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# Clinical Pathway Implementation and Teamwork in Swedish Intensive Care

*Challenges in Evidence-Based Practice and  
Interprofessional Collaboration*

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### **Abstract**

Bjurling-Sjöberg, P. 2018. Clinical Pathway Implementation and Teamwork in Swedish Intensive Care. Challenges in Evidence-Based Practice and Interprofessional Collaboration. (Teamarbete och implementering av standardiserade vårdplaner inom svensk intensivvård. Utmaningar med interprofessionellt samarbete och evidensbaserad praktik). *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1425. 89 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-513-0227-0.

Suboptimal quality of care is an evident issue in current healthcare services. Clinical pathways (CPs) have the potential to facilitate evidence-based practice and interprofessional teamwork, and thereby improve patient safety and quality of care.

The overall aim of the thesis was to develop comprehensive empirical knowledge and understanding of CP implementation and teamwork in Swedish intensive care units (ICUs). Four studies were included (I-IV).

Study I was a survey including all Swedish ICUs (N84) and a document analysis of CP examples (n12). In total, 17 (20%) ICUs used CPs and many had implementation plans. The quality, extent and content of the CPs (n56) varied greatly, with sometimes insufficient interprofessionalism, evidence base and renewal.

Study II was a mixed method including ICUs using CPs. The implementation processes were retrospectively explored through questionnaire data (n15) and qualitative content analysis of interviews with key informants (n10). The CP implementation was revealed as a process directed at realizing the usefulness and creating new habits, which requires enthusiasm, support and time.

Studies III and IV were grounded theory studies in an action research project in an ICU. Study III explored everyday teamwork through focus group interviews with registered nurses, assistant nurses and anesthesiologists, as well as an individual interview with a physiotherapist (n38). Teamwork was revealed as an act of ‘balancing intertwined responsibilities.’ The type of teamwork fluctuated as the team processes were affected by circumstantial factors and involved individuals. Study IV prospectively explored the implementation process of a CP during a five-year period through repeated focus groups and individual interviews, questionnaires and logbooks/field notes, including the interprofessional project group, staff and managers (n71), and retrospective screening of health records (n136). ‘Struggling for a feasible tool’ was revealed as a central phenomenon. The implementation process included contextual and processual circumstances that enforced negotiations to achieve progress, which made the process tentative and prolonged and had consequences on the process output.

In conclusion, CP implementation processes are affected by multiple interplaying factors. Although progress has been achieved in evidence-based practice and interprofessional collaboration there is still potential for substantial improvements, emphasizing a need for further facilitation.

*Keywords:* Decision support, Standardized care plans, Research utilization, Organisation, Caring sciences

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*To all healthcare professionals who  
struggle to improve patient care*



# List of Papers

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

- I Bjurling-Sjöberg P, Jansson I, Wadensten B, Engström G & Pöder U (2014). Prevalence and quality of clinical pathways in Swedish intensive care units: a national survey. *Journal of Evaluation in Clinical Practice*, 20(1): 48-57
- II Bjurling-Sjöberg P, Wadensten B, Pöder U, Nordgren L & Jansson I (2015). Factors affecting the implementation process of clinical pathways: a mixed methods study within the context of Swedish intensive care. *Journal of Evaluation in Clinical Practice*, 21(2): 255-261
- III Bjurling-Sjöberg P, Wadensten B, Pöder U, Jansson I & Nordgren L (2017). Balancing intertwined responsibilities: A grounded theory study of teamwork in everyday intensive care unit practice. *Journal of Interprofessional Care*, 31(2):233-244
- IV Bjurling-Sjöberg P, Wadensten B, Pöder U, Jansson I & Nordgren L. Struggling for a feasible tool - the process of implementing a clinical pathway in intensive care: A grounded theory study. *Submitted manuscript*

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# Abbreviations

AN	Assistant nurse
CP	Clinical pathway
EBP	Evidence-based practice
EHR	Electronic health record
ICU	Intensive care unit
i-PARIHS	Integrated Promoting Action on Research Implementation in Health Services framework
IVA	Intensivvårdsavdelning [Swedish]
PARIHS	Promoting Action on Research Implementation in Health Services framework
RN	Registered nurse
SVP	Standardiserad vårdplan [Swedish]

## *Statistical abbreviations:*

IQR	Interquartile range
m	Mean
Md	Median
n	Number of cases
$p$	Probability that observed data are consistent with null hypothesis
SD	Standard deviation



# Prologue

During my experience as a registered nurse, including over 20 years as a specialist nurse in intensive care, I observed that patients were cared for variously depending on which staff members were on duty. Despite proficient frontline healthcare staff, the patients were largely at the mercy of what the individual staff members thought was important and remembered to perform. I also become increasingly aware of the frequency of incidences and adverse events that occurred during the patients stay in the hospital. Since I believe that all patients are entitled to equal care based on her/his individual needs and current knowledge of best practice, my interest in care development and patient safety was awakened.

In the early 2000s, I and some colleagues heard about clinical pathways. We found this protocol-based care methodology appealing and started to implement it in our intensive care unit. The pathways were perceived to support the staff and to improve the quality of care.<sup>1,2</sup> However, the implementation process was arduous and far from straightforward.<sup>3</sup> Therefore, with the ambition to enhance quality of care and patient safety, I become committed to increasing understanding and knowledge about clinical pathway implementation and interprofessional teamwork.

The context of the present thesis is intensive care. However, it is my hope and belief that the rendered insights will also be useful for those of you acting in other contexts.



# Introduction

All patients should be entitled to high-quality care. However, although scientific knowledge is being developed at an ever-quickening pace, suboptimal and unsafe care still leads to unnecessary suffering, morbidity and mortality, as well as high healthcare costs.<sup>4-6</sup> In order to improve the quality of care and to optimize the use of healthcare resources, evidence-based practice (EBP) and reliability in the care processes need to be increased.<sup>6-8</sup> Hence, as stated by Pronovost et al. in *The Lancet*:

*The greatest opportunity to improve outcomes for patients over the next quarter century will probably come not from discovering new treatments but from learning how to deliver existing effective therapies.*<sup>9 (p1040)</sup>

The context in focus in this thesis is intensive care. Intensive care is an expanding and resource-demanding field.<sup>10</sup> The care of the critically ill patients in the intensive care units (ICUs) is complex, interprofessional teamwork is essential for optimal outcome,<sup>11-13</sup> and there is a recognized need to improve patient safety.<sup>14-17</sup> Consequently, there is a need to implement methodologies to support the care processes.<sup>13,18</sup>

Clinical pathways (CPs) have the potential to organize care processes, facilitate EBP and support teamwork, and thereby promote a high reliability and high-value care.<sup>7,19-22</sup> However, there has been a lack of knowledge regarding the prevalence and quality of CPs in Swedish ICUs, as well as a lack of understanding regarding the CP implementation process and everyday teamwork. Further knowledge and understanding of those phenomena can provide guidance for future interventions.

# Background

This part of the thesis provides a background to which the aim, method, findings and discussion can be understood. The first four sections are about ‘quality of care and patient safety,’ ‘teamwork,’ ‘evidence-based practice,’ and ‘implementation,’ followed by two subsections about the core constructs in an implementation: ‘innovation, recipients and context’ and ‘facilitation.’ The fifth section is about the concept ‘clinical pathways,’ followed by subsections about ‘implementation of clinical pathways’ and ‘clinical pathways in Sweden’. The sixth section is about the context of ‘intensive care,’ followed by subsections about ‘teamwork in intensive care’ and ‘clinical pathways in intensive care.’ Finally, the seventh section provides ‘the rationale for the thesis.’

## Quality of care and patient safety

The basic ontological assumptions of this thesis are grounded in the ethos of caring science, emphasizing a holistic view of care and an overall mission to promote life and health, and alleviate human suffering. The concept *care* includes both nursing and medical activities aimed at curing, revealing and preventing suffering. Suffering is multidimensional, and can include human life suffering, suffering during the course of a disease or treatment, and suffering related to the care situation or care relations.<sup>23</sup> The World Health Organization defines quality of care as “the extent to which healthcare services provided to individuals and patient populations improve desired health outcomes.”<sup>24</sup> They further emphasize that in order to achieve quality of care, healthcare must be “safe, effective, timely, efficient, equitable and people-centred.”<sup>24</sup>

In a global perspective, lack of access to healthcare is the greatest source of suffering, but the quality and safety of the care provided once individuals access healthcare services is also an evident issue. It is difficult to estimate the number of patients being harmed within healthcare services. However, most reports are consistent that the adverse event rate is well over ten percent, which is an unacceptably high number.<sup>4,6</sup> According to an ongoing national structured review of health records,<sup>25</sup> the adverse event rate in Swedish in-hospital somatic care has successively decreased over the last four years. Still, approximately eight percent of the patients are subjected to

avoidable adverse events. In addition to human suffering, this is estimated to cost nine billion Swedish crowns per year (13-14% of the budget for adult somatic in-hospital care).<sup>25</sup>

The patient safety issue is global, but as conditions differ between countries and settings, the priorities differ. Recommendations for enhancing patient safety in high-income countries include focusing on processes and organizational factors, such as, for example, coordination and communication.<sup>26</sup> The current notion among patient safety researchers is that healthcare services need to increase the reliability in their processes.<sup>6-8</sup> Fundamental principles for this are to standardize and simplify the processes and to highlight deviations in the pursuit of learning.<sup>7,8</sup> It is also essential to have a strong safety culture that empowers frontline healthcare staff as well as patients and relatives to initiate and take part in continuous improvements.<sup>6,27</sup>

In order to achieve highly reliable processes, healthcare services must set the expectation that the provided care should be evidence-based, and thereby follow standardized plans unless contradicted for the specific patient.<sup>7,8</sup> Further, in the increasingly complex and knowledge-intensive healthcare sector, collaboration in the healthcare team plays an important role for the quality of care and patient safety.<sup>28-30</sup> Hence, when implementing innovations to improve healthcare quality and patient safety, teamwork characteristics and workplace behaviors are important.<sup>11,27,31</sup>

## Teamwork

Teamwork is the actions taken by team members while communicating, cooperating, and coordinating their work.<sup>29</sup> Commonly, healthcare teams include different staff categories. In this thesis, the concepts *staff*, *profession* and *professional* refer to all categories of healthcare employees involved in patient care. When a specific staff category is referred to, this is specifically expressed.

Differences in clinical practice place a variety of demands on teamwork among different healthcare specialties,<sup>29</sup> and teams may vary greatly in their structure, form and functionality.<sup>28,32</sup> Teams that include different staff categories can be multiprofessional, interprofessional or transprofessional. In multiprofessional teams, the different staff categories work independently, in parallel or sequentially to each other; in interprofessional teams, they interact to accomplish a desired outcome and have a high level of communication, mutual planning, collective decision making and shared responsibilities; and in transprofessional teams, the different staff categories collaborate in an integrative process in which role boundaries are partly dissolved.<sup>32</sup>

The function of the teamwork is dependent on contextual, organizational, relational and processual factors.<sup>33</sup> Many teams in healthcare are provisional,

implying frequent changes of team members under dynamic conditions, which makes collaboration difficult.<sup>28</sup> Additionally, team members with distinct professional identities can have different, and sometimes opposing, priorities due to different background and limited awareness of the other staff categories' specific knowledge.<sup>34,35</sup>

Teamwork function plays an important role in the prevention as well as causation of adverse events.<sup>28-30</sup> Additionally, interprofessional teamwork is essential for successful outcome in continuous quality improvements and implementation of EBP.<sup>11,27,31</sup> Based on systematic reviews teamwork can be improved by different sorts of team training, continuous quality improvement,<sup>36</sup> and by the implementation of CPs.<sup>21</sup>

## Evidence-based practice

Healthcare professionals have ethical<sup>23</sup> as well as legal<sup>37,38</sup> responsibilities to perform care in accordance with best available evidence, which is also emphasized by Swedish intensive care professional organizations.<sup>39,40</sup> In this thesis, *EBP* refers to evidence-based nursing<sup>41</sup> as well as to evidence-based medicine.<sup>42</sup> Hence, EBP means a process in which all clinical decisions about the individual patient's care are based on integrated knowledge from the best available scientific research, clinical experience, local contextual circumstances, and the patient's requirements and needs.<sup>43,44</sup> The nature of 'evidence' is thus broader than solely scientific research, and EBP should be considered as knowledge subjected to critical review, generated from a range of sources.<sup>41-44</sup> The move to EBP thus does not mean that individualized care is replaced by a "cookbook" approach. Rather, EBP comprises a partnership between the healthcare staff and the patient and her/his relatives,<sup>45</sup> which thereby corresponds with the holistic understanding of the evidence concept in caring science.<sup>46</sup>

However, while current opinion emphasizes the importance of EBP in the pursuit of assuring high-quality and high-value care,<sup>7,8</sup> the implementation has proven to be challenging, which has rendered a widely cited gap between what is known and what is done.<sup>5,22,47-49</sup> Further knowledge and understanding are therefore needed regarding the implementation process.

## Implementation

Implementation is "the process of putting to use or integrating new practice within a setting."<sup>50(p2)</sup> Knowledge of implementation can be extracted not solely from implementation science but also from closely related research fields, studying for example innovation diffusion, knowledge translation, and quality improvement.<sup>50-52</sup> A number of publications provide a range of

theoretical approaches (theories, models and frameworks) aiming to describe and/or guide implementation processes, to understand and/or explain what influences the implementation outcomes, and to evaluate implementation processes.<sup>50</sup> These theoretical approaches differ to some degree in terminology as well as in focus, and contribute with different aspects to the implementation science. Hence, there is no evidence that universally merits any particular theoretical approach.<sup>50,51</sup>

Frameworks aiming to understand and/or explain influences on implementation outcomes are known as ‘determinant frameworks.’<sup>50</sup> The determinant frameworks (e.g. Harvey & Kitson<sup>31</sup> and Damschroder et al.<sup>53</sup>) recognize that implementation is a multidimensional phenomenon, with multiple integrated components (determinants) that can influence the implementation on many different levels.<sup>50</sup>

One of the frameworks developed to understand the complexity of successful implementation of evidence into practice is the Promoting Action on Research Implementation in Health Services (PARIHS) framework, originally presented by Kitson et al. in 1998.<sup>54</sup> The PARIHS framework has over the decades been successively evaluated and refined,<sup>31,55-57</sup> and is widely cited and utilized, mainly in the pursuit of retrospectively analyzing implementation processes.<sup>31,58</sup> From its inception, the PARIHS framework has proposed that successful implementation of evidence into practice is a function of the quality and type of evidence, the characteristics of the context, and the way the evidence is facilitated into practice.<sup>31</sup> However, in the latest revision, called the integrated PARIHS (i-PARIHS), a new component termed ‘recipient’ has been added, and ‘evidence’ is extended to also include other innovations (although preferably evidence-based). Hence, the current i-PARIHS framework proposes that the success of implementation depends on characteristics and interplay between the constructs: *innovation*, *recipients*, *context* and *facilitation*.<sup>31</sup> Based on a narrative review by Nilsen,<sup>50</sup> these constructs are also commonly recognized determinates in other frameworks, although to some extent differently termed, defined, delineated and weighted.

## Innovation, recipients and context

*Innovation* refers to the knowledge/improvement that is intended to be put into practice. The construct includes evidence from research and from clinical, patient, and local experience, as well as practical knowledge generated from improvement initiatives.<sup>31</sup> Innovation is analogous with, for example, ‘implementation object,’ ‘intervention’ and ‘evidence.’<sup>50</sup> Characteristics of the innovation that are proposed to influence successful implementation include the underlying knowledge source, clarity, usability and degree of fit with existing practice, trialability, relative advantage and observable results.<sup>31</sup>

*Recipients* refer to the actors/people who are affected by and influence the implementation, for example, frontline staff and managers.<sup>31</sup> Other terms, such as ‘users’ and ‘adopters’,<sup>50</sup> can be regarded as analogues to the recipient construct. Characteristics of the recipients that are proposed to influence successful implementation, on individual as well as collective team level, are, for example, motivation, values, beliefs, goals, skills, knowledge, time, resources, support, local opinion leaders, collaboration, teamwork, power, authority and networks.<sup>31</sup>

*Context* refers to the inner context, including the local unit (micro level) and the organization within which the unit is embedded (meso level), as well as the outer context, including the wider healthcare system and infrastructure (macro level).<sup>31</sup> Context is recognized as a determinant in most frameworks, although the analogue ‘setting’ is sometimes used.<sup>50</sup> Characteristics of the context that are proposed to influence successful implementation can be found on all contextual levels and include, for example, formal/informal leadership and management support, culture, past experience of innovation/change, mechanisms for embedding change, evaluation and feedback processes, learning environment, organizational priorities, structure and system, networks, policies and regulations.<sup>31</sup>

Additionally, in order to enable the innovation to be adopted by the recipients in their context, the implementation process needs facilitation.<sup>31</sup>

## Facilitation

Facilitation literally means ‘make easier,’ and refers to the actors/people who have a facilitator role, as well as to the set of strategies and actions taken in the facilitation process. Facilitation is thereby proposed to be the active ingredient that enables implementation through assessing and responding to characteristics of the innovation and the recipients within their context.<sup>31</sup> Facilitation as an implementation strategy is influenced by the humanistic principles of participation, engagement, shared decision making and enabling others.<sup>59</sup> Hence, facilitation itself is a complex intervention involving individuals who have to apply a combination of improvement and team-focused strategies to enable and support change.<sup>31,59</sup>

The *facilitator* role can be assigned to people in the local setting (*internal facilitator*) or to people outside the organization (*external facilitator*). Sometimes a combination of internal and external facilitators is used, preferably with experienced expert facilitators mentoring the more novice ones.<sup>31</sup> Researchers commonly agree that having some form of human component within the process promotes a successful implementation. In addition to ‘facilitator,’ the human component can include a plethora of different roles, for example, ‘opinion leaders,’ ‘champions,’ ‘change agents’ and ‘educational outreach.’<sup>5,50,59</sup> While the terminology varies and partly overlaps, and the overall aim is to achieve change, the function of the roles

differs.<sup>59</sup> For example, educational outreach involves a trained person who meets the recipients in order to learn and inform them,<sup>5</sup> an opinion leader operates informally by peer influence,<sup>5,59</sup> and a facilitator is formally assigned to enable, aid and facilitate the implementation.<sup>59</sup> The facilitator operationalizes the facilitation by applying different facilitation strategies.<sup>31</sup>

*Facilitation strategies*, also termed ‘implementation strategies,’ ‘interventions,’ ‘actions’ or ‘activities,’<sup>50,60</sup> can vary widely in complexity and include single components as well as multiple components.<sup>5,60</sup> Common strategies include information and education (oral and/or written), training, interactive consensus building and goal setting, quality improvement tools (such as e.g. the plan-do-study-act cycles<sup>61</sup>), audit and feedback, and reminders.<sup>5,31</sup> Assessing the effect size of different strategies is difficult, as the effect of the strategies presumably relates to how well they address the barriers and needs in the specific context.<sup>5</sup> Hence, systematic reviews demonstrate that, for example, printed education materials, educational meetings, audit and feedback, and computerized reminders, all have a modest effect on the intended change,<sup>5</sup> and that multi-component strategies do not necessarily increase the effect.<sup>5,62</sup> Those findings strengthen the proposition that successful implementation depends on the ability of the facilitators to appropriately tailor the strategies to the innovation, recipients and context in the facilitating process.<sup>31</sup> Additionally, each of the described determinants (innovation, recipients, context and facilitation) can include a number of barriers and/or enablers that influence the outcome of the implementation,<sup>31</sup> and their complex interplay makes it very difficult to conclude what works where and why across contexts. More research is thus needed regarding which implementation strategies are successful under various circumstances.<sup>5,50</sup>

Early research and theoretical approaches to implementation tend to assume a one-way liner process to transfer knowledge from the researchers to the frontline practitioners. However, in recent decades the complexity of implementation has been recognized,<sup>50</sup> emphasizing the importance of tailoring strategies, involving the recipients (e.g. frontline healthcare staff) and utilizing local improvement knowledge.<sup>31,59,63</sup> Additionally, it is proposed that successful implementation can be promoted, and further scientific knowledge be developed, by strategies that include collaboration between recipients and researchers in, for example, action research projects.<sup>64-66</sup>

## Clinical pathways

Traditionally, protocols in the form of delimited guidelines have been used to provide generic recommendations regarding the management of certain disorders or diagnoses.<sup>18,19,67</sup> However, during the 1980s, the more

comprehensive locally customized CPs were introduced in some healthcare services.<sup>68</sup> The CP methodology aims to support quality improvement by organizing/re-organizing care processes to support the integration of EBP into the local organizations, and making the care processes transparent to involved staff, patients and relatives.<sup>7,68,69</sup> The development (and/or revision) of CPs is a quality improvement method and, once implemented, the CP is used in the everyday practice as part of the patient health record.<sup>68</sup> However, CPs differ greatly regarding models, content and utilization between different countries as well as between different settings within the countries<sup>68,70</sup> (for examples of different CPs, see Edlund & Forsberg<sup>70</sup>). Additionally, there is no international consensus regarding terminology and definition. Frequently, different terms and definitions are used interchangeably.<sup>68,71</sup>

*Clinical pathway* is the most common term in current publications.<sup>19</sup> This is therefore the term used in the present thesis, abbreviated as *CP*, and defined as *a care plan that is decided upon in advance, based on a systematically aggregated evidence base, describing recommended healthcare actions for specific health problems* [author's translation of the Swedish concept 'standardiserad vårdplan' (SVP) in the National Board of Health and Welfare's terminology database].<sup>72</sup> This definition is consistent with the criteria set up by Kinsman et al.<sup>71</sup> proposing that a CP needs to be a structured multidisciplinary plan of care, and also include at least three of the four criteria: i) be used to translate guidelines or evidence into local structures; ii) detail the steps in a course of treatment or care in a plan, pathway, algorithm, guideline, protocol or other inventory actions; iii) have timeframes or criteria-based progression; iv) aim to standardize care for a specific clinical problem, procedure or episode of healthcare in a specific population.

The Medical Subheadings, however, use the term 'critical pathway,' defined as "schedules in patient care for coordinated treatment."<sup>73</sup> The European Pathway Association advocates the term 'care pathway,' defined as "a complex intervention for the mutual decision-making and organization of care processes for a well-defined group of patients during a well-defined period."<sup>19</sup> 'Standardized care plan' or 'standardized nursing care plan' are terms particularly used for the CP methodology in the field of nursing but the terms also apply to interprofessional subjects.<sup>70,74</sup> Additional terms for the CP methodology include: 'care map,' 'collaborative care plan/pathway,' 'integrated care plan/pathway,' 'standardized order set,'<sup>75</sup> and the more recently emerging 'enhanced recovery pathway.'<sup>76</sup>

In Swedish practice, a CP includes two parts. One part is easily foreseeable and included in the patient's health record (paper/electronic), displaying problems/diagnoses, goals and recommended care interventions/activities, and is used in everyday practice. The other part is a more extensive 'knowledge base' that displays the evidence base of content

in the health record part, inclusion/exclusion criteria for the application and guidelines for documentation, etc.<sup>70,77</sup> Hence, in this thesis the term *CP* refers to both described parts, unless otherwise stated, and publications using all the above mentioned as well as other equivalent terms are used for the purpose of gaining knowledge of the CP phenomenon.

An extensive review of publications regarding CPs and EBP<sup>43,70-72,77-83</sup> reveals some key characteristics of a high-quality, interprofessional and evidence-based CP; see Table 1.

**Table 1.** Key characteristics of a high-quality, interprofessional and evidence-based CP.\*

Scope	<ul style="list-style-type: none"> <li>• Provides information about the condition/clinical problem the CP covers (for which patients the CP is intended versus not intended)</li> <li>• Interprofessional approach</li> <li>• Covers both medical and nursing issues</li> </ul>
Development	<ul style="list-style-type: none"> <li>• Developed by team including all relevant staff categories</li> <li>• Provides information about the development team/authors (any conflicts of interest declared)</li> <li>• Provides information about methods used in the development process, evidence search strategy, inclusion and exclusion criteria for scientific evidence</li> <li>• Externally reviewed/ endorsed, and piloted by the users</li> </ul>
Content and format	<ul style="list-style-type: none"> <li>• Contains health problems/diagnoses, goal-setting and recommended interventions</li> <li>• Recommended interventions and outcome assessments are time-framed or criteria based</li> <li>• Provides information about what staff category is responsible for the measures</li> <li>• Provides information about documentation (including variance management)</li> <li>• A structure that makes it possible to follow the care process</li> <li>• Recommendations in the CP are explicitly linked to supporting evidence base, with references</li> </ul>
Evidence base	<ul style="list-style-type: none"> <li>• Scientific evidence systematically searched and quality-assessed (review articles and quality-assured guideline preferable)</li> <li>• Clinical experiences are reflected upon and expressed</li> <li>• Contextual circumstances are reflected upon and expressed (review of health records preferable)</li> <li>• Patients' preferences are included as evidence source (preferably including patients in the development team)</li> </ul>
Renewal	<ul style="list-style-type: none"> <li>• Provides information about evaluation and renewal</li> <li>• The content is up to date</li> </ul>

\* Based on an extensive review of publications regarding CPs and EBP, performed in 2013<sup>43,70-72,77-83</sup>

## Implementation of clinical pathways

Globally, the CP methodology is gaining in importance in healthcare.<sup>75,84</sup> In 2010 about eighty percent of US hospitals used CPs<sup>71</sup> and the use continue to expand.<sup>85</sup> CPs are also becoming more widely used in Europe, even if the methodology is relatively new in several countries.<sup>19,84</sup> However, a weakness of the CP methodology is that the latest evidence is not always integrated.<sup>78,83,86</sup> Additionally, concerns are raised that the increasing use of CPs undermines the autonomy of individual healthcare professionals to exercise clinical judgment, and leads to a reductionist approach that does not address patients' individual needs.<sup>87-89</sup> However, recent publications strongly emphasize that CPs are to be used as decision support in performing EBP. A

CP should therefore include the latest available evidence, and appropriate use includes considering the individual patient's clinical status, needs and preferences. Valid deviations from the CP recommendations are thereby encouraged.<sup>7,19</sup>

Based on findings from empirical studies, the implementation of CPs has the potential to improve the organization of care, interprofessional teamwork and documentation in the health records, decrease the length of the patients' hospital stays, improve patient outcomes, and reduce hospital costs.<sup>20-22</sup> However, although many publications report positive outcomes, CPs do not always have the intended effect. Contextual circumstances must be taken into account, and the effect of a CP is likely related to the grade of improvement potential in the setting.<sup>90</sup> Because healthcare organizations, and models and utilization of CPs, differ between countries and settings, more research from different contexts is needed.<sup>19,20,76</sup>

Clinical pathways are complex interventions that include quality and efficiency improvement processes.<sup>19</sup> Hence, the implementation is complex and includes implementing a quality improvement methodology as well as developing and implementing the CP document and necessary changes in the care process. In this thesis 'CP implementation' refers to all these components.

Commonly, CPs are derived from a bottom-up approach and tailored to fit a local organization.<sup>91</sup> Vanhaecht et al.<sup>69</sup> describe the '7-phase method' of designing, implementing and evaluating CPs. This method is based on Deming's plan-do-study-act cycles<sup>61</sup> and offers a systematic approach to support teams that intend to implement a CP.<sup>69</sup> In short the seven phases include: 1) 'screening' with the objective of determining if a CP is appropriate for the problem, and if so, to make the decision to start a project; 2) 'project management' in which the project structure is set up; 3) 'diagnostic and objectification' to evaluate current organization of the care process from the perspectives of one's own organization and team, vision of patients and relatives, available evidence and legalization, and external partners; 4) 'development' of the CP on the basis of the findings in phase three; 5) 'implementation' with the objective of putting the CP to use in everyday practice through information, training and testing; 6) 'evaluation' of usability, variance and outcome; and 7) 'continuous follow-up' to keep the CP up to date.<sup>69</sup>

Several other descriptions of CP implementations exist.<sup>70,92</sup> However, they all mainly focus on the development part and less on the issue of how to put the CP in use in everyday practice.<sup>93</sup> Siebens et al.<sup>94</sup> however, report in detail about the implementation process of a CP for patients with chest pain, successfully utilizing action research, unfortunately without reporting about the outcome. Further, Coxon et al.<sup>76</sup> recently provided a first draft of a context-mechanism-outcome model of CP implementation, which is largely consistent with the determinants proposed by the i-PARIHS framework,<sup>31</sup>

emphasizing the importance of facilitators/change agents and engaging frontline staff and managers.<sup>76</sup> Based on publications of implementation of other forms of protocols as well, Evans-Lacko et al.<sup>91</sup> propose that an openness to change the current organization, and multi-component implementation strategies that involve all staff, promote successful implementation of CPs. However, studies that evaluate CPs rarely report about the implementation process.<sup>20,76</sup> Hence, researchers agree that knowledge regarding factors that facilitate versus impede successful implementation of CPs is insufficient, and that there is a need for better understanding of activities and actors involved in the implementation process.<sup>22,76,90,91</sup>

## Clinical pathways in Sweden

Swedish healthcare is largely publicly funded.<sup>95</sup> Laws and regulations state that all healthcare services should be organized in such a way that patient safety, quality of care and efficiency of costs are ensured, and patient participation and autonomy respected.<sup>37,38,96,97</sup> Further, all authorized healthcare professionals are obligated to document planned and given care in the patients' health records.<sup>98</sup> However, the organization of care and the utilization of information systems are locally self-governed.<sup>95</sup> Electronic health records (EHRs) are utilized throughout the country but different EHR systems are used in different county councils as well as in different settings, and paper-based health records still exist for parts of the care processes.<sup>99</sup>

The CP methodology was introduced in some Swedish hospital settings in the mid-1990s, mainly with a nursing approach.<sup>70</sup> Since then, the knowledge of CP has been spread by passive diffusion, without any national decree or coordinated efforts. In a 2005 survey, initiated by the National Board of Health and Welfare,<sup>81</sup> 23 of the 25 included Swedish hospitals (92%) reported CP use. A total of 782 different documents classified by the informants to be CPs were submitted. However, when reviewed, insufficient interprofessional approach and poor scientific evidence base were revealed. Only 34 documents (4%) could be classified as CPs with a demonstrated evidence base. These findings indicate a lack of knowledge about what type of documents can be classified as CPs.<sup>81</sup>

In 2011, the concept CP [SVP] was defined in the national terminology database,<sup>72</sup> and a framework for interoperability within healthcare was published that recommended CPs to be used as interprofessional decision support tools.<sup>77</sup> Furthermore, the national framework stated that CPs should be documented in the individual patient's health record and that a related 'knowledge base' should display the evidence base and references.<sup>77</sup>

Fuelled by attention from national conferences and a rising number of publications, there has been a rapid growth of CPs within Swedish healthcare, with heightened emphasis on the evidence base and interprofessional

approach, and an increasing number of settings successfully using CPs. The publications report overall positive experiences of the CPs but focus mainly on evaluation from a nursing perspective.<sup>2,100-104</sup> There is thus a scarcity of publication reporting on CPs from an interprofessional perspective, which emphasizes a need for further research that takes into account all staff categories in the team involved in the patients' care.

## Intensive care

Intensive care is a specialty that has evolved from the treatment of poliomyelitis patients with respiratory failure in the 1950s. In ICUs, the patients cared for often have acute organ dysfunction and/or are in need of being monitored in order to prevent and detect acute organ dysfunction. In addition, some patients receive end-of-life care when curative treatment is no longer possible or ethically correct. Due to advances in understanding pathophysiology, innovations in supportive technology, and an aging population, the field of intensive care is expanding, though at a high cost.<sup>10</sup>

The everyday practice and care of ICU patients is complex and technologically intense.<sup>17,105,106</sup> The patients commonly have impaired cognitive and communication function and experience physical as well as emotional and existential discomforts due to critical illness and/or due to procedures and the ICU environment.<sup>10,107,108</sup> The staff needs to provide expert physical care and treatment and also fulfill the patients' and their relatives' emotional needs in person-centered care.<sup>105,106,109,110</sup> The environment can thus be stressful for patients and relatives, as well as for the ICU staff.<sup>10,105-110</sup>

Sweden, with 10 million inhabitants,<sup>111</sup> has 84 ICUs distributed across six healthcare regions.<sup>112</sup> The number of ICU beds per 100,000 people is estimated to be 8.7.<sup>10</sup> Different categories of hospitals provide different levels of intensive care. *University hospitals* offer highly specialized care at both general and specialized ICUs with the most advanced diagnostic and interventional technology available for different types of organ dysfunctions. *County hospitals* have a large number of clinical experts and general ICUs that can handle most organ dysfunctions. However, patients who need more advanced care are referred to university hospitals. *Local hospitals* cover basic inpatient specialties and have small ICUs that can handle some organ dysfunctions, but patients who need more advanced care are referred to a county or university hospital.<sup>95,113</sup>

The number of admissions to Swedish ICUs is nearly 50,000 a year.<sup>112</sup> The ICU patients are fragile and often in need of advanced procedures, including invasive mechanical ventilation (38% of the admissions).<sup>112</sup> In 2016, mortality in the Swedish ICUs was seven percent and 30-day mortality was 16 percent.<sup>112</sup> Mortality is mainly due to critical illness. However, the

ICU patients are also at especially high risk for harm, increased morbidity and mortality due to adverse events.<sup>14-17</sup> According to a review of health records of patients who died in connection to the intensive care period in a Swedish ICU, as many as one-fifth of the patients had been subjected to adverse events. More than half of those events were found to be avoidable.<sup>16</sup> Adverse events in intensive care can, for example, be healthcare-associated infection, drug errors, pressure ulcer, procedural complication in/outside ICU, omission of care/supervision, or equipment-related events due to improper use of equipment, equipment failure, or teamwork failure.<sup>14-17</sup>

The complex care and highly specialized ICU context requires a large number of professionals with multiple specialties, skills and approaches, who work in teams with partly provisional membership.<sup>10</sup> Thus, the demands for interprofessional communication and coordination are high, and for optimal patient outcomes functional teamwork is essential.<sup>11,110,114,115</sup> In order to promote optimal patient outcome and cost efficiency, appropriate structure and effective processes of care are needed.<sup>13</sup>

## Teamwork within intensive care

The staff in Swedish ICUs includes anesthesiologists, physicians in specialist training, registered nurses (RNs) with specialist education in intensive care, assistant nurses (ANs), also called enrolled nurses, and physiotherapists. Physicians from the patients' clinics are involved but do not participate in the everyday care. Other healthcare professions are usually available as consultants.<sup>113</sup> While there are some structural variations between different ICUs, the ICU staff handles the entire patient care, including mechanical ventilation and pharmacological procedures, which in some countries are handled by allocated professions.

Internationally, studies from the ICU context illuminate that intra-team conflicts, communication gaps, and tensions between different staff categories exist, which negatively affect healthcare quality and patient safety as well as team welfare and cohesion.<sup>35,114,116,117</sup> A survey conducted in an European intensive care nursing conference indicates that the interprofessional collaboration in the Nordic countries (in which Sweden is included) is greater than in the non-Nordic countries.<sup>118</sup> However, in spite of much research, recent reviews conclude that in order to achieve improvements in ICU teamwork there is still need of further understanding about everyday team processes.<sup>11,114</sup>

In Sweden the few publications on ICU teamwork have focused on evaluating how simulation-based training of emergency situations affects teamwork, summarily reporting positive effects.<sup>119,120</sup> However, there is a dearth of knowledge of everyday ICU teamwork.

## Clinical pathways within intensive care

Within intensive care, protocols in the form of delimited guidelines are common.<sup>18,121</sup> However, there is a recognized need for increased utilization of available evidence<sup>121</sup> and further progress of the quality of care for critically ill patients.<sup>14-17</sup>

The CP methodology is infrequently utilized within intensive care.<sup>18</sup> However, empirical studies from the ICU context report several positive effects of CPs. For example, a CP for patients with pneumonia increased compliance with evidence-based guidelines for hospital-acquired pneumonia.<sup>122</sup> Also, a CP for patients with sepsis increased compliance with evidence-based interventions, and the patients had shorter hospital stay durations and a lower 28-day mortality rate than the patients in the control group.<sup>123</sup> Studies of CPs for patients undergoing esophagectomy report earlier postoperative extubation and mobilization,<sup>124</sup> reduction in complications,<sup>124,125</sup> length of ICU stay, length of hospital stay,<sup>124</sup> re-admission, and hospital cost.<sup>125</sup> A CP for patients undergoing aortic surgery implied that several evidence-based nursing interventions were performed earlier in the postoperative process<sup>2</sup> and that the nursing staff perceived increased patient safety and quality of care.<sup>1</sup> A CP dealing with sedation and analgesia in a cardiac ICU led to reduced time on mechanical ventilation,<sup>126</sup> and some other studies report decreased time on mechanical ventilation and length of ICU stay when weaning is protocolized.<sup>127,128</sup> However, the publications are few, the studies quite small, and the findings are not completely consistent, implying a need for further research.<sup>18</sup>

In Sweden, so far, it is known that CPs are used to some extent within intensive care. However, there are few publications,<sup>1,2</sup> and the overall prevalence and quality of the CPs are unknown. Existing knowledge and understanding about the CP implementation process is therefore also insufficient.

## Rationale for the thesis

Suboptimal and unsafe care is an evident issue, leading to unnecessary suffering and high healthcare costs.<sup>4-6</sup> In order to increase the quality of patient care, healthcare services need to increase the reliability in the care processes, further work according to EBP,<sup>6-8</sup> and improve communication and coordination in everyday teamwork.<sup>26</sup> For this task, implementation of CPs is suggested to be beneficial.<sup>7,19-22</sup> A CP describes evidence-based recommendations for a specific group of patients and is supposed to be used as a decision support for the interprofessional team in the individual patient's care.<sup>69-72</sup>

In the highly specialized and rapidly progressing context of intensive care, there is a high demand for EBP and interprofessional teamwork,<sup>10-13</sup> and a recognized need to improve the patient safety.<sup>14-17,27</sup> International research purposes that further the use of CPs in ICUs would likely be beneficial to patients as well as healthcare providers by improving care processes, patient outcome and resource utilization.<sup>1,2,18,122-128</sup> However, in Swedish intensive care, there has been a lack of knowledge regarding the status of CPs and an absence of coordinated facilitating initiatives. As prevalence, content, evidence base, and quality of CPs have been unknown, an overview of the current situation has the potential to provide a basis for directing future development, research and cooperation within the field. Furthermore, the understanding of the CP implementation process is scant, implying a need for further exploration.<sup>22,90,91</sup> A further understanding of factors that facilitate versus impede successful CP implementation, the activities and individuals involved in the implementation process, and how everyday practice is influenced in an ICU, can provide guidance on how to facilitate future CP projects. Additionally, although there is some research regarding teamwork in emergency situations,<sup>119,120</sup> the knowledge of everyday ICU teamwork in Sweden has been scant. Increased understanding of teamwork processes can thereby facilitate the understanding of everyday ICU practice and provide guidance for future interventions.

In summary, enhanced knowledge and understanding of CP implementation and teamwork can lead to reflective discussions as well as practical propositions that can facilitate quality improvement and CP progress, and thereby contribute to enhancing patient safety and quality of care.

# Overall and specific aims

The overall aim of this thesis was to develop comprehensive empirical knowledge and understanding of CP implementation and teamwork in Swedish intensive care.

Specific aims of the included studies were to:

- I Identify the prevalence of CPs in Swedish ICUs and to explore the quality, content and evidence base of the documents in use.
- II Explore the implementation process of CPs within the context of intensive care.
- III Describe and explain teamwork and factors that influence team processes in everyday practice in an ICU from a staff perspective.
- IV Explain the process of implementation of a CP based on a bottom-up approach in an ICU context.

# Methods

## Design

The thesis includes four studies (I-IV). First, a national survey was conducted, in which the current situation of CPs in Swedish ICUs was explored (I). Second, a mixed method study was conducted to retrospectively explore perceptions of the implementation process (II). Additionally, an action research project was conducted concurrently in one ICU in order to implement the CP methodology. From this project, two grounded theory studies (III, IV) were included in the thesis. Study III explored teamwork before the implementation process of the CP started, and Study IV prospectively explored the implementation process of the CP during a nearly five-year period. An overview of the four studies (I-IV) is presented in Table 2.

**Table 2.** Overview of the studies included in this thesis.

Study	Research questions	Design	Participants/sample	Data source	Data analysis
I	To what extent are CPs implemented? What are the CPs' quality, content and evidence base?	Descriptive and explorative survey	All Swedish ICUs (N84)	Questionnaire and document analysis of CP examples	Descriptive and comparative statistics
II	What factors affect the implementation process?	Retrospective explorative sequential mixed method	ICUs with CPs (n15)	Questionnaire and individual interviews	Descriptive statistics and qualitative content analysis
III	How can teamwork in everyday practice be explained? What are the processes involved?	Grounded theory in an action research project	Staff (n38) in an ICU without CPs	Focus groups and individual interviews	Constant comparative analysis
IV	How can implementation of a CP based on a bottom-up approach be explained? What are the processes involved?	Grounded theory in an action research project	Staff (n69), managers (n2), health records from patients on mechanical ventilation (n136) in an ICU implementing a CP	Focus groups and individual interviews, questionnaire, logbooks, field notes and health records	Descriptive statistics and constant comparative analysis

## Methodological assumptions

As the knowledge and understanding of CP implementation and teamwork in Swedish intensive care has thus far been poor, exploratory studies were considered appropriate.<sup>129,130</sup> In order to enable a broad perspective as well as in-depth understanding, triangulation<sup>131</sup> was utilized through national as well as single-setting studies, including quantitative as well as qualitative methods and different types of data sources. The studies were not framed by any a priori framework or theory. However, in the discussion part of the thesis, the i-PARIHS framework<sup>31</sup> is utilized as a base when relating the empirical findings to a previously existing body of knowledge in order to further extend the knowledge and understanding of the phenomena.

The approach in the thesis is underpinned by some basic assumptions from symbolic interactionism,<sup>132</sup> including that 1) people, individually and collectively, act on the basis of what meanings objects or phenomena have for them; 2) meanings are social products, created and formed through the interaction of individuals in a social context; and 3) meanings are handled by individuals in an interpretative process that transforms the meaning and guides the actions taken in particular situations. In groups, people act and interact in a process in which individuals interpret indications on a symbolic level and also indicate to other people how to act. This complex activity forms the different actors' actions and establishes structure in organizations.<sup>132</sup>

Additionally, some assumptions are based on Corbin and Strauss'<sup>129</sup> interpretation of pragmatism, including that 1) knowledge arises through the acting and interacting of self-reflective beings; 2) reflective thinking arises in testing ideas for actions; and 3) we live in a reality that is in a continuous process. Reality is multiple, complex, socially constructed and subjectively perceived by the people experiencing the event. People are assumed to be actors who take an active role in responding to problematic situations. Reality cannot be fully known but it can be interpreted.<sup>129</sup> Thus, to obtain knowledge about human group life and social action, it is necessary to explore the dynamic process in which participants define and interpret each other's acts.<sup>132</sup> Below, the rationales for the different utilized methods are presented.

### *Survey (Study I)*

In order to identify the prevalence of CPs and explore the quality, content and evidence base of the CPs in use in Swedish ICUs (I), a survey<sup>130</sup> was considered appropriate. A survey provides an opportunity to obtain information about the prevalence and distribution of variables in a population. The method is advantageous for collecting self-reported quantitative data that require brief responses. However, the information obtained is relatively superficial and limited to what questions are included

in the questionnaire and the extent to which informants are able and willing to report on the topic.<sup>130</sup> Therefore, in order to further explore the quality, content and evidence base of the CPs, the survey was supplemented with a document analysis of submitted CP examples.

#### *Mixed method (Study II)*

In order to retrospectively explore the implementation process of CPs in the context of Swedish intensive care (II), a sequential mixed methods approach<sup>133</sup> was considered appropriate. Mixed methods research strives to bridge the gap between the quantitative and qualitative paradigms and is appropriate for exploring multifaceted and complex phenomena that only a broader range of perspectives can do justice.<sup>133</sup>

In the present study (II), the sequential mixed methods meant that a quantitative approach was used to gain general information about the implementation process, and next a qualitative approach was used to gain insight into how those committed to the implementation of CPs experienced the process. Finally, the quantitative and qualitative findings were integrated in the analysis.

#### *Action research (Study III and Study IV)*

In order to empower staff and managers who wanted to implement a CP methodology in their ICU, and also be able to study teamwork (III) and an implementation process of a CP based on a bottom-up approach (IV) in real time, an action research project<sup>64</sup> was considered appropriate. The rationale for conducting action research is the ambition to empower the participants to act on their own behalf in order to solve problems in their natural context.<sup>64</sup>

Action research aims to understand how human beings interact and respond to events and situations, and seeks to bridge the gap between academic and practical knowledge through close collaboration between researchers and the people involved in the situation under study<sup>64</sup> (in the present scenario, the ICU staff and managers). The concept of empowerment is of central importance and embodies a trust in people's ability and willingness to work constructively together, and also an ideal of democratic participation and responsible citizenship.<sup>64</sup>

The epistemological assumption underlying action research is that knowledge and understanding about the social world can be generated from practical involvement in a situation.<sup>64</sup> Action research is a useful method in healthcare and can lead to deeper understanding, conceptualization and theorization about what is happening in practice.<sup>134</sup> The method has previously been used successfully in the intensive care context.<sup>65</sup> Significant in action research is that researchers and participants work together in cyclical activities, including *observing, reflecting, planning, and acting*.<sup>64</sup> Action research thereby has similarities with the plan-do-study-act cycles<sup>61</sup> that is commonly utilized to guide healthcare improvement efforts.<sup>52,59</sup>

However, while the plan-do-study-act cycle is a technique for pursuing improvement,<sup>61</sup> the action research cycles are additionally aimed at producing transferable knowledge.<sup>64</sup> Hence, action research, as opposed to traditional research methods, does not distinguish between quality improvement project and research.<sup>64</sup>

The method publications on action research provide guidance primarily on the “action part” but less guidance on the “research part” and the development of theoretical understanding. It is therefore common in action research to use grounded theory for guidance in the analysis.<sup>135</sup> A combination of action research and grounded theory can improve the efficiency of data interpretation, facilitate theorization and increase understanding based on the activities of action research projects. The methodology from action research can support the improvement work and the methodology from grounded theory can add stringency to the analysis and the developed theory or model.<sup>135</sup> In action research, theory/model refers to an explicit set of statements that illuminate a situation by abstracting its main components.<sup>135</sup>

#### *Grounded theory (Study III and Study IV)*

In order to describe and explain teamwork and factors that influence team processes in everyday practice (III), and explain the CP implementation process (IV) in the action research project, Strauss and Corbin’s version of grounded theory<sup>129,136</sup> was considered appropriate. This approach is considered usable to explore a complex and continuously changing social world and enables the development of models/substantive theories that can explain phenomena under study.<sup>129</sup>

The philosophical orientation that underlies and informs Strauss and Corbin’s version of grounded theory methodology is influenced by symbolic interactionism and pragmatism.<sup>129</sup> Thus, grounded theory involves understanding and explaining how participants develop meanings and how these meanings are influenced by organizational, psychological and social factors and events.<sup>129</sup>

In grounded theory, originally developed by Glaser and Strauss,<sup>137</sup> the study design should be emergent and different data sources can be utilized. Throughout a grounded theory study, constant comparative analysis takes place and the analysis and data collection is performed simultaneously.<sup>136,137</sup>

The development of theoretical understanding in grounded theory is a process between the researcher and the empirical data, and the voice of the participants is rendered into the findings. The data collection is purposeful and starts with *open sampling* which aims to maximize variations of experiences and descriptions. Later, *theoretical sampling* takes place, in which the analysis guides what questions to ask and where to look for data in order to saturate emerging concepts and categories. The process continues until *theoretical saturation* is reached, which means that no new data seems

to emerge, that the categories are well developed and that the relationships among categories are well established. Validation of the interpretations is built into each step of analysis and data collection, constantly comparing the interpretations against incoming and previous collected data and making modifications or additions in the categories as necessary.<sup>136</sup>

## Setting and participants

Swedish intensive care provided the setting for all the studies (I-IV). A flowchart of the ICUs is presented in Figure 1.

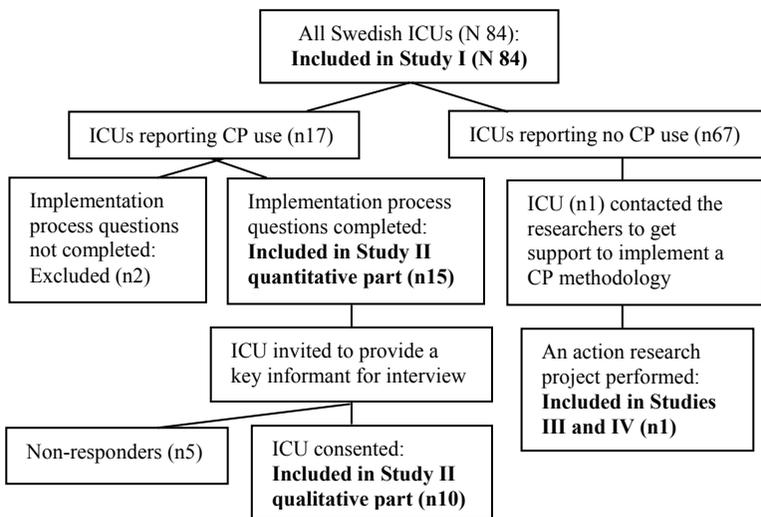


Figure 1. Flowchart of the ICUs participating in Studies I-IV.

### *Study I and Study II*

In *Study I*, the sample included all Swedish ICUs (N84), as identified by the Swedish Intensive Care Registry.<sup>138</sup> A letter with information and an invitation to participate in the study together with a questionnaire was sent by mail to the manager of each ICU. The managers were given the opportunity to participate themselves or delegate the mission to someone else.

In *Study II*, the sample included the ICUs that in the survey (Study I) had reported use of CPs (n17). From this sample, two ICUs were excluded since they had not answered the questions concerning the CP implementation process, resulting in a sample of 15 ICUs in the quantitative part of the

study. Additionally, based on contact information provided by the survey, e-mails were sent to all these 15 ICUs with information about the qualitative part of the study and an invitation to provide a key informant for interview. These invitations resulted in 10 key informants who signed up to participate and they were all included in the study.

Characteristics of the ICUs, healthcare region, hospital category, type and size of the ICU, type of health records utilized, and profession of the informants in the different studies (I-II) are provided in Table 3.

**Table 3** Characteristics of the ICUs and profession of the informants included in the different parts of Studies I and II. Specifications regarding the ICUs that self-reported use of CPs, submitted an example of a CP, replied to the implementation questions in the survey questionnaire, and provided key informant for interview.

Characteristics	Study I			Study II	
	All ICUs (N84)	Reported CP use (n17)	Submitted CP example (n12)	Answered implementation questions (n15)	Provided interview informant (n10)
	n	n	n	n	n
<b>Healthcare region</b>					
North regions <sup>a</sup>	46	5	4	5	3
South regions <sup>b</sup>	38	12	8	10	7
<b>Hospital category</b>					
University hospital	33	6	4	5	4
County hospital	20	7	6	6	5
Local hospital	31	4	2	4	1
<b>Type of ICU</b>					
General <sup>c</sup>	65	14	9	12	7
Specialized <sup>d</sup>	19	3	3	3	3
<b>Size of ICU</b>					
1-5 beds	27	6	3	5	1
6-10 beds	47	9	7	8	7
≥ 11 beds	10	2	2	2	2
<b>Type of health records</b>					
EHR entirely	23	3	2	7	5
Combination of EHR and paper	61	14	10	8	5
<b>Informants</b>					
Manager	46	7	5	6	-
Registered nurse	35	10	7	9	10
Anesthesiologist	1	-	-	-	-
Administrator	1	-	-	-	-
Unknown	1	-	-	-	-

<sup>a)</sup> Northern regions included: Region North, Uppsala-Örebro, and Stockholm-Gotland.

<sup>b)</sup> Southern regions included: Region Southeast, West, and South.

<sup>c)</sup> Included also ICUs limited to: Infection (n2), Gastro-ental (n1), Medical-cardiology (n1).

<sup>d)</sup> Included Thorax (n8), Neuro (n6), Pediatric (n3), and Burn (n2) units.

### *Study III and Study IV*

The setting of Studies III and IV was a general 11-bed ICU in a local hospital in the southeast region of Sweden. The ICU mainly cared for medical-cardiology patients and had the capacity to take care of up to three patients on mechanical ventilation at the same time. Some local guidelines existed but no comprehensive CPs. Health records were kept electronically and on paper-based monitoring sheets.

Contact with the ICU was established as some nursing staff from the ICU contacted the research team in order to get support to implement the CP methodology. This initiative opened an opportunity to perform an action research project in their ICU. Permission to perform the action research project and the included studies was given by the first- and second-line manager of the ICU and ethical permission was given by an ethical review board. All staff members were informed about the action research project and the planned studies in staff meetings as well as by individual e-mail.

*The action research project* had an emergent design and was managed by a voluntary local interprofessional project group, including three RNs, an AN, an anesthesiologist and a physiotherapist, who also acted as internal facilitators in the CP implementation. The author of this thesis and a senior researcher, both RNs, had roles as external facilitators by contributing with experience, promoting reflection and being primarily responsible for data collection and analysis. Based on agreement with the managers and the project group, the function of the external facilitators was to empower the participants in the emerging process, rather than to interfere or govern.

The emergent design led to four partly overlapping phases, including 'initiating and defining the improvement work,' 'exploring and initial drafting' of the CP, knowledge base and included guidelines, 'revising, completing and implementing,' and 'enforcing and evaluating.' All phases included one or more action research cycles of observing, reflecting, planning, and acting. An overview of the phases, time periods, main content of the action research cycles, and the different data sources utilized, is provided in Table 4.

The project group decided to implement a CP for the care of patients on mechanical ventilation. The choice of this patient group was motivated by the complexity and rapid development of their care, and the fact that mechanical ventilation was a common procedure in the ICU, enabling the staff to quickly be familiar with the CP. *The completed CP* included concerns, goals and care activities common and essential for patients on mechanical ventilation, related to respiration, circulation, nutrition, elimination, skin, tissue, activity, pain, sleep, communication, knowledge, cognitions, and psychosocial, spiritual and cultural needs. The related knowledge base included 18 new/revised local guidelines that explained the content in the CP and displayed the evidence base.

**Table 4** Overview of the action research project performed to implement the CP methodology in an ICU (Studies III and IV).

PROJECT PHASE	MAIN CONTENT OF THE ACTION RESEARCH CYCLES			DATA SOURCE*
	Observing and reflecting	Planning	Acting: Developing activities	
<b>1. Initiating and defining the improvement work</b>	<p>November 2011-March 2012</p> <p>Problem identified. Need for change acknowledged.</p>	<p>Initial planning for a project to implement a CP. Researcher contact established.</p>	<p>Acting: Project group and external facilitators assigned. Patient group chosen. Permits obtained.</p> <p>Implementing strategies</p> <p>Project information provided in nursing and anesthesiologist staff meetings and by e-mail.</p>	<p>One project focus group interview. Logbooks/field notes.</p>
<b>2. Exploring and initial drafting</b>	<p>March-November 2012</p> <p>Current practice and existing guidelines scrutinized and reflected upon.</p>	<p>Planning for developing the CP and need to create/revise guidelines.</p>	<p>Acting: Outside world analysis. Evidence search (librarian assistance). Initial drafting of a CP and guidelines.</p> <p>Implementing strategies</p> <p>CP lectures (nursing staff attended). Involved specialized staff for guidelines evidence, and all staff in reviewing drafts.</p>	<p>Two project group and six staff focus group interviews. Two managers and one physiotherapist interview. Logbooks/field notes.</p>
<b>3. Revising, completing and implementing</b>	<p>November 2012-October 2014</p> <p>Perspectives from staff and managers on the drafts were collected and considered.</p>	<p>Perspectives prioritized, plans constructed for revised models of the guidelines and CP.</p>	<p>Acting: Revision and successive intranet publication of guidelines. Composition, clinical testing, and intranet publication of the CP.</p> <p>Implementing strategies</p> <p>Repeated information in nursing staff meetings. Successive implementation of guidelines (from March 2013). Each guideline e-mailed to all staff. Strategically placed copies/sign-up lists. External lecturer about change in sedation regime (reached all staff categories). Implementation of CP when all guidelines were completed (October 2014).</p>	<p>Two project focus group interviews. Logbooks/field notes.</p>
<b>4. Enforcing and evaluating</b>	<p>October 2014-September 2016</p> <p>Use and perceptions of the CP evaluated and reviewed.</p>	<p>Planning for enhanced utilization.</p>	<p>Acting: Repeated information and reminders to the staff. Feedback from data analysis to managers and staff.</p>	<p>Two manager and four project group interviews. Five staff focus group interviews. Questionnaire. Monthly health record screening. Field notes.</p>

\* Study III included data from project phase two (the staff focus group interviews, the physiotherapist interview, and one focus group interview with the project group). Study IV included all presented data from all project phases.

*The sampling* in the studies (III, IV) was open, purposive and theoretical according to the principles of grounded theory.<sup>136</sup> Initially, to get an open sample with maximum variation and also to promote motivation for the project, all staff members in the ICU were informed and invited to participate in the studies. Thereafter, guided by a simultaneously performed analysis, the sampling was purposeful and theoretical, which implied collecting additional data sets as well as returning to previous collected data sets to seek explanations previously overlooked.

All information and invitations were provided through staff meetings, notices in the staff area in the ICU and through personal e-mail. The managers allocated time for the staff to participate in the studies during working time but participation was voluntary. In *Study III*, a total of 38 of 61 (62%) available staff participated; RNs (n19), ANs (n14), anesthesiologists (n4) and a physiotherapist (n1). In *Study IV*, a total of 71 of 92 (77%) available staff and managers participated in some or several parts; RNs (n31), ANs (n26), anesthesiologists (n11), physiotherapist (n1), and the first-line manager (RN) and the second-line manager (anesthesiologists). Additionally, all patients on mechanical ventilation during a two-year period (n136) were included in the health record screening.

## Data collection

### *Study I and Study II*

In *Study I*, data collection was carried out from November 2011 to January 2012. A study-specific survey questionnaire was created based on a review of publications and the researchers' experiences. Face validity of the questionnaire was tested by seven RNs from five different units in three different hospitals, and after minor revisions assessed as valid. The questionnaire included a CP definition<sup>72</sup> and a total of 31 questions, covering the informant's assignment, characteristics of the ICU, extent of CPs, development, content, formation, source of evidence utilized, and implementation process of CPs. The questions were mainly multiple-choice, closed-response options and were accompanied by a space for comments. Additionally, ICUs with CPs were asked to submit one example of the unit's CPs with the related knowledge base. The questionnaire was delivered by postal mail to all ICUs. Two reminders were performed by telephone, in which the opportunity to answer the questions orally was given, resulting in a 100% response rate (N84), including 19 telephone responses. The ICUs with self-reported CPs (n17) that did not submit an example together with the questionnaire were first reminded by e-mail and then by telephone, resulting in examples from 12 ICUs.

In *Study II*, quantitative data from ICUs that had responded to the implementation process questions in the survey (Study I) were utilized (n15). Additionally, qualitative data were collected in early 2012 through semi-structured telephone interviews<sup>139</sup> with key informants from the same ICUs (n10). The semi-structured interview guide was developed based on a review of publications, the researchers' experiences and discussion in a PhD seminar. It was then tested in two pilot interviews with RNs who had experience of CP implementation from other settings (not ICU), and found appropriate. The interviews were performed as a dialog with an initial question: 'Can you please tell me about how you started to use CPs?' followed by probe questions to cover the areas: origin of the idea, development and introduction activities, use of CPs, climate of change, and managers' roles. All interviews (0.3-1 hour/interview) were audio recorded and transcribed verbatim.

### *Study III and Study IV*

In Studies III and IV, data were collected within the action research project. Following the methodology of grounded theory,<sup>136</sup> analysis was performed simultaneously with the data collection and guided where, when and how to collect more data.

In *Study III*, data collection was conducted in 2012, during the early project phase two, when the staff knew about the project but the CP implementation had not yet started. Six focus group interviews<sup>140</sup> with different categories of staff, one individual interview<sup>139</sup> with the physiotherapist, and one focus group interview with the interprofessional project group, were utilized as data sources. In *Study IV*, data collection was conducted from November 2011 to September 2016, all through the project until the two-year follow-up, utilizing all data sources presented in Table 4 above.

Focus group interviews<sup>140</sup> were performed with the project group and different staff categories (1-1.5 hour/session). The staff sessions were held with one staff category at a time to promote an atmosphere that allowed the participants (up to 7/session) to be free to speak. Individual interviews<sup>139</sup> were performed with managers and members of the project group (0.5-1 hour/interview). The focus groups and individual interviews all started with an open initial question that was appropriate for the time being in the project. Thereafter, probe questions were posed depending on how the conversation progressed. Subsequent sessions were planned based on the analysis of the former. Areas covered in the sessions included current practices and collaboration, the project (initiative, roles, progress and facilitating/impeding factors), the CP, the implementation, and the influence on practice and collaboration. All sessions were recorded and transcribed verbatim.

Questionnaires were distributed to all staff before and after the CP implementation. The questions included in Study IV were answered when

the CP had been implemented for approximately one year (in project phase four). The questions included were based on previously developed questionnaires<sup>102,104</sup> and the questionnaire used in Studies I and II, including the areas: general impression of the CP, utilization, patient/relative involvement, usability, documentation, care quality, and the implementation process.

The EHRs of all patients who had been on mechanical ventilation (n136) over a two-year period were retrospectively screened by two RNs in the ICU in order to collect data regarding whether or not the CP was used. Logbooks/field notes of activities and reflections<sup>64</sup> were continuously kept by the project group and the external facilitators.

## Analysis

### *Study I and Study II*

In both Study I and Study II, quantitative data from the survey questionnaire were processed with SPSS.<sup>141</sup> In both studies, descriptive statistics for frequency and distribution<sup>130</sup> were generated and free-text answers and comments were summarized.

In *Study I*, characteristics of the ICUs and the use of CPs were also cross-tabulated and Chi-square tested.<sup>130</sup> Statistical significance was set at  $p < 0.05$ . A document analysis of the submitted CPs was performed concerning content, structure, evidence base and renewal, using audit protocols from a previously conducted survey.<sup>81</sup> Additionally, a complementary study-specific protocol was developed and used to specify the different sources of evidence, the development process and the interprofessional approach. The merged data from the questionnaire and the document analysis were interpreted on the basis of the key characteristics of a high-quality, interprofessional and evidence-based CP, presented in Table 1 above.

In *Study II*, the interviews were additionally analyzed using qualitative content analysis,<sup>142</sup> which included five coherent steps: 1) each transcription was read to become familiarized with the data; 2) meaning units were identified, condensed, abstracted and labeled with codes; 3) codes from all interviews were compared and grouped into categories; 4) the categories were compared and organized into main and sub-categories; 5) through reflective discussions in the research team, the underlying meaning of the categories was interpreted, which enabled two themes to emerge. Finally, the descriptive statistic from the questionnaire data was integrated in the categories that emerged from the qualitative data, which enabled further interpretations about the implementation process. Throughout the analysis process, re-reading, re-sorting and re-labeling took place, until a satisfying understanding of the data was reached.

### *Study III and Study IV*

In both Study III and Study IV, constant comparative analysis according to the principles of grounded theory was conducted, including open, axial, and selective coding.<sup>136</sup> The analysis process started with the first data collection and continued until theoretical saturation was achieved, and a conceptual model was developed and validated in the empirical data.

In both studies, *open coding* was first conducted, in which concepts were inductively identified from focus groups and individual interviews, and in Study IV also from logbooks/field notes. The data was listened to/read repeatedly to find out what was going on and what actors were involved. In Study IV, quantitative data from the questionnaires and health records were additionally processed to generate descriptive statistics for frequency and distribution,<sup>130</sup> which were integrated with the qualitative data. The identified concepts were successively compared, grouped and re-grouped into categories as properties and dimensions of the categories emerged. The analysis proceeded with *axial coding*, in which the categories' interrelations were identified. In this procedure, with the aim of uncovering processes, the categories were sorted according to whether they included conditions, actions/interactions or consequences, and a preliminary theoretical scheme was developed. As the coding progressed into the *selective coding*, a core category was identified, all categories were related to the core category, and the theoretical scheme was refined. The scheme was reviewed for internal consistency. Gaps and poorly developed categories were saturated through theoretical sampling, and a conceptual model was developed. Finally, the conceptual model was validated by testing it on the original empiric raw data.

The analysis process included constantly comparing data back and forth, moving between open, axial and selective coding as new data were collected. This meant reflecting, writing memos and drawing diagrams of interpretations, ideas, assumed associations and theoretical reflections related to each emerging category. An abductive approach was applied,<sup>143</sup> shifting between inductive interpretation and deductive testing as hypotheses evolved. The primary analysis was conducted jointly by the researchers who collected the data. Thereafter reflective discussions took place with the whole research team throughout the analysis and validation of the developed model. Additionally, informal member checks with the participants and methodological discussions with other researchers were performed during the analysis process.

## Ethical considerations

The studies were conducted in line with the ethical principles set out in the Declaration of Helsinki.<sup>144</sup> As Studies I and II included data on a unit level,

and did not include any sensitive information, no ethical approval was needed,<sup>145</sup> as confirmed by the Stockholm Regional Ethical Review Board (telephone conversation October 8, 2010). Studies III and IV were approved by the Uppsala Regional Ethical Review Board (2012/166), and by the management of the ICU.

Consent from the informants was assumed as the questionnaires were returned or questions answered orally. Informed consent for interviews, focus group interviews and logbooks were given by all the participating staff/managers in writing as well as orally. The participants were free to withdraw at any time, without given reason.

The focus group interviews implied considerations about confidentiality.<sup>140</sup> However, all participants agreed to keep confidentiality and not disclose individual views or perceptions from the discussions to other people. The moderators were prepared to interrupt the discussion if it were to get out of hand and risk harming any of the participants. The participants were informed about the possibility to contact the researchers afterwards if they wanted a private talk. Support was also available through the occupational health service if needed. After each session, the participants were asked about how they perceived the participation in the focus group interviews. Only positive comments were revealed and the participants asked for another session as soon as possible, as expressed by one participant: “we should have the opportunity to sit down and talk, and think about our work, more often.”

Another confidentiality issue was the single-setting and small sample size in Studies III and IV. The single physiotherapist, first-line manager, and second-line manager, as well as the participants in the project group, are all possible to identify by others in the study setting as well as by people who know about the study setting. The participants were all aware of that issue when they consented to participate. To ensure their comfort, they were given the possibility to exclude given statements from the data. However, this opportunity was never utilized.

The intervention made in the action research project, implementation of a CP, was part of the ICU’s quality improvement work and the research was not considered to expose the patients to any risk of harm. There was no contact between the researchers and any patients. Screening of EHRs was performed as part of the ICU’s internal evaluation and no patient identities were revealed to the research team. All data were handled to ensure confidentiality. In summary, the ethical risks were thus considered to be minimal and the possible beneficial contribution of the studies was considered to outweigh eventual inconveniences for the participant.

# Findings

## Study I

The survey (I) revealed that 17 (20%) of the 84 Swedish ICUs were using CPs. Characteristics of the ICUs are displayed in Table 3 above. Additionally, 13 (15%) of the ICUs had ongoing projects or imminent plans for CP implementation, and 31 (37%) of the ICUs had thoughts but no concrete plans for CP implementation. There were significantly higher numbers of ICUs using CPs in the southern regions compared to the northern regions (32% and 11% respectively,  $p < 0.05$ ), but no relationships were identified between CP use and hospital category, ICU type, ICU size or applied type of health record. The ICUs had used CPs between one and twelve years (Md 3, IQR 5), with an increasing number of ICUs with CPs during the last couple of years; see Figure 2.

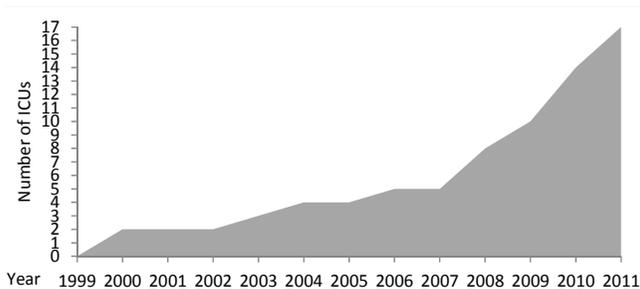


Figure 2. Swedish ICUs using CPs. Cumulative number based on the self-report regarding what year the ICUs implemented their first CP.

In total, the 17 ICUs that were using CPs reported 56 different CPs (1-11 CPs/ICU, Md 2, IQR 1). The document analysis of submitted CP examples (n12) revealed that the 19 key characteristics of a high-quality, interprofessional and evidence-based CP (presented in Table 1 above) were fulfilled in a range between seven and 14 characteristics/analyzed CP (m 11.9, SD 2.8). The findings in the document analysis were not always in concordance with the same ICU's self-report; for example, the self-reported use of systematic reviews and guidelines exceeded the actual use in the submitted examples. Merging the questionnaire findings and the findings from the document analysis of submitted CP examples revealed a great variety of CP characteristics; see Table 5.

**Table 5.** Summary of the findings regarding key characteristics of the CPs, as reported by the ICUs (n17) and as presented in the document analysis of submitted CP examples (n12).

Scope	<ul style="list-style-type: none"> <li>• Wide range of scopes (56 CPs): Specific nursing area (n15); A diagnose (n14); Specified treatment (n13); Surgical procedure (n12); Total care of an ICU patient (n2).</li> <li>• Covering a variety of the care process (17 ICUs): Solely the ICU period (n7), One/several CPs covering also other parts of the in-hospital care path (n10), Covering also out-of-hospital after care (n0).</li> <li>• Inclusion/exclusion criteria explicitly stated in 11 of the 12 CPs.</li> <li>• Most of the CPs covered both medical and nursing issues.*</li> <li>• About half of the CPs were intended for interprofessional use.* Submitted CPs (n12) formed for: RNs (n12), anesthesiologists (n7), ANs (n6), physiotherapist (n1).</li> </ul>
Development	<ul style="list-style-type: none"> <li>• Staff categories participating in the CP's development (17 ICUs): RNs (n17), anesthesiologists (n11), ANs (n10), physician from other clinic (n7), physiotherapist (n5), occupational therapist, speech therapist, dietician, or counselor (n4).</li> <li>• Information about the development team stated in 9 of the 12 CPs.</li> <li>• Information about methods used in the development process (12 CPs): Complete (n2), Some information (n5), No information (n5).</li> </ul>
Content and format	<ul style="list-style-type: none"> <li>• Externally reviewed/endorsed and piloted by the users: 4 of the 12 CPs.</li> <li>• All submitted CPs contained health problem/diagnosis, goal-setting and recommended interventions, but not all ICUs reported such content.</li> <li>• Recommended interventions and outcome assessments (12 CPs): Completely time-framed/criteria-based (n7), Some time frame/criteria base (n3), No time frame/criteria base (n2).</li> <li>• Information about what staff category was responsible for specific measures: Sufficient in 8 of the 12 CPs.</li> <li>• Information about documentation (including variance management): Provided in 11 of the 12 CPs.</li> <li>• Structure that made it possible to follow the care process: Sufficient in 9 of the 12 CPs.</li> <li>• Recommendations in the CP explicitly linked to supporting evidence in a related knowledgebase with references: 9 of the 12 CPs.</li> </ul>
Evidence base	<ul style="list-style-type: none"> <li>• Scientific evidence used in all CPs. Systematic review of scientific evidence was reported by 13 of the 17 ICUs and declared in 7 of the 12 submitted (of which 2 included a declaration that the references were quality-assessed). Additionally, in 2 CPs that did not include any declaration of systematic review, the number and relevance of included papers indicated that a systematic review had been performed. Use of quality-assured guidelines were reported by 14 ICUs and found in 7 of the submitted CPs.</li> <li>• Clinical experience as an evidence source were reported by 14 of the 17 ICUs and found reflected upon and expressed in 7 of the 12 submitted CPs.</li> <li>• Contextual circumstances taken into account were reported by 12 of the 17 ICUs and found expressed and reflected upon in 8 of the 12 submitted CPs, of which 4 had performed a review of health records.</li> <li>• Patients' and relatives' preferences as evidence source were reported by 2 of the 17 ICUs but no ICU had patients/relatives in the development team. Of the 12 CPs submitted, 5 had references to studies of patients'/relatives' experiences. No CP included local experience from patients/relatives.</li> </ul>
Renewal	<ul style="list-style-type: none"> <li>• Information about evaluation and renewal was mostly provided. Reported renewal interval (17 ICUs): Once a year (n8), Every second year (n7), No routine for renewal/missing data (n2). However, two of the submitted had a five-year planned renewal interval.</li> <li>• Varying degrees of up-to-dateness (n12): Developed/renewed the current year (n6); More than 1.5 years since renewal despite planned annual renewal (n2); Over three years since renewal (n4).</li> </ul>

\*Based on the integrated findings from the questionnaire data and review data.

## Study II

The findings in Study II revealed that most of the CP implementations retrospectively explored were perceived as successful. The ICUs (n15) had between one and eleven CPs in their units, and the period since they implemented their first CP ranged between one and twelve years. The implementation of CPs was conceptualized as a process directed at realizing the usefulness and creating new habits, which required enthusiasm, support and time. Based on both questionnaire (n15) and interview data (n10), multiple interplaying factors affected the process; see Figure 3.



*Figure 3.* Implementation process of CPs. Boxes indicate categories, with subcategories, of factors that were perceived to affect the process. Ovals indicate overall themes for how the process was conceptualized. (Reprinted with minor changes, with permission from the publisher of Paper II).

The most common motive for implementing CPs was a desire to improve/assure quality of care, but a motive to facilitate/improve documentation was also revealed. Bottom-up initiatives, interprofessional project groups and small ICUs seemed to promote successfulness. Education, information and reminders in different forms, timing, facilitation and staff involvement were perceived as essential.

Several ICUs had centralized CP support units in their hospital but the support was perceived to be insufficient as regards how to introduce the CP in practice. The complexity of ICU patients were perceived to complicate the implementation of CPs. Additionally, many interviewed key informants felt lonely in their struggle and perceived insufficient support from their managers. Insufficient support, managers that lacked postgraduate degrees, interprofessional disagreements, time constraints, inadequate EHR systems, and sidelined paper-based CPs were perceived to impede the implementation. Further, the evaluation of the implemented CPs was sometimes perceived to be insufficient. The decision to use a CP was often made without involving or informing the patient or relatives. However, if the individual patient's need was not covered by the recommendations in the CP, the CP was abandoned, complemented or adjusted to meet the needs.

General motivational benefits of using the CPs were stated as: quality-ensured and efficient care, increased awareness of the care needs of the patient group in focus, increased application of EBP, and easier documentation. However, old habits were perceived to be difficult to alter, and the staff members' pre-understanding had to be considered when choosing implementation strategy. Characteristics of the CP implementations related to whether they reported successful versus non-successful implementation of their first CP are presented in Table 6.

**Table 6.** Characteristics regarding the CP implementations, specified by units reporting successful versus non-successful implementation of their first CP.

<b>First CP implementation</b>	<b>Successful (n12)<sup>1</sup></b>	<b>Non-successful (n3)<sup>1</sup></b>	<b>Total (n15)<sup>1</sup></b>
<b>Hospital category</b>			
University hospital	4	2	6
County hospital	5	1	6
Local hospital	3	-	3
<b>Type of ICU</b>			
General	10	2	12
Specialized	2	1	3
<b>Size of ICU</b>			
1-5 beds	5	-	5
6-10 beds	6	2	8
≥ 11 beds	1	1	2
<b>Initiative<sup>1</sup></b>			
Bottom-up	6	-	6
Top-down	2	2	4
<b>Project group that implemented the CP</b>			
RNs and anesthesiologists (or also ANs/physiotherapists)	10	-	10
RNs and ANs (or solely RNs)	2	3	5
<b>Support<sup>1</sup></b>			
Centralized CP support unit	5	1	6
No centralized CP support unit	3	1	4
<b>Implementation strategies</b>			
Education/training at implementation	12	3	15
Repeated training	9	1	10
Written information	3	-	3
Internal facilitator	9	2	11
External facilitator	2	1	3
Repeated reminders	11	3	14
Feedback given	11	1	12
<b>Number of strategies</b>	<b>2-8</b>	<b>1-5</b>	<b>1-8</b>
<b>Format of CP document</b>			
Separate paper	7	-	7
Included in EHR	5	3	8
<b>Evaluation of the CP</b>			
Feedback from staff	10	1	11
Review of health records	9	1	10
Feedback from patients/relatives	2	-	2
<b>Estimated use of the CP</b>			
All intended patients	9	-	9
Usually	3	2	5
Seldom	-	1	1

<sup>1)</sup> *Initiative* and *Support* only include data from the ICUs participating in the interviews (n10).

## Study III

In Study III, a conceptual model was developed that describes and explains teamwork and factors that influence team processes in everyday practice in an ICU from a staff perspective (RNs, ANs, anesthesiologists and physiotherapist). The ICU staff's main goal was to obtain progress in the care process in order to improve the patients' health, which could include either recovery or death with dignity. Additionally, the staff strived for patient safety as well as comfort in the situation for both the patients and their relatives. In this mission they perceived interprofessional teamwork as essential. The core category 'balancing intertwined responsibilities' conceptualized the teamwork and was embedded and generated from the conditions of everyday practice in the ICU; see Figure 4.

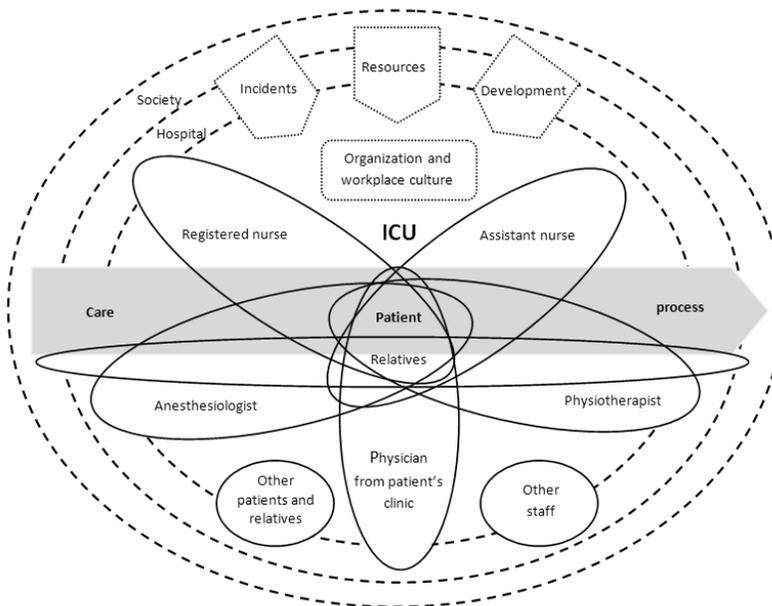


Figure 4. Illustration of the core category 'balancing intertwined responsibilities,' the care process and the conditions that formed the everyday practice in the ICU. (Reprinted with minor changes, with permission from the publisher of Paper III).

Eleven categories were found relating to the core category, all closely interrelated. Two of the categories were related to *contextual conditions* that referred to the fundamental and general circumstances in which the care process and teamwork existed. The contextual conditions generated two categories of *causal conditions* that explained why the balancing of intertwined responsibilities occurred. Further, two categories were related to *intervening conditions* that referred to factors that fluctuated from time to

time and from individual to individual and influenced the team processes. Three of the categories were related to *actions/interactions* which explained how the actors handled the occurring conditions by constantly and simultaneously moving and balancing on different continuums. The actions/interactions, or lack thereof, led to two categories of *consequences*, which in turn influenced the contextual conditions, causal conditions, intervening conditions, the phenomenon ‘balancing intertwined responsibilities’ and the staff’s forthcoming actions/interactions; see Figure 5.

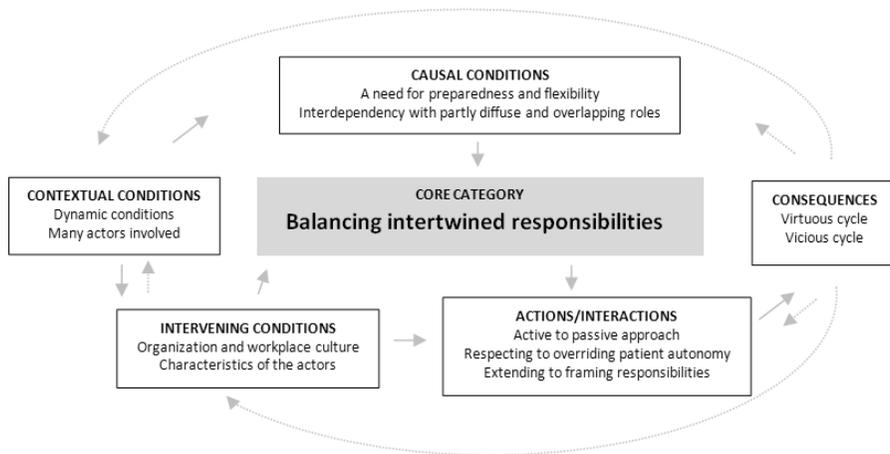


Figure 5. The process of balancing intertwined responsibilities, a conceptual model of teamwork in everyday practice in the ICU. (Reprinted with minor changes, with permission from the publisher of Paper III).

The findings revealed that type of teamwork fluctuated due to shifts in contextual, causal and intervening conditions. Although the workplace culture emphasized the importance of interprofessional teamwork, a traditional hierarchical order was prominent, and interprofessional long-term care planning was perceived as insufficient. The intertwined responsibility, interdependency and partly diffuse and overlapping roles to some degree enabled the staff to cover up for other staff categories, but on the other hand sometimes hindered optimal team performance. Functional everyday teamwork and progress of the care processes largely depended on individual team members’ attitude and commitment. Further, the ICU team seemed to work autonomously, without perceiving a need for a leader in everyday practice.

## Study IV

In Study IV, a conceptual model was developed that explains the process of implementing a CP based on a bottom-up approach in an ICU context. The participants' primary concern during the implementation process was to make the CP usable and acceptable in everyday practice. 'Struggling for a feasible tool' emerged as a central phenomenon and the core category that linked all other categories. The phenomenon evolved from the *Triggers*, pervaded the *Implementation process*, and led to the process *Output*. The findings illuminate a complex interplay that had consequences for the implementation process and output; see Figure 6.

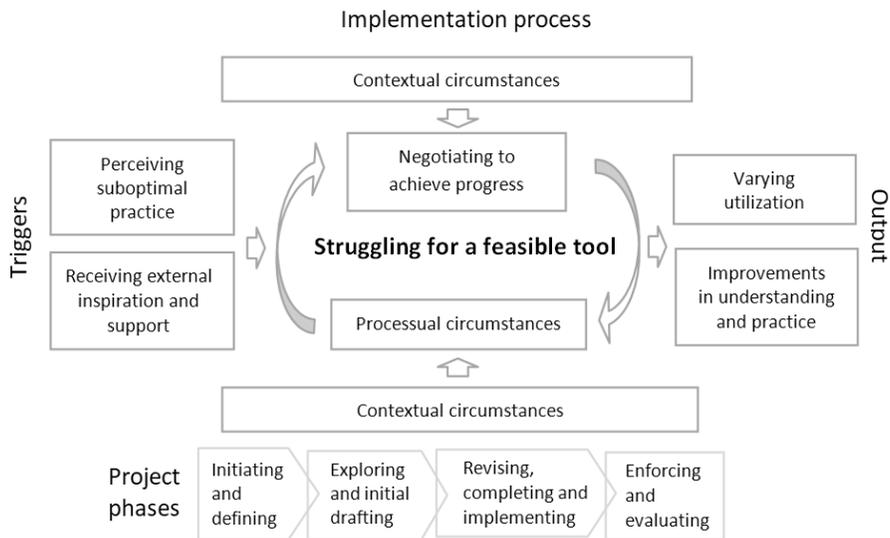


Figure 6. Conceptual model of the process of implementing a CP based on a bottom-up approach in an ICU. (The figure is also included in the submitted manuscript of Paper IV).

Major triggers for the implementation process were identified as: *Perceiving suboptimal practice*, and *Receiving external inspiration and support*. Perceiving suboptimal practice included: *Inequalities*, characterized by insufficient continuity of care, non-patient-specific variations, insufficient guidelines and lack of evidence utilization; *Documentation deficits*, characterized by few health records that displayed planned care, and too extensive nursing documentation; and *Role vagueness*, as revealed in Study III. Receiving external inspiration and support included: *Realizing a possible solution* when some nursing staff heard about CPs from other ICUs and at a national conference; and *Contact with external facilitators* that was initiated when the ICU participated in the national survey on CP use (I).

The implementation process implied *Negotiating to achieve progress*, which was imposed and influenced by both the pre-existing *Contextual circumstances* and the emerging *Processual circumstances*. The negotiations and different circumstances progressed in a dynamic interplay, which had facilitating as well as impeding influence on the implementation process and thereby consequences for the process output.

The contextual circumstances originated from both local and general conditions that included: *Organization and workplace culture*, characterized by separate managers for nursing staff and anesthesiologists as well as separate staff meetings and separate guidelines, a traditional hierarchical structure, an atmosphere that emphasized interprofessional teamwork, and change willingness; *Different pre-understanding*, characterized by varied levels of education, and varied knowledge about evidence utilization and CP methodology; and *Shifting premises with limited resources*, characterized by rapid development, and fluctuation in care burden and staffing, which meant a continual adaptation of activities.

The processual circumstances emerged over time as a result of the contextual circumstances and occurring negotiations in the project and included: *Vague leadership*, *Few interprofessional meetings*, *Diffuse vision*, *Unequal information and staff involvement*, and *Delayed follow-up* that largely impeded the implementation process. Additionally, the processual circumstances included *Enthusiasm and support* that facilitated the process and enabled the project to be completed.

The negotiation to achieve progress implied flexibility, pragmatism and orientation-reorientation in the interactions but also with respect to the actors' own pre-understanding. The negotiations occurred in *Role-setting and working methods*, *CP modeling*, and *Activity timing*. As a consequence, the implementation process became tentative and prolonged, and the CP was completed with a less extensive knowledge base than originally stipulated. According to the initial plan, the CP and all guidelines that constituted the knowledge base were to be implemented within one year from project start. In the end, the mission was completed 2.5 years after project start. Furthermore, due to an EHR system that was not able to include CPs and delayed accessibility via the intranet, the CP was not taken into use until a further four months had passed.

Facilitators in the implementation process primarily included: a local enthusiasm and motivation to improve practice, internal facilitators, staff involvement, and a supportive first-line manager. Additionally, a feeling of local ownership of the project and the action research design were perceived to be empowering, to enhance the project legitimacy and lead to improved understanding and practice. Impeding factors primarily included: insufficient interprofessional collaboration, traditional hierarchical structure, a diffuse vision, resource variability, and vague leadership. This altogether contributed to the output of the implementation process.

The output of the implementation process included *Varying utilization* of the CP while perceiving *Improvements in understanding and practice*.

The varying utilization included that, although the CP was intended for interprofessional use, it was primarily utilized as *A nursing tool*. Additionally, although patient autonomy was desired, the decisions to use the CP were often made without involving or informing the patients or their relatives. Furthermore, although most staff members perceived the implementation as successful, and stated that the CP was used for nearly all patients on mechanical ventilation, a *Fluctuating documentation* of CP use was revealed in the EHR screening; see Figure 7. A total of 28% of the EHRs included documentation regarding CP use. Of the EHRs from patients who had been on mechanical ventilation for more than one day (n70), 49% included documentation regarding CP use. However, in some months no EHR included documentation regarding CP, while in other months all did. The proportion increased for some months when the retrospective EHR screening started (May 2015) and when feedback regarding the questionnaire was given to the managers and project group (January 2016), but did not appear to be affected by the staff focus group sessions or number of patients on mechanical ventilation.

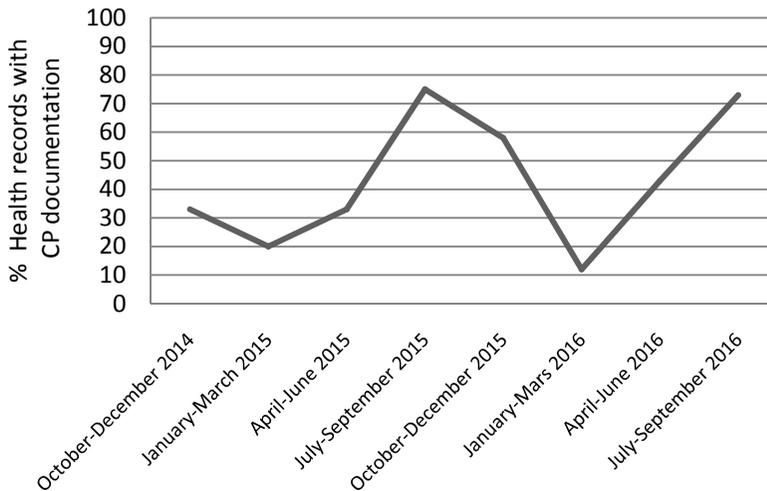


Figure 7. Proportion of health records from patients who had been on mechanical ventilation more than one day (n 70) that included documentation regarding CP use.

Despite varying utilization of the CP, the project group, managers and staff perceived improvements in understanding and practice. They perceived the CP as a feasible tool that facilitated their everyday teamwork and, to some degree, contributed to overcoming the previous issues. The perceived improvements included: *Knowledge expansion*, *Clarified roles*, *Improved documentation*, and *Care equality*, which were perceived as facilitating EBP, enhancing the continuity of care and decreasing non-patient-specific variations, which enhanced care quality and patient safety. Care was perceived to be adjusted from the recommendations made in the CP in order to meet the individual patient's need, but less dependent on which staff members were on duty. However, although care continuity was perceived as improved, the care process remained largely dependent on the anesthesiologist on duty.

# Discussion

## Summary of findings

The present thesis provides comprehensive empirical knowledge and understanding of CP implementation and teamwork in Swedish intensive care. The survey (I) revealed that one-fifth of the ICUs were using CPs and many ICUs had plans or thoughts for CP implementation. The quality, extension, and content of the CPs in use varied greatly regarding the degree to which they were interprofessional, evidence-based and renewed (I).

Based on survey data and perceptions from informants that retrospectively reflected on CP implementations in their ICUs (II), implementation of CPs was a process directed at realizing the usefulness and creating new habits, which requires enthusiasm, support and time. Additionally, the prospectively in-depth exploration of a bottom-up-initiated action research project (IV) revealed that ‘struggling for a feasible tool’ was a central phenomenon in the CP implementation process, and that the process included several areas of negotiations to achieve progress.

Based on findings from both Studies II and IV, the CP implementation process was affected by multiple facilitating as well as impeding interplaying factors that in turn had consequences for the process output. Facilitating factors were mainly: bottom-up initiatives, interprofessional project groups, small ICUs, local enthusiasm and motivation to improve practice, user-friendly CP format, internal and external facilitators, staff involvement, and supportive managers. Implementation strategies perceived as essential included education, information and reminders in different forms. Further, the timing of activities was of importance. Impeding factors were mainly insufficient interprofessional collaboration, insufficient support and leadership, inadequate EHR systems, time constraints, and insufficient follow-up and evaluation (II, IV).

The exploration of teamwork and factors that influence team processes in everyday practice in an ICU (III) revealed that the teamwork was an act of ‘balancing intertwined responsibilities.’ The type of teamwork fluctuated, and the team processes were affected by involved individuals and shifting circumstances that the staff responded to, which created virtuous or vicious cycles of the teamwork (III). The CP implementation (IV) was perceived to clarify the roles of different staff categories, and to some extent facilitate the interprofessional teamwork. Additionally, based on the participants’

perceptions (II, IV), a CP implementation affected the everyday practice by: increased awareness and understanding of the care needs of the patient group in focus, increased knowledge and application of EBP, and improved documentation. This altogether was perceived to enhance efficiency and continuity of care, and decrease non-patient-specific variations, which enhanced quality of care and patient safety, and provided staff and managers with a sense of security (II, IV). Summarily, however, the studies revealed that achieving EBP and interprofessional collaboration were challenging (I-IV).

## Prevalence of clinical pathways and factors affecting implementation

At the time of the survey (I), one-fifth of the Swedish ICUs used CPs and many ICUs had plans or thoughts for CP implementation. In total, 56 CPs for a variety of health issues, and with varying quality, content and evidence bases, were in use (I). This is novel knowledge and indicates that the amount of ICUs using CPs to date has probably increased and will continue to increase in the near future. As CPs can promote quality of care, patient safety, and resource utilization,<sup>7,18</sup> the increasing use is probably beneficial for patients as well as healthcare providers. However, the presumed increase of CPs places demands on the implementation process to ensure that the quality, content and evidence base become appropriate, and the CPs are reflectively applied in practice.

Although most of the explored CP implementations were perceived as successful, the findings reveal that the process was affected by multiple interplaying factors (II, IV). The revealed factors correspond with the i-PARIHS framework<sup>31</sup> and other frameworks/models,<sup>53,76</sup> proposing that the success of implementation depends on characteristics of the innovation, recipients, context and facilitation. However, as further displayed below, the present empirical findings contribute with novel knowledge and understanding of the implementation of CPs as an innovation in the context of Swedish intensive care. The findings also contribute with further knowledge of the ICU context, by providing enhanced understanding of teamwork and interprofessional collaboration in everyday practice as well as in the CP implementation process.

## Quality of the clinical pathways – the innovation

Characteristics of the innovation object are proposed to influence successful implementation.<sup>31</sup> Clinical pathways are complex interventions<sup>19,69</sup> and

thereby, as the present studies revealed, they are complex innovation objects (I, II, IV).

The primary aim of CP implementation is to promote EBP and thereby highly reliable and high-value care.<sup>7,69,70</sup> Hence, it is essential that CPs are developed from a systematically developed evidence base, are inter-professional, and are regularly evaluated and renewed to assure updated content.<sup>7,69,70</sup> A solid underlying evidence base is also proposed to promote successful implementation.<sup>31</sup> Additionally, usability in practice and observable effects are known to promote implementation and sustainability,<sup>31</sup> which further emphasizes the importance of evaluation and renewal.

### *Evidence base*

The present survey (I) revealed that all ICUs utilized scientific publications as evidence source in their CPs. However, the publications were not always systematically reviewed and seldom quality-assessed. Clinical experience and contextual circumstances were utilized as evidence source in the CPs by only about three-quarters of the ICUs and inclusion of patients' and relatives' preferences was even more scarce (I). However, clinical experience is embedded in practice, often tacit and intuitive, and thereby most likely embedded in the determination of recommendations in the CPs, although not explicitly expressed. Further, almost half of the submitted CPs included references to publications about ICU patients' experiences (I), indicating that patients' experiences at a collective level were utilized to some degree.<sup>43</sup>

The CP for patients on mechanical ventilation that was developed and implemented within the action research project (IV) was based on some scientific evidence. However, due to the negotiations that took place in the development process, the publications were not systematically reviewed or quality-assessed. Clinical experience and contextual circumstances were included as evidence sources, although not explicitly stated in the document, but patients' experiences were not included. Hence, the evidence base of the CP was not optimal, which might be a contributing factor to the limited use of the CP among the anesthesiologists (IV).

The fact that latest evidence is not always integrated in the CPs is a previous known weakness of the methodology.<sup>78,83,86</sup> In 2005, a survey within Swedish in-hospital care revealed that only 32% of the submitted CPs referred to any peer-reviewed publication,<sup>81</sup> and in 2006, half of the 23 countries participating in an international survey stated that less than 40% of their CPs were evidence-based.<sup>75</sup> Although the present findings (I) compared to these previous surveys<sup>75,81</sup> indicate a welcome improvement, further progress would be beneficial and the use of review articles and quality-assured guidelines should be encouraged.<sup>5</sup> Additionally, to disseminate clinical experience and enable critical analysis and reflection, the tacit experience must be made explicit.<sup>43,70</sup> It would therefore be beneficial if the

reflections that take place in the CP development process were expressed in the final documents more fully. Further, the involvement of patients and relatives in the development of CPs can promote creation of high-quality documents<sup>43,69,70</sup> and should thus be extended.

#### *Interprofessional content and usability*

Clinical pathways should be used by the entire interprofessional team and are supposed to clarify the roles of different staff categories.<sup>7,70,77</sup> However, in the present survey (I), less than half of the ICUs stated that their CPs were formed for interprofessional use (I). Additionally, although most of the CPs covered both medical and nursing issues, one-third of the submitted CPs lacked sufficient information about what staff category was responsible for the measures (I). Consistent with CPs in other European countries,<sup>75,84</sup> the CPs in Swedish ICUs were mainly formed for RNs (I). Hence, the present findings reveal that the interprofessional approach in existing CPs was largely insufficient (I). In order to promote interprofessional teamwork, further effort is needed to also make the CPs interprofessional.

A central phenomenon that permeated the CP implementation process was the struggle for a feasible tool, implying a tentative process to make the CP usable in practice (IV). Usability and fit to existing practice are known to promote successful implementation of an innovation.<sup>31,53</sup> Thereby, as revealed by the present findings, not only the content but also the format of the CP is of importance for successful implementation (II, IV).

The CPs are assumed to provide guidance in the care process as well as ease and improve documentation in the health record.<sup>20,21,70</sup> However, inadequate EHR systems impeded the CP implementations (II, IV), and sometimes hindered ICUs to even try to implement CPs (I). All ICUs applied EHR (I), but since the EHR systems commonly did not manage to incorporate CPs, the CPs often had to be paper-based (II, IV). The paper-based CPs were perceived to be easily sidelined (II), which was also indicated in the action research project (IV). Although the staff stated that the paper-based CP was used for nearly all patients, information about the use was found in only about half of the EHRs from patients who had been on mechanical ventilation for more than one day (IV). Inadequate EHR systems are an issue also revealed in other CP studies.<sup>104,146</sup> To have divided information about the patient care leads to a risk of missing information. For compliance, it is important that the CP is integrated in the main health record.<sup>147</sup> Hence, to facilitate increased CP implementation and enable systematic follow-up and variance analysis, the issue of insufficient EHR systems merits greater attention by healthcare services.

#### *Evaluation and renewal*

Another issue revealed in the present findings was that while half of the CPs had been developed or renewed within the latest year, some CPs were more

than three years old (I). Additionally, while most of the CP implementations were perceived as successful, the variance management and evaluation of the implemented CPs were too often insufficient (II, IV). Vanhaecht et al.<sup>69</sup> purpose that CPs should preferably be evaluated and the content re-considered every half year and at least every year. However, a lack of systematic evaluation has also been revealed in other studies.<sup>102,146</sup> CP quality and sustainability are thereby compromised, which may jeopardize the stipulated quality improvement<sup>7,69,70</sup> and lead to a risk that patients are not receiving the best available care.

To develop, implement, evaluate and maintain CPs to achieve sustainability is a never-ending process and lessons are learned over time.<sup>70,91</sup> The present findings reveal that this mission places great demands on resources, knowledge and skills in the local organizations (II, IV), which are further discussed below.

## Staff and managers – the recipients

Characteristics of the recipients on the individual as well as collective team levels are proposed to influence successful implementation.<sup>31</sup> In the complex care of ICU patients, interprofessional teamwork is essential,<sup>11,14</sup> which was also confirmed by the present findings (III). Hence, the primary recipients in a CP implementation are the interprofessional team.<sup>7,70,77</sup> However, the management is responsible for overall organization and quality of care,<sup>37,38,95</sup> and thereby allocation of resources, support and authorization for a CP. Managers are thus also recipients in a CP implementation.

### *Everyday teamwork in an ICU*

The conceptual model developed in Study III helps to describe and explain teamwork and factors that influence team processes in everyday practice in an ICU from a staff perspective. The model contributes with some novel insights of the dynamic in the process of balancing intertwined responsibilities, and thereby complements current frameworks about interprofessional teamwork<sup>33</sup> and ICU team performance.<sup>11,12,148</sup>

The everyday teamwork seemed to be mainly interprofessional, although fluctuating due to circumstantial factors (III), which is consistent with international descriptions of ICU teamwork.<sup>34,114,149</sup> However, although the culture seemed to be in favor of interprofessional teamwork, a traditional hierarchical order was prominent, and the staff did not always act as an interprofessional team. Functional teamwork, and the care process' progress, largely depended on individual team members' attitudes and commitment. Sometimes, for example due to high workload or individuals' attitudes, the different staff categories worked parallel to each other (III), implying that the teamwork was multiprofessional.<sup>32</sup> On the other hand, sometimes the

boundaries of different staff categories' roles were extended in order to cover for other staff categories (III), indicating some informal task shifting and thereby partial transprofessional teamwork.<sup>32</sup> Furthermore, as also revealed by others,<sup>110,114,150</sup> interprofessional long-term care planning was perceived to be insufficient (III). Mutual planning and collective decisions<sup>151</sup> as well as clear roles are important for optimal interprofessional team performance.<sup>11,12,33</sup> Hence, as in many ICUs,<sup>13</sup> the ICU participating in the action research project (III) had potential for improvements in the everyday teamwork.

Interventions tailored for the specific context are more likely than others to have an effect on the desired improvement.<sup>5</sup> The dynamic in the ICU teamwork revealed in the present findings (III) is thus essential to understand when aiming to implement innovations in the pursuit of improvements in care quality and patient safety.<sup>11,148,152</sup>

#### *To realize the usefulness*

The present studies revealed that the recipients' primary motive for implementing CPs in the ICUs was to improve or safeguard care quality, including clarifying roles and responsibilities, and improving documentation (II, IV), which is consistent with the CP methodology intention.<sup>19</sup> Most of the explored CP implementations originated from a need identified by the recipients, i.e. a bottom-up initiative (II). The awareness of patient safety issues, and need for evidence-based and reliable care, has increased in recent decades.<sup>8,91</sup> Further, the emphasis of healthcare professionals' dual mission, to possess both professional practical competence and improvement competence, has increased.<sup>153</sup> This altogether probably encourages bottom-up initiatives for quality improvements. However, the present findings revealed that although some recipients had realized the potential benefits of implementing a CP methodology, the mission to convince managers and colleagues required great enthusiasm and commitment (II, IV).

In order to succeed with the implementation, the recipients, i.e. staff and managers, needed to realize the CPs' usefulness (II, IV). Thereby the CPs needed to be user-friendly and have perceived benefits for the staff as well as the patients (II, IV). Motivational benefits were the quality-ensured and efficient care with increased continuity, increased awareness of the care needs of the patient group in focus and the team members' responsibilities, increased application of EBP, and easier documentation (II, IV). However, as relative advantage and observable effects are known to promote successful implementation<sup>31,53</sup> the sometimes insufficient evaluation and feedback revealed in the present studies (II, IV) probably impeded the implementation and sustainability. Additional complicating aspects for realizing the usefulness were the range of pre-understanding and engagement among the recipients (II, IV).

### *Different pre-understanding*

The ICU staff includes several different professions with a wide range of education levels<sup>113</sup> and sometimes different priorities.<sup>34,35</sup> Additionally, individuals have different lengths of clinical experience and different interests. Hence, as revealed in the present findings (II-IV), knowledge regarding pathophysiology and treatment as well as evidence utilization, improvement work and CP methodology differ dramatically between as well as within the different staff categories. These circumstances affected the interprofessional collaboration in the implementation process, impeded the development of an interprofessional CP that was usable for the whole team (IV), and impeded successful implementation into practice (II, IV).

Managers' roles in the implementation of EBP in general tend to be passive and limited due to competing demands.<sup>154</sup> The present findings indicate that this may also be the case in the implementation of CPs (II, IV). Many of the key informants expressed insufficient support from their managers in the implementation process (II). This was partly evident also in the action research project (IV) as the managers took a mainly passive role since they relied on the project group to handle the implementation themselves. Further, although authorized by the ICU management, the project lacked strategic priority, which affected the resource allocation (IV). A lack of managers with postgraduate education was perceived as a barrier in the CP implementations (II). Postgraduate education can enhance awareness of the importance of EBP.<sup>155</sup> In the light of this, higher academic education among managers would probably be beneficial in order to give EBP and CPs increased priority.

### *Engaging the recipients*

Involving the recipients in the implementation process is suggested to enhance the understanding of the innovation and promote change willingness,<sup>31,53,63</sup> which was also revealed in the present studies (II, IV). However, the national studies revealed that the project groups that had developed the CPs all included RNs. Additionally, many project groups included ANs, and some included physiotherapists or other healthcare professions, but only about two-thirds of the project groups included anesthesiologists (I, II). Hence, the approach in the implementation process was largely insufficiently inter-professional, which impeded the success of the implementation effort (II).

The interprofessional collaboration in the project group was also problematic in the action research project due to different pre-understandings as well as staff shortages and a traditional hierarchical structure (IV). Formally, the project group was interprofessional (IV). However, as in the national studies (I, II) and other improvement initiatives,<sup>156</sup> RNs were the most represented staff category and there were few interprofessional meetings (IV). Given that these RNs, as well as the participating AN, had

great credibility, they were adequate local opinion leaders for the nursing staff. However, the anesthesiologists did not have an equivalent opinion leader and were not as informed or involved in the process as the nursing staff. This discrepancy might explain the perception of the CP as a nursing tool and its limited use among anesthesiologists (IV).

Due to physicians' authoritative position, their participation is generally important for successful implementation<sup>5,69</sup> and the lack of their involvement is one of the reasons cited for failure to implement CPs.<sup>93</sup> Possible reasons for the lack of involvement of physicians in the CP implementations might be staff shortages and/or a skeptical attitude towards CPs due to a fear of losing control over decision-making.<sup>157</sup> An additional reason, as indicated in the action research project (IV), might be insufficient understanding of the CP methodology. Having mandatory education, training and meetings for all staff categories would probably facilitate further involvement of the anesthesiologists.

## Intensive care – the context

The complex context of intensive care<sup>10,12</sup> motivated CPs but the implementation process was affected by cultural factors such as hierarchical structures, and by available resources in the dynamic conditions (II, IV).

### *Hierarchical structures*

The interprofessional collaboration in Nordic countries' healthcare are presumed to be greater than in non-Nordic countries.<sup>118</sup> However, in the studies exploring CP implementation processes (II, IV), some inter-professional disagreements were revealed, as previously described from other countries.<sup>114,116,117</sup> Additionally, despite a friendly workplace culture in the ICU that participated in the action research project, a traditional hierarchical structure was prominent (III, IV). This hierarchical structure sometimes hindered optimal interprofessional collaboration and decision processes, and implied that RNs and ANs sometimes resigned for decisions and actions they considered disadvantageous (III, IV). A factor that impeded collaboration was that nursing staff and anesthesiologists had separate managers and separate staff meetings (III, IV). Hence, the opportunities for collective reflections were limited.

Hierarchical structures were not specifically explored in the ICUs included in the national studies (I, II). However, the underrepresentation of anesthesiologists in the CP implementations as well as in the use of CPs (I) indicate that a traditional hierarchical structure is common in Swedish ICUs. Consequently, despite an overall move towards more interprofessional teamwork, clinical decision-making is still problematic and continues to be

an authoritative process,<sup>33,158</sup> with the consequence that functional teamwork depends on individual team members' willingness (III, IV).

Reeves et al.<sup>33</sup> propose that hierarchical structures are closely related to a culture of animosity about shared professional power. Because the traditional hierarchy has physicians/anesthesiologists at the top, it might be assumed that the responsibility for limited interprofessional teamwork rests on this group. However, RNs in Swedish intensive care have a high professional status and are traditionally used to perform nursing activities as well as some medical decisions without involvement of the anesthesiologists. Therefore, an alternative explanation is that the RNs consciously or unconsciously exclude the "higher" profession, in the everyday practice as well as in improvement projects, to shield their area of power.

It is known that a traditional hierarchical structure could compromise interprofessional collaboration,<sup>33,158</sup> and difficulties involving all staff and conflicts due to diverse professional backgrounds commonly impede implementations.<sup>5,65</sup> Additionally, managers are known to greatly influence culture and organization.<sup>11,33,148</sup> Hence, in order to promote the inclusion of all staff categories as well as patients and their relatives in the everyday care process as well as in improvement projects, such as for example CP implementation, the managers need to take a more active role, and forums for collective reflections be established.

#### *Resources in the dynamic conditions*

As discussed above, development, implementation, evaluation and maintenance of CPs is a never-ending process,<sup>70,91</sup> which places great demands on resources in the local organizations (II, IV). Furthermore, due to advances in understanding pathophysiology and innovations in supportive technology, the intensive care is subject to rapid development and alterations.<sup>10</sup> The common alterations within the specialty made the ICU staff accustomed to frequent alteration (III, IV). However, as revealed in the present findings, contemporaneous alterations led to competing interests (IV). Timing of implementation activities is therefore essential in order to avoid information overload.

Allotting adequate time must be considered when planning CP implementations and necessary resources must be given to the task.<sup>157</sup> The ICUs in Sweden, as well as in other countries, are struggling with economic constrains and staff shortages.<sup>10,95</sup> Thereby, the revealed deficiencies in evidence base and renewal of the CPs, as well as the insufficient amount of interprofessional project groups, may be due to local managements' priorities. Another reason for the insufficient evidence base may be lack of knowledge of EBP and how to appraise scientific publications,<sup>5</sup> which emphasizes the need for support and skilled facilitators.<sup>31,59</sup> Hence, in order to enhance the quality of the CPs, further support and guidance are needed,

and further cooperation within the field is suggested to make the best use of the limited resources available.

## Strategies and support – the facilitation

For the innovation to be adopted by the recipients in their context the implementation process needs to include facilitation, e.g. strategic activities and support from facilitators.<sup>31</sup> However, the present findings revealed that the facilitation in the CP implementations were sometimes insufficient (II, IV).

### *Facilitation strategies*

Although there is no evidence that multiple strategies in the implementation process increase the effect,<sup>62</sup> multi-component strategies are generally regarded as more successful than single strategies.<sup>5,62</sup> In the explored implementation processes, slightly more strategies were used in the processes that were considered to be successful than in the ones that were considered to not be successful (II). This is an indication in favor of multi-component strategies. However, due to the small sample, no firm conclusions are possible. Commonly utilized facilitation strategies, such as education, training, reminders and feedback,<sup>5,31</sup> were revealed as common also when implementing CPs in ICUs (II, IV). Moreover, although previously revealed to have a modest effect,<sup>5</sup> these strategies as well as timing, facilitation and staff involvement were perceived as essential for altering old habits (II).

Coxon et al.<sup>76</sup> conclude from their literature review of CPs for enhanced recovery after surgery that engaging internal facilitators are essential in order to achieve successful implementation. The present findings reveal that this is evident also in CP implementations in the ICU context (II, IV).

Six out of ten explored CP implementations originated from a bottom-up initiative (II). A bottom-up initiative seemed to enhance implementation successfulness as it led to a feeling of local ownership for the project, empowered the participants, incorporated knowledge and understanding of the local conditions, and enabled local internal facilitators, training and reminders (II, IV). Consistent with previous findings,<sup>76,91,102</sup> this promoted motivation and change willingness (II, IV). Additionally, as proposed,<sup>64,65,157</sup> combining implementation with a research agenda was attractive to the ICU staff, and perceived to enhance the project's legitimacy (IV). Furthermore, the empowering approach in the design<sup>64,65</sup> contributed to perceived improvements in understanding and practice (IV).

However, the bottom-up approach also included challenges. According to the present findings (II, IV), the progress in the implementation and the sustainability in the CP utilization were largely dependent on enthusiastic

individuals, which made the process vulnerable for staff turnover. Different pre-understanding, diffuse vision, insufficient leadership, support and guidance, and lack of predefined design of the implementation, as well as time restraints made the implementation process tentative and prolonged (II, IV). Prominent in the findings were the multiple negotiations that occurred throughout the implementation process. The negotiations were performed to achieve progress, but in some cases, the results contra productivity made the implementation process suboptimal (IV).

In summary, the present findings advocate multi-component strategies and confirm the strength of engaging recipients (II, IV), as advocated by both implementation researchers<sup>31,53,91,159</sup> and action researchers.<sup>64,65</sup> However, there is a prominent need for better facilitation (I, II, IV).

### *Facilitators*

A need for better support and guidance as well as resources in the CP implementation was prominent in the findings (I, II, IV). When these components were insufficient, the implementation process become tentative and prolonged, the quality of the CPs suboptimal, and evaluation and renewal of the CPs inadequate (I, II, IV), which is also described by others.<sup>91</sup>

The national study revealed that the majority of ICUs had used internal facilitators<sup>31</sup> when implementing their first CP, regardless of whether the initiative for the implementation was bottom-up or top-down (II). Internal facilitators were also used in the ICU that participated in the action research project (IV). The facilitators acted as opinion leaders, performed training sessions and provided reminders and feed back to their colleagues (II, IV). However, several of the internal facilitators perceived lack of support (II, IV). About half of the ICUs had access to centralized CP support units in their hospital and some ICUs had utilized external facilitators<sup>31</sup> (II). However, these support units and external facilitators were perceived to mainly facilitate the development of CPs, and did not provide sufficient strategies to support the recipients to adopt the CP methodology in practice (II). In the ICU that participated in the action research project, two of the researchers acted as external facilitators (IV). The external facilitators' function was to contribute with experience, promote reflection and be primarily responsible for data collection and analysis, not to interfere or manage the project. The support from the external facilitators was perceived to be useful by the managers as well as by the project group that acted as internal facilitators. However, the lack of predefined design and firm guidance affected the quality of the CP and made the whole implementation process tentative and prolonged. On the other hand, the local ownership of the project empowered the participants and promoted the change willingness among the recipients (IV).

Hervey and colleagues<sup>31,59</sup> emphasize that facilitators need to balance between the expectance to achieve the goal of the innovation, the

development of teamwork processes, and the building of improvement capacity among the involved actors. Hence, the facilitators need to have technical and process skills as well as personal attributes, such as being flexible, pragmatic, empathetic, credible, resilient and passionate. Hervey and colleagues<sup>31,59</sup> further emphasize that facilitation should be operationalized through a network of novice, experienced and expert facilitators. Such organization could enable the application of skills and strategies to structure the implementation process, manage relationships between the actors, and identify and negotiate emerging barriers.<sup>31,59</sup>

Despite the fact that many theories, models and frameworks exist, quality improvement initiatives in general seldom utilize any of them.<sup>51</sup> The present findings revealed that this was also evident in CP implementation. None of the informants referred to any theoretical framework, CP guide or specific quality improvement tool (II). Further awareness and utilization of existing frameworks has the potential to support project groups as well as managers, and thereby facilitate CP implementations.<sup>51,63,69</sup> In order to overcome the above issues, further use of skilled external facilitators who can support and guide local internal facilitators and managers would be beneficial.

## Influence on everyday practice

Implementation of CPs aims to improve quality of care by facilitating EBP and teamwork, and thereby enable highly reliable and high-value care.<sup>7,68,69</sup> Empirical studies from other contexts demonstrate promising effects,<sup>18-22,122-128</sup> and based on the perception of the participants in the present studies, implementation of CPs has a positive influence on everyday practice also in the context of Swedish intensive care (II, IV). However, patient partnership and individualized care, as well as reliability and patient safety, merit further reflection.

### *Patient partnership and individualized care*

In the ICU team, not only professionals but also patients and their relatives are actors.<sup>11</sup> As previously mentioned, standardization can contribute to increased quality of care and patient safety.<sup>8</sup> However, using CPs (or other forms of standardization protocols) demands reflection regarding the recommendations' appropriateness for the individual patient, and deviations from the CP should be made if needed.<sup>7,19</sup> Additionally, in order to promote life and health, and alleviate human suffering, the human caring dimension that takes place in the meeting and interaction between the patient and her/his relatives and the healthcare staff also has to be emphasized.<sup>23</sup> Hence, EBP should include a partnership between the healthcare staff and the patient and her/his relatives.<sup>45</sup>

Concerns regarding the increasing use of CPs have been raised, including a risk of undermining the individual healthcare staff's ability to exercise clinical judgment and professional autonomy, and an emerging reductionist approach that does not take into account patients' individual needs.<sup>87-89</sup> However, these issues were not indicated by the present findings (II, IV). While aiming for progress in the care process in order to improve the patients' health, the ICU staff strived for patient safety and comfort in the situation (III). The staff in the action research project (IV) as well as the informants in the national study (II) stated that they adjusted the recommendations made in the CPs in order to meet the individual patient's needs. However, although patient autonomy was desired, the decision to use the CP was often made without involving or informing the patients or their relatives (II, IV). These findings are consistent with findings in a previous Swedish study that explored perceptions of using a CP for the intensive care of aortic surgery patients.<sup>1</sup>

Patient autonomy and right to be properly informed are statutory in Swedish regulations.<sup>97</sup> Additionally, differences in the level of healthcare service and quality of care are becoming increasingly visible and also less accepted in the community.<sup>160</sup> Hence, patients and relatives are making greater demands for information and influence on the care.<sup>160</sup> However, ICU patients commonly have impaired cognitive function.<sup>161</sup> The present findings revealed that the staff thereby faced an ethical dilemma of balancing between respecting patient autonomy and overriding the autonomy in order to enable recovery (III). The current trend in Nordic ICUs is to minimize sedation, which further accentuates this dilemma and the need for interprofessional care planning, if possible together with the patient and their relatives.<sup>110,150,162</sup>

The CP methodology has the potential to make care processes transparent to involved staff as well as to the patients and relatives.<sup>7,68,69</sup> One way to promote the involvement of patient and relatives is to prepare patient versions of the CPs.<sup>69</sup> However, this is still uncommon and should therefore be encouraged. In summary, despite emerging awareness of the importance of patient partnership (III), further efforts are needed in order to ensure genuine person-centered intensive care,<sup>109</sup> regardless of whether or not CPs are used.

### *Reliability and patient safety*

To achieve reliable healthcare, it is important to build systems of safety, as well as a culture of safety and continuous learning.<sup>8</sup> The CP methodology is, as other protocol-based methodologies, a way to build reliability through standardization.<sup>7</sup> Based on the perceptions of the participants in the present studies (II, IV), implementation of CPs contributed to increased awareness and understanding of the care needs of the patient group in focus, increased knowledge and applications of EBP, easier and improved documentation,

and to some extent facilitated everyday teamwork. Altogether, this was perceived to enhance continuity of care, decrease non-patient-specific variations, enhance efficiency, improve and ensure quality of care and patient safety, and provide staff and managers with a sense of security (II, IV), which corresponds with findings from other studies.<sup>1,21,28</sup> However, since CPs are complex interventions, it is difficult to precisely define the active components of their effect.<sup>68</sup>

The present findings do not make it possible to conclude if the influence on everyday practice was due to the use of a completed CP or if the effect came from going through the implementation process, i.e. the evidence search, reflections and training in the quality improvement process (II, IV). However, the perceived improvements in understanding and practice (IV) indicated, as previously proposed,<sup>69</sup> that the implementation process itself could be an active component of a CP's influence on practice, which further reinforces the advantages of engaging the recipients in the process.<sup>31,53,63</sup>

Finally, it is important to emphasize that although standardization builds reliability,<sup>7,8</sup> patient safety also relies on the team's ability to be resilient.<sup>163,164</sup> Highly reliable organizations try to avoid surprises but are always prepared for them.<sup>164</sup> Given healthcare's variability and complexity, the team needs to be able to collaborate, identify and act on non-routine events and solve novel problems.<sup>29,164</sup> Hence, resilience requires a set of competencies, which is beyond what CPs can contribute to.<sup>29</sup> In groups, people act and interact in a process, in which individuals interpret indications and also indicate to other people how to act.<sup>132</sup> Healthcare staff therefore needs non-technical skills that include how to interact in the team.<sup>29,33,165</sup> Training for these skills is increasingly incorporated in the curricula of professional education.<sup>165,166</sup> However, existing healthcare teams also need to develop their competence to interact. For this, crew resource management and simulator-based teamwork training seem to be promising strategies.<sup>165,167-169</sup> Furthermore, as a team-oriented and safety-conscious culture is crucial for quality of care and patient safety, leadership and learning environments are essential.<sup>8,148,164</sup>

## Methodological considerations

The studies in this thesis all had some strengths and limitations that have to be considered when interpreting the findings. The overall aim was to develop comprehensive empirical knowledge and understanding of CP implementation and teamwork in Swedish intensive care. It is important to emphasize that a pre-assumption, based on previous research and experience, was that CPs and teamwork are positive phenomena for the quality of care and patient safety. Although an objective evaluation of the advantages or

disadvantages and outcome of the phenomena is also important, this was beyond the scope of the studies.

The studies had an exploratory design,<sup>130</sup> largely underpinned by the methodological assumptions of grounded theory.<sup>129</sup> Grounded theory emphasizes theorization built on empiricism.<sup>129,137</sup> Hence, the studies were not framed by any a priori theory (or model/framework). To use a specific theory could have guided the exploration and provided further knowledge of the components included in the particular theory. However, to use a single theory might have blinded the perspectives and thereby delimited an extended understanding of the phenomena.<sup>50</sup> Additionally, available evidence does not merit any particular theory.<sup>51,170</sup>

The applied design, with triangulation regarding national and single-setting studies, quantitative and qualitative approaches, data sources and data collection methods, and utilizing grounded theory in an action research project, enabled comprehensive empirical knowledge and understanding. Additionally, in order to further extend the body of knowledge, the i-PARIHS framework<sup>31</sup> was retrospectively used as an explanatory model of the empirical findings.

### *Study I and Study II*

A major strength in the national studies was the inclusion of all Swedish ICUs and a 100% response rate in the survey. Thereby, we know that one-fifth of the ICUs used CPs (I). However, the survey did not include exploration of compliance to the CPs, or reasons for not using CPs.

The number of CPs available for document analysis was limited (I). The ICUs were asked to submit only one CP example and might have submitted, in their opinion, their best document. Additionally, five out of the 17 ICUs with CPs did not submit any CP (I). There is thus a risk for non-response bias.<sup>130</sup> However, examples of CPs with different characteristics were submitted by ICUs from different parts of the country (I), which makes it unlikely that further examples would have changed the conclusions made from the study.

In the document analysis, some incoherencies were revealed compared to the self-report (I). Possible reasons for this could be that the informants had insufficient knowledge about their CPs, or social desirability bias.<sup>130</sup> Hence, the use of self-reports within research in this field should be questioned.

The small dataset (I, II) delimited the possibility to make generalizable conclusions. Furthermore, in the interviews (II), each ICU was represented by only one informant. These informants were mainly RNs who been committed to the implementation of CPs. It is likely that other staff as well as managers could have contributed with other perspectives. Additionally, data collection was retrospective (II), which involves a risk for recall bias.<sup>130</sup> However, out of the 17 ICUs using CPs, quantitative and qualitative data were provided by 15 and 10 of the ICUs, respectively. The informants

represented ICUs with different characteristics from different parts of the country, which promoted large diversity in the sample (II).

Finally, it is important to note that the studies (I, II) were restricted to CPs. The ICUs might have other documents or decision support systems to promote high-quality care that were not covered by the studies.

### *Study III and Study IV*

The action research project (III, IV) was conducted in a single local ICU, which precluded generalization. However, it enabled long-term in-depth exploration of the subject matter, which provided understandings that would have been difficult to achieve if the engagement had been spread out over several settings.

The ICU that participated in the action research project volunteered for a CP implementation and could thereby not be assumed to be representative of all ICUs without CPs. However, more than one-third of the Swedish ICUs are located in local hospitals<sup>112</sup> and the majority of those ICUs did not use CPs (I). Hence, the circumstances might to some extent be the same in many other ICUs, enhancing the possibility that the emerged understandings are transferable also to other settings.

A major strength in Studies III and IV was the inclusion of different categories of staff (III, IV) and managers (IV), enabling a broad perspective of the phenomena under study (teamwork and CP implementation). As the phenomena under study occurred in a social context, focus group interviews<sup>140</sup> were considered appropriate as the main data collection method (III, IV). The strength of focus group interviews is the opportunity to understand the way a group of people view their own reality. Focus group interviews thus help researchers tap into peoples' daily interactions, and thereby reveal levels of understanding that remain untapped by other data collection methods. Moreover, the interactions in the focus group interviews can highlight the participants' similarities and differences, thus providing rich information about a range of perspectives and experiences.<sup>140</sup> On the other hand, focus group interviews include a risk that the participants do not feel free to speak and thereby only express normative discourses.<sup>171</sup> However, in the discussions during the sessions in the present studies (III, IV), the participants did not always agree and some controversial perceptions were also expressed, indicating a non-judgmental environment. Further, individual interviews, logbooks/field notes, questionnaires and health record screening were also utilized as data sources (IV). This triangulation<sup>130</sup> of data collection methods reasonably outweighed some of the focus group interviews' limitations.

In both studies (III, IV), theoretical saturation<sup>129</sup> was reached, enabling dense conceptual models that might be further developed into substantive theories.<sup>129</sup> However, not all eligible staff participated in the data collections. Since the review of health records revealed less documented CP use than

stated by the participants, it is possible that the staff that did not participate held negative perceptions that were not captured in the study (IV).

The quality of the findings in a grounded theory study should be assessed based on the criteria fit, work, relevance and modifiability.<sup>136,172</sup> The authors argue that the generated conceptual models (III, IV) emerged from data and ‘fit’ the empirical situations in the social context under study. The models ‘work’ as they explain what was going on in the studied context, and have ‘relevance’ since they represent subjects of real concern to the people involved. Finally, the models have ‘modifiability’ as they are not definitive. As changes take place in reality, and studies are performed in other contexts, the models can be developed and substantive theories can eventually emerge.

The action research approach implied the researchers’ involvement in the studied process.<sup>64</sup> As Portela et al.<sup>52</sup> conclude, practical improvement work and science are not necessarily conflicting. However, balancing active participation and neutrality, in order to facilitate progress while producing valid findings,<sup>173</sup> was a delicate mission. A lesson learned was that one should have extensive experience of conducting action research when entering such a project. The project had an emergent design, and was carried out by the local project group with some, though limited, external facilitation from the research group. The CP implementation process would likely have been more streamlined with a pre-defined structure and firmer guidance, and possibly the output would have been more advantageous. Additional involvement, however, might have been perceived as an intrusion on local ownership, and thereby jeopardized the ambition to study a bottom-up approach to the implementation process. Further, the positive attitude towards the project and the CP methodology, as well as the empowerment<sup>64</sup> and educational aspect in the “try and error” process, might have been jeopardized.

#### *Overall trustworthiness*

In the studies, strategies were applied to achieve trustworthiness, as suggested by Lincoln and Guba.<sup>131</sup> Hence, credibility, confirmability and transferability were considered.<sup>131</sup>

*Credibility* refers to the extent to which the methods applied appropriately interpret data and produce credible findings.<sup>131</sup> In this thesis, overall credibility was enhanced by triangulation<sup>52,131</sup> through a combination of quantitative and qualitative approaches, national as well as single-setting studies, and by utilizing several different data sources and data collection methods. The triangulation enabled in-deep understanding of CP implementation and teamwork. Further, repeated peer debriefing,<sup>131</sup> within the research team and in research seminars, provided external checks on the research process. The action research method,<sup>64</sup> utilized in Studies III and IV, enabled prolonged engagement, which gave sufficient time to built trust and come close to the culture in the setting.<sup>131</sup> The repeated focus group

interview sessions also enabled informal member checks with the participants regarding the interpretations made. Additionally, the grounded theory method<sup>136</sup> provided rigor in the analysis,<sup>135</sup> and the validation of the developed conceptual models in the raw data (III, IV) enabled referential adequacy.<sup>131</sup>

*Confirmability* refers to the objectivity or neutrality of the interpretations.<sup>131</sup> Based on the philosophical orientation of the thesis, reality is multiple, complex, socially constructed, subjectively perceived, and can be interpreted but not fully known.<sup>129,132</sup> A further assumption is that knowledge is created within the interaction between the researchers and the participants.<sup>64,129</sup> Consequently, objectivity is not a goal or even desirable. However, the findings are to be grounded in empirical data. Thus, the researchers have to be reflective regarding their own pre-understanding.<sup>64,129</sup>

The author of this thesis is an experienced RN, specialized in intensive care and with previous experience of implementing CPs and some experience of both quantitative and qualitative research methods. The research team also included senior researchers, knowledgeable in quantitative and qualitative methodologies and with, as well as without, experience from intensive care and CP implementation. However, the research team did not include any other professions than RNs. The pre-understanding and single profession were reasons for caution in the analysis process but on the other hand the pre-understanding enabled sensibility to the subject matter.<sup>129</sup> To ensure that the pre-understanding would not permeate the interpretations, measures were taken to ensure reflectivity.<sup>129</sup> Throughout the studies (I-IV), reflectivity was promoted through comprehensive memo writing, and frequent reflective discussion sessions within the research team, as well as discussions in research seminars that also included other professions.

To promote credibility and confirmability in the document analysis of the submitted CPs (I), two of the researchers independently of each other analyzed the documents and thereafter compared and discussed their findings. The primary analysis of qualitative data (II, III, IV) was partly performed in collaboration between two researchers, and the interpretations repeatedly discussed within the research team. Further, audit trails, in-depth methodological descriptions and, when applicable, translated quotes, were provided in the papers (I-IV).

*Transferability* refers to the extent to which the findings can be transferred to other groups, settings and contexts.<sup>131</sup> Since the phenomena under study were inevitably connected to the context, it is not possible to claim generalizability.<sup>52</sup> However, to enable the reader to assess the transferability to other contexts, rich descriptions of the setting, participants, data collection and time period were provided in the papers (I-IV).

# Conclusion

The overall aim of this thesis was to develop comprehensive empirical knowledge and understanding of CP implementation and teamwork in Swedish intensive care. The main conclusions from the included studies are:

- One-fifth of the ICUs were using CPs and many ICUs had plans or thoughts for CP implementation, indicating an increasing proportion of ICUs utilizing the CP methodology.
- The quality, extension, and content of the CPs in use varied greatly regarding the degree to which they were interprofessional, evidence-based and renewed, emphasizing a further need for guidance, support, collaboration and resources.
- Implementation of CPs implies a struggle for a feasible tool that is usable in practice, and is a process directed at realizing the usefulness and creating new habits, which requires enthusiasm, support and time.
- Facilitating factors in CP implementation were mainly: bottom-up initiatives, interprofessional project groups, small ICUs, local enthusiasm and motivation to improve practice, user-friendly CP format, internal and external facilitators, staff involvement, and supportive managers.
- Implementation activities perceived as essential were mainly: education, information and reminders in different forms as well as the timing of activities.
- Impeding factors in CP implementation were mainly: insufficient interprofessional collaboration, insufficient support and leadership, inadequate EHR systems, time constraints, and insufficient follow-up and evaluation.
- Everyday teamwork can be conceptualized as an act of ‘balancing intertwined responsibilities.’ The teamwork was mainly interprofessional but fluctuated due to involved individuals and shifting circumstances that the staff responded to in virtuous or vicious cycles.
- A successful CP implementation was perceived to: increase awareness of the care needs of the patient group in focus, increase knowledge and applications of EBP, facilitate and improve documentation, and to some extent facilitate everyday teamwork. Altogether, these were perceived to enhance continuity of care, decrease non-patient-specific variations, enhance efficiency, increase quality of care and patient safety, and provide staff and managers with a sense of security.

# Clinical implications

Achieving EBP and interprofessional collaboration is challenging. Progress has been made in CP utilization and teamwork but there is potential for substantial improvements. Based on the present findings and previous publications, future CP implementation may be facilitated by:

- Embracing a bottom-up approach and advantageously incorporating an action research methodology and a pre-defined structure, such as, for example, the aforementioned 7-phase method.<sup>69</sup>
- Ensuring interprofessional collaboration, involving all recipients, and including patients' and relatives' perspectives.
- Strategic prioritization by the management and sufficient resources assigned, with clear leadership and expression of roles and responsibilities.
- Ensuring accurate evaluation, variance management, and continual renewal.
- Considering the consequences of imposed negotiations in the implementation process.
- Utilizing support from facilitators who have skills and strategies to structure the process, manage the actors' relationships, and identify and negotiate barriers in the implementation process.

To facilitate enhanced CP use and enable systematic follow-up, the issue of inadequate EHR systems needs to be addressed. National guidance and cooperation, as well as centralized units at the local hospitals with skilled facilitators that can provide support regarding the whole implementation process, have the potential to increase the quality of CPs, and benefit the progress of the CP methodology.

Furthermore, in order to promote quality of care and patient safety, interprofessional teamwork need to be facilitated by overcoming the traditional hierarchical structures. For this, team training of non-technical skills, and managers who by their leadership promote interprofessional teamwork in projects as well as in everyday ICU practice are needed.

## Future perspective

This thesis contributes to the body of knowledge through comprehensive empirical knowledge and understanding of CP implementation and teamwork in Swedish intensive care. However, much is still to be uncovered. For example, there are needs to:

- Evaluate the outcome of CPs regarding application of EBP, documentation, teamwork, and patient outcome, preferably in large-scale comparative multi-center studies.
- Explore rationale for non-adopters of the CP methodology, including exploring possible benefits of utilizing other types of protocols and methodologies.
- Explore how to promote patient involvement and long-term sustainability of CP implementation, including follow-up and renewal, to ensure that current best practices are applied.
- Evaluate if utilization of a pre-defined structure or implementation theory can facilitate CP implementation processes.
- Further explore teamwork in ICUs and how to promote interprofessional teamwork. Preferably also include observations, and the perspectives of patients, relatives, and staffs outside the ICUs.

Additionally, further research and innovations are needed to expedite information technology systems that enable user-friendly computerized clinical decision support systems that are integrated in the EHR and give individualized evidence-based recommendations.

Finally, it would be outrageous to believe that implementing the CP methodology can solve all patient safety issues. Research about other patient safety interventions are thus also of importance. For example, further research is needed regarding how organizations can improve the reliability of their processes through standardization while retaining or improving person centred care and an ability to adapt and react efficiently when non-routine events and novel problems occur.

# Svensk sammanfattning (Swedish summary)

## Teamarbete och implementering av standardiserade vårdplaner inom svensk intensivvård

- Utmaningar med interprofessionellt samarbete och evidensbaserad praktik

### *Bakgrund*

Forskningsresultat produceras i snabb takt men tillämpas inte fullt ut i den patientnära verksamheten. Detta innebär att patienter inte alltid får evidensbaserad och säker vård, vilket medför att de utsätts för onödigt lidande samt att samhällets resurser inte utnyttjas optimalt.<sup>4-6</sup> För att förbättra vårdkvaliteten behöver hälso- och sjukvården öka reliabiliteten i vårdprocesserna, i ökad omfattning arbeta enligt evidensbaserad praktik<sup>6-8</sup> samt uppnå förbättrad kommunikation och samordning i det dagliga teamarbetet.<sup>26</sup> För detta föreslås implementering av standardiserade vårdplaner (SVP).<sup>7,19-22</sup> En SVP, som internationellt vanligen benämns 'clinical pathway', kan stödja kvalitetsförbättring genom att beskriva rekommenderad vård för en specifik patientgrupp och vara ett lokalt beslutsstöd för det interprofessionella teamet i den individuella patientens vård.<sup>69-72</sup>

Denna avhandling fokuserar på intensivvård. Intensivvård är en expanderande och resurskrävande verksamhet.<sup>10</sup> Vården av de kritiskt sjuka och sköra patienterna på en intensivvårdsavdelning (IVA) är komplex. Interprofessionellt samarbete är nödvändigt för ett gott resultat<sup>10-13</sup> och det finns behov att förbättra patientsäkerheten.<sup>14-17,27</sup> Tidigare forskning föreslår att ökad användning av SVP inom intensivvården skulle kunna förbättra vårdprocesserna, vårdutfallet samt resursutnyttjandet och därmed vara fördelaktigt för såväl patienter som vårdgivare.<sup>1,2,18,122-128</sup> Kunskap och förståelse kring implementeringsprocessen av SVP är dock otillräcklig.<sup>22,90,91</sup> Övergripande kunskap angående implementeringen av SVP inom svensk intensivvården saknats. Det har också saknats tillräcklig kunskap och förståelse kring det vardagliga teamarbetet på svenska IVA. En ökad kunskap och förståelse avseende SVP-implementering och teamarbete skulle kunna leda till reflektion och praktiska förslag som kan underlätta kvalitetsförbättring och SVP-utveckling och därmed bidra till förbättrad patientsäkerhet och vårdkvalité.

### *Syfte och metod*

Avhandlingens övergripande syfte var att utveckla mångsidig empirisk kunskap och förståelse kring SVP-implementering och teamarbete på svenska IVA. Fyra studier inkluderades (I-IV).

Studierna I och II genomfördes nationellt. *Studie I* syftade till att identifiera förekomsten av SVP på svenska IVA samt undersöka kvalitet, innehåll och evidensbas i de SVP som var i bruk. En deskriptiv och explorativ kartläggning<sup>130</sup> som inkluderade samtliga svenska IVA (N84) och en dokumentanalys av inskickade SVP-exempel (n12) genomfördes. *Studie II* syftade till att undersöka implementeringsprocessen av SVP inom svensk intensivvård. Explorativ sekventiell mixad metod<sup>133</sup> tillämpades som inkluderande IVA som använde SVP. Implementeringsprocessen utforskades retrospektivt genom data från frågeformulär besvarade av olika IVA (n15) och kvalitativ innehållsanalys<sup>142</sup> av semistrukturerade intervjuer<sup>139</sup> genomförda med nyckelpersoner (n10).

Studie III och IV genomfördes i ett aktionsforskningsprojekt<sup>64</sup> på en svensk IVA och 'grounded theory' tillämpades.<sup>129</sup> Projektet innebar att en lokal interprofessionell projektgrupp i samarbete med forskargruppen utvecklade och implementerade en SVP för ventilatorvårdade patienter. *Studie III* syftade till att utifrån ett interprofessionellt perspektiv beskriva och förklara teamarbetet och faktorer som påverkar teamprocesser i den vardagliga praktiken på en IVA utan SVP. Data samlades i början av aktionsforskningsprojektet från personal (n38) via fokusgruppsintervjuer<sup>140</sup> med sjuksköterskor, undersköterskor och anestesiologer samt en individuell intervju med en fysioterapeut. *Studie IV* syftade till att förklara en bottom-up initierad implementeringsprocess av en SVP. Data samlades under nästan fem år från projektgruppen, olika personalkategorier och deras chefer (n71) via frågeformulär, fokusgruppsintervjuer, individuella intervjuer och loggböcker/fält-noteringar<sup>64</sup> samt från journaler (n136).

### *Summering av resultat*

I kartläggningen (Studie I) rapporterade 17 av Sveriges 84 IVA (20%) att de använde SVP och många hade planer på implementering. Kvalité, innehåll och evidensbas i de SVP som var i bruk (n56) varierade stort, med ibland bristande interprofessionell inriktning, evidensbas och revidering. Baserat på retrospektiva uppfattningar från olika IVA (Studie II) var implementering av SVP en process riktad mot att förstå nyttan och att skapa nya vanor, vilket krävde entusiasm, resurser och tid. Vidare visade den prospektiva studien av en bottom-up initierad SVP-implementering (Studie IV) att strävan efter ett användbart verktyg var ett centralt fenomen i SVP-implementeringen och att implementeringsprocessen inkluderade förhandlingar inom många områden för att komma framåt.

Baserat på resultat från Studie II och Studie IV påverkades SVP-implementeringen av flera samspelande faktorer som underlättande såväl

som försvårande processen och hade konsekvenser för processens utfall. Underlättande faktorer var främst: bottom-up initiativ, interprofessionella projektgrupper, små IVA, lokal entusiasm och motivation att förbättra praxis, användarvänligt SVP-format, interna och externa underlättare/facilitatorer, personalmedverkan och stödjande chefer. Implementeringsstrategier som uppfattades som nödvändiga inkluderade utbildning, information och påminnelser i olika former. Vidare var tajmingen av aktiviteter betydelsefull. Försvårande faktorer var främst bristande interprofessionellt samarbete, otillräckligt stöd och ledarskap, icke ändamålsenliga elektroniska journalsystem, tidsbrist samt bristande uppföljning och utvärdering.

Utforskningen av teamarbete och faktorer som påverkar teamprocesser i den vardagliga praktiken på en IVA (Studie III) visade att teamarbetet handlade om att balansera ett sammanvävt ansvar. Graden av interprofessionellt samarbete varierade och teamprocesserna påverkades av de involverade personerna och skiftande förutsättningar. Implementeringen av SVP (Studie IV) upplevdes förtydliga rollerna hos olika personal-kategorier, och till viss del underlätta det interprofessionella samarbetet. Vidare, baserat på deltagarnas upplevelse (Studie II och Studie IV), påverkade en SVP-implementering den vardagliga praktiken genom: ökad medvetenheten och förståelse av vårdbehovet hos patientgruppen i fokus, ökad kunskap och tillämpning av evidensbaserad praktik samt underlättad och förbättrad dokumentation. Detta sammantaget upplevdes förbättra effektiviteten och kontinuiteten i vården och minska oönskade variationer, vilket förbättrade patientsäkerheten och vårdkvalitén samt ingav personal och chefer en känsla av trygghet.

### *Slutsats och praktisk tillämpning*

Avhandlingen tillhandahåller delvis ny empirisk kunskap och förståelse kring SVP-implementering och teamarbete på svenska IVA. Sammanfattningsvis visade de inkluderade studierna att en femtedel av Sveriges IVA använde SVP samt att det var en utmaning att uppnå evidensbaserad praktik och interprofessionellt samarbete. När de aktuella studierna sätts i relation till tidigare forskning går det att konstatera att SVP-användning och interprofessionellt teamarbete förbättrats men det finns fortfarande potential för avsevärda förbättringar. Framtida SVP-implementeringar skulle kunna underlättas genom:

- att uppmuntra bottom-up initiativ och med fördel följa en förbestämmd struktur, t.ex. 7-stegsmetoden för design, implementering och utvärdering av SVP<sup>69</sup>
- interprofessionellt samarbete, inkluderande alla berörda personal-kategorier och även patient- och närståendeperspektiv
- tydligt ledarskap, roll- och ansvarsfördelning samt strategisk prioritering och tillräckliga resurser från ledningen

- utvärdering, variansanalys och kontinuerlig revision av implementerade SVP
- att betänka vilka konsekvenser kompromisser i implementeringsprocessen kan få på tillämpningen och upprätthållandet av SVP
- stöd från underlättare/facilitatorer som har färdigheter och strategier för att strukturera implementeringsprocessen, hantera aktörernas relationer samt identifiera, förhandla och överbrygga hinder i processen.

För att främja ökad SVP-användning och systematisk uppföljning behöver dessutom problematiken med icke ändamålsenliga elektroniska journal-system lösas. Nationell guidning och samarbete, likväl som centrala enheter inom respektive sjukvårdsorganisation som kan ge stöd i hela implementeringsprocessen, skulle kunna öka kvalitén på SVP och vara till fördel för utvecklingen av evidensbaserad praktik. För ökad patientsäkerhet och vårdkvalité behöver även det interprofessionella samarbetet förbättras, bl.a. genom att komma ifrån de traditionella hierarkiska strukturer som fortfarande existerar inom hälso- och sjukvården. För detta behövs träning av icke-tekniska färdigheter, genom t.ex. 'crew resource management' och simulator baserad teamträning, samt chefer som genom sitt ledarskap främjar inter-professionellt teamarbete i förbättringsprojekt likväl som i vardaglig patientvård.

#### *Framtida perspektiv*

Denna avhandling tillför mångsidig empirisk kunskap och förståelse kring SVP-implementering och teamarbete på svenska IVA. För större och säkrare slutsatser behövs dock ytterligare kunskap. Det behövs t.ex. fler och större SVP-implementerings och utvärderingsstudier samt studier avseende för-/nackdelar med alternativa metoder och hur patientmedverkan, interprofessionellt samarbete och långsiktigt upprätthållande av SVP kan främjas. Vidare behövs ytterligare forskning och innovationer för att utveckla informationsteknologi som möjliggör användarvänliga beslutstöd som, integrerat i journalsystemen, kan ge individanpassade evidensbaserade rekommendationer.

Slutligen är det av vikt att poängtera att implementering av SVP eller andra beslutstöd inte kan lösa alla patientsäkerhetsproblem. Ytterligare forskning avseende även andra patientsäkerhetsåtgärder är nödvändig. Det behövs t.ex. mer kunskap angående hur hälso- och sjukvården kan förbättra reliabiliteten i sina vårdprocesser genom standardisering och samtidigt behålla eller förbättra ett personcentrerat förhållningssätt samt förmåga att anpassa sig och agera effektivt när icke-rutin händelser och nya problem uppstår.

# Acknowledgements - Tack

This thesis is the result of several years of challenging work. It has cost “sweat, blood, and tears” but in the end I would not like to have it undone. Being able to add a puzzle piece that hopefully can facilitate the work for healthcare professionals and contribute to improving patient care is rewarding. However, I could not have done this on my own. I would therefore like to express my sincere gratitude to all of you who have in various ways helped to make this thesis possible. Thank you!

To those of you I especially owe, I choose to express my gratitude in my native tongue:

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