

Predicting Outcomes After Hip Fracture

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J Gen Intern Med 32(2):143–4
DOI: 10.1007/s11606-016-3877-x
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What if the post-operative course we clinicians anticipate and describe for typical patients undergoing surgery for hip fracture is too optimistic? The article by Tang et al. in this issue of *JGIM* raises this question.¹ The findings may not alter patients' decisions to undergo surgical repair, but they may change how clinicians envision and describe the course of rehabilitation.

Tang et al. compare pre- and post-hip fracture functional status for 755 older adults by linking pre- and post-fracture patient data from the large national Health and Retirement Study (HRS) for individuals shown in Medicare claims data to have suffered hip fracture. Functional status is self-reported by patient or proxy as 1) independence with activities of daily living (ADLs), 2) ability to walk one block, and 3) ability to climb a flight of stairs. Subjects are old (mean age 84), mostly female (77%), and infirm; 17% bear a diagnosis of dementia. Patients in nursing homes are not excluded. Post-fracture outcomes and associations between baseline characteristics and those outcomes are described.

Even for those with pre-fracture independence in ADLs, mortality is 37%. Furthermore, of those subjects with the highest level of function at baseline who survive, about one-third report functional decline. Logistical regression models are used to estimate outcome probabilities based on subjects' clinical and demographic characteristics. Unsurprisingly, older age, dementia, and higher comorbidity predict less complete recovery. Defined as dichotomous variables, race, marital status, wealth, and income prior to fracture do not influence functional outcomes.

Restoring baseline level of function is not realistic for the majority of geriatric patients incurring a hip fracture. This updated and broadly inclusive study of the fate of such patients forces us to ask whether our preoperative discussions and optimistic plans for post-operative care and rehabilitation are evidence-based and realistic.

The balance of risks and benefits of surgical hip fracture repair with respect to a reference population might be expressed as a syllogism: If patients with conditions and risk factors matching those of patients at hand are not included in

published clinical trials, then truly informed consent based on medical literature suffers.

In practice, experienced surgeons and consulting practitioners may compensate for knowledge gaps by extrapolating from results for younger and healthier patients included in clinical trials and by implicitly adjusting for age or risk based on clinical judgment. Let's acknowledge this can be less than precise.

Tang et al. have wisely chosen to include subjects often overlooked in clinical research: 1) very old people and those with multiple co-morbidities, 2) nursing home residents, and 3) people with dementia. The authors deserve credit for including these subpopulations, and consequently helping to develop the relevant evidence base for patients at increased likelihood of hip fracture. However, claims data are drawn from Medicare fee-for-service claims records, which do not include people under age 65 or those in capitated Medicare Advantage systems. Some categories of otherwise eligible subjects were also omitted from the study: 24% of HRS subjects declined to have survey results linked to Medicare claims; 19% of those with fracture did not have HRS surveys within the observation period; another 8% were dropped because their HRS surveys occurred too early during rehabilitation.

Another potential source of error in prognosis stems from the assumption that a reference setting where published data are generated is equivalent to one's own setting, where clinical outcomes may be heavily influenced by local processes and practices. The large databases linked by the authors of this study help to ensure statistical validity and generalizability of their findings. But, inevitably, the aggregation of data from multiple non-uniform settings risks concealing best-practice or state-of-art processes associated with improved outcomes at particular sites. Likewise, the 18-year span for data collection risks masking improvements in hospital and rehabilitative care that may have emerged over that interval, including enhanced roles of geriatricians in "orthogeriatric" units.² In counseling patients and in designing quality improvement, it is helpful to have knowledge of both industry-wide outcomes and how local practice produces results that are better or worse.

Predicting risks and benefits in a meaningful way for individuals also depends on that individual's time course. The observation period has particular relevance for hip fracture repair in older adults; both benefits and risks accrue over a time frame of many months. Notably, authors include HRS

reports of functional status and mortality data within 2.5 years before and after hip fracture.

Time course also needs interpretation for older patients with a limited lifespan. A recovery period of months can constitute a disproportionate share of remaining longevity for the 84-year-old. Operative mortality rates are relatively high for hip fracture,³ placing an upper limit on the benefits of otherwise successful surgery. Moreover, the magnitude of achievable functional benefit depends on prior functional limitations. Discussion of benefit must adapt to an individual's clinical state and overall prognosis.

Readers may quibble that the study's measures of functional status are not sufficiently standardized, normalized, or validated, or that function is measured by different scales in different domains. Since different choices of metrics will yield different definitions of clinical success, agreement on optimal functional measures is needed. The attention to functional status by Tang et al. properly recognizes that what matters to patients—activities of daily living, being able to walk a block or climb a flight of stairs—should matter to physicians. Geriatricians whose patients often place more value on everyday function than on longevity will appreciate the emphasis and will benefit in counseling patients.

Clinical studies serve a purpose in raising pertinent questions they do not fully answer, and in reframing how we think about clinical conditions. This article does both. In seeking to identify specific factors contributing to disappointing outcomes for older adults with hip fracture, the authors call attention explicitly or implicitly to patient characteristics, practices, or settings, and to possibilities to improve care or modify it to suit the particular circumstance. For example, including representative numbers of patients with dementia before hip fracture allows the authors to highlight this group's lower likelihood (8 % vs. 39 %) of regaining independence in ADLs. The article also raises the questions not addressed by the authors: Does pre-fracture dementia constitute a marker for higher likelihood of perioperative delirium, with lingering effects on rehabilitation and recovery? Does post-operative pain contribute to delirium and influence progress with rehabilitation? More information might not merely aid prognosis, but also support more effective efforts to prevent or limit delirium.⁴

Some experts, including the co-authors of this article, have asked whether hip fracture is a sentinel event that heralds decline or a marker that indicates decline has already commenced.⁵ A comparison population or synthetic control group with similar risk but no hip fracture might illustrate the added risk posed by hip fracture per se. Such a comparison was performed by Wolinsky and Fitzgerald, who matched patients

with similar risk and “simulated” hip fracture.³ Using propensity-matching methods to create a control cohort of HRS subjects, Tang, et al. might have generated additional findings from their study.

Patients with hip fracture surgery and their loved ones will hope for the best post-operative outcomes, but must also anticipate other likely scenarios. A major takeaway message is that even patients with relatively high function undergoing hip fracture repair need help to more realistically plan for the likelihood of subsequent decline. Knowledge based on findings in this article can help clinicians individualize care.⁶ The authors point to the need for more supportive care for hip fracture patients.

And a major implication from better appreciating the burden of suffering that hip fracture inflicts on older patients is that efforts to prevent falls and hip fracture in the elderly should be pursued more diligently. Fall and fracture prevention measures have been implemented in many settings and described in the medical literature,⁷ with encouraging evidence that hip fracture rates seem to be declining.⁸

At a minimum, and in particular, Tang et al. show that including the very sick and very old in studies of hip fracture is essential to generating the evidence base that allows truly informed consent and realistic care planning.

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