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Potential Influence of Advance Care Planning and Palliative Care Consultation on ICU Costs for Patients with Chronic and Serious Illness

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Abstract

Objective—To estimate the potential ICU-related cost-savings if in-hospital advance care planning and ICU-based palliative care consultation became standard of care for patients with chronic and serious illness.

Design and Setting—Decision analysis using literature estimates and inpatient administrative data from Premier, Inc.

Patients—Patients with chronic, life-limiting illness admitted to a hospital within the Premier network.

Methods—Using Premier data (2008-2012), ICU resource utilization and costs were tracked over a 1-year time horizon for 2,097,563 patients with chronic life-limiting illness. Using a Markov microsimulation model, we explored the potential cost-savings from the hospital system perspective under a variety of scenarios by varying the interventions' efficacies and availabilities.

Main Results—Of 2,097,563 patients, 657, 825 (31%) utilized the ICU during the 1-year time horizon; mean ICU spending per patient was 11.3k (SD 17.6k). In the base-case analysis, if in-hospital advance care planning and ICU-based palliative care consultation were systematically provided, we estimated a mean reduction in ICU costs of 2.8k (SD 14.5k) per patient and an ICU cost-savings of 25%. Among the simulated patients who utilized the ICU, the receipt of both interventions could have resulted in ICU cost savings of 1.9 billion, representing a 6% reduction in total hospital costs for these patients.

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Supplemental Digital Content: Online text document contains additional details regarding model specifics.

Conclusions—In-hospital advance care planning and palliative care consultation have the potential to result in significant cost-savings. Studies are needed to confirm these findings, but our results provide guidance for hospitals and policy-makers.

Keywords

End-of-life care; palliative care; ICU utilization; economics

Introduction

Caring for critically ill patients with a high risk of death in the intensive care unit (ICU) involves complex decision-making on the part of both providers and families. Communication strategies aimed at facilitating decision-making processes for patients and surrogate decision-makers have shown an improvement in patient and family emotional outcomes (1). The goal of interventions that target increasing the frequency and quality of communication about end-of-life care is to ensure that care remains patient-centered and is respectful of individual preferences and values (1-3). These interventions include advance care planning (ACP) and both “primary” and “specialty” palliative care (4). Primary palliative care is care provided by all clinicians caring for patients with serious illness while specialty palliative care is provided by palliative care specialists, including physicians, nurses, social works and others (4). For the purpose of this study, we consider interventions such as ethics consultation and routine ICU family conferences to be a form of primary palliative care because they are designed, in part, to improve communication between clinicians and family members. We use the term “palliative care” inclusively to refer to both “primary” and “specialty” palliative care.

In this context, there is evidence to suggest that providing patient-centered care for patients with chronic and serious illness can lead to a reduction in intensity of care near the end-of-life. For example, there is evidence that ACP early during an acute care hospitalization can reduce ICU admissions (5, 6) and that proactive early palliative care consultation in the ICU can reduce the length of stay (LOS) for patients who die in the ICU (1, 7-13). However, despite this evidence, eliciting and implementing patients' values and preferences for end-of-life care in the ICU has proven difficult in actual practice(14, 15).

To help payers and policymakers guide resource allocation for primary and specialty palliative care programs, evidence from economic evaluations is important (16, 17). The degree to which cost-savings could result from patient-centered care at the end-of-life remains unknown and continues to be a topic of debate (18, 19). The objective of this study is to estimate the potential ICU cost-savings, from a hospital system perspective over a 1-year time horizon, that may result if in-hospital ACP and ICU-based palliative care interventions for patients with serious life-limiting illness were standard of care. We chose to focus on in-hospital ACP and palliative care interventions because these interventions have the most compelling data supporting cost reductions.

Methods

Data and eligibility criteria

Data are from patients seen in hospitals participating in the Premier network from 2008-2012. Premier is a national alliance of over 2,000 community-based hospitals that operates a detailed clinical and financial database. Hospitals with varying structures and models of care electively participate in the Premier alliance. Patients can be tracked with a unique patient identifier throughout multiple inpatient admissions within participating hospitals.

We identified a cohort of adult patients with chronic life-limiting illness considered to be at high risk of death using criteria that have been previously identified (10, 13, 20, 21) (Table 1). We excluded patients with the DRG (Diagnosis-related group) upcode associated with palliative care (V66.7; 4.3% of patients) and assumed the remaining patients did not receive palliative care interventions. The first hospital admission during which a patient met one of the qualifying criteria was considered the index event and we examined patients' ICU and hospital resource utilization over the following 12 months.

Decision analytic model

Decision analysis is an approach for assessing the relative value of different decision options when data from randomized trials are limited. In this form of analysis, a model is built that simulates patients' decisions and outcomes. This Markov microsimulation model starts with initial or “default” values that replicate the patterns of ICU utilization and costs documented in Premier data. Using estimates of the effectiveness of ACP and palliative care interventions from the literature, we then alter the parameters of the model to simulate ICU utilization, and their corresponding costs, relevant to these interventions. For example, we were able to simulate patient trajectories if ACP were standard of care by decreasing the probability of using the ICU during a given hospitalization from the observed level in the Premier data. We also simulate trajectories if routine palliative care consultation in the ICU were standard of care for these patients by decreasing ICU LOS from that observed in the Premier data. In this type of stochastic model, patient care trajectories only depend on the patient's current state (hospital, ICU, death), and not the entire sequence of care that preceded it. We included one deviation from the Markov model assumptions—only the first three times each intervention was offered were considered potentially effective. Refer to Section A in the online supplement for additional details regarding model specifics and Section F for more details on modeling limitations.

Figure 1 shows the basic flow of patient care during the 12 months following index hospitalization. After becoming eligible for entry in our cohort, patients experienced some combination of ICU admissions, hospital readmissions, and deaths. We estimated the fraction of patients in each trajectory using empirical proportions.

For each distinct patient trajectory, we required estimates of the distributions of ICU LOS, ICU costs, and ICU costs relative to acute care costs. We used the actual Premier data to estimate distributions of costs and to estimate the care trajectories under standard care. Flexible parametric distributions were used to estimate distributions of costs and LOS, while empirical proportions were used to estimate care trajectories. The size of the Premier sample allowed us to estimate relevant quantities with a high degree of precision. Estimates of the proportion of patients in each distinct patient trajectory are displayed in Tables E1 and E2, along with estimates of the distribution of ICU LOS (Table E3), marginal costs savings of ICU days relative to acute care floor days (Table E4), and total ICU costs (Section E). We show a comparison of these estimates of distributions to the actual data observed in Premier in Figures E1-E3.

Effect of interventions

Our primary interest was assessing cost savings if ACP and/or palliative care consultation were routine practice. Using our model for patient flow based on the observed Premier data, we simulated the effect of these interventions and examined cost savings across a range of efficacies for both in-hospital ACP and ICU-based palliative care consultation. In our base-case model for the intervention arm, we assumed that all eligible patients received ACP or palliative care consultation (100% penetration). The efficacy of these interventions for the base-case model was estimated from a systematic review of available published data (22). In-hospital ACP was estimated to reduce ICU admissions by 37% for all patients. Each patient was randomly assigned a palliative care consultation effectiveness assuming a reduction in ICU LOS from a normal distribution with the mean of 26% (SD: 23%). Recognizing that the literature from which we obtained our estimates is limited, in addition to our base-case model, we examined cost savings across a range of penetrations and intervention efficacies (zero effect to 25% more effective).

We simulated the effect of ACP by “offering” the intervention to eligible patients at the time of index hospital admission (56.5% of patients were admitted directly to the ICU and considered ineligible to receive in-hospital ACP). For patients offered ACP, in the base-case, 37% of patients were randomly selected to have a reduced probability of a subsequent ICU admission. If a patient is readmitted to the hospital or transferred back to acute care after an ICU admission, they are again eligible to receive in-hospital ACP for up to 3 acute care admissions. After the third admission, we assume ACP has no additional effect. Each time an ICU admission is avoided due to an ACP intervention, we assume that LOS is constant, only the location of care changes from the ICU to acute care and we calculate the cost savings as the marginal difference between ICU days and acute care days for that patient.

We simulated the effect of palliative care consultation by “offering” the intervention to patients at the time of ICU admission. Consider a patient who under usual care is admitted to the ICU and has a LOS of 10 days. After receiving a palliative care consultation at the base-case 26% efficacy, this patient's LOS would be reduced to 7.4 days and we would calculate cost savings due to palliative care consultation as the marginal difference between 2.6 days in the ICU versus acute care for a patient who survived their ICU stay. For the patients who die in the ICU, the cost saving is calculated as the total ICU costs for the reduction of days in the ICU. We again assumed that the randomly assigned effect of palliative care consultation (based on normal distribution with mean 26% (SD 23%)) would be the same on the second and third ICU admissions and after the third ICU admission there would be no effect. In accordance with Markov assumptions, each subsequent hospitalization and receipt of intervention was independent of previous hospitalizations and ICU use. Additionally, based on limited literature, we made the assumption that the intervention was only 1/3 as effective in reducing LOS for patients who survived their ICU stay, compared to patients who died in the ICU (11, 13).

Sensitivity Analyses

We explored cost savings due to ACP and palliative care consultation across a range of efficacies in survivors. In addition, since previous studies suggest that the primary mechanism for reducing ICU LOS and ICU costs is likely earlier decisions to withdraw life-sustaining treatments (7, 8, 12, 23), we hypothesized that selecting a more targeted population with a higher mortality may have a significant impact on overall cost-savings by decreasing the number of ICU days. To explore this, we performed a sensitivity analysis varying the probability of death during any hospital admission.

Costs in all analyses were adjusted for inflation and reported in 2013 U.S $. All costs represent actual costs, not charges. The models were constructed using STATA statistical software, version 12.0 (StataCorp., College Station, TX) and results were summarized using R 3.0.0 (www.cran.r-project.org). Results are based on three million simulated patients; this sample size gave us estimates of cost savings with negligible variation due to Monte Carlo sampling. The research use of non-identifiable, coded Premier data was conducted in compliance with University of Washington policy and did not require IRB review or approval.

Results

Characteristics of patient sample

We identified 2,097,563 patients who met one or more of our inclusion criteria between 1/1/2008 and 12/31/2011 (Table 1). Forty-two percent of patients were older than 80; 28% of patients were ≥ 65 years old with end-stage renal disease and roughly 18% had a previous stroke or COPD requiring prior hospitalization. Sixty-seven percent of patients were admitted through the emergency department. The mean age was 73 years (SD 14); 47.5% of the cohort was male, and 68% were white. Overall, 6.2% of patients had a recorded in-hospital death within a year of index hospitalization (Table 2).

ICU utilization and costs

Of patients meeting our inclusion criteria for chronic life-limiting illness or advanced age with acute illness, 657, 825 (31%) utilized the ICU during the 1-year time horizon; mean ICU spending per patient was 11.3k (SD 17.6k). Mean number of ICU admissions per patient was 1 (SD 1). Mean number of days spent in the ICU during the 1-year time horizon was 7 (SD 10). Of patients utilizing the ICU, 11.5% died in a Premier hospital - 9.4% in acute care, 2.1% in the ICU.

Overall, 23.8% of patients had an ICU admission during their index hospitalization; 2.5% of these patients died in their first ICU stay, while 97.5% were discharged to acute care. Of those discharged to acute care, 86.1% were discharged from the hospital and 13.9% went back to the ICU during this first hospital admission.

Simulation results

Figure 2 displays the results of our analysis varying the efficacy of the interventions. At base-case efficacy, if both ACP and palliative care consultation were systemically provided to all eligible patients, on average $2.8k per patient could be saved; this represents an ICU cost-savings of 25% (Panel A). If only in-hospital ACP were offered, these patients would save on average $1.8k (cost savings 16%). If only ICU-based palliative care consultation were offered, these patients would save an average of $1.3k cost savings (12%). At our most optimistic efficacy projections (46.3% ACP efficacy, 32.5% palliative care efficacy) total cost savings were about $3.4k (30%). Even if ACP only reduced ICU admissions by 9.3% and palliative care consultation reduced ICU LOS by 6.5%, we still estimate a cost savings of $800 per patient (7%). The cost savings over the entire sample of patients meeting inclusion criteria is shown in Panel B.

We also report results of varying the penetration at random of ACP and palliative care consultation (number of eligible patients who actually receive the intervention) in Supplemental Figure E4. Although these results are equivalent to varying the effectiveness of the intervention, this interpretation may be important from a system's perspective.

Among patients who utilized the ICU under usual care, the receipt of both interventions would have resulted in ICU cost savings of $1.9 billion over 1 year, representing a 6% reduction in total inpatient costs ($33.7 billion) for these patients. These interventions could theoretically cut total ICU costs ($16.8 billion) by an estimated 11% per year for the hospitals participating in the Premier system.

Sensitivity Analyses

In our base-case analysis, the effectiveness of the palliative care consultation intervention was 1/3 as effective in survivors as in patients who die. Cost savings when this differential efficacy is varied are displayed in Figure 3. For interventions including both in-hospital ACP and ICU-based palliative care consultations, cost-savings for patients utilizing the ICU under usual care ranged from $2.1k to 4.3k (Panel A). Similar results for all patients meeting inclusion criteria are shown in Panel B.

We also varied the 1-year mortality of the underlying target population to assess its influence on cost-savings. If the mortality was ½ of what was observed in our Premier sample, the savings were $2.76k per patient utilizing the ICU; for mortality 3× higher, the savings were $2.92k per patient.

Discussion

Our findings demonstrated four key findings: (1) based on available estimates of intervention effects, a savings of $2800 per patient, (representing 11% of all ICU costs and 25% of ICU costs for eligible patients utilizing the ICU), can theoretically be achieved through systematic offering of in-hospital ACP and ICU-based palliative care consultation;

(2) varying the effectiveness of these interventions gives us a range of savings from $3.4k to $800 per patient; (3) as a single intervention, in-hospital ACP is more effective in reducing overall costs when compared to palliative care consultation in the ICU, although both appear to reduce costs; and (4) varying the mortality of the target population did not lead to a significant decrease in overall savings but did lead to modest variation in savings on a per-treated patient basis. These findings suggest that, among hospital-based interventions, ACP and palliative care consultation have the potential to improve the quality of care for patients with life-limiting illness while simultaneously reducing high intensity care and associated healthcare costs. Our findings also provide estimates of the potential magnitude of these costs savings. Our results are consistent with previous findings that preventing an ICU admission all together is more effective in saving costs than reducing the ICU LOS (24), suggesting that ACP early in the course of a hospitalization has the most potential for cost-savings. While the importance of this magnitude of cost-savings to healthcare policy experts is a subjective assessment, these data can help to answer whether or not in-hospital ACP and ICU-based palliative care interventions can pay for themselves through hospital cost-savings.

The United States spends greater than $80 billion on critical illness per year, representing 3% of total health care spending (25). If the greater than 2,000 hospitals that opt to participate in the Premier network are representative, our results can be extrapolated to potential national savings of $8.8 billion (11%) in ICU cost-savings system-wide over 1 year. While this may be modest savings compared to the nearly $3 trillion spent on healthcare annually in this country (26), it is important to recognize that no single intervention is going to solve the healthcare spending crisis. Interventions that improve the quality of care, such as ACP and palliative care consultation, while reducing unwanted expensive medical care, should receive increased attention. These interventions seek to individualize care, matching medical care to treatment preferences of informed patients and their families. Prior studies have demonstrated mismatches between patient preferences and care delivered (27); these interventions aim to close that gap and have demonstrated improved quality of life and mood (28).

We emphasize that the primary rationale for these interventions is to improve quality of care and improve patient and family outcomes. However, recognizing that hospital and payer resources are limited, decisions regarding where and how to allocate resources can be influenced by economic consequences. Estimating the cost-savings for ACP and palliative care interventions has been challenging for a variety of reasons, including: 1) estimates of intervention effects on utilization from the literature have wide variation with significant uncertainty; 2) extremely large sample sizes are needed to accurately assess costs; and 3) retrospective decedent analyses may be confounded by indication bias and limited in that we cannot accurately predict who will die (29). We attempted to address these challenges by using decision analysis to model cost-savings from the hospital perspective if these interventions were standard of care. In developing this model, we addressed many of the concerns regarding economic evaluations pertaining to reducing ICU costs (17, 19). First, we performed a non-decedent analysis by identifying a broad cohort with serious illness or advanced age with acute illness and tracking utilization for 1 year after. Second, we applied differential effects for survivors and decedents, recognizing that the main mechanism of action for reducing costs with palliative care consultation in the ICU is likely earlier withdrawal of non-beneficial or unwanted life-sustaining therapies. In addition, we used actual costs, rather than charges, and accounted for the marginal savings of reducing ICU LOS and replacing it with acute care days for ICU survivors. We also accounted for variability in ICU costs by day of stay and selected a national sample to avoid the limitation of regional variation in ICU utilization (30).

Limitations

We acknowledge that our approach has several limitations. First, we recognize that the systematic review from which we based the magnitude of intervention effects for the base-case is limited by the quality and number of original studies. Furthermore, we acknowledge that estimates obtained from observational studies may introduce bias if patients who agree to these interventions are more likely to limit life-sustaining interventions. This, however, is a reflection of the current state of the literature. For this reason, we conducted multiple sensitivity analyses varying the effect of the interventions, including the effect on survivors, to provide a range of potential cost-savings. Second, the estimates of cost-savings do not account for the costs of implementing ACP or palliative care programs; to our knowledge, robust estimates for these costs are not available. The range of cost-savings we provided, however, can help guide providers, payers and policymakers regarding the margin of savings that are possible given the costs of implementing a robust palliative care program in a particular hospital. Third, in the Premier database, we were unable to identify all patients who may have had a palliative care consultation or ACP and therefore may be underestimating the potential cost savings by assuming all patients received “usual care” without these interventions. Furthermore, we were unable to determine if a patient died at home or in a hospital that is not part of the Premier network; thus, our mortality may be lower than expected based on our inclusion criteria. The potential savings we report are therefore likely to be conservative estimates. Fourth, our model only addresses in-hospital ACP and ICU-based palliative care consultation and may under-estimate the potential benefits of outpatient or community-based programs. We chose to focus on in-hospital ACP and palliative care interventions because these interventions have the most compelling data supporting cost reductions, although application of these interventions in the outpatient or community setting could potentially have a significantly greater impact and should be the focus of future studies. Fifth, the derivation dataset is based on patient trajectories, outcomes and costs during the sampling period. Medical care, disease-specific life expectancy and healthcare costs change over time and thus the accuracy of these microsimulation results may decrease over time. Sixth, we recognize that our assumption about the effectiveness of interventions over time may bias cost estimates upward or downward. Our sensitivity analysis around the effectiveness of the ACP and palliative care interventions overall can give an estimate of the cost savings if the interventions became progressively more or less effective. (See Section F in the online supplement for additional details.) Lastly, we designed this model for a 1-year time horizon. Future research will require extending the time-horizon to understand the true impact of fixed and variable costs. One argument for lack of savings in the ICU is the high proportion of fixed costs that are not saved when bed occupancy is reduced; however, over a long enough time horizon, fixed costs can become variable costs by reducing growth in ICU-bed and ICU-staffing needs (19).

Establishing the true efficacy of these interventions will require large randomized trials and other experimental designs, aimed at developing personalized treatment goals that maximize quality of life and care, while minimizing costs. In the meantime, our modeling of the potential cost-savings from in-hospital ACP and palliative care consultation can help inform providers, payers, hospital administrators and policymakers about the utility of investing resources in developing these interventions to improve the quality of end-of-life care.

Conclusions

Advance care planning and palliative care consultation have been associated with improved quality of care for patients with serious and life-limiting illness. The results of our model suggest that systematically offering these interventions to patients with serious and life-limiting illness has the potential to reduce hospital costs for payers and hospital networks. Based on the current literature, our analysis estimates that the savings could entail 11% of all ICU costs and 25% of the ICU costs for patients with chronic, life-limiting illness, or age over 80 years, who utilize the ICU. These results would extrapolate to potential national savings of $8.8 billion over 1 year. Future studies are needed to investigate the optimal structure for integrating ACP and palliative care interventions into routine practice and the associated costs of these programs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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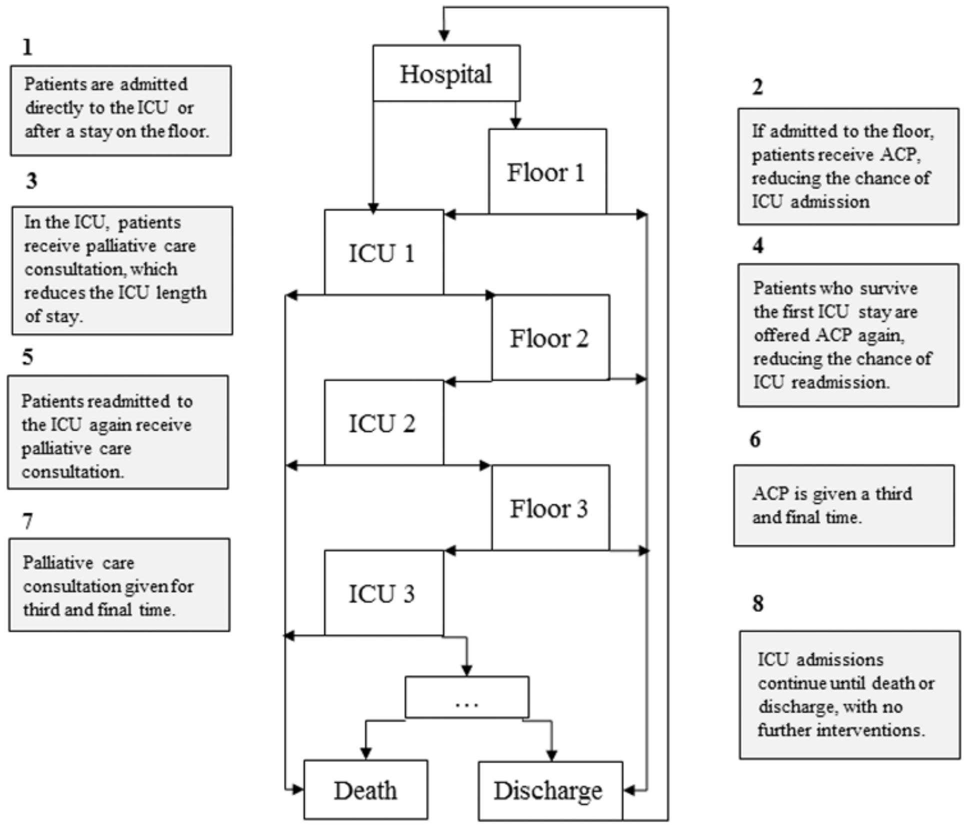

Figure 1.

Trajectory of patient care during 12 months following index hospitalization. Patients experienced a combination of acute care floor and ICU admissions. Gray boxes indicate potential points of intervention.

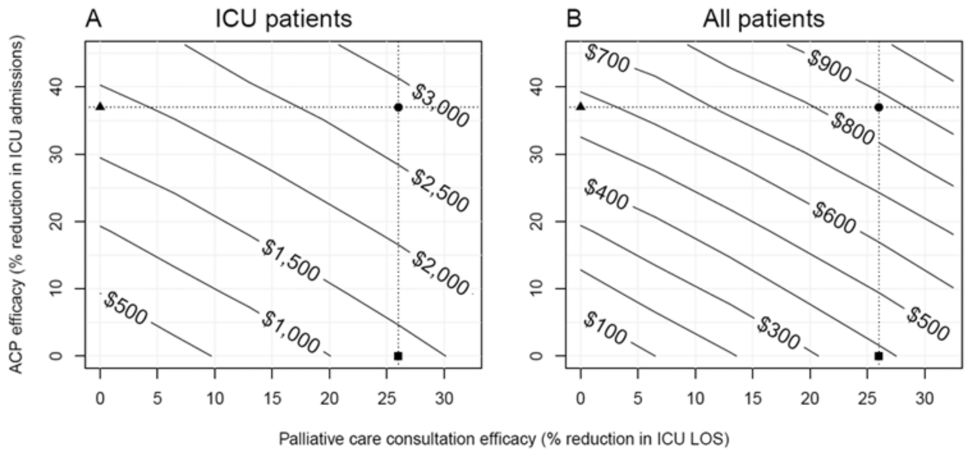

Figure 2.

Cost-savings as a result of varying the efficacy of the interventions. For a given % reduction in ICU length of stay and a given % reduction in ICU admissions relevant to palliative care consultation and ACP, respectively, the intersection point estimates cost-savings per patient. Dotted line: base-case efficacy (37% for ACP and 26% for palliative care consultation), intersection point represented by dot = $2800 saved per patient; Triangle = cost-savings when palliative care is not effective and Square = cost-savings when ACP not effective; Panel A: Sample of patients utilizing the ICU in 12 month time-horizon; Panel B: Savings spread across entire sample of 2,097,563 patients meeting inclusion criteria in Premier database.

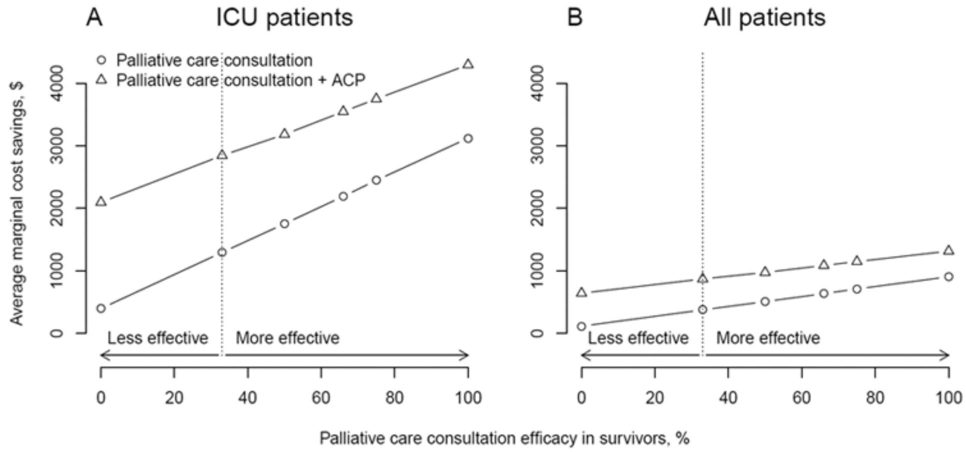

Figure 3.

Cost-savings as a result of varying efficacy of interventions in survivors. Dotted line: base-case efficacy of 1/3 as effective in survivors as decedents. Arrows indicate direction for more or less efficacy in survivors. Panel A: Sample of patients utilizing the ICU in 12 month time-horizon; Panel B: Entire sample of 2,097,563 patients meeting inclusion criteria in Premier database.

Table 1

Inclusion criteria

Criteria[a]	**N (%)**
Advanced Cancer[b]	161,677 (7.7)
Congestive Heart Failure[b]	299,400 (14.3)
Advanced Liver Disease[b]	53,791 (2.6)
COPD[b]	393,310 (18.8)
Stroke[b]	386,216 (18.4)
Advanced Dementia[b]	158,142 (7.5)
ICU admission following stay in hospital regular ward for ≥ 10 days	39,197 (1.9)
Age ≥ 80 AND ≥ 2 life-threatening comorbidities[c]	655,620 (31.3)
Patient suffered a cardiac arrest	95,164 (4.5)
Diagnosis of intracerebral hemorrhage (ICH) requiring mechanical ventilation	2,572 (0.1)
End stage renal disease AND diabetes mellitus	94,825 (4.5)
End stage renal disease AND age ≥ 65	577,803 (27.6)
ICU length of stay ≥ 10 consecutive days	114,703 (5.5)
≥ 2 ICU stays during the same hospitalization	67,922 (3.2)
Age ≥ 80 years old	873,917 (41.7)

[a]As reflected in the N (%), these groups are not mutually exclusive. Index admission was considered the first hospital admission in which 1 of these criteria were met; patients may meet criteria for multiple categories.

[b]In addition to the index admission, patients had 1 additional hospital admission in the preceding 6 months OR 1 ICU admission in the preceding 12 months with the same diagnosis.

[c]Life-threatening comorbidities include: Advanced cancer; Congestive heart failure; Advanced liver disease; COPD; Stroke; Advanced Dementia; End Stage Renal Disease

Table 2

Sample characteristics

Characteristic	All Subjects (N=2,097,563)	ICU utilization[a] (N=657,825)	No ICU utilization[a] (N=1,439,738)
N(%)			
Age, mean ± SD	73 ± 14	69 ± 16	74 ± 13
Male Gender	996,808 (47.5)	342,339 (52.0)	654,469 (45.5)
Race			
White	1,427,313 (68.0)	438,237 (66.6)	989,076 (68.7)
Black	258,875 (12.3)	83,355 (12.7)	175,520 (12.2)
Hispanic	78,551 (3.7)	24,543 (3.7)	54,008 (3.8)
Other	332,824 (15.9)	111,690 (17.0)	221,134 (15.4)
Admission type			
Emergency	1,410,908 (67.3)	442,163 (67.2)	968,745 (67.3)
Urgent	335,965 (16.0)	98,544 (15.0)	237,421 (16.5)
Elective	333,922 (15.9)	108,165 (16.4)	225,757 (15.7)
Trauma Center	10,080 (0.5)	6,399 (1.0)	3,681 (0.3)
Other	6,688 (0.3)	2,554 (0.4)	4,134 (0.3)
In-hospital death	131,528 (6.2)	75,429 (11.5)	56,099 (3.9)
Died in ICU	13,892 (0.7)	13,892 (2.1)	N/A
Quan single summary score, mean ± SD	3.39 ± 2.27	3.43 ± 2.34	3.38 ± 2.23
Hospital admissions*, med (IQR)	1 (1,2)	2 (1,3)	1 (1,2)
mean ± SD	2 ± 2	2 ± 2	2 ± 1
Hospital days[a], med (IQR)	10 (5-20)	17 (9-30)	8 (4-15)
mean ± SD	16 ± 18	24 ± 23	12 ± 13
ICU admissions[a], med (IQR)	0 (0- 1)	1 (1- 2)	N/A
mean ± SD	0 ± 1	1 ± 1	N/A
ICU days[a], med (IQR)	0 (0- 1)	4 (2- 9)	N/A
mean ± SD	2 ± 6	7 ± 10	N/A
Inpatient costs[a], med (IQR)	15.6 (7.3,33.7)	35.2 (17.9,64.4)	11.2 (5.8,21.6)
mean ± SD	28.3 ± 41.1	51.3 ± 58.5	17.8 ±23.3
ICU costs[a], med (IQR)	0 (0, 1.9)	5.4 (2.3,13.4)	N/A
mean ± SD	3.5 ± 11.2	11.3 ± 17.6	N/A
At least one intensive therapy day[b]	313,239 (14.9)	313,239 (47.6)	N/A
median (IQR) [c]	2 (1, 4)	2 (1, 4)	N/A
mean ± SD[c]	4.7 ± 9.5	4.7 ± 9.5	N/A

[a]In 12 months following index hospitalization

[b]Intensive therapies include mechanical ventilation, renal replacement therapy and/or artificial nutrition

[c]Among subjects with at least one intensive therapy day