



Original Investigation | Health Policy

Prevalence and Characteristics of Potentially Avoidable Interhospital Transfers

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Abstract

IMPORTANCE Interhospital transfer (IHT) among hospitalized medical patients is common, yet little is known about which patients undergo potentially avoidable IHT.

OBJECTIVE To determine the prevalence and characteristics associated with potentially avoidable IHT among hospitalized medical patients.

DESIGN, SETTING, AND PARTICIPANTS This cross-sectional study was conducted across 16 US referral hospitals. Participants were randomly selected adult medical patients who underwent IHT to participating hospitals between March 1, 2022, and October 31, 2023. Data were analyzed December 2025 through May 2026.

EXPOSURES Demographics, primary diagnosis category, and severity and vulnerability risk scores obtained from the Vizient Clinical Data Base, and transfer process characteristics obtained through targeted electronic health record review.

MAIN OUTCOMES AND MEASURES Potentially avoidable transfers were defined as transfers in which care needs could have been met through an alternative to transfer, managed at the transferring hospital, or did not require urgent management during that hospitalization. Two trained adjudicators independently rated transfer appropriateness using a 6-point Likert scale (highly inappropriate through highly appropriate) and reached consensus; transfers rated inappropriate were classified as potentially avoidable. Multivariable logistic regression clustered by site was used to identify characteristics associated with avoidable IHT, correcting for multiple testing.

RESULTS Of 1560 medical patients transferred, the mean (SD) age was 59.2 (16.4) years, and 901 (57.8%) were male. Overall, 374 transfers (24.0%) were classified as potentially avoidable. Among these transfers, 250 (66.8%) had a care need that could have been managed at the transferring hospital, 186 (49.7%) could have been managed using at least 1 alternative to transfer under current systems of care, and 233 (62.3%) under ideal systems of care, with teleconsultation the most commonly identified alternative (111 [29.7%] for current care and 165 [44.1%] for ideal care). Factors associated with greater adjusted odds of avoidable IHT included transfer delayed more than 24 hours (adjusted odds ratio [AOR], 1.42 [95% CI, 1.06-1.90]), lower severity risk score (AOR, 1.70 [95% CI, 1.25-2.31]), admission to a specialty service categorized as other (eg, hepatology, gastroenterology, and kidney) (AOR, 2.14 [95% CI, 1.35-3.40]), transfer for care continuity (AOR, 2.35 [95% CI, 1.45-3.79]) or for patient or family preference (AOR, 26.60 [95% CI, 12.11-58.45]). Secondary transfer reasons involving need for specialized procedural (AOR, 0.38 [95% CI, 0.23-0.63]) or nonprocedural (AOR, 0.39 [95% CI, 0.24-0.63]) care were associated with lower odds of avoidable transfer.

(continued)

Key Points

Question What is the prevalence of potentially avoidable interhospital transfer (IHT) among hospitalized medical patients, and what factors are associated with potentially avoidable IHT?

Findings In this cross-sectional study of 1560 adult medical patients who underwent IHT to 16 US hospitals, 374 transfers (24%) were potentially avoidable. Avoidable transfers were more common among lower-acuity patients, delayed transfers, and transfers driven by care continuity or patient or family preference, with teleconsultation identified as the most common alternative to IHT.

Meaning These findings indicate that nearly one-quarter of medical IHTs may be avoidable, suggesting opportunities to reduce transfers through telehealth-based alternatives and strategies targeting lower-acuity patients and nonmedical drivers of transfer.

+ Supplemental content

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Abstract (continued)

CONCLUSIONS AND RELEVANCE In this cross-sectional study of 1560 medical patients who underwent IHT, nearly one-quarter of the transfers were potentially avoidable. Many could have been managed at the transferring hospital or through alternatives such as teleconsultation, suggesting opportunities to reduce avoidable transfers. Future efforts should explore telehealth-based alternatives and approaches targeting lower-acuity patients and nonmedical drivers of transfer while maintaining patient-centered care.

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Introduction

Interhospital transfer (IHT) involves the coordinated movement of patients between acute care hospitals in order to access resources unavailable at the referring hospital. IHTs are common, with over 1 million Medicare beneficiaries undergoing IHT annually,¹ particularly among patients admitted to the intensive care unit (ICU)² and those with high-acuity cardiac diagnoses, such as acute myocardial infarction.³ Rural hospitals in particular frequently depend on IHT for higher-complexity cases.⁴ Transfers are a fundamental aspect of the relationship between community and tertiary or quaternary care hospitals, enabling specialized care that cannot be feasibly offered across all hospitals (eg, stroke centers and organ transplants).⁵ Although federal regulatory oversight and standards exist for patient transfers from the emergency department of one facility to another via the Emergency Medical Treatment and Labor Act (EMTALA) laws,⁶ there are limited specific guidelines or requirements for transfers after a patient is admitted aside from select clinical scenarios (eg, burn unit) or state-specific policies and laws.

Under ideal circumstances, all transfer decisions are made with the goal to ensure patients get the right care, in the right place, at the right time.^{7,8} In reality, however, the factors that drive IHT following hospital admission are highly variable in ways that are not solely explained by differences in patient need nor hospital capabilities.¹ Unlike transfers that originate from the emergency department, which are often shaped by EMTALA requirements and regionalized systems of emergency care, decision-making regarding IHT of hospitalized patients, including selecting patients most appropriate for transfer, is a complex process involving various medical and contextual factors.⁹ This is particularly true among medical patient transfers, given the heterogeneity in their diagnoses and care needs.^{1,10} As such, most IHT is left to a range of considerations, leaving practices highly variable¹¹⁻¹⁴ and leaving patients vulnerable to potentially unnecessary or avoidable IHT that may lead to prolonged hospitalization, higher costs, and other quality and safety outcomes.^{10,11,15-20} In this study, we aimed to identify and understand which hospitalized medical patients may be exposed to the risks of discontinuity of care and high resource use associated with IHT despite limited clinical benefit, that is, undergoing potentially avoidable transfer.

Methods

This cross-sectional study was approved by the Mass General Brigham institutional review board serving as the single institutional review board for all participating sites. Given the minimal risk of the study, a waiver of informed consent was granted. Although patient identifiers were accessible at individual sites for data abstraction purposes, all data were deidentified and assigned study-specific identifiers before transfer to the central study team for analysis. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines for cross-sectional studies.

Study Design and Setting

The Identification and Prevention of Potentially Avoidable Inter-Hospital Transfers (POINT) study was a cross-sectional cohort study that aimed to define and evaluate the prevalence and impact of potentially avoidable IHT across a nationally representative sample at 16 tertiary or quaternary care referral hospitals. Participating hospitals were recruited in partnership with the Hospital Medicine Reengineering Network,²¹ a national network of hospital medicine clinicians across over 50 affiliated sites with a long track record of conducting multisite research to evaluate and improve hospital-based care.²²⁻²⁴ Hospitals were eligible to participate if they cared for more than 500 patient transfers per year; had an established data-sharing relationship with the Vizient Clinical Data Base (CDB),²⁵ a virtual data enterprise that houses data from over 4900 hospital members across the US; and could identify 2 site leads to direct site-specific grant operations, including medical record adjudications involved in this phase of the study.

Data Sources and Study Population

Each site conducted retrospective medical records reviews on randomly selected adult medical patients who underwent an IHT to their site between March 1, 2022, and October 31, 2023. Potential patients for inclusion were generated by Vizient CDB²⁵ using a defined data element of admit source as transfer from an acute facility. Medical patients were identified based on the *International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)* codes of their admitting diagnosis based on the Centers for Medicare & Medicaid Services all-cause readmissions definition of patients with medicine, cardiovascular, or cardiorespiratory conditions, as has been used in prior similar research.²⁴ Each site first conducted prescreening of the Vizient-generated list via targeted electronic health record (EHR) review to determine eligibility, including transfer to a medical service at the receiving hospital. Patients were excluded if they were transferred from a noninpatient hospital location (eg, emergency department), subacute care hospital, psychiatric hospital, or outpatient clinical setting or if they were cared for by the adjudicator during their hospitalization, to minimize bias of determination of the outcome. Prescreening was conducted until 100 patients per site met inclusion criteria.

Determination of Potentially Avoidable Transfers

For each included patient, 2 independent adjudicators conducted targeted reviews of clinical documentation using a previously developed adjudication tool (eAppendix in [Supplement 1](#)).²⁶ Clinical documentation included EHR-documented conversations between transferring and receiving hospitals at the time of the transfer request in addition to selected clinical data from the transferring hospital prior to transfer. Adjudicators were all hospital-based clinicians (eg, hospital medicine physicians) who had experience with management of transferred patients. The tool used a consensus definition of potentially avoidable IHT based on prior involvement of key informants involved in IHT, including transferring and accepting clinicians, hospital leadership, and patient or family representatives.²⁷

A potentially avoidable IHT was defined as the transfer of a patient who had a care need that (1) could be appropriately served by an alternative to transfer. Alternatives to transfer included teleconsultation, defined as a range of services from verbal phone consultation to more in depth access to clinical (eg, laboratory or vital sign data) or visual modalities for patient evaluation; expedited outpatient follow-up; engagement of a known clinician who provided care; or other. For each, adjudicators rated whether that alternative existed under ideal or current systems of care; (2) could be appropriately managed at the transferring hospital; or (3) did not require urgent management during that hospital episode (ie, could be referred for outpatient management). After making these determinations for each case, the adjudicator ranked the level of appropriateness of the transfer using a 6-point scale ranging from highly inappropriate to highly appropriate.

Adjudication training emphasized the intent to evaluate each case from the lens of what was known at the time of patient transfer to mitigate hindsight bias based on the patient's care trajectory

following transfer. Additionally, training emphasized consideration for both ideal circumstances, defined as advanced health care offerings available in at least some US hospitals, as has been used in other similar research,²⁸ as well as systems of care currently available at each site (ie, when asking whether a patient could have been appropriately served by an alternative to transfer). Each record was independently reviewed by 2 reviewers. On completion by the second reviewer, any differences in the case assessment were resolved through discussion, after which final determinations were made. Although we did not calculate agreement statistics, our approach represents a shared and final adjudication representing full agreement of 2 physicians, as has been done with similar studies conducted at Hospital Medicine Reengineering Network sites.^{24,29}

Addressing Reliability of Determination of Potentially Avoidable Transfers

Given the potential for subjectivity in the determination of potentially avoidable transfers, we undertook several measures to improve the reliability of the adjudication process and mitigate hindsight bias, similar to other studies that use adjudication methodology.²⁴ First, we conducted rigorous adjudication training on the use of the tool prior to initiation of EHR reviews using standardized cases.²⁶ Second, throughout the duration of site adjudications, we conducted monthly meetings to review cases, answer questions, and ensure consistency in the determination of potentially avoidable transfers. We also updated and shared a sheet of frequently asked questions to address common questions. Throughout initial adjudication training and monthly adjudicator meetings, we emphasized that determination of appropriateness should be from the lens of what was known at the time of patient transfer. Finally, our study team (S.K.M.) performed an overread of every 10th case at each site; if questions arose regarding determination of appropriateness of transfer, we conducted directed outreach to the adjudicators for further discussion to reach consensus.

Transfer Process Characteristics

In addition to determination of potentially avoidable IHTs, the adjudication tool gathered other transfer process variables. These variables included the relationship between transferring and receiving hospital (in-network vs out-of-network, ie, part of the same health system); primary reason for transfer, including anticipated need for specialized procedural care unavailable at the transferring hospital, anticipated need for specialized nonprocedural care unavailable at the transferring hospital, anticipated need for higher level of care (eg, ICU) unavailable at the transferring hospital, patient or family preference, continuity of care, or other primary reason for transfer; and secondary reason(s) (same choices, plus no secondary reason for transfer), among others. Importantly, the selection of reasons for IHT inherently assessed resource limitations at the transferring hospital by designating that anticipated care was unavailable at the transferring hospital.

Vizient Administrative Variables

In addition to the data collected via the adjudication tool, we also used administrative data available within the Vizient CDB,²⁵ which was merged with adjudicated data at the patient level using the corresponding study identification number, patient-level, and receiving hospital-level variables. Besides standard patient demographics, these variable included a primary diagnosis category (based on *ICD-10-CM* 3-letter codes), several Vizient proprietary risk scores, including a Mortality Index, Length of Stay (LOS) Index, and Vulnerability Index,³⁰ as well as receiving hospital-level variables. Patient race and ethnicity were obtained from participating hospital EHRs and abstracted into the Vizient CDB as part of routine data submission. Race and ethnicity categories followed the US Office of Management and Budget race and ethnicity reporting standards and included Asian, Black non-Hispanic, Hispanic, White non-Hispanic, not reported, and unknown. Categories were collapsed for analysis.

Statistical Analysis

We performed descriptive statistics for all baseline characteristics. For determination of potentially avoidable transfers, we used descriptive statistics to view the overall prevalence of appropriateness of transfer across the 6-point Likert scale and then dichotomized, including any patient transfers that were rated slightly inappropriate, inappropriate, or highly inappropriate as potentially avoidable. We evaluated for site-specific variability in prevalence of potentially avoidable transfers stratified by site. Among all potentially avoidable patient transfers, we used descriptive statistics to examine prevalence of explanatory reasons. These reasons included (1) could have been served by an alternative to transfer under ideal vs current systems of care; (2) had a care need that could have been adequately managed at the transferring hospital; or (3) had a care need that was nonurgent in nature. Lastly, we conducted multivariable logistic regression models including all transfer process variables and Vizient administrative variables to identify characteristics associated with potentially avoidable IHT, clustering by site. We first identified potential associations using a 2-sided $P < .05$ and subsequently applied the Benjamini-Hochberg procedure to control for multiple comparisons and assess adjusted significance.³¹ All data were analyzed from December 2025 through May 2026 using SAS, version 9.4 (SAS Institute Inc).

Results

Across 16 included sites, 4477 patients were screened for eligibility, of whom 1560 met eligibility criteria and completed the dual adjudication process (100 per site, with 1 site completing only 60 adjudications). The most common reasons for exclusion were patient transfers from a noninpatient location (1625 [55.7%]) or patient transfers to a nonmedical service (1154 [39.6%]). The mean (SD) age of included patients was 59.2 (16.4) years, 659 (42.2%) were female, and 901 (57.8%) were male (**Table**). Regarding race and ethnicity, 165 (10.6%) were Black non-Hispanic, 124 (7.9%) were Hispanic, and 1046 (67.1%) were White non-Hispanic. In total, 777 (49.8%) reported Medicare as their primary insurance. Among all 1560 patients who underwent IHT, the most common primary reasons for transfer were need for specialized procedural care and need for specialized nonprocedural care (54.3% and 28.9%, respectively); 703 (45.1%) included involvement of consultant services prior to transfer; and 705 (45.2%) had a delay of more than 24 hours between time of acceptance for transfer and time of arrival. Of 156 overread cases by an independent member of the study team (S.K.M.), directed outreach was conducted for 16 cases for further discussion, from which 4 resulted in changes to determination of appropriateness. Thus, agreement was demonstrated in 152 of 156 cases (97.4%) for the third reviewer (S.K.M.) compared with the consensus of the first 2 reviewers.

Results of the ratings across the scale of appropriateness demonstrated that 30 (1.9%) were rated as highly inappropriate, 157 (10.1%) were inappropriate, and 187 (12.0%) were slightly inappropriate (**Figure 1A**), leading to a potentially avoidable transfer rate of 24.0% (374 transfers) (**Figure 1B**). When stratified by site, prevalence of potentially avoidable IHT ranged from 10.0% to 46.0% (**Figure 1C**).

We further quantified 374 potentially avoidable patient transfers under current vs ideal systems of care (**Figure 2**). Under current systems of care, we found that 186 (49.7%) could have been served by at least 1 alternative to transfer, with teleconsultation being the most common (111 [29.7%]) in addition to expedited follow-up (62 [16.9%]) and engagement with a known clinician (42 [11.2%]). We also found that 250 (66.8%) had a care need that could have been adequately managed at the transferring hospital and that 24 (6.4%) had a specialized care need that did not require urgency of care during the time frame of that hospitalization. Under ideal systems of care, we found that 233 (62.3%) could have been served by at least 1 alternative to transfer, with teleconsultation again as the most common (165 [44.1%]), particularly for patients admitted to general medicine ($n = 78$) or ICU services ($n = 80$), and across all primary diagnosis categories. In addition, 14 (3.7%) could have been

Table. Patient- and Hospital-Level and Interhospital Transfer Process Characteristics

Characteristic	Transfers, No. (%)	
	Appropriate (n = 1186)	Avoidable (n = 374)
Patient-level variable		
Age, mean (SD), y	59.3 (16.4)	59.0 (16.2)
Sex		
Male	678 (57.2)	223 (59.6)
Female	508 (42.8)	151 (40.3)
Race and ethnicity		
Black non-Hispanic	119 (10.0)	46 (12.3)
Hispanic	96 (8.1)	28 (7.5)
White non-Hispanic	809 (68.2)	237 (63.37)
Other ^a	162 (13.7)	63 (16.8)
Insurance		
Medicare	585 (49.3)	192 (51.3)
Medicaid	226 (19.1)	78 (20.9)
Commercial	324 (27.3)	92 (24.6)
Other ^b	51 (4.3)	12 (3.2)
Median income by zip code, \$		
<70 000	254 (21.4)	109 (29.1)
70 000-81 999	187 (15.8)	46 (12.3)
82 000-99 999	249 (21.0)	67 (17.9)
100 000-125 000	256 (21.6)	71 (19.0)
>125 000	240 (20.2)	81 (21.7)
Primary diagnosis category at time of transfer ^c		
Diseases of blood and neoplasms	51 (4.3)	18 (4.8)
Diseases of the circulatory system	348 (29.3)	55 (14.7)
Diseases of the digestive system	240 (20.2)	91 (24.3)
External causes of morbidity and injury, poisoning	143 (12.1)	38 (10.2)
Infectious and parasitic diseases	223 (18.8)	88 (23.5)
Diseases of the respiratory system	70 (5.9)	48 (12.8)
Other ^d	111 (9.4)	36 (9.6)
Vizient Mortality Index ^e		
Below expected	457 (38.5)	152 (40.6)
At expected	112 (9.4)	34 (9.1)
Above expected	617 (52.0)	188 (50.3)
Vizient LOS Index ^e		
Below expected	366 (30.9)	150 (40.1)
At expected	279 (23.5)	70 (18.7)
Above expected	541 (45.6)	154 (41.2)
Vizient Vulnerability Index >1 ^f	185 (15.6)	68 (18.2)
Receiving hospital-level variable		
US geographic region		
Midwest	460 (29.4)	141 (37.7)
Northeast	359 (30.3)	108 (28.9)
South	392 (33.1)	23 (6.1)
West	358 (30.2)	102 (27.3)
No. of hospital beds		
<500	51 (4.3)	9 (2.4)
500-750	462 (38.9)	138 (36.9)
>750-1000	460 (38.8)	140 (37.4)
>1000	213 (18.0)	87 (23.3)
No. of transfers received annually, mean (SD)	5405.5 (2256.9)	5808.7 (2798.9)
Relationship with transferring hospital		
In-network	357 (30.1)	98 (26.2)
Out-of-network	829 (69.9)	276 (73.8)

(continued)

Table. Patient- and Hospital-Level and Interhospital Transfer Process Characteristics (continued)

Characteristic	Transfers, No. (%)	
	Appropriate (n = 1186)	Avoidable (n = 374)
Transfer process variable		
Primary reason for transfer ^g		
Need for specialized procedural care	695 (58.6)	152 (40.6)
Need for specialized nonprocedural care	353 (29.8)	98 (26.2)
Need for higher level care (eg, ICU)	43 (3.6)	12 (3.2)
Patient or family preference	10 (0.8)	49 (13.1)
Continuity of care	72 (6.1)	56 (15.0)
Other ^h	13 (1.1)	7 (1.9)
Secondary reason for transfer (multiselect) ^g		
Need for specialized procedural care	186 (15.7)	45 (12.0)
Need for specialized nonprocedural care	541 (45.6)	131 (35.0)
Need for higher level care (eg, ICU)	103 (8.7)	21 (5.6)
Patient or family preference	69 (5.8)	32 (8.6)
Continuity of care	276 (23.3)	102 (27.3)
Other ^h	18 (1.5)	10 (2.7)
No secondary reason for transfer	286 (24.1)	99 (26.5)
Distance between transferring and receiving hospital, miles		
<27	431 (36.3)	144 (38.5)
27-74	391 (32.9)	106 (28.3)
>74	364 (30.7)	124 (33.2)
Involvement of consult service prior to transfer	540 (45.5)	163 (43.6)
Documentation of discussion with family or patient prior to transfer	525 (44.3)	163 (43.6)
Time delay >24 h between acceptance and arrival	514 (43.3)	191 (51.1)
Time of day of patient arrival		
Daytime (7 AM to 5 PM)	329 (27.7)	94 (25.1)
Evening (5 PM to midnight)	520 (43.8)	161 (43.0)
Overnight (midnight to 7 AM)	337 (28.4)	119 (31.8)
Service of admission		
General medicine	280 (23.6)	103 (27.5)
Cardiology	285 (24.0)	45 (12.0)
Oncology or hematology	63 (5.3)	43 (11.5)
ICU	407 (33.3)	113 (30.2)
Other medical service ⁱ	151 (12.7)	70 (18.7)

Abbreviations: ICU, intensive care unit; LOS, length of hospital stay.

^a Includes Asian, other, not reported, and unknown.

^b Includes self-insured and other.

^c Derived from *International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)* codes 3-letter category.

^d Includes diseases of the ear; endocrine, nutritional, and metabolic diseases; diseases of the eye; factors influencing health status; diseases of the genitourinary system; congenital malformations; mental, behavioral, and neurodevelopmental disorders; diseases of the musculoskeletal system and connective tissue; diseases of the nervous system; diseases of the skin and subcutaneous tissue; symptoms, signs, and abnormal clinical findings not elsewhere classified.

^e Vizient Mortality Index and Vizient LOS Index are 2 proprietary measures of illness severity provided by Vizient Clinical Data Base²⁵ involving calculations of measures of individual patient illness severity to determine whether their expected mortality or

LOS is above expected, at expected, or below expected compared with similar patients. Above expected index indicates greater severity of illness; below expected index, lesser severity of illness.

^f Vizient Vulnerability Index is a proprietary measure provided by Vizient Clinical Data Base²⁵ that includes 43 social determinants of health variables across 9 domains including economic, educational attainment, health care access, neighborhood resources, housing, clean environment, social environment, transportation, and public safety. Vulnerability index higher than 1 indicates highly vulnerable population.

^g Primary reason for transfer was a single-select option. Secondary reason for transfer was a multiselect option and was evaluated as checked vs unchecked.

^h Other primary or secondary reason for transfer included capacity at transferring hospital and other.

ⁱ Included any medical specialty service (eg, hepatology, gastroenterology, and kidney).

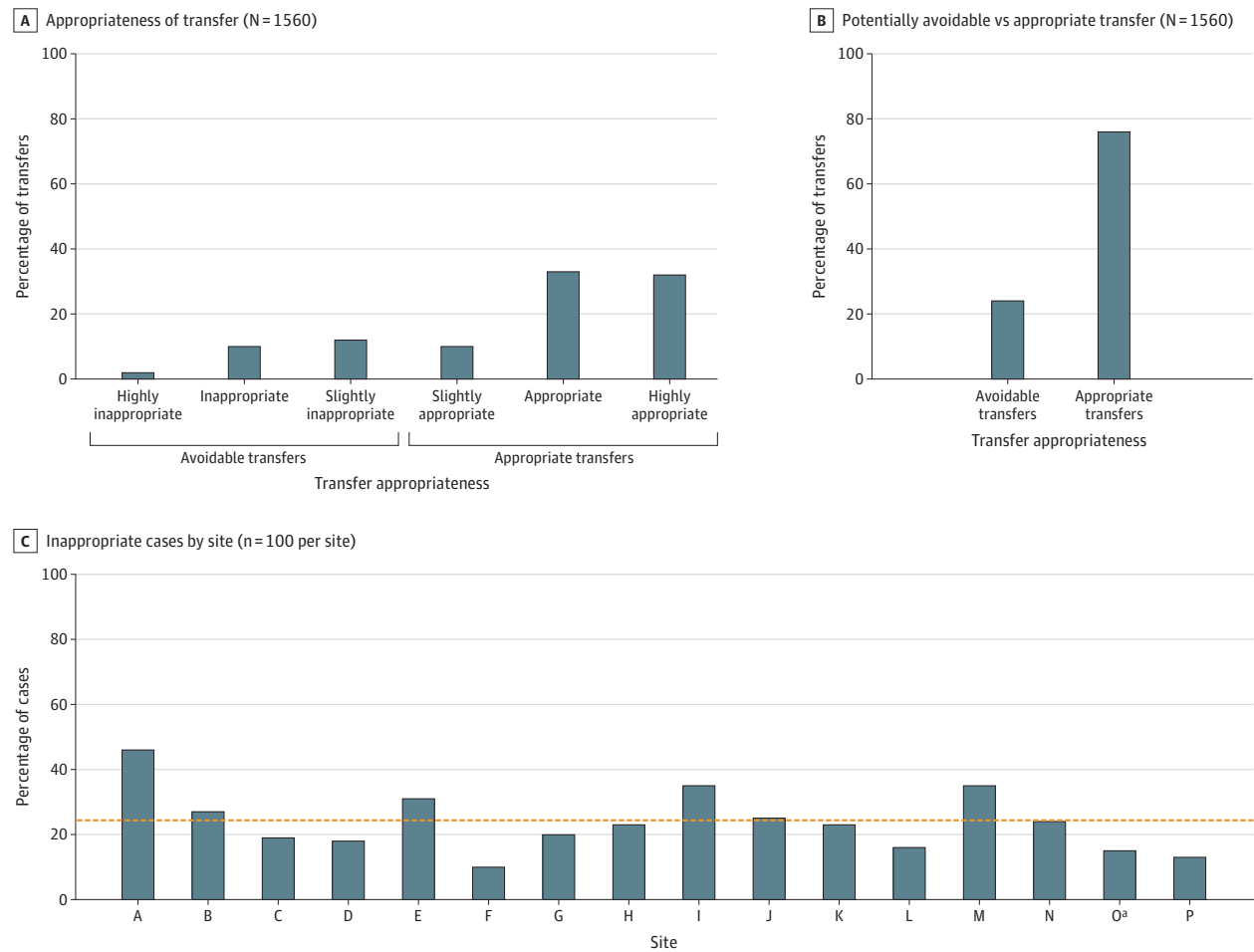
served by expedited follow-up and 33 (8.8%) could have been served by engagement of a known clinician who provided care.

After we accounted for multiple testing, the results of our multivariable analysis found several variables associated with increased adjusted odds of potentially avoidable IHT. These variables included delay of more than 24 hours between time of acceptance and time of transfer (adjusted

odds ratio [AOR], 1.42 [95% CI, 1.06-1.90]), below expected LOS on the Vizient LOS severity index (AOR, 1.70 [95% CI, 1.25-2.31]), other medical specialty service of admission (AOR, 2.14 [95% CI, 1.35-3.40]), and primary reason for transfer of continuity of care and patient or family preference (AOR, 2.35 [95% CI, 1.45-3.79] and AOR, 26.60 [95% CI, 12.11-58.45], respectively) (Figure 3). We additionally found several variables that were associated with decreased adjusted odds of potentially avoidable transfer, including a secondary reason for transfer of anticipated need for specialized procedural care and anticipated need for specialized nonprocedural care (AOR, 0.38 [95% CI, 0.23-0.63] and AOR, 0.39 [95% CI, 0.24-0.63], respectively). None of the patient demographics or hospital characteristics were associated with potentially avoidable transfer.

To facilitate interpretation on the absolute risk scale, we translated AORs into predicted probabilities using the overall study prevalence of potentially avoidable transfer (24.0%) as the reference risk. Under this approach, the predicted probability of potentially avoidable transfer increased from 24.0% to approximately 35.1% for patients with a below-expected LOS on the Vizient LOS severity index and to 89.3% for transfers driven by patient or family preference.

Figure 1. Bar Graphs Showing the Prevalence of Potentially Avoidable Transfers



A, Frequency of ranking of appropriateness of transfer across the 6-point Likert scale across all patient transfers. B, Dichotomized outcome demonstrating prevalence of potentially avoidable transfers. C, Variability in prevalence of potentially avoidable transfers across the 16 included hospital sites (A through P). Orange dashed line represents the mean prevalence of potentially avoidable transfers across all sites.

^a For site O, n = 60 rather than 100.

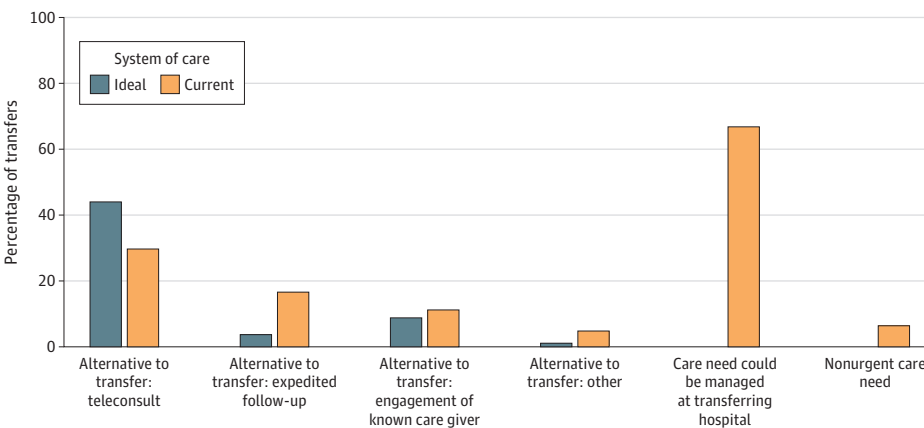
Discussion

In this national study of adult patients who underwent IHT to 16 academic centers, 24.0% of the transfers were potentially avoidable. The majority of potentially avoidable transfers could have been served by alternatives, including teleconsultation, expedited outpatient specialty care, or engagement of a known clinician who provided care. Avoidable transfers tended to be lower acuity, and many patients did not require IHT to obtain more specialized care (ie, it was already available at their initial hospital). Patient and family request and transfer for purposes of care continuity were also associated with avoidable transfer.

Understanding which IHTs may be unnecessary or avoidable is essential to ensure that patients receive appropriate care without exposing them to unnecessary risks related to discontinuity of care. Indeed, the complexity of medical patient transfers has been shown to be high risk, with suggestion of patient harm among selected patient transfers.^{15,32} This understanding is also critical for developing alternative strategies that deliver optimal care without relying on transfer. Moreover, the substantial resources required for IHT combined with current inpatient capacity constraints^{33,34} necessitate prioritization of IHT for patients that truly require tertiary or quaternary level of care so that limited resources are allocated to the patients that need them most. Despite the importance of this issue, limited data have examined appropriateness of IHT. Prior studies have largely focused on potentially avoidable emergent transfers of surgical or trauma patients who present to the emergency department.³⁵⁻³⁸ Among these patients, an estimated 20% to 39% of transfers do not receive surgical care following transfer, suggesting that a substantial portion are also potentially avoidable.³⁵⁻³⁸ To our knowledge, the present study is among the first to evaluate potentially avoidable transfers among hospitalized medical patients, demonstrating similar rates to those observed in surgical and trauma populations.

We found that most potentially avoidable transfers had a care need that could have been managed at the transferring hospital (66.8%) or could have been served by an alternative to transfer under both current (49.7%) and ideal (62.3%) systems of care. Of note, teleconsultation was the most common alternative to transfer under both current and ideal lenses. Other alternatives to transfer were also thought to be appropriate replacements for patient transfer, although less frequently considered than teleconsultation, including expedited outpatient follow-up and engagement of a known clinician who provided care. These results suggest that more robust processes for screening patients for care needs that require transfer may be necessary to ensure necessity of IHT. Furthermore, teleconsultation with a specialist may be an area to target to prevent avoidable transfers. Indeed, the potential for telehealth to connect patients with highly specialized care without transfer has been available in a limited fashion in the US, including telestroke,^{39,40} tele-ICU,⁴¹ and most recently telehospitalist care,⁴² in addition to the surge in use of telehealth since

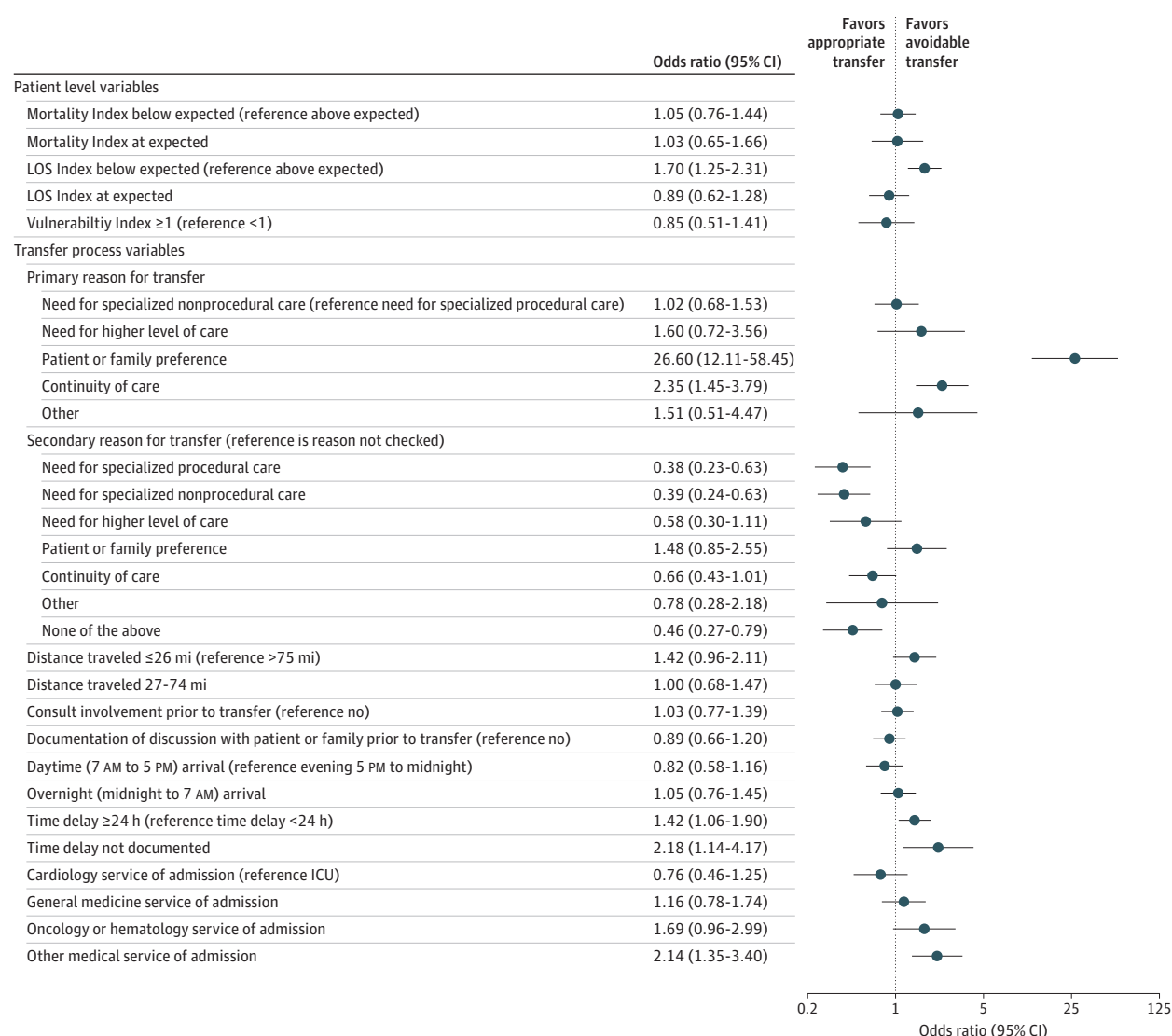
Figure 2. Bar Graph Illustrating Potentially Avoidable Transfers Under Current and Ideal Systems of Care



Frequency of reasons for potentially avoidable transfers as identified under current and ideal systems of care. Other alternatives to transfer included longer duration of observation at transferring hospital to better determine need for transfer, better assessment of patient's goals of care prior to transfer, leave of absence (ie, round-trip transfers), improved resources for patients to be able to attend outpatient specialty care (eg, transportation services), and multidisciplinary review of transplant candidacy prior to transfer. Multiple responses could be selected for each patient.

the COVID-19 pandemic.^{43,44} Despite this increased availability, our results demonstrate that the adoption of telehealth as an alternative to IHT has been limited, presumably due to lack of guidelines to direct its use (eg, which patients would benefit), and the complexities of implementation, such as reimbursement structures and allocation of consultant time, among others. Nevertheless, evolving pressures within health care systems are likely to generate a growing need for more robust telehealth services. Given the rising trend toward health care consolidation,^{45,46} concentration of specialty services within centers of excellence,⁴⁷ and rural hospital closures,^{48,49} reliance on IHT to meet all patients' care needs will be less tenable, particularly with growing capacity constraints.^{33,34,50,51} Thus, future innovations to broaden telehealth as an alternative to transfer will be essential to meet these growing demands in specialty care among hospitalized patients without physical transfer of patients. Given the aforementioned complexities to implementation and adoption of telehealth-based solutions, future feasibility and effectiveness studies are needed to evaluate their influence on both patient-centered and health care utilization outcomes. Such evaluations should also incorporate

Figure 3. Dot Plot of the Associations Between Patient, Hospital, and Transfer Characteristics and Adjusted Odds of Potentially Avoidable Transfers



Secondary reason for transfer was a multiselect option (as opposed to primary reason for transfer, which was a single-select option), with the reason evaluated as checked vs unchecked. ICU indicates intensive care unit; LOS length of hospital stay.

balancing measures, including potential harms of nontransfer, and unintended consequences, such as increased transfer rates resulting from greater specialty involvement.

We also identified several notable factors that were associated with potentially avoidable transfers, including primary and secondary drivers of IHT. Primary reasons for transfer of patient or family preference and continuity of care often indicate a less urgent medical need for transfer as compared with need for specialized procedural or nonprocedural care. These associations warrant further evaluation. Although it is possible that screening for lower patient acuity and patient or family preference or continuity of care (rather than medical necessity) as the primary drivers of IHT may help to reduce potentially avoidable transfers, it is important to recognize these as distinct and potentially important drivers of transfer. For example, a patient or family request for an IHT may reflect a complex interplay of factors, including limited trust in the index hospital, differing perceptions of transferring vs receiving hospitals' reputation or expertise, discordant goals of care, or challenges in patient-clinician communication and shared decision-making.⁹ Similarly, transfers driven by continuity of care often reflect established patient-clinician relationships and may therefore represent an important aspect of patient-centered care. There are limited data that fully explore the mechanisms underlying these transfer decisions. Existing evidence suggests that patients and families are often suboptimally involved in transfer decision-making and may have an incomplete understanding of the rationale for transfer.^{9,19,20} A more comprehensive understanding of these drivers of IHT will require direct engagement of patients and families to better understand the motivations underlying transfer requests, and to identify patient- and family-centered alternatives that may be appropriate in certain circumstances. Such alternatives could include the involvement of a known clinician who provides care or other strategies that promote care continuity while offering assurance that appropriate care is being delivered. In addition, future efforts to develop and evaluate interventions targeting these drivers will need to incorporate outcomes that are meaningful to patients and families, including patient experience and satisfaction.

We additionally found that time delays in transfer and lower patient illness severity were also associated with potentially avoidable transfers. Time delays between patient acceptance and arrival is often inversely correlated with patient acuity, that is, higher-acuity patients are most often prioritized for rapid transfer, while lower-acuity patients are more likely to have delays in transfer.^{52,53} Given the dynamic nature of clinical acuity, reevaluation of the need for transfer every 24 hours could prevent unnecessary IHT of patients who have experienced improvement in their clinical status, thus obviating their need for transfer.⁵⁴

We found that transfer to a medical specialty service categorized as other (eg, hepatology, kidney), as opposed to general medicine, cardiology, oncology or ICU service, was also associated with potentially avoidable transfers. It is possible that these services were more likely to accept longitudinal care patients regardless of medical necessity for transfer. It is also possible that specialists were not appropriately involved in the transfer decision-making, supported by our results demonstrating that less than half of all patient transfers had documented involvement of a consult service prior to transfer. Indeed, existing literature suggests that specialist involvement in transfer decision-making has been recognized as a persistent challenge and an important opportunity for improvement with current IHT practices.¹⁹ This approach may serve as another potential area to target to prevent potentially avoidable transfers.

Limitations

Our study is subject to several limitations. First, given the retrospective study design, there was inherent risk of hindsight bias in determination of appropriateness of IHT. However, we mitigated this bias to the greatest extent possible via rigorous adjudicator training that emphasized evaluating the appropriateness of transfer based on what information was known at time of transfer,²⁶ dual adjudication process to determine appropriateness of transfer, and robust quality assurance practices described in the Methods. Second, we were unable to account for transferring hospital characteristics, or for variability in IHT processes, referral patterns, or alternatives across transferring

or receiving hospitals, which may have added more depth to our evaluation. For example, adjudicators could only consider limitations in specialist availability or level-setting capacity at the transferring hospital when these factors were documented in the EHR or transfer materials, which may have influenced determination of transfer reason and appropriateness. Additionally, although the Vizient composite severity of illness scores were generated from a number of clinical variables, we were unable to account for detailed clinical variables at the time of transfer request other than what was documented in transfer center paperwork. Furthermore, all ratings of appropriateness were conducted by clinicians at the receiving hospital. Although some of the reviewers worked in both transferring and receiving hospital settings, and the definition of potentially avoidable transfer used in the adjudication form was developed with input from transferring clinicians, this approach may have added additional bias to ratings of appropriateness. Third, our study was limited to only 16 referral hospitals, which may limit generalizability of our findings. However, included hospitals are geographically distributed across the country and are generally reflective of hospitals that receive a high volume of patient transfers. Lastly, recognizing that IHT is a complex process with multiple considerations, there is an anticipated false-positive rate, in which some volume of unnecessary transfers is accepted to ensure that we do not prevent necessary transfers. This concept will require further exploration as we move toward interventions that may reduce potentially avoidable transfers, including close measurement of quality and safety outcomes to evaluate potential risks of nontransfer.

Conclusions

In summary, in this cross-sectional study of 1560 medical patients who underwent IHT to 16 hospitals across the US, we found that a substantial volume of transfers was potentially avoidable. Most avoidable IHTs could have been served by an alternative to transfer under both ideal and current systems of care, with teleconsultation being the most common. Exploring expansion of telehealth services as an alternative to patient transfer may be an important target to address potentially avoidable transfers, provided regulatory, financial, and other challenges can be overcome. Screening for patient acuity level in advance of transfer may be an additional area to target as well as improving involvement of patient and family input to better understand drivers of patient request for transfer and exploring acceptable alternatives to transfer.

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Author Contributions: Dr Mueller had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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REFERENCES

1. Mueller SK, Zheng J, Orav EJ, Schnipper JL. Rates, predictors and variability of interhospital transfers: a national evaluation. *J Hosp Med*. 2017;12(6):435-442. doi:10.12788/jhm.2747
2. Wagner J, Gabler NB, Ratcliffe SJ, Brown SE, Strom BL, Halpern SD. Outcomes among patients discharged from busy intensive care units. *Ann Intern Med*. 2013;159(7):447-455. doi:10.7326/0003-4819-159-7-201310010-00004
3. Iwashyna TJ, Kahn JM, Hayward RA, Nallamothu BK. Interhospital transfers among Medicare beneficiaries admitted for acute myocardial infarction at nonrevascularization hospitals. *Circ Cardiovasc Qual Outcomes*. 2010;3(5):468-475. doi:10.1161/CIRCOUTCOMES.110.957993
4. Westfall JM. Transfer as treatment in rural hospitals. *JAMA Netw Open*. 2024;7(3):e241845. doi:10.1001/jamanetworkopen.2024.1845
5. Shaw DL, Haimovich AD, Grossestreuer AV, et al. Operational outcomes of community-to-academic emergency department patient transfers. *Am J Emerg Med*. 2024;86:110-114. doi:10.1016/j.ajem.2024.09.062
6. The Emergency Medical Treatment and Active Labor Act, as established under the Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1985 (42 USC 1395 dd) and 42 CFR 489.24; 42 CFR 489.20 (EMTALA regulations).
7. Newton SM, Fralic M. Interhospital transfer center model: components, themes, and design elements. *Air Med J*. 2015;34(4):207-212. doi:10.1016/j.amj.2015.03.008

8. Rutherford P, Anderson A, Kotagal U, et al. Achieving Hospital-wide Patient Flow (Second Edition). Institute for Healthcare Improvement. 2020. Accessed August 13, 2026. <https://www.ihl.org/library/white-papers/achieving-hospital-wide-patient-flow>
9. Yu A, Harrison JD, Kelly C, Leykum L, Mueller SK. Decision-making in the interhospital transfer of medicine patients: a novel conceptual model. *J Gen Intern Med*. 2026. doi:10.1007/s11606-026-10186-z
10. Sokol-Hessner L, White AA, Davis KF, Herzig SJ, Hohmann SF. Interhospital transfer patients discharged by academic hospitalists and general internists: characteristics and outcomes. *J Hosp Med*. 2016;11(4):245-250. doi:10.1002/jhm.2515
11. Bosk EA, Veinot T, Iwashyna TJ. Which patients and where: a qualitative study of patient transfers from community hospitals. *Med Care*. 2011;49(6):592-598. doi:10.1097/MLR.0b013e31820fb71b
12. Mueller SK, Shannon E, Schnipper JL, Dykes P. Patient and care team experience with inter-hospital transfer: a qualitative study. Paper presented at: Society of Hospital Medicine National Conference; May 1-4, 2017; Las Vegas, NV.
13. Wagner J, Iwashyna TJ, Kahn JM. Reasons underlying interhospital transfers to an academic medical intensive care unit. *J Crit Care*. 2013;28(2):202-208. doi:10.1016/j.jcrc.2012.07.027
14. Herrigel DJ, Carroll M, Fanning C, Steinberg MB, Parikh A, Usher M. Interhospital transfer handoff practices among US tertiary care centers: a descriptive survey. *J Hosp Med*. 2016;11(6):413-417. doi:10.1002/jhm.2577
15. Mueller S, Zheng J, Orav EJ, Schnipper JL. Inter-hospital transfer and patient outcomes: a retrospective cohort study. *BMJ Qual Saf*. 2019;28(11):e1-e1. doi:10.1136/bmjqs-2018-008087
16. Huntington CR, Cox TC, Blair LJ, et al. Acuity, outcomes, and trends in the transfer of surgical patients: a national study. *Surg Endosc*. 2016;30(4):1301-1309. doi:10.1007/s00464-015-4361-0
17. Heincelman M, Gebregziabher M, Kirkland E, et al. Impact of patient-level characteristics on in-hospital mortality after interhospital transfer to medicine services: an observational study. *J Gen Intern Med*. 2020;35(4):1127-1134. doi:10.1007/s11606-020-05659-8
18. Rush B, Tyler PD, Stone DJ, Geisler BP, Walley KR, Celi LA. Outcomes of ventilated patients with sepsis who undergo interhospital transfer: a nationwide linked analysis. *Crit Care Med*. 2018;46(1):e81-e86. doi:10.1097/CCM.0000000000002777
19. Harrison JD, Leykum LK, Yu A, Kelly C, Mueller SK. From challenges to solutions: a qualitative thematic analysis of inter-hospital transfer processes. *J Gen Intern Med*. 2025. doi:10.1007/s11606-025-10051-5
20. Mackie B, Kellett U, Mitchell M, Tonge A. The experiences of rural and remote families involved in an inter-hospital transfer to a tertiary ICU: a hermeneutic study. *Aust Crit Care*. 2014;27(4):177-182. doi:10.1016/j.aucc.2014.04.004
21. Auerbach AD, Patel MS, Metlay JP, et al. The Hospital Medicine Reengineering Network (HOMERuN): a learning organization focused on improving hospital care. *Acad Med*. 2014;89(3):415-420. doi:10.1097/ACM.0000000000000139
22. Donzé JD, Williams MV, Robinson EJ, et al. International validity of the HOSPITAL score to predict 30-day potentially avoidable hospital readmissions. *JAMA Intern Med*. 2016;176(4):496-502. doi:10.1001/jamainternmed.2015.8462
23. Aubert CE, Schnipper JL, Williams MV, et al. Simplification of the HOSPITAL score for predicting 30-day readmissions. *BMJ Qual Saf*. 2017;26(10):799-805. doi:10.1136/bmjqs-2016-006239
24. Auerbach AD, Lee TM, Hubbard CC, et al; UPSIDE Research Group. Diagnostic errors in hospitalized adults who died or were transferred to intensive care. *JAMA Intern Med*. 2024;184(2):164-173. doi:10.1001/jamainternmed.2023.7347
25. Vizient Clinical Data Base. Accessed June 6, 2025. <https://www.vizientinc.com>
26. Mueller SK, Kelly C, Singleton S, et al. Development of a tool to measure potentially inappropriate inter-hospital transfer (IHT): the POINT study. *J Gen Intern Med*. 2025;40(8):1917-1923. doi:10.1007/s11606-024-09221-8
27. Harrison JD, Anderson WG, Fagan M, et al. Patient and family advisory councils (PFACs): identifying challenges and solutions to support engagement in research. *Patient*. 2018;11(4):413-423. doi:10.1007/s40271-018-0298-4
28. Auerbach AD, Kripalani S, Vasilevskis EE, et al. Preventability and causes of readmissions in a national cohort of general medicine patients. *JAMA Intern Med*. 2016;176(4):484-493. doi:10.1001/jamainternmed.2015.7863
29. Schnipper JL, Raffel KE, Keniston A, et al. Achieving diagnostic excellence through prevention and teamwork (ADEPT) study protocol: a multicenter, prospective quality and safety program to improve diagnostic processes in medical inpatients. *J Hosp Med*. 2023;18(12):1072-1081. doi:10.1002/jhm.13230

30. Vizient Vulnerability Index. Vizient. U.S. patent 12,430,367. September 30, 2025.
31. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J R Stat Soc Series B Stat Methodol*. 1995;57(1):289-300. doi:10.1111/j.2517-6161.1995.tb02031.x
32. Brooten JK, Buckenheimer AS, Hallmark JK, et al. Risky behavior: hospital transfers associated with early mortality and rates of goals of care discussions. *West J Emerg Med*. 2020;21(4):935-942. doi:10.5811/westjem.2020.5.46067
33. Burke LG, Stack CD, Pope JV. Declining interhospital transfers—a symptom of strained hospital capacity. *JAMA Netw Open*. 2025;8(5):e2512306. doi:10.1001/jamanetworkopen.2025.12306
34. Greenwood-Ericksen M, Kamdar N, Swenson K, et al. Emergency department boarding, inpatient census, and interhospital transfer acceptances. *JAMA Netw Open*. 2025;8(5):e2512299. doi:10.1001/jamanetworkopen.2025.12299
35. Sorensen MJ, von Recklinghausen FM, Fulton G, Burchard KW. Secondary overtriage: the burden of unnecessary interfacility transfers in a rural trauma system. *JAMA Surg*. 2013;148(8):763-768. doi:10.1001/jamasurg.2013.2132
36. Kummerow Broman K, Ward MJ, Poulouse BK, Schwarze ML. Surgical transfer decision making: how regional resources are allocated in a regional transfer network. *Jt Comm J Qual Patient Saf*. 2018;44(1):33-42. doi:10.1016/j.jcjq.2017.07.005
37. Ciesla DJ, Sava JA, Street JH III, Jordan MH. Secondary overtriage: a consequence of an immature trauma system. *J Am Coll Surg*. 2008;206(1):131-137. doi:10.1016/j.jamcollsurg.2007.06.285
38. Murphy SM, Whately K, Eadie PA, Orr DJ. Unnecessary inter-hospital referral of minor hand injuries: a continuing problem. *Ir J Med Sci*. 2010;179(1):123-125. doi:10.1007/s11845-009-0416-3
39. D'Anna L, Mangiardi M, Corea F, et al. The future of stroke care: how telestroke is bridging the gap in stroke care. *J Thromb Thrombolysis*. 2025;58(6):743-746. doi:10.1007/s11239-025-03150-x
40. Schwamm LH, Holloway RG, Amarenco P, et al; American Heart Association Stroke Council; Interdisciplinary Council on Peripheral Vascular Disease. A review of the evidence for the use of telemedicine within stroke systems of care: a scientific statement from the American Heart Association/American Stroke Association. *Stroke*. 2009;40(7):2616-2634. doi:10.1161/STROKEAHA.109.192360
41. Subramanian S, Pamplin JC, Hravnak M, et al. Tele-critical care: an update from the society of critical care medicine tele-ICU committee. *Crit Care Med*. 2020;48(4):553-561. doi:10.1097/CCM.0000000000004190
42. Koch AT, Keuseman RL, Parikh R, et al. Innovative telehospitalist model optimizes medical triage in collaboration with community emergency departments: a cross-sectional study. *J Telemed Telecare*. 2026;32(1):32-39. doi:10.1177/1357633X241311957
43. Macedo BR, Garcia MVF, Garcia ML, et al. Implementation of Tele-ICU during the COVID-19 pandemic. *J Bras Pneumol*. 2021;47(2):e20200545. doi:10.36416/1806-3756/e20200545
44. Patel SY, Mehrotra A, Huskamp HA, Uscher-Pines L, Ganguli I, Barnett ML. Trends in outpatient care delivery and telemedicine during the COVID-19 pandemic in the US. *JAMA Intern Med*. 2021;181(3):388-391. doi:10.1001/jamainternmed.2020.5928
45. Levinson Z, Godwin J, Hulver S, Neuman T. *Ten Things to Know About Consolidation in Health Care Provider Markets*. Kaiser Family Foundation; 2024.
46. Dafny L. Addressing consolidation in health care markets. *JAMA*. 2021;325(10):927-928. doi:10.1001/jama.2021.0038
47. Elrod JK, Fortenberry JL Jr. Centers of excellence in healthcare institutions: what they are and how to assemble them. *BMC Health Serv Res*. 2017;17(suppl 1):425. doi:10.1186/s12913-017-2340-y
48. McCarthy S, Moore D, Smedley WA, et al. Impact of rural hospital closures on health-care access. *J Surg Res*. 2021;258:170-178. doi:10.1016/j.jss.2020.08.055
49. Mullens CL, Hernandez JA, Murthy J, et al. Understanding the impacts of rural hospital closures: a scoping review. *J Rural Health*. 2024;40(2):227-237. doi:10.1111/jrh.12801
50. Marr R, Shrestha S, Haughey D, et al. PARTNER: a qualitative study on academic and community hospitals partnerships to optimize outbound patient transfers and capacity. *J Hosp Med*. 2026;21(3):239-246. doi:10.1002/jhm.70141
51. Clements J, Mueller S. Interhospital care transitions: coordinating care across institutions. *Med Clin North Am*. 2026;110(4):569-582. doi:10.1016/j.mcna.2025.10.001
52. Mueller SK, Fiskio J, Schnipper J. Interhospital transfer: transfer processes and patient outcomes. *J Hosp Med*. 2019;14(8):486-491. doi:10.12788/jhm.3192

53. Solà-Muñoz S, Azeli Y, Trenado J, et al. Effect of a prioritization score on the inter-hospital transfer time management of severe COVID-19 patients: a quasi-experimental intervention study. *Int J Qual Health Care*. 2022; 34(1):mzac011. doi:10.1093/intqhc/mzac011
54. Vazquez JR, Clements J, Hendricks M, Pagali S. 5 Best practices and resources for interhospital transfers. *The Hospitalist: Society of Hospital Medicine*. 2025. Accessed August 13, 2026. <https://www.the-hospitalist.org/hospitalist/article/38755/practice-management/5-best-practices-and-resources-for-interhospital-transfers/>

SUPPLEMENT 1.

eAppendix. Primary Adjudication Tool

SUPPLEMENT 2.

Data Sharing Statement