

CORR Insights®: What was the Epidemiology and Global Burden of Disease of Hip Fractures From 1990 to 2019? Results From and Additional Analysis of the Global Burden of Disease Study 2019

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Where Are We Now?

Hip fractures are common, costly, and familiar to most orthopaedic surgeons and internists. Exclusive of high-impact trauma, which is altogether different, most hip fractures occur in adults who have substantial comorbid illness and frailty, irrespective of age. Although there are important opportunities for

improvement, management of hip fractures in the United States, Canada, and other high-income countries is fairly refined and protocol driven. In high-income countries, patients with hip fractures are almost always transported to a hospital, diagnosed with the use of radiographs or other imaging, assessed for coexisting medical conditions, and taken reasonably promptly to the operating room for surgery unless serious contraindications mandate against doing so (such as stroke or myocardial infarction, or in situations where a palliative approach is preferred). By contrast, in low-income or middle-income countries, management of hip fractures is likely more variable because of limited hospital infrastructure and capacity, although data are sparse.

International comparisons of hip fractures (or other conditions) are extremely valuable for benchmarking and exploring between-country differences in treatment patterns, outcomes, costs of care, and systems for healthcare delivery [1]. In individual countries, investigators have studied regional differences in


care for decades; such studies were popularized by Wennberg et al. [12] before they coalesced into The Dartmouth Atlas [5]. However, for decades, studies of geographic variations were limited to evaluations conducted across regions in a given country. This limitation was imposed because most data came from government or private entities in each country (such as the United States Medicare files or English National Health Service data). Available data sources were insufficient for international comparisons because they were typically inaccessible to those outside of the given country and lacked standard definitions of diagnoses, treatments, or outcomes, which precluded multicountry comparisons.

Things are now changing rapidly with the advent of distributed data networks and large multicountry clinical registries. It is important for clinicians and the public to understand the strengths and weaknesses of some of the most prominent international comparison data sources and collaborations. For example, the WHO and the Organization for Economic Cooperation and Development provide reports on the health of various countries; their studies typically rely on aggregated population-level data submitted by individual countries and governments [11]. The Global Burden

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of Disease initiative amalgamates data from multiple different sources to estimate disease burdens across countries [7]. Although the Organization for Economic Cooperation and Development and Global Burden of Diseases can provide sweeping overviews of global health, they lack the granular data required for detailed comparisons of processes of care or outcomes for circumscribed diseases or conditions.

Initiatives such as the American College of Surgeons National Surgical Quality Improvement Project [2], the International Health System Research Collaborative (<https://projects.iq.harvard.edu/ihsr>) [3], and the EuroHope initiative [10] take a different approach. These initiatives use either international clinical registries (National Surgical Quality Improvement) or administrative data (International Health System Research Collaborative and EuroHope) to compare treatments and outcomes for specific conditions across countries. A key limitation in studies that use patient-level data is that such research is generally limited to high-income countries where electronic health records and rigorous data standards exist; such studies are difficult to complete in low-income and middle-income countries.

In a study published in *Clinical Orthopaedics and Related Research*®, Dong et al. [6] used data from the 2019 Global Burden of Disease study to estimate global hip fracture trends between 1990 and 2019. First, the investigators found large variations in hip fracture incidence rates between countries. Second, the burden of hip fractures to the individual and society increased with age, as measured by years lived with disability. Based on the findings in this paper, readers should recognize that hip fractures are

likely to increase in frequency as populations age and that hip fractures are substantially more common in polar climates.

Where Do We Need To Go?

We need better data on two different levels. Dong et al. [6] found 300% to 500% differences in hip fracture incidence rates across countries; most of these differences appeared when comparing hip fracture rates in low-income and middle-income countries with those in high-income countries. For example, the authors reported hip fracture incidence rates of 68 in Benin and 428 per 100,000 population in Australia. Although the Global Burden of Diseases study attempts to obtain rigorous data from all participating countries and adjust for uncertainty in estimates from countries with lower-quality data, the magnitude of the differences between low-income and high-income countries should trigger questions; in particular, how well are hip fractures captured in low-income and middle-income countries? Are the differences merely a manifestation of data quality or do these differences demonstrate true differences in the incidence of hip fractures? Low-income and middle-income countries likely require better physical healthcare infrastructure and health information technology [8]. The study by Dong et al. [6] is also notable for the limited outcomes they assessed in their study. Although the incidence of hip fractures and years lived with disability are important, for international comparisons to be the most valuable, we would ideally have surgical outcomes (for example, the type of surgical procedure performed), postoperative complication rates, and patient functional status at a standard duration (for example, 1 year) after hip fracture repair.

How Do We Get There?

There are some key barriers that must be overcome to allow for better international comparisons. First, there needs to be further investment in developing the physical infrastructure and healthcare workforce in low-income and middle-income countries; this would include investment in hospitals and clinics as well as educational systems to build the healthcare workforce (doctors, nurses, and staff). In tandem, efforts should be made to develop low-cost electronic health records that can be used for clinical care and capture diagnoses and procedures using standard coding systems such as International Classification of Diseases codes [9]. However, in lower-income countries, budgetary constraints, political instability, and outright civil war are formidable barriers to this vision. Second, in high-income countries, we need more-consistent coding; for example, an international comparative study demonstrated implausibly large differences in the coding of comorbid conditions across countries, making calculations of risk-adjusted outcomes extremely difficult and potentially misleading [4]. Ensuring accurate coding is challenging and relies on rigorous training of clinicians and staff, as well as periodic audits to verify the codes that are used. Third, standard health administrative data, which are typically derived from insurance claims and billing data, need to evolve to include enhanced elements such as laboratory values or patient-reported outcomes. Fourth, we need governments and private foundations to develop funding mechanisms to support international comparisons; in the United States, many health systems and registries can link administrative data to clinical information stored in the electronic medical record. Across-country comparisons are analytically complex and expensive. Typical funding mechanisms (for example, National

Institutes of Health grants) were not designed for projects of this scope. Other funding options might include government agencies charged with delivering healthcare to their populations (for example, Medicare in the United States and the English National Health Service) or charitable organizations (such as the Gates Foundation). A more robust funding model could use global agencies such as the WHO, Organization for Economic Cooperation and Development, or United Nations, which are already investing in population health and across-country comparisons.

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