

CORR Insights®: The Rothman Index is Associated With Postdischarge Adverse Events After Hip Fracture Surgery in Geriatric Patients

Esa Jämsen MD, PhD

Where Are We Now?

Hip fractures remain one of the most devastating events that older patients can experience. These injuries can cause the need for around-the-clock care, institutionalization, and even death. Despite a declining incidence, the absolute number of patients with hip fracture will increase as the population ages [15].

This CORR Insights® is a commentary on the article "The Rothman Index is Associated With Postdischarge Adverse Events After Hip Fracture Surgery in Geriatric Patients" by McLynn and colleagues available at: DOI: [10.1007/s11999.0000000000000186](https://doi.org/10.1007/s11999.0000000000000186)

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Esa Jämsen MD, PhD (✉), Faculty of Medicine and Life Sciences University of Tampere, Finland P.O. Box 100, FIN-33014 e-mail: esa.jamsen@uta.fi

Only half of the patients with hip fracture eventually regain their prefracture mobility and daily activity [3, 9] and consequently, many will need assistance from others. Furthermore, at least 10% will experience subsequent fractures [2], indicating our failure to identify and act against risk factors for falls and fractures at the time of the first injury. Fortunately, there is mounting evidence showing that comprehensive orthogeriatric care and rehabilitation can help restore function and recovery at home [4, 10].

We generally rely on widely used measures like the ASA score to identify patients who carry an increased risk of adverse complications. In the current study, McLynn and colleagues [6] report on the Rothman Index (RI), a patient-status measurement that is calculated and automatically updated based on electronic medical charts without extra work by nursing staff. Compared to the ASA score, RI seems to predict postoperative adverse events following hip fracture more accurately and could help in identifying patients who need special attention.

E. Jämsen, Professor of Geriatrics (Deputy), Faculty of Medicine and Life Sciences, University of Tampere, and Chief Geriatrician, Centre of Geriatrics, Tampere University Hospital, Tampere, Finland

Where Do We Need To Go?

Our goal in treating patients with hip fractures should be returning them to prefracture mobility and performance in activities of daily living (ADLs). This is not an unrealistic goal; if half of this patient population regains their prefracture mobility [3, 9] as noted above, that proportion can be increased with good care. In addition, we should work to prevent future falls and new fractures. But these goals have not been met. Furthermore, it is uncommon that hospitals would register and routinely monitor the key patient-related outcome parameters such as function, mobility, quality of life, and new falls and fractures.

Independent of setting, all hip-fracture pathways should include certain basic elements. First, patients who choose to have surgery should have it performed without unnecessary (system-related) delays [13]. Second, the fracture should be treated in a way that allows immediate weight-bearing to enable early mobilization. Third, concurrent medical conditions and symptoms—including those present at the time of admission and those occurring later during the care—must be identified and managed effectively.

Older patients with hip fractures may not be capable of withstanding new illnesses or postoperative complications. Even minor disturbances to

homeostasis, let alone reoperations, may have fatal consequences. Moreover, these patients are at high risk of delirium that further complicates care and prolongs rehabilitation [1]. Fortunately, the frequency and severity of delirium can be minimized by good control on pain and other symptoms, prompt management of concurrent medical issues, avoiding harmful medications (such as anticholinergic agents and sedative hypnotics), and maintaining safe environment that supports orientation and normal day-night cycle [5]. Although hip fracture patients' vulnerability, and to some extent, their overall prognosis, are related to their prefracture levels of mobility and medical health, events shortly after surgery can meaningfully influence the likelihood that a patient will survive and walk again; this further emphasizes the role of trauma (or subspecialty hip fracture) units.

While these are all worthy goals, it must be acknowledged that one size does not fit all [11]. Approximately 10% to 20% of hip fractures occur in patients who already live in nursing homes or institutions [8, 11]. This patient population has different needs [11] that may affect surgical and perioperative care. Because a majority of the patient population has dementia, postoperatively, they carry a high risk of delirium, require assistance for even basic daily activities and ambulation, and have difficulties following weight-bearing limitations. Therefore, it would be beneficial to utilize personnel familiar with treating patients with cognitive impairment. Unfortunately, this is rarely seen in current clinical practice, possibly, in my view, because of inappropriate characterization of the patients or a lack of guidelines detailing how patient characteristics should guide treatment (such as the access to orthogeriatric care).

Information on a patient's prefracture mobility, disability, and cognition, which are the major determinants of treatment outcomes [9, 14], should be made available either in patient records or should accompany the patient upon arrival to emergency department. Furthermore, treating medical personnel, including physicians, nurses and, physical therapists both in hospital and in outpatient care should monitor changes in mobility and ADL performance through the treatment, as well as after discharge.

How Do We Get There?

We can limit the burdens associated with hip fractures by having a clear understanding of the patient's prefracture quality of life, as this background information will define the goals of treatment and helps identify high-risk patients (those with dementia or severe comorbidities). In my view, ASA scores are too simple of a marker for patient-level decision-making. Data-mining techniques that could search electronic medical charts for key prognostic factors, such as comorbidities, disability, dementia or signs of delirium, could help in identifying those with high risk of adverse event during the care and those who would benefit from geriatric care [1].

Automatic systems like RI, combined with risk thresholds, could bring earlier attention to deteriorating conditions and possible complications. The idea is similar to early-warning systems used to predict cardiac arrest and ICU admission, but the RI index extends the evaluation to include a patient's general health [6]. Such scores could also be used when considering whether a patient should be discharged from the hospital. An

obvious limitation with risk scores, of course, is that they do not tell us what is wrong with the patient, which means we still need to systematically assess the patient.

Finally, orthopaedic surgeons could incorporate validated tools like the Clinical Frailty Score [12] to measure function, and to supplement comorbidity scores. Together, these data would help in monitoring outcomes that are significant to the patient, such as function, mobility, adverse events, and mortality. Furthermore, detailed description of patient profiles would make comparisons between different providers more accurate.

In order to improve the care of patients with hip fracture, there is an obvious need for valid and openly reported outcome data. In the United Kingdom, the utilization of the National Hip Fracture Database has already led to improvement in the care of patients with hip fracture and has reduced mortality among this patient population [7]. Broadening the use of such standardized databases would help orthopaedic surgeons recognize the advantages and flaws in the treatment practices both within and between institutions (ie, learning to treat these vulnerable patients at the right time and right way).

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