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Is Futile Care in the Injured Elderly an Important Target for Cost Savings?

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Abstract

Background—This study proposes a definition of futile care and quantifies its cost in injured elders.

Methods—This was a retrospective study of Medicare patients with an ICD-9 injury diagnosis admitted to 171 Oregon and Washington facilities from 1/1/2001 through 12/31/2002 who died within six months of admission. Futile care was defined as death within 7 days of discharge from a hospitalization of at least 14 days. We compared healthcare costs in the last six months of life in those who did and did not meet our definition of futility. To simulate predicting and preventing futility early in the hospital course, we examined the effect of reducing spending on the futile care cohort to the level of those who survived from seven to ten days after injury.

Results—There were 6,832 elders who died within six months of injury, of whom 230 (3.4%) met our definition of futility. The median cost of care in the last six months of life was \$33,373 for those not meeting our definition of futility, and \$87,391 for the futile care group, (p [It] 0.001). The 3.4% receiving futile care incurred 8.9% of total costs. Reducing expenditures in the futile care group to the level of those who died from seven to ten days after injury (median \$25,633) would result in an overall cost savings of 6.5%.

Conclusions—End-of-life healthcare costs were significantly higher for those who received futile care. However, even aggressive reductions in futile care would result in small savings overall.

Keywords

Geriatrics; injury; trauma; economics; futility

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INTRODUCTION

utility in medical care is a highly controversial topic without a clear definition.^{1,2} For the clinician, futility may be a low likelihood of a good outcome from an aggressive treatment. For the patient, futile care may be that which overemphasizes prolongation of life at the expense of a “good death”. For the economist or policy maker, futile care may seem like a prime target for cost savings. End of life care is known to be expensive, with Medicare spending on the last year of life representing about 27% of total program expenditures, a figure which has been stable over time.³ These issues have become highly politicized in the health care reform debate as opponents and detractors invoke charges of “death panels” that would “pull the plug on grandma”.⁴

Despite the importance of medical futility to the clinician, patient, and society, there have been surprisingly few efforts to precisely define, let alone quantify, futile care. Our objective was to propose a quantifiable definition of futile care and estimate the cost of this care among a Medicare cohort of injured elders hospitalized in Oregon and Washington. Our hope is that proposing an explicit definition will promote further exploration of this controversial but poorly defined topic.

MATERIALS AND METHODS

Study Design

This was a retrospective analysis of Medicare claims for patients ages 67 years and older admitted to 171 Oregon and Washington hospitals with any injury diagnosis who died within six months of injury admission.

Study Setting and Population

Medicare patients admitted from January 1, 2001 through December 31, 2002 were identified by ICD-9 diagnosis injury codes 800-959, excluding 905-909 (late effects of injury), 930-939 (foreign bodies), and 958 (complications of injury). Patients who died before hospital admission (on scene or in the emergency department) were excluded. Only patients enrolled in fee-for-service Medicare programs were included, as our datasets did not track utilization by those in managed care programs. The study was approved with a HIPAA Waiver of Consent by the Oregon Health & Science University (OHSU) Institutional Review Board and the Centers for Medicare and Medicaid Services Privacy Board.

Measurements

The details of the patients’ index hospitalization and demographics were obtained from the Centers for Medicare and Medicaid Services in the Medicare Provider Analysis and Review (MEDPAR) file. When a second acute care hospitalization began within two days of discharge from the index injury hospitalization, this was considered to be an inter-hospital transfer and a continuation of the initial length of stay, unless there was a discharge disposition code indicating the patient had gone to another type of facility in the interim. Discharges to skilled nursing and other types of facilities (rehabilitation, hospice, etc.) were counted toward the patients’ survival at home, as these facilities may have been their baseline residences even before injury. Mortality and date of death after injury were tracked in the Medicare Denominator Standard Analytic File, which is considered to be highly accurate.

The MEDPAR file contained up to 9 ICD-9 diagnosis codes which were used to calculate an ICD-9 based injury severity score (ICISS) for each patient.⁵ The ICISS is the product of the empirically-derived survival risk ratios of each ICD-9 injury code. Survival risk ratios for

each diagnosis factored into the ICISS were derived from the 2002 National Inpatient Sample.⁶ We defined seriously injured patients as those with an ICISS of 0.9 or less, a definition used in previous trauma studies.⁷ Injuries were grouped as femoral neck (hip) fractures, other extremity injuries, spinal injuries, head injuries, chest injuries, and other injuries using the method described by Clark et al.⁸ Hip fractures were defined by an ICD-9 code of 820. Other extremity injuries were defined by ICD-9 codes of 808 (pelvic fractures), 810–819 (upper extremity fractures), 821–829 (lower extremity fractures besides hip fractures), 831–838 (dislocations), 840–845 (sprains and strains), 880–897 (wounds), 912–917 (superficial injuries), 923–924 (contusions), and 927–928 (crush injuries). Spinal injuries were defined by ICD-9 codes 805–806 and 952. Head injuries were defined by ICD-9 codes 800–804 and 850–854. Chest injuries were defined by ICD-9 codes 807, 860–862, 875, and 901. Abdominal injuries were defined by codes 863–868, although this category was not used by Clark et al. Our list of ICD-9 procedure codes constituting major surgery was compiled from six years of Oregon trauma registry data. This list was reviewed by an experienced physician to exclude procedures that would usually be done at the bedside, without the need for the operating room or general anesthesia (e.g. chest tube placement, closed reductions of fractures and dislocations, central venous catheter placement, and sutured laceration repair).

Data for medical comorbidities were obtained from the MEDPAR and Outpatient Standard Analytical Files for one year before the index injury admission. The adaptation of the Charlson comorbidity index devised by Deyo et al. was used to convert ICD-9 codes to a comorbidity score.⁹ This validated system uses weighted scores for 17 diagnoses as well as age to produce a prognostic index for survival. We defined patients with an elevated comorbidity burden as those with a Charlson score of ≥ 3 . We calculated the total cost of care for the last six months of life by summing the Medicare allowable charges in all available claims databases (MEDPAR, outpatient, carrier, durable medical equipment, and home health). The hospice dataset was not available for analysis. Medicare charges for skilled nursing and inpatient rehabilitation care were summed from the MEDPAR file. Medicare does not cover most other types of sub-acute institutional care, nor skilled nursing care beyond 100 days. The carrier dataset included services billed independently of an institution such as physicians, clinical social workers, independent laboratories, ambulances, and free-standing surgical centers.

Our definition of futile care was derived from discussions among intensivists, trauma surgeons, emergency physicians, and researchers regarding professional and personal experiences with end-of-life care. Our guiding principle was that a prolonged hospitalization would be justified as not futile if it were followed by a reasonable amount of time alive outside the hospital. Multiple definitions were proposed and modeled using varying ranges of intensive care and regular hospitalization, discharge disposition, and survival duration after injury. Our consensus definition of futile care was at least 14 days hospitalization with 7 or fewer days alive after discharge. Care for any patient with a length of stay shorter than 14 days was not considered futile, regardless of survival, nor was care for any patient who survived seven or more days after discharge, regardless of length of stay. Previous studies using administrative data have defined the end-of-life period as either the last six or twelve months of life.^{10,11} We examined the shorter interval to emphasize the importance of the injury event in this time period.

To estimate the cost savings of decreasing futile care, we proposed an alternative scenario for comparison: We conjectured that those who died from seven to ten days after injury admission would be a group with similarly severe and unsurvivable injuries, but in whom hospital care was not prolonged. Like those in our futile care group, they would represent those who survived the initial resuscitation and immediate post-injury phase but whose care

then turned to palliation and less aggressive interventions, with death a few days later. These deaths could have taken place in or outside of the hospital.

Because of the right-skewed, non-normal distributions of length of stay, charges, ICISS, and comorbidity score, summary statistics were reported as medians and interquartile ranges. The non-parametric Wilcoxon rank-sum test was used for comparisons between non-normal group medians. Ages were compared by the *t* test. Proportions were compared using the χ^2 test. Database management and analysis was performed using SAS v.9.1 and STATA 11.

RESULTS

Our data set included 32,135 elders who were admitted to the hospital for injury, of whom 6,832 (21.3%) died within six months of injury (table one). Of the total, 230 (3.4%) met our definition of futile care, being hospitalized for at least 14 days with seven or fewer days of survival after discharge. The futile care cohort was significantly more male, younger, and were more seriously injured by ICISS than the non-futile group (all *p* [It] 0.001). The two groups did not differ significantly in comorbidity score or skilled nursing facility residence before injury. Those in the futile care group had a median length of stay of 16 days, 8 of which were spent in the intensive care unit. The maximum length of stay was 103 days in the non-futile care group and 109 days in the futile care group. The futile care group had a significant burden of injury, with 73.9% undergoing surgery and 31.7% meeting an ICISS-based definition of serious trauma. The overall cohort had a median survival after injury of 38 days.

Both the non-futile and futile care cohorts had outliers with spending far greater than the median (max \$782,118, figure one). Table two shows the median and total costs for the three subgroups. Median costs were significantly higher in the futile care group (*p* [It] 0.001), and were even more strikingly different when reported as means. Median health care spending for the last six months of life was \$34,330 (IQR \$20,372 - \$57,329). Total spending for the entire cohort was \$321 million (95% CI \$314-\$329 million), of which \$28.6 million (8.9%) went to the futile care group and \$293 million (91.3%) to the non-futile care.

Hip fractures occurred in 2,371 (40.0%). Excluding patients with hip fractures yielded a less severely injured cohort, (median ICISS 0.973 versus 0.964 for the entire sample. Excluding hip fractures slightly increased the proportion meeting our definition of futile care to 4.3% and the futile care cohort's share of all spending on the last six months of life to 12.3%.

To simulate that futile care could be predicted earlier in the hospital course and maximally decreased, we calculated the effect of reducing the level of spending on the futile care cohort to the same mean level as those who survived from seven to ten days after injury. This would have reduced the mean costs of care in the futile care cohort from \$124,222 to \$33,449, reducing the total spending for the last six months of life on this portion of the cohort from \$28.6 million to \$7.7 million. This savings of \$20.9 million would represent 6.5% of the total end of life spending for our entire cohort of injured elders.

We conducted sensitivity analyses using other definitions of futile care. A more liberal definition based on a stay of at least 14 days with fewer than 30 days survival after discharge fit 332 members of our cohort (4.9%), with a median spending of \$116,412 and total spending of \$38.6 million. A very conservative definition of futile care as a stay of at least 30 days with fewer than 30 days post-discharge survival fit 51 members of our cohort (0.75%), with a median spending of \$230,090 and total spending of \$12.7 million.

DISCUSSION

In this study we proposed a definition of futile care as at least 14 days of hospitalization followed by post-discharge survival of 7 or fewer days and determined that it would apply to 3.4% of elders who died within six months of admission to the hospital for injury. The median cost of care in the futile care cohort was 2.6 times that in the non-futile care group.

Our study's goal was to promote discussion of futile care by proposing a novel, retrospective definition and quantifying its costs in the injured elderly. This is justified by the extent to which the term "futility" is used in the literature without definition. Our survey of the literature found that even papers with "futility" or "futile care" in the title often lacked any definition of the term.¹²⁻¹⁴ One recent study relevant to our population of injured elders concluded that a survival rate of 57% made "damage control laparotomy" non-futile but did not precisely define what likelihood of death they would have considered futile.¹⁵ The Society for Critical Care Medicine Ethics Committee defined futility as treatments which "will not accomplish their intended goal".¹⁶ Schneiderman offers the quantitative definition that "when physicians conclude (either through personal experience, experiences shared with colleagues, or consideration of reported empiric data) that in the last 100 cases, a medical treatment has been useless, they should regard that treatment as futile".⁷⁸ He couples this with a qualitative definition that if a treatment "merely preserves permanent unconsciousness or... fails to end total dependence on intensive medical care [lsqb]it[rsqb] should be regarded as ... futile".

Each of these prior approaches to defining futility has its limitations. Mortality-based definitions require an arbitrary choice of the certainty with which mortality should be predicted: Nirula's highly relevant study of major trauma in the elderly sought to predict death with 95% certainty based on age, anatomic, and physiologic predictors.¹⁸ Quality-of-life based definitions also hinge on highly individual judgments of what constitutes a worthwhile quality of life. Economic definitions that would define futility by the cost of care would be rejected by those who would consider them tantamount to putting a price on human life.

Given the limitations of these definitions of futility, we were justified in proposing a novel, retrospective definition. Our definition of futility was derived by consensus among local experts in the fields of acute injury care, critical care, and health policy. Our concept of a prolonged hospitalization with little post-discharge survival should have a high degree of face validity both for caregivers and family members. Our chosen time intervals for length of stay and subsequent survival are conservative from among the definitions we considered and explored. Given the frailty and medical co-morbidities that often complicate the recovery of injured elders, 14 days would often be necessary to get through initial stabilization, staged operative repair of injuries, and the early rehabilitative phase that will declare the patient's likelihood of recovering. Given the complexity of managing combined medical and traumatic issues, a shorter period such as seven days would be premature for a patient to declare his or her likelihood of survival. Statistically, 14 days is also a reasonable definition of an outlier, being the 93rd percentile for length of stay. Previous works by our group have shown a high rate of death immediately following discharge in the injured elderly, suggesting that many injured elders with poor prognoses are discharged from the hospital to die in other setting such as home hospice, making in-hospital mortality a suboptimal outcome measure.¹⁹ Seven days after discharge captures this early post-discharge. Dying within 7 days of discharge also suggests that death was related to the initial injury event or an ensuing complication. This fairly short interval was chosen to be conservative in that many patients would consider even a few weeks at home with family worthwhile and justification for a prolonged hospitalization.

While our results showed significantly higher spending in the futile care group, the importance of this is largely mitigated by only 3.4% meeting that definition. A sensitivity analysis lengthening the minimum survival after discharge for non-futile care to two weeks yielded similar results, increasing the proportion in the futile-care cohort only from 3.4% to 4.9% and their share of end-of-life care costs from \$28.6 to \$38.6 million.

We then sought to model the maximal cost savings that might be reaped if futile care could be predicted and drastically curtailed. This required proposing a comparison group, as even the most aggressive reduction would not eliminate futile care spending. We chose those who died between seven and ten days after injury as a group with similarly unsurvivable injuries but who did not receive prolonged care. Reducing the expenditure on the futile care cohort to the level of this group would only save 6.5% of the total costs of end-of-life care for this whole cohort. While an imperfect comparison, it represents a conservative comparison which should over-represent the difference between this group and those meeting our definition of futile care. As this level of spending reduction is a projected maximum and could never actually be reached, the actual cost savings that could be reaped through even the most aggressive cost-control measures would be less than this. This finding is consistent with other studies suggested that curbing end of life care costs will not be the panacea for our over-budget healthcare system.^{20,21} Previous studies have found that neither more widespread use of hospice care, advanced directives, nor do-not-resuscitate orders consistently decreased health care costs at the end of life.²² Furthermore, looking at the importance of end of life spending as a portion of Medicare overestimates its share in healthcare spending for those of all ages.

These results should not be interpreted as devaluing the demonstrated benefit of improving end-of-life care, both economic and non-economic.²³ A matched case-control study of patients receiving palliative care consultations in the hospital showed significantly decreased symptom scores as well as lower per-day costs of hospitalization (\$897 versus \$1,004).²⁴ Similar results were seen in another multicenter matched case control study in which patients receiving palliative care consultations who died in the hospital showed savings of \$374 per day and \$4,908 for the entire hospital stay compared with those who did not receive palliative care.²⁵ While these savings are significant in this selected group, our findings that only 3.4% met our definition of futile care and that their median total healthcare costs for the last six months of life were \$87,391, suggest that these programs would only slightly decrease total Medicare expenditures.

Our choice of a population of elders admitted to the hospital for injury may limit applicability to all end-of-life care, but provides focus on this specific population. Unlike a medical hospitalization, which may occur during a long period of gradually declining health, an injury is more likely to represent a singular occurrence around which a time-based definition of futility can be applied. Our use of six months rather than one year as the end-of-life period focused the analysis more on the injury event, as an injury event in the elderly may be both a marker and cause of ill-health.

Use of retrospective billing data to measure costs has limitations. For one, these measurements are based on Medicare allowable charges, not true or adjusted costs; however, these are a reasonable measure when looking from a governmental perspective on health care spending.²⁶ Another limitation is that this fee-for-service dataset excludes the 19% of the Medicare entitled population covered by Medicare managed care organizations, a percentage that is even higher in the West. As our dataset was not population-based, but only included those admitted with injury diagnoses, it cannot be extrapolated to overall estimates of the cost of the care for the entire elderly population either locally or nationwide. Billing data also does not capture the many other costs associated with end of life care.

Medicare only pays for skilled nursing and inpatient rehabilitation care, not most other types of long-term care such as assisted living and adult foster homes. Caring for an elder at the end of life, whether at home or elsewhere, is associated with many other informal costs such as the lost wages of family members. Aggressively discharging injured elders from the hospital may shift these costs to settings in which they are not captured.

Our lack of access to the hospice data file resulted in an underestimate of total costs for all groups. Inclusion of this data would likely have further supported our conclusion that futile care contributes very modestly to overall end of life spending, as our futile care group had the opportunity to receive hospice care for at most seven days, unless they were receiving it before injury.

Our economic analysis should not be seen as contradicting other understandings of futility and the issues they raise. There is clear benefit to advancing palliative care, the use of advanced directives, and open communication between clinicians, patients, and families. If anything, our conclusion that aggressively reducing futile care will not be a cure for our over-budget health care system should emphasize the importance of patient autonomy over economics.

In summary, our study of health care spending in the last six months of life among injured Medicare patients found that 3.4% of the study population had hospitalizations of at least 14 days and then died within 7 days of discharge. We defined this pattern as “futile care” and found that median costs for this group were 2.6 times that for those who did not receive futile care. However, even if spending could be aggressively managed in this group, the resulting savings would only account for 6.5% of the total end of life care costs for the cohort. Policy makers should not be overly optimistic about reducing spending on futile care in the injured elderly as a target for cost savings.

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Fig. 1. Distributions of the total costs of care for the last six months of life in the futile care (230) and non-futile care (6,602) cohorts. IQR = interquartile range.

Table 1

Characteristics of hospitalized injured Medicare patients who died within 6 mo of hospitalization (n=6,832), divided into futile care (length of stay [mt]=14 d with [lt]= 7 d survival after discharge), non-futile care, and death from 7-10 d after admission.*

	Non-futile* 6602 (97%)	Futile 230 (3.4%)	Significance non-futile vs. futile	Died 7-10 d 491 (7.1%)
Male	2,648	131		
Age at injury median, IQR	85 80-90	83 77-87	<i>P</i> [lt] 0.001 <i>P</i> [lt] 0.001	234 85 47.7% 80-91
Charlson co- morbidity index, median, IQR	1 0-2	1 0-2	<i>P</i> [lt] 1	1 0-3
0	2,207	72		175
1-2	1,870	74		192
3	2,525	84		124
Skilled nursing facility resident prior to injury	6,116	486	<i>P</i> [lt] 0.3	33
Length of stay, median days, IQR	4 3-7	18 16-25	<i>P</i> [lt] 0.001	7
ICU length of stay, median, IQR	0 0-0	6 0-17	<i>P</i> [lt] 0.001	0
ICD-9 based Injury Severity Score (ICISS), median, IQR	0.96 0.96-0.98	0.95 0.88-0.97	<i>P</i> [lt] 0.001	0.96
Serious injury (ICISS 0.9)	511	73	<i>P</i> [lt] 0.001	64
Any surgery	4,095	170	<i>P</i> [lt] 0.001	332
Non-orthopedic surgery	294	63	<i>P</i> [lt] 0.001	40
Injuries**				
Hip fracture	2,681	50	<i>P</i> [lt] 0.001	180
Other extremity injury	2,132	65	<i>P</i> [lt] 0.20	75
Spine injury	454	42	<i>P</i> [lt] 0.001	42

	Non-futile* 6602 (97%)	Futile 230 (3.4%)	Significance non-futile vs. futile	Died 7-10 d 491 (7.1%)
Head injury	678 10.2%	53 23.0%	$P[t] 0.001$	75 15.3%
Chest injury	441 6.7%	33 14.3%	$P[t] 0.001$	39 7.9%
Abdominal injury	161 2.4%	15 6.5%	$P[t] 0.001$	23 4.7%

* Categories of survival were not mutually exclusive.

** Patients could have injuries in more than one category.

Table 2

Median and total costs for the last 6 mo of life for futile care, non-futile care, and those who died 7-10 d after injury.*

	Non-futile* 6602 (97%)	Futile 230 (3%)	Died 7-10 d 491 (7.1%)
Median cost of care, \$, IQR	\$33,373 \$19,983- \$55,157	\$87,391 \$57,462- \$154,705	\$25,633 \$15,638- \$42,656
<i>Total cost of care for cohort, millions of dollars (95% CI)</i>	\$293 \$286- \$299	\$28.6 \$25.5- \$31.7	\$16.4 \$15.3- \$17.5

* Categories of survival were not mutually exclusive.