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Preventing pressure ulcers

– *risk assessment and patient participation*

LISA HULTIN

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Abstract

Hultin, L. 2022. Preventing pressure ulcers. – risk assessment and patient participation. *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1823. 75 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-513-1447-1.

Background: Pressure ulcers are considered as an adverse event. Identifying patients at risk is the first step in pressure ulcer prevention. The patient should receive relevant information about their risk status and be encouraged to participate in their own preventive care. PURPOSE T is a new pressure ulcer risk assessment instrument, and the CBPM system shows the patient's pressure points visually in real time. Aim: This thesis aimed to evaluate the psychometric values, usability and feasibility of PURPOSE T and to investigate the possibility of improving patient participation through the CBPM system. *Method:* The study setting was a university hospital and three nursing homes. Nurses (n=28) risk assessed patients (n=235) with PURPOSE T in an observational, descriptive and comparative study (I). Focus group interviews were then conducted with the nurses (II). A mixed-method study evaluated the feasibility of PURPOSE T with patient record review (n=60), individual patient interviews (n=15) and focus group interviews with nurses (n=15) and assistant nurses (n=8) (III). A descriptive study with patients (n=31) evaluated if the CBPM system increased patient participation (IV). *Results:* Study I demonstrated good inter-rater and test-retest reliability of PURPOSE T. Study II showed that PURPOSE T had good clinical usability. It was an efficient risk assessment instrument performed at bedside; the nurses gained a deeper understanding and awareness of risk factors. Study III showed that PURPOSE T has good clinical feasibility. More patients were identified at risk for pressure ulcers and were prescribed more preventive interventions in comparison with patients assessed with the Modified Norton Scale. These results were mirrored in the focus group interviews with the nurses´ and assistant nurses' experiences. Risk assessment took the same amount of time despite being more comprehensive; the instrument encouraged more preventive actions, and nurses were more involved at bedside. However, almost all the patients expressed not receiving any information about pressure ulcers. Study IV showed that the CBPM system increased the patients' knowledge, and as they became aware of increased pressure, they started to take preventative action in their own care. Thus, patient participation increased. *Conclusion:* The evaluation of PURPOSE T in Sweden demonstrates good results and could be considered as replacing the Modified Norton Scale at a national level. Providing information to the patient needs to be a priority, and new information and communication technologies, such as the CBPM system, need to be taken advantage of, to benefit the patients.

Keywords: Patient participation, pressure ulcer prevention, risk assessment

Lisa Hultin, Department of Public Health and Caring Sciences, Caring Sciences, Box 564, Uppsala University, SE-751 22 Uppsala, Sweden.

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To my family

List of Papers

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

I. Hultin, L., Karlsson, A-C., Öhrvall, M., Coleman, S., & Gunningberg, L. (2020). PURPOSE T in Swedish hospital wards and nursing homes, a psychometric evaluation of a new pressure ulcer risk assessment instrument. *Journal of Clinical Nursing,* 00:1-10. DOI: 10.1111/jocn.15433

II. Hultin, L., Gunningberg, L., Coleman, S., & Karlsson, A-C. (2021). Pressure ulcer risk assessment-registered nurses´ experiences of using PURPOSE T: A focus group study. *Journal of Clinical Nursing,* 00:1-9. DOI: 10.1111/jocn.15901

III. Hultin, L., Karlsson, A-C., Löwenmark, M., Coleman, S., & Gunningberg, L. Feasibility of PURPOSE T in clinical practice and patient participation – a mixed method study (submitted 2022)

IV. Hultin, L., Karlsson, A-C., Öhrvall, M., & Gunningberg, L. (2019). Information and communication technology can increase patient participation in pressure injury prevention: a qualitative study in older orthopedic patients. *Journal of Wound Ostomy Continence Nursing,* 00(0):1-7. DOI: 10.1097/WON.0000000000000568

Contents

Abbreviations

AN	Assistant Nurse
CBPM	Continuous Bedside Pressure Mapping System
EPUAP	European Pressure Ulcer Advisory Panel
NPIAP	National Pressure Injury Advisory Panel
PPPIA	Pan Pacific Pressure Injury Alliance
ICT	Information and Communication Technology
MNS	Modified Norton Scale
i-PARIHS	Integrated Promoting Action on Research Implementation in Health Services
PI	Pressure Injury
PU	Pressure Ulcer
PU-RAI	Pressure Ulcer Risk Assessment Instrument
PURPOSE T	Pressure Ulcer Risk Primary or Secondary Evaluation Tool
RN	Registered Nurse
SPMSQ	Short Portable Mental Status Questionnaire
WHO	World Health Organisation

In the present thesis, the words “pressure ulcer” and “pressure injury” have the same meaning.

Introduction

Pressure ulcers (PUs) are a problem throughout the world and are considered as adverse events in health care. Around the world, studies in health care setting report a wide prevalence from 0 % to 72.5 % (EPUAP/NPIAP/PPPIA, 2019). In Sweden, 14 % of admitted patients to hospital care develop PUs (The Swedish Association of Local Authorities and Regions [SALAR], 2021). The prevalence rates are generally higher in unique populations that are at elevated risk, such as patients with impaired mobility. PUs are mostly avoidable if preventive methods are in place. Therefore, it is important that the health care take responsibility through the patient's journey in the health care system (EPUAP/NPIAP/PPPIA, 2019) and optimise the quality of care and prevent adverse events (Patient Safety Act, 2010). Persons with PUs experience a reduced quality of life (Gorecki et al., 2009). They also generate an extended length of stay at the hospital, as well as increased re-admissions (Demarré et al., 2015; Gunningberg et al., 2019).

According to international guidelines, it is important to assess risk patients with an evidence-based and validated PU risk assessment instrument (PURAI) to inspect the skin and plan the preventive care. Furthermore, the patients should receive information and be encouraged to participate in their own PU prevention care (EPUAP/NPIAP/PPPIA, 2019). Therefore, patient involvement in the decisions around PUs is an important factor (Ledger et al., 2020). In Sweden, the Modified Norton Scale (MNS) is used for assessing the patient's risk for PUs. This instrument was developed approximately 60 years ago and was modified 25 years ago; however, it does not include risk factors based on the latest evidence (EPUAP/NPIAP/PPPIA, 2019, Källman & Lindgren, 2014).

Pressure ulcer

Definition and etiology

A PU is defined by international guidelines as 'a localized damage to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear. PUs usually occur over a bony prominence but may also be related to a medical device or other object' (EPUAP/NPIAP/PPPIA, 2019, p.16). The

PU can be seen as intact skin or an open wound (EPUAP/NPIAP/PPPIA, 2019). The pathophysiology of PUs is not fully understood, and there is still ongoing research on this question. One view "from outside and in" suggests that PUs are caused by pressure or sheer to the skin or a combination of both, which leads to a deformation of cells, ischemia, cell death, causing a PU to occur. Another view "from inside and out" is that a PU arises in the tissue that sustains the highest pressure, typically the muscle layer adjacent to a bony prominence. As the muscle layer is very vulnerable to ischemia, cells in the muscle layer closest to the bone will die first when a PU occurs. Unless the ischemia and the injured muscle layer surrounding the deep injury can be rescued, the PU advances towards the skin (EPUAP/NPIAP/PPPIA, 2019; Gefen et al., 2013). Both of these views, "from outside and in" and "from inside and out", can cause a PU in the same person at the same time. For example, pressure and deformation of cells outside may cause direct damage to the skin but also trigger the ischemia inside and cause damage on the inside (EPUAP/NPIAP/PPPIA, 2019; Gefen et al., 2013). A tissue deformation resulting from pressure and/or shear can cause damage to cells within minutes, although it may take hours before this is clinically visible as a PU (Gefen et al., 2008). The time duration, which cells and tissue receive ischemia without irreversible damage, differs for various tissues that are potentially involved, e.g. muscle, fat and skin. Muscle tissues are more susceptible to damage compared to skin tissues, as the skin is much stiffer, therefore a PU "from inside and out" develops faster. When a person develops a deep and severe PU, it is probably "from inside and out" (EPUAP/NPIAP/PPPIA, 2019; Nola & Vistnes, 1980).

PU classification is based on the visual and palpatory identification of tissue, including skin, subcutaneous fat, bone, muscle, tendon and ligament in four categories and two categories with depth unknown (EPUAP/NPIAP/PPPIA, 2019); see table 1.

Table 1. Classification of PUs according to EPUAP/NPIAP/PPPIA (2019)

Category	Description
Category I	Intact skin with non-blanchable redness of a localised area.
Category II	Partial thickness loss of dermis presenting as a shallow open ulcer with a red wound bed, without slough.
Category III	Full thickness tissue loss.
Category IV	Full thickness tissue loss with exposed bone, tendon or muscles.
Unstageable: Depth unknown	Full thickness tissue loss in which the base of the ulcer is covered by slough and/or eschar in the wound bed.
Suspected deep tissue injury: Depth unknown	Purple or maroon localised area of discoloured intact skin or blood-filled blister because of damage to underlying soft tissue from pressure and/or shear.

Prevalence and incidence

The point prevalence is defined as the proportion of patients with a PU at a specific point in time, and the incidence rate is defined as the proportion of new PUs within a given time period (patient-days). There is also the concept hospital-acquired PU rate, which shows the number of patients with PUs at a specific point in time that were acquired during the hospital stay (Baharestani et al., 2009). The PU prevalence and incidence are indicators of the quality of care. There are large variations observed between different geographic and clinical settings around the world (EPUAP/NPIAP/PPPIA, 2019). Identifying prevalence and incidence of PUs is important in understanding the extent of PUs, and with this knowledge, decision-makers and clinicians can be informed in order to improve planning and delivery of healthcare (Tubaishat et al., 2018).

A recent systematic review and meta-analysis included 42 studies from Asia, Australia, Europe, Middle East, North America and South America (Li et al., 2020). The study included hospital patients over 16 years of age. The results demonstrated a pooled point prevalence of 12.8 % (n=1,366,848 patients), and the prevalence after excluding category I was 8 %. The pooled incidence rate was 5.4 % per 10,0000 patient-days (n=681,885 patients), and the pooled hospital acquired PU rate was 8.4 % (n= 1,893,593 patients) and after excluding category I, the prevalence was 5.1 %. PU categories were reported in 16 studies, with the most frequent categories in order being: category I (43.5 %), category II (28.0 %), category III (12.8 %), category IV (9.9 %), unstageable: depth unknown (7.8 %), and suspected deep tissue injury: depth unknown (2.4

%). PU categories I and II represented over half of the PUs among these hospitalised adult patients worldwide, and the most frequently affected areas were sacrum, followed by heels and hips (Li et al., 2020).

In comparison, in 2021, the annual Swedish national PU-survey including hospitalised patients over 18 years (n=8,710) of age demonstrated a point prevalence of 14 %, and the prevalence after excluding category I was 8.0 %. The hospital acquired PU rate was 11 % (SALAR, 2021).

Impact on quality of life

Having a PU (categories II–IV) has a significant impact on the person's quality of life and causes a substantial burden on the person, while a person with a PU category I experiences less of an impact on his or her life (Gorecki et al., 2009). A major concern for the persons with a PU is the pain, both general wound pain and pain at dressing change, with reports that their pain is often ignored. The constant pain from the PU is a major concern; specifically, the PU can be so painful that it affects daily life, activities and mobility; it is there all the time, even if the person tries to lay down, sit or walk; it does not matter, it is a constant pain (Gorecki et al., 2011; Jackson et al., 2017).

Other concerns for persons with a PU are greater levels of powerlessness and emotional problems, such as low mood, anxiety, frustration, anger, depression and poor psychological well-being (Essex et al., 2009). The persons often feel that they are a burden to their family and society (Gorecki et al., 2009). In contrast to leg ulcer, persons with PUs report that they constantly think about their living environments, activities and worry about the duration of their PU e.g. pressure relief in their daily life, such as bed rest versus participating in a social activity (Gorecki et al., 2009, 2012). They experience self-inflicted tensions between what they want to do and what they should do for healing of the PU. They feel anxiety and worry that their PU is a result of inadequate care by the health care (Gorecki et al., 2009, 2012).

Persons with PUs feel that they are dependent on health care to assist with their wound care. However, they often struggle for self-control and independence. Moreover, they express a desire to be involved in decisions about their wound care and want help from the health care to become independent (Gorecki et al., 2009). Generally, they have a lack of education as well as knowledge on PUs (Gorecki et al., 2009; Jackson et al., 2017). They also claim that if they had more knowledge, then they could have taken better care of themselves (Gorecki et al., 2012). Furthermore, they suffer from an economic impact because of the PU, such as income loss and in some countries hospital bills for many weeks up to months and years (Gorecki et al., 2009, 2012). There is no definitive answer regarding the time it takes for a PU to heal due

to the contextual factors. It can vary from a couple of days (category I) to months and years (categories III–IV) (EPUAP/NPIAP/PPPIA, 2019).

The economic impact

PUs are a financial burden to the health care organisations. The cost of a PU increases depending on the severity of the ulcers because the time to heal is longer and the incidence of complications is higher among those patients with more severe PUs (categories III–IV). A systematic review considering the cost of prevention and treatment of PUs (categories I–IV) estimated that the prevention cost per patient per day ranged between €2.65 and €87.57, while PU treatment cost per patient per day ranged between €1.71 and €470.49. Of course, the treatment of PU category I is cheaper compared to category IV. The total costs per hospitalised patient for treatment ranges from 19.74 € (category I) to 69,472 € (category IV) (Demarré et al., 2015). The main cost of PUs is the nursing time; the total costs of PUs include e.g. material for dressing changes, surgery, debridement, medication, laboratory tests, radiology, secondary prevention, complications, emergency visits and clinic contacts (Demarré et al., 2015; Padula et al., 2019).

It is hard to compare the costs due to different outcomes in different countries. According to a calculation example from the National Board of Health and Welfare in Sweden, PU categories II–IV result in an extended hospital stay of 50,000 days/year or 0.9 % of the length of stay at hospital and the costs of those are approximately 0.6 % of the total costs for the annual hospital budget in Sweden (The National Board of Health and Welfare, 2018). The cost to provide PU prevention to patients at risk can affect health care budgets; however, the costs to treat severe PUs are found to be substantially higher (Demarré et al., 2015). Hospitals should invest more in early detection of patients with risk for PUs and care for PUs to avoid unnecessary economic costs (Padula et al., 2019). Approximately 90 % of PU categories II–IV are determined to be preventable (The National Board of Health and Welfare, 2018). There is a high economic burden of PUs around the world, which is likely to increase, as the older population will keep growing (EPUAP/NPIAP/PPPIA, 2019; WHO, 2014). This highlights the importance of skin assessment and risk assessment as soon as possible after admission, as well as a care plan with appropriate treatment and/or prevention strategies (Latimer et al., 2019).

Risk factors

A challenge for health care is to identify the patients who have the characteristics that increase the probability of developing a PU. The most important risk factors related to PUs are limitations in mobility/activity and skin status. In addition, there are several hundreds of risk factors described, and the most

common are: perfusion, nutrition, moisture, body temperature, older age, sensory perception, blood markers, and general and mental health status. Therefore, a patient with a high risk of developing a PU often suffers from physical problems and has multiple risk factors (Coleman et al., 2014; EPUAP/NPIAP/PPPIA, 2019).

There are specific groups of persons that have a high risk of developing PUs. Frail older adults with chronic diseases in community as well as in hospital care. Furthermore, patients that are critically ill, have spinal cord injury, neonates, receive palliative care, with obesity, in the operating room, and in transit between health care settings or wards are also at risk. It is of importance to identify those persons that are at risk of developing PUs as soon as possible after being admitted; to adequately identify such patients, registered nurses (RNs) should use a PU-RAI (Coleman et al., 2014; EPUAP/NPIAP/PPPIA, 2019). During the annual national PU survey day in Sweden in 2021, the results showed that out of the patients that were assessed to be at risk of PUs, on the day of the study, only 21 % had a risk assessment documented within 24 hours from admission (SALAR, 2021).

Pressure ulcer risk assessment instruments

International and national guidelines agree that structured PU-RAIs are a cornerstone of PU prevention (EPUAP/NPIAP/PPPIA, 2019). Since the early 1960s, over forty PU-RAIs have been developed. However, a systematic review shows that they are limited in their methodological development and that there are no significant differences between the instruments in their ability to identify patients at risk for PUs (Coleman et al., 2013). It has been argued that a PU-RAI should be developed on the basis of multivariable analysis to identify factors that are independently associated with PU development (EPUAP/NPIAP/PPPIA, 2019; Nixon & Mc Gough, 2001).

Internationally, the Braden Scale is one of the most commonly used PU-RAIs, and the most commonly used in Sweden is the MNS (Källman & Lindgren, 2014). With both instruments, the RN must perform a full assessment of all patients, even though a patient is clearly not at risk, which takes time away from the RN to perform other important care activities (Coleman et al., 2018). Both of these instruments are numeric scales, and for many years, it has been a tradition to use numeric scales; they generate a total score that is compared with a reference value to allocate if the patient is “at risk” or “not at risk” (Källman & Lindgren, 2014). According to the latest evidence, a PU-RAI should include activity and mobility limitations, skin assessment, circulation and perfusion, nutrition, moisture, body temperature, older age, sensory perceptions, blood markers and general health status (EPUAP/NPIAP/PPPIA, 2019). Neither the Braden scale nor the MNS include those risk factors, and

since neither of them includes a skin assessment, they cannot distinguish if a patient already has a PU or if a patient is at risk but without a PU (Coleman et al., 2018).

A PU-RAI needs to be appropriate for the health care population; however, both the Braden Scale and the MNS were developed for the population 40–60 years ago (Coleman et al., 2013; EPUAP/NPIAP/PPPIA, 2019; Källman & Lindgren, 2014). Due to changes in the hospital care with shorter hospital stays and an increased prevalence of an older population, which will be doubled from 2017 to 2050, there have been calls for a new evidence-based PU-RAI. A PU-RAI should be evidence-based, perceived as relevant, easy to use and have the ability to correctly identify those patients who are not at risk, at risk and/or have a PU (EPUAP/NPIAP/PPPIA, 2019; WHO, 2014).

Pressure Ulcer Risk Primary or Secondary Evaluation Tool (PURPOSE T)

The instrument PURPOSE T was developed through the "golden standard" method in a structured five phase approach: systematic review, consensus study, conceptual framework development, designing with pretesting and clinical evaluation (Coleman et al., 2013, 2014a,b, 2016, 2018). PURPOSE T separates primary prevention (for patients with risk for PU) from secondary prevention (for patients that have a PU); moreover, it differs from all other traditional PU-RAIs as it does not include a numeric scale. It includes a screening stage for all patients and full assessment of those at potential risk, supports care planning in response to the patient's risk profile (risk factors) and inspires to provide a more reflective assessment of the patient (Coleman et al., 2018). After the risk assessment is performed, the patient should receive information about the results of the risk assessment, what the health care staff will do to prevent PU for the patient and what the patient can do to prevent PU themselves (Latimer et al., 2013, 2017; Roberts et al., 2017; Schoeps et al., 2016).

Patient participation

Definition and legislations

Patient participation can be defined as the patients' participation in the decisions around their care and treatment (International Alliance of Patients' Organisation, 2016). However, research shows that the patients' definition of patient participation includes a wider range of properties such as being engaged in care, sharing experiences of symptoms and treatment with health care staff, and being involved in planning and decisions about their care and treatment (Eldh et al., 2004, 2006a,b, 2010). With this definition, the patients can

be involved in their whole life situation, which, in addition to decisions around their care and treatment, also includes self-care and/or prevents illness (Eldh, 2019).

According to the World Health Organisation (WHO), the patient should be encouraged to participate in his or her own care (WHO, 1994), and in Sweden, the patient's rights and safety are strengthened through legislation (Patient Act, 2014; Patients Safety Act, 2010), aiming to increase the patients' participation in their own health care (Patient Act, 2010). Patients could have a key role in their safety during their hospital stay and should therefore be invited to participate in their PU prevention, through information and increased knowledge, although the health care professionals have the core responsibility (Eldh et al., 2008; Latimer et al., 2014; Roberts et al., 2017; Schoeps et al., 2016; Tobiano et al., 2016).

Health care providers should encourage and empower patients to take responsibility for their own health and safety situation. Patient participation in decision-making in health care and treatment is not a new area; however, it has become a political necessity in many countries and healthcare systems around the world (Eldh, 2019). It is not only important to allocate the power between the RN and the patient, but also to take advantage of the patients' resources and understand what they can contribute with in their own care (Kärkkäinen & Eriksson, 2004, 2005). Patient participation is regarded as a primary requisite for delivering optimal health care (Eldh, 2019).

Thórarinsdóttir and Kristjansson (2014) have developed a framework with three phases for patient participation in healthcare. In the present thesis, this framework has been used to discuss patients' participation in their PU prevention. The framework embraces human connection, information processing and action. In the first phase, the RN and the patient build an equal human connection. In the second phase, the RN and the patient exchange information. Finally, in the third phase, the patient takes action towards his or her health problem. The RN and the patient must go through all three phases together to achieve patient participation and thereafter, the patient can take action towards his or her own health problem (Thórarinsdóttir & Kristjánsson, 2014). If the RN and the patient can build a human connection, the RN might be able to exchange PU information with the patient. Furthermore, the patient could take action in his or her own PU prevention in the last phase.

Patient knowledge through information

Providing adequate information to the patient is a safety issue that can increase the patient's awareness and patient participation (Eldh, 2019). Patients report that health care professionals fail to inform and explain PU prevention in a

way such that the patients can understand and participate in their own PU prevention (Latimer et al., 2014, 2017). However, recent studies show that there is limited research that focus on the patients' knowledge. Furthermore, patients' knowledge on PU needs to be evaluated (Ledger et al., 2020). The health care professionals have an important role in transferring knowledge to the patient regarding PU prevention (Latimer et al., 2017; Ledger et al., 2020). With education in PU prevention, the patients may start to change their daily routines, their physical routines and develop an awareness of PU risk in daily life (Latimer et al., 2014, 2017; Roberts et al., 2017; Schoeps et al., 2016; Tobiano et al., 2016). It is of importance to listen to the patients to understand their level of knowledge when taking care of the patients' PU (Jackson et al., 2017; Roberts et al., 2017). Patients claim that if they had more information about PUs, they would have been able to take better care of themselves. Regardless of the level of knowledge, patients believe that prevention is always better than treatment (Gorecki et al., 2012; Roberts et al., 2017).

Information and communication technology

Traditionally, the RNs have given patients verbal or written information about PUs. Today, new ways of including patients in their own care are needed; thus, with fast-developing information and communication technology (ICT), it is important to take advantage of this technology. A scoping review demonstrated that the use of ICT within the health care context has a great potential of improving the quality of life for patients in home care (Zonneveld et al., 2019), and a randomised controlled trial (RCT) demonstrated that ICT can improve quality of life and reduce health care costs (Gustafson et al., 2015). The Continuous Bedside Pressure Mapping System (CBPM) is an ICT instrument that comprises a mat connected to a small computer monitor that shows the body's pressure points as real time feedback (Scott et al., 2014). A review shows that the CBPM system is a resource that can improve repositioning of patients and help health care professionals to prevent PUs (Gaspar et al., 2019). The CBPM system has been evaluated by nursing students (Gunningberg et al., 2016), health care staff (Behrendt et al., 2014; Gunningberg et al., 2018; Hultin et al., 2017) and in a RCT study at a geriatric department (Gunningberg et al., 2017); the results have shown that the CBPM system is a promising tool in nursing care. This technology could be a complementary approach to increase patients' participation in their PU prevention.

Nursing care

One of the main responsibilities and purposes of RNs in nursing care is to alleviate suffering. Suffering related to care received a lot of attention because

of the sensation that professional care could cause suffering. This was established as suffering of care (Eriksson, 1994). The nursing care process is, in general, a step-by-step model applicable to all areas of nursing care. It is developed based on patient analysis, planning, implementation of care, evaluation and planning of continued care (Kärkkäinen & Eriksson, 2004, 2005). PU prevention should be included in all those steps.

- Patient analysis: the prevention starts with identifying the patients that are at risk of developing a PU, which includes a risk assessment and a skin assessment.
- Planning: the PU prevention care is planned together with the patient and his/her family, e.g. information about what the patient can do to prevent PU and what the RN is going to do to prevent PU. Here, an estimation is made as to how much the patient can be active in and take responsibility for his or her care.
- Implementation of care: the RN prescribes nursing intervention for PU prevention, such as bed and chair support surfaces, repositioning, early mobilisation and nutritional support. The RN also prescribes dressing for already existing PUs.
- Evaluation: this process is ongoing between the patient and the RN; depending on the outcome, they may need to modify the preventive planning.
- Planning of continued care: if the patient is discharged, the patient and his/her family are involved in how the follow-up care of the PU is planned.

Patients' participation in their own PU prevention includes sharing the knowledge and respect between the patient and the RN. The patient has experience-based knowledge of the ailment, and the RN contributes with evidence-based knowledge and clinical experiences. By receiving this information from both the patient and the RN, it is easier to reach a joint perception of what is of importance for the patient and thereby increases the patient's participation (Eldh, 2019; EPUAP/NPIAP/PPPIA, 2019). It is important to put this together in the nursing care process to get positive results. As PUs are considered as an adverse event and cause suffering, the PU prevention is crucial in nursing care; moreover, most PUs can be prevented if correct nursing care is given (EPUAP/NPIAP/PPPIA, 2019).

Implementation of evidence-based practice

The field of implementation science is a field of research that investigates different aspects of integrating evidence-based practise within healthcare and

outside healthcare. It is a vast field, and there are many different theories, models and frameworks (Nilsen, 2015). It includes a focus on patients' experiences as well as on providers, organisations and policy levels of healthcare (Bauer et al., 2015). Implementation in a healthcare setting is considered as complex, an unpredictable process and sometimes difficult, as there are many factors that need to be considered, e.g. culture, evidence, feedback, organisation, etc. (Kitson et al., 2014; Kitson & Harvey, 2016). There is a wide variety of implementation strategies to implement nursing care and guidelines (Spoon et al., 2020). One such framework is the integrated Promoting Action on Research Implementation in Health Services framework (i-PARIHS). The purpose of this framework is to provide a map of elements of importance for successful implementation (Kitson & Harvey, 2016).

In the present thesis, i-PARIHS framework has been used to discuss the use and integration of an evidence-based innovation. The framework points out important constructs that can influence the success of implementation positively or negatively: the innovation, the recipients, the context and the facilitation. The innovation represents the evidence-based knowledge planned to be introduced, and the recipients are the people who are affected by and influenced by the implementation. The context can be divided into internal (local and organisational setting) and external (health system) context, and facilitation can be defined as a technique by which one person makes things easier for other persons (Kitson et al., 1998; Kitson & Harvey, 2016).

Rationale for the project

PUs continue to be a common problem worldwide, with suffering for the patient, extended hospital stays and huge costs for the health care system (Demarré et al., 2015; Gorecki et al., 2012). Therefore, prevention is preferable for the patient and less expensive for the health care system (EPUAP/NPIAP/PPPIA, 2019).

It is important to work with an evidence-based PU-RAI when performing risk assessments of patients. PURPOSE T is evidence-based and includes all risk factors that are recommended according to the latest research. The instrument has shown promising psychometric results in the UK (Coleman et al., 2018); however, it has not been evaluated outside the UK. When evaluating a new PU-RAI, it is important to evaluate the psychometric characteristics, the usability and the feasibility. The usability must be acceptable for the user regarding ease of use, format and clinical information, and the feasibility considers relevant factors to ensure that the intervention will work (Georgakellos & Macris, 2009; Glad et al., 2012). Therefore, it is important to evaluate the psychometric characteristics of usability and feasibility to ensure that PURPOSE T is suitable in the Swedish health care context.

Research shows that health care professionals fail to inform patients about PU prevention in a way such that the patients can participate in their own PU prevention (Latimer et al., 2014, 2017). Patients claim that if they had more information about PUs, they would have been able to take better care of themselves. There is a lack of research regarding patients' participation in using ICT. It is important to understand if older patients who are at risk can use the CBPM system as a complement to written and verbal information on PU prevention and to continue the evaluation of the CBPM system.

Therefore, in this thesis, the focus has been on risk assessment and patient participation.

Aims

Overall aim

The overall aim of this thesis was to evaluate the psychometric values, usability and feasibility of PURPOSE T and to investigate whether it is possible to improve patient participation through the CBPM system.

Study I

To evaluate the psychometric characteristics of PURPOSE T: reliability (inter-rater and test-retest) and validity (convergent validity) in a Swedish context.

Study II

To evaluate the clinical usability of PURPOSE T among RNs in Sweden.

Study III

To evaluate the feasibility of implementing an electronic version of PURPOSE T in clinical practice in Sweden.

Specific aims were:

- To assess the impact of using PURPOSE T in the electronic documentation of PU risk factors and preventative interventions.
- To explore if and how information about PU risk and prevention is shared with patients.
- To explore the experience of RNs and assistant nurses using PURPOSE T in routine clinical practice.

Study IV

To evaluate the CBPM system from the patients' perspective, with a focus on patient participation with use of the system and whether their knowledge of PU prevention improved as a result of study participation.

Methods

Study I had a quantitative approach, studies II and IV a qualitative approach, and study III a mixed method approach. An overview of the methods used in the four studies is shown in table 2.

Table 2. Overview of the studies included in this thesis

Study	*Design*	*Data collection method*	*Sample*	*Data analyses*
I	Observational, descriptive and comparative	Risk assessment of patients	Patients (n=235) RNs (n=28)	Descriptive statistics, Cross-tabulation, kappa statistics and phi correlation
II	Descriptive	Focus group interviews	RN (n=28)	Content analysis
III	Convergent parallel mixed method	Review of records, individual interviews and focus group interviews	Orthopaedic patients (n=60), review of records, (n=15), individual interviews, RN (n=15), and AN (n=8)	Descriptive statistics, Chi-square, Fishers exact test, Independent t-test, Mann-Whitney U test and content analysis
IV	Descriptive	Individual interviews	Orthopaedic patients over 65 years (n=31)	Content analysis

Overall setting

Studies I–IV took place in one county in Sweden, which has a university hospital with approximately 900 beds, one local hospital and 36 nursing homes.

Most of the RNs in Sweden have a university degree with a Bachelor of Science in nursing. An assistant nurse (AN) has an exam from upper secondary school. The RNs are responsible for conducting risk assessments, care planning and its documentation in the electronic health record (Swedish Nurses Association, 2017). The national PU guidelines in Sweden from SALAR are based on the international guidelines from EPUAP/NPIAP/PPPIA (2019), and all hospitals and nursing homes have access to the national PU guidelines. All

patients should undergo a skin assessment, and all patients who are bedridden, in a wheelchair, have low mobility, have sensitive and/or fragile skin, or already have a PU should be risk assessed with the MNS as soon as possible after admission to the hospital or the nursing home. The assessment should be repeated regularly, especially if the patient has a deteriorating health condition, a larger surgical intervention, and when the patient is transferred to another ward. All patients found to be at risk for PUs should receive preventive nursing interventions (EPUAP/NPIAP/PPPIS, 2019; SALAR, 2021).

PU prevention is a prioritised area in Sweden, as well as a recognised quality indicator. In the Swedish healthcare system, prevalence studies have been conducted every year since 2011 (SALAR, 2021), and the results are reported and discussed with the hospitals, quality departments, nurse managers and head of the departments.

Study I

Setting

The study setting was six hospital wards from the departments of geriatric, cardiology, surgery and spinal cord injury, and two nursing homes. The rationale for choosing these wards and nursing homes was to have a variation in RNs´ age, work experiences and education, as well as variation in patients' mobility status.

Participants

Patients and RNs were purposively invited to participate in the study. The inclusion criterion for patients was ≥ 18 years of age, and the exclusion criterion was patients at the end of life. Patients were sampled to ensure a similar number of patients from both the hospital wards and the nursing homes with a representation of patients across four groups (25 %/group): no mobility restrictions, some mobility/activity limitations, bedfast/chairfast and PU category ≥1. Inclusion criterion for RNs was that they had >6 months of working experiences at the ward or nursing home.

Instruments

Three PU-RAIs were used in paper form: PURPOSE T (Coleman et al., 2018), the MNS and the Braden Scale (Källman & Lindgren, 2014).

PURPOSE T

PURPOSE T was translated from English into Swedish according to WHO´s translation guidelines (2010), as well as the PURPOSE T language translation guideline (Coleman et al., 2018). An expert panel of two RN researchers translated the original instrument individually and then discussed their translations together, analysing the different versions until reaching a consensus. Thereafter, a native-born wound expert translated and interpreted the Swedish version back to English. Lastly, four researchers verified the final Swedish version. The verified version was pre-tested on four RNs. No modifications were required.

PURPOSE T is divided into three steps:

Step 1 - Screening, which comprises mobility, skin status and clinical judgement. This step allows the patients who are clearly not at risk to be quickly screened as a "fast track" and those with potential risk or actually having PUs to proceed to step two and a full assessment.

Step 2 - Full assessment, which comprises analysis of independent movement, sensory perception and response, moisture, diabetes, perfusion, nutrition, medical devices, detailed skin assessment, previous PU history and a reminder figure with the different PU categories on how to categorise the PUs.

Step 3 - Requires consideration of step 2 in order to choose one of three assessment decisions: "no PU - not currently at risk", "no PU but at risk" or "PU category 1 or above or scarring from previous PU". Please see the Swedish version in appendix 1 or the English version at: https://ctru.leeds.ac.uk/purpo se/purpose-t/

The Modified Norton Scale

The MNS incorporates numerical scoring to support decisions about risk, by scoring 1–4 for each risk factor item. The risk factors included in the MNS are general physical condition, mental state, activity, mobility, fluid intake, food intake and incontinence. Each risk factor is added together to give the patient an overall score. The overall score is then compared to a standard reference value to allocate if the patient is "at risk" or "not at risk". A total score ≤ 20 is a "patient at risk for PU" (Källman & Lindgren, 2014).

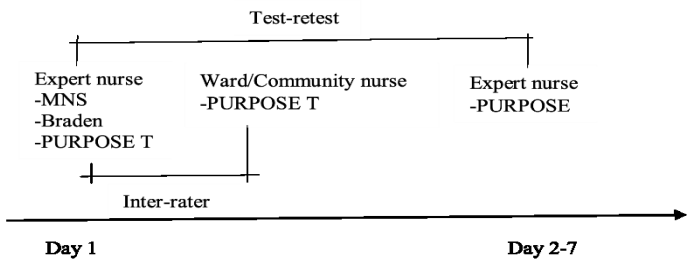
The Braden Scale

The Braden Scale incorporates numerical scoring to support a decision about risk, by scores (1–3 or 1–4) for each risk factor item. The risk factors included are mobility, activity, friction and shear, moisture, sensory perception and nutrition. Each risk factor is added together to give the patients an overall score.

This overall score is then compared to a standard reference value to allocate if the patient has: severe risk ≤ 9, high risk with a score of 10–12, moderate risk 13–14 or mild risk 15–18 (Källman & Lindgren, 2014).

Procedure

There were two RNs acting as expert nurses. One of them (the author) recruited the RNs from the wards and the nursing homes and trained them and the other expert RN on how to use PURPOSE T. Prior to data collection, all RNs performed one or two clinical assessments on patients with PURPOSE T. The two expert RNs purposively included patients. Thereafter, the expert RN undertook a baseline assessment on all the patients, which incorporated the collection of demographic data, clinical assessment with the MNS, the Braden Scale and PURPOSE T assessment (convergent validity), and a staff RN undertook a PURPOSE T assessment (inter-rater) at the same time but recorded separately (blindly). The skin assessment was undertaken at the same time by the expert RN and the staff RN to minimise any burden on the patient. The expert nurse reassessed the patient with PURPOSE T, blinded to baseline a second time using PURPOSE T (test-retest). The length of the test interval was approximately 2–7 days, depending on if it was a hospital ward or a nursing home. All data were collected between May 2018–November 2018; see figure 1.



Data analysis

The inter-rater and test-retest reliability of the overall risk status was assessed with cross-tabulations and kappa statistics. To examine the extent of reliability and agreement for each individual PURPOSE T item, simple and weighted kappa statistics and percentages of agreement were used (Chen et al., 2009; Sim & Wright, 2005; Strainer et al., 2015;). Published benchmarks were used to interpret estimates of the kappa statistics: poor $k < 0.20$, fair $0.21 \leq k \leq 0.40$, moderate $0.41 \leq k \leq 0.60$, good $0.61 \leq k \leq 0.80$ and very good $0.81 \leq k \leq 1.00$

(Chen et al., 2009; Sim & Wright, 2005). To examine the extent to which the MNS, the Braden Scale and PURPOSE T assess the patients as "at risk" or "not at risk", phi correlation coefficients were calculated with cross-tabulation.

Study II

Setting

Please see study I.

Participants

All RNs and one expert RN, who were included in study I, the psychometric evaluation, also agreed to participate in study II, the clinical usability study.

Procedure

Data were collected through six focus groups interviews (3–5 participants/group) with RNs and one expert RN. The focus group interviews took place approximately one week after the RNs had completed their risk assessments, except for one group; due to summer holidays, their focus group interview took place six weeks later. The focus group interviews at the hospital and nursing homes were held separately, in a separate room outside the ward or at the nursing home. The participants who could not attend the focus groups due to e.g. sickness or parental leave were interviewed individually via telephone. A questioning route was developed and pilot tested in the first focus group; however, no changes were made, and the data were included in the analysis. Main questions were:

-Can you tell me about your experiences of using PURPOSE T?
-Do you agree with the outcome of PURPOSE T?
-Did you have any practical problems?
-If you compare PURPOSE T with MNS, what are your thoughts?
-What PU-RAI would you prefer to use in the future?

Additional probing questions were used.

The interviews lasted between 35–60 minutes and were conducted by one moderator (the author or co-authors) whose role was to facilitate the group discussion by asking questions and probing questions when appropriate. An assistant moderator (the author or co-authors) observed the interaction in the

group, took field notes and summarised the discussion at the end of the interview. All data were collected between May 2018–November 2018.

Data analysis

Data analysis was performed using a method proposed for analysing focus groups by Kreuger (2015). The analysis proceeded as follows: the moderator and the assistant moderator shared a summary directly after the focus group interview. Thereafter, the text from the verbatim-transcribed interviews was read repeatedly to get a broad picture of the data. Meaning units were identified and coded. Codes were grouped according to their differences and similarities, forming categories. Comparisons were made through the whole process between the categories and the text as a whole. Quotes were used to show the interaction (Krueger, 2015).

Study III

Setting

The study setting was a 24-bed orthopaedic ward that served patients 18 years of age and older. The ward receives both acute and elective patients. The rationale for choosing this ward was to include first line patients from emergency care and patients at risk of developing PUs, as well as RNs and ANs who risk assess first line patients, increasing the chances of being proactive in PU prevention.

Participants

Patients were consecutively asked if they accepted a review of their *electronic health record*. Inclusion criterion: enrolled at the ward for ≤ two days. Exclusion criteria: patients at the end of life, patients with dementia and acute confusion.

Patients were conveniently invited to participate in the *individual interviews*. Inclusion criterion: patients enrolled at the ward for ≤ two days. Exclusion criteria: patient at the end of life, patients with dementia and acute confusion.

All RNs and a convenience sample of 10 ANs were invited to participate in the *focus groups interviews*. Inclusion criterion for RNs and ANs was working ≥ 50 % at the ward.

Instruments

Two PU-RAIs in electronic form, integrated into the patients' electronic health record, were used in study III; PURPOSE T (Coleman et al., 2018) and the MNS (Källman & Lindgren, 2014). When PURPOSE T was integrated into the electronic health record, it turned out that it was not possible to transfer the colours of PURPOSE T into the computer system. Otherwise, it was the same as the paper version of the instrument.

Procedure

Implementation of PURPOSE T

Prior to the study, an education nurse at the ward was appointed as an internal facilitator to schedule staff education and provide the external facilitator (the author) with information about the ward routines. PURPOSE T was integrated into the electronic health record. A pocket card was designed to be used as a reminder of the key elements of PURPOSE T and specific information to share with the patient about PUs. The external facilitator trained all RNs and ANs in how to perform and document the risk assessment with PURPOSE T. They were also trained in how to inform the patients about the result of the risk assessment, what the patient could do him or herself to prevent PUs and what the health care staff would do to prevent PUs or to take care of existing PUs. Thereafter, the MNS was replaced with PURPOSE T in the electronic health record, and the RNs and ANs worked with PURPOSE T for one month. The author acted as an external facilitator during the implementation period, visiting the ward daily to answer questions about risk assessing with the PURPOSE T instrument and if there were any questions about the documentation of PURPOSE T in the electronic health record; see figure 2.

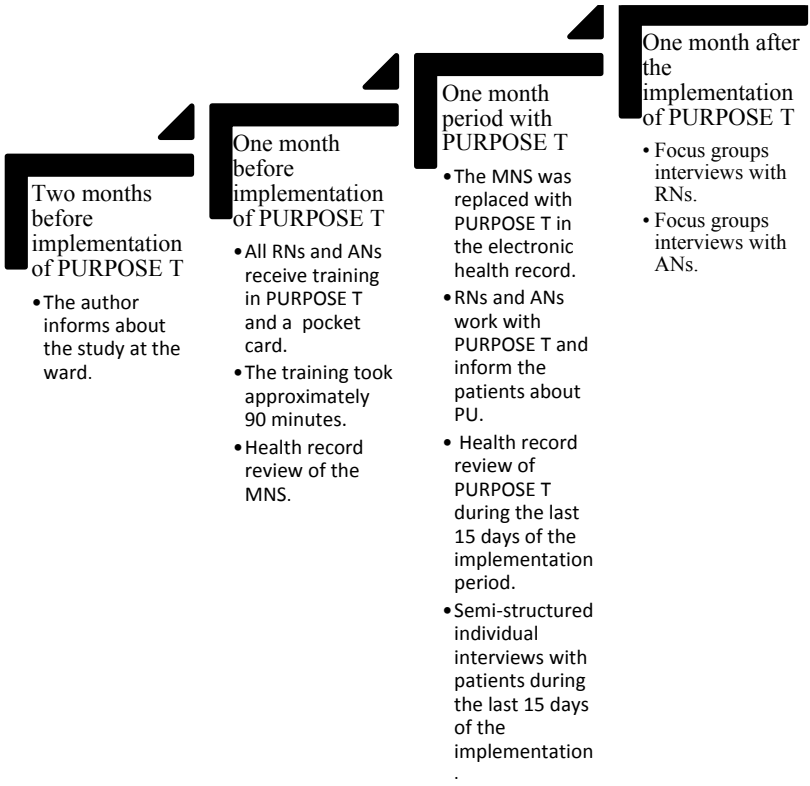


Figure 2. Implementation procedure of PURPOSE T

Data collection

The patient's health record review was conducted before and after the implementation of PURPOSE T. The individual interviews with patients and focus group interviews with RNs and ANs were conducted after the implementation of PURPOSE T; see figure 2. Data were collected between August 2020 and December 2020.

Electronic health record review: A study specific data collection form was used with yes and no questions. The data collection form included: patients' background data, PU risk assessment and nursing interventions. In the electronic health record, information about these aspects were found and reviewed under the following subtitles: Nursing care plans, nursing interventions, result, evaluation and discharge notes.

Individual patient interviews: Individual interviews took place at the bedside at the ward. Demographic data were collected before the interviews. All patients were encouraged to talk freely, and all questions were asked from the

questioning route using probing questions, when appropriate. The interviews lasted between five to 20 minutes.

Main questions for patients were:

-What information have you received about PU at the ward?
-What information have you received regarding risk assessment of PU/skin inspection?
-What information have you received on how to prevent PU?
-Has a RN or an AN established a care plan together with you to prevent PUs or treat existing PUs?

Focus group interviews with RNs and ANs: Focus group interviews with RNs and ANs took place separately in a conference room at the ward. There were four focus group interviews with RNs (2–4 participants/group) and two focus group interviews with ANs (4 participants/group). Two individual interviews were performed with RNs who could not attend any focus group interview due to sickness (one was held in the conference room and the other via telephone). The focus group interviews started with collecting demographic data and thereafter, the questions were asked. A moderator conducted the focus groups interviews (co-authors and a RN/lecturer who had experiences of focus group interviews) and an assistant moderator (co-authors) observed the interaction and took field notes. All questions were asked from the questioning route using probing questions, when appropriate. See table 3 for the main questions posed to RNs and ANs. Since the RNs have the main responsibility for the risk assessments, there were a few extra questions for the ANs to understand their part in the risk assessment. The interviews lasted between 20–40 minutes.

Table 3. Main questions for the RNs and ANs and additional questions* for ANs.

Questions for RNs
Can you tell me about your experiences of using PURPOSE T?
Can you tell me how you have experienced talking to the patient during the assessment?
How do you think it has been to look at the skin?
How was it to inform the patient about the result of the risk assessment?
Can you tell me how it has been to document the risk assessment in the electronic health record?
Can you tell me how the cooperation with the ANs has been?
How much time was needed to conduct a risk assessment with PURPOSE T compared to the MNS?
If you compare PURPOSE T with the MNS, what are your thoughts?
Is PURPOSE T suitable for the care at your ward?
In thinking about the future - what risk assessment instrument would you like to use?
**Can you describe your role in risk assessment and prevention of PUs.*
**How was the collaboration with the RNs?*
**How was it to inform the patient about the result of the risk assessment?*

Data analysis

Electronic health record review: Chi-square was used to compare nominal data (before and after, e.g. skin assessment, risk for PUs, general nursing care plan). Mann-Whitney U test was used to compare non-parametric variables (prescribed nurse interventions before and after). Values of $p<0.05$ were considered as statistically significant.

Individual patient interviews: Data from the individual interviews did not allow for a qualitative analysis as almost all the patients expressed not receiving any information about PUs, PU prevention, result of the risk assessment, and none of the RNs/ANs had made a care plan together with the patient. Therefore, a quantitative content analysis was used (Weber, 1976). The transcribed text from the interviews was systematically and repeatedly read to get a sense of the meaning as a whole. Numeric values (yes=1 /no=0) were given to the answers as codes, which allowed for the frequency to be summarised.

Focus group interviews with RNs and ANs: The qualitative analysis of the focus group interviews was made separately between the RNs and ANs. In study II, risk assessment, documentation, teamwork and patient information and patient participation were identified as important concepts to evaluate regarding the feasibility of PURPOSE T. Hence, a deductive approach (Cresswell & Plano, 2018) with content analysis was used (Kreuger, 2015). The analysis proceeded as follows. The moderator and assistant moderator summarised the key points, as well as group activities directly after the focus

group. The transcribed text was read repeatedly to get a sense of the meaning as a whole. Thereafter, meaning units were deductively identified according to the four concepts: risk assessment, documentation, teamwork and patient information, and patient participation. Meaning units were labelled with codes, grouped and sorted according to similarities and differences into subcategories. Comparisons were made during the whole process between RNs and ANs and between categories and subcategories and the text as a whole.

Study IV

Setting

The study setting was a 24-bed orthopaedic rehabilitation ward at the university hospital that served patients 65 years of age and older. The rationale for choosing this ward was to include older patients at risk of developing PUs.

Participants

A convenience sample of older adults who underwent orthopaedic surgery participated. The inclusion criteria were: intact cognitive function measured with the Short Portable Mental Status Questionnaire (SPMSQ), with a score of eight or more (Pfeiffer, 1975); willingness to answer questions during an interview; risk of PU assessed with the MNS, with a score of 20 or less (Källman & Lindgren, 2014); and being able to change positions by themselves. Exclusion criteria were patients at the end of life and those with a MNS score of one or less on mobility.

Instrument

The CBPM system was used (Scott & Thurman, 2014), which is a modern ICT instrument that comprises a mat with thousands of pressure sensors, connected to a monitor with real time feedback that shows the body's pressure points on a monitor. The patient's body is pictured in a colour scale, where blue and green indicate acceptable pressure between the body and the underlying surface; in addition, yellow, orange and red indicate high pressure (warmer colours indicate high pressure). Therefore, the CBPM can provide the patient and the health care staff with real-time feedback on the parts of the body that are exposed to high pressure (Scott & Thurman, 2014). The CBPM system has the potential to be used as a PU prevention approach that can involve the patient in their care (Gustafson at al., 2015; Hultin et al., 2017).

Procedure

The procedure was as follows: on day 1, the patient was included and received PU information; thereafter, on day 2, the patient received information about the CBPM system and was encouraged to use the system for three days. On day 4, the patient was interviewed; see figure 3. Prior to the data collection, the procedure was pilot tested on two patients, and minor adjustments were made to the interview guide. Data from these two were not included. All data were collected between November 2016 and February 2017.

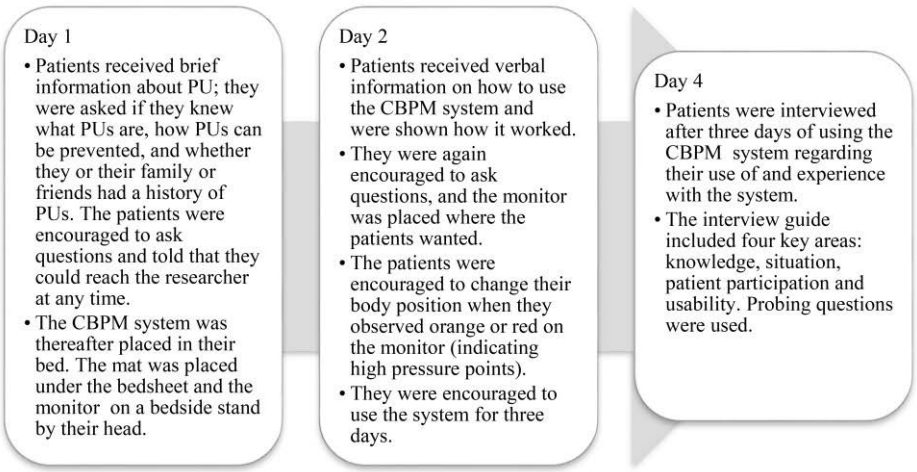


Figure 3. Procedure for study IV

Data analysis

The individual interviews were analysed with a qualitative content analysis (Graneheim & Lundman, 2004). The analysis proceeded as follows: the transcribed text was read as a whole to get an initial sense of its entirety. Thereafter, the text was read repeatedly to identify meaning units based on the purpose of the study. Meaning units were then condensed without loss of content, abstracted and coded. The condensed meaning units and codes were repeatedly read and discussed. Codes were then compared to find similarities and differences, and thereafter sorted into categories and subcategories. Subsequently, the codes were discussed, and a theme was formulated. Quotations illustrate the subcategories.

Ethical considerations

Ethical standards for scientific work were followed, based on the declaration of Helsinki (The World Medical Association, 2013), as well as national and

local ethical guidelines (CODEX, 2021) in all studies. The Regional Ethical Review Board, Uppsala, Sweden approved all studies prior to the data collection (studies I and II 2018/196, study III 2020/01730 and study IV 2016/427). All data and materials have been stored so that no unauthorised persons had access to them. All participants were able to choose where and when they wanted the interviews to take place. All data in the study were coded and presented at a group level, so that no participant could be identified. The studies did not entail any risk for the participants.

Patients, RNs and ANs received verbal and written information about the studies and signed a written informed consent at the time of inclusion.
According to the Regional Ethical Review Board, the RNs in study II did not need to give a written consent, as risk assessment was considered being part of their nursing duties.

Patients with cognitive impairment were asked to participate in study I. Individuals in community care, aged care and rehabilitation setting have a higher risk of PUs, as these settings care for older adults (EPUAP/NPIAP/PPPIA, 2019). Therefore, it is important to include patients with dementia or cognitive impairment, as they are more sensitive and vulnerable to PUs and constitute a large part of the patient groups in the institutions/wards. In those cases, a relative was informed about the study and asked to give a written informed consent on the patient's behalf.

It is always a delicate matter to ask a patient to participate in a research study. In study III, patients with an acute orthopaedic diagnosis were asked to participate; thus, patients may have had to make a decision during a time when they were affected by their acute illness, heavy drugs for the pain and/or in a stressful situation, which could have affected their decision. The author who asked the patients to participate made it clear that their decision regarding whether or not to participate would not affect their care. Patients at the end of their life, patients with dementia and/or patients with acute confusion were not included in the electronic health record review or the individual interviews because it was not possible to get informed consent. However, these patients were included in the intervention and underwent a risk assessment with PURPOSE T.

Summary of results

Study I

A total of 235 patients and 28 RNs participated in the study. The group of patients included 138 women and 97 men; their mean age was 80 years (range 20–102). The included RNs were 26 women and two men, with a mean age of 35 (range 23–65); furthermore, the mean years of working experience as a RN was 7.8 years (range 0.5–34).

The result demonstrated that PURPOSE T identified 146 (62.1 %) patients "at risk for PU", the MNS identified 59 (25.1 %) patients "at risk for PU" and the Braden Scale identified 78 (33.2 %) patients "at risk for PU".

Inter-rater reliability for PURPOSE T

There was 90.2 % (212/235) agreement in the three-way decision pathway between the expert nurses and the RNs. The assessment with PURPOSE T was performed in a similar manner by the expert nurses and the RNs, with a corresponding simple kappa statistics of 0.85 (0.79–0.91) and weighted kappa statistics of 0.88 (0.84–0.93), which indicate very good reliability. When classified dichotomously as "at risk for PU"/"not at risk for PU", there was 95.5 % (222/235) agreement between the expert nurse and the RN. In terms of agreement for each risk factor between the expert nurses and RNs, the lowest level was 71.3 % (112/157) for the analysis of sensory perception, and the highest was 98.5 % (79/80) for the analysis of clinical judgement; see table 4.

Test-retest reliability for PURPOSE T

There was 97.4 % (229/235) agreement in the three-way decision pathway between the baseline and follow-up assessment. The corresponding simple kappa statistics of 0.96 (0.93–0.99) and weighted kappa statistics of 0.97 (0.95–0.99) indicate very good reliability. When classified dichotomously as "at risk"/"not at risk", there was an agreement between the baseline and follow-up assessment for 97.4 % (229/235). In terms of agreement for each risk factor between baseline and follow-up, the lowest level was 85.5 % (135/158) for the analysis of sensory perception, and the highest was 98.5 % (79/80) for the analysis of clinical judgement; see table 4 (Hultin et al., 2020).

Convergent validity for PURPOSE T

The overall risk status of PURPOSE T was compared with the MNS and the Braden Scale for all 235 patients at baseline assessment. A moderate association was observed between PURPOSE T and MNS with a phi correlation of 0.41, and a moderate association was also identified between PURPOSE T and the Braden Scale, with a phi correlation of 0.55. This indicates low to moderate correlation between the PU-RAIs.

Table 4. The levels of agreement for each risk factor item between the expert nurse and RN at baseline and at follow- up (Hultin et al., 2020).

	Expert nurse vs staff nurse			Expert nurse baseline vs follow-up		
	n	%	kappa	n	%	kappa
Mobility (agreement on presence/absence of problem)	221/235	94.0	0.880	224/235	95.3	0.905
Skin status (agreement on presence/absence of problem)	96/99	97.0	0.900	93/99	93.9	0.787
Clinical judgement	79/80	98.5	0.902	79/80	98.5	0.902
Analysis of independent movement (agreement on presence/absence of problem)	138/157	87.9	0.684	149/158	94.3	0.853
Sensory perception	112/157	71.3	0.375	135/158	85.4	0.699
Nutrition (problem vs no problem)	151/155	97.4	0.890	150/157	95.5	0.812
Diabetes status	153/157	97.5	0.915	153/158	96.8	0.896
Perfusion status (agreement on presence/absence of problem)	125/157	79.6	0.540	137/158	86.7	0.662
Moisture status (agreement on presence/absence of problem)	115/157	73.2	0.434	138/158	87.3	0.730
Medical devices	131/157	83.4	0.492	143/158	90.5	0.651
PUs earlier	151/155	97.4	0.890	150/157	95.5	0.812

Study II

There were 29 RNs participating in the study: 27 women (26 ward RNs and one expert RN) and two men, aged 23–65 years (median 35). Their working experience as a RN varied from six months to 34 years (median five years). The clinical usability of PURPOSE T among RNs was identified in four categories:

An efficient risk assessment instrument performed at the bedside- described that the RNs were surprised by PURPOSE T's efficiency. It made it obvious what risk factors were to be assessed and what questions to ask the patients. It was easy to learn to use and understand the instrument. Another advantage was that it was found to be valuable to perform the assessment bedside; specifically, the RNs appreciated meeting and talking to the patient during the assessment with PURPOSE T, instead of receiving the information second hand from ANs. It was surprisingly quick and easy to complete the instrument, and it was not seen as time-consuming; instead, it was perceived as saving time as the RNs did not have to perform the whole assessment on all patients.

Deeper understanding and awareness of risk factors- described that the RNs became aware of the risk factors included in PURPOSE T, and those risk factors contributed to a deeper and more comprehensive analysis of the overall assessment. Through a deeper understanding of the risk factors, the RNs became aware of the importance of assessing those risk factors to prevent PUs.

Benefits compared to the MNS- described that PURPOSE T showed a more comprehensive assessment as it includes evidence-based risk factors compared to the MNS that, according to the RNs, gives a superficial impression. The RNs noticed that PURPOSE T would probably identify more patients at risk compared to the MNS. When a RN performed a risk assessment with the MNS, the result could demonstrate that the patient is not at risk; however, the RNs clinical judgement indicated that the patient could be at risk for PU or, even worse, they could have identified a PU. The RNs recognised that this would probably not have happened with PURPOSE T. The RNs expressed that they would prefer using PURPOSE T in the future if they were given the opportunity to choose.

Necessity of integration of PURPOSE T in the electronic health record and team collaboration- described the need to use PURPOSE T in their daily work, i.e. to integrate the instrument in the electronic health record where all other information concerning the patient is gathered. It would be easier to follow if one could see only one risk factor at a time, instead of all at once on a paper. Another prerequisite for using PURPOSE T in daily work was a team collaboration between the RN and the AS. Both RNs and ANs would receive training in the PURPOSE T, as it could contribute to increased learning and involvement in the nursing care, skin inspection and PU categorisation for the ANs. However, the RN would still have the main responsibility for the risk assessment.

Study III

The impact of using PURPOSE T in the documentation of PU risk factors and preventive interventions

The patients whose medical records were reviewed included 32 women and 28 men; their mean age was 66 years (range 19–97). The result demonstrated that the MNS identified two (6.6 %) patients at risk for PUs, and PURPOSE T identified 12 (40.0 %), which was significantly more. There was no significant difference regarding the patients who received a standardised nursing care plan between the two groups. However, patients at risk for PU according to PURPOSE T were prescribed significantly more nursing interventions compared to patients who were risk assessed with the MNS.

Information about PU risk and prevention shared with patients

The group of patients interviewed included six women and nine men; their mean age was 68 years (range 30–89). Almost all the patients expressed not receiving any information about PUs or on the result of the risk assessment, and none of the RNs had made a care plan together with them. However, some of the patients expressed that they knew what a PU was and /or how to prevent a PU from previous experiences of health care and /or if a relative had experiences of PUs.

The RNs' and ANs' experiences of using PURPOSE T in routine clinical practice

The focus group interviews with RNs consisted of 13 women and two men; their mean age was 32 years (range 23–57), and mean years in the profession was eight years (range 0.25–26). The focus group interviews with ANs consisted of six women and two men; their mean age was 42 years (range 23–60), and mean years in the profession was 13 years (range 4–35). The result showed that all of the RNs were satisfied with PURPOSE T and were not interested in going back to using the MNS. The ANs were also satisfied and felt that PURPOSE T contributed to the risk factors being carefully considered. There were nine subcategories derived from the pre-defined concepts; see table 5.

Table 5. RNs' and ANs' experiences of working with PURPOSE T; focus group interviews

Categories	Subcategories
Risk assessment	
	Satisfactory in its entirety
	Unaltered time required, despite a comprehensive assessment
	Reflection, analysis and conclusion
	Possibility to identify more risk patients
Documentation	
	Went from uncertain to confident
	Encouragement for preventive action
Teamwork	
	Unchanged teamwork – but more involved nurses at the bedside
Patient information and participation	
	Gave information to patients "in passing"
	Patient participation hindered due to the patients' health condition

Risk assessment

Satisfactory in its entirety- described that the instrument served the RNs well in their daily work and contributed to a more efficient risk assessment. The instrument was more "up to date" to today's admitted patients compared to the MNS. The RNs perceived that PURPOSE T included risk factors that were easy to assess and understand and that they could decide what the answer to the risk factors was "here and now" compared to the MNS.

Unaltered time required, despite a comprehensive assessment- described that the assessment did not take a longer time to conduct compared to the MNS. They appreciated step 1, which could save time in the end. PURPOSE T was more comprehensive, with increased depth and breadth on the patient's PU risk status.

Reflection, analysis and conclusion- described that the RNs felt they were encouraged to reflect, analyse and to draw their own conclusions from the risk assessment. They appreciated being able to make their own decision concerning if the patient was at risk for PU or not, or already had a PU. The RNs perceived they could be more active, as opposed to using the MNS, where they relied on a number telling them if the patient was at risk or not.

Possibility to identify more risk patients- described that PURPOSE T could identify more patients at risk or have a PU because of the content of risk factors compared to the MNS. RNs expressed that they recognised the importance of each risk factor and valued how PURPOSE T allowed them to see different risk profiles that required different interventions.

Documentation

Went from uncertain to confident- described that the documentation in the electronic health record was 'tricky' in the beginning, but the RNs went quickly from being uncertain to confident. Initially, they experienced that there were several options to choose between; however, this became easier with repeated use.

Encouragement for preventive action- described that when the RNs documented the assessment of PURPOSE T, it encouraged them to start a care plan and prescribe nursing interventions due to the risk factors that they had identified, e.g. if independent movement was impaired, they prescribed nursing interventions, such as turning schedule and pressure reducing equipment. The RN could see a pattern in the risk assessment as a basis for what planned nursing interventions to prescribe.

Teamwork

Unchanged teamwork – but more involved nurses at the bedside- described that the teamwork with the AN had not changed; on the other hand, the RNs shared that they took the opportunity to look at the patient's skin more frequently now, as a skin assessment is included in the PURPOSE T compared to the MNS.

Patient information and participation

Gave information to patients "in passing"- described that the RNs were aware that they should give the patients information about the risk assessment result and PU prevention. However, they often gave that information to the patient "in passing" during other care situations due to lack of time, e.g. during skin inspection or admission dialogue. The RNs were not certain that the patients understood the importance of the information.

Patient participation hindered due to the patients' health condition- described that there were obstacles for patient participation with many of the patients who were admitted to the ward. The RNs expressed that when patients arrive at the ward, they are often tired after being at the emergency department. Thereafter, they are transferred to the ward where they are often placed in the hallway, waiting for a room and when they finally arrive in a room, they are exhausted and cannot absorb information about PUs. When the patients are in pain, they do not want to participate in their own care.

Study IV

This study had a sample of 31 participants, consisting of 20 women and 11 men, and their mean age was 81 years (range 66–99). The findings revealed that verbally adapted information, in combination with using the CBPM system, increased most of the participants' knowledge on PUs. They became aware of increased pressure on the skin and started to take preventive action by changing their position in bed. An overall theme was formulated "A new way of understanding helped patients to recognise vulnerable pressure points and to take action in their own care". Two categories and five subcategories were identified; see table 6.

Table 6. The participants' experiences of using the CBPM system

Awareness	Action
Increased knowledge about PU and prevention	Identifying vulnerable pressure points
Visual feedback as an eye-opener	Changing position and getting control
Independence through participation in self-care	

Awareness

Increased knowledge about PU and prevention- described that the information the participants received increased their knowledge about PUs and prevention, and that knowledge gave them a sense of security. The participants reported that it was easy to understand the system and they learned which areas were especially prone to pressure. Prior to the study, they did not know what a PU was but afterwards they knew what it is and how to prevent it.

Visual feedback as an eye-opener- described that when the participants saw their body movements on the monitor, it was an "eye-opener". Furthermore, they learned how a minor change of position could relieve the pressure. They received immediately information about the pressure in certain areas.

Independence through participation in self-care- described how the participants experienced more independence by participating in their own care, by having the monitor that confirmed and visually warned them if they needed to shift their position. They became aware of how they could be a part of their own care and did not need to ask the RN or AN for help as they managed their repositioning by receiving feedback from the monitor.

Action

Identifying vulnerable pressure points- described how participants managed to identify vulnerable pressure points and started to change position. Partici-

pants identified the most vulnerable points, such as heels, buttocks and shoulders. Moreover, they could identify that the “operated side” was more vulnerable and prone to pressure compared to the “unaffected side”. They used the visual feedback as a reminder and took action to relieve the vulnerable area.

Changing position and getting control- described how the participants took control over their repositioning and used different types, such as taking a walk and finding new positions in bed. They realised that even micro repositioning was effective in relieving pressure and were confirmed by the visual feedback from the monitor when the red colours disappeared.

Discussion

In this thesis, the focus has been on risk assessment and patient participation to improve PU prevention in a Swedish context. The thesis concentrated on the evaluation of PURPOSE T and the CBPM system. The results from study I demonstrated that PURPOSE T has good psychometric characteristics, very good inter-rater and test-retest reliability, and the convergent validity was moderate. Study II showed that PURPOSE T´s clinical usability was acknowledged as positive overall. The RNs found PURPOSE T to be an efficient risk assessment instrument that gave a deeper understanding and awareness of risk factors. Study III showed that the feasibility of PURPOSE T was good. The RNs were more involved bedside, identified an increased number of patients at risk of PUs, and an increased number of nursing interventions were prescribed. Almost all the patients expressed not receiving any information about PUs. The results from study IV showed that the CBPM system helped patients to recognise vulnerable pressure points and to take action in their own care.

As mentioned earlier, PUs are considered as an adverse event and preventing PUs is a goal of patient safety and the RNs' responsibility (EPUAP/NPIAP/PPPIA, 2019; Patient Safety Act, 2010; SALAR, 2021). Since most of the PUs are avoidable, prevention would lead to less patient suffering and lower the costs for health care (Demarré et al., 2015; EPIAR/NPIAP/PPPIA, 2019; Gorecki et al., 2012; Padula et al., 2019). Both risk assessment and patient participation in their own PU prevention should be cornerstones of PU prevention (EPUAP/NPIAP/PPPIA, 2019; Latimer et al., 2013). The key findings will be discussed in relation to risk assessment, patient participation and implementation.

Risk assessment

The underlying knowledge on PURPOSE T before the studies included in this thesis was that PURPOSE T is an instrument for assessing patients' PU risk, it is evidence-based and evaluated in the UK (Coleman et al., 2013, 2014a,b, 2016, 2018). The psychometric properties of an instrument are close to the population that is studied in one context (Hunsley & Mash, 2007). This means

that in order to transfer PURPOSE T to a new context, the instrument's psychometric properties need to be studied. Therefore, study I is a replication to assess the psychometric properties of PURPOSE T in Sweden. The results indicate good and very good inter-rater and test-retest reliability and a moderate convergent validity that was consistent with the results of Coleman et al. (2018).

In the Swedish context, the risk factors sensory perception, perfusion, moisture and medical devices demonstrated lower levels of agreement. This could indicate that the RNs are not used to assessing those items, as they are not included in the MNS, which they are familiar with (Källman & Lindgren, 2014). Moisture is included in both PURPOSE T and the MNS, but has different descriptors. Therefore, the RNs could be unsure and assess moisture in PURPOSE T as in the MNS, therefore the low agreement. These findings are in accordance with previous research in the UK where the levels of agreement were demonstrated as low, in a similar way (Coleman et al., 2018). The lower number of agreements was demonstrated in perfusion, which is not included in the Waterlow scale that the British RNs are used to for conducting risk assessments (Nixon & McGough, 2001). Mobility and nutrition reflected higher levels of agreement in the Swedish context, and those levels of agreement were on risk factors that they are used to assessing. This could indicate that the RNs need more practice and education in PURPOSE T, especially the risk factors that the RNs are not used to for conducting risk assessment in their own country.

When the psychometric properties were demonstrated as good, the next step was to evaluate the clinical usability and thereafter the feasibility (Georgakellos & Macris, 2009). An instrument or method needs to be perceived as relevant and worthwhile by the practitioners (Glad et al., 2013). The findings in studies II and III showed that the RNs had an overall positive perception of PURPOSE T's clinical usability and feasibility. The instrument was regarded as an efficient tool that addressed the complex needs when identifying the patients' risk of PUs. Studies I, II and III add evidence to previous knowledge (Coleman et al., 2018) about the psychometric characteristics, usability and feasibility of PURPOSE T.

The results from Studies I, II and III are in accordance with international guidelines. A PU-RAI should be appropriate for the population and have the ability to identify those at risk accurately (EPUAP/NPIAP/PPPIA, 2019). The results showed that when assessing with PURPOSE T, the RNs experienced that they identified "correct" patients that were at risk of PUs. They felt that they were able to identify an increased number of patients at risk of PUs that they might have failed to identify with the MNS. Furthermore, the RNs experienced the instrument as accurate. This is an important issue since you do not

want to identify patients at risk, who are actually not at risk, as this would put a strain on health care resources. If a new PU-RAI, such as PURPOSE T, can contribute to an increased number of persons being identified that need prevention or care for an already existing PU, it should be used. Since PU is an adverse event, the prevention is crucial (EPUAP/NPIAP/PPPIA, 2019). This could lead to prevention of patient suffering of care, which is one of the main responsibilities for RNs (Eriksson, 1994). Research also shows that PUs have a significant impact on the person's quality of life (Gorecki et al., 2009). Therefore, it is important to work with an appropriate and evidence-based PU-RAI.

An advantage with PURPOSE T is that it contains a skin assessment in accordance with international guidelines (EPUAP/NPIAP/PPPIA, 2019). The MNS and the Braden scale do not include a skin assessment (Källman & Lindgren, 2014), and consequently they cannot identify patients with PUs. Information from PURPOSE T resulted in that the RNs identified an increased number of patients at risk of PUs and patients with PUs (I, III) and an increased number of PU preventions were prescribed (III). This indicates the clinical usefulness of PURPOSE T in relation to the MNS and the Braden Scale. These findings are also in accordance with Coleman et al. (2013, 2014), who suggest that a skin assessment allows the RNs to make a distinction between patients that are at risk of PUs and already have a PU. If the health care can identify patients at risk of PUs and prevent them, this could also affect the economic burden for the health care of PUs, as prevention is cheaper compared to treatment (Demarré et al., 2015; Padula et al., 2019).

Having RNs undertake the skin assessment was thought to facilitate more interaction with the patient, which was also confirmed in studies II and III. The RNs (II) appreciated the bedside work, and the bedside time increased (III). This is not only good for the PU prevention, but it may also contribute positively to the whole care process of the patient as the RN has the opportunity to meet the patient bedside more often. According to Thórarinsdóttir and Kristjansson´s (2014) framework, the first step, the human connection phase, includes an inviting atmosphere from the health care staff and a genuine attention and interest from the patient. Thus, the increased bedside time could affect and enhance the relation between the patient and the RN in a positive manner, as well as facilitate patient participation.

Study II identified two prerequisites for a successful implementation of PURPOSE T in the future. Firstly, the risk assessment should be a teamwork between the RN and the AN, which is in line with the core competences for health care where the team members must be able to give information and to receive (Cronenwett et al., 2007; Greiner et al., 2003). An example of teamwork is a skin assessment that is often performed by two persons due to the

need for two pairs of hands to turn the patient in bed to be able to assess the skin of the patient; therefore, the RN and the AN perform it together. This could also be an opportunity to understand what resources the patient has and how they can contribute to their own care (Eldh, 2019; Kärkkäinen & Eriksson, 2004), which is important for both RNs and ANs. It is the responsibility of the RN to perform the risk assessment (Swedish Nurses' Association, 2017). While RNs felt the use of PURPOSE T encouraged them to inspect the patient's skin together with the ANs in their overall assessment of risk, there were practical difficulties sometimes in physically undertaking this due to time. In these situations, the role of the AN is of paramount importance.

The second prerequisite, according to the RNs in study II, was that it should be integrated into the electronic health record to support safe processes of patient care. Therefore, in study III, PURPOSE T was integrated into the electronic health record.

All the RNs (II, III) claimed that they would choose PURPOSE T ahead of the MNS, and one of the reasons was that it felt more up to date for "today's" patients. PURPOSE T has now been implemented electronically in one university hospital in Sweden since May 2021, and other regions have shown interest. It is a modern PU-RAI, and it would probably mean that an increased number of risk patients are identified. Therefore, it would be an advantage for patient safety if it were to be implemented nationally. An important factor to consider is how much training the health care staff would need as the instrument is more complex and comprehensive compared to the MNS. In the present studies (I, II, III), the author had "classroom" training for approximately 90 minutes with all RNs and ANs that participated. This could have been an important factor for the positive result. It is important to consider the amount of training and if the training should be in a classroom, digital or a hybrid setting.

International studies report that both RNs and ANs need more education in PU prevention (Dalvand et al., 2018; Gedamu et al., 2021; Gunningberg et al., 2015; Iranmanesh et al., 2013; Parisod et al., 2021,). Research in Sweden reports that the attitudes and knowledge among RNs and ANs towards PU can be varying; they can have a positive attitude towards PUs, but when it comes to knowledge, it is lacking (Gunningberg et al., 2015). Therefore, it is important to understand what knowledge the RNs and ANs need if a more complex instrument, such as PURPOSE T, should be implemented nationally. Some of the risk factors had lower agreement between the RNs, e.g. sensory perception and response, medical devises and perfusion. This is important to keep in mind when planning the training in PURPOSE T.

Patient participation

Older orthopaedic patients have been interviewed (III, IV). They are seldom asked about their perspectives, and there are assumptions that these patients are too old to learn and use new technology. This specific group of patients that have a high risk of developing PUs (EPUAP/NPIAP/PPPIA, 2019) showed that it is possible to increase patient participation by using ICT technology (IV). How we inform the patients and receive information from the patient is of importance to facilitate the patients' ability to participate in their own care (Eldh et al., 2019). In study IV, patients received knowledge from both the RN (the author) and the CBPM system and used this to participate in their care. The use of ICT to deliver health care messages to patients has the potential to encourage interactive learning (Gustafson et al., 2015). The results are also in line with findings from other studies, which show that information can facilitate patients to participate in their own PU prevention, and that RNs should invite patients to be active partners in their own PU prevention (Roberts et al., 2017; Schoeps et al., 2016). The result from study IV with increased patient participation indicates that the CBPM system could help to prevent adverse events, increase patient safety and prevent patient suffering.

In study III, it was a ward RN who shared the PU information, having a pocket card to use as a reminder of what is needed to be conveyed. In study IV, it was the researcher (the author/external RN) who provided the information, and the patients thereafter used the CBPM system. This could be a conclusive factor, as an external RN has more time to build an equal relation with the patient and thereafter to introduce the CBPM system that encourages the patients to act. The RN should provide patients with adequate information, encourage and empower them to take responsibility for their own health and safety, which can increase patient participation (Eldh, 2019; Kärkkäinen & Eriksson, 2004). Patients and RNs should have had the possibility to have active roles in study III. According to the Thórarinsdóttir and Kristjánsson's framework (2014), the patient and the RN must pass the first phase to be able to continue to the second phase and so on. When the patients did not experience patient participation, it is possible that the patient and the RNs did not go through the first information phase. This could be because of e.g. insufficient time for information sharing, the patient feeling no connection with the RN, being too tired or in too much pain, and not creating a partnership. Therefore, it was not possible to go forward to the next two phases and achieve patient participation (Thórarinsdóttir & Kristjánsson, 2014). The RN needs to prioritise informing the patient in order to give them the chance to participate in their care (Latimer et al., 2013; Roberts et al., 2017; Schoeps et al., 2016).

Another issue that could have been an obstacle to participation is the patients' health condition. According to the RNs and the patients (III), the patients were

tired, in pain and received drugs that made it difficult for them to participate in their care the first couple of days at the orthopaedic ward, which could have affected the results negatively. A review by Angel and Fredriksen (2015) shows that the patient's situation with severe illness, pain, poor health and age impedes patient participation. Another study shows that elderly patients with a hip fracture are vulnerable to delirium (Mosk et al., 2017), which can also affect the patients' ability to receive information. This is also in line with other studies that show that pain, medications and mobility have an impact on the patients' ability to participate in their PU prevention (Ledger et al., 2020; Roberts et al., 2017).

During study III, the Covid-19 pandemic was ongoing. All staff wore a face mask and visor to cover their face to protect the patients and themselves from Covid-19. This could have affected the RNs' experience of stress when they informed the patients about PU. Furthermore, this could have affected the patients' experiences of receiving PU information from the RNs.

According to EPUAP/NPIAP/PPPIA (2019), the CBPM system is recommended for use on patients that are at risk of PUs and are predicted to stay for an extended time at the ward or in community care. Unfortunately, the CBPM system that was used in study IV is no longer available in Sweden. However, there may be other ICT that can be used to prevent PUs and increase patient participation e.g. monitoring through a sensor-based e-Health image system, a smart phone application that can send pictures of the body's position (Sung & Park., 2017). A RCT demonstrated that web-based ICT, such as links to resources that target older adults, medical reminders and discussion groups, could improve the quality of life and reduce the costs of health care (Gustafson et al., 2015). The cost per hospitalised patient for treatment of PUs is between 19.74 € to 69 472 € (Demarré et al., 2015). The combination of information from health care staff about PUs and the use of ICT should be cheaper as, according to Demarré (2015), prevention of PUs is cheaper compared to treatment. Prevention could also prevent suffering of care (Eriksson, 1994). Healthcare is increasingly performed at home and in nursing homes in community care. Therefore, it is important that patients receive appropriate care, and ICT could offer an opportunity for these patients to share responsibility and participate more actively in their own safety and care. Healthcare needs to take advantage of ICT and use it as an eye-opener for both health care staff and patients to prevent PU.

Implementation of PURPOSE T in relation to i-PARIHS

There are different elements described as conditions for successful implementation of evidence-based nursing care in health care settings (Kitson et al. 2016). If the evidence is robust for the innovation, the context is receptive to change, and the process of change is appropriately facilitated. These different conditions for successful implementation are discussed for study III considering fulfilment and barriers in clinical practice. Previous research demonstrate evidence of good psychometric characteristics (Coleman et al., 2013, 2014a,b, 2016, 2018), which were also demonstrated in studies I and II. The evidence was considered strong for PURPOSE T, facilitating the usage of the instrument (Coleman et al., 2013, 2014a,b, 2016, 2018, Studies I and II). The innovation PURPOSE T fulfils the first condition.

The second condition (Kitson et al., 2016) is that the organisation needs to be receptive for change and open to implementation of a new innovation. The leaders play an important role in the change of process and to actively involve and discuss with them might enhance the success of the implementation (Kitson et al., 2016). Both leaders on local and organisational level were positive to a change, e.g. the head of the department and the nurse manager approved the implementation of PURPOSE T and provided resources so the staff could leave the ward to attend training in PURPOSE T. However, leaders on local and organisational level were not active in the implementation process. Our results show that both RNs and ANs found the instrument useful, and they did not want to go back to using the MNS. The implementation of PURPOSE T went surprisingly well, and they started to use the instrument. An apprehension was that the RNs and the ANs would find it burdensome to receive training and work with a new PU-RAI. However, they accepted the instrument, understood it and could work with the instrument quite quickly. The RNs, especially, showed a genuine interest in PURPOSE T, and there were no informal leaders that opposed PURPOSE T. In line with Wallin et al. (2012), the individual RN´s own beliefs could also affect the use of research findings in clinical practice, not only the organisation such as the head of the department and the nurse manager.

The third condition that Kitson et al. (2016) mention is the facilitation, including strategies and actions to support the implementation. The author acted as an external facilitator who could help and encourage the RNs and ANs to work with PURPOSE T and was present at the ward daily during the weekdays during the implementation period. The education nurse was an internal facilitator who met those who on the night shift, answered questions, and encouraged them to use PURPOSE T. These factors: an evidence-based assessment instrument, a positive context and the daily presence of facilitators were probably

important for the successful implementation of PURPOSE T. However, retrospectively, more focus and facilitation should have been on the information to the patients, since the results showed that almost all the patients expressed not receiving any information about PUs or experienced patient participation. There are various theories and models in implementation science (Nilsen, 2015; Spoon et al., 2020). The framework i-PARIHS was only used implicitly during the planning of study III. During the discussion, it was realised that it could have been more to our advantage to use the framework when planning the study in more detail, instead of just using it implicitly.

Methodological considerations

In the present thesis, quantitative (I), qualitative (II, IV), and mixed methods (III) approaches were used. Using different approaches is a strength, as they can be seen as complementary to each other. The qualitative studies give a deeper understanding of the phenomenon, and the quantitative captures measurable factors and statistical significances that are studied. In mixed method, both qualitative and quantitative data are collected and analysed to address different but related questions to obtain the optimal answer to the phenomenon studied (Creswell & Plano Clark, 2018).

Study I

When using a quantitative approach, the validity, reliability and generalisability of the results are important aspects (Kosuke, 2017). The major strength of study I is that it replicated the study by Coleman et al. (2018). Thus, we could compare the results from both studies in two different international contexts. Both studies compared reliability and validity aspects. Reliability refers to the consistency with which it measures the target attribute (Streiner et al., 2015). To ensure reliability, Kappa statistics were used to determine how similarly the risk assessments were performed between the expert nurses and the RNs, and kappa statistics are appropriate to use when comparing two nominal measurements, often used to assess inter-rater and test-retest reliability. Validity refers to the degree to which the study measures what it is supposed to measure (Streiner et al., 2015). To ensure validity, a phi value for convergent validity was calculated to compare PURPOSE T with the MNS and the Braden Scale in order to provide evidence of a logical relationship among the instruments. According to Streiner et al. (2015), a low correlation would suggest differences in the concept being measured and would raise concerns about the content validity, and if there is too high a correlation, there is no need for a new instrument. The results from PURPOSE T demonstrated a moderate phi value for convergent validity, when compared to the MNS and the Braden Scale,

providing evidence of a logical relationship among the items, domains and concepts that should exist with measures of related concepts.

The study included patients from both hospital and nursing homes, and there were the four broad risk levels of patients, resulting in a variation of the patient's age and health condition. This gave the RNs a variation of patients on whom to conduct risk assessments, which is a strength. In order to ensure that the study population was representative of the clinical population assessed in the wards and nursing homes, patients were asked to participate. If patients could not answer, his/her legal representative was asked, which strengthened the variation of the participants. According to Balzer et al. (2013), the sample size for predicting sensitivity and specificity of predicting PUs/no PU that should be necessary would exceed what is judged as ethically and economically justified. Therefore, this was not possible to study with PURPOSE T.

Studies II and IV

A qualitative approach, using focus group interviews (II) and individual interviews (IV), was found to be appropriate for capturing the participants' experiences. Focus group interviews are suitable when a group of participants has a common frame of reference, and the researcher would like to evaluate those (Patton, 2015). The focus group interviews were conducted several times (different groups) with similar participants, and the researcher stimulates and observes the interaction in the groups (Krueger & Casey, 2015). There were interactions and discussions in all focus group interviews. Both studies provided valuable insights from patients and RNs. However, some limitations and strengths need to be discussed. The fact that the patients (IV) were recruited from one ward at one hospital is a limitation, meaning that the result can only be transferable if the context is taken into consideration. There was a lack of balance in gender, which is another limitation (35 % of the patients were men in study IV, and 0.07 % of the RNs were men in study II). This could have affected the result as they did not adequately represent both genders; however, this might reflect how the gender is spread among the participants. The population group in study IV was older orthopaedic patients, and this group could have found it difficult to fill out questionnaires due to their age, so the use of qualitative interviews in this study allowed for their voices to be heard.

To ensure rigour in the methodology, several key components of qualitative research have been considered (Tong et al., 2007). In qualitative studies, trustworthiness is used to consider the quality of the knowledge obtained, and several aspects were considered during the research process (Patton, 2015). Credibility refers to the confidence in the truth of the findings. To increase credibility, an interview guide (IV) or a questioning route (II) was used in all interviews, and both were pilot tested. It is a limitation that the author who trained

all the RNs was responsible for the data collection, and performed risk assessments in parallel with many of the RNs who also participated in all focus group interviews. It cannot be ruled out that the RNs expressed a particular type of response to please the author. Credibility was also supported throughout the analysis process through close collaboration among the co-authors, and triangulation was used to validate the findings (Patton, 2015). Confirmability refers to the objectivity of the data and interpretations. To ensure confirmability, quotations were used to illustrate the results and confirm the categorisation in studies II and IV. The author is a RN and has worked in the hospital and elderly care, providing her with some pre-understandings. To take responsibility for her situatedness within the research and the effect that it may have on the setting, on the participants, the questions being asked during the focus group interviews, the individual interviews and the following data analysis, the author and co-author have continuously, jointly discussed and reflected in order to avoid that pre-understanding, which may have affected the results. Dependability refers to the degree to which the data changes over time and was ensured in both studies by providing a careful description of the method. Moreover, both studies followed Tong's (2007) criteria for reporting qualitative studies. It was also supported through the interviews being transcribed verbatim by the author (IV) and by transcribing services (II); also, the interviews were verified by the author to ensure a high level of accuracy. Transferability refers to the extent to which the result can be transferred to other settings or groups. In studies II and IV, the study setting and selection of participants, as well as the data collection and data analysis, have been carefully described. Therefore, the findings could be transferred to patients and RNs in a similar context, which is a strength; however, it is up to the readers to decide if the results are relevant in other situations (Lincoln & Guba, 1989).

Study III

Both quantitative and qualitative data were collected and analysed to address different but related questions. Using a mixed method approach is a strength as it gives the reader an enhanced and broader perspective of a studied phenomenon (Creswell & Plano Clark, 2018), i.e. PURPOSE T and patient participation in this study.

When integrating PURPOSE T into the health record, it was not possible to retain the colours; this issue was discussed with the co-authors, including Susanne Coleman, who developed the instrument. In the UK, as in Sweden, it was not possible to transfer the colours into the electronic health record. According to the results in study II, the RNs did not discuss the colours as an advantage or disadvantage. Therefore, the decision was made that it was acceptable to integrate the instrument into the electronic health record without the colours.

Recommendations for mixed-method (O'Cathain et al., 2010) were followed to ensure the rigour. To ensure validity, the co-authors followed transparent processes through data collection and analysis. This incorporated research group involvement in the development, piloting and use of the questioning routes and health record review forms, reflective and open discussions about the data collected, and agreed open discussions until a consensus was reached during the analysis processes (Cresswell & Plano Clark, 2018). There are, however, limitations that need to be discussed. The first author acted as a facilitator during the study period, e.g. available for questions regarding PURPOSE T. Especially during the first few days, there were questions about how to document in the electronic health care chart, but there were few questions regarding the risk factors. The questioning routes and health record review forms were not validated or tested for reliability. The patients included for individual interviews were assumed to be at risk for PUs since they were admitted to the ward; therefore, this was not an inclusion criterion. During the analysis process of those interviews, the authors identified that there were patients who had undergone hand surgery. This could have contributed to not all included patients being at risk for PUs, as we did not conduct a risk assessment on the included patients. It would have been better with an exclusion criterion of patients that had undergone hand surgery. The exclusion criteria for the health record review and the individual interviews were: patients at the end of life, had dementia and acute confusion. Therefore, the author asked a RN in every ward team if there were any patients at the end of life, had dementia or acute confusion. If there were any, they were excluded at once due to the ethical aspects, namely that a patient at the end of life is not suitable for being interviewed and a patient with dementia or acute confusion cannot sign a written consent form. These patients are often at risk of PU; however, they were included in the intervention and have undergone a risk assessment with PURPOSE T.

Clinical implications

PURPOSE T has been implemented in one university hospital in Sweden, based on the results from studies I, II and III. Implementation of the instrument on a national level, replacing the MNS in both hospital and community care, could be considered by SALAR.

The results (II, III) indicate that it is imperative to consider the format and content of the training when implementing PURPOSE T in clinical practice. In order to assure the quality of the risk assessment, it is important to consider what parts to focus on in the training. The instrument is more complex compared to the MNS, and risk factors such as sensory perception and response, analysis of independent movement, medical devices and perfusion should be emphasised as these factors might be new for the health care staff. In studies I and III, classroom training was performed at the wards, but alternatives for consideration could be digital training, hybrid training or a combination of both.

Another issue to consider prior to an implementation of PURPOSE T is the integration of the instrument into the electronic health record. Collaboration with the unit responsible for the electronic health record, as well as with the RNs, is needed to ensure that the new templates for risk factors make the documentation process smooth, logical and easy to use. Different electronic health records may have different challenges, depending on which computer programme is used.

The RN is responsible for the risk assessment and to prescribe PU prevention if needed. It is important to establish ward routines for the teamwork, with ANs related to PU, and to inform the patient about what they can do themselves and what the health care staff will do to prevent PU, or to treat already existing PUs. This could contribute to a learning climate for both ANs and patients.

To enhance the patients' awareness and participation in their own care, it is optimal to give patients customised information about PUs and the results of their risk assessment. Furthermore, the hospital and community care need to take advantage of ICT, such as pressure mapping for the benefit of the patients.

Conclusion

This thesis evaluated the psychometric values, usability and feasibility of PURPOSE T and investigated whether it was possible to improve patient participation through the CBPM

- PURPOSE T demonstrate good inter-rater and test-retest reliability to assess patients' risk status, and a moderate convergent validity was demonstrated when compared to other PU-RAIs.

- The RNs acknowledged an overall positive perception of PURPOSE T's clinical usability. The instrument was seen as an efficient tool, which addressed the complex needs when performing risk assessments on patients. The instrument contributed to a deeper understanding of risk factors and a greater awareness of PUs.

- The implementation of PURPOSE T positively affected the nursing staff's PU risk assessments. The feasibility of PURPOSE T was good. However, almost all the patients did not experience that they received information about PUs.

- It is possible for older participants to understand and use a new ICT, and they should be invited to participate in PU prevention.

Future work

- To explore the ANs' knowledge in PUs and risk assessment, e.g. to categorise PU, skin assessment, the difference between PU and incontinence associated dermatitis.
- To study / plan a follow-up on how the RNs and ANs continue to risk assess after the implementation of the PURPOSE T and to follow-up on the number of prescribed nursing interventions and PUs.
- To collaborate on a study involving two hospitals in order to evaluate how RNs and ANs perform risk assessments on the same patient with PURPOSE T, inter-rater and understand the ANs' experiences of performing a risk assessment on their own.
- To find ICTs for patients to use themselves in hospitals and community care in order to prevent PUs.

Svensk sammanfattning

Trycksår som vanligen uppstår inom hälso- och sjukvården är en vårdskada och ett problem världen över. Personer som utvecklar trycksår upplever i allmänhet försämrad livskvalitet och beskriver bland annat lidanden såsom; konstant smärta, svårigheter att delta i sociala sammanhang, ångest och depression. Det finns en stor mängd forskning om varför trycksår uppstår och hur trycksår förebyggs vilket internationella och nationella riktlinjer för hälso- och sjukvård grundar sig på. Trots dessa riktlinjer visar studier att patienter på sjukhus och inom äldreomsorgen fortsatt utvecklar trycksår. I Sverige genomförs årligen nationella punktprevalensmätningar av trycksår. Det senaste årets mätning (2021) visade att av 8710 inlagda patienter på sjukhus hade 14 % någon form av trycksår vilket förutom tidigare nämnt lidande också är en stor kostnad för hälso- och sjukvården.

Trycksår orsakas av den syrebrist som uppstår på grund av ett ökat tryck och/eller skjuv mot huden. Om en patient får ett trycksår ska trycksåret kategoriseras utifrån en fyrgradig skala 1-4 där kategori 1 är en rodnad som inte bleknar vid tryck och kategori 4 ett öppet sår där ben, senor och/eller leder blottas. Det finns också två nyare kategorier med okänt sårdjup. Vanligen är de som drabbas av trycksår patienter med nedsatt rörlighet, t.ex äldre och sköra patienter.

Enligt befintliga internationella och nationella riktlinjer är det av stor vikt att sjuksköterskan genom riskbedömning identifierar de patienter som löper risk att utveckla trycksår och/eller de som redan har trycksår. Riskbedömningen bör genomföras med ett evidensbaserat och validerat instrument som innehåller en hudbedömning. Om patienten bedöms ha en ökad risk för trycksår ska planering och genomförande av trycksårsprevention sättas in. Patienten ska ges information om vad ett tryckår innebär, resultatet av riskbedömningen, vad patienten själv kan göra för att förebygga trycksår och vad personalen kommer att göra för att förebygga trycksår. Det är möjligt att förebygga de allra flesta trycksår om korrekt prevention sätts in.

I Sverige används riskbedömningsinstrumentet Modifierade Nortonskalan vilket utvecklades för omkring 60 år sedan och modifierades för 25 år sedan. Modifierade Nortonskalan är ett numeriskt instrument vilket innebär att det

baseras på siffror som räknas ihop och jämförs mot ett referensvärde för att utläsa om patienten är i risk för att utveckla trycksår eller ej. Instrumentet innehåller däremot inte de riskfaktorer som den senaste forskningen visar att ett riskbedömningsinstrument bör innehålla för att korrekt kunna identifiera patienter i risk för att utveckla trycksår och/eller redan har ett trycksår.

PURPOSE T är ett modernare riskbedömningsinstrument som är framtaget i England genom ”golden standard” metoden. Instrumentet särskiljer mellan patienter i primär prevention (patienter med risk för trycksår) och sekundär prevention (patienter med redan utvecklade trycksår). PURPOSE T är ej numeriskt utan innehåller tre steg som avslutas med en reflekterande bedömning av patientens risk. Det första steget kan vara ett snabbsteg om patienten tydligt inte är i risk för att utveckla trycksår. I steg två görs en fullständig bedömning och steg tre innebär att sjuksköterskan behöver ta ställning till helheten för att besluta huruvida 1) patienten för tillfället ej är i risk för att utveckla tryckår 2) är i risk för att utveckla trycksår 3) eller redan har ett utvecklat trycksår.

Patientens delaktighet i sin egen trycksårsprevention är av stor vikt för att förebygga trycksår och öka patientsäkerheten under vistelsen på sjukhus eller i äldreomsorgen. För att öka delaktigheten bör patienten bjudas in till att delta i sin egen trycksårsprevention. Genom muntlig eller skriftlig information kan patientens kunskap öka och därmed bidra till att patienten blir intresserad av att vara delaktig och förebygga trycksår.

Informations- och kommunikationsteknik är ett snabbt växande område inom sjukvården. CBPM systemet är en form av informations- och kommunikationsteknik som består av en monitor kopplad till ett lakan med tusental trycksensorer. Lakanet bäddas in i patientens säng och en bild av kroppens tryckpunkter visas i realtid på monitorn. Beroende på trycket mellan patienten och underlaget skiftar färgerna från varma röda och orangea färger till kallare gröna och blåa färger. Varmare färger indikerar ett högre tryck mellan patienten och underlaget och kallare färger ett lägre tryck. Denna teknik skulle kunna vara ett hjälpmedel för att öka patientens delaktighet i sin egen trycksårsprevention.

PURPOSE T visar på goda psykometriska egenskaper i England men har inte utvärderats i något annat land. När ett instrument utvärderas i ett annat land är det viktigt att inte enbart utvärdera de psykometriska egenskaperna utan även användbarheten och genomförbarheten inom klinisk verksamhet, det vill säga hur användaren upplever användningen av instrumentet samt implementering av instrumentet och hur det är att arbeta med det. Det saknas ännu kunskap om hur PURPOSE T fungerar i en svensk kontext samt även forskning och kunskap om huruvida patienter kan använda CBPM systemet som ett hjälpmedel för att påverka sin delaktighet i sin egenvård.

Det övergripande syftet med denna avhandling är att utvärdera de psykometriska egenskaperna, användbarheten och genomförbarheten av PURPOSE T samt att undersöka om det går att öka patientdelaktigheten genom att använda CBPM systemet.

Delstudie I är en observationsstudie med beskrivande och jämförande design där utvärdering av de psykometriska egenskaperna av riskbedömningsinstrumentet PURPOSE T genomförts i en svensk kontext. Studien utfördes på tre äldreboenden, samt sex vårdavdelningar på ett universitetssjukhus. I studien riskbedömde 28 sjuksköterskor och två expertsjuksköterskor tillsammans 235 patienter. Resultatet visade på goda psykometriska egenskaper hos PURPOSE T. Inter-rater och test-retest reliabiliteten var god och den konvergenta validiteten moderat jämfört med Modifierade Nortonskalan och Bradenskalan.

Delstudie II har en beskrivande design där PURPOSE Ts användbarhet utvärderades i klinisk verksamhet. Studien genomfördes på samma äldreboenden och vårdavdelningar som delstudie I. I studien deltog 28 sjuksköterskor och en expertsjuksköterska i fokusgruppsintervjuer. Resultatet visar på en övervägande positiv uppfattning om PURPOSE Ts användbarhet inom klinisk verksamhet. PURPOSE T ansågs vara ett effektivt instrument som även bidrog till en djupare förståelse av riskfaktorer och en större medvetenhet om trycksår hos sjuksköterskorna.

I delstudie III används mixad metod för en utvärdering av den kliniska genomförbarheten av PURPOSE T genom journalgranskning, individuella patientintervjuer samt fokusgruppsintervjuer med sjuksköterskor och undersköterskor. Studien genomfördes på en akutortopedisk vårdavdelning på ett universitetssjukhus. I studien deltog 60 patienter i journalgranskningen, 15 patienter i individuella intervjuer och 15 sjuksköterskor och åtta undersköterskor i fokusgruppsintervjuer. Det sammantagna resultatet av journalgranskningen samt fokusgruppintervjuerna visade på en god klinisk genomförbarhet. Journalgranskningen visade att fler patienter riskerade att utveckla trycksår och fler preventiva åtgärder sattes in utifrån PURPOSE T jämfört med Modifierade Nortonskalan. Patientintervjuerna visade att patienterna upplevde brist på information om trycksår. Fokusgruppsintervjuerna visade att samtliga sjuksköterskor och undersköterskor var nöjda med PURPOSE T, de ville behålla instrumentet och inte byta tillbaka till Modifierade Nortonskalan. Instrumentet bidrog till en ökad reflektion och analys samt möjligheten att kunna dra egna slutsatser avseende patienternas riskstatus.

Delstudie IV har en beskrivande design som utvärderade äldre patienters erfarenhet av att använda CBPM systemet med fokus på patientdelaktighet och trycksårsprevention. Studien genomfördes på en ortopedgeriatrisk rehabiliteringsavdelning på ett universitetssjukhus. I studien intervjuades 31 patienter

individuellt efter att ha använt CBPM systemet i 2-4 dagar. Resultatet visade att det var möjligt för patienterna att förstå och använda CBPM systemet. Muntlig information i kombination med CBPM systemet ökade patientdelaktigheten i deras trycksårsprevention. Detta nya synsätt hjälpte patienterna att identifiera utsatta tryckpunkter och de började ändra läge för att avlasta de utsatta områdena.

Sammanfattningsvis visar avhandlingsarbetet att PURPOSE T och CBPM systemet kan bidra till ökad patientsäkerhet och minskat patientlidande. PURPOSE T har goda psykometriska egenskaper, god klinisk användbarhet och god genomförbarhet. PURPOSE T är nu breddinfört på ett universitetssjukhus och det skulle därmed vara möjligt att införa det på även på nationell nivå. Dessutom visar studierna i denna avhandling att ny informations- och kommunikationsteknik ökar patienters medvetenhet och delaktighet i deras egenvård av trycksår. Hälso- och sjukvården förflyttar sig mer och mer till äldreomsorgen och hemsjukvården, därför är det viktigt att ta vara på och använda sig av denna teknik eftersom resultatet visar att patienten kan ges möjlighet till delaktighet i sin patientsäkerhet och vård.

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Bedömning av trycksårsrisk – PURPOSE T (V2)

Appendix 1

Patientens namn	Personnummer	Sjukhus	Avdelning

Steg 1 – screening

Rörlighet – *markera ett eller flera alternativ*

- Behöver hjälp av en annan person för att gå ☐
- Tillbringar all tid eller största delen av tiden i säng eller stol ☐
- Stannar kvar i samma läge långa perioder ☐
- Går självständigt med eller utan gånghjälpmedel ☐

Om **ENDAST** blå ruta är markerad →

Hudstatus – *markera ett eller flera alternativ*

- Har trycksår kategori 1 eller mer? ☐
- Har haft trycksår tidigare? ☐
- Känslig, skör hud ☐
- Medicin-teknisk utrustning som kan orsaka tryck/skjuv på huden, t ex O_2-mask, sond ☐
- Normal hud ☐

Om **ENDAST** blå ruta är markerad →

Klinisk bedömning – *markera ett alternativ*

- Tillstånd / behandling som i väsentlig grad påverkar patientens risk för trycksår, t ex nedsatt genomblödning, epidural, ödem, steroider ☐
- Inget problem ☐

Om **ENDAST** blå ruta är markerad →

- Inget trycksår **för tillfället ingen riskt**
- *Markera om passande* ☐
- **Ingen risk för trycksår för tillfället**

Om **NÅGON** gul ruta är markerad **fortsätt till Steg 2** ↓

Om **NÅGON** gul eller rosa ruta är markerad **fortsätt till Steg 2** ↓

Om **NÅGON** gul ruta är markerad **fortsätt till Steg 2** ↓

Steg 2 – fullständig bedömning

Fyll i ALLA delar

Analys av självständig rörelse

Markera lämplig ruta (där kategorierna frekvens och omfattning möts)

Frekvens av läges-ändring \ Omfattning av egna rörelser (Avlastar alla tryckutsatta områden)	Rör sig inte	Små läges-ändringar	Stora läges-ändringar
Rör sig inte	☐	Ej tillämpligt	Ej tillämpligt
Rör sig ibland	Ej tillämpligt	☐	☐
Rör sig ofta	Ej tillämpligt	☐	☐

Sensorisk perception och respons – *markera passande alternativ*

- Inget problem ☐
- Patienten kan inte känna och/eller reagera adekvat på obehag av tryck t ex vid stroke, neuropati, epidural ☐

Fukt beroende på svettning, urin, avföring eller sårvätska – *markera passande alternativ*

- Inget problem / Ibland ☐
- Ofta (2–4 gånger per dag ☐
- Hela tiden ☐

Diabetes – *markera passande alternativ*

- Ingen diabetes ☐
- Diabetes ☐

Genomblödning – *markera passande alternativ*

- Inget problem ☐
- Tillstånd som påverkar centrala cirkulationen,t ex chock, hjärtsvikt, lågt blodtryck ☐
- Tillstånd som påverkar perifera cirkulationen, t ex perifer kärlsjukdom/arteriell kärlsjukdom ☐

Nutrition – *markera passande alternativ*

- Inget problem ☐
- Oplanerad viktminskning ☐
- Dåligt mat- och vätskeintag ☐
- Lågt BMI (mindre än 18.5) ☐
- Högt BMI (30 eller mer ☐

Medicinsk-teknisk utrustning – *markera passande alternativ*

- Inget problem ☐
- Medicinsk-teknisk utrustning som orsakar tryck/skjuv på huden, t ex O^2 mask, sond ☐

Känslig/skör hud (förstadium till trycksår) t ex ihållande rodnad, torrhet, papperstunn och/eller fuktig hud.
NPUAP / EPUAP Trycksårsklassifikationssystem (2019)
Kat 1 Rodnad som inte bleknar vid tryck. Hel hud
Kat 2 Delhudskada eller blåsa med klar vätska
Kat 3 Fullhudsskada (fett synligt/fibrinbeläggning
Kat 4 Djup vävnadsskada (muskler/ben synligt
- Icke klassificerbart trycksår: särdjup okänt
- Misstänkt djup hudskada: särdjup okänt

Aktuell noggrann hudbedömning – *markera om smärta, ömhet eller obehag är relaterat till någon hudlokalisation. Markera också för varje hudlokalisation passande alternativ – känslig/skör hud, normal hud eller ange trycksårskategori*

Hud-lokalisation	Smärta	Känslig hud	Trycksårs-kategori	Normal hud
Sakrum	☐	☐		☐
Vä skinka	☐	☐		☐
Hö skinka	☐	☐		☐
Vä sittben	☐	☐		☐
Hö sittben	☐	☐		☐
Vä höft	☐	☐		☐

Hud-lokalisation	Smärta	Känslig hud	Trycksårs-kategori	Normal hud
Hö höft	☐	☐		☐
Vä häl	☐	☐		☐
Hö häl	☐	☐		☐
Vä fotknöl	☐	☐		☐
Hö fotknöl	☐	☐		☐
Vä armbåge	☐	☐		☐

Hud-lokalisation	Smärta	Känslig hud	Trycksårs-kategori	Normal hud
Hö armbåge	☐	☐		☐
Andra lokalisationer (kan vara relaterat till medicinsk-teknisk utrustning)				
	☐	☐		☐
	☐	☐		☐
	☐	☐		☐
	☐	☐		☐

Tidigare trycksår? – *markera passande alternativ*

- Inga tidigare kända trycksår ☐
- Har tidigare haft trycksår – *fyll även i nedan* ☐
- Antal tidigare trycksår

Beskrivning av tidigare trycksår (om patienten tidigare har haft fler än ett trycksår så välj det djupaste trycksåret eller det som lämnat ärr).

Ungefärligt datum	Lokalisation	Kategori	Ärr	Inget ärr
			☐	☐

Annan relevant information (vid behov):

Steg 3 – beslut efter bedömning

Om **NÅGON av de rosa rutorna** är markerade har patienten ett befintligt trycksår eller ärr från ett tidigare trycksår.

Om **NÅGON av de oranga rutorna** är markerade (men ingen rosa ruta) har patienten risk för att utveckla trycksår.

Om **endast gula och blå rutor** är markerade måste sjuksköterskan ta hänsyn till andra aktuella riskfaktorer för att bestämma om patienten har risk eller inte risk för trycksår för tillfället.

Befintligt trycksår eller ärr från tidigare trycksår

Markera om passande ☐

Vårdplan för sekundärprevention och behandling av trycksår

Inget trycksår men har risk för trycksår

Markera om passande ☐

Vårdplan för primärprevention

Inget trycksår – för tillfället ingen risk

Markera om passande ☐

Vårdplan behöver för tillfället inte ta hänsyn till trycksårsrisk

Sjuksköterskans namn (textat)	Sjuksköterskans signatur	Datum	Tid

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