

Assessment of Hospitalist-Subspecialist Agreement About Who Should Be in Charge and Comparison With Actual Assignment Practices

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ABSTRACT

BACKGROUND: A key juncture in patient hospitalization is determining which type of physician should be primarily responsible for directing treatment. We (1) examine the frequency hospitalists and subspecialists agree on preferred assignments and (2) compare preferred assignment with actual assignment.

METHODS: Using a mixed methods approach, we first surveyed 66 physicians in 8 specialties about hospitalist assignments versus subspecialist assignments for 176 diagnoses at an academic children's hospital. Agreement was calculated by using the interrater reliability coefficient, P_i . We subsequently compared survey responses to actual hospitalization data from January 2009 to August 2015.

RESULTS: Specialty and physician response rates were 100% and 44%, respectively. For preferred assignment among hospitalists and specialists, some diagnoses (eg, gastroesophageal reflux, syncope) experienced high agreement ($\pi = 0.714-1.000$); other diagnoses (eg, Guillain-Barre, encephalopathy) had less agreement ($\pi = 0.000-0.600$). Hematologists and oncologists agreed among themselves most frequently (73%); endocrinologists agreed among themselves least frequently (9%). Perceptions of agreement were often higher than actual survey results. Of the 25 highest volume diagnoses, 7 were conditions with consensus ($P_i \geq 0.6$) about assignment, and of those conditions, 6 were assigned to a subspecialist at least 50% of the time, although consensus indicated a hospitalist should have been assigned (1597 hospitalizations).

CONCLUSIONS: This is the first study used to analyze preferences of hospitalist-subspecialist assignment and show variation from actual practice. Although physicians assessed the same patient information, agreement on preferred assignment varied noticeably across diagnoses and subspecialties. With our results, we reveal potential challenges in integrating hospitalists with other specialists and provide evidence for standardizing certain aspects of physician roles.

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There is increasing awareness that health care is delivered by teams rather than individuals and that a clear understanding of each individual's roles and responsibilities is important for safe and reliable team functioning.^{1,2} Inpatient care teams are led by physicians, but little is known about how hospital-based physicians (who can either be hospitalists or subspecialists) negotiate or navigate their respective roles during hospital admissions. Both bring expertise to the care of the patient during a hospital admission, but one or the other must assume primary responsibility.

With the increasing prevalence of hospitalists in the last 2 decades, primary responsibility for inpatient admissions has shifted from outpatient physicians to hospitalists.³ As hospitalist roles have become more prominent in the inpatient setting, the blurring of hospitalist-subspecialist roles frequently leads to jurisdictional ambiguity or disagreements, creating challenges in determining which specialty bears primary responsibility for a hospitalized patient.⁴ However, despite the challenges that arise when roles can overlap, researchers emphasize the importance of coordinated patient care in which roles are well defined between hospitalists and subspecialists.^{5,6} Yet, despite the widespread presence of hospitalists, physicians' perspectives on the implementation of the role vary markedly, and there is a need to understand such differences in opinion that may stem from a lack of clarity around role functions.^{7,8}

Specifically, as hospitalist functions become widespread and evolve, 2 complications surface that have the potential to disrupt clinical practice among physicians across disciplines. First, specialist-hospitalists, such as neurology-hospitalists, are becoming more common, blurring roles even further. Second, hospitalists comanage patients alongside other medical specialists now more than ever in the United States; however, authors of few studies have examined what effective comanagement practices look like.⁹ Both of these trends challenge professional notions of expertise and jurisdiction over particular patient

conditions, potentially having detrimental effects on collaborative practices, accountability, and the appropriate delivery of care. Unpacking differences in management of pediatric conditions can lend to improvements in quality, safety, appropriate workflows, and resource use.¹⁰

Thus, with our study, we set out to explore the practice of physician assignment, both perceived and actual, for 176 common conditions that reveal potential ambiguity in hospitalist-subspecialist assignment for inpatient pediatric admissions. Specifically, we (1) examine how frequently hospitalists and subspecialists prefer diagnoses to be assigned to them for a hospital admission and (2) compare those assignment preferences with actual assignment.

METHODS

Setting

This study was set within a 300-bed academic children's hospital on the west coast of the United States. Patients can be admitted from numerous sources (eg, ED admissions, lateral transfers) to any service within the hospital depending on the condition of the patient. Admitted patients are first called into an access center where basic information is collected and subsequently communicated to the "doctor of the day," a hospitalist who suggests hospitalist or subspecialist assignment. Whereas some diagnoses have clear norms around assignment (eg, "bread and butter" conditions like pneumonia and bronchiolitis), often assignments can vary, and any physician assigned to a patient by the doctor of the day can contest those initial assignments.

At this hospital, hospitalists comanage patients alongside subspecialist physicians, meaning that hospitalists may be assigned as the primary attending (or the foremost decision-maker in treating a patient), whereas the subspecialist may be a consultant physician (who only provides decision support to the hospitalist on a required or optional basis), or vice versa. It should be noted that US hospitals vary in the practice of physician assignment, and this study is most directly comparable to settings in which hospitalist or

subspecialist services could be assigned either primary or consulting responsibilities for many conditions on a case-by-case basis.

Data Collection: Survey to Assess Perceptions of Assignment

A 19-item online survey was administered through Qualtrics software to physicians in the following specialties: hospital medicine, cardiology, endocrinology, gastroenterology, hematology and oncology, neurology, pulmonology, and rheumatology. The first author designed the survey while closely working with the division head of hospital medicine and the director of research at the hospital. Cognitive interviews were also performed on a pilot version of the survey to 3 hospitalists to ascertain respondents' interpretations of questions. Approximately 3 months before administering the survey, the first author gave presentations at a leadership meeting for division heads and an all-faculty meeting, explaining the purpose of the survey and inviting feedback. After a final version of the survey was developed and administered, e-mail reminders were sent midway and 1 week before the conclusion of the 1-month response period.

Although the survey contained questions about current assignment practices and respondent demographics, the primary aim of the survey was to assess preferences of hospitalist or subspecialist assignment to a set of subspecialty-specific top diagnoses. Subspecialists responded to only their subspecialty's top diagnoses, whereas hospitalists responded to diagnoses in 2 subspecialties (randomized). Initially, the top diagnoses were composed of the most frequently admitted patient conditions by subspecialty for the past year, as identified by the health information management department at the hospital. Next, subspecialty division heads vetted their respective top diagnoses to generate the most representative list of fairly common patient conditions that needed assignment guidelines, because the survey would be used to facilitate clearer rules around primary and/or consultant assignments for common conditions that were not dictated by institutional norms. With the survey instructions, we asked respondents to specify whether hospitalists or subspecialists

should be the primary or consultant attending; respondents could also select the option “unsure – my selection depends greatly on other factors” (~5% of all responses and excluded from the analysis). Our question was phrased to incite responses that were perceptions of how assignments should be, rather than what the current state might dictate. Although we recognize that respondents’ experiences with the actual assignment process in their given context could influence their beliefs about roles, our chosen setting and survey design were created to mitigate that as much as possible. This study was determined as exempt status by the institutional review board of the subject children’s hospital before data collection.

Agreement Measure

Because our purpose with this study was to analyze agreement on physician assignment at the diagnosis level, we did not use measures such as Gwet’s agreement coefficient or Krippendorff’s α , which would force us to aggregate responses for all diagnoses. Instead, we used the reliability coefficient, P_i , which is part of Fleiss’ derivation of the interrater reliability measure, κ^{11} :

$$P_i = \frac{1}{n(n-1)} \sum_{j=1}^k n_{ij} (n_{ij} - 1),$$

where n is the number of raters, “ i ” is the subject unit being rated (ie, top diagnosis), and “ j ” represents categories selected by raters (ie, hospitalist primary or subspecialist primary). The advantages of using P_i include the following: (1) P_i may be used with small or varying sample sizes; (2) agreement is weighted by the number of raters, meaning that diagnoses with fewer physician raters will have an adjusted P_i value; and (3) P_i reflects agreement when raters have previous knowledge and chance ratings are unlikely. The value of P_i ranges from 0 (perfect disagreement) to 1 (perfect agreement).

P_i was calculated among hospitalists, among subspecialists, and among both hospitalists and subspecialists for each top diagnosis. To make clearer comparisons of agreement across diagnoses and subspecialties, we used a threshold of at least 0.6 to identify diagnoses with sufficient

agreement (or “consensus”) among physician respondents, which is consistent with other applications of interrater agreement measures.¹² In practice, consensus diagnoses reveal minimal or no discord in physician assignment and are amenable to guidelines around practice. However, diagnoses with no consensus could be those in which physicians believe both hospitalists and subspecialists possess requisite skills to handle care of the patient. Such diagnoses are prone to negotiations over who should be assigned to patients, which can hinder the provision of appropriate and timely care.

Data Collection: Medical Records to Assess Actual Assignment

To compare survey results to hospitalists’ and subspecialists’ actual assignments for a given condition, we collected medical record

data from the children’s hospital for patients hospitalized from January 2009 to August 2015 with a principal diagnosis of those in the survey. We analyzed diagnoses appearing at least 5 times in the data set and identified when a hospitalist or a subspecialist was the physician of record for each condition.

RESULTS

Eight specialties were invited to take the survey (100% response rate), with 66 physicians (response rate ~44%) participating. The nonresponse rate was 39% hospitalist versus 61% subspecialist and 63% male respondents versus 60% female respondents. In Table 1, we illustrate the demographic differences between hospitalist and subspecialist respondents. These results reveal that on average, compared with subspecialists, hospitalists tended to be

TABLE 1 Comparison of Demographic Characteristics of Hospitalist and Subspecialist Respondents

Demographic Characteristic	Hospitalists ^a (<i>n</i> = 20)	Subspecialists ^a (<i>n</i> = 46)	<i>P</i>
Age, y			<.01 ^b
≤30	6%	3%	
31–40	89%	48%	
41–50	0%	20%	
51–60	6%	10%	
>60	0%	20%	
Male respondent	44%	45%	.97 ^b
Ethnicity			.67 ^b
White (non-Hispanic)	53%	64%	
African American	6%	0%	
Hispanic or Latino	6%	0%	
Asian or Pacific Islander	24%	25%	
Native American	0%	0%	
Multiracial	12%	6%	
Other	0%	6%	
Dependents in household, average	1.1	1.3	.07 ^c
Years postresidency, average	6.2	14.6	<.01 ^c
Years working at the hospital, average	5.4	11.0	<.01 ^c
Position			.35 ^b
Attending physicians	89%	84%	
Fellows	11%	16%	
Inpatient wk, average	15.0	9.0	.14 ^c

^a May not sum to 100% because of rounding to the nearest whole number.

^b Wilcoxon-Mann-Whitney test.

^c One-way analysis of variance.

younger, have fewer years of experience (years postresidency, years working at this particular hospital, and years practicing in their current domain), and have more weeks per year serving in the inpatient clinical setting.

We capture the variation in actual assignment of a hospitalist versus subspecialist for each of the highest volume conditions in the data set and compare the preferred assignment with the actual assignment in Table 2. The table reveals the preferred physician assignment on the basis of the survey responses and the related agreement score among hospitalists and subspecialists. Our sample contained 5050 hospitalizations for a subset of the top diagnoses (59 total). Assignment varied at least 15% of the time for 61% of the diagnoses and at least 25% of the time for 35% of the diagnoses (unadjusted). Of the diagnoses in Table 2, 7 were conditions in which hospitalists and subspecialists had consensus ($P_i \geq 0.6$) about assignment. Of those conditions, 6 were assigned to a subspecialist at least 50% of the time when the consensus preference indicated a hospitalist should have been in charge (1597 hospitalizations).

In Table 3, we show the perceived and actual consensus within (in-group consensus) and across (out-group consensus) hospitalist and subspecialist groups, comparing perceived and actual consensus to capture the degree to which physicians' perceptions about agreement matched reality and to expose potential "blind spots" in which physicians may incorrectly think there is little disagreement. Such findings could be used to help elucidate areas of potential resistance to modifying physician assignment, because there would likely be less desire to streamline practices if physicians presume concordance. Perceived consensus was measured from a survey question in which we asked respondents the percent of time they thought their physician colleagues agreed with their primary and/or consultant assignment selections within and outside their specialty.

In the table, we rank each subspecialty from highest to lowest percentage of diagnoses with actual out-group consensus (ie, among

both hospitalists and subspecialists), as reflected in the right-most column. Rheumatology (78%) and hematology and oncology (70%) had the highest percentage of consensus diagnoses, whereas endocrinology (27%) and gastroenterology (35%) had the lowest. The actual out-group consensus was lower than the actual in-group consensus for 3 of the 7 subspecialties. In addition, the perceived in-group consensus was higher than the actual in-group consensus for 6 of the 8 services surveyed, whereas the perceived out-group consensus was higher than the actual for 4 of the 7 subspecialties.

We illustrate the variation in agreement about primary attending selections among hospitalists and subspecialists for the 7 subspecialties in Fig 1. For each subspecialty, the percentages of diagnoses that had a $P_i \geq 0.6$ (consensus) is shown, as well as whether a subspecialist or a hospitalist was selected for those diagnoses. Over 50% of the diagnoses revealed no consensus ($P_i < 0.6$) in 3 of the 7 subspecialties (endocrinology, gastroenterology, and neurology). Additionally, 3 of the 7 subspecialties revealed higher consensus for diagnoses in which a subspecialist was selected to be in charge, rather than a hospitalist.

DISCUSSION

With this study, we support the notion that disagreement over and negotiation of physician roles exists within inpatient pediatrics. First, we find that hospitalists and a variety of subspecialists can disagree among themselves and with one another about whether their specialty should be in charge over a wide range of diagnoses during inpatient admissions. Second, our study is unique in that we use it to compare physicians' preferences with actual assignments across multiple specialties and multiple diagnoses. In analyzing this comparison, we show that even when hospitalists and subspecialists agreed completely among themselves and with one another, patients' actual assignment was often different from that which was agreed upon (eg, syncope). Although some of the variation in consensus within and across subspecialties is expected because of a

wide variety of factors (eg, particular relationships with patients, general staffing issues), the degree to which variation can exist and how actual assignment can differ from preferred assignment even when there is complete consensus regarding preferences, is a key finding.

This study also has important implications for how to improve pediatric inpatient care and safety. Certainty about who is in charge can have the benefit of timely or effective care (eg, fewer excessive diagnostic tests, futile or persistent handoffs)¹³; however, it also may diminish the benefits of comanagement. On the other hand, comanagement can have its own share of woes, which include diffused authority (and therefore reduced accountability) over the care of patients. Although it is hard to change physician practice styles,¹⁴ exploring the division of labor among teams of physicians that have potential overlap in expertise has merit in allowing for the enhancement of training programs and initiation of robust dialogue around role identification and collaborative practice. Lastly, this work is used to inform the implementation of novel roles that shift jurisdictions of other professionals. In particular, authors of few studies compare physician practices when expertise has the potential to overlap, and authors that do so examine such practices in the context of 1 or a few diagnoses.¹⁵

Through our analysis, we present opportunities for clinicians in different settings and future research in this area to assess why hospitalists and subspecialists might demonstrate variation in perceptions of assignment. For example, after an initial examination of the types of consensus diagnoses (examples in Table 2), we found that high agreement could result for multiple reasons, beyond such factors as culture across specialty units and physician experience or personality types. Such instances could include situations in which either the patient's condition was unrelated to some underlying chronic issue and would therefore prompt the patient to go to a hospitalist, or alternatively, the patient's condition involved an exacerbation of the underlying chronic condition, in which case

TABLE 3 Comparison of Perceived and Actual Percentage of Top Diagnoses With In-Group and Out-Group Consensus, by Division

Specialty	Total Invited ^a (%)	In-Group Consensus		Out-Group Consensus	
		Perceived, %	Actual ^b , %	Perceived, %	Actual ^c , %
Rheumatology	8 (50)	86	70	79	78
Hematology and oncology	34 (29)	71	73	48	70
Pulmonology	15 (40)	76	64	63	64
Cardiology	15 (40)	72	72	70	64
Neurology	9 (56)	81	53	42	47
Gastroenterology	20 (35)	85	32	80	35
Endocrinology	16 (50)	87	9	77	27
Hospital medicine	33 (61)	72	54	57	—

—, not applicable.

^a Percentage in parentheses represents approximate response rate by division.

^b Percentage for hospital medicine reflects diagnoses with consensus among hospitalists as a percentage of all diagnoses.

^c Percentage of diagnoses with consensus among hospitalists and respective subspecialists by division; the table was sorted on the basis of this column.

academic children's hospitals is clinically important because such institutions tend to care for larger proportions of children with disabling or complex medical conditions and therefore employ a wide range of hospitalists and subspecialists. Thus, problems related to physician leadership on inpatient teams within academic children's hospitals may be particularly present and important to solve. Although particular levels of agreement or disagreement for a set of diagnoses at a single academic children's hospital may not necessarily translate to other institutions, the fact that there is weak agreement among and across hospitalists and subspecialists for common diagnoses and that actual assignment may defy consensus when it is present is likely to hold true.

CONCLUSIONS

With this study, we provide groundwork for examining how physicians can enact different judgments when presented with the same facts. With our study, we can inform efforts to standardize physician assignment and streamline workflow by identifying and minimizing points of

the subspecialist would be more readily identified as the primary attending (eg, rheumatoid arthritis). Because these are intuitive interpretations of diagnoses with and without consensus, future work could entail a systematic analysis of the types of diagnoses that would produce more or less

agreement on physician assignment and subsequently be used to facilitate identification of diagnosis types amenable to assignment standardization.

Our study is limited by the fact that it was conducted at a single institution. However, clarity around physician assignment at

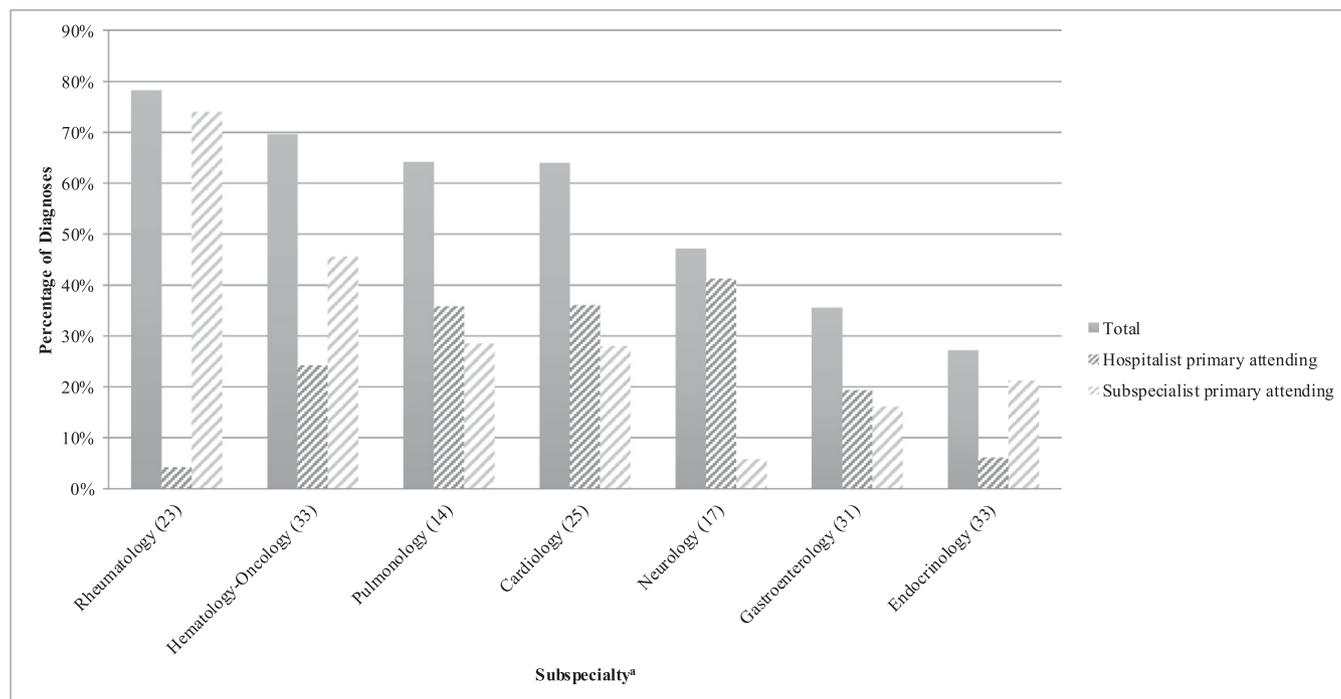


FIGURE 1 Percentage of diagnoses by subspecialty revealing consensus ($P_1 \geq 0.6$) among hospitalists and subspecialists. ^a The numeric value in parentheses represents the number of top diagnoses in the survey for each subspecialty (total of 176 top diagnoses); subspecialties are sorted from highest to lowest percent of diagnoses with consensus.

contestation over assignment while negotiating professional identity and enhancing comanagement practices such that patient care is improved.

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REFERENCES

1. Song H, Ryan M, Tendulkar S, et al. Team dynamics, clinical work satisfaction, and patient care coordination between primary care providers: a mixed methods study. *Health Care Manage Rev*. 2017;42(1):28–41
2. Valentine MA, Nembhard IM, Edmondson AC. Measuring teamwork in health care settings: a review of survey instruments. *Med Care*. 2015;53(4):e16–e30
3. Berry JG, Hall M, Hall DE, et al. Inpatient growth and resource use in 28 children's hospitals: a longitudinal, multi-institutional study. *JAMA Pediatr*. 2013;167(2):170–177
4. Oh H. Hospital consultations and jurisdiction over patients: consequences for the medical profession. *Sociol Health Illn*. 2014;36(4):580–595
5. Stille CJ, Primack WA, Savageau JA. Generalist-subspecialist communication for children with chronic conditions: a regional physician survey. *Pediatrics*. 2003;112(6 pt 1):1314–1320
6. Stille CJ, Jerant A, Bell D, Meltzer D, Elmore JG. Coordinating care across diseases, settings, and clinicians: a key role for the generalist in practice. *Ann Intern Med*. 2005;142(8):700–708
7. Srivastava R, Norlin C, James BC, Muret-Wagstaff S, Young PC, Auerbach A. Community and hospital-based physicians' attitudes regarding pediatric hospitalist systems. *Pediatrics*. 2005; 115(1):34–38
8. Freed GL, Brzoznowski K, Neighbors K, Lakhani I; American Board of Pediatrics, Research Advisory Committee. Characteristics of the pediatric hospitalist workforce: its roles and work environment. *Pediatrics*. 2007;120(1): 33–39
9. Mayer ML, Skinner AC, Freed GL. Interspecialty differences in the care of children with chronic or serious acute conditions: a review of the literature. *J Pediatr*. 2009;154(2):164–168
10. Friedman J. The hospitalist movement in general pediatrics. *Curr Opin Pediatr*. 2010;22(6):785–790
11. Fleiss JL. Measuring nominal scale agreement among many raters. *Psychol Bull*. 1971;76(5):378–382
12. Krippendorff K. *Content Analysis: An Introduction to its Methodology*. Thousand Oaks, CA: Sage; 2012
13. Stavert RR, Lott JP. The bystander effect in medical care. *N Engl J Med*. 2013; 368(1):8–9
14. Greco PJ, Eisenberg JM. Changing physicians' practices. *N Engl J Med*. 1993;329(17):1271–1273
15. Eames J, Eisenman A, Schuster RJ. Disagreement between emergency department admission diagnosis and hospital discharge diagnosis: mortality and morbidity. *Diagnosis (Berl)*. 2016; 3(1):23–30