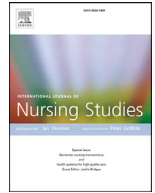




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## Exploring the incidence and nature of nursing-sensitive orthopaedic adverse events: A multicenter cohort study using Global Trigger Tool

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## ABSTRACT

**Background:** For decades, patient safety has been recognized as a critical global healthcare issue. However, there is a gap of knowledge of all types of adverse events sensitive to nursing care within hospitals in general and within orthopaedic care specifically.

**Objectives:** The aim of this study is to explore the incidence and nature of nursing-sensitive adverse events following elective or acute hip arthroplasty at a national level.

**Design:** A retrospective multicenter cohort study.

**Outcome variables:** Nursing-sensitive adverse events, preventability, severity and length of stay.

**Methods:** All patients, 18 years or older, who had undergone an elective (degenerative joint disease) or acute (fractures) hemi or total hip arthroplasty surgery at 24 hospitals were eligible for inclusion. Retrospective reviews of weighted samples of 1998 randomly selected patient records were carried out using the Swedish version of the Global Trigger Tool. The patients were followed for readmissions up to 90 days postoperatively throughout the whole country regardless of index hospital.

**Results:** A total of 1150 nursing-sensitive adverse events were identified in 728 (36.4%) of patient records, and 943 (82.0%) of the adverse events were judged preventable in the study cohort. The adjusted cumulative incidence regarding nursing-sensitive adverse events for the study population was 18.8%. The most common nursing-sensitive adverse event types were different kinds of healthcare-associated infections (40.9%) and pressure ulcers (16.5%). Significantly higher proportions of nursing-sensitive adverse events were found among female patients compared to male,  $p < 0.001$ , and patients with acute admissions compared to elective patients,  $p < 0.001$ . Almost half (48.5%) of the adverse events were temporary and of a less severe nature. On the other hand, 592 adverse events were estimated to have contributed to 3351 extra hospital days.

**Conclusions:** This study shows the magnitude of nursing-sensitive adverse events. We found that nursing-sensitive adverse events were common, in most cases deemed preventable and were associated with different kinds of adverse events and levels of severity in orthopaedic care. Registered nurses play a vital role within the interdisciplinary team as they are the largest group of healthcare professionals, work 24/7 and spend much time at the bedside with patients. Therefore, nursing leadership at all hospital levels must assume responsibility for patient safety and authorize bedside registered nurses to deliver high-quality and sustainable care to patients.

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## What is already known about the topic?

- Patient safety has been recognized as a critical global health-care issue.
- Rates of adverse events are still high in in-hospital care, especially in the orthopaedic field.
- Professional nursing care is crucial to prevent patients from being affected by adverse events.

## What this paper adds

- This study, with weighted samples, demonstrates that 36% of the patients with hip arthroplasty suffered at least one nursing-sensitive adverse event, and female patients and patients with acute admissions had higher proportions of nursing-sensitive adverse events.
- All types of nursing-sensitive adverse events were included and healthcare-associated infections, such as urinary tract infections and soft tissue infections, as well as pressure ulcers, were most common and a majority was assessed as preventable.
- Nursing-sensitive adverse events contributed to a substantial amount of extra in-patient days.

## 1. Background

For decades, patient safety has been recognized as a critical global healthcare issue. The World Health Organization defines patient safety as the absence of preventable harm to a patient and reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum (World Health Organization, 2006). Although most of the care given in hospitals is safe, hospital care nevertheless always involves the risk of an adverse event (AE). The presence of AEs reflects the gap between the actual care given and optimal safe care, and it always entails some form of suffering for the affected patient (Duarte et al., 2015). AEs have been shown to be common in in-hospital care (Hibbert et al., 2016; Schwendimann et al., 2018), especially in surgical specialities (Anderson et al., 2013) with orthopaedics having one of the highest AE rates, up to 30.0% (Merten et al., 2015; Rutberg et al., 2016; Unbeck et al., 2013). Pukk-Härenstam et al. (2008) found that surgical specialities accounted for 88% of patient claims to the County Councils Mutual Insurance Company, but for only 46% of hospital discharges. Orthopaedic and hand surgery care had the highest claims rate. A systematic review (Schwendimann et al., 2018) found that the most common AE types were related to operative/surgical procedures and accounted for a median of 40% of all AEs. Several systematic reviews (Anderson et al., 2013; Hibbert et al., 2016; Schwendimann et al., 2018; Vries et al., 2008) have reported on in-hospital AEs and the incidence differs both within and between specialities, ranging from 3% to 62%. One of those reviews (Vries et al., 2008) showed that different kinds of surgical specialities accounted for a median of 58.4% of the AEs, while the corresponding medicine specialities was 24.1%. The review by Hibbert et al. (2016) reported that general inpatients, including different specialities within both medical and surgical care, had an AE range of 7–40%.

To prevent patients from being affected by AEs, professional nursing care is crucial (Marques da Silva de Paiva et al., 2010). The registered nurses' responsibility includes considering risk factors, taking relevant precautions in the planning of care, improving quality of care, and ensuring that all interventions are based on evidence (Smith et al., 2017). Despite this, the role nursing care can play in the prevention of patients' suffering from AEs has not been given sufficient attention since many patients at risk do not receive adequate preventive care. For example, none of the

studied patients at-risk of falling had adequate preventive interventions according to existing guidelines (Van Gaal et al., 2014). A national study (Bååth et al., 2014) including 39,271 inpatients concludes that, despite a pressure ulcer prevalence of 16%, the use of preventive interventions was not on an acceptable level.

There is a gap of knowledge of AEs sensitive to nursing care within hospitals in general and within orthopaedic care specifically, and we have been unable to identify AE studies sensitive to nursing care within this speciality. AE studies with a nursing focus have had different study designs and data collection methods such as interviews, observations, surveys, clinical incident reports and record reviews (Duarte et al., 2015), making comparison difficult. In some studies, which often use record review, the focus has been on predefined AEs, such as adverse drug events, medication administration errors, pressure ulcers, falls, urinary tract infections or in-hospital mortality (D'Amour et al., 2014; De Meester et al., 2013; Duarte et al., 2015; Van Gaal et al., 2014). Other studies have focused on, for example, staffs' perceptions of facing AEs, knowledge regarding AEs, and motivation to report AEs (Duarte et al., 2015). We conclude that there is a lack of knowledge regarding all types of AEs sensitive to nursing care in general, and also to patients operated with a hip arthroplasty. Patients who undergo hip arthroplasty, either elective due to osteoarthritis or acute due to a hip fracture, are a common patient group in orthopaedic departments. Therefore, this study aims to explore the incidence and nature of nursing-sensitive AEs following hip arthroplasty on a national level.

## 2. Methods

### 2.1. Study design

This sub-study is part of a retrospective multicenter cohort study (Magnéli et al., 2019), VARA (Validation of Register data after Hip Arthroplasty). The aim of the main study was to validate the ability of a set of predefined ICD-10 codes used on a national level to compare hospitals, detect AEs, and calculate the incidence of AEs following primary hip arthroplasties. The method and variables are the same for both the main study and this sub-study and are presented below.

### 2.2. Data sources

The study was based on three data sources: the Swedish Hip Arthroplasty Register, National Patient Register, and patient records.

All public and private orthopaedic units in Sweden performing hip arthroplasty report to the Swedish Hip Arthroplasty Register on a voluntary basis. The completeness of the register is about 98%. The participants in the study were recruited from the Swedish Hip Arthroplasty Register.

The National Patient Register includes data on all inpatient and outpatient care. Information is delivered to the register once a month from all regions in Sweden. The participants were identified by cross-linking data from the Swedish Hip Arthroplasty Register and the National Patient Register using the personal identification number and surgery date. Used for identifying each registered individual in Sweden, the personal identification number is a life-long, unique 12-digit number consisting of the date of birth and four control digits. A statistician at the National Board of Health and Welfare performed the cross-linking.

Retrospective reviews of patient records were carried out using the Swedish version (SALAR, 2012) of the Global Trigger Tool (GTT) (Griffin and Resar, 2007) to identify AEs in the study cohort. The GTT is a two-stage retrospective record review process.

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