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Demonstrating value: association of cost and quality outcomes with implementation of a value-driven oncology-hospitalist inpatient collaboration for patients with lung cancer

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ABSTRACT

The hospitalist model of care has gained favour in many hospital systems for the value, cost-effectiveness and quality of care that hospitalists provide. Hospitalists are experts in high-acuity medical problems of patients and they are intimately knowledgeable about hospital operations that enable efficiency of patient care. This results in tremendous cost-savings for institutions especially since hospitalists are also obligated to be involved in quality and practice improvement initiatives. The University of Texas MD Anderson Cancer Center employs oncology-hospitalists for many of their patients with cancer needing inpatient services. This physician team has expertise in both cancer-related and comorbidity-related reasons for hospitalisation. In September 2015, the thoracic and head and neck medical oncology team started a collaboration with the Oncology Hospitalist team whereby a proportion of patients with thoracic malignancies were directly admitted to hospitalists for inpatient care. To determine the value of this collaboration, a pre- and post- implementation study was done to compare quality outcomes such as readmission rates and length of stay (LOS) between the two groups. Adjusted outcomes showed that readmission rates were similar for both physician groups both at baseline and after implementation of the collaborative (p=0.680 and p=0.840, respectively). Median LOS was similar for both groups at baseline (4 days) and was not significantly different post-implementation (4vs5 days, p=0.07). The adjusted cost of a hospitalisation was also similar for hospitalist encounters and thoracic oncology encounters. This initial study showed that quality of care remained comparable for patients with lung cancer who were admitted to either service. With possibly shorter LOS but comparable readmission outcomes and adjusted cost for patients discharged from the hospitalist service, there is a strong value benefit for the implemented Thoracic Oncology-Hospitalist inpatient collaborative.

PROBLEM

Transforming US healthcare to a value-based care system requires meaningful quantification of costs and outcomes at the level of individual patients and providers. Cost of healthcare has surpassed 18 percent of the gross domestic product and continues to rise. This high cost of healthcare is unsustainable and has not translated into improved quality outcomes. This is a public health problem as healthcare delivery impacts many stakeholders. Providing value-based care is the core issue in healthcare that unites the interests of payers, patients and providers.[1] Hospitalists as quality improvement leaders and bedside clinicians are critical to improving the performance of hospitals on most quality-driven and value-based measures.[2]

At The University of Texas MD Anderson, patients with lung cancer have traditionally been cared for by oncologists who divide their time between the ambulatory clinics and inpatient duties. The Division of Internal Medicine's Oncology Hospitalist Team similarly provides comprehensive clinical care for hospitalised patients with cancer while constantly implementing quality-driven and outcomes-oriented practice improvement initiatives. This is a practice model that has not been evaluated to date in terms of patient outcomes such as unplanned readmissions or cost outcomes.

BACKGROUND

The hospitalist model of care has been in existence for approximately 20 years now. From the inception of this acute care hospital specialist, the number of physicians practising as hospitalists has now blossomed to 50 000 making it one of the largest subspecialties of internal medicine. As hospitalists, over the years have proven their value to institutions and outpatient practices, patient care delivered by

hospitalists has expanded to subspecialties such as paediatrics, neurology and cardiology. Most academic health systems and majority of hospitals in the USA now employ hospitalists.[3] Being at the forefront and intimately knowledgeable on hospital systems and operations that directly impact patient care, it is not surprising that hospitalists have served as clinical leaders in many institutions. Hospitalists have played an essential role in facilitating improvements in hospital system performance.[2] Oncology is yet another field that has employed hospitalists to care for their hospitalised patients with cancer. Memorial Sloan Kettering Cancer Center and UT MD Anderson Cancer Center are examples of top academic institutions that have hospitalists among their cancer care teams. Hospitalists who practice in an oncology setting become highly specialised in the skills and knowledge needed to provide care for the complex patient with cancer. This specialisation enables effective acute hospital care that is tailored to and constantly considers the individual's cancer treatment plan. From a value perspective, hospitalist physicians are highly involved in initiatives that evaluate healthcare delivery in their respective institutions. More importantly, these evaluations are in terms of the metrics that matter to most hospital systems (eg, LOS, readmissions, patient safety, hospital acquired infections), based on their implications on the value equation.[4–6] As an example, at Memorial Sloan Kettering, one study evaluated LOS, readmission rates, resource use, advanced directives and healthcare acquired infections among patients admitted under the GI medical oncology inpatient service.[5] The authors compared outcomes between two patient groups – those discharged by an oncology attending and those discharged by a hospitalist. There was no significant difference in the outcomes studied between the two groups suggesting that care given by hospitalists is comparable to care given by oncology-trained attending physicians. The study did not look at cost impact and was specifically done in a GI medical oncology service, thus findings are not generalizable to all hospitalised patients with cancer.

At UT MD Anderson Cancer Center, oncology hospitalists have collaborated with the GI oncology service to deliver hospital care for their patients. With success of this collaboration, a similar partnership was established with the thoracic and head and neck medical oncology (THNMO) team. The impact of this new model of inpatient care on cost and quality outcomes of patients with thoracic malignancy has not previously been evaluated.

BASELINE MEASUREMENT

Baseline measurements on quality metrics such as unplanned readmission rate, time to readmission and LOS were measured and subsequently compared with data after implementation of the new collaborative. In order to make the population as homoegenous as possible, we chose to only study patients with lung cancer. Average cost of a hospital encounter prior to the collaboration was measured. Statistical tests were conducted to compare baseline measures between the two physician groups (THNMO and hospitalists) and sensitivity analyses performed.

The baseline period defined as 'prior to implementation of the THNMO-Hospitalist collaborative' is from 1 August 2013 to 31 August 2015. Multivariable linear mixed effect model or logistic regression model using generalised estimating equations was used to compare the outcome variables between the two services adjusting for other factors significantly associated with the outcomes. All tests were two sided. Analyses was conducted using SAS V.9.4 software.

We used Vizient Clinical Data Base (previously University HealthSystem Consortium) as our data source for both patient-level and encounter-level data.[7] UT MD Anderson Cancer Center is a member of Vizient, an alliance with membership from 90% of the nation's non-profit academic medical centres. Vizient collects administrative, financial, clinical and operations data in de-identified format which is made available in aggregate form for comparison to other member institutions. As such, use of the Vizient data allows our results to be comparable to many US medical academic centres, especially since cost data would similarly be estimated across members. We augmented our data set with tumour staging from UT MD Anderson's Tumor Registry.[6]

Prior to the collaboration (baseline period) all patients with active lung cancer who needed hospitalisation were admitted to the THNMO service. Patients with a prior diagnosis of lung cancer but without evidence of disease, those with active disease but receiving only radiation therapy and no chemotherapy, or those with no pathological confirmation of tumour type at the time of hospitalisation were traditionally admitted under the hospitalist service. During our baseline period, we identified 326 encounters from 257 patients with a diagnosis of lung cancer that were discharged from the hospitalist service. In comparison, there were 1495 hospital encounters from 979 patients with a diagnosis of lung cancer that were discharged from the THNMO service. The median LOS was 4 days for both hospitalist and oncology discharges. The unplanned readmission rate which was adjusted based on covariates was 22.7% for hospitalists and 21.7% for thoracic oncologists (p=0.68). The median time to readmission (no. of days from hospital discharge to next hospital admission) for those who were readmitted within 30 days was shorter for THNMO compared with hospitalists (11.5 vs 13.5 days respectively). Finally, using the sum of estimated total direct cost for a hospital encounter we found that the average cost of a hospital encounter was higher for an oncology discharge compared with a hospitalist discharge by about $1500 (p=0.620) after adjusting for covariates such as age, gender, race, stage, insurance, source of admission, day of discharge, complications flag, medical tourism, ICU stay, LOS and comorbidity count. To make the comparison more valid, we excluded encounters with a bill for chemotherapy as this could drive the total direct cost for a patient's hospitalisation.

DESIGN

The collaboration between the hospitalist group and the THNMO group for inpatient management of patients with a thoracic malignancy was implemented on 1 September 2015. This new model of inpatient care was intended to allow the THNMO oncologists to see more patients on the outpatient setting, decrease their wait times for new patients and allow them more time to focus on cancer-related clinical research. It is important to demonstrate comparable cost and quality outcomes of patients with thoracic malignancy traditionally seen by THNMO oncologists with those who are admitted under the hospitalist service. With the heavy involvement of hospitalists in quality initiatives and intimate knowledge of the hospital system, patient throughput and hospital clinical operations, it is believed that this collaborative would also add increased value and encourage continued quality and practice improvement while keeping costs neutral.

During the post-implementation period, patients with lung cancer were distributed in a 1:1 ratio between the hospitalist and THNMO group. Only patients who required inpatient chemotherapy and those who were admitted to the ICU and likely needing goals of care discussions were admitted to the thoracic oncology service.

STRATEGY

Plan-Do-Study-Act (PDSA) cycle 1 Prior to the implementation of the new inpatient collaborative whereby the hospitalist physicians started taking care of patients with lung cancer, understanding the patient flow within each team and the resources required to take care of additional patient volume on the hospitalist team was necessary. Criteria were set in place as to which patients should be seen preferentially by the thoracic oncologists and which ones were to be seen by the hospitalist physicians. Hospitalist physicians and THNMO physicians provided feedback on the appropriateness and efficiency of this distribution process (Plan). The thoracic oncology-hospitalist inpatient collaborative was implemented in September 2015. The ER referral process and the 1:1 distribution of medical patients with lung cancer underwent continuous review and streamlining in order to ensure all patients were assigned and seen in a timely manner and in order to ensure seamless communication between ambulatory providers (Emergency Room and clinic) and inpatient providers (THNMO inpatient oncologist and hospitalist physicians) (Do). After 10 months from the implementation of the inpatient collaborative for patients with thoracic malignancy, outcome measures were studied and compared between the two physician groups and between the baseline and post-implementation period (Study). Feedback specifically on the consultation process for patients requiring oncology-specific input were also incorporated into the collaborative agreement (Act).

RESULTS

After 10 months of the inpatient collaborative between THNMO and hospitalist physicians, there were 176 patients with lung cancer who were discharged from the hospitalist service (221 encounters) and 190 patients (238 encounters) who were discharged from the THNMO service. Patient characteristics (ie, age, gender, race, tumour stage, insurance, source of admission, international patients and number of comorbidities) of those discharged by either THNMO or the hospitalists did not significantly differ except for ICU stay. Because of the distribution criteria, 19.9% of patients admitted to THNMO had an ICU stay compared with 2.7% of patients admitted to the hospitalist group (p= 0.001). The median LOS of patients discharged by the hospitalist physicians was 4 days (range 1–29), and those discharged by thoracic oncologists was 5 days (range 1–38) (p=0.069). The 30 day unplanned readmission rate during the post-implementation period adjusted for covariates including ICU stay and LOS was similar for both physician groups (29.4% vs 26.9%, p=0.840). For patients who were readmitted within 30 days of discharge, median time to readmission was shorter for patients discharged by THNMO (12 days) compared with those who were discharged by hospitalist physicians (14 days). A comparison of total direct costs for a hospitalisation encounter discharged by the two physician groups showed that during the post-implementation period, hospitalizations discharged by the hospitalist group cost approximately $4000 less on average compared with hospitalizations discharged from THNMO. However, when we adjusted for patient characteristics and hospitalisation characteristics such as LOS, presence of complications, LOS and ICU stay, there was no statistically significant difference noted (p=0.365).

Because of the preferential admission to THNMO group of patients undergoing chemotherapy as well those admitted to the ICU, we conducted sensitivity analyses by excluding patients with an encounter for chemotherapy during admission as well as those who were admitted to the ICU. Table 1 shows that the baseline characteristics were similar for patients admitted to either physician group. The LOS was 5.4 days for the hospitalist group and 6.3 days for the THNMO group (p=0.275). There was no difference in the unplanned readmission rate between the hospitalist and THNMO physician groups (28.6% vs 29.2% respectively, p=0.079). Similarly, hospitalisation costs were similar regardless of admitting physician group ($9301 vs $9127, p=0.841).

LESSONS AND LIMITATIONS

The collaboration between THNMO and the Oncology Hospitalists is deemed successful in that quality of care was maintained for patients regardless of their managing physicians while in the hospital. Seamless communication between the two physician groups was necessary to ensure that the process of assigning patients was appropriate and efficient, and in order to ensure optimal patient handoffs.

Table 1 Characteristics of patients discharged from the Hospitalist service and the thoracic oncology service excluding encounters with ICU stay and chemotherapy charges

Patient characteristic	Category	Hospitalist	Thoracic	P value
Age group	1:<45	5 (3.4%)	7 (5.1%)	0.394
	2:(45,65)	62 (41.9%)	66 (47.8%)	–
	3:≥65	81 (54.7%)	65 (47.1%)	–
Gender	Female	70 (47.3%)	63 (45.7%)	0.780
	Male	78 (52.7%)	75 (54.3%)	–
Race	Asian	13 (8.8%)	15 (10.9%)	0.686
	Black	17 (11.5%)	11 (8%)	–
	Other	14 (9.5%)	11 (8%)	–
	White	104 (70.3%)	101 (73.2%)	–
Tumour stage	Distant	98 (66.2%)	90 (65.2%)	0.762
	Localised	10 (6.8%)	7 (5.1%)	–
	No evidence of disease	6 (4.1%)	3 (2.2%)	–
	Regional	32 (21.6%)	35 (25.4%)	–
	Unstaged	2 (1.4%)	3 (2.2%)	–
Insurance	1:Private	55 (37.2%)	58 (42%)	0.145
	2:Medicare	83 (56.1%)	60 (43.5%)	–
	3:Medicaid	1 (0.7%)	2 (1.4%)	–
	4:Uninsured	5 (3.4%)	11 (8%)	–
	5:Other	4 (2.7%)	7 (5.1%)	–
Admission status	Elective	6 (4.1%)	6 (4.3%)	0.860
	Emergency	140 (94.6%)	129 (93.5%)	–
	Urgent	2 (1.4%)	3 (2.2%)	–
Discharge status	Home	108 (73%)	100 (72.5%)	0.373
	Home health	2 (1.4%)	(%)	–
	Transfer	15 (10.1%)	15 (10.9%)	–
	Left against medical advice or expired	4 (2.7%)	(%)	–
	Hospice	3 (2%)	4 (2.9%)	–
	Skilled nursing/rehab/Long Term Acute Care	11 (7.4%)	14 (10.1%)	–
	Left against medical advice or Expired	5 (3.4%)	5 (3.6%)	–
Day of discharge	1:Sunday	14 (9.5%)	15 (10.9%)	0.858
	2:Monday	15 (10.1%)	13 (9.4%)	–
	3:Tuesday	29 (19.6%)	21 (15.2%)	–
	4:Wednesday	22 (14.9%)	25 (18.1%)	–
	5:Thursday	21 (14.2%)	25 (18.1%)	–
	6:Friday	38 (25.7%)	30 (21.7%)	–
	7:Saturday	9 (6.1%)	9 (6.5%)	–
Complications	0:No	146 (98.6%)	138 (100%)	0.171
	1:Yes	2 (1.4%)	(%)	–
International patient	0:No	147 (99.3%)	134 (97.1%)	0.152
	1:Yes	1 (0.7%)	4 (2.9%)	–
Comorbidity count	0:<3	79 (53.4%)	80 (58%)	0.435
	1:≥3	69 (46.6%)	58 (42%)	–
LOS	0:≤4 days	83 (56.1%)	72 (52.2%)	0.508

Table 1	Continued			
Patient characteristic	Category	Hospitalist	Thoracic	P value
	1:>4 days	65 (43.9%)	66 (47.8%)	–

LOS, length of stay.

CONCLUSION

This value-driven THNMO-Oncology Hospitalist inpatient collaboration for patients with lung cancer revealed that quality outcomes were the same for all patients. Our post-implementation data did show that readmission rates were comparable between the two groups. This was a cost neutral transition as adjusted hospitalisation costs were similar for both groups. While the general inpatient process is the same for patients hospitalised at The University of Texas MD Anderson Cancer Center, the hospitalist physicians have successfully implemented several best practice programmes that are incorporated in daily patient care. These include multidisciplinary rounds of patients admitted to their home unit where discharge needs are discussed with nursing, case management, social work and other healthcare affiliates; early referral for outpatient clinic visit for patients deemed high risk for readmission; medication reconciliation and patient education for patients being discharged on problem medications. While it is difficult to capture the impact of these programmes on patient outcomes and the value equation and is beyond the scope of the current project, this could be a focus for future study within the Plan-Do-Study-Act (PDSA) cycle. Additional future strategies could involve expanding measures to include patient reported outcomes and patient satisfaction, other clinical outcomes such as return to active cancer treatment and provider outcomes such as improvement in physician productivity and progress in research.

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