

Clinical Science

The differential effects of surgical harm in elderly populations. Does the adage: “they tolerate the operation, but not the complications” hold true?



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Abstract

BACKGROUND: Elderly patients are thought to tolerate surgical complications poorly because of low physiologic reserve. The purpose of the study was to evaluate the differential effects of surgical harm in patients over 80 years old.

METHODS: Three years of data from a harm-reduction campaign were used to identify inpatient surgeries performed on patients older than 50. The rates of harm, death, cost, and length of stay (LOS) were analyzed using SPSS 21 (IBM, New York, NY).

RESULTS: A total of 22,710 patients were identified. Rates of harm and mortality increased with increasing age. Harmed patients over age 80 had increased mortality (9.5% vs 7%), but lower cost, intensive care unit days, and LOS versus those aged 50 to 80. Linear regression showed increased cost with harm (\$24,000) and decreased cost with age above 80 (−\$7,000).

CONCLUSIONS: In the elderly surgical population, there is more harm and harm events are associated with higher mortality rates, but less additional cost and LOS. Differing goals or aggressiveness of care may explain cost avoidance in the elderly.

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There is an adage in surgery that says of the extreme elderly “they tolerate the operation, but not the complications.” Elderly patients are felt to have limited physiologic

reserve; therefore, a 2nd physiologic insult after an operation, in the form of a complication, is likely to result in much more devastating consequences than in younger patients. This lack of reserve is especially prevalent in patients over age 80 and is extreme after age 90.¹ Elderly surgical patients are counseled that they have a higher expected mortality based on their age, but if they can get through their operation and early recovery without a complication, they can expect a good outcome. From the providers’ perspective, vigilant early postoperative care and avoidance of complications are felt to be essential. Unfortunately, only 44% of adverse events in hospitals are

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Table 1 Major categories of harm

Medication	Procedural	Infection	Employee	Care delivery	Other
Hypoglycemia	Coded complications	BSI	Back injury	Falls	Renal failure
Anticoagulation	NSQIP	VAP	Sharps	Pressure ulcers	Blue alert
Narcotics	Pneumothorax	UTI	Assaults		DVT
Other		C-Diff			OB harm
		SSI			
		Sepsis			

For purposes of structure, reporting, and review, 6 broad categories, covering 27 different types of harm, were used in the No Harm Campaign.¹⁷

BSI = bloodstream infection; C-Diff = *Clostridium difficile*; DVT = deep vein thrombosis; NSQIP = National Surgical Quality Improvement Program; OB = obstetrics; SSI = surgical site infection; UTI = urinary tract infection; VAP = ventilator-associated pneumonia.

likely avoidable.² The population of Americans over age 85 is expected to increase from 6 million to 14 million from 2015 to 2040,³ so surgeons are likely to see more and more patients at the high extreme of age in our hospitals and clinics.

There are several studies that estimate the cost of adverse medical events^{4–9} and several studies which quantify the incidence of adverse events in elderly populations,^{10–15} but to our knowledge, no study has directly compared the differential effects of harm, including cost, in elderly surgical patients versus younger patients. The Department of Health and Human Services has reported that 13.5% of Medicare inpatients experience an adverse event and 1.5% suffers a fatal adverse event.² The Agency for Healthcare Research and Quality estimates the rate of hospital-acquired conditions at 145 per 1,000 admissions. They estimate the total cost attributable to medical errors at \$19.5 billion or \$13,000 per error.¹⁶ Ackroyd-Stolarz et al¹⁰ found that patients over age 65 admitted to acute care Canadian hospitals who experienced an adverse event had twice the hospital length of stay (LOS) (20.2 vs 9.8 days) at a cost of approximately \$7,500 per patient. Eicinosa and Hellinger⁶ used claims data to identify surgical admissions that included at least one potentially preventable adverse event. They found that surgical admissions with an adverse event had a mortality of 6.3% compared with .6% without adverse events. Total cost was \$66,879 versus \$18,284 and total inpatient days were 21.5 versus 5.1. Hamel et al¹³ used the Veterans Affairs National Surgical Quality Improvement Project dataset for noncardiac surgery and found that patients aged 80 and older had a 30-day mortality of 8% versus 3% for younger patients, although for many commonly performed operations the mortality rate for those aged 80 and older was less than 2%. Patients aged 80 and older had a complication rate of 20% and those who suffered a complication had a mortality rate of 26% versus 4% for those who did not.

Surgical patients and the elderly are at higher risk of adverse events in hospitals, which makes the elderly surgical patient particularly vulnerable. With reimbursement models shifting toward outcome-based payment, adverse events are likely to become very expensive for providers.

Our healthcare system is a nonprofit integrated system in southeast Michigan with 7 hospitals, including a large, urban flagship hospital. In 2008, the system launched its global No Harm Campaign with the goal of reducing or eliminating 27 sources of harm. From 2008 to 2011, the program reduced harm events by 31% and inpatient mortality by 18% systemwide.¹⁷ The data from this campaign are ideal for analyzing the differential effects of harm. Assuming the adage “they tolerate the operation, but not the complications” is true, we hypothesized that harm events in surgical patients over age 80 would be associated with significantly higher mortality, LOS, and cost than in younger patients. In addition, unharmed elderly patients should have outcomes similar to younger patients.

Patients and Methods

Data compiled from a large Midwestern health system’s global No Harm Campaign from 2009 to 2011 was used to identify inpatient surgical patients 50 years or older at a single hospital. The system’s flagship hospital is an urban, 802-bed tertiary care center, Level 1 trauma center, and education and research complex staffed by an employed medical group. The data were compiled prospectively as part of an ongoing quality assurance and improvement program. Occurrences of harm were tracked for reporting purposes and linked to demographic and care-related variables, as well as financial claims data.¹⁷ Data were obtained under the supervision of our Institutional Review Board. Analysis was performed using SPSS 21 statistical software (IBM, New York, NY).

Patients were considered surgical if their hospitalization included at least one visit to the main operating room. Harm was defined as “any unintended physical injury resulting from or contributed to by medical care (including the absence of indicated medical treatment) that requires additional monitoring, treatment, or hospitalization or results in death. Such injury is considered harm whether or not it is considered preventable, resulted from a medical error, or occurred within a hospital”.¹⁷ The campaign included all types of harm that could be routinely measured. Harm occurrences were placed in the major

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