The Implementation of an Electronic Symptom Management (eSyM) System to Monitor Post-Operative Pain in Thoracic Surgery Patients: A Multi-Center Evaluation

Objective:
Only a few single-center studies have evaluated the postoperative recovery of patients after thoracic surgery using digital patient-reported outcome measures (PROMs). The objective of this study is to assess the implementation of an electronic symptom management (eSyM) system integrated into an electronic health record (EHR) platform for thoracic surgery patients at multiple academic medical centers with a focus on real-time pain monitoring.

Methods:
Patients undergoing lung resections at three large academic medical centers were invited to complete multiple electronic symptom surveys within eSyM during their 60 to 90-day post-operative period between October 2019 and September 2022. eSyM is a multi-symptom questionnaire based on a Patient-Reported Outcomes version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE). It is integrated into the EHR and was administered via the patient portal. The self-reported pain score (0=none, 1=mild, 2=moderate, 3=severe) and use of opioids were the focus of this analysis. Baseline patient demographics, surgical data as well as post-operative opioid data was gathered from the EHR. Multivariable logistic regression was used to evaluate the relationship between opioid prescriptions and pain severity scores.

Results:
Of the 457 patients who submitted postoperative eSyM responses, 182 (39.8%) reported at least one severe pain score. Patients who reported a severe pain score were associated with a higher median number of opioid tablets prescribed compared to patients who did not report any severe pain after discharge (21 vs. 14, $p<0.0001$). The severe pain group was composed of a significantly higher percentage of patients who underwent an open surgery compared to patients who reported no severe pain (36.3% vs. 24%, $p=0.005$). In multivariable logistic regression analysis, a severe pain score (OR: 3.41, 95% CI: 1.87-6.23, $p<0.0001$) and an open surgical approach (OR: 3.39; 95% CI: 1.00-11.5, $p=0.05$) were associated with patients prescribed with at least 1 outpatient opioid prescription (Table 1).

Conclusions:
This multi-center study demonstrates the feasibility of implementing an electronic PROM such as eSyM for real-time pain monitoring in patients undergoing thoracic surgery. The continued integration and evaluation of PROMs in the postoperative period will be critical to providing individualized care and improving patient outcomes.

Jorind Beqari (1), Jacob Hurd (1), Alexandra Potter (1), Angela Tramontano (2), Christine Cronin (2), Sandra Wong (3), Hannah Hazard Jenkins (4), Michael Hassett (2), Chi-Fu Jeffrey Yang (1), (1) Massachusetts General Hospital, Boston, MA, (2) Dana-Farber Cancer Institute, Boston, MA, (3) Dartmouth Hitchcock Medical Center, Lebanon, NH, (4) West Virginia University Cancer Institute, Morgantown, WV

Table 1. Independent Predictors of Patients Having at Least 1 Outpatient Opioid Prescription

	OR	95% CI	p-value
Severe pain (ref=no)	3.41	1.87, 6.23	<0.0001
Age	0.99	0.96, 1.02	0.55
Sex (ref=Male)	1.51	0.86, 2.64	0.15
Race (ref=White)			
Non-White	1.94	0.17, 21.7	0.59
Ethnicity (ref=Non-Hispanic)			
Hispanic	1.95	0.31, 12.5	0.48
Marital Status (ref=Married)			
Single	0.4	0.18, 0.92	0.03
Divorced	0.21	0.09, 0.51	0.0006
Widowed	0.53	0.19, 1.50	0.23
Other	>999.99	<0.001, >999.99	0.99
Employment (ref=Full time)			
Retired	0.64	0.27, 1.51	0.31
Part time	0.54	0.12, 2.48	0.43
Disabled	5.91	0.54, 64.58	0.15
Not employed	0.31	0.10, 0.97	0.04
Other	0.89	0.32, 2.43	0.81
Site (ref=Site 1)			
Site 2	0.12	0.05, 0.26	<0.0001
Site 3	1.39	0.44, 4.36	0.57
Surgical Type (ref=VATS)			
Open	3.39	1.00, 11.5	0.05