a promising method for implementing EBP, though they were unable to conclude that action research is more successful than designs which are less iterative and not based on partnerships. The advantage we experienced is that we were able to adapt the implementation of EBP to the setting and to tailor the implementation strategies. In this way we empowered nurses to participate in the process (Koshy *et al.* 2011). It was the nurses themselves who proposed using the discharge protocol as a vehicle to implement EBP.

Facilitators and barriers we identified in this study were in agreement with systematic reviews concerning the implementation of guidelines and protocols in the nursing setting (Estabrooks *et al.* 2003, Ploeg *et al.* 2007, Eizenberg 2010). Furthermore, Baker *et al.* (2010) concluded in a systematic review that interventions tailored to prospectively identified barriers are more likely to improve professional practice than no intervention or the dissemination of guidelines. In our study we tailored the interventions to the barriers we identified. However, there is as yet insufficient evidence on the most effective approaches to identifying barriers and on tailoring interventions (Baker *et al.* 2010). In this study we used the knowledge and clinical expertise of members of the working group (Rycroft-Malone *et al.* 2004) to tailor interventions that had been reported in the literature to be effective.

It proved possible to implement a discharge protocol in a clinical setting. We used nurses' practical expertise as a starting point for the discharge protocol. The situation in nursing is such that patients rarely participate in the implementation process (Van Achterberg *et al.* 2008). We incorporated the patient perspective by consulting patients for the description of the current practice of the discharge procedure, and we asked them to provide feedback on the discharge protocol, which we then used to develop the unit-specific protocol. As regards scientific evidence, we had to make considerable adjustments, which raised the question whether we still met the conditions of EBP concerning scientific evidence? We are positive in this regard, as we complied with the methodological requirements of EBP, even though we tailored activities within the steps to the practical context. Yet, we did in a way start with naïve ideas, as we thought that we could translate the steps of EBP as described by Sackett *et al.* (1996, 2000). These steps do not seem to be suitable for front-line nurses with medium-level vocational training. In our setting, the average age of nurses was over 40 years, none of them had a bachelor's or master's degree or training in EBP, and their English reading proficiency was poor. Our setting reflects current trends in the nursing work force in general (Buerhaus *et al.* 2007, Melnyk & Fineout-Overholt 2008).

The implementation of EBP in our study was in agreement with the literature, in which EBP is often about the implementation of scientific evidence or clinical practice guidelines in an organization or at unit level (Gawliniski & Rutledge 2008, Squires *et al.* 2011) and not so much about the use of scientific evidence and clinical practice recommendations in the decision-making process for individual patients (Barratt 2008), as it was originally defined by Sackett *et al.* (2000).

After an implementation project is completed, there is always a high risk of reverting to old routines. Some conditions described in the literature (Gruen *et al.* 2008, Grol *et al.* 2013) to ensure sustainability were met, like one nurse taking over the lead and continuing the working group sessions. However, a culture shift toward EBP, which was perceived necessary to really implement EBP, was not yet achieved. Most authors in healthcare emphasize that organizations have to develop

an “EBP culture”, in which continuous learning, teamwork and patient focus are central, in order to really achieve a change in patient care (Ferlie & Shortell 2001, Grol *et al.* 2013) .

STRENGTHS AND LIMITATIONS

The strengths of action research are the cyclical process and the partnership between the researcher and those involved in the process. The cyclical approach to EBP implementation produced situation-specific knowledge.

Although we do not claim empirical transferability, we propose that we have achieved transferability of knowledge, which means that the reader decides which knowledge he/she perceives to fit his/her own setting and to be worth transferring. We have developed some initial insights about adapting EBP so as to make it more practice-oriented. Our study did not specifically tailor the discharge protocol to the needs of individual patients as regards decision making about individual care.

We used purposive sampling to gain information about the initial situation. We interviewed persons from different groups of stakeholders (e.g. nurses, patients and external care partners) in order to incorporate their views. We may not have reached data saturation for all groups of stakeholders, however. For example, only two nurses from external care partners were interviewed. Furthermore, although we had planned to involve recently discharged patients in the study, only two patients agreed to participate. Other patients said it would be too much of a burden to them, and we respected this. The members of the client council, however, were very willing to participate, so we included all of them in the study to make sure that patient values as a component of EBP were truly part of the EBP implementation.

The approach we chose was time-consuming. From the perspective of implementation efficiency, this might perhaps not be the preferred method. Another problematic aspect is the focus of the discharge protocol. It seems to have added to the complexity of implementing EBP compared to situations where nurses might opt for a simpler subject, such as improving hand hygiene.

CONCLUSION

Our study has generated insights into the development of practice-informed implementation, and yielded knowledge from front-line nurses who implemented EBP. Action research provides an opportunity to empower nurses and to tailor EBP to the practice context to do justice to the nature of this design. We learned that the steps of EBP were difficult for nurses to apply, especially for nurses with a medium-level vocational training. It seems that there is a need for a simplified and pragmatic method of EBP next to the full-blown academic version. Our study might provide some preliminary insights into what a pragmatic method of EBP could perhaps look like. Although we were able to implement a discharge protocol, the nurses felt that true implementation of EBP would require introducing an EBP culture.

RELEVANCE TO CLINICAL PRACTICE

Strategies to implement EBP should as much as possible be fine-tuned and tailored to the practice situation. Adjustment of the academic model of EBP to develop a more pragmatic method seems necessary to introduce EBP into clinical practice. The use of scientific evidence in clinical practice should be facilitated by using pre-appraised evidence, like clinical practice guidelines.

The situation in nursing is such that patients rarely participate in the implementation of EBP. We involved patients by asking them to provide information and consulting them at unit level. However, to provide high-quality patient-centred care, patients must also have a voice in clinical decision-making. In the context of EBP, scientific evidence should not claim priority over the patient's wishes and over professional knowledge. Rather, we consider it relevant for clinical practice to implement the integration of scientific evidence with clinical expertise and patient values in nurses' clinical decision making at the individual patient level.

WHAT DOES THIS PAPER CONTRIBUTE TO THE WIDER GLOBAL CLINICAL COMMUNITY

- A participatory action research design has generated insights into ways of implementing EBP in a tailored and systematic manner.
- The content of EBP must be adapted to the specific competencies of nurses working in a clinical setting.
- Knowledge of and implementation experience with EBP in a natural setting contribute to practice-informed implementation science.

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Table 1: Methods and data collection in the different phases of action research

Phase	Methods and Data collection
Observe	<p>2 interviews with patients 2 interviews with informal caregivers 2 interview with external care partners (lung rehabilitation clinic and home care organization) 1 interview with the manager of the lung unit 2 interviews with IT specialists 7 individual interviews with nurses from the lung unit 1 focus group session with nurses from the lung unit (n=7)</p> <p>Review of current protocols Review of scientific literature on evidence-based discharge planning, including systematic reviews and national and international guidelines Rapid literature review on facilitators and barriers to EBP implementation and scientifically effective implementation strategies</p> <p>Throughout the action phases, data were collected from minutes of the working group meetings (n=26) and research team meetings (n=13), as well as from field notes of observations and informal conversations, and e-mail conversations.</p>
Reflect	<p>Reflection within the working group: comparing the findings from the literature review with available protocols Reflection on the results of the interviews Continuous reflection throughout the action phases on data (minutes, field notes, informal conversations and e-mail conversations)</p>
Plan	<p>Discussion and selection of implementation strategies (who, what, where and when) in the working group and research team Cross-check of past best experience and implementation strategies scientifically proven to be effective Working on EBP discharge protocol in working group Review of the EBP protocol by nurses and patients Approval by the hospital protocol commission and integration in electronic patient record Review of implementation plan and add-in of implementation interventions</p>
Act	<p>Implementation meeting with nurses from the lung unit and dissemination of EBP protocol Execution of implementation interventions</p>
Summative evaluation	<p>Evaluation of the implementation of EBP protocol by nurses from the lung unit 1 focus group session with nurses from the lung unit to feed back process outcomes and to discuss causes 3 evaluation meetings within the working group Discussion of and agreement on adaptations to improve implementation</p>

Table 2: Strategies to ensure trustworthiness reliability of results

Method triangulation:	We used multiple methods of data collection: in-depth interviews, focus group discussions, observations, written minutes and other documents.
Researcher triangulation:	Multiple researchers reflected on the methods and results of the phases of the action study. We reviewed and discussed scientific and organizational aspects of the study within the research team.
Data triangulation:	We used multiple data sources during the study to verify the results, such as nurses, patients, informal caregivers, and various written documents, reflective and analytical notes.
Member check:	We fed back and discussed data in meetings with the working group, for example verifying the findings from the interviews and summative evaluation.
Thick description:	We gave a rich description of the study context to enable readers to judge whether the findings are transferable to other care contexts.

Table 3: Facilitators and barriers, and implementation strategies

<p>Facilitators and barriers</p> <p>Individual factors</p> <p>Facilitators</p> <ul style="list-style-type: none"> • Leadership <p>Barrier</p> <ul style="list-style-type: none"> • Negative attitude towards EBP <p>Team factors</p> <p>Facilitators</p> <ul style="list-style-type: none"> • Enthusiastic and critical team which was open to innovation and wanted to develop further • Motivation to deliver high-quality care • Shared vision where full-time employees take over the lead • Willingness to learn <p>Barriers</p> <ul style="list-style-type: none"> • Little motivation to implement EBP because of fear that nurse's expertise was not valued anymore and overruled by scientific evidence • Little knowledge about and skills for EBP • Lack of time and personnel • Little trust in success of the project based on previous negative experiences with other projects • Lack of English language proficiency • Lack of bottom-up decision making <p>Organization</p> <p>Barriers</p> <ul style="list-style-type: none"> • Workload because of reorganization and lay-offs • No educational policy on post-graduate training • Overload of projects since the lung unit was also the pilot unit for the electronic patient record
<p>Concrete implementation strategies</p> <p>Leadership</p> <ul style="list-style-type: none"> • Members of work group: creating a positive outlook on EBP and stimulating critical reflection in team meetings • Implementation: adapting implementation plan and activities according to the content of action cycles <p>Incentive</p> <ul style="list-style-type: none"> • Dinner vouchers: incentive for high-quality feedback (critical thinking) on EBP <p>Continuous information exchange and communication concerning EBP</p> <ul style="list-style-type: none"> • Display of posters at the lung unit: explaining EBP • Recruitment of opinion leaders within the nursing team with the following tasks: stimulating critical thinking about EBP in the team, pursuing a personal approach and giving explanations and background information • Inviting nurses from other hospitals who have experience with EBP to give presentations • Regular publication in hospital's internal newsletter: publicizing activities and preliminary results <p>Communication of EBP in the context of care quality improvement</p> <p>Interactive outreach training</p> <p>Reminders</p> <ul style="list-style-type: none"> • Integration of reminders in digital patient record <p>Discharge protocol</p> <p>Structural intervention</p> <ul style="list-style-type: none"> • Agenda setting: Putting the implementation of EBP on the agenda of every team meeting <p>Preconditions</p> <ul style="list-style-type: none"> • Time: linking EBP activities to other activities e.g. linking outreach training to the team training day • ICT: Using the electronic patient record as a vehicle to implement the EBP protocol

Box 1 Goal and description of the tailored outreach training programme

The aims were (a) providing interactive outreach training so that EBP was immediately applicable for nurses, (b) translating and adapting EBP activities so that beginners with little preexisting knowledge could practice it and (c) using Dutch guidelines.

The first part dealt with the definition of EBP, the goal, barriers and EBP competencies. The second part explained the steps of EBP. In the first EBP step we explained the PI method, which is a variant of the P (patient/population) I (intervention) C (comparison) O (outcome) method. P was defined as the problem or patient population and I as intervention. The PI terms were also the search terms (e.g. COPD and high energy intake). In the second EBP step we recommended reliable Dutch databases to track guidelines. We used databases that published nursing guidelines but also multidisciplinary guidelines. We showed the nurses how to find these sources on the web. In the third EBP step we explained how to critically appraise the guidelines. We used an adaptation of the Appraisal of Guidelines for Research and Evaluation II (AGREE) instrument (Brouwers 2009) and included four critical appraisal questions: Do you understand the content of the guideline? Does the guideline provide an answer to the PI question? Is the guideline up to date (not older than 5 years)? Can the recommendations be put into practice? We created a yes/no answer option and made it a cut-off *criterion* that all questions needed to be answered in the affirmative if the guideline was to be included. Next we explained the levels of evidence. Systematic reviews were labeled as level A, RCTs as level B, observational studies as level C and expert committees as level D. However, we did not explain the research design, but the strengths of evidence. We simplified the explanations: “level A, strong” was explained as: it is evident that..., “level B, medium”: it is assumed that ..., “level C, weak”: it is likely that....., and “level D, no evidence”: the guideline working group is of the opinion that.... These formulations were adopted from the Dutch Institute for Healthcare Improvement (Dutch Institute for Healthcare Improvement 2007). In the fourth EBP step we highlighted that nurses needed to provide a concise conclusion about the results, determine if the results could be put into practice at their own unit, provide a recommendation and finally communicate with the unit to update existing protocols. In the final EBP step we explained that an evaluation should take place from the patients’ point of view and from the nurses’ perspective. In the last part we presented a case about a patient with a lung problem. Nurses formed small groups and jointly worked through the first four EBP steps. The training course ended with a plenary discussion.

Table 4: Major components of the discharge protocol

Exit evaluation	<p>Discharge visit before discharge (if possible with patient and informal caregiver)</p> <p>Discharge letter</p> <p>Handing over documents for external partners</p>
Patient education	<p>Medication (oral and written information)</p> <p>Lifestyle interventions (oral and written information)</p>
Follow-up	Follow-up appointments
Timely communication of discharge date	Discharge date on whiteboard and communicated 48-24 hours before discharge
Electronic patient record	Registration of discharge components in electronic patient record