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Fiscal Analyses for Inpatient Palliative Care Programs in Public Hospitals

Authors: J. Brian Cassel, Health Services Researcher, Virginia Commonwealth University; and Kathleen Kerr, Partner, Transforming Care Partners

The primary purpose of inpatient palliative care (IPPC) is to improve care for people with serious illness by providing an additional layer of support for patients, families, and hospital staff dealing with challenging circumstances; reducing pain and other symptoms; and improving communication about prognosis and clarifying goals of care. Another benefit of IPPC is that it often reduces the costs of hospital care. According to a recent meta-analysis, IPPC consultation was associated with an average reduction of 28% ($3,237) in hospitals' direct cost of care per hospital stay.[1] That study analyzed data on more than 130,000 hospitalizations from 10 community and academic hospitals, capping two decades of research on hospital-based palliative care.

Intended Audience

This document provides detailed, technical guidance for several analyses that can be used to quantify the economic outcomes of an IPPC service. The intended audiences are the health system data / financial analysts who will conduct the analyses, and the IPPC clinical leaders who will partner with analysts to verify the scope of work and assist with interpreting results. There are sections that refer to fields in billing and administrative data, financial measures, and methods for manipulating data — some of which may be unfamiliar to many clinicians. The goal is not for IPPC clinical leaders to develop the expertise needed to conduct these analyses. Rather, clinical leaders should aim to understand the broad strokes of the analytic approaches, with enough depth to make the case that the findings are a reliable representation of IPPC service outcomes.

Preparatory Tasks

Before initiating any analyses, it is strongly recommended that you do some exploratory assessments to verify goals and that the needed data are ready to be analyzed.

- **Have multiple conversations** that include palliative care leaders, data analysts, finance leaders, and others who have asked for or will be interested in your palliative care program outcomes. Clarify the goals and expectations ahead of time, as well as the time frame or urgency of the analyses. Who will interpret the findings? How will they be used in making decisions? Do stakeholders only want to see that your IPPC program's impact is in the same general direction as published findings, or is a specific return on investment expected? You can also use these conversations to voice a preference or expectation that the financial findings will be presented alongside case vignettes and other evidence of the value of palliative care, such as the impact on health outcomes and patient experience of care.
- **Conduct preliminary, descriptive analyses** of IPPC consultation data including the number that were initiated early in a hospitalization (admission day or subsequent two days), later in the hospital stay, and the number ending in death. Conduct analyses of the frequency of consultations to ensure your data have no unexpected spikes or drops in PC consultation volumes per month that may be due to missing or messy data.
- **Understand what kinds of cost data are available.** Some hospitals have cost accounting software that can quantify direct, indirect, fixed variable, direct variable, and total costs for every single item

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used in a hospital stay. Other hospitals may have some but not all these data. Some hospitals do not have cost accounting systems and instead use a charge-to-cost ratio to estimate costs. It is important to understand which data are available, as that will dictate which types of analyses are possible. However, do not worry if your hospital has limited data (for example, only has charges): The granularity of analyses used to assess PC program outcomes will be no better or worse than other fiscal analyses done at your hospital.

- **Assess availability of cost components** as needed. If you are going to conduct some financial analyses only on purchased/consumed cost components such as pharmacy, labs/pathology, supplies, etc., you need to create a sum of those kinds of costs for each PC and non-PC case (for cases included in the Early-PC analysis), or for the days before and after the PC consultation (for cases included in the Later-PC analysis). This will typically require using specific ranges of revenue codes / Uniform Billing Codes. Your cost accounting system may already categorize expenses in this way.

Overview of Analyses

There are three analyses that could be conducted to capture the financial impact of an inpatient palliative care program. The first two are conducted on two different subsets of IPPC recipients and the cost savings from the two can be added together to estimate total program fiscal impact. The third analysis is confirmatory and serves only to validate findings from the other analyses.

- **Analysis #1: Early-PC.** An evaluation of the costs and length of stay (LOS) for the hospitalization, comparing cases where PC was involved within the first three days of hospital stay (day of admission or in first two full days of stay) to matched controls where PC was not provided at any point in the hospital stay. This rigorous, between-patients approach is similar to that used in the meta-analysis mentioned above. The most challenging part of this analysis is producing the best possible match between patients who received PC and the subset of nonrecipients most similar to the recipients.
- **Analysis #2: Later-PC.** An evaluation of the costs per day before and after PC consultation, for cases where PC was initiated later in the stay. This within-patient analysis captures the effect of PC for those PC recipients excluded from Analysis #1. The most challenging part of this approach is getting day-by-day cost data for the hospital stay — not the average per day, but the exact costs per day, which change every day.
- **Analysis #3: Validating Analysis.** A confirmatory evaluation of the costs in the final days of the hospital stay for people who die in the hospital, comparing cases where PC was involved to those without PC. Like Analysis #1, this uses a between-patients approach, but here matching is easier because all patients had the same clinical outcome of death during that hospitalization. And like Analysis #2, this focuses on the per day costs of the stay.

Findings from Analysis #1 and Analysis #2 would be added together to generate an estimate of IPPC cost savings. (Findings from Analysis #3 would just serve to validate Analysis #2 findings.) If any of the above scenarios do not fit your program's experience, or the data are unavailable, you would not conduct the corresponding analysis. For example, if PC team involvement for all your patients began in the emergency department (ED) or on hospital day one, you would skip Analysis #2 (Later PC). Or if you cannot produce a good match between PC recipients and nonrecipients, you would skip Analysis #1 (Early-PC).

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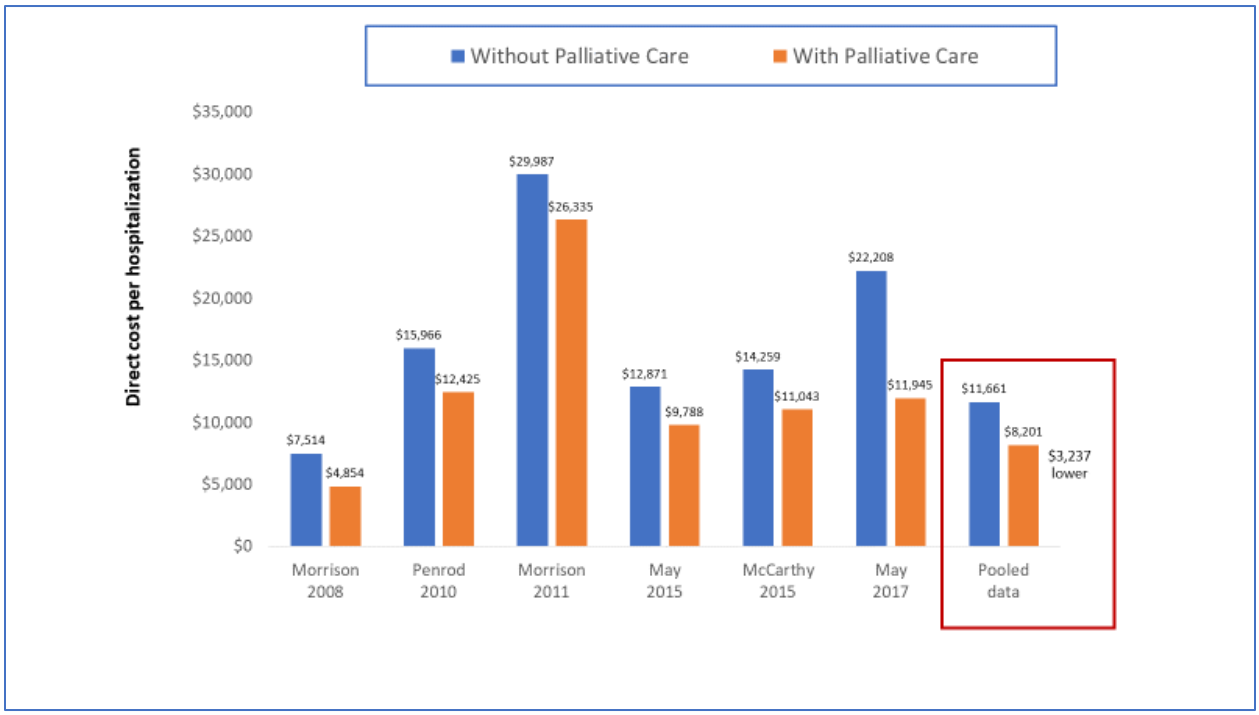
Analysis #1: Early-PC

This analysis focuses on the subset of hospital stays where PC was involved early — on the day of admission or the following two full days. Assessment of the entire hospital stay is appropriate because the PC team was involved early in the stay, meaning there was no extended pre-PC period. The figure below is from the results of the 2018 meta-analysis, which examined the economic impact of early PC.[2]

Figure 1. Hospital Costs Lower with Inpatient Palliative Care – Results of a Meta-Analysis



Source: Adapted from Peter May et al., "Economics of Palliative Care for Hospitalized Adults with Serious Illness: A Meta-Analysis," *JAMA Internal Medicine* 178, no. 6 (June 1, 2018): 820–29.

General Notes on This Method

- **Include the day of ED visit.** If the PC team does consultations in the ED, treat the day of the ED visit as the day of admission. These cases will be included in the analysis, along with cases where the first PC consult occurred on the day of admission (regardless of admission source) or during the following two full days.
- **Focus on acute stays.** "Observation" and subacute stays (hospice, psychiatry, rehab) are typically excluded.
- **Focus on adults.** If the PC team consults with children only rarely (relative to adult volume), then exclude infants, children, and adolescents from the analyses.
- **Focus on PC-appropriate populations.** If the PC team never consults on certain patient populations, then those populations can be excluded from the potential control group. For example, if the PC team does not consult in Labor and Delivery (L&D), then exclude L&D cases from the pool of potential controls.
- **Include both LOS and costs as outcomes.** Because the whole stay is being evaluated, both LOS and costs can be used as outcomes. While highly correlated, the interpretation of the two is somewhat

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different; the total impact of IPPC on the use of hospital bed days over a year has implications for resource availability.

- **Match within the facility.** If your IPPC operates in multiple sites (for example, your system has three hospitals and you operate an IPPC service in each of them), the matching of PC cases and usual care cases should be done within the facility first. It would be fine to pool findings across sites when describing results.

Creating the Matched Control Group

Palliative care recipients are usually quite different than others in the hospital in terms of their advanced disease, symptoms, complexity of decisionmaking, and other factors not visible in billing and administrative data. Therefore, appropriate methods must be used when creating a matched control group to try to compensate for the inherent differences between PC recipients and nonrecipients.

Researchers working in this area have mostly used propensity-based matching or weighting to construct a good comparison group. See studies by Garrido and May for descriptions of methods.[3] The goal is to use *baseline* characteristics to create well-matched samples of recipients and nonrecipients. Propensity scores reduce multiple variables into a single score representing the likelihood that a patient would have received treatment. The propensity for treatment is derived from a logistic regression analysis where receiving treatment (yes or no) is the dependent variable, and predictors are drawn from data known about the patients at baseline. Using propensity scores, recipients of IPPC and nonrecipients are matched or weighted according to *baseline* similarity (*before* admission, though some allow data from day of admission).

Table 1 describes typical variables from health system data that could be used for matching, including demographics, primary disease, comorbidities, prior hospital use, and the like.

Table 1. Categories of Potential Variables for Propensity Scores

Category	Specifics	Notes
Demographics	Age (or age bands), race, ethnicity, sex, insurance type, socioeconomic factors.	You may need to try different kinds of categorization (e.g., narrower vs. wider age bands) as part of the iterative process of balancing treatment and comparison groups.
Primary Disease	Cancer, COPD, CHF, liver disease, kidney disease, dementia and other neurodegenerative, or other serious, life-limiting illnesses.	While many patients will have multiple PC-relevant diseases, it should help to determine the predominant disease. For the index hospital stay, this may be driven by the primary diagnosis or primary attending specialty. Where historical data can be included, tally the charges or other utilization measure by primary diagnosis across past inpatient and ambulatory encounters.
Comorbidities	Accounted for by using the Charlson index, Elixhauser index, or similar.	Comorbidities can be drawn from the secondary diagnoses on the index hospitalization, or from prior encounters.

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Category	Specifics	Notes
Trauma	Flag for physical trauma (accidents, violence, etc.).	Trauma patients may be a distinct group of PC-relevant patients who often have no underlying serious, life-limiting illness such as cancer.
New vs. Established Patients	Flag for whether historical data on this patient are available.	Some serious-illness patients may be coming to this hospital for the first time for this index hospitalization. In those cases, information about prior hospitalizations should be noted as missing rather than zero.
Prior Hospitalizations or Hospital Days	Count within past 6 months, 12 months, or other timespan.	If historical data are available from health system or payer, tally the prior hospitalizations or hospital days. You should compute several kinds of tallies (time windows, number of hospitalizations vs. number of days, >0 hospitalizations vs. "0, 1–2, 3–4," etc.) to explore as part of the iterative process of balancing treatment and comparison groups.
Prior PC, Hospice, POLST, DNR, or DDNR	Flag(s) for whether patient had previously used or been referred for palliative care or hospice or other indicators of serious/advanced disease.	To the extent available, hospital data could indicate whether the patient had previously been in PC, hospice, or referred for such, as well as prior DNR status, or cross-setting code status order such as POLST or DDNR.
Clinical Data (labs, pharmacy, etc.)	May include biometrics (e.g., very low BMI), certain lab values (e.g., albumin, creatinine, hemoglobin), polypharmacy, etc.	Although delving into these kinds of data may be fruitful in identifying indicators of functional decline and advanced disease, it can also take many hours to acquire, prepare, analyze, and interpret such data and their relevance to palliative care. You may wish to focus only on variables where the hospital EMR can offer simple counts (such as number of medications on admission).
Special Conditions (e.g., COVID-19)	Flag for presence or absence.	You may want to flag patients for specific acute, life-threatening conditions of interest that could be associated with the use of life-sustaining treatments even in the absence of cancer or similar chronic, progressive, life-limiting diseases. This can include COVID-19 as well as other conditions of interest, such as physical trauma.

Source: Developed by authors.
Notes: *BMI* is body mass index; *COPD* is chronic obstructive pulmonary disease; *CHF* is congestive heart failure; *DNR* is do not resuscitate; *DDNR* is durable do not resuscitate; *EMR* is electronic medical record; *POLST* is Physician Orders for Life-Sustaining Treatment.

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Creating a well-matched comparison group usually requires several repetitions of the steps — recategorizing or dropping predictor variables, checking balance of groups, assessing cases dropped — to achieve adequate (though imperfect) balance between PC recipients and nonrecipients. One challenge of this process is to create an adequate matched control group without dropping many (if any) PC recipients from the analysis.

Once propensity scores are created, they can be used in three slightly different ways to construct a comparison group. One option used in several palliative care studies is to allow multiple nonrecipients to be matched to each recipient. For example, in the Sharp HealthCare study, most PC recipients were matched to three nonrecipients.[4] Another option is to match 1:1, which has been done in the study of the Sutter Advanced Illness Management program.[5] A third option is to use propensity weighting, which retains more nonrecipients and simply assigns them a lower weight in the analyses. The weighting approach was used in the previously described meta-analysis of inpatient palliative care.[6] For guidance on the complex question of which of these three approaches to use, see the 2014 paper by Garrido.[7] Any of the described options could be used. The number of cases available in the intervention and comparison populations will likely dictate the method selected (i.e., if there are very few matching comparison cases, a 1:1 matching or weighting approach may be favored over a many-to-one approach).

Upon review of the above methods, you may be concerned about the resources, expertise, and time needed to produce a reasonably well-matched comparison group. That would be a valid concern; discuss this issue with stakeholders early in the process. If your hospital lacks the analytic resources needed, consider using published outcomes as a proxy for estimated impact, or unpublished outcomes developed at another public hospital site. For the latter, you would want to reach out to other public hospital PC leaders to see if they can share any data.

Selection of Outcomes

Most financial analyses of IPPC use direct (or variable) costs of the index hospitalization. These costs should be included among the outcomes examined in your analysis. You can also compare the PC recipients and nonrecipients on length of stay, case-mix index, revenue, contribution margin, and cost categories (salaries, supplies, etc.), though some of those (revenue and margin) have not been studied as an outcome of interest for palliative care in published research.

Furthermore, you can evaluate the disposition of patients at the time of discharge (e.g., died in hospital, discharged to home hospice). Many IPPC teams put a great deal of effort into discharge planning and making referrals for postacute care. Consider at least exploring the percentage dying in hospital, discharged to hospice, discharged to outpatient or home-based PC, and other dispositions.

Looking at Outcomes Beyond That Hospital Stay

The between-patients approach of Analysis #1 also allows you to look at the longitudinal patterns and costs of surviving patients' care across settings after discharge from the index hospitalization. Some research has demonstrated that this is feasible to measure, and that inpatient PC is associated with longitudinal effects after discharge. See papers by Gade and May.[8]

If this is important to your stakeholders, and you have the necessary data and resources, you can compare the survivors (PC patients and matched controls) on measures such as enrollment in hospice, referral to and use of home-based or ambulatory palliative care services at your site or in the community, and readmissions to hospital including the intensity, length, and cost of those additional

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hospital stays. In addition to potential direct avoidance of costs for the hospital, some of these outcomes (such as readmission rates for select conditions) are the bases for pay-for-performance or value-based care elements of hospital financial arrangements.

Use the following steps to measure these longitudinal effects after discharge using the well-matched, surviving PC recipient cases and controls from Analysis #1:

- Determine which patients were alive at discharge from the index hospital stay.
- Determine what later outcomes are of interest and measurable.
- Select a postdischarge time frame (e.g., 30, 60, or 90 days).
- For each time frame, retain only the patients known to be alive for that whole time period (e.g., 30 days), since only patients who are alive can be readmitted. Even with techniques such as propensity-based matching, it is quite possible that your PC recipients are less likely to survive through each time frame than matched comparison patients. To ascertain whether patients were alive through your time frame of interest, obtain and add two event dates to your data: date of death if deceased, and date of last known contact with your hospital or health system. Use those in tandem to determine which patients survived for a full 30 (60, 90) days following discharge.
- Use a unique patient identifier to find and analyze subsequent hospitalizations and other data of interest for the same patients over time.
- Compare PC recipients and other patients using rates of events (e.g., percentage readmitted to hospital), sums of resources used (e.g., number of hospital days or intensive care unit days), and averages (e.g., mean costs per patient).

Note that of the three analytic methods described in this document, only Analysis #1 can be used as the basis for evaluating these types of longitudinal effects of inpatient PC following discharge.

Interpretation

If your PC program and your hospital are similar to others that have been studied, your results using Analysis #1 (Early-PC) should be similar to those published to date, indicating a lower cost associated with PC involvement.

Research to date has only looked at the cost side of the equation, not the revenue side. Public hospitals may be very sensitive to any reduction in revenue, given their constrained revenue and resources. If you include revenue and contribution margin (revenue minus direct costs) as outcomes for Analysis #1, it is possible you will find that Early-PC cases have a lower revenue than their comparison cases (as well as lower costs). Early-PC can change the choices made for the remainder of the stay, including whether to have a procedure or use mechanical ventilation. These choices would in turn impact the diagnosis-related group (DRG) assigned for a hospital stay, potentially lowering reimbursement. For example, if Early-PC consultation resulted in medical rather than surgical intervention for a 95-year-old with advanced dementia and respiratory failure, it could change the DRG from one with a high DRG weight and reimbursement to a lower one. If you find this, you can include the following in your interpretation of Early-PC cases:

- **Occupancy pressures and ability to backfill beds.** If Early-PC cases have shorter LOS compared to control cases, and if freed bed days are backfilled with cases that the hospital would have otherwise struggled to accommodate due to staffing or bed shortages, then lower revenues from Early-PC cases are offset by opportunities to receive revenue from other cases.

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- **Shared-savings arrangements.** If Early-PC cases are less costly than comparison cases, then some lost revenue could be recovered for cases included in shared savings arrangements, such as a Medicare shared savings program accountable care organization.
- **Shared risk arrangements.** If your hospital is at risk for the cost of care for some patients (for example, your site is at risk for all costs of patients covered by a local Medi-Cal managed care plan), then the lower costs of hospital care for Early-PC patients directly benefits the hospital. Your hospital likely receives a per member capitation payment for those patients, rather than a separate payment for the hospitalization. Because of this, a change in DRG assignment would not impact revenues.
- **Reduced staffing needs.** If your hospital is struggling with a workforce shortage, then reducing hospital days may have the benefit of allowing units to reduce costs associated with overtime pay, use of per diem staff, or use of agency staff. Such benefits would likely only accrue if your IPPC service is fairly large and sees many Early-PC cases. If so, it is worthwhile to discuss this potential benefit with clinical and administrative leaders.

Summary of Analysis #1

Palliative care delivered in the ED or first days of hospital admission can have a powerful impact on the clinical goals and trajectory of the whole stay. To capture the corresponding financial outcomes effectively, we recommend using Analysis #1 if feasible.

Analysis #2: PC Involved Later in Hospital Stay

The second analysis focuses on patients whose PC consult occurred on the third full day of hospitalization or later — those PC recipients who were not appropriate to include in Analysis #1. In this analysis, the PC patients serve as their own controls — average costs per day before PC consultation are compared to average costs following PC consultation for each patient. This within-patient approach has been used in published studies of PC economic outcomes and is the most common approach used by health systems assessing the fiscal impact of an inpatient PC consultation service.

Two features of Later-PC consultations dictate the method of this analysis: (1) the days before the PC consult may comprise a majority of the total admission costs (it is not unusual for a PC team to be called for the first time after 10 or more hospital days have elapsed) and (2) the PC team has no control over costs incurred before their involvement. When PC is involved late, the proper unit of analysis is each individual hospital day because the PC team could influence the course of care and costs for only the subsequent portion of the hospital stay.

A key assumption of Analysis #2 is that the level of utilization that existed at the time of PC consultation would have continued (or even escalated) had the PC consultation not occurred. Some stakeholders do not agree with this assumption; in those cases, you should consider conducting Analysis #1 and Analysis #3 because they include comparison groups.

Figure 2 displays all the essential elements of Analysis #2. These include the direct costs per day from admission forward, knowledge of when the consult occurred, and a comparison of the average costs per day in the two to three days immediately preceding consultation to the average costs per day in the two to three days following.

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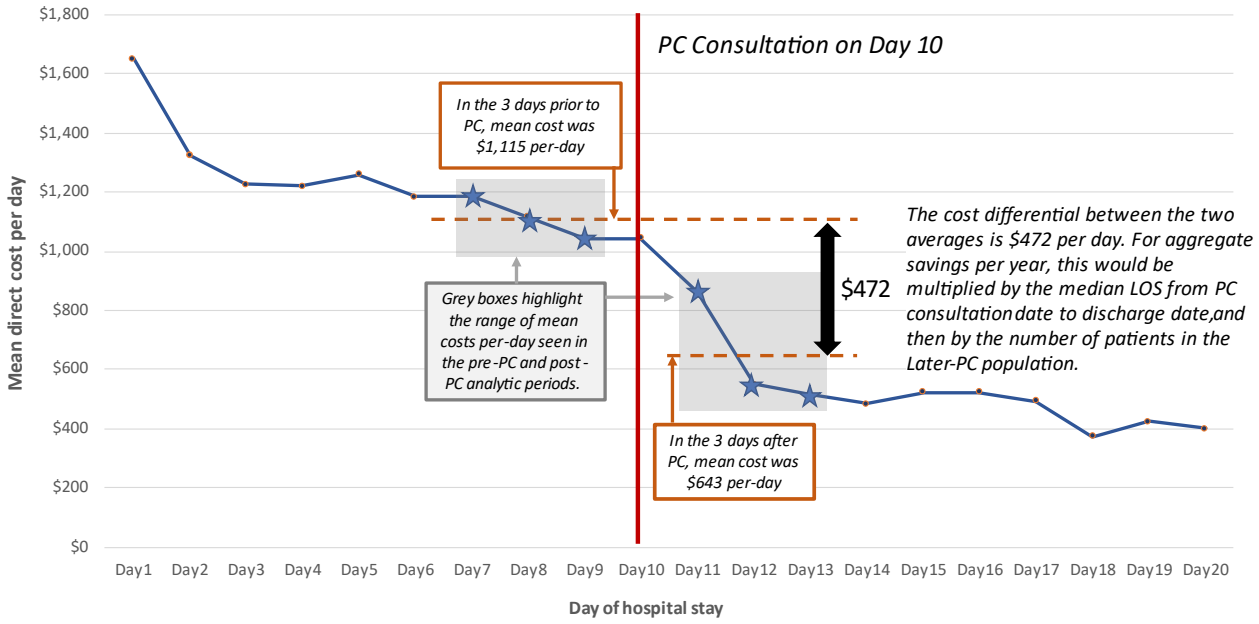
Figure 2. Logic of the Within-Patient Analysis, Using Published Data



Source: Adapted from R. Sean Morrison et al., "Cost Savings Associated with US Hospital Palliative Care Consultation Programs," *Archives of Internal Medicine* 168, no. 16 (Sept. 8, 2008): 1783–90.

This is a two-step analysis: In the first step you use a subset of Later-PC cases to conservatively estimate cost impact per day per recipient, and in the second step you apply that to all Later-PC cases.

Calculation step. Later-PC patients whose hospital stay was at least seven days, with at least three days before the day of PC consult, and at least three days after the day of PC consult.

Application step. All Later-PC cases with any LOS.

Methods

1. Identify Later-PC cases excluded from Analysis #1 because PC consult occurred on the third full day or later. For each case you will have the admission date, the discharge date, and the initial PC consultation date.
2. Within that Later-PC group, identify those with at least three hospital days before and at least three hospital days after the day of PC consultation (calculation step subset).

   Example: Patient XYZ was admitted to the hospital on April 15, PC consult occurred on April 25, and the patient was discharged on April 30. This patient does not meet criteria for Analysis #1 but does meet criteria for Analysis #2. This patient also meets the criteria to be in the "calculation step subset" for Analysis #2 (they have at least three full hospital days before PC and at least three full days after PC).
3. Create a data table to capture the costs per day for three days just before PC consult, the PC consult day, and three days just after the PC consult. Use field names like PC-3, PC-2, PC-1, PC0, PC1, PC2, PC3.
4. Drawing from detailed charge and cost data for patients (where each room and board cost, each bandage, each injection, etc., carries a charge and cost amount), compute the sum of costs per

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day for each of those seven days for each patient. You are adding up the detailed costs of room and board, labs, pharmacy, radiology, etc., per patient per day, for those seven days.

Example: Using Patient XYZ again (admitted April 15, PC consulted April 25, discharged April 30), the cost amount entered in PC0 is a tally of expenses incurred on April 25. The cost amount entered in PC-3 is a tally of expenses incurred on April 22; for PC-2 it is expenses incurred April 23; PC-1 is April 24. Those are the three days before PC. Similarly, in PC1 you would tally the expenses incurred on April 26, PC2 is April 27, and PC3 is April 28.

5. Complete the calculation step by comparing the mean cost per day for the three days before PC (PC-3, PC-2, PC-1) to the three days after PC (PC1, PC2, PC3). (See Figure 3.) Do this for all patients in your calculation step data.

Figure 3. Daily Costs and Calculations for Patient XYZ

Patient	Admit	Dischg	PC-consult	PC-3	PC-2	PC-1
XYZ	4/15/2022	4/30/2022	4/25/2022	$ 1,897	$ 2,005	$ 1,990

PC0	PC1	PC2	PC3	AvgPre	AvgPost	PrePostDiff
$ 1,822	$ 1,564	$ 1,499	$ 1,425	$ 1,964	$ 1,496	$ 468

Source: Developed by authors.

6. Across all patients in the calculation step subset, compute the average cost difference. For example, for all patients in the hypothetical example the averages were pretty similar to Patient XYZ: average cost of pre-PC days = $1,950, average cost of post-PC days = $1,500, difference = $450. In other words, the average cost per day after PC is $450 less than the average cost before PC.
7. Now do the application steps. First, determine the median post-PC LOS for all Later-PC patients. In other words, what is the median number of hospitalized days from PC consult day to discharge day? This is often between three and six days. Second, multiply the number of Later-PC patients times the average cost reduction per day times the median post-PC LOS. Table 2 provides an example.

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Table 2. Final Steps for Analysis #2 (Example Data)

a	Pre-PC mean direct costs per day, average across patients	$1,950
b	Post-PC mean direct costs per day, average across patients	$1,500
c	Pre minus post (a – b)	$450
d	Median PC LOS for all Later-PC cases	4
e	Number of Later-PC cases	310
f	Total reduction in direct costs (c × d × e)	$558,000

Source: Developed by authors.
Notes: Steps a, b, and c are part of the calculation steps and are limited to the smaller set of Later-PC patients with ≥3 full days before PC and ≥3 full days after PC. Steps d, e, and f are part of the application steps and are applied to all Later-PC cases.

While several data manipulations are required for Analysis #2, none of these necessitate a statistician or advanced data scientist. Still, in some hospitals, finance analysts will find this day-by-day cost tallying to be novel and different from their usual focus on the costs of the whole stay.

Optional Steps and Caveats

You may wish to further categorize costs to distinguish the portion of costs associated with purchased and consumed goods and use the same sequence of calculations to determine savings in those cost categories. Although this trimming of expected savings is not reflected in the literature, some public hospitals prefer this more conservative approach. This is a topic to discuss with stakeholders who will interpret the significance of your fiscal impact analyses. The same comments in Analysis #1 would apply here to Analysis #2 concerning what kinds of costs to use, what to do if your health system does not do cost accounting at the individual item level, etc.

You may also wish to specify the number and proportion of Later-PC cases discharged to outpatient palliative care, home-based palliative care, or hospice — services that have been shown to reduce preventable costs, especially related to avoidable hospitalizations.

Diverted from ED Following PC Consultation

If your service consults on patients in the ED who are then discharged from the ED to hospice, home, or other settings outside the hospital, the hospitalization is avoided and such patients would not be included in any of the analyses described in this document. Rather than trying to quantify the costs saved in such cases (and revenues not paid in some cases), it may be adequate to provide some case vignettes and a tally of such cases for stakeholders.

What About Revenue and LOS?

In general, Later-PC does not alter the entire course of hospitalization, and therefore is not thought to change the DRG assignment; thus Later-PC would not affect reimbursement from the payer/plan. Similarly, Later-PC does not occur early enough to alter the full LOS of the case. For these reasons, Analysis #2, unlike Analysis #1, does not include outcomes such as LOS, revenue, or contribution margin.

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Summary of Analysis #2

Analysis #2, concerning Later-PC cases, supplements the information from Analysis #1 (Early-PC). Several analytic steps are required, but the math in each step is simple. There is no need to find and match non-PC patients as a "usual care" comparison group; each Later-PC patient serves as their own control.

Putting Analysis #1 and Analysis #2 Together

Before proceeding to Analysis #3, note that the cost savings from the first two analyses should be added together, to generate a complete picture of savings generated by your IPPC, regardless of when the initial consultation occurred. There is no overlap between the two patient populations of Early-PC and Later-PC. You are using two different analytic approaches to estimate the financial impact of PC consultation in two subsets of PC recipients.

Analysis #3: Optional, Confirmatory Analysis: Costs in the Final Days of Stay

It can be helpful to generate data that bolster the case that the palliative care intervention was responsible for the reduction in costs observed in Analysis #2 (Later-PC). This is particularly useful if a hospital administrator looking at your Analysis #2 results says, "This cost reduction would have happened anyway" or "Our attending physicians provide comfort care and withdraw costly interventions without special assistance," or expresses similar remarks indicating doubt that the PC intervention was responsible for the change in utilization.

Such reactions are understandable because for most hospital stays, costs will be highest at the beginning of the stay — when diagnostics, major procedures, or both occur — and decrease in the latter portion of the stay, as the focus of care shifts to stabilizing the patient for a safe discharge. However, in cases where patients are at risk of death, or when there is a lack of clarity about goals of care, it is not unusual for costs to go up in the final days of stay, with intensity of care escalating as the patient's condition worsens. This escalation pattern is often overlooked by hospital finance analysts because PC-appropriate patients make up such a small proportion of the overall hospital population.

Analyzing cost of care in the last days of a hospital stay, comparing the costs for PC recipients and non-PC patients, is a useful way of demonstrating how PC involvement changes utilization. Hypothetical results of such an analysis are presented in Figure 4. You would *not* add the results of this validating analysis to a summary of financial outcomes. Rather, it is a way of confirming that lower daily costs are linked to the PC intervention.

Limiting the analysis to people who died in the hospital can address concerns about comparable severity of illness between the intervention and comparison groups — all patients in the analysis were sick enough to die in the hospital, and it is likely that all would have been PC-appropriate. Still, it is optimal to do a high-level comparison of PC and usual care cases, to ensure alignment according to disease group. For example, if your IPPC sees mostly cancer patients, you would want to include mostly cancer patients in the comparison population.

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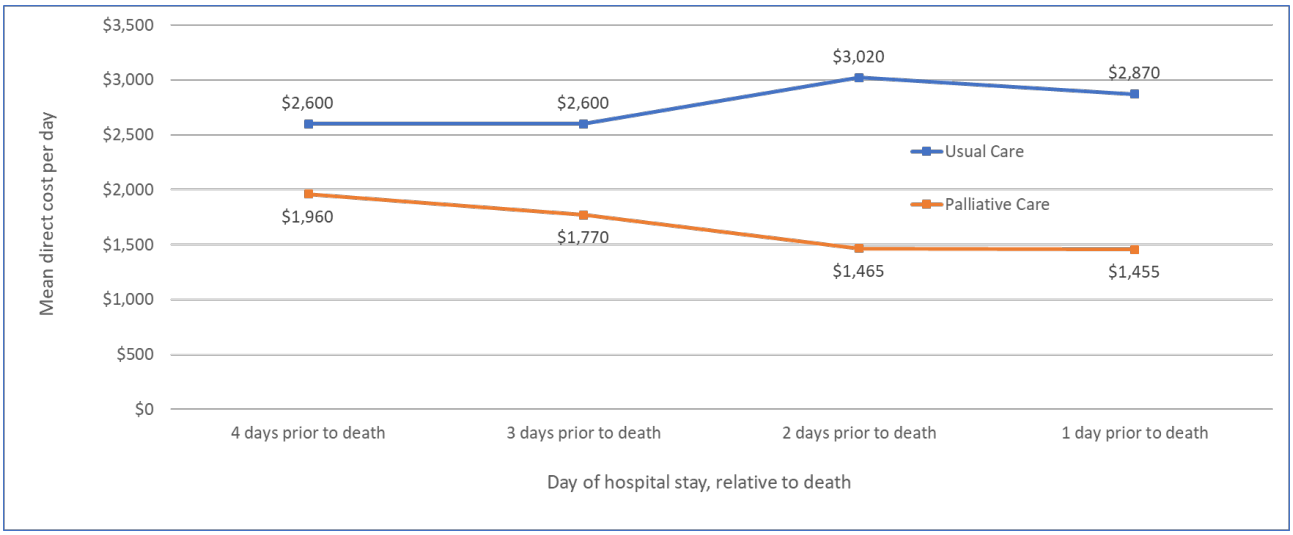
Figure 4. Average Costs per Day for Patients Who Died in Hospital — Hypothetical Example



Source: Developed by authors.

Methods

1. For all PC recipients, determine the median number of days between initial PC consult and discharge. In the hospital data identify all those who died in the hospital (not just PC recipients), and limit the remainder of this analysis to those who died in the hospital whose hospital LOS was at least two days more than that median LOS following PC consult.
   Example: The median time from PC consult to discharge for all PC recipients was four days. For Analysis #3, your analysis would use hospital decedents, some of whom used PC and some of whom did not, whose hospital LOS was at least six days.
2. Among those hospital decedents with LOS of at least a certain length, distinguish between those with PC consults and those receiving usual care (i.e., not seen by the PC service).
3. Similar to the steps in Analysis #2 for creating day-level tallies of costs, compute tallies of direct costs per day relative to the date of death.
   - Day of death (not shown in Figure 4) is the partial day on which death occurred.
   - Deathdate-1 (labeled "Day before death" in Figure 4) is the full day in the hospital before that date.
   - Deathdate-2 is the full day in the hospital before Deathdate-1.
   - And so on, for the number of days that correspond to the median PC days +2. In our example, the median of PC days was four, so data would be added up through Deathdate-6.
   - For each patient, tally the costs incurred on each of those days in the hospital.
4. Compare the average direct cost per day among PC recipients vs. non-PC patients.

Do not report findings for the day of death, as there is no room charge for that day. Each day included should be a complete day in the hospital.

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Clarifying Which Patients Can Be Used in Which Analyses

Here are some reminders and restatements about the criteria for the three analyses:

- Day of admission is not a full day, but "in the first three days" includes the partial day (of admission) plus the two full days after that.
- All IPPC recipients are included either in Analysis #1 or Analysis #2 — but not both. Analysis #1 and Analysis #2 are mutually exclusive, determined by the timing of IPPC consultation.
- Analysis #2 has two steps. Patients included in the calculation step are those with at least three full days in hospital before PC and at least three full days in hospital after PC consultation. All Later-PC patients are included in the application step.
- Among the patients in Analysis #1, those discharged alive can be used to explore the impact on subsequent care such as fewer readmissions or less costly readmissions in the IPPC group.
- Whether they were included in Analysis #1 or Analysis #2, some patients who died in the hospital may also be analyzed in Analysis #3.
- Both Analysis #1 and Analysis #3 use control or comparison patients who did not receive PC consultation during their hospital stay. For Analysis #1, the comparison group is determined through a somewhat complex statistical process. For Analysis #3, the comparison group is simply hospital decedents with an LOS that exceeded a certain length.

Table 3 depicts these decisions using hypothetical scenarios.

Table 3. Examples of Who Would Be Included in Which Analyses

Scenario	Include in Analysis #1?	Include in Analysis #2?	Include in Analysis #3?
Patient admitted on August 1, PC consult on August 3, did not die in hospital.	Yes, this is "Early-PC," the PC consult occurred on the third day (second full day).	No, this is not "Later-PC."	No, the patient did not die in the hospital.
Patient admitted on August 1, PC consult on August 3, died in hospital on August 10. (Median LOS from PC consult to discharge for the year was 4 days).	Yes, this is "Early-PC," the PC consult occurred on the third day (second full day).	No, this is not "Later-PC."	Yes, the patient died in the hospital and had more than 6 days in the hospital (median PC LOS plus two days).
Patient admitted after midnight on August 1, PC consult occurred in the ED late on July 31, did not die in hospital.	Yes, this is "Early-PC," the PC consult occurred very early in the admission (before Day 1!). Consider that to have occurred on the day of admission and include in analyses.	No, this is not "Later-PC."	No, the patient did not die in the hospital.

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Scenario	Include in Analysis #1?	Include in Analysis #2?	Include in Analysis #3?
Patient admitted on August 1, PC consult occurred on August 8, discharged alive on August 13.	No, the PC consult did not occur in the first three days.	Yes, PC consult occurred on Day 7. Include this case in the calculation step because the patient had 3+ full days in the hospital before PC, and 3+ full days in the hospital after PC.	No, patient did not die in the hospital.
Patient admitted on August 1, PC consult occurred on August 8, patient died in hospital on August 10. (Median LOS from PC consult to discharge for the year was 4 days).	No, the PC consult did not occur in the first three days.	Yes, PC consult occurred on Day 7. Do not include this case in the calculation step because the patient had <3 full days in the hospital after PC. Include in application step instead.	Yes, the patient died in the hospital and had more than 6 days in the hospital (median PC LOS plus two days).

Source: Developed by authors.

Final Thoughts — Putting It All Together

The methods described in all three of these analyses are "tried-and-true" — they have been used for almost two decades to describe and convey the financial outcomes of inpatient palliative care services. These methods have been used with programs at different stages of development, with different payer mixes, and with different forms of inpatient PC (consult only, consults plus a dedicated PC unit). How much time and expertise you spend on this task is up to you, but most hospital executives want some kind of analysis to be done using their own patients, programs, and data. That is, executives appreciate the findings published in research, but it is often insufficient; they also want to see internal analyses. While you may not be able to substitute others' published findings for your own hospital's experience, you can certainly use those findings to help interpret and validate your own. Are they in the same ballpark? Are there dramatic differences that need to be further investigated? Use published findings as guardrails for stakeholders' expectations.

We also recommend that all presentations of financial outcomes for palliative care programs be prefaced by descriptions of the clinical service and examples of clinical, patient-centered, and experiential outcomes. What does the PC program do that could change utilization and costs? What is the status quo when palliative care specialists do not enter the picture? What impact does the PC team have on pain, suffering, confusion, miscommunication? How does the PC team contribute to higher-quality care? Reiteration of these themes helps to reinforce the message that PC is primarily a patient-centered specialty that happens to have a positive impact on costs of care. For more information, refer to *Making the Case for Inpatient Palliative Care*.

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Endnotes

[1] Peter May et al., "Economics of Palliative Care for Hospitalized Adults with Serious Illness: A Meta-Analysis," *JAMA Internal Medicine* 178, no. 6 (June 1, 2018): 820–29.

[2] May et al., "Economics."

[3] Melissa M. Garrido et al., "Methods for Constructing and Assessing Propensity Scores," *Health Services Research* 49, no. 5 (Oct. 2014): 1701-1720; and May et al., "Economics."

[4] J. Brian Cassel et al., "Effect of a Home-Based Palliative Care Program on Healthcare Use and Costs," *Journal of the Amer. Geriatrics Society* 64, no. 11 (Nov. 2016): 2288–95.

[5] Sarah Ruiz et al., "Innovative Models for High-Risk Patients Use Care Coordination and Palliative Supports to Reduce End-of-life Utilization and Spending," *Innovation in Aging* 1, no. 2 (Sept. 2017).

[6] May et al., "Economics."

[7] Garrido et al., "Methods."

[8] Glenn Gade et al., "Impact of an Inpatient Palliative Care Team: A Randomized Controlled Trial," *Journal of Palliative Medicine* 11, no. 2 (Mar. 11, 2008): 180-90; and Peter May et al., "Evaluating Hospital Readmissions for Persons with Serious and Complex Illness: A Competing Risks Approach," *Medical Care Research and Review* 77, no. 6 (Dec. 1, 2020): 574–83.