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PROTOCOL

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Implementation of advanced practice nursing for orthopaedic patients in the emergency care context – A study protocol for outcome studies

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Abstract

Aim: To evaluate the implementation of advanced practice nursing in emergency care in Norway for patients with orthopaedic injuries, including hip fractures. The outcomes relate to quality of care and patient trust.

Design: A non-inferiority study comparing an advanced practice nursing care model with a standard (physician-led) care model.

Methods: Data will be collected from patient records and through the Patient Trust Questionnaire, completed by patients. The data will be analysed by descriptive and inferential statistics. Funding for the research was granted in 2015 and the regional ethical committee approved the current study in February 2019.

Discussion: In Norway and the other Nordic countries, advanced practice nursing is still in its infancy, especially in the emergency care context. This study will evaluate advanced practice nursing in this new context.

Impact: The study will add to knowledge on the quality of care provided for orthopaedic patients with minor orthopaedic injuries or hip fractures as delivered by advanced practice nurses and physicians, respectively. It will also evaluate how well-advanced practice nursing is accepted by patients in this new context.

KEYWORDS

advanced practice nursing, emergency care, hip fractures, minor injuries, nurse practitioner, outcome, protocol

1 | INTRODUCTION

Emergency department (ED) presentations are increasing (Bjornsen, Uleberg, & Dale, 2013; Tang, Stein, Hsia, Maselli, & Gonzales, 2010) and overcrowding is a common problem (Velt et al., 2018). One approach used to increase ED throughput is the introduction of clinical pathways for specific patient groups (Eriksson, Kelly-Pettersson, Stark, Ekman, & Skoldenberg, 2012; Wireklint Sundstrom et al., 2014).

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Another is the implementation of advanced practice nursing (APN), i.e., ED throughput can be increased by expanding nursing roles and the scope of nursing practice (Elder, Johnston, & Crilly, 2015).

APN involves: "nurses working in advanced roles have additional training and work beyond RNs' scope of practice?" (Maier & Aiken, 2016). In previous research, researchers have found advanced practice nursing to be as good as or, in some cases, even better than physician-led care (Cooper, Lindsay, Kinn, & Swann, 2002; Roche, Gardner, & Jack, 2017; Wilson, Zwart, Everett, & Kernick, 2009). Nurse-led care has been shown to have a positive impact on wait times (Hiza, Gottschalk, Umpierrez, Bush, & Reisman, 2015; Jennings, Clifford, Fox, O'Connell, & Gardner, 2015), patient satisfaction (Cooper et al., 2002; Jennings et al., 2015; Martinez-Gonzalez et al., 2014), and quality of care (Jennings et al., 2015; Martinez-Gonzalez et al., 2014). Still, more research on the subject is needed (Jennings et al., 2015; Martinez-Gonzalez et al., 2014).

In Norway, the physician–patient ratio is estimated to be higher than the RN-patient ratio, a situation that differs from many other countries also affected by physician shortages (Forsetlund et al., 2013). The Norwegian Government has approved the introduction of APN (Ministry of Health & Care Services, 2009), seen in both the education and healthcare systems (Henni, Kirkevold, Antypas, & Foss, 2018). Still, to date, research on APN in the Norwegian healthcare system is scarce, due to its recent introduction. This study will add to knowledge on the quality of care provided by advanced practice nurses in comparison to physicians for orthopaedic patients with hip fractures or minor orthopaedic injuries, i.e. injuries and/or closed fractures in the elbow and/or distal of elbow and/or distal of the knee (listed in Appendix S1). During the study we will also explore how well patients accept APN in the above context by studying patient trust. The results are expected to be generalizable and add knowledge on APN in emergency care in an international perspective.

1.1 | Background

Researchers have found that APN, "extends the traditional scope of nursing, involves highly autonomous practice, maximizes the use of nursing knowledge and contributes to the development of the profession" (Bryant-Lukosius, Dicenso, Browne, & Pinelli, 2004, p. 521). In Norway, APN can be undertaken by advanced practice nurses or nurse practitioners (NPs). It is recommended that these nurses as such have added skills and knowledge derived from clinical experience and post-basic education at the Master's level (International Council of Nurses, n.d.). There are other nursing roles that include some elements of the advanced scope of practice, but not on the same level as NPs or advanced practice nurses (Maier, Aiken, & Busse, 2017). APN can involve task-shifting, i.e., nurses performing activities that are traditionally performed by the medical profession (Maier, Aiken, & Busse, 2017). In Norway, the first NP educational program started in 2011 and there are now five NP Master's level programs throughout the country. In these programs, there is a focus on acute-, emergency-, geriatric-, and family care (Henni et al., 2018). In praxis there are examples of other advanced nursing roles where advanced nursing is applied in a specific area of practice, e.g., the orthopaedic field.

1.2 | Patients with minor injuries in the emergency care context

It is estimated that about 15% of the patients presenting to the ED in Norway are non-urgent patients (Bjornsen et al., 2013), a ratio that corresponds to recent figures from the United Kingdom (O'Keeffe, Mason, Jacques, & Nicholl, 2018). In international literature, however, considerable variability in the reporting of the proportions of non-urgent ED presentations are seen, ranging from about 5%–90% (Durand et al., 2011). The relatively low proportion of non-urgent ED presentations in Norway may be explained by the current Norwegian healthcare system. General practitioners (*fastlege*) and urgent care centres (*legevakt*) have been given the key role of "gatekeepers" for specialist health services, including EDs (Ringard, Sagan, Sperre Saunes, & Lindahl, 2013). Urgent care centres in Norway provide a pre-hospital level of care and do not have full diagnostic resources. Therefore, if a patient is evaluated as needing further treatment, e.g., radiography services, he/she will be referred to specialist health services such as the ED in urgent cases. Previous research has shown that APN is convenient for non-urgent emergency care patients (Jennings, McKeown, O'Reilly, & Gardner, 2013; Li, Westbrook, Callen, Georgiou, & Braithwaite, 2013; van der Linden, Reijnen, & de Vos, 2010; Wilson et al., 2009) and one can therefore hypothesize that the implementation of APN roles in the Norwegian emergency care system will enhance the effectiveness of care.

Patient-centred communication styles positively influence patient outcomes, such as patient satisfaction, increased adherence to treatment plans and improved patient health (Charlton, Dearing, Berry, & Johnson, 2008). To gain patients' trust, caregiver's must be able to attend to patients' medical and psychosocial issues. It is therefore important that caregivers invite each patient to participate in the assessments and decisions concerning his/her own health care, in a credible manner and using everyday language (Norberg Boysen, Nyström, Christensson, Herlitz, & Wireklint Sundström, 2017; Wireklint Sundstrom & Dahlberg, 2011). Compared with physician-led care, researchers have found that patients experience nurses as being easier to talk to and as providing more information (Cooper et al., 2002). When implementing APN in a new context and considering a potential redistribution of tasks, it is important to consider patients' perspectives and experiences. In respect to the Norwegian healthcare system, this is particularly important, because the NP role is new.

1.3 | Patients with hip fractures in the emergency care context

Hip fractures are a common and major health problem among older people. Patients with hip fractures can be considered a vulnerable population, because such fractures are often associated with old age, frailty, and comorbid diseases and many of these patients

also suffer from cognitive impairment (Ranhoff, Holvik, Martinsen, Domaas, & Solheim, 2010). Researchers have found that hip fractures have a substantial impact on older peoples' abilities, function, quality of life and living situation; hip fracture survivors experience decreased mobility, independence in function, health and quality of life and higher rates of institutionalization (Dyer et al., 2016). Hip fractures have also been identified as a major cause of premature death (von Friesendorff et al., 2016; Panula et al., 2011).

The highest rates of hip fracture are found in Scandinavia (Cheng et al., 2011) and Norway has the highest reported incidence rate of hip fractures in the world (Dhanwal, Dennison, Harvey, & Cooper, 2011; International Osteoporosis Foundation, 2017). To ensure that patients with hip fractures receive the best possible care and to facilitate patients' discharge in a condition relative to their prefracture condition, certain care standards related to aspects of pre-, intra- and postoperative management should be followed. In general, pre-operative management includes timing of surgery, expedited patient management, identification and treatment of correctable comorbidities, pain management, preventive measures and multidisciplinary management (Filiatreault, Hodgins, & Witherspoon, 2018). In a review, Farrow et al. (2018) concluded that low compliance to care standards is associated with increased mortality, reduced likelihood of a short length of stay and increased odds of discharge to a high-care setting (Farrow et al., 2018). Other researchers have found that compliance with such standards is suboptimal (Seys et al., 2018; Sunol et al., 2015). In Norway, there are published national care standards for patients with hip fractures and national guidelines for the interdisciplinary treatment of such patients (Norsk ortopedisk forening, Norsk forening for geriatri, & Norsk anestesiologisk forening, 2018).

Researchers have found in previous research that, compared with having a single physician managing care practice, the introduction of NP-physician co-management results in greater compliance with care standards (Norful, Swords, Marichal, Cho, & Poghosyan, 2017). In the orthopaedic context, APN can play an important role in the coordination of patient care to ensure the delivery of high-quality evidence-based care for patients with hip fractures. Such care can involve performing a thorough health assessment that reveals prior fall history and previous functional ability, requesting diagnostic interventions, prescribing medication, planning management for current care and beginning discharge planning (Coventry et al., 2017; Pickles, Coventry, Glennon, & Twigg, 2014). Through the implementation of the NP role in the care of patients with hip fractures in the Norwegian healthcare system, we hypothesize that compliance to care standards will be at least as good as with the currently used traditional physician-led care model.

2 | THE STUDY

2.1 | Aims

Primary Outcome: To evaluate the implementation of APN for patients with orthopaedic injuries, including patient trust and a comparison of outcomes in relation to APN vs. standard (physician-led) care models.

Secondary Outcome: To evaluate outcomes related to care standards delineated for pre-operative patients with hip fractures in the emergency care context in Norway, including the comparison of APN vs. standard (physician-led) care models.

2.2 | Objectives

In the emergency care context in Norway, where advanced nursing practice is in an initial stage of implementation, the study objective is to:

1. Compare the quality of care, i.e., diagnostic and treatment accuracy, provided for patients with minor orthopaedic injuries between APN vs. standard (physician-led) care models. This also includes the evaluation of patient trust in relation to APN vs. standard (physician-led) care model.
2. Compare compliance to care standards for patients with hip fractures in the pre-operative phase in the emergency care context in relation to APN vs. standard (physician-led) care model.

2.3 | Design

The proposed study is a non-inferiority study, comparing an APN care model with a standard (physician-led) care model. This research is part of a larger project entitled, "Providing person-centred health care – by new models of advanced nursing practice in cooperation with patients, clinical field and higher education".

2.4 | Intervention and control

The study will be performed in an ED unit in southern Norway that provides 24-hr care. The proposed ED unit receives about 30,300 annual patient visits.

2.4.1 | Objective 1

All patients with suspected fractures/orthopaedic injuries below the elbow or knee will be considered for inclusion in this study. In the standard (physician-led) care model, all patients presenting with minor orthopaedic injuries will be diagnosed and treated by a medical intern (*LIS-1*) (control). In parallel, an APN model has been implemented (intervention). In the APN model, patients with minor orthopaedic injuries will be assessed, diagnosed (including analysis of radiographs), treated and/or deemed in need of surgery by a RN, working at an advanced level following in-house-training, i.e., an advanced practice nurse. The nurses, with several years of experience from emergency care, have participated in a 1-day in-house

education program, after which they started to treat patients in the clinic. When needed, the nurses consult the orthopaedic surgeon on duty to support hands on support and instruction.

To ensure quality of care, a specialist in orthopaedic surgery will review the charts and radiographs of all orthopaedic patients presenting in the outpatient clinic for diagnostic and treatment accuracy in 1–3 days of initial assessment. If needed, based on the specialist's review, diagnosis and suggested treatment will be modified.

2.4.2 | Objective 2

All patients with clinical presentation of hip fracture will be referred through a fast-track system directly to the ED observation unit. To date, patients have been admitted to the ED unit and treated by a medical intern and a RN, which is the standard care model (control). From January 2020, the ED unit will be partly manned with NPs instead of medical interns (intervention). Due to the still small numbers of NPs in the rotating schedule, NPs cannot cover all shifts. Consequently, the standard (physician-led) care model will still be applied, which will enable comparison.

2.5 | Participants

2.5.1 | Objective 1

Inclusion criteria: Patients diagnosed with suspected fractures/orthopaedic injuries below the elbow or knee (Appendix S1) that could have been treated through either the APN or standard (physician-led) care model in the outpatient clinic. To compare the quality of the care (diagnostic and treatment accuracy) provided for patients with minor orthopaedic injuries between the APN and standard (physician-led) care models, data will be collected from 15 May 2019, until 310 (155 in each group) patients are included in the intervention and control groups. Power calculation was performed in sealed envelope™ (https://www.sealedenvelope.com/power/binary-noninferior/) and was set by: α = 5%; 1 − β = 90%; percentage success (both groups) = 90%; δ = 10%.

To explore patient trust, patients receiving treatment for minor orthopaedic injuries will be asked to fill in the Patient Trust Questionnaire (PTQ) (Norberg Boysen, Christensson, Wireklint Sundström, Nyström, & Jutengren, 2016). Exclusion criteria will be impaired cognitive function or inadequate skills in the Norwegian language, as determined by the professional responsible for treatment. Data will be collected from February 2020 until 50 patients are included in the intervention and control groups, respectively.

2.5.2 | Objective 2

To identify participants, data will be extracted from patient records. Diagnostic codes will be used to identify potential participants and all patients with hip fractures will be included. Data will be collected prospectively from February 2020, until 310 (155 in each group) patients are included in the intervention and control groups. Power calculation was performed in sealed envelope™ (https://www.sealedenvelope.com/power/binary-noninferior/) and was set by: α = 5%; 1 − β = 90%; percentage success (both groups) = 90%; δ = 10%.

2.6 | Data collection

2.6.1 | Objective 1

To assess clinical accuracy, a data collection tool has been developed (Appendix S1). The data collection tool will be used by the orthopaedic surgery specialist to evaluate the diagnostic and treatment accuracy of the care provided for patients with minor orthopaedic injuries through either in the APN or standard (physician-led) care models. Collected background characteristics will include patients' age, gender and diagnosis. Information on whether the suggested diagnosis and suggested treatment are accurate will be collected and scored. An answer of "No" on the question "Correct diagnosis?" will be scored 0 and an answer of "Yes" will be scored 1. The question "Correct suggested treatment?" will be scored in similar way.

To assess patient trust, patients receiving treatment for minor orthopaedic injuries will be asked to fill in the PTQ. The PTQ rates patients' degree of trust in terms of accessibility and credibility. The PTQ is an eight-item questionnaire with a 5-point Likert scale, with answers ranging from 1 (disagree) – 5 (strongly agree) (Norberg Boysen et al., 2016) and a total score (mean) will be calculated. Participants will also be asked to fill in background characteristics: age, gender and reason for visiting the emergency outpatient clinic.

The outpatient clinic receptionist will give the participants the questionnaire directly after the patient visit. Whether the participant has received treatment trough the APN or standard (physician-led) care model will be noted on the questionnaire. The participants will be asked to fill in the questionnaire in situ and return the questionnaire in a sealed envelope to the receptionist.

2.6.2 | Objective 2

For data collection a research assistant not actively involved in the research group will extract data from the patient record system. Data on participant background characteristics and compliance with care standards will be collected. Participant background characteristics will include age, gender, date of admittance, date of discharge, hospital length of stay (LOS, days), length of wait before surgery (ED LOS, hours), residence (own home; service flat; nursing home), type of fracture/diagnostic code, American Society of Anesthesiologists (ASA) score, patient's discharge destination (rehabilitation; nursing home; same as at admittance).

Together with the physician responsible for the running of the study setting's ED unit, 12 care standards, i.e., measures of

compliance, have been determined whereby the care received will be evaluated (Appendix S2). The care standards are:

1. Examination of vital signs (ABCDE).
2. Assessment of pre-fracture falls.
3. Assessment/examination for eventual acute, life-threatening condition(s) that may have caused patient fall, e.g., decompensated heart failure, myocardial infarction, pneumonia, sepsis, stroke.
4. Assessment/examination for eventual non-life-threatening factor(s) that may affect patient outcome in relation to surgery, e.g., anticoagulants, chronic obstructive pulmonary disease, chronic or recent wounds, dehydration, dementia or confusion, diabetes mellitus, heart failure, recent surgery, renal failure.
5. Timely analgesia, i.e., fascia iliaca compartment blockade (FICB) or other pain relief administered before X-ray.
6. Pain assessment.
7. Fluid treatment according to protocol.
8. Laboratory tests according to protocol.
9. Pressure ulcer assessment.
10. Fall risk assessment.
11. Identification of eventual urinary tract infection.
12. Pre-operative medication ordered and given as suggested.

Data will be registered in a data collection tool (Appendix S2). If there is documentary evidence that all of the care standards have been achieved, a score of 1 will be documented. A score of 1 will also be documented if some of the care standards are not are achieved, but there are valid reasons for non-adherence given. If care standards are not achieved and there is no valid reason (i.e., an error of omission), a score of 0 will be documented.

2.7 | Data analysis

All data will be imported into and analysed using IBM SPSS Statistics 24.0 (IBM SPSS Statistics for Windows, Version 24.0, IBM Corp.). Descriptive statistics will be used to describe the main characteristics of the population. Data will be presented as frequencies with percentage or means ± standard deviations, or, if appropriate, median with quartiles. Comparisons of baseline characteristics and outcome variables between the two groups (i.e. APN model vs. standard care model) will be performed using chi-square test or Student's *t* test, or if appropriable non-parametric tests. Two-sided *p*-values of $< .05$ will be considered as significant.

2.8 | Ethical considerations

2.8.1 | Objective 1

During the assessment of clinical accuracy no consent will be obtained, because the only patient data collected are patients' age, gender and diagnosis. During the assessment of patient trust (using the PTQ), information about the study and voluntary participation will be included. A completed and returned questionnaire will be understood as informed consent. The questionnaires will be anonymous (no coding will be applied).

During the course of the study, the possibility exists that errors made by physicians and/or advanced practice nurses in regard to diagnostics and/or treatment will be revealed. If such occurs, appropriate changes will be made to the organization, routines and/or training offered to minimize the potential for future errors.

2.8.2 | Objective 2

A research assistant not actively involved in the research group will collect and register the data in a data collection tool. In the data collection tool, each patient will be given a code. To be able to verify the data retrospectively, a list of identifier codes based on a patient identification number (date of birth) and code will be set up. This list will be stored on an IronKey USB in a locked cabinet in the research unit at the hospital. Only designated people in the hospital organization will be given access to the information on the USB. The data will be destroyed 5 years after the end of the data collection period. The study protocol will contain anonymized data, only shared with the research team. The Regional Committees for Medical and Health Research Ethics (2019/173 and 2019/188) have given their approval for the studies (Objectives 1 and 2).

2.9 | Validity and reliability/rigor

2.9.1 | Objective 1

One of the evaluators, a specialist in orthopaedic surgery, has tested and assessed the data collection tool in regard to the assessment of diagnosis and treatment accuracy before the data collection and found the data collection tool to be applicable. While the PTQ has been tested in a similar context and is considered to have acceptable psychometric quality, no empirical validation has yet been conducted (Norberg Boysen et al., 2016). The PTQ has been translated from Swedish into Norwegian using a forward-back translation process. The professional responsible for treatment will determine whether a patient has impaired cognitive function or inadequate skills in the Norwegian language that could prevent the patient from understanding or completing the PTQ. As this professional will not always be the same person, some variability in the decisions made is expected.

2.9.2 | Objective 2

The data collection tool will be pilot tested and consensus on data collection gained by letting the data-collecting research assistant

and a representative from the research group collect data in parallel. The results will be discussed in the research group and allowance will be made for a revision of the study protocol as needed.

3 | DISCUSSION

APN in the form of the NP role in emergency care in Norway will be pioneered in this project. Studying whether APN has an impact on service effectiveness for patients with minor injuries in the Norwegian healthcare system is of relevance. It is also of interest to study both whether an APN model can be considered equally effective in-service delivery as the previous, standard (physician-led) care model for patients with hip fractures and how patients perceive APN.

3.1 | Limitations

The study will be performed in Norway and caution will therefore be needed in generalizing the results to other countries with other healthcare systems and potential cultural differences. As part of a larger project, the outcome studies here will have a limited time frame. This could mean that fewer participants than the number estimated through power calculation could be an impending threat.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

AUTHORS' CONTRIBUTIONS

All authors meet the ICMJE recommended criteria. All authors have made substantial contributions to the design of the manuscript. EB has drafted the manuscript and all of the other authors have substantively revised it. AL was responsible for power calculations, ED and KG for planning data collection in the ED and LF is the principal investigator.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Regional Committees for Medical and Health Research Ethics have given their approval (2019/173 and 2019/188). For data collection from patient records, no consent will be collected. A completed and returned PTQ will be understood as informed consent.

DATA AVAILABILITY STATEMENT

The datasets to be used and/or analysed during the current study will be available from the corresponding author on reasonable request.

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Additional supporting information may be found online in the Supporting Information section.

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