Original Contribution

Hospitalists on an Inpatient Tertiary Care Oncology Teaching Service

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Abstract

Purpose: Hospitalists provide quality care in various inpatient settings, but the ability of hospitalists to provide quality inpatient care for patients with complex cancer has not been studied. This study explores outcomes with a hospitalist-led versus medical oncologist–led house staff team on an inpatient medical GI oncology teaching service.

Methods: This observational retrospective cohort study examined 829 patient discharges from August 2012 to January 2013 on the GI oncology inpatient teaching service at Memorial Sloan Kettering Cancer Center, a tertiary cancer center in New York, New York. We compared average length of stay (ALOS), 30-day readmission rates, establishment of new do not resuscitate (DNR) orders, nosocomial pneumonia and urinary tract infection (UTI) rates, radiographic and laboratory tests per patient, and disposition on discharge between hospitalist-led and oncologist-led teams.

Results: Median years of clinical experience was 6 (range, 4 to 9 years) for hospitalists and 7 (range, 0.5 to 36 years) for oncologists. ALOS (hospitalist led, 5.6 *v* oncologist led, 5.2 days; $P = .30$), readmission within 30 days (hospitalist led, 14% *v* oncologist led, 16%; $P = .44$), new DNR orders (hospitalist led, 18% *v* oncologist led, 19%; $P = .90$), nosocomial pneumonia (hospitalist led, 0.5% *v* oncologist led, 0.7%; $P = .63$) and UTI rates (hospitalist led, 0.5% *v* oncologist led, 0.7%; $P = .63$), number of radiographic studies and laboratory tests, and disposition on discharge were not significantly different between groups.

Conclusion: A hospitalist-led inpatient service with house staff represents a novel approach for caring for hospitalized GI oncology patients with cancer.

Introduction

Hospitalist programs have expanded beyond general medicine inpatient practices and extended into specialty practices, with cancer centers implementing the hospitalist model for oncology. Although studies have examined the role of hospitalists in various settings, the effect of hospitalists caring for inpatient oncology patients at an academic cancer center has yet to be described. There are, however, several examples of hospitalists in specialized settings; a systematic review demonstrated that compared with nonhospitalists, hospitalists led to shorter lengths of stay and lower costs per stay, with improvement in outcomes for orthopedic surgery patients and improved quality of care for patients with pneumonia and heart failure.[1] A comanagement model with neurosurgeons and hospitalists showed reduced hospital costs and improvement in health care professionals' perceptions of quality, with little effect on patient outcomes and satisfaction.[2] Moreover, a recent study showed that comanagement between hospitalists and hepatologists improved quality of care for hospitalized patients with chronic liver disease.[3]

Because hospitalists practice in various settings with unique patient populations, knowledge and skills become specialized and tailored to inpatient needs. Hospitalist medicine at a comprehensive cancer center takes on special significance because of the complex medical needs of hospitalized oncology patients. Cancer centers have traditionally structured inpatient teams divided by organ- or disease-specific services and, at academic institutions, have used house staff led by specialty oncologists to care for these patients. At Memorial Sloan Kettering Cancer Center (MSKCC), the traditional inpatient care model consisted of medical oncologists rotating through the inpatient service, typically in 2-week blocks at a time. During these on-service blocks, the medical oncologists' outpatient clinical activity and research efforts were necessarily curtailed as a result of the burden of work associated with inpatient service time. Because of the recognition that a vast majority of medical issues faced by the hospitalized patient with a GI malignancy fell within the realm of a hospitalist's capabilities, as well as the desire to maximize the outpatient and research productivity of its medical oncologists, the MSKCC GI oncology service hired its first hospitalist in 2004. With the initial success of this pilot, the MSKCC hospitalist service grew in number and scope. Today, the MSKCC hospital medicine service consists of seven full-time academic hospitalists who attend on the GI oncology, lymphoma, and general medicine inpatient services, as well as a larger number of dedicated nocturnists who work exclusively at night. Currently, both hospitalists and GI medical oncologists provide inpatient care on the GI oncology service by leading house staff teams, with hospitalists providing approximately two thirds of the total annual coverage of the inpatient service. In this article, we describe our experience at MSKCC with hospitalist-led compared with oncologist-led house staff teams

on the GI medical oncology service and examine average length of stay (ALOS), readmission within 30 days, do not resuscitate (DNR) orders, nosocomial infection, resource use, and disposition on discharge. We hypothesized that there would be no difference in outcomes between hospitalist- and oncologist-led teams.

Methods

Design

This was an observational retrospective cohort study.

Setting

The MSKCC inpatient facility, Memorial Hospital, is a 470-bed specialty cancer hospital located in New York, New York. The GI medical oncology inpatient service of MSKCC had 1,820 admissions in 2012[4] and is a medical teaching service with residents, interns, and subintern medical students; the house staff comprise interns from our MSKCC transitional year residency program and rotating internal medicine residents from several surrounding institutions, including New York Presbyterian/Weill Cornell Medical Center, Mount Sinai Roosevelt Hospital, SUNY Downstate Medical Center, and New York Methodist Hospital. This service is divided into two teams with identical house staff structures (generally consisting of two residents and two interns ± one subintern medical student per team), with one team led by a hospitalist attending physician and the other team led by an oncologist attending physician with specialty training in GI oncology. Admissions are assigned to the two different teams by the medical chief residents regardless of admission diagnosis to keep the patient census in each team approximately even, and all newly admitted patients are seen by the service attending physician within 24 hours of admission. If medical oncology consultation is required for management or key oncologic decisions, the patient's primary outpatient oncologist is consulted on an as-needed basis. Primary oncologists are automatically notified by e-mail when their patients are admitted and will often contact the inpatient attending for communication. During the study period, the average number of admissions to each team per day was 2.7. The average daily census of each team was 14.8 patients. For analysis of data, we examined all discharges during a period of 5 months (August 2012 to January 2013) on the GI medical oncology inpatient service and sorted patients according to discharge by a hospitalist or oncologist attending to examine the variables and outcomes detailed here. Discharge decisions were at the discretion and under the leadership of the attending physician. Virtually all discharge planning occurred during weekdays, when case management support staff were available. This study was determined to be exempt research by the institutional review board at MSKCC.

Clinician Characteristics

There were 19 different oncologists and five different hospitalists during this study period. The median years of clinical experience, defined as years in clinical practice postresidency or postfellowship training, was 6 (range, 4 to 9 years) for hospitalists and 7 (range, 0.5 to 36 years) for oncologists. Individual hospitalist attendings spend approximately 16 weeks per year attending on the GI oncology inpatient service and oncologist attendings spend 2 weeks per year on service.

Patients and Variables

We used our institutional database data delivery service, called DataLine, to identify patients admitted to the GI oncology inpatient service during this 5-month period for analysis. We examined age, sex, race, primary cancer type, presence of metastatic cancer, and comorbidities (ie, Charlson comorbidity index) of patients admitted during this time. The Charlson comorbidity index was obtained via administrative data review of International Classification of Diseases (ninth revision) coding.

Outcome Measurements

The outcomes examined were ALOS, readmission rates within 30 days, new DNR orders written, nosocomial pneumonia and urinary tract infections, and disposition on discharge. To assess resource use, we examined the ordering of radiology and laboratory tests.

Data Analysis

Descriptive statistics were used to characterize data based on whether a patient was discharged by a hospitalist or oncologist attending. Comparisons between the two groups were made using t test for continuous variables or χ^2 analysis for categorical variables. Differences were considered significant if $P < .05$.

Results

The mean age of patients in both groups was 62 years. A majority of patients were male and white. Pancreatic cancer accounted for the most common primary cancer type in both groups. Ninety percent of patients had metastatic disease. The mean Charlson comorbidity index score for both groups was 9.5. The baseline characteristics of patients did not differ significantly between groups (Table 1).

During this 5-month period of analysis, we identified 421 and 408 patients who were discharged by a hospitalist attending or oncologist attending, respectively. Results are summarized in Table 2. ALOS was not statistically significant between groups (hospitalist led, 5.6 *v* oncologist led, 5.2 days; $P = .30$). Rate of readmission to this hospital within 30 days (hospitalist led, 14% *v* oncologist led, 16%; $P = .44$) was also not significantly different. The entry of new DNR orders was similar between groups (hospitalist led, 18% *v* oncologist led, 19%; $P = .90$). Disposition on discharge was also similar, as summarized in Table 3, with the majority of patients having a routine home discharge (hospitalist led, 52% *v* oncologist led, 56%; $P = .21$). The percentage of patients developing nosocomial pneumonia (hospitalist led, 0.5% *v* oncologist led, 0.7%; $P = .63$) or nosocomial urinary tract infections (hospitalist led, 0.5% *v* oncologist led, 0.7%; $P = .63$) was similar between groups. The

Table 1. Patient Baseline Demographic and Clinical Characteristics

Characteristic	Hospitalist Led (n = 421) No.	%	Oncologist Led (n = 408) No.	%	P
Age, years					1
Mean	62		62		
SD	14		14		
Female sex	191	45	176	43	.52
Race					
White	301	71	280	69	.37
Black	54	13	58	14	.56
Asian	39	9	48	12	.24
Refused	18	4	16	4	.80
Other	9	2	6	0.9	.47
Primary cancer type					
Pancreatic	99	24	103	25	.56
Colon	69	16	81	20	.20
Stomach	42	10	49	12	.35
Multiple primaries	48	11	42	10	.41
Liver	41	10	37	9	.53
Rectal	35	8	30	7	.44
Metastatic cancer	379	90	367	90	.97
Charlson comorbidity index score					.86
Mean	9.5		9.5		
SD	2.6		2.4		

Abbreviation: SD, standard deviation.

number of radiographic studies obtained per patient was not significantly different (hospitalist led, 2.0 *v* oncologist led, 1.7 studies; $P = .11$), and the number of laboratory tests ordered per patient was similar as well (hospitalist led, 33 *v* oncologist led, 30 studies; $P = .27$). When we sorted data according to team rather than type of discharge attending, we found no statistically significant difference in any of our measures.

Discussion

The widespread use of hospitalists is well into its second decade of growth, with advocates arguing that hospitalists improve the value of hospital-based care in an environment where hospital stays are becoming shorter and inpatient care is becoming more intensive.[5] However, the use of hospitalist-led house staff teams in caring for patients with cancer at a tertiary care hospital has not been examined. Our data indicate that hospitalist-led teams can indeed provide care for the hospitalized GI oncology patient with complex cancer at a level comparable to that provided by teams led by subspecialized medical oncologists.

Many stakeholders are interested in ALOS because it has become one of the main metrics of hospital efficiency and cost. Numerous studies have shown that hospitalists decrease ALOS and decrease costs, without harmful effects on quality of care or patient satisfaction.[6] In our study, we did not find a decrease in ALOS among patients cared for by hospitalist attendings. Although studies have shown that ALOS can be decreased when hospitalists care for patients with certain diagnoses, such as pneumonia and heart failure, hospital outcomes depend greatly on the baseline health of the patient as well as the reason for hospitalization. Indeed, our assessment of the Charlson comorbidity index for the patients in our study indicated a population with a large number of comorbidities. The average Charlson comorbidity index score was 9.5 for our patients. This corresponds to the highest category for mortality within a 12-month period of time using this index, demonstrating that our cohort of patients had medically complex conditions and numerous comorbidities in addition to metastatic cancer.[7,8] We hypothesize that there is a limit to the reduction in ALOS that can be achieved among patients with medically complex conditions and advanced GI cancer and that the ALOS demonstrated in our study may represent the lower limit. During 2012 at our institution, we found that the hospital-wide ALOS was 6.1 days, and ALOS for the entire department of medicine was 7.3 days.[4] According to the Centers for Disease Control National

Table 2. Comparison of Outcomes

Outcome	Hospitalist Led (n = 421) No.	%	Oncologist Led (n = 408) No.	%	P
ALOS, days					.30
Mean	5.6		5.2		
SD	5.7		5.3		
30-day readmission	61	14	67	16	.44
New DNR orders	77	18	76	19	.90
Nosocomial pneumonia	2	0.5	3	0.7	.63
Nosocomial UTI	2	0.5	3	0.7	.63
Radiographic studies per patient					.11
Mean	2.0		1.7		
SD	2.7		2.7		
Laboratory tests ordered per patient					.27
Mean	33		30		
SD	38		40		

Abbreviations: ALOS, average length of stay; DNR, do not resuscitate; SD, standard deviation; UTI, urinary tract infection.

Table 3. Discharge Disposition

Disposition	Hospitalist Led (n = 421) No.	%	Oncologist Led (n = 408) No.	%	P
Routine discharge home	217	52	228	56	.21
Home with home health care services	101	24	92	23	.62
Home hospice	46	11	33	8	.16
Inpatient hospice	25	6	21	5	.62
Extended skilled nursing facility	0	0	1	0.2	.31
Rehabilitation center	12	3	8	2	.41
Inpatient death	16	4	25	6	.12

Hospital Discharge Survey in 2010, the average ALOS for patients discharged from short-stay hospitals was 6.3 days among those who had cancer as the first-listed diagnosis.[9] Therefore, we feel that our ALOS of 5.6 and 5.2 days among hospitalists and oncologists, respectively, may be close to, if not at, the threshold of the achievable ALOS in this setting.

It may be argued that having a more experienced hospitalist group would have achieved a reduction in ALOS, but we believe that our average of 6 clinical years of practice for hospitalists represents a relatively experienced group. Two studies examining the effect of hospitalist experience and outcomes showed that decreased ALOS and costs were most apparent in the second year of hospital experience, and therefore, we would be unlikely to see a further reduction in ALOS with more years of experience.[10,11] Thus, the results of our study may not be generalizable to hospitalists who have fewer years of clinical experience in managing patients with cancer.

Despite the many positive findings related to hospitalists and reductions in ALOS, a cohort study of Medicare patients showed that decreased ALOS and hospital costs associated with hospitalist care were offset by higher medical use and costs after discharge, specifically more emergency department visits and more readmissions.[12] The results of our study indicate that the rate of readmission within 30 days was similar between hospitalist-led and oncologist-led teams. In comparison with national readmission statistics, our 30-day readmission percentages of 14% with hospitalists and 16% with oncologists were quite favorable, considering that 90% of our studied patient population had metastatic GI malignancies. Data from the Dartmouth Atlas of Healthcare, which are taken from records of Medicare beneficiaries, showed that in 2010, readmission within 30 days occurred in 31.8% of all US medical discharges.[13] Given that there is much regional variation in the delivery of health care, in 2010, it was found that the borough of Manhattan in New York City had a 17.3% rate of readmission within 30 days of discharge for all medical patients.[14]

There is a suggestion in the literature that hospitalists may reduce unnecessary inpatient testing because of their expertise in hospital medicine.[15] However, we did not find a difference in the number of radiographic studies or laboratory tests ordered per patient between hospitalist-led and oncologist-led teams. This could suggest that these tests are being driven by medical indications rather than preference by type of provider or that at academic institutions, it is often house staff who have a stronger role in number of tests and studies ordered. Decreasing unnecessary testing would involve education of house staff, and hospitalists may be more readily available to educate house staff on diagnostic workup of hospitalized patients as well as implementation of evidence-based clinical guidelines to assist with ordering tests.

We found that disposition on discharge was not different between groups and that a majority of our patients were routinely discharged home. This suggests that discharge patterns do not differ among hospitalist-led and oncologist-led teams and that patient performance status and social environment may be more important factors in disposition after hospitalization. Anecdotally, we observed that some physician recommendations, particularly suggestions for hospice, were not heeded by patients or their family members. Disposition to hospice programs accounted for 17% of hospitalist-led and 13% of oncologist-led discharges, and future areas of intervention and research would be to examine patient and family rationales for resistance to hospice programs. This area needs to be investigated further, given our patient population with metastatic solid tumors and multiple comorbidities with limited anticipated life expectancy.

There are several limitations to our study. The results of our study are generalizable to hospitalist- or oncologist-led house staff teams at tertiary care cancer hospitals; the impact of hospitalists in other types of hospitals or on nonteaching services remains unknown. Our data do not allow us to draw any conclusions beyond a lack of difference, and more data are needed to speculate about the reasons for this lack of difference. Moreover, our results are limited to a specific population of patients and may be different in non-GI cancers. Additionally, we present our data sorted according to discharge attending for analysis rather than by team; when we did examine the data by team, we found no statistically significant difference in any of our measures. We did not examine the insurance status of patients in our study, which could have affected the results. We also did not use admitting diagnosis to describe the patients in the sample, because we have found these diagnoses by administrative review to be inaccurate, and medical record review was beyond the scope of this study. Medical record review may have also enabled us to determine whether the number of medical consultations obtained by hospital-led versus oncologist-led teams varied. Our data also lacked longitudinal follow-up of these patients to determine important clinical outcomes, such as return to systemic chemotherapy.

The similarities between hospitalist- and oncologist-led teams indicate that these measurements may be driven more by patient needs and illness among hospitalized oncology patients rather than by provider. We believe our study is a first step in investigating the role of hospitalists in caring for hospitalized patients with cancer. Other areas of study in hospitalist care of oncology patients include examining continuity in medical care, investigating clinical outcomes, determining impact on cost, assessing effects on medical education and house staff interaction, and evaluating patient satisfaction. Moreover, it would be interesting to examine whether there is increased clinical and academic productivity among oncologists with use of a hospitalist program on inpatient services. We conclude from this investigation that a hospitalist-led inpatient service with house staff represents a novel approach for caring for hospitalized GI oncology patients with cancer.

Authors' Disclosures of Potential Conflicts of Interest

Disclosures provided by the authors are available with this article at jop.ascopubs.org.

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