Knowledge Utilisation in Swedish Neonatal Nursing

Studies on Guideline Implementation, Change Processes and Contextual Factors

BY

LARS WALLIN
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Abstract

The overall aim of this thesis was to study the implementation of guidelines, change processes and contextual variables from the perspective of improvements and neonatal nursing care’s endeavours to be more evidenced-based. Because health care is exposed to extensive change pressure and because the impact of effectiveness research on clinical practice is limited, it becomes urgent to understand how knowledge utilisation initiatives can be facilitated.

Three studies involved managers and nurses at all neonatal units in Sweden. Two of these studies also included nurses from other healthcare organisations. The fourth study included all staff at four neonatal units. The study designs used were cross-sectional, comparative and prospective longitudinal surveys; questionnaires were used as data collection tools in all four studies.

Evaluation of the utilisation of the neonatal nursing guidelines showed that the guidelines were known to the nurse managers and used at most of the units, though to varying degrees and in different ways. Fifteen months after guideline dissemination, 8 of 35 units had changed practice, of which 2 units had completed the implementation process of a guideline. Involvement in the preceding guideline project facilitated the completion of improvement projects compared with participation in training courses for quality improvement (QI) only. There was no difference between these two groups on long-standing involvement in improvement work. Nurses who continued QI work over a 4-year period were more active in seeking research and implementing research findings in clinical practice than those who ceased the improvement work. The QI-sustainable nurses reported better contextual support for research-related activities. In a separate study staff perceptions of organisational factors appeared stable over the course of one year at the aggregated level. Improvements in skills development and participatory management predicted higher overall organisational and staff well-being.

The findings emphasize the importance of including both individual and organisational factors in the strategic planning for evidence-based nursing. Plans have to be long-term and consider that change is a slow process. Leadership commitment is essential and there are clear benefits in developing a learning and professional supportive environment as well as of involving staff in organisational decision making.

Keywords: neonatal nursing, knowledge utilisation, quality improvement, change processes, clinical practice guidelines, evidence-based nursing, contextual factors, research utilisation

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PAPERS INCLUDED IN THE THESIS

This thesis is based on the following papers, which are referred to in the text by their Roman numerals:


IV Wallin Lars, Ewald Uwe, Wikblad Karin, Arnetz Bengt. Predictors of organisational improvement in neonatal care - staff perceptions as compared with objective measures. (Manuscript)
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# Abbreviations

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<td>CPGs</td>
<td>Clinical Practice Guidelines</td>
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<tr>
<td>DFS</td>
<td>Dynamic Focus Score</td>
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<td>DySSSy</td>
<td>Dynamic Standard Setting System</td>
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<td>GE</td>
<td>Generic Education</td>
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<td>OR</td>
<td>Odds Ratio</td>
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<td>QI</td>
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<td>Quality Work Competence</td>
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<td>RU</td>
<td>Research Utilisation</td>
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<td>TI</td>
<td>Targeted Intervention</td>
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<td>TQM</td>
<td>Total Quality Management</td>
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Preface

The journey that resulted in this thesis started in the beginning of the 1990s. I was on parental leave from my work as a nurse manager at a neonatal intensive care unit and had some time to think about my work. Neonatal care was in rapid development, and the knowledge base for neonatal nursing increased in a promising way. The problem was, however, how to make use of this knowledge, make changes in appropriate ways and achieve improved patient care quality?

These questions have been on my mind the whole journey. My working life has changed, from clinical leadership to education and research. Concepts have changed and trends have been replaced with new trends on how to change clinical practice. Our knowledge on effective medical treatment and qualified nursing care has increased substantially. However, I believe the underlying terrain – the reality in health care – is more or less the same. It is probably even more complex and with an even stronger pressure on leaders and staff, making the 10-year-old questions still highly relevant today. The questions are likely to be more important nowadays as the financial and public demands on health care services have increased. The main issue of this thesis – knowledge utilisation – seems to be a relevant and urgent strategy to find ways out of this pressing situation. Because the research area also holds a number of unanswered questions, the journey may likely continue for sometime into the future.
Background

Health care is exposed to extensive change pressure [1-4]. It may concern organisational changes, alterations of political and economical conditions, the impact of an ageing population, new technology, patient preferences or the flood of new evidence. It is a situation filled with turmoil and high complexity. Prospects of success because of expanded knowledge, sophisticated technology and improved clinical effectiveness are mixed with alarming reports of financial cutbacks and staff working in healthcare organisations exposed to high stress levels, causing job dissatisfaction, staff turnover and staff burnout [5-8].

Resolving core problems in work design and workforce management appear to be worldwide issues for preserving patient safety and high quality care [6]. Actions based on knowledge are particularly urgent if expectations of a more evidence-based and effective health care are to be realised. The fact is that many studies point at a striking uncertainty about the impact on clinical practice of medical and nursing research [9-18]. Great variations in clinical practice performance and practices that are out of date, which are consequences of defective adherence to established research evidence and badly working quality systems, have negative effects on patients and health care outcomes.

To conclude, there are problems in getting evidence to influence daily practice in healthcare, problems that can seriously affect the patient. The following background will outline some ingredients of importance in the endeavours of improving patient care.

Changing clinical practice

During the past three decades, different models for quality improvement (QI) and research utilisation (RU) have often been employed as vehicles for the implementation of new knowledge and development in health care. The concepts originate from divergent perspectives: QI deals with the development of clinical practice while RU deals with the use of research findings. An unfortunate consequence is that research and discussion of these issues have often occurred in separate loops. This condition is
somewhat surprising as the processes of QI and RU have the common aim of better health care performance and improvements of patient outcomes. Dissimilarities have concerned how different elements of the improvement process have been emphasised and a focus that has primarily been on the individual practitioner (RU) or on the whole organisation (QI).

Despite the separate emergence and development, RU and QI today share substantial features. In similarity with RU, sound evidence (e.g., systematic reviews and clinical guidelines) has been increasingly important for QI projects [19-21]. Outcome measurement, a prominent feature of QI, is gaining increased interest in RU [22-25]. The need to view RU also as an organisational process rather than as an activity that can be undertaken by the individual practitioner has repeatedly been proposed [26-32].

QI and RU may be seen as successively united concepts, pointing out the basic components of today’s main movement, namely evidence-based health care [13, 33, 34]. An often used definition of evidence-based care is “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” [p.2, 34], which means the integration of individual clinical expertise with the best available external clinical evidence from systematic research. Besides this overall approach, evidence-based care is a process of life-long, self-directed learning following five basic steps when issues in patient care creates a need for important information: (1) converting information needs into answerable questions, (2) tracking down the best evidence for answering the questions, (3) critically appraising that evidence, (4) implementing the results of this appraisal in clinical practice, and (5) evaluating care performance.

Quality improvement

“How can practice be improved” is the starting point for QI. In comparison with RU, the work is normally more action-oriented and not necessarily research based. Methods for QI have a “to do” and an organisational approach, often focusing on processes, tools and contextual factors [35, 36]. The organisation’s ability to support change is highlighted for improvement work [37]. A basic model is the problem-solution cycle, such as Deming’s Plan-Do-Study-Act (PDSA) cycle [38]. The “evolution” of QI has entailed the development of a rich variety of methods. Starting with quality assurance and standard setting in the 1980s, there are now such approaches as total quality management (TQM), organisational audit, balanced scorecards and breakthrough series. These models hold basic similarities but also marked differences.
**Impact of quality improvement**

The conclusions from studies on outcomes and effectiveness of QI vary considerably, from severe doubt to overflowing enthusiasm. Much of this literature is anecdotal, describing what was done and what seemed to have been accomplished, often in a specific location and over a short period [39]. Lately, a trend towards controlled studies can be observed [40]. Improved patient outcomes, as well as no changes or just small effects are reported. Promising findings of QI programmes, however, are often tempered by weak study designs [41-43]. In parts of Europe, QI is frequently described at an operational level as clinical audit, defined as a systematic and critical analysis of the quality of clinical care [36]. Audit is suggested to have benefits, including the improvement of communications skills, patient care and professional satisfaction. Disadvantages are described as hierarchical and territorial suspicion, professional isolation and diminished clinical ownership [44]. Effects have been concluded to be small to moderate, but potentially worthwhile [45, 46]. Similar results have been detected in effectiveness studies on nursing QI/audit [47-49].

These results show that the belief of many people in different QI models as effective tools for improving patient care is not so easy to prove [35, 50]. The absence of conclusive results could be a consequence of a shifting reality in that outcomes quite simply differ; yet, it could also reflect the methodological problems frequently encountered in these “clinical reality” studies [51]. QI is a complex idea containing philosophical perspectives, practical tools and that requires goal-oriented activities to bring about change. All this may result in studies that evaluate an intervention that is incompletely implemented [43, 50, 52]. Failure to complete all stages of the quality cycle is suggested to have a serious effect on the capability to create change and improvement [53, 54].

**Supporting factors and obstacles for improving clinical practice**

Despite (or maybe because of) the absence of strong evidence for positive effects of QI, there has been considerable interest in studying what enhances or impedes the processes of QI in health care. Many organisational factors are widely recognised as crucial for success when implementing QI programmes. Key supporting factors include strategic leadership, supportive organisational culture, effective training, dedicated staff, attitudes of colleagues, availability of databases and research reports, protected time and structured programmes. QI has been recognised as a means for professional development and accountability, not least in nursing. Another factor is legislation that calls for evidence-based healthcare and improvements. In contrast to the facilitating factors there are several potential barriers, many of which reflect lack or defectiveness of the supportive factors. For example:
deficiency in resources, a lack of expertise in methods and project management, problems with interaction and group processes, the absence of an overall plan and organisational impediments, and, not to forget, general confusion reflecting the many different approaches to quality. [42, 44, 50, 51, 55-57]

Studies focusing on the involvement of nurses and therapy professions in clinical audit have reported large variation in activity. Enthusiasm is mixed with several obstacles, including hierarchy and organisational problems, workload pressure, lack of staff commitment and practical support [48, 58-61]. Ownership for quality and action to improve has been identified as two key factors for a successful implementation of a quality system [37].

**Quality improvement in Sweden**
The establishment of QI in Sweden has taken a winding road. It has followed the international course, starting in the 1980s with professional initiatives. In 1993 a national regulation was launched, confirming earlier initiatives by focusing on systematic activities and the health professional’s accountability for QI. A revision of the regulation three years later further underlined the system approach and management responsibility [62]. Since then QI has been gradually established, employing several approaches, from project or unit-based initiatives to TQM. A total picture of the situation is lacking, however, and QI activities can vary a great deal between health care organisations [63-65]. Today, the breakthrough model is probably the most applied model for QI, broadly launched by the Federation of County Councils during the late 1990s [66]. A distinctive feature of QI in Sweden is the national quality registers, covering more than 20 health care areas, primarily used for comparative studies and benchmarking [67]. These registers play an increasing role in national strategies for improvement of health care.

Regarding nursing there was an initiative from the Swedish Society of Nursing and the Swedish Association of Health Professionals in the early 1990s on the implementation of the DySSSy method [68, 69]. Courses and activities based on this method constituted a substantial part of QI in nursing during the past decade. In recent years more emphasis on clinical practice guidelines, quality indicators and facilitation of change processes has evolved [70, 71].

**Research utilisation**

RU is derived from the researcher's perspective. Why is research (not) being used? How can it be used? RU can be seen as a sub-set of evidence-based practice focusing on the use of research findings. It has broadly been
defined as “the use of research findings in any and all aspects of one’s work as a registered nurse” [p.19, 13]. RU is not a homogenous concept. It has been classified in three ways: (1) concrete application of research (instrumental/direct), (2) influence thinking at a general level but not necessarily generating particular actions (conceptual/indirect) and (3) research as a persuasive or political tool (symbolic/policy) [72]. Stetler and Marram (1976) presented one of the first models for RU in nursing. This and other models [25, 73, 74] pertain to the direct use of research, in which the research findings and their application are central. Reviewing the strength of research is an essential feature of all models, leading to a grading of research evidence. Another area of interest bears on the communication of research results, which seeks ways to supplement publication in research journals [26, 75, 76]. Further, there has been substantial attention to factors that relate to the individual nurse and hers/his ability to put research into practice [77-81].

Supporting factors and obstacles for research utilisation
Concerning supportive factors and obstacles to RU, similar factors as in QI are recognised, but with a stronger emphasis on individual qualifications and on RU as a means for professional development and accountability [28, 76, 81-86]. The impact of RU is not so explicitly treated in the literature, or questioned, as compared with the impact of QI. The debate that is, concerns research utilisation/evidence-based care in itself and the criticism is directed to the evidence-based movement in that it ignores the context of clinical practice and the need of individualising care. That debate will not, however, be addressed in this thesis. It can be concluded that the process of RU encounters the same obstacles as the process of QI, which limits the impact of transferring knowledge from research into clinical practice. A number of studies emphasise the restricted utilisation of research findings in practice [9-18].

Research utilisation in Sweden
In Sweden, the obligation to use an evidence-based approach in healthcare is emphasised in the introductory paragraphs of the Health Care Law [87]. This regulation is, however, not a guarantee for such a practice. The National Board on Health and Welfare recently published a report over the situation in Swedish healthcare 2002. Considerable regional differences concerning the use of established research-based treatment methods was explained with dissemination diversities, but above all with variations in resources, knowledge and attitudes towards changes of practice [64]. There are some RU studies on nursing in Sweden [30, 76, 77, 88-90]. These reports on attitudes to research and research utilisation in nurses and nurse students, and on the impact of educational programmes in order to enhance research
utilisation. Of interest for the overall picture of research utilisation in nursing in Sweden is the fact that nursing research has been a component of the basic training for becoming a nurse since 1993.

Clinical practice guidelines

Systematic reviews and clinical practice guidelines (CPGs) may be the most frequent used tools for disseminating overviews of research findings and evidence-based recommendations for clinical practice. By providing descriptions of appropriate health care that are useful for care providers and care purchasers, as well as for the public, CPGs have received a broad international interest [21]. It is suggested that the gap between scientific evidence and clinical practice can be significantly reduced by guidelines [91, 92]. QI is supported by the provision of recommendations for best practice and measures for compliance rating [20, 21, 93]. Improvements in care processes and patient outcomes as a result of adherence to recommendations in CPGs have been demonstrated [17, 94], even though increased standardisation may be perceived to reduce individualised decision-making [95, 96].

Benefits of CPGs appear to relate to a complex mix of national and local factors, such as validity, dissemination and implementation. Validity is enhanced by developing guidelines using a rigorous methodology, basing recommendations on best available evidence (where possible, systematic reviews of research evidence) and ensuring involvement of all stakeholder groups affected by the guidelines [97, 98]. Consensus processes are also employed [99]. Typically, this requires development at a national or regional level because of the resource implications involved [94]. Although guidelines have a number of benefits, they are not applied spontaneously. Feasibility and application are demonstrated to have a complex pattern [10, 11, 100, 101]. Numerous strategies have been used for dissemination and implementation [20, 94, 102, 103]. Implementation seems to be enhanced by local adaptation and ownership of the guideline and reinforced by measurement to compare local practice against the guideline [37, 104].

In the development of guidelines for nursing care there are particular challenges because of the limited evidence base on effectiveness derived from experimental studies [19]. However, as the body of knowledge on nursing is growing, the need for guidelines in nursing care becomes prominent as a means to ensure that this new knowledge influences practice [93, 102].
Neonatal nursing and national practice guidelines

Neonatal nursing involves the holistic care of prematurely born infants and unhealthy full-term newborns and their families. It is constantly in an extensive interaction with medical care and advanced technology. The nurse manages a wide variety of care procedures, independently or in collaboration with physicians and other professionals. Life sustaining procedures have highest priority. Prevention of pain and stress, developmental supportive care, nutrition and breastfeeding support are other major nursing care areas. Further, the nurse has an important role in empowering the parents and in providing them with guidance on how to care for their infant [105].

The research base for neonatal nursing has increased substantially over the past two decades, including several studies carried out by Swedish nurses [106-119]. These studies concern areas as kangaroo mother care, developmental supportive care, pain management and breastfeeding.

The neonatal guideline project

The development of national neonatal nursing guidelines was initiated and led by the author of this thesis. The project was supported by the Swedish Society of Nursing and the Swedish Specialist Group of Paediatric Nurses, and was carried out 1994-95 in co-operation with 93% (42 of 45) of all neonatal units in Sweden. The goals of the project were threefold: (1) to introduce “quality thinking” in neonatal nursing care, (2) to develop clinical practice guidelines and (3) to provide measures for auditing neonatal nursing. The work proceeded in four phases: planning, local activity, compilation and dissemination.

Planning

A survey that included all participating neonatal units was undertaken to identify areas focusing on patient problems and nursing interventions. Seven broad subject areas were identified, and after negotiation among participating nurses, these areas were used as a content framework for the guideline project.

Local activity

Two nurses from each unit were trained in a method for QI, namely the Dynamic Standard Setting System (DySSSy) [59, 68]. The method involves a problem solving, patient-centred and team-based approach that is directed towards the development, implementation and evaluation of potentially better practices. The method is based on the quality improvement cycle, encompassing structure, process and outcome dimensions of clinical practice. Using this method and led by the two nurses, a team at each unit developed, implemented and evaluated a standard of care on a topic within
the content framework. This work was facilitated through continuing personal contacts between the project leader and the two unit-based group leaders. Networking was established within the guideline project by four common meetings for all the local group leaders during a two-year period.

Compilation
The project leader and seven nurses from selected units composed a group for compiling the guidelines. The locally derived standards were revised and compiled after conducting extensive literature reviews in each subject area. Using an informal process, the guidelines were assembled containing a mixture of evidence-linked and consensus-based recommendations. To facilitate the evaluation of clinical practice, suggestions for audit measures were included within the guidelines. Finally, experts in different fields of neonatal care (nurse researchers, physicians and a psychologist) reviewed the materials. The methodology used may be seen as a “lean” variant, and one that was more based on clinical experience, as compared with the recommended guideline development process [97-99].

All together, 13 guidelines were presented in a standardised way in a report in Swedish. For each guideline, underlying evidence was outlined and presented. The standard of care, including structure, process and outcome criteria, followed, supported by comments and references. Each guideline was supplemented with proposals on auditing measures.

Dissemination
The guidelines were presented at a national conference in the beginning of 1997. The report was sent to all participating nurses and all neonatal units. The Journal for Swedish Paediatric Nurses published a special issue on the project [120]. After dissemination, it was up to the units to select, adapt and implement the guidelines.

Organisational factors
The common challenge for improving practice, no matter what concept or model it concerns, is the implementation of change. The importance and impact of various organisational factors then become apparent. The knowledge on strategies for organisational improvement is however sparse, and that change is not always equivalent with improvement has been cleverly stated by Aiken et al [p. 9, 121]: “the widespread diffusion of new models for organizing care that have no evidence base may be part of the problem rather than the solution.”
Different concepts flourish to capture the environment for health care practices. Terms such as practice environment, organisational culture, organisational climate and context both coincide and differentiate depending on the literature source [122, 123]. In this thesis, I will not make any proposal as to which concept is most relevant, but preferably I will use the terms context and organisational factors. McCormack and co-workers have proposed that context is the physical environment in which practice takes place. These authors suggest further that context contains such issues as boundaries, decision-making processes, power structures, resources, feedback systems and organisations’ receptiveness to change. Significant sub-elements are culture, leadership and evaluation.

There is a shortage of research that explores the impact of the practice environment and organisational features on clinical outcomes [122, 124]. Relatively much literature exists on performance measurement, less on performance management, and least on the determinants of performance [125]. A number of reviews have presented excellent summaries of the performance management literature and several organisational elements with varying strength concerning the impact on healthcare outcomes have been identified. Examples of such organisational factors are continuing education, leadership style, local opinion leaders, facilitation, audit, project management, organisational and staff commitment, dedicated time and resources for improvement projects [9, 11, 15, 42, 44, 46, 51, 126-128].

Some other papers that have approached the “determinants of performance” issue, illuminate the importance and wide range of the impact of organisational factors. Examples include clinical supervision decreased staff stress [129], interpersonal relationships enhanced job satisfaction [130], downsizing decreased organisational and staff well-being as well as quality of care [4, 131, 132], a creative organisational climate increased patient autonomy [133] and organisational change in an intensive care unit reduced mortality [134]. Aiken and coworkers’ studies on Magnet Hospitals in the USA are perhaps the most widely known in the area of workplace organisation research [1, 2, 135, 136]. Higher staffing levels, registered-to-practical nurse ratios, nurse-to-patient ratios and organisational support were associated with higher job satisfaction, lower staff burnout, failure-to-rescue rates and patient mortality rates. These outcomes were confirmed in a recent study [5].

Some instruments for examining organisational factors have been developed. Most of these instruments focus on staff perceptions of work environment. In Sweden several studies have been conducted using the Creative Climate Questionnaire [137] and the Quality Work Competence (QWC) questionnaire [3]. These instruments differ in comparison with three north American questionnaires [138-140] that are directed on the health care
environment and specifically on nurses. In contrast, the Swedish instruments have a more overall perspective that is relevant for various work environments and professional groups.

Starting point for the studies

In 1997 the neonatal nursing guidelines were developed and disseminated, and the national project was thereby completed. It had been successful considering activities during the project and the final guidelines were well acknowledged. The utilisation and clinical implications of the new guidelines were, however, unknown. Would the guidelines ever be used? If they were used, to what extent? How would they be used? A search of the literature suggested that implementation is a tricky business and that results vary considerably. It was also obvious that follow-up of guideline utilisation was not always performed. In Sweden, most guidelines were developed, circulated and then it was assumed that they would be used.

The uncertainty about the implementation in the clinical settings called for an investigation. This intention to follow-up guideline application generated more questions on the change of clinical practice and knowledge utilisation. How do we support progress of improvement work? Do QI projects promote research utilisation? Is sustainability important for changing clinical practice? How can we develop organisational support for implementing evidence-based nursing? Which organisational factors are important? How can we improve these factors? Such questions constituted the basis for the research in this thesis.
Aims

The overall objectives of this thesis were to study

- dissemination and implementation of neonatal nursing guidelines
- change processes and quality improvement in the clinical setting
- associations between sustainability in changing clinical practice and research utilisation
- staff perceptions of contextual variables and prediction of organisational improvement

The specific aims of the four studies were as follows:

1. To evaluate the extent and direction of the clinical application of national guidelines for neonatal nursing and how the preceding project producing the guidelines was perceived by involved neonatal nurse managers.
2. To evaluate the support strategy for nurses to work with quality improvement used in the guideline project, by studying the progress of audit, sustainability in audit work, and identify facilitative and inhibitory factors in audit performance.
3. To examine the relation between sustained work with quality improvement and factors related to research utilisation in a national sample of nurses.
4. To investigate the stability over time of neonatal staff ratings of work context factors and identify predictors of organisational and staff well-being.
Materials and methods

Design
Study 1 was performed as a cross-sectional survey to evaluate the application of national neonatal nursing guidelines. Study 2 used a natural experimental design with post-intervention evaluation of an improvement support strategy. Study 3 was designed as a comparative survey in order to assess associations between sustainability in quality improvement work and research utilisation. Study 4 employed a longitudinal prospective design with paired samples for assessing staff perceptions of organisational and environmental factors at their units. All four studies were directed to staff personnel and used postal questionnaires as the data collection method.

Setting
The studies were conducted 1998 (Studies 1-3) and 2001-2002 (Study 4). Figure 1 shows the timeline of the studies and preceding events. A common denominator for all four studies is neonatal care in Sweden. The medical care of newborn infants is organised according to three levels: university, county and local hospitals, comprising approximately 40 units in the country. Studies 1-3 included nurse managers and staff nurses from nearly all neonatal units. Study 4 comprised all personnel at four neonatal units (unit A, B, C and D) at county hospitals in the middle of Sweden. In Studies 2 and 3 the participants were also nurses from other health care organisations than neonatal care. The common setting for these two studies was the recruitment of nurses who had participated in uniformly designed 4-day basic training courses in a method for QI that were arranged by the Swedish Society of Nursing.
Subjects

Study 1

Study 1 was directed to the nurse managers at 39 neonatal units. Staff teams from these units had participated in the development of the national neonatal nursing guidelines. Three units had been closed since the guidelines were produced. A questionnaire was mailed to all 39 nurse managers, with 35 (90%) completing it. Length of experience as a nurse manager varied between 6 months and 30 years (median 3 years).

Study 2

The participants in 8 consecutive courses in QI (from August 1993 to May 1994) were identified in a register held by the Swedish Society of Nursing. All were registered nurses working in Swedish health care. These nurses were divided into two groups:

1. Nurses who had to relay on this basic training without further support on the national level for their forthcoming QI work. They constituted the generic education (GE) group, which served as a reference group in this study.
2. Nurses who participated in the QI courses as the introduction for being involved in the national neonatal nursing guideline project. This sample made up the targeted intervention (TI) group.

The GE group consisted of 156 nurses from more than 50 health care institutions. These nurses represented various clinical areas, including acute care (university, county and local hospitals), psychiatric care, primary care and nursing home care. Twenty of the nurses were inaccessible because of retirement or because their postal address was not available. The TI group included 84 nurses from 42 neonatal units. All nurses in the GE and TI groups were invited to participate in the study.

The response rate for the GE group was 63.9% (n=87) and 79.8% (n=67) for the TI group. Because QI is an explicit part of the management responsibility, all nurses in managerial positions at the departmental level were excluded from the study. Thus, the sample for analysing progress in QI work consisted of 70 nurses in the GE group and 66 nurses in the TI group. As there were some changes in professional roles during the time span for the investigation (1994 to 1998), an additional exclusion was made of the nurses that had been appointed to managerial positions at the departmental level during these years. Thus, the final sample size for analysing sustainability of QI work was 65 nurses in the TI group and 54 in the GE group.

Study 3
The sample in Study 3 was derived from those nurses participating in Study 2. It consisted of 119 respondents, 86 (72%) were staff nurses and 33 (28%) were nurse managers at the unit level. Four years after the basic training courses 46 nurses (39%) were still involved in QI-related activities while 72 (61%) reported that they had discontinued the QI work. The sample was divided according to this distribution. The nurses still involved in QI work were called QI nurses, whereas nurses that no longer were involved in such work were referred to as QI nurses. The QI and QI groups were relatively homogenous in basic background variables.

Study 4
All staff personnel at the four involved units (practical nurses, registered nurses, midwives and physicians) were invited to take part in the study. Data collection was done in October 2001 and October 2002. The response rate for 2001 was 90.6% (164/181) and 87% (167/192) for 2002. Of these individuals, 134 answered the questionnaire at both occasions, making up
the sample for this study. There were no significant differences between the units regarding background variables (sex, age, and years of professional experience).

Instruments and data collection

Questionnaires

Studies 1 and 2
All four studies used postal questionnaires as data collecting tools. For Studies 1 and 2 the questionnaires were developed purposively for the studies. The items were formulated based on a review of relevant literature, subject to face validation by two experienced researchers and, finally, tested on nurses with a corresponding background to the respondents in these studies. The questionnaire in Study 1 covered unit and nurse manager background variables and key questions illuminating guideline utilisation. It included such questions as: How were the guidelines used? To what extent was the guidelines used for improvement work? How was the usefulness of the guidelines perceived?

The questionnaire in Study 2 included background variables on units and respondents, and outcome variables on the process of changing clinical practice. Some example questions are: How did you proceed in your QI project? Have you continued with QI work after that project? What made you quit the QI work? What made you continue the QI work? The main outcome measure for both studies was progression in the QI cycle, using Deming’s four-stage model, “the Plan-Do-Study-Learn cycle” (PDSL) [38]. The cycle of QI has been used similarly in other studies to measure progress [141, 142]. The questionnaires were mainly made up of items with fixed response alternatives, using different variants of five-point Likert scales, and some open-ended questions.

Study 3
A questionnaire developed by Humphris and colleagues [143], which was based in turn on the work of Champion and Leach [78], and Pettengill et al [144], was used in study 3. The respondents were asked to the following:
1. Indicate their participation in a range of research-related activities.
2. Respond to a number of items related to (a) their attitudes to research, (b) availability and support for the implementation of research findings.
and (c) research utilisation in daily practice. A 5-point Likert scale was used to assess separate indices for these three domains.

3. Indicate the research support resources available for them and rank nine activities that would make research more useful.

4. Complete a scale from 1-10 on how active they are in seeking research literature.

5. Rank 10 items that might “discourage” their use of research findings in practice and 10 items that might be “helpful.”

The questionnaire was translated into Swedish and slightly revised regarding the attitude items/indices. One of the authors of the paper (KW) had used the revised questionnaire in a population study on Swedish diabetes nurses. At this occasion the instrument showed acceptable homogeneity measured with Cronbach’s alpha.

**Study 4**

The quality work competence (QWC) questionnaire was used in Study 4 to assess staffs’ perceptions of organisational and staff well-being. Scales have been tested for validity and reliability in a series of studies [3, 145-148]. The questionnaire conveys 10 key enhancement areas/indices: mental energy, work climate, work-related exhaustion, work tempo, performance feedback, participatory management, skills development, goal clarity, organisational efficacy and leadership. Based on current psychosocial practice and research these measures are major determinants of work context [3, 147, 148].

The instrument employs standard Likert scales with response alternatives as: disagree strongly, disagree somewhat, agree somewhat, agree strongly. The percentage scores on the enhancement indices range from a low of 0% to a high of 100% (the higher the scores the better) and with target levels indicating acceptable outcomes based on aggregated data from earlier studies (Figure 3). The scales for *work tempo* and *work-related exhaustion* are counted backwards (the lower the scores the better). An overall score of organisational and staff well-being, the Dynamic focus score (DFS), was calculated on the sum of the weighted score on each of the listed 10 enhancement indices, with the exception of the work-related exhaustion, and converted into per cent values, range 0-100%, where higher scores indicate enhanced well-being. The weighting of individual enhancement indices in the calculation of the DFS is described by Arnetz [3]. DFS indicates the overall potential for renewal and organisational improvement.

In order to obtain data on the respondents’ perceptions of the occurrence of organisational improvement, the questionnaire was completed with an additional area/index *commitment to improving care and work environment*.
in the 2002 data collection period. A single item concerning change was also added: *work environment has improved*.

**Procedure**

The questionnaire surveys for Studies 1-3 took place in spring 1998. Study 1 was conducted 15 months after the national guidelines had been presented at a national conference and disseminated to all neonatal units. In Studies 2 and 3 data were collected four years after completion of the basic training courses in QI. Study 4 included two periods of data collection, with a one-year interval between the periods.

Data collection in all four studies was similar. Accompanying the questionnaire was a signed letter from the authors, which provided the purpose of the study, instructions as how to fill out the questionnaire and how the results would be used. Two reminders were needed to achieve acceptable response rates in Studies 1-3, but only one in Study 4. In Study 4 it was also pointed out that the nurse manager at participating units would get results back on unit level, which would be feasible to use as a basis for improvements on work environment. These reports were sent to the nurse managers four months after the first data collection period, in which the results of each unit was displayed in relation to a database from earlier investigations and in relation to the other units’ results (anonymous) in the current study. The managers were informed that they could use the results in any suitable way.

**Ethical considerations**

Studies 1-3 were not considered necessary to have ethically approved as they did not include patients, but was directed to health care staff and was not comprised of questions that could be considered as ethically problematic. Participation in the studies was voluntary and all managing of data was confidential.

Study 4 was approved by the medical research ethics committee at Uppsala University (01-029). The medical chief executive and nurse manager at each participating unit gave their consent to carry out the study. In the enclosed letter to the respondents the confidential nature of the study was emphasised, clearly pointing out that the persons in the independent research group would be the only individuals handling the questionnaires and the analyses.
Data analyses

Studies 1 and 2
Generally, the fixed response alternatives were dichotomised into either positive or negative responses. The relation between background and outcome variables was analysed using chi-square tests and logistic regression. Independent variables for logistic regressions were selected by identifying significant variables in chi-square tests between the outcome variables and each background variable [149]. Co-variation between selected background variables was tested. P-values less than 0.05 were considered as significant. In Study 2, rank order for reported reasons concerning continuing/discontinuing QI work was received by simple addition.

Study 3
Group differences on participation in research-related activities and available research-related resources were analysed using chi-square tests. Group differences on the three indices were calculated with unpaired t-tests. In the analysis of separate items differences between groups were tested with chi-square tests. The scale for activity in research searching was assumed to generate ordinal data and thus the Mann-Whitney U-test was used. Because of repeated testing p-values of less than 0.01 were considered to indicate a significant difference.

Study 4
Paired t-tests were used for analysing differences between 2001 and 2002 in each index. Unpaired t-tests and ANOVA were employed for determining differences between groups regarding the course of indices’ results between the test periods in 2001 and 2002. The Bonferroni correction was used for post hoc tests. Delta values for the indices were calculated subtracting the mean value for each index 2002 with the mean value for each index 2001, except for work tempo and work-related exhaustion which were based on 2001 minus 2002. Accordingly, positive delta values indicated improvement from 2001 to 2002. Multiple linear regression analysis was used to assess associations between DFS 2002 and delta values for the indices as well as between delta values for separate indices. These outcomes were further confirmed in logistic regression analyses calculating odds ratios for improvements of contextual factors. The significance level was set to 0.05.
Results

Study 1 – implementation of neonatal nursing guidelines

The national guideline project as described in the background to this thesis was the first attempt to develop national guidelines for a nursing speciality in Sweden. It was characterised by extensive participation of practising nurses, which was advantageous for reaching project goals. To determine if the wide participation would result in a comprehensive utilisation of the guidelines, the application was investigated 15 months after the release of the guidelines.

Utilisation of the guidelines

The nurse managers estimated the extent of guideline application at their units. Thirty units reported varied application of the guidelines, with 13 using them sparingly, 12 to some extent and 4 to a greater extent. Two main types of guideline application were apparent. In 10 units the guidelines were primarily used as educational material. The remaining 20 units utilised the guidelines in order to change and evaluate clinical practice. Differences in the progress of clinical application were reported. From a quality cycle perspective, most of the units (12) were in the planning phase of changing practice, while 8 units had implemented a guideline. Four units had come so long that they were evaluating nursing practices against the guidelines.

The extent of utilisation was dichotomised (no-little vs. some-very large). Four independent variables significantly increased the likelihood of using the guidelines: (1) still using DySSSy as a QI method (OR 87.3), (2) four or more years of experience as a nurse manager (OR 33.2), (3) experience of nursing research at the unit (OR 30.7) and (4) the nurse manager’s estimation of sufficient staff resources for delivering a high standard of care (OR 56.7).

Units that had both an assistant nurse manager and a nurse manager employed were more likely to have used the guidelines as the basis for changing clinical practice. Units without an assistant manager mainly used the guidelines as educational material.
Some aspects of guideline utilisation
Almost all nurse managers viewed the guidelines as very useful and most of the 13 guidelines were used in clinical practice. Seventy-two QI projects were reported, of which 51 (71%) concerned topics specifically covered in the guidelines. The most frequently applied guidelines focused on family-centred care, breastfeeding and pain management. Difficulties with implementation were described in terms of shortage of time and organisational problems as an effect of cutbacks and restructuring. Sixty-three percent of the nurse managers viewed time constraints as a problem for guideline utilisation. No significant differences were apparent between units with low or high estimates of time constraints in relation to guideline utilisation. Three units reported improved patient outcomes related to guideline application.

Study 2 – quality improvement in the clinical setting
Changing clinical practice is obviously not a simple and straightforward task. An opportunity to study this problem emerged in a follow-up of nurses who had participated in the described basic training courses in QI. A natural experiment evolved as the nurses were exposed to different contextual conditions for their subsequent involvement in QI work (audit). One group participated in the neonatal nursing guideline project (TI group). The other nurses had no national context for their QI activity (GE group). Relying on the basic training, these nurses had to manage QI with available support at their units.

Progression of QI work
When comparing the groups, the nurses in the TI group completed the audit process significantly more often. Throughout all phases, the TI nurses made greater progress in implementing change in clinical practice (Figure 2). The four-stage cycle typically took 1-2 years to complete. Further in the analysis the 4 stages were dichotomised (plan/do vs. study/act) to make the differences in audit progress clearer: The results from this analysis showed that 63.1% of the nurses in TI group and 27% of the nurses in GE group completed the measuring or taking action phases

Data were collected on background variables concerning the current conditions for working with QI at the time of the survey. Logistic regression was used to test the relation between the nurses’ level of progress in QI (dichotomised plan/do vs. study/act) to the independent variable (TI vs. GE group) and background variables. Only the independent variable was
significant, indicating that the targeted intervention accounted for the differences in progress of QI (OR 4.3).

Figure 2. Comparing nurses in the target intervention group vs. generic education group on progress in QI work. The level of progress is “backwards” accumulated.

Table 1. Reasons reported for continuing or discontinuing QI. Each nurse could report more than one reason. In total, 292 reasons were reported.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Target intervention group</th>
<th>Generic education group</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuing QI/audit</td>
<td>(n=25)</td>
<td>(n=21)</td>
<td></td>
</tr>
<tr>
<td>Enhancing knowledge</td>
<td>25</td>
<td>18</td>
<td>93.5</td>
</tr>
<tr>
<td>Influencing clinical practice</td>
<td>23</td>
<td>19</td>
<td>91.3</td>
</tr>
<tr>
<td>Develop as a nurse</td>
<td>17</td>
<td>12</td>
<td>63.0</td>
</tr>
<tr>
<td>Support from management</td>
<td>12</td>
<td>5</td>
<td>39.5</td>
</tr>
<tr>
<td>Support from colleagues</td>
<td>5</td>
<td>5</td>
<td>21.7</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>11</td>
<td>26.1</td>
</tr>
<tr>
<td>Discontinuing QI/audit</td>
<td>(n=40)</td>
<td>(n=32)</td>
<td></td>
</tr>
<tr>
<td>Reorganisation, new structure</td>
<td>14</td>
<td>11</td>
<td>34.7</td>
</tr>
<tr>
<td>Lack of facilitation and knowledge</td>
<td>5</td>
<td>16</td>
<td>29.2</td>
</tr>
<tr>
<td>Leaving workplace</td>
<td>8</td>
<td>11</td>
<td>26.4</td>
</tr>
<tr>
<td>Lack of support from colleagues</td>
<td>6</td>
<td>10</td>
<td>22.2</td>
</tr>
<tr>
<td>Other projects for practice development</td>
<td>5</td>
<td>10</td>
<td>20.8</td>
</tr>
<tr>
<td>Personal education</td>
<td>10</td>
<td>3</td>
<td>18.1</td>
</tr>
<tr>
<td>Lack of support from management</td>
<td>3</td>
<td>10</td>
<td>18.1</td>
</tr>
<tr>
<td>On leave</td>
<td>10</td>
<td>1</td>
<td>15.3</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>1</td>
<td>8.3</td>
</tr>
</tbody>
</table>
Continuation in QI
The respondents were asked at the time of the survey, i.e. 4 years after the basic training courses, if they were still actively involved in QI-related activities. Of 119 nurses, 46 (39.0%) had continued with audit. There was no difference between the two groups, with 38.5% of the nurses in TI group and 39.6% of the nurses in the GE group still working in QI projects.

Facilitating factors and constraints on sustainability in QI
The relation between continuing vs. discontinuing to work with audit and five selected background variables were analysed using logistic regression. Three factors were significantly related to sustained involvement in audit: (1) the nurse remaining employed on the same unit (OR 11.3), (2) the nurse taking courses in nursing research (OR 4.1) and (3) maintenance of the same QI model as in the training courses at the unit level (OR 3.1).

Furthermore, all the respondents were asked to state their reasons for continuing or discontinuing their involvement in QI. The motives reported are displayed in Table 1.

Study 3 – sustainability and research utilisation
Taking into account the obstacles often appearing when changing clinical practice and that change takes time, sustainability seemed to be a matter of interest. The knowledge on factors that promote individual sustainability in improving practice was scarce, however. With the results from Study 2 as the point of departure, factors related to research utilisation were explored. The nurses who continued to work in QI teams (QI+) and those who discontinued (QI-) were examined on attitudes to and application of evidence-based nursing care, and if specific contextual factors were related to the prolonged involvement in QI work.

Activities related to research
The most frequently reported activities concerned the implementation of research into clinical practice. A majority of nurses indicated that they read research reports in professional journals. Over half of the nurses reported that they discussed research findings with colleagues at their department and almost 25% reported discussing research findings with colleagues at other departments. Concerning the central issue of direct utilisation of research, there was a significant difference between the QI-sustainable nurses and the others, where 46% of the QI nurses implemented specific research findings
in practice compared with 16% of the QI\textsuperscript{n} nurses. There was also a tendency to a difference between the QI\textsuperscript{+} and QI\textsuperscript{n} nurses in discussing research findings with department colleagues (Table 2). Measured with a visual analogue scale, the QI\textsuperscript{n} nurses reported significantly more activity in seeking new research literature than the QI\textsuperscript{n} nurses.

Only a minority of the nurses were involved in conducting research which was the theme for most of the items about participation in research-related activities. Significantly more of the QI\textsuperscript{+} nurses had experience of designing a research project with the assistance of a researcher. There was also a tendency for the groups to differ on assisting with research undertaken by other professional groups and analysing research data (Table 2).

**Table 2. Comparison between the nurses who continued with QI work and those who discontinued regarding participation in research-related activities**

<table>
<thead>
<tr>
<th></th>
<th>Continued QI work (n=46)</th>
<th>Discontinued QI work (n=72)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading research projects in professional journals</td>
<td>79</td>
<td>67</td>
<td>-</td>
</tr>
<tr>
<td>Discussing research findings with professional colleagues at your own department</td>
<td>67</td>
<td>46</td>
<td>*</td>
</tr>
<tr>
<td>Implementing specific research findings in practice</td>
<td>46</td>
<td>16</td>
<td>**</td>
</tr>
<tr>
<td>Assisting with research undertaken by other professional groups</td>
<td>33</td>
<td>17</td>
<td>*</td>
</tr>
<tr>
<td>Discussing research findings with professional colleagues at other departments</td>
<td>32</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>Assisting with research undertaken by your professional colleagues</td>
<td>25</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td>Analysing research data</td>
<td>25</td>
<td>9</td>
<td>*</td>
</tr>
<tr>
<td>Designing a research project with the assistance of a researcher</td>
<td>17</td>
<td>2</td>
<td>**</td>
</tr>
<tr>
<td>Implementing a research project by yourself</td>
<td>12</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Developing and testing a research instrument</td>
<td>11</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Preparing a report on research findings</td>
<td>10</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

* $p<0.05$, ** $p<0.01$
Available research-related resources

Most nurses in both groups reported that they had access to a library of current journals and books. A majority of them also had access to the Internet and availability of support from a librarian in literature search. For many of the other research-related resources significant differences were noted between the nurses who continued the QI work and those who did not. The QI nurses were more likely to engage in consultation with a skilled researcher and in statistical support. The better contextual conditions for the QI nurses were further revealed as there was a tendency for the groups to differ on secretarial services to assist research activities as well as on resources within the wider health care organisation (e.g., the occurrence of a research and development strategy, research assistant staff and a research committee). There were no differences between the groups regarding the resource time (possibilities to attend research conferences and conducting research during work hours).

Table 3. Indices for attitudes to research, opinions about availability of research and implementation support, and ratings of own research utilisation in clinical practice

<table>
<thead>
<tr>
<th></th>
<th>Mean value ± SD</th>
<th>Continued QI work</th>
<th>Discontinued QI work</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes to research (12 items)</td>
<td>1.93 ± 0.64</td>
<td>2.11 ± 0.57</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Opinions about availability of research and support for implementation of research findings (8 items)</td>
<td>2.21 ± 0.59</td>
<td>2.57 ± 0.66</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Ratings of own research utilisation in clinical practice (9 items)</td>
<td>2.67 ± 0.87</td>
<td>2.94 ± 0.75</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

*The items in each index employed a 5-point Likert scale (1=strongly agree, 5=strongly disagree)

** p<0.01

Research utilisation indices

The respondents’ attitudes to research, availability of research and support for implementation of research findings and their own research utilisation in daily practice were captured in three indices (Table 3). Most respondents were positive to research in general, but with a slightly less positive attitude to the items that considered research related to their own practice. Rating examples: 84% of the nurses agreed to the statement research is
understandable, 66% to I want to base my practice on research and 12% to research is a dull, boring subject.

Concerning the availability and support index, 70% of the nurses agreed to the statement I have access to research findings where I work, 65% to the chief executive supports the utilisation of research and 35% to I have time to read about research while I am on duty. There were significantly more of the QI nurses than of the QI nurses that agreed to the first two statements and a significant difference was also found between the two groups on the whole index.

In the index on own research utilisation 62% of the nurses agreed to the statement I apply research results to my own practice, 46% to I base my practice on research and 49% to I seek research related to my clinical practice. Significantly more of the QI nurses agreed to the third statement.

Factors affecting research utilisation

The nurses in both groups made similar ratings on factors that would make research more useful and understandable for them. Involvement in professional research projects had the highest ranking, followed by exploring how research findings can be used in clinical settings and learning to analyse research. Among factors obstructing research utilisation time limitations were ranked as the most important, followed by insufficient staff resources and workload pressures. Concerning factors that would support research uptake, two statements were ranked equally high: dedicated time in the working week for research activities and frequent education sessions on the utilisation of research findings.

Study 4 – contextual variables and organisational improvement

The results of the three previous studies pointed to the importance of a supportive environment for achieving success when implementing change. This fourth study was aimed at better understanding the factors that facilitate organisational improvement, which likely leads to better conditions for putting evidence into practice. Using staff data from a separate multi-site study on implementation of neonatal nursing guidelines revealed the course over time for organisational and staff well-being and predictors to specific environmental factors.
Stability of work context factors 2001 versus 2002

Based on aggregated data, Figure 3 depicts an overview of the enhancement indices during the one-year study period. The overall score for organisational and staff well-being (DFS) was 71.2% in 2001 and 69.8% in 2002. No significant change was observed between the two measurement periods in any of the enhancement indices.

When comparing the outcomes for 2001 and 2002 within each unit, the enhancement indices also tended to be relatively stable. Of 44 possible scales (4x10 and 4xDFS) significant differences were noted in five. At unit A, there were no differences on any of the scales; unit B showed significant increases on skills development and goal quality; unit C had a significant increase on work climate; and at unit D, there were significant decreases on participatory management and work climate. Further, significant differences between the units concerning changes in indices over time were revealed for 3 of the 10 enhancement indices: work climate (units B and C increased more than unit D); skills development (unit B increased more than unit D); and work tempo (unit C decreased more than unit A).

Predictors of staff and organisational well-being

In order to understand the relative impact of differences over time a series of multiple regression analyses was performed, using the delta values for each index and background variables as the independent variables. In the first analysis, the DFS in 2002 served as the dependent variable. Three significant predictors were identified, namely changes in skills development and participatory management and the variable years of professional experience.

In the next step, predictors of changes of mental energy, organisational efficacy and leadership were explored. Leadership was found to be a significant predictor of the course of mental energy, skills development and age predicted organisational efficacy, and skills development and performance feedback predicted leadership.

Because skills development was the most important factor for DFS 2002 and for leadership and organisational efficacy ratings, skills development was set as the dependent variable in the next analysis. The analysis identified three significant predictors: participatory management, performance feedback and unit (Table 4).

Further, the course of each index from 2001 to 2002 was transformed into either deterioration (difference ≤0) or improvement (difference >0) and applied as dichotomous variables employed in subsequent logistic regression analyses for the estimation of odds ratio (OR) for improvements in selected factors. The results showed an OR of 2.2 for mental energy when leadership improved and an OR of 2.7 for organisational efficacy when skills
development improved. Further, leadership showed an OR of 7.8 when skills development improved and an OR of 2.7 when performance feedback improved. Finally, skills development had an OR of 5.2 when participatory management improved.

Figure 3. Overview of the results of each index for data collection in 2001 and 2002

Target levels
Acceptable outcomes should be at or above target levels, with the exception for Work-related exhaustion, where it should be below 30%, and Work tempo where it should be between 32-37%. Outcomes between 60 and 70% constitute a “comfort zone” for Dynamic focus score.
Table 4. Multiple regression analyses: predicting organisational and staff well-being based on changes in QWC outcomes between 2001 and 2002

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Step</th>
<th>Independent variables</th>
<th>Beta coefficient</th>
<th>t-value</th>
<th>p-value</th>
<th>Adjusted $r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus Score 2002</td>
<td>1</td>
<td>Skills development</td>
<td>0.266</td>
<td>1.552</td>
<td>0.045</td>
<td>0.295</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Years of professional experience</td>
<td>0.294</td>
<td>2.877</td>
<td>0.006</td>
<td>0.063</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Participatory management</td>
<td>0.356</td>
<td>2.806</td>
<td>0.007</td>
<td>0.070</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjusted $r^2$ = 0.428</td>
<td></td>
<td>F=7.87</td>
<td>df=1, 55</td>
<td>p=0.007</td>
</tr>
<tr>
<td>Mental energy</td>
<td>1</td>
<td>Leadership</td>
<td>0.276</td>
<td>2.164</td>
<td>0.035</td>
<td>0.060</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjusted $r^2$ = 0.06</td>
<td></td>
<td>F=4.68</td>
<td>df=1, 57</td>
<td>p=0.035</td>
</tr>
<tr>
<td>Organisational efficacy</td>
<td>1</td>
<td>Skills development</td>
<td>0.385</td>
<td>3.272</td>
<td>0.002</td>
<td>0.162</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Age</td>
<td>0.255</td>
<td>2.165</td>
<td>0.035</td>
<td>0.051</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjusted $r^2$ = 0.213</td>
<td></td>
<td>F=4.69</td>
<td>df=1, 56</td>
<td>p=0.035</td>
</tr>
<tr>
<td>Leadership</td>
<td>1</td>
<td>Skills development</td>
<td>0.418</td>
<td>3.535</td>
<td>0.001</td>
<td>0.314</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Performance feedback</td>
<td>0.313</td>
<td>2.645</td>
<td>0.011</td>
<td>0.065</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjusted $r^2$ = 0.379</td>
<td></td>
<td>F=7.00</td>
<td>df=1, 56</td>
<td>p=0.011</td>
</tr>
<tr>
<td>Skills development</td>
<td>1</td>
<td>Participatory management</td>
<td>0.420</td>
<td>4.699</td>
<td>0.001</td>
<td>0.281</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Performance feedback</td>
<td>0.225</td>
<td>2.850</td>
<td>0.005</td>
<td>0.060</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Unit</td>
<td>-0.179</td>
<td>-2.12</td>
<td>0.036</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjusted $r^2$ = 0.366</td>
<td></td>
<td>F=4.532</td>
<td>df=1, 89</td>
<td>p=0.036</td>
</tr>
</tbody>
</table>

Commitment to improving care and work environment

The mean value for the additional index in the 2002 measurement period was 64.9% and there was a significant difference between the units (the staff at unit B rated this aspect of work environment higher than the staff at the other units). The index was used as a dependent variable and tested in a multiple regression analysis as described above. Two significant predictors were identified. Changes in work tempo and work-related exhaustion accounted for 24.2% of the total variance, indicating the higher the work tempo and work-related exhaustion, the lower the commitment for change and improvement.
Assessment of change: composite questionnaire versus single item

To get a view of the respondents’ perceptions of change they were asked to disagree or agree to the statement, “work environment has improved.” The distribution of the answers was dichotomised and tested against the units. The analysis revealed a significant difference, indicating a deteriorated work environment in units A and D, an improved work environment in unit B and unchanged in unit C.

The dichotomised distribution of answers of all respondents was used as a grouping variable and tested against the DFS delta value, showing a significant difference between the disagreeing and agreeing group. The distribution on disagreeing/agreeing was further tested against the delta values for separate indices, indicating significant differences concerning: skills development, organisational efficacy, work tempo and leadership. The delta values of these four indices and DFS were significantly lower in the disagreeing group as compared with the agreeing group.
Discussion

The overarching questions of this thesis concerned the need of increased knowledge in order to enhance the implementation of research findings in clinical practice. To reach a more evidence-based nursing care it is necessary to gain a fuller understanding of the components of knowledge utilisation. The present studies generated several findings of interest for this inquiry, which are discussed in the following section.

No guarantee for guideline implementation

Although many of the guidelines were applied and perceived to be useful, it is obvious that several managers reported limited use of the guidelines. One third of the units used them as educational material. That sounds appropriate, but traditional education as a sole activity does not appear to be an effective method for changing clinical practice [15, 127]. Only 8 units had implemented a guideline and just 4 of these 8 units had collected data in order to evaluate clinical practice. This lack of follow-up is an area of concern in that completion of the change process, through evaluating practice, is important for learning and to ensure that clinical practice reflects guideline recommendations [94]. An evaluative culture is suggested to be a basic component of an environment open for implementing new knowledge [16, 124].

The neonatal guidelines were disseminated and presented at a conference and in the paediatric nurse’s professional journal. Implementation support was however, not a part of the project. It was assumed that the collaborative design of the development of the guidelines would enhance utilisation. This assumption seems to have been inappropriate. Practitioner involvement in development enhanced awareness about the guidelines [93], but did not guarantee implementation, which also has been reported in other studies [94]. One possible explanation for these implementation problems could be a perceived problem with the adequacy or validity of the guidelines [101]. This is, however, unlikely as most of the nurse managers reported the guidelines to be pertinent and suitable for use. Rather, the results require consideration of influencing factors in a broader context.
Although the guidelines seemed to be under utilised in general, some of them were more frequently applied than others, especially the guidelines on family-centred care, breastfeeding and pain management. Reasons for the “popularity” must be speculative. They may reflect the core elements in neonatal nursing care and were, therefore, prioritised and put into practice more promptly. These guidelines may also deal with clinical areas in which nurses have a high degree of autonomy and are able to implement changes independent of other professionals. A noteworthy observation is that the most frequently applied guidelines covered areas with recent publications of Swedish nursing researcher [112, 116, 117, 119].

**Improvement work during guideline development**

This limited extent of guideline implementation proved to be a contrast to the success of neonatal teams in producing and implementing a standard of care during the period of guideline development, as reported in Study 2. The progress of clinical audit was highly variable among the nurses in the two groups in that study, which is consistent with other studies [58-61]. The nurses from the national project (TI group) completed all phases of audit to a significantly higher degree. A 45% completion of the quality cycle is comparable or higher than that reported in other studies [53, 54, 61, 150]. Three components of the intervention appear particularly important in relation to the results: common focus for improvement, networking and facilitation.

**Common focus for improvement**

The collaborative context of the national project served as a powerful impetus for audit performance at the local level. The nurses in the TI group were from the same speciality and had colleagues throughout the country striving for a common objective. The selection of topics, the ownership, the national status, the goal-orientation and high motivation were prominent features of the guideline project, which also were found to be key factors in other studies [37, 44, 48, 57]. The nurses in the GE group were more heterogeneous and lacked this kind of overall plan. Furthermore, the local context was probably more supportive for the neonatal nurses in that both the nursing and medical managers were requested to facilitate their unit's contribution to the national project. The importance of leadership’s promotion of action is emphasised in several reports [44, 55, 151].
Networking
The nurses leading the groups at each unit met at 4 common meetings during the project (2 each year). There were good opportunities for networking and learning from each other on these occasions. One of the meetings was topic-focused and an expert in each field of interest (mostly a nurse researcher) participated. Networking developed between several of the participants working with similar topics. In contrast, the GE nurses had no network for collaboration. Benefits, such as improved patient outcomes and cost savings, are reported from collaborative approaches to QI (e.g., “the breakthrough series” [152] and in neonatal intensive care [153]). However, collaboration does not provide an automatic route to success: the diversity of sites involved and the necessity of making realistic improvement projects can make it hard to generalise and learn from each other [154].

Facilitation
The tailored approach and the intensity in interaction between the facilitator and local teams suggest that the facilitation provided to the intervention group contributed to the better progress in QI work for the neonatal nurses. Many reports highlight the need of appropriate facilitation for learning and development; insufficient support and expertise have been identified as major constraints on progress. Process-oriented support, which is often directed to the whole QI team, is vital for altering clinical practice [16, 44, 58, 60, 126, 151, 155-157]. For a 2-year period, facilitation was available in the project. The support was tailored to the specific needs of the nurses in the TI group in producing, implementing and evaluating a standard of care [56, 126, 151]. Because researchers were involved in the project, the teams were provided with expert knowledge in most of the topics covered. The facilitation was given in different ways, mainly through personal contacts on phone and fax between the project leader and the unit-based group leader. It covered such issues as group dynamics, appraisal of evidence, reviewing team-produced standards, measures, data collection, analysing results and composing reports.

Sustainability in changing clinical practice
Thirty-nine percent of all the nurses sustained an involvement in QI activity during the 4 years from the training courses to the time of the survey in 1998 (Figure 1). The guideline project terminated 2 years earlier. Access to networking and external facilitation was thus similar in the GE and TI groups. Better progress in accomplished QI projects was obviously not an
advantage for sustaining involvement in improvement work. There is a lack of relevant comparative material to judge expected sustainability in working with QI. A diminishing involvement can be expected. From the guideline implementation study there is information that QI activities were taking place at 69% of the units where TI nurses were employed. Engagement may have been spread to other colleagues. Team-based activities, including those involved in applying the DySSSy method, could also have moved on to models of QI that are more organisationally directed. The TQM approach became relatively widespread in Sweden during the end of the 1990s.

Sustainability linked to research utilisation

Using the results concerning sustained involvement in QI, factors related to research utilisation were explored in Study 3. The nurses who continued to work in QI teams (QI+ nurses) and those who discontinued (QI− nurses) were compared on attitudes to and application of evidence-based nursing care, and if specific contextual factors were related to the prolonged involvement in QI work.

The nurses had generally positive attitudes to research. There was no difference between QI+ nurses and QI− nurses on any of these items. These positive viewpoints are consistent with several studies [78, 81, 82, 84, 143, 158]. Some caution in the interpretation must be noted, however. The probability for social desirable answers can be considered high in the current evidence-based era. Moreover, there are still many steps that need to be taken to transform these thoughts and attitudes into action, which is reflected in the fact that a rather high proportion of the nurses used research findings in clinical practice only sparingly. Such a phenomenon is also found in other studies [81, 159]. This finding is in contrast to those that have claimed that attitude is a powerful predictor of utilisation [78, 158, 160]. I believe, in accordance with Parahoo [81] and Veeramah [159], that a positive attitude is a necessary but insufficient condition for managing the implementation of research in daily practice. The findings in Study 3 strongly support this standpoint. Although there was no difference in attitudes between the two groups of nurses, the results indicated that QI+ nurses were more active in searching (66% vs. 39%) and implementing (46% vs. 16%) research relevant for their clinical practice. The prolonged QI work can, in itself, be an explanation to account for this difference. The noted difference in organisational support, as discussed below, is another.

There were no differences in resources on access to library and the Internet in the QI+ nurses and QI− nurses reports. Regarding factors with a more “human” emphasis, the QI+ nurses reported greater access to consultation of a skilled researcher and statistical support as compared with
the QI nurses. Some other factors having this “human” quality approached significant difference. Access to individuals that have facilitative functions seems to be of considerable importance. It should also be observed that lack of facilitation and knowledge was reported as the second major reason for nurses discontinuing QI. In the RU literature the need of positions in clinical practice for nursing researchers is emphasised. Such positions (change agents/facilitators) should make a platform for performing research and for promoting a research-based nursing practice [27, 30, 78, 161].

Factors of importance for guideline implementation, quality improvement, research utilisation and organisational improvement

The fourth study differed from the other three in design and in the absolute focus on organisational factors. The use of individually matched data offered an opportunity to study the course of organisational and staff well-being, as well as for identifying predictors to key contextual factors.

With aggregated data for all four units, there were no statistically significant differences in the various indices over the one-year period. Thus, it can be concluded that there were limited changes on staff perceptions of contextual factors over time, presumably a manifestation of a relatively stable period. In some cases, factors at the various units did show measurable changes over the study period, which made it possible to identify predictors to the overall outcome (DFS), and to some specific environmental factors. These findings and factors identified in the other studies are discussed further on in this section.

Restructuring

Reorganisations and cutbacks were explicitly reported as obstacles to implementation of the guidelines. Our findings indicate that the motivation among staff and the possibilities for managers to initiate and support implementation processes were affected. The impact of guidelines in a constrained economy has been questioned [162]. Compliance with guidelines may demand extra resources or acquisition of new knowledge and skills [101]. Because such changes often concern large groups of staff and may require complex interventions, attempts at improving nursing care may be more vulnerable to financial restrictions. Conversely, it is suggested that short-term investment produce a longer-term gain by reducing cost-ineffective variations in care [21].
How then were the financial conditions in Swedish healthcare during the time for neonatal guideline dissemination? Between 1990 and 1995 the number of hospital beds was reduced by 28% and health care personnel by 27% [163]. Furthermore, health care expenditure as a percentage of the gross national product decreased during these years from 8.6% to 7.2% [164]. This general downsizing had delayed consequences for neonatal care, with three neonatal units closing down in 1997 and major restructuring measures taking place during the second half of the 1990s. These changes made an impact on the results of Study 2, where reorganisations topped the list over the nurses’ reasons for discontinuing their involvement in QI work.

**Impact of downsizing on organisational factors**

Studies published between 1994 and 1999 in Sweden reflect a pattern of deterioration in work environment, presumably because of increased discrepancies between work demands and resources. One study using the same instrument as in Study 4 showed significant deterioration in most indices [132]. Another study revealed several significant changes over time, including increased workload and a decrease in mental energy [4]. An additional study identified an association between staff opinion on decreased patient care quality and substantially lower scoring on all counts of organisational well-being [3]. Using another method [137] and in another part of Sweden, personnel reported significantly lower job satisfaction, increased risk of burnout, worsened patient care quality and reduced experiences of creative and innovative working climate [131]. In contrast, the results in Study 4, i.e. some years later, do not indicate a poorer working environment over time. The findings of Study 4 suggest instead more of a steady state from 2001 to 2002, and for half of the indices, better outcomes than target levels were noted. However, it would be premature to draw any firm conclusion that the result reflects a trend break from the 1990 studies. Rather, the findings may point to benefits of specialisation in health care, which is suggested to be a major contributor to nurse job satisfaction [165].

**Staff health, time constraints and prospects of improvement**

An important outcome in Study 4 on the relation between organisational performance and staff health was that decreases in *work tempo* and *work-related exhaustion* predicted higher commitment to improving *care and work environment*. The comments from nurse managers in Study 1 reflected time constraints as an important cause of not implementing more of the guidelines. In Study 3 *time limitations* were ranked as the most obstructive factor for RU. These findings support the common view that work overload is contra productive to improvement [4, 44, 51, 56, 57, 60, 61, 131] and in the utilisation of research [29, 82, 83, 85, 86, 143, 159, 166]. Today’s health
care organisations put extensive strain on both managers and staff. Recent reports suggest that high levels of burnout and increased workload for nurses may have negative consequences regarding prospects of organisational and care improvement [5, 6, 121].

Time is obviously a limited resource for the nurse manager and the practising nurse. However, time is a factor that cannot be easily interpreted. In Study 1 no significant differences were apparent between units with low or high estimates of time constraints in relation to guideline utilisation. In Study 3 no differences were found between the QI continuing/discontinuing groups’ ratings on time as a resource. These findings may send a warning for those who assert categorically that time is the primary barrier for changing practice. Giving prominence to time constraints can have underlying meanings. Lack of time is a socially accepted explanation, although it may reflect lack of interest, lack of need or lack of knowledge [167].

Leadership

Leadership issues are closely related to organisational change and improvement in care. The need of a strategic and committed leadership for achieving success in RU and QI has nearly taken the status of an axiom in the literature [16, 26, 28, 29, 37, 44, 55, 57, 85]. The relevance of committed leadership is also reflected in all four studies in this thesis. Findings in Study 1, in which associations between leadership attributes and guideline utilisation were noted, point to the importance of resources and knowledge at the management level for initiating changes of care. In Study 2 leadership support was reported as an important reason for continuing QI work, however, leadership was rated lower than the benefits of professional development. In Study 3 the pattern of more supportive conditions for the QI+nurses also was present regarding leadership. The QI+nurses reported a higher degree of support from their chief executive concerning utilisation of research. Although leadership constitutes a crucial component for developing nursing care and getting evidence into practice, it is an issue that has received less attention, at least in Swedish research. A recent published thesis in Sweden focused on nursing management, but primarily on the organisational levels above the unit level [168]. The role of the nurse manager at the unit level has changed radically during the past 10-15 years. Management decentralisation has, in my experience, made staff administration and economic issues so extensive that they have become a serious burden for nurse managers at the unit level. To take the lead for quality patient care is one responsibility among many others and, as administrative routines has become more dominating, not always the one
with highest priority. Policy and management philosophies, more than empirical investigations, seem to have been the influencing factors for this course of development.

**Participatory management**

One aspect of practising leadership is the space given to staff to participate in the development of the workplace. The second factor of importance for the overall level of organisational and staff well-being in study 4 was *participatory management*, which also was the single most contributing factor to improvements in *skills development*. Wagner defined participation as “a process in which influence is shared among individuals who are otherwise hierarchical unequals” [p.312, 169]. He further claimed that participation has a significant positive effect on job performance and job satisfaction. Engagement in work decisions, informal participation and employee ownership are suggested to be effective forms of participation [170]. Participation, in the form of an interdependent relation between employees and managers, is also a hallmark of a learning organisation. Senge considers that employees enhance their participation in organisational endeavours when they feel valued and are given choices [171]. Staff ownership is described as a key factor in implementing change in clinical practice [37], which is a view consistent with the present findings.

**Sparse guidance for leadership**

To my knowledge, there is not much research evaluating different leadership styles or tests of leadership initiatives aimed to improve the organisations ability to deliver high standard care. Despite that, some authors argue for a transformational leadership style. Transformational leaders are described as those who (a) create a culture that recognises everybody as a leader of something, (b) motivate and enable employees to pursue high standards and long-term goals and (c) develop team building, trust and open communication [124, 172]. Reviewing the literature on occupational stress, Clegg claimed that a transformational leadership style is related to reduced levels of stress [173]. A Swedish study proposed that nurse managers with a clear leadership style experience fewer management problems compared with those with a composite leadership style [174]. A more operative guidance for unit nurse managers seems to be sparse. Results from Study 4, however, indicate specific initiatives that leadership can implement in order to improve the work conditions, even in times of increased competition and structural changes.
Professional development and learning

In Study 4 skills development was the major factor for explaining the variance in overall organisational and staff well-being and in accounting for the changes in organisational efficacy and leadership. The odds ratios of 2.7 and 7.8 for organisational efficacy and leadership, respectively, indicate a considerable potential of organisational improvement through developing learning opportunities.

Skills development reflects learning, freedom, utilisation and authority in relation to professional performance, factors that are recognised as being important in developing as a professional. The findings connect to Senge’s widespread view of a learning organisation, in which he claims that the organisational learning is based on the learning and development of individuals [171]. Organisational learning further refers to the “Plan-Do-Study-Learn” cycle [38], which is extensively used as a model for staff involvement in changing clinical practice. To create a learning environment there is also a need for strong elements of feedback within the organisation. The association between skills development and performance feedback in Study 4 confirms this view. This point has been emphasised by Rycroft-Malone and co-workers in their claim that evaluation is a necessary attribute of an organisation open to implement change [16]. There must also be a climate of boldness within the organisation if change is to take place.

A fine balancing act for a health care organisation is maintenance and refining of standardised routines at the same time as attitudes and structures encourage exploration and discovery [175]. It is a considerable challenge to attain such an objective. The evidence suggests the need to employ active learning tools, best captured in the problem-based learning approach [176]. The relation to health care outcomes of continuing education was investigated in a Cochrane review, which concluded that interactive workshops, but not regular didactic sessions, could result in moderately large changes in professional practice [127].

Referring to the utilisation and authority dimensions of skills development, professional autonomy over practice has been highlighted as a core feature of professional nursing practice [123, 136]. This aspect is presumably of major importance in a high-tech environment such as the neonatal intensive care setting. There has been a rapid development of the knowledge base in the neonatal area, where competence is highlighted and respected in a business in which there are small margins between success and failure.

In Study 2 the nurses reported their reasons for continuing or discontinuing their involvement in QI (Table 1). The predominant motives for continuing were fairly homogenous and reflected rewarding elements for the practitioners: enhancing knowledge, influencing practice and developing
as a professional. The findings indicate that improvement work hold empowering elements for the individual nurse. These findings are consistent with others [44, 50, 56] and correspond well with the principles of a learning organisation. Improvement work may also be an issue of power. Some British studies have shown that positive attitudes among nurses to audit tend to differ somewhat from the attitudes among physicians [58, 177]. QI may provide nurses an increased freedom of movement and an opportunity to influence changes in care, as suggested in a Swedish thesis [50]. In contrast, the medical profession has sometimes claimed that QI diminishes clinical freedom/ownership and is an obstacle to quality patient care [44]. This divided view is an area of great concern, as improvements of care are dependent on multi-professional collaboration. It is urgent to strive for professional concordance in the viewing of improvement work.

**Education in nursing research**

A factor of importance for changing clinical practice is the general level of nurses’ education, or more exactly, if nurses have passed courses in nursing research, which is not so obvious if the basic training to become a nurse was more than 10 years in the past. The link between such an educational background and knowledge utilisation is revealed in this thesis. In Study 1 an association was found between guideline implementation and experiences of nursing research at the unit. In Study 2 courses in nursing research were significantly related to continued QI involvement. In Study 3 the factors exploring how research findings can be used in clinical settings and learning to critique research were ranked high in order to understand and use research.

A relation between passing courses in nursing research and positive attitudes to research has been observed in several studies [78, 81, 82, 158, 178, 179], of which only two, however, have detected a link between research courses and research utilisation [81, 158]. Whether it is the case that individuals want to learn more when they are involved in improvement work, or whether they begin to change their clinical practice when they acquire more knowledge is hard to say. In either case, this relationship merits further investigation in terms of achieving knowledge utilisation in practice. It seems also important to encourage nursing students’ interest in specific research areas during their training, in that such an interest recently has been shown to be the most important variable for students’ attitudes to research and the expected future use of research [88].
Models for changing clinical practice

Many professionals have experienced change projects failing because team members become mentally drained and thus unable to continue their improvement work, also suggested as a negative impact of QI [43]. One reason for the hardship of implementing research findings is that it often is a question of altering behaviour (literally changing practice), which is more demanding than merely expanding knowledge. The challenge with lifelong learning, the consequence of practising evidence-based care, is being able to cope with change. Change has to be seen as an integral component of daily work. In most organisations it is necessary to view the implementation of new knowledge as an organisational process, rather than as an activity that is solely undertaken by the individual practitioner [26, 27, 29, 32, 37, 83, 90]. It “... requires the understanding that apparently simple and straightforward changes are set within a complex chain of interdependent units that may block progress” [p.6, 180]. It takes time, and time must be dedicated for this purpose. There may also be a need of a guiding model for the process of change.

In the guideline development project we used the DySSSy method in order to have a uniform working process at involved units and for achieving a standardised format on the contributions to the guidelines. At that time, DySSSy was the method for QI in nursing. Today, 10 years later there are a great number of models to use. It is hard to grasp all approaches, but one can assume that the basic idea and working process are rather similar among the models. I am not totally convinced it is a sign of progress to have a new approach for improvement work almost every year. This is particularly true when evaluative studies and evidence on effectiveness are lacking. Rather, there is a risk of confusion [44, 57] and that improvement work is losing in importance when QI turns into a market place for consultants and advisers instead of being a professional concern. In my view, the “Plan-Do-Study-Learn” cycle represents a basic, simple and straightforward model, one that is excellent to use in improvement projects. It is well suited to be combined with the 5-step process of evidence-based care [34]. A tendency to model affluence can be noticed in the literature on RU [23, 25, 73, 74, 161, 181]. However, it is not that visible in Swedish healthcare settings relative to all the QI models.

Some of the problems with changing tools for improvement work were noted in this thesis. In Study 1 an association was found between maintaining the use of method for guideline development and guideline implementation, i.e. when the current method for improvement was congruent with the guideline format, guidelines were used more often. In Study 2 the maintenance of the DySSSy method was one factor related to sustained involvement in QI. I do not believe that the DySSSy method in
itself explains these outcomes. Rather, the findings indicate the importance of maintaining a consistent approach to QI. Also others have advocated for perseverance in order to make the chosen method work well [182]. However, Grol has claimed that there are benefits in integrating elements and build upon different approaches to improvement [35]. This view is easy to sympathize with, but to be operative it probably requires considerable experience and skills in improvement work.

**Promoting action on research implementation in health services**

In 1998 Kitson and co-workers criticised current conceptual implementation models. They argued that, despite growing awareness of the complex and messy character of implementing research into practice, the models still tended to be unidimensional, suggesting linearity and logic that do not exist in reality [151]. Instead, these authors proposed a conceptual framework that accentuated the interplay and interdependency of several factors influencing the uptake of research findings into practice, called the Promoting Action on Research Implementation in Health Services (PARISH). The framework consists of three major components. There has to be a clear understanding of: (1) the nature of evidence being used (research, clinical experiences and patient preferences), (2) the quality of context in terms of its ability to cope with change, and (3) the type of facilitation needed to ensure a successful change process. Details of the model have been refined in a recent publication [16].

This framework has been very useful as a tool for reflecting on the outcomes of the studies in this thesis. The attraction lies in that the authors are not prescribing how the process of change should be carried out. The highlighting of major ingredients to consider in the implementation of research and their relative importance in various clinical situations seems to me to be a much more helpful and intellectually stimulating approach for guiding the endeavours of improving clinical practice. However, an area not illuminated in the PARISH framework is the prerequisites at the individual staff level. Based on the studies in this thesis, especially the findings on motives for continuing improvement work, nurses’ educational background and the importance of staff health for being successful in changing clinical practice, I propose a wider perspective for understanding the mechanisms of knowledge transfer. Further studies testing the framework and its ability to contribute in research uptake would be of great value.
Methodological considerations

An overall limitation of these four studies is the restricted focus on health care personnel when studying aspects of knowledge utilisation and organisational improvement. Staff members are an important target group in better understanding these issues. However, the significant outcome is at the patient level and the ultimate research questions consider how knowledge utilisation affects care processes and patient outcomes. Such study designs were not feasible in this thesis.

Another overall objection that could be raised is the fact that in Study 1-3 I was first involved as a project leader and later as a research leader evaluating parts of the project and the utilisation of the projects’ outcome. Respondents involved in the neonatal guideline project may have considered their answers in knowing that these would directly reach their former collaborator. This objection is hard to completely reject. However, the reports on relatively low guideline implementation do not point at any intentional inflation of the outcomes. The high frequency of reports on discontinuing QI work also indicates reliable answers. Furthermore, the risk for bias was reduced in that the respondents’ answers to the questionnaire items were confidential. The time passing from the guideline project to data collection may also have reduced the links between respondents and researcher.

Questionnaires

From a methodological point of view, the current studies may be biased in that the method of choice for the four papers was questionnaires. A greater methodological variety may have hold advantages, but seen from the research objectives, questionnaires were the logical method. This method also proved to be an informative source of data.

In Studies 1 and 2 the questionnaires were purposively developed for the studies. They were subject to face validation by two experienced researchers and tested on nurses with a corresponding background to the respondents in these studies. The questionnaires were not tested for reliability, however. Still, these questionnaires must be assessed as fit for use, not least by the amount of detailed questions.

In Studies 3 and 4 the questionnaires had been tested and used in several studies. They were judged as valid and reliable tools, especially the QWC instrument in Study 4, which had a solid base concerning the underlying theoretical framework and clinical tests in Swedish settings. However, although the questionnaire used in Study 3 was validly judged, there are some considerations. Several of the items focused on conducting research
rather than on research utilisation, which brings the instrument a bit out of the course of interest. Further, the multi-item construction within each section of the questionnaire brought the need of quite a number of statistical tests. To reduce the risk of making Type 1 errors, the significance level was set to 0.01.

Internal validity

All four studies reached high response rates, with the single exception in the GE group in Study 2 where the response rate was 64%. These response rates strengthen the internal validity of the studies.

In Study 1 the 15 months between the introduction of the guidelines and the follow-up study might have been too short an interval for a valid evaluation of the application, a longer interval may have shown greater use of the guidelines. On the other hand, it can be questioned if all the nurse managers responding were able to clearly separate the phases of developing and implementing the guidelines, leading to over reporting of guideline utilisation.

The natural experimental design, used in Study 2 has potential for bias at the same time as it benefits from being rooted in reality. The internal validity of this study was judged good enough for the following reasons. First, the two groups were sufficiently comparable as the level of education and number of years of professional experience were equal in the groups. Second, QI had not been an issue in basic professional training for any of the nurses. Third, all the nurses participated in uniformly designed training courses for similar reasons. They were sent to learn something new and returned to start a QI project. Fourth, the intervention group was not self-selected; rather, it consisted of nurses from all neonatal units in the country. Fifth, the training and the subsequent projects were performed during corresponding periods for the two groups, and therefore historical events should have influenced both groups. Sixth, the neonatal sector of health care was not exposed to any common quality initiative, except of the guideline project. Finally, the 64% response rate of nurses in the GE group could have been a misleading factor. However, the non-responding nurses were probably those who had less interest and experience of QI work. Thus, it is plausible that the differences between TI and GE groups may have been even greater if a higher response rate had been obtained.

As in Study 2, the internal validity of the comparative survey in Study 3 could be judged as good enough. The participants in the study were homogenous in basic background variables, suggesting that the risk for selection bias was low. The decision to exclude nurse managers at the departmental level was supported by the findings of Hatcher and Tranmer.
[160], who noted that senior and middle nurse managers scored significantly higher compared with staff nurses on the research utilisation index used in Study 3. However, studies in this field may have validity problems concerning the basic concept of RU [72]. It can have different meaning for different individuals, especially when viewing the concept as instrumental or conceptual. Such a problem in definition could have influenced the results.

Concerning Study 4, virtually all research in that area has reported either cross-sectional or aggregated department data. The employment of a longitudinal design at the individual level in one nursing care subspecialty gives the findings credibility in indicating areas with potential for improving working conditions and organisational performance. “History” was probably not a threat to internal validity in that there were no major changes in the involved health care organisations during the time of the study. Using a repeated measures design may result in the possibility of “testing” effects. The risk of that was reduced as a feedback element was purposely built into the study design by sending reports to involved nurse managers on the outcome of the first measurement period. Another possible bias risk is “instrumentation”, which refers to changes made in the researchers’ instrument. Because the new items in the second data collection period were placed at the end of the questionnaire, they probably did not significantly affect the respondents’ answers.

Further studies
Knowledge utilisation is an exciting research area as several highly interesting issues remain to work on. Linked to the studies in this thesis, further work is needed to understand the relation between developing, disseminating, promoting and the actual utilisation of guidelines. The impact of various organisational factors on knowledge utilisation largely remains to be tested. It is also necessary to gain a fuller understanding of the individual nurse’s inducement for using or not using recommendations in clinical guidelines. As previously noted, the impact on patient outcomes of guideline utilisation and the impact of support strategies on guideline utilisation are more or less unexplored areas within nursing.

Moreover, as a consequence of the limitations of the instrument used in Study 3, a global instrument that focuses on the implementation of research findings/knowledge utilisation ought to be designed. Study 4 revealed differences both within and between the units concerning the course of some enhancement indices. It would be worthwhile to further explore these differences, by attempting to evaluate the impact of nurse-to-patient ratios and financial resources on staff perceptions of organisational status, as well
as to examine more closely the relation between contextual variables and care performance.

Conclusions

A number of conclusions on the issue of knowledge utilisation can be drawn from the present studies. Although the findings clearly indicate that the neonatal nursing guidelines were successfully disseminated and diffused, there was less impact as to implementation of the guidelines in practice and evaluation of practice against guideline recommendations. Practitioner involvement in guideline development did not guarantee implementation. Further, participation in the national guideline project, including a common focus for improvement, facilitation and opportunities for networking, remarkably enhanced the ability to carry out an improvement project, but not to sustain a QI team over a longer period. Sustainability in QI work was significantly related to knowledge in nursing research, supportive leadership, facilitative human resources, increased activity in seeking new research and enhanced implementation of research findings in clinical practice. Finally, in the study on practice environment, organisational factors appeared considerably stable during the course of two years. Improvements in skills development and participatory management predicted higher overall organisational and staff well-being.

To take these conclusions further it is justified to allege that involvement in a national project was beneficial for enhancing the progress during local improvement work, but not for sustainability in changing clinical practice or for being successful in the succeeding guideline implementation. Health care finances and restructuring initiatives may have been powerful factors in influencing both sustainability and the guideline implementation process.

Concerning sustainability it is clear that uptake of new knowledge often requires comprehensive change of behaviour of individuals who interact with each other in complex organisations. Normally, such processes do not take place rapidly. Sustainability might be a more vital ingredient of success than a repeated introduction of new concepts for quality management.

Leadership is an acknowledged component of major importance for implementing change and has appeared in all four studies. The results that indicate the potential of skills development and participatory management for organisational improvement are concrete contributions for developing the leadership role.

Both supportive and obstructive factors of importance for knowledge utilisation have been identified in this thesis. The factors include leadership, experiences of research and development at the unit level, facilitative human
resources, goal-orientation and networking, the educational background of nurses, especially concerning nursing research, sustainability, nurses professional development and influence over care performance, restructuring, time constraints, turn-over rates, work tempo and work-related exhaustion and models/methods for improvement work. Taken collectively, the findings emphasize the importance of including both individual and organisational factors in the strategic planning for enhanced knowledge utilisation and evidence-based nursing. There are benefits of developing a learning and professional supportive environment as well as involving staff in decision making concerning care provision and organisational issues. Plans have to be made on a long-range basis and take into consideration that changes do not happen easily.
Summary

The overall aim of this thesis was to study the implementation of guidelines, change processes and contextual variables from the perspective of improvements and neonatal nursing care’s endeavours to be more evidenced-based. Because health care is exposed to extensive change pressure and because the impact of effectiveness research on clinical practice is limited, it becomes urgent to understand how knowledge utilisation initiatives can be facilitated.

Three studies involved managers and nurses at all neonatal units in Sweden. Two of these studies also included nurses from other healthcare organisations. The fourth study included all staff at four neonatal units. The study designs used were cross-sectional, comparative and prospective longitudinal surveys; questionnaires were used as data collection tools in all four studies.

Evaluation of the utilisation of the neonatal nursing guidelines showed that the guidelines were known to the nurse managers and used at most of the units, though to varying degrees and in different ways. Fifteen months after guideline dissemination, 8 of 35 units had changed practice, of which 2 units had completed the implementation process of a guideline. Involvement in the preceding guideline project facilitated the completion of improvement projects compared with participation in training courses for quality improvement (QI) only. There was no difference between these two groups on long-standing involvement in improvement work. Nurses who continued QI work over a 4-year period were more active in seeking research and implementing research findings in clinical practice than those who ceased the improvement work. The QI-sustainable nurses reported better contextual support for research-related activities. In a separate study staff perceptions of organisational factors appeared stable over the course of one year at the aggregated level. Improvements in skills development and participatory management predicted higher overall organisational and staff well-being.

The findings emphasize the importance of including both individual and organisational factors in the strategic planning for evidence-based nursing. Plans have to be long-term and consider that change is a slow process. Leadership commitment is essential and there are clear benefits in developing a learning and professional supportive environment as well as of involving staff in organisational decision making.
Sammanfattning (in Swedish)

Syftet med denna avhandling var att studera införandet av kliniska riktlinjer, genomförandet av förändringar och i samband med det betydelsen av olika organisationsfaktorer. Det råder ett stort förändringstryck i vården samtidigt som spridningen och tillämpningen av forskningsresultat är begränsad. I slutändan är det patienten som drabbas av att vårdpersonal arbetar utifrån inaktuell kunskap eller använder ineffektiva metoder. Det är därför angeläget att bättre förstå hur användningen av forskningsbaserad kunskap och förändringsprocesser kan underlättas.

Tre av studierna riktade sig till avdelningschefer och sjuksköterskor vid samtliga nyföddhetsavdelningar i Sverige. Två av dessa undersökningar inkluderade även sjuksköterskor från andra vårdorganisationer. Den fjärde studien omfattade all personal vid fyra nyföddhetsavdelningar. Alla studierna var baserade på kartläggnings- och omfattade olika sorters jämförelser. Enkät användes som datainsamlingsmetod i samtliga arbeten.

Inledningsvis undersöcktes den praktiska tillämpningen av kliniska riktlinjer för neonatal omvårdnad, vilka var utvecklade i ett gemensamt nationellt projekt. Uppföljningen visade att riktlinjerna var kända av avdelningscheferna och tillämpade vid de flesta avdelningarna, men i varierad omfattning och på olika sätt. Femton månader efter publiceringen av riktlinjerna hade 8 av 35 avdelningar förändrat vissa vårdrutiner enligt rekommendationerna i riktlinjerna, varav 2 avdelningar hade fullständigt infört specifika riktlinjer. De sjuksköterskor som medverkade i arbetet med att ta fram riktlinjerna, under tiden som detta projekt pågick, var framgångsrika i att genomföra förbättringsprojekt vid sina avdelningar jämfört med de sjuksköterskor som endast deltagit i en kurs i kvalitetsutveckling. Det var dock ingen skillnad mellan dessa grupper vad gäller varaktigt deltagande i förbättringsarbete. De sjuksköterskor som fortsatte att arbeta i förbättringsprojekt under fyra år var mer aktiva i att söka forskningslitteratur och i att utnyttja forskningsresultatet, jämfört med dem som slutat med kvalitetsutvecklingsarbete. De mer aktiva sjuksköterskorna rapporterade också bättre stöd för forskningsrelaterade aktiviteter vid sina arbetsplatser. Den avslutande studien om hur personalen uppfattade olika aspekter av arbetsmiljön, arbetsorganisationen och egen hälsa visade att dessa faktorer, på en aggregerad (övergripande) nivå, var tämligen stabila.
över en ettårsperiod. Förbättringar i ”lärande i arbetet” och ”delaktighet” predicerade (förutsåg) bättre resultat i personalens sammanvägda skattning av arbetsmiljön. Högre arbetstakt och ökad arbetsrelaterad utmatning var kopplat till lägre intresse för förbättringar av arbetsmiljön och vården.


I avhandlingen har flera betydelsefulla faktorer för ökad kunskapsanvändning i omvårdnadsarbete identifierats. Tillgång på målmedvetenhet och engagemang hos chefer, erfarenhet av forskning och utvecklingsarbete, handledningsresurser, målfokusering, nätverksarbete, ihärdighet, kunskaper i vårdvetenskap, yrkesmässigt lärande och inflytande kan främja en positiv utveckling. Däremot riskerar nedskärningar, strukturförändringar, tidsbrist, stor personalomsättning, hög arbetstakt och arbetsrelaterad utmatning innebära det motsatta. Dessa fynd understryker Vikten av att både individ och organisationer faktorer tas i beaktande i arbetet med att uppnå en mer evidensbaserad omvårdnad. Planeringen måste ske långsiktigt och präglas av insikten att förändringar inte genomförs lättvindigt. Snarare krävs en genomtänkt strategi och uthållighet. En sammanfattning av fynden i denna avhandling pekar på ledarskapets betydelse för kunskapsanvändningen och att det finns vinster med att utveckla en lärande och professionellt utvecklande miljö samt i att engagera personalen i beslut om övergripande frågor.
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