



Abstract: 4598

Scientific Abstracts > Acute Pain

INSIGHTS ON THE OPERATIONAL AND FINANCIAL CONSIDERATIONS OF IMPLEMENTING A TRANSITIONAL PAIN SERVICE

Caroline Zubieta, Christina Shabet, James Lin, Aurelio Muzaurieta, Akul Arora, Nazanin Maghsoodi, Chad Brummett, Anthony Edelman
University of Michigan Medical School

Introduction

More than one in five patients presenting for surgery have preoperative use of opioids. These patients often have more complications and utilize more healthcare resources for their pain-related needs in the postoperative period, which is reflected in prolonged hospital lengths of stay (LOS), increased emergency department (ED) visits, high rates of hospital readmissions, and overall increased hospital costs. Several institutions have responded by adopting a transitional pain service (TPS), which aims to optimize patients by providing management of pain regimens beginning in the pre-operative period and continuing throughout the post-operative period. While there are some preliminary studies suggesting improved outcomes from TPS, there are limited data to support the financial impact. Furthermore, no resource currently exists that details the various approaches utilized by TPS programs globally.

Materials and Methods

Unstructured interviews were conducted with 27 stakeholders representing diverse service lines at Michigan Medicine, directors of TPS programs globally, and health economists. Qualitative and quantitative insights were collected on the current state of TPS programs as well as the preoperative opioid-using population more generally. A literature search was performed to further support the anecdotal evidence. The authors subsequently established assumptions regarding patient volume and throughput in the health system. These assumptions are listed below:

- Exponential decline of hospital costs as LOS increases: three times the average daily cost of a stay is attributed to the first day of admission, and all additional costs are equally distributed to subsequent days.
- Total cost of a high-risk patient's stay: 12% higher than the average surgical patient.
- LOS for this patient population: 8.4 days.
- LOS reduction from TPS implementation for this population: 10%.
- Readmission rate due to post-operative pain in this patient cohort: 5%.
- LOS of readmission: 2 days.
- Cost of readmission: Daily cost same as average daily cost of initial stay.
- ED visit rate for post-operative, non-mechanical-related, pain: 14%
- No revenue loss from reduction in ED visit rate after TPS implementation due to global charge period.

A modifiable financial modeling tool was subsequently developed.

This project was originally formulated as a Multidisciplinary Action Project at the University of Michigan Stephen M. Ross School of Business. The team consists of MBA and MD/MBA students serving as consultants for the Opioid Prescribing Engagement Network at the University of Michigan to design a business proposal and financial model for the implementation of a Transitional Pain Service. Due to this, IRB approval was not sought in advance. An application has since been submitted for IRB exemption and is currently under review. All interviewees whose input has been included in this abstract have consented to the dissemination of findings.

Results/Case Report

A summary of qualitative findings can be found in Table 1. Furthermore, the authors created a modifiable financial model (Figure 1) to account for patient volumes based on the institution's patient population and surgical volume. The data populated in Figure 1 are sample data and do not represent true costs. Variables can be adjusted in the model to reflect different institutional factors. The outputs include the predicted total cost to implement the TPS program, predicted hospital cost reductions from decreasing LOS, ED visits, and readmissions in these patients, predicted revenue from health insurance reimbursement of TPS services, predicted revenue opportunities for filling additional inpatient beds due to decreasing this patient population's LOS, gross profit, net profit, and overall return on investment (ROI).

The financial tool is freely available for download through the Opioid Prescribing Engagement Network (OPEN) at the University of Michigan, <https://michigan-open.org/resource/transitional-pain-service-financial-tool/>.

Discussion

The largest cost driver for a TPS is the staffing model, which varies across institutions. The largest driver of financial savings is decreased downstream healthcare utilization because of patients' access to TPS. Specifically, the primary source of cost savings can be attributed to reduction in LOS. Furthermore, several operational options exist for incorporating a TPS that perform at breakeven or positive net profit. The varying TPS models described in interviews and summarized in Table 1 reflect this and reinforce the importance of tailoring a TPS to an institution's current state and unique operations. Overall, this tool and these findings are important for informing health systems of operational and financial considerations when implementing a TPS program.

Limitations: The limitations of our model include the assumption involved in the calculation of potential revenue generated from reducing LOS. It assumes constant patient throughput and that the incremental reduction of LOS of high-risk patients can yield a cumulative opening of beds for other patients. Furthermore, most surgical cases are billed within a global charge period, but for those that are not, top-line revenue may be reduced due to LOS reduction. It is difficult to quantify the lost revenue from reduced LOS, but we assume it is negligible compared to the financial gains associated with new patient admissions. Lastly, this model does not account for revenue generated from opened surgery clinic visit spots with new surgical candidates.

References

1. Cron DC, Englesbe MJ, Bolton CJ, Joseph MT, Carrier KL, Moser SE, et al. Preoperative Opioid Use is Independently Associated With Increased Costs and Worse Outcomes After Major Abdominal Surgery. *Ann Surg*. 2017;265(4):695-701.

2. Yerneni K, Nichols N, Abecassis ZA, Karras CL, Tan LA. Preoperative Opioid Use and Clinical Outcomes in Spine Surgery: A Systematic Review. *Neurosurgery*. 2020;86(6):E490-E507.
3. Sun EC, Mariano ER, Narouze S, Gabriel RA, Elsharkawy H, Gulur P, et al. Making a business plan for starting a transitional pain service within the US healthcare system. *Reg Anesth Pain Med*. 2021;46(8):727-31.
4. Hernandez-Boussard T, Graham LA, Desai K, Wahl TS, Aucoin E, Richman JS, et al. The Fifth Vital Sign: Postoperative Pain Predicts 30-day Readmissions and Subsequent Emergency Department Visits. *Ann Surg*. 2017;266(3):516-24.
5. Wassef C, Frangenberg A, Lee H, Iloani N, Bates CM, Pientka AC, et al. Postoperative emergency department visits for pain after outpatient orthopaedic surgery: did rescheduling hydrocodone make a difference? *Current Orthopaedic Practice*2023. p. 123-7.

Disclosures

No

Tables / Images

-
-

High-risk		Input	5.4%
# of MDs on staff	Variable	# positions dedicated to TPS	0.5
# of PAs on staff	Variable		2
Estimated Total Surg Cases (INPATIENT & OUTPATIENT)	Static		30,000
Estimated Total Surg Cases (INPATIENT)	Static		10,000
Estimated Total Surg Cases (OUTPATIENT)	Static		20,000
Surgical Volume of high risk patients (inpatient)			
# of Visits for Initial Visit - Establishing Care	# of Visits per Patient	540	540
# of Initial Rounding	# of Visits per Patient	1	540
# of Subsequent Rounding Visits	# of Visits per Patient	2	1080
# of Return Visits	# of Visits per Patient	3	1620
Surgical Volume of high risk patients (outpatient)			
# of Visits for Initial Visit - Establishing Care	# of Visits per Patient	1080	1080
# of Return Visits	# of Visits per Patient	3	3240
Staffing Priorities/Assignments			
Activity	Initial Surgery/Patient Type	Visits Demanded	MD Fixed Capacity (Annual Visits) PA Fixed Capacity (Annual Visits)
Initial Visit - Establishing Care	Inpatient	540	3000 2000
Initial Rounding	Inpatient	540	4500 5600
Subsequent Rounding Visit	Inpatient	1080	4500 5600
Return Visit	Inpatient	1620	4500 4000
Initial Visit - Establishing Care	Outpatient	1080	3000 2000
Return Visit	Outpatient	3240	4500 4000
Reimbursement Revenue			
Service	CPT Code	Average Charge by MD	Total Charge by MD Average Charge by PA
Initial Visit - Establishing Care	***	\$ 250	\$ 375,000 \$ 213
Initial Rounding Visit	***	\$ 350	\$ - \$ 298
Subsequent Rounding Visit	***	\$ 200	\$ - \$ 170
Return Visit	***	\$ 150	\$ - \$ 128

Length of Stay (LOS) Cost Saving (Inpatient Patients Only)	
Average LOS for High-risk Pain Pt (Days)	8
Predicted LOS Reduction	10.0%
Days reduced	0.80
Hospital Stay Cost/High-risk Pain Pt	\$ 40,000
Day one multiplier of total cost assumption	3.00
Day one cost	\$ 15,000
Subsequent daily cost	\$ 3,571
Cost savings/pt	\$ 2,857
Total Estimated Cost Saving/Year	\$ 1,542,857

Readmissions Cost Saving (All Patients)	
Average ReAdmit to same service due to pain	10.0%
Predicted ReAdmit Reduction	5.0%
Cases Readmitted for Pain	162
LOS of Readmit for Pain	2
Hospital Stay Cost/day/High-risk Pain Pt	\$ 5,000
Estimated Cost Saving/High-risk Opioid Pt	\$ 500
Total Estimated Cost Saving/Year	\$ 81,000

ED Visits Cost Saving (All Patients)	
ED visit rate due to postop pain (non-mech)	14.0%
Estimated Ed Visit Cost/High-risk Pain Pt	\$ 1,000
Predicted Reduction in ED Visits due to postop pain	5.0%
ED visits of High Risk Opiate Users due to Pain (non-mech)	227
Estimated Cost Saving/High-risk Pain Pt	\$ 50.00
Total Estimated Cost Saving/Year	\$ 11,340.00

Pro Forma				
SG&A		Benefits Multiplier: 20%		
Staffing		FTEs	Base Salary (\$)	Total
	Anesthesiologist	0.8	\$ 500,000	\$ (480,000)
	Physician Assistant	3	\$ 250,000	\$ (900,000)
	Social Worker	1	\$ 100,000	\$ (120,000)
	Pain Psychologist	0	\$ 100,000	\$ -
	Pain Pharmacist	0.5	\$ 100,000	\$ (60,000)
Total:				\$ (1,560,000)
Operations Buffer	(\$5,000)			\$ (5,000)
Total Cost:				\$ (1,565,000)
Reimbursement Revenue		Reimbursement		
From MD		\$ 112,500		
From PA		\$ 296,820		
Revenue Opportunity Due to Open Beds from LOS Reduction		\$ 126,677		
Total Revenue:		\$ 535,997		
Projected Indirect Cost Savings*	LOS	\$ 1,542,857		
	Readmissions	\$ 81,000		
	ED Visits	\$ 11,340		
	Total Indirect Cost Saving:	\$ 1,635,197		
Gross Profit		\$ (1,029,003)		
Net Profit		\$ 606,194		
ROI		0.39		

Revenue Opportunity Due to Open Beds from LOS Reduction	
Number of patients inpatient over the year	540
Average LOS High-risk Pain Pt	8.00
LOS reduction	10.0%
Days reduced in a year	432
Weighted average LOS of any patients	6.65
Number of possible bed openings over course of year attributed to TPS initiation	64.96240602
Weighted Direct Charge of New Admit	\$100,000
Charge Captured	30%
Estimated Direct Margin of new admit	\$ 30,000.00
Estimated % Profit Margin	6.50%
Opportunity cost attributed to beds opening due to TPS	\$ 126,676.69

Figure 1: Screenshots from Financial Tool. The data populated are sample data and do not represent true costs. (A) Shows a screenshot of the tool which takes inputs of the chosen staffing model and expected patient volumes to then calculate projected revenues based on internal hospital metrics. From top to bottom, the different sections show the input areas for staffing, total surgical volumes, distinction of inpatient and outpatient volumes, staffing capacity, and then revenues generated by each staff member. (B) Shows the indirect cost savings portion of the financial tool which shows calculations for length of stay, post-op pain related ED visits, readmissions, and revenue opportunity due to open beds from length of stay reduction. Tool comes complete with drop down menus and areas where tailored data can be input to personalize to any hospital system. (C) Shows the Pro Forma Profit and Loss statement, which aggregates the Revenue for part A and the indirect savings from part B with the costs of the chosen staffing model to project expected profits and ROI. The costs of the TPS service can be modulated by tailoring the staffing model as needed.

Table 1. Summary of insights from TPS program leads and hospital administrators (n=6)

<p>Problem Statements</p>	<p><i>“Chronic pain patients are among the most clinically complex patients you may encounter as a health provider.” - Anesthesiologist</i> <i>“Surgeons really want help.” - Surgeon, Pain-trained Nurse Practitioner</i> <i>“Opioids are a massive issue in the orthopedic population.” - Physiatrist</i> <i>“A patient post-op at 6–8 weeks would be lucky if asked about pain.” - Anesthesiologist</i> <i>“There is unnecessary patient suffering and [high-risk patients] clog the system.” - Anesthesiologist</i> <i>“Staffing is currently maxed out at the chronic pain clinic here. We are very understaffed.” - Anesthesiology department administrative staff</i> <i>“We do not currently have the availability of faculty to absorb more referrals from surgical departments.” - Anesthesiology department administrative staff</i> <i>“Chronic pain centers have a 12-month waitlist.”- Anesthesiologist</i></p>
<p>Various Referral Criteria Elements Described by TPS Programs</p>	<ul style="list-style-type: none"> - Patients on chronic opioids, methadone, buprenorphine, naltrexone with > 90 days of prescriptions or 3 consecutive prescriptions. - Currently using >60 MME of opioids. - Opioid-tolerant individuals (30 MME per day for >3 months). - Chronic benzodiazepine use. - History of substance use disorder. - Currently using illicit substances. - Suicide attempt or hospitalization in the last year for mental health. - Uncontrolled anxiety and/or depression. - Patient with anxiety about surgery. - All orthopedic surgery cases regardless of risk. - Surgery type: spine, thoracic, major joint, plastics. - History of postoperative pain control issues. - Low pain tolerance. - If a surgeon is having difficulty managing the patient’s pain post-operatively. - Any patient that a surgeon is “worried about.”
<p>Operational Models Utilized in TPS Programs</p>	<ul style="list-style-type: none"> - Referrals from: Surgeons, Acute Pain Service, TPS staff via chart review of surgical patients, or anyone. - Referral location: surgery pre-op clinic, chart review then telephone call, anesthesiology pre-op clinic, or post-op inpatient stay - Departments into which TPS is incorporated: Surgery or Anesthesiology - Maximum length of care: 90 days or 6 months. - Post-TPS referrals: previous prescriber, chronic pain clinic, or addiction clinic. - Role of TPS: Provide recommendations only or prescribe during patients’ time in the program.
<p>Staffing Models</p>	<ul style="list-style-type: none"> - Pain-trained advanced practice provider (APP) led + pain psychologists. - Pain-trained Anesthesiologist led +/- APPs, physical therapist, pain psychologist, clerical administrator, floor coordinator, data coordinator, social worker, psychiatrist.
<p>Implementation Strategies and Tips</p>	<ul style="list-style-type: none"> - Integrate into existing staff, space, and resource structures; leverage existing resources. - Implement specific rules for clinical referral. - Educate surgeons, staff, and other stakeholders for program buy-in and referral. - Incorporate administrators to oversee finances & operations. - Collect data during the process to demonstrate meeting the goals of various service lines. - Start small and expand strategically.
<p>Outcomes Statements</p>	<p><i>“Surgeons love the service. There is a huge need for chronic opioid patient management.” - Anesthesiologist</i> <i>“PROMIS scores improved, quality of life improved, [the program] eliminated new chronic opioid use in</i></p>

	<p><i>patients who have been satisfied with their care.” - Pain-trained Nurse Practitioner</i></p> <p><i>“Hospital-wide opioid numbers have been decreasing the last two years.” - Pain-trained Nurse Practitioner</i></p> <p><i>“~40% opioid reduction one month after surgery, Improvements on SF-12 for both mental and physical health, improved pain interference scores, and improved patient recovery in general.” - Anesthesiologist</i></p> <p><i>“Calls to the surgery teams have dramatically decreased.” - Pain-trained Nurse Practitioner</i></p>
--	--