Guided transfer of critically ill patients: where patients are transferred can be an informed choice

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Purpose of review

Given increasingly scarce healthcare resources and highly differentiated hospitals, with growing demand for critical care, interhospital transfer is an essential part of the care of many patients. The purpose of this review is to examine the extent to which hospital quality is considered when transferring critically ill patients, and to examine the potential benefits to patients of a strategy that incorporates objective quality data into referral patterns.

Recent findings

Interhospital transfer of critically ill patients is now common and safe. Although extensive research has focused on which patients should be transferred and when they should be transferred, recent study has focused on where patients should be transferred. Yet, the choice of destination hospital is rarely recognized as a therapeutic choice with implications for patient outcomes. The recent public release of high-quality, risk-adjusted and reliability-adjusted outcome data for most hospitals now offers physicians an informed basis on which to choose to which destination hospital a patient should be transferred. A strategy of 'guided transfer' that integrates public quality information into critical care transfer decisions is now feasible.

Summary

Although hospitals often transfer patients, there may be substantial room for improvement in transfer patterns. Guiding transfers on the basis of objective quality information may offer substantial benefits to patients, and could be incorporated into quality improvement initiatives.

Keywords

interhospital transfer, outcomes measurement, quality improvement

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Introduction

The role of interhospital transfer in the critically ill patient remains ill-defined. For a handful of conditions, we have gold-standard evidence that prompt transfer of patients offers real benefits. But for most of our patients, things are less clear. Most research about patient transfers answers three questions:

(1) Which patients should be transferred?
(2) How should we transfer them?
(3) Does transfer improve outcomes?

In this review we argue that one cannot answer questions (1) and (3) unless we first answer a unique question – where should we transfer patients? An answer to such a question requires careful analysis of our actual transfer practices, and necessitates acknowledging certain politically uncomfortable realities about differences among hospitals. But, we will argue, doing so opens up the possibility of a new approach – that we term guided transfer – that seems likely to offer substantial improvements in our patients' outcomes.

This review will be organized as follows. First, we will review foundational data, arguing that we now have a system that can competently transfer patients over large distances with few complications. Second, we identify a core problem in current practice – the failure to recognize that where one sends a patient is a choice, with consequences that must be faced. Third, we present a recently developed paradigm using high quality objective data on hospitals that can be used to guide transfer decisions. We then suggest a strategy of guided transfer – being selective not only about which patients are transferred, but where they are transferred – as an approach to improving patient outcomes, including survival. Finally, we discuss the evidence for such a strategy, as well as approaches to implementing such a strategy on the ground.

The foundation: interhospital transfer of critically ill patients is now safe, common, and often evidence-based

In the developed world, the interhospital transfer of critically ill patients is now a routine practice both from Emergency Departments and among hospitalized patients [1–5,6•,7]. These transfers weave together a multitiered system allowing patients to present to local hospitals and then obtain access to specialized care in other centers. Median transfer distances in the U.S. were greater than 25 miles for critically ill patients, and transfers greater than 50 miles were common [5,8•]. Given the realities of limited resources and limited providers, not all hospitals can provide access to every possible diagnostic and interventional modality. As such, interhospital transfer may occur for half or more of patients with certain conditions [8•,9,10].

Interhospital transfer of patients was once quite dangerous. An important early review of adverse clinical events during pediatric transfer during 1992 reported that 75% of children experienced an adverse clinical event, and 23% were deemed life-threatening [11]. This contrasts with more recent data showing very low levels of adverse events. For example, a review of Ontario's centralized transfer service showed that 981 (5.1%) of 19 228 urgent aeromedical transfers involved an adverse event [12]. (The median transfer distance in this series was 10.5 km, but with frequent long range transfers.) Similarly low rates have been observed in a number of other contexts, ranging from careful studies of high acuity transfers at a single center to system-wide audits [6•,13–15]. We must acknowledge that an alternative explanation for these data is that transfer services have simply become much better at selecting which patients can tolerate interhospital transfer; certainly patient selection can be an important source of bias in many transfer studies [16••]. But given the high acuity of many patients transferred to referral centers, it seems likely that the proliferation of guidelines for interhospital transfer represents a real accumulation of knowledge about how to safely perform this essential task [17–22].

With the increasing safety of interhospital transfer, there is good evidence that for some conditions, prompt transfer to an appropriate facility is clearly indicated. Prompt interhospital transfer for percutaneous coronary intervention results in better outcomes than thrombolysis when prompt transfer is feasible for patients with ST-elevation myocardial infarction (MI) – assuming such treatment is done sufficiently quickly [23,24]. There are even some data for high-risk non-ST elevation MI [25]. There are excellent observational data on the benefits of transfer to a trauma center for severely injured trauma patients [26–28]. Stroke centers appear to have superior outcomes [29•], via mechanisms other than simply faster times to thrombolysis, although we await conclusive data on the benefits of transfer to stroke centers.

Key points

- Interhospital transfers are common and safe.
- Existing transfer patterns do not fully direct patients to the local hospitals with lowest 30-day mortality.
- High quality public data on hospital outcomes are now available.
- A strategy of guided transfer that takes into account public outcome data may improve patient outcomes.

The problem: destination is rarely recognized as a therapeutic choice

Despite this growing evidence that interhospital transfer can be thought of as a routine part of the medical armamentarium, recent evidence shows that current practice rarely achieves for patients the full potential benefits.

In interviews with clinicians at several community hospitals, practitioners discussed candidly their decision-making process for patient transfers and destination selection. In the many hours of tapes, there was no discussion of relative quality of various alternative hospitals as a determinant for transfer [30•]. Clinicians did not perceive themselves to be choosing which destination hospital, but rather only making a choice between transferring or keeping the patient. If more than one hospital was considered, the discussion was driven by timely acceptance, not the relative merits of different hospitals.

In these intensively studied hospitals, transfer destination can be understood as an organizational routine, that is, something that is automatically performed, without careful weighing of the relative benefits and risks of the choices. Supporting this qualitative data are quantitative data showing the remarkable stability of hospital transfer relationships over time periods as long as a decade [31]. Quantitative and qualitative data from Italy likewise suggest that transfer patterns there result primarily from interhospital relationships, not efforts to optimize the care of individual patients [32••].

This leads to inefficiencies in hospital transfer decisions that have real consequences for patients. Consider the case of Medicare patients with acute myocardial infarction (AMI) being transferred from hospitals lacking revascularization capabilities to hospitals that can perform revascularization. Forty-four percent of patients with AMI admitted to nonrevascularization hospitals undergo such a transfer [8•]. Yet 27% of such transferred

patients were transferred to a hospital with demonstrably and clinically significantly worse outcomes that was also farther away than another nearby option. In another study, hospitals varied widely in the timeliness with which they arranged transfers, but the characteristics of hospitals that predicted greater timeliness did not predict transfers to hospitals with better 30-day mortality [33•].

Thus, convergent data from a number of settings suggest that when patients are transferred to another hospital, little conscious thought goes into selecting the hospital by quality of outcomes. Certainly, attention is paid to which perceived class of hospital should be selected, but despite wide variation in hospitals – and the fact that, at least in the U.S., many hospitals within a given class are often within feasible transfer range [5,8•] – little attention is paid to optimizing hospital choice by outcomes data.

The opportunity: not all hospitals are the same – and the data are public

It is possible to suggest that differentiating among hospitals might be a simple matter of the hospital's nominal level of capacity. For example, it might be that there are no important differences among hospitals performing coronary artery bypass grafting, or offering critical care. Yet such an argument is demonstrably false by ubiquitous professional experience and large quantitative databases. The data proving variation in quality – however conceived – are overwhelming. In domains relevant to critical care, this includes differences in risk-adjusted and reliability-adjusted mortality for AMI, pneumonia [34••,35], and major surgery [36], and difference in process measures ranging from curative therapies [37] to 'end-of-life' care in those over 65 years old [38]. This accords with many physicians' experience of calling consults, and having the usefulness of the consult vary substantially within a given service, depending on which colleague happens to be available to take consults on a given day. Just as not all physicians with the same specialty certification are equally excellent, not all hospitals with the same nominal resources achieve the same patient outcomes.

Documenting variation in hospital quality alone might not be of any value unless information on individual hospital quality were available to providers forced to make real-time decisions. In fact, condition-specific, high quality, public data on most hospitals are now routinely available in the U.S. through, for example, Hospital-Compare (http://www.hospitalcompare.hhs.gov/). Careful reviews have been published elsewhere that describe the important advances in risk-adjustment and reliability-adjustment that make possible such data [39,40,41••,42,43] . As we discuss below, although these metrics may not be perfect, they likely have advanced to the point that their incorporation into clinical decision-making would benefit patients. Yet given the reality of the current decision-making process – often an unconsidered routine – it is perhaps not surprising that these high-quality data have had little clear impact on behavior to date [44].

A proposal: improving patient outcomes by guiding transfers

If our current habits often lead us to transfer patients to inferior hospitals, and if superior, accessible hospitals can be identified using existing data, then this suggests a strategy for improving care using existing resources: guiding transfers by objective publicly available quality data may lead to improved patient outcomes.

This 'guided transfer' proposal can be thought of as the next generation of selective referral. The Leapfrog Group has long advocated that patients should be selectively referred to hospitals with certain characteristics: high volumes of relevant procedures, and intensivists [45]. Similarly, there are compelling data on the advantages and feasibility of referring trauma patients to 'Level 1' trauma centers [26,27,46]. But such recommendations were loath to draw distinctions among hospitals with a given class of resources. More recent data suggest that guiding transfers, not just to any hospital of a given class, but to the hospital with the best reported outcomes, will offer further advantages.

To examine the potential importance of this approach, consider again the case of transfers of AMI patients from nonrevascularization hospitals to revascularization hospitals. We carried out simulations in which a patient was transferred to a hospital with the best reported 30-day mortality ratings within a given radius [8•]. We then examined the potential impact on patient outcomes, taking into account the fact that the reported 30-day mortality ratings had substantial uncertainty, and so might be inaccurate in any given case. In such a situation, transferring patients to the best hospital within 50 miles reduced relative mortality by 11.9% [95% confidence interval (CI): 11.7–12.1%], and reduced absolute 30-day mortality by 1.9% (95% CI: 1.9–2.0%). This implies a number needed to treat of 53 patients to save one life at 30-days, which compares quite favorably with many standard-of-care interventions in cardiology [47]. In sum, these publicly reported 30-day mortality rates, if carefully risk-adjusted and reliability-adjusted, can serve as markers for higher quality hospitals.

How could 'guided transfer' be implemented?

The core contention of guided transfer is that physicians should recognize that the particular choice of destination

Table 1 Stages of guided transfer

Stage	Description of behavior
1: Contemplative	Recognize that where a patient is transferred is a choice of which therapy a patient will receive, and use available information to make optimal choice for that patient
2: Individual	Routinely seek out objective rigorous data on condition-specific outcomes, and use that to guide transfers to hospital with best outcome data for a given condition
3: Systematic	Develop quality improvement system in hospital to routinely monitor where and when transfers are sent, and concordance of that practice with best available, updated data on outcomes at destination hospitals
4: Supported decision-making	Develop integrated decision-support tools to rapidly identify patients who might benefit from transfer, and provide individualized data on alternative transfer options

hospital is a choice of which therapy to provide a given patient. This therapeutic option should be applied with the same patient-centered commitment to excellence used in choosing any other highly consequential therapy. As in other cases, risk, benefit, and availability all need to be considered.

Before discussing implementation, we must frankly acknowledge that there is no gold-standard evidence demonstrating that guided transfer improves outcomes. Large-scale evaluation with careful attention to unintended consequences has not yet been done.

There are four levels at which guided transfer can be implemented, as described in Table 1. Physicians can simply recognize that they have a choice in where they send patients, and consciously attempt to optimize that choice for individual patients. But they could also begin to routinely incorporate up-to-date objective data in their recommendations for patients. Several national data sources exist in which carefully risk-adjusted and reliability-adjusted data are published and updated (examples are listed in Table 2 [35,36,43,48,49]). The United States Department of Veterans Affairs (VA) has been a national leader in developing methods for careful and fair risk-adjustment and reliability-adjustment, and broad-ranging data are available at http:// www.hospital compare.va.gov/. It must be noted that these public reporting systems were all designed in a political environment that made it difficult to report quantitative hospital outcomes. As such, the default is to report a dichotomous outcome, whether a hospital is probably better than the national average or not. (This is akin to a lab reporting whether a creatinine value is 'normal' or 'abnormal' rather than giving the actual value.) Yet all websites have 'details' tabs that allow careful quantitative assessment to allow nuanced clinical decision-making.

Unfortunately, the high quality outcomes data that are needed for guided transfer are not routinely available for some important conditions cared for by critical care physicians. As of 2011, these conditions include severe sepsis, acute respiratory distress syndrome, and acute exacerbation of chronic obstructive pulmonary disease. Developing methods and data infrastructure to support accurate and fair reporting should be an important research priority. There are important examples where the data infrastructure to support public reporting also drives ongoing quality improvement efforts, including the VA's success with the Inpatient Evaluation Center [50•] and the many hospitals that pay for the rich data of the APACHE system.

When condition-specific data are not available, clinicians are forced to extrapolate – a situation with which they are already routinely familiar in applying randomized controlled trials to their own patients. Common clinical examples include the use of thrombolytic therapy for acute pulmonary embolism, the use of recombinant activated protein C for pneumonia, or the benefit of early tracheostomy in the critically ill. In each of these common scenarios, the literature can only make suggestions to the clinician in the use of these therapies which might dramatically alter patient outcome. Likewise, clinicians should consider individually the decision regarding

Table 2 Outcomes data for guided transfer

Condition	Data source	Comments
Acute myocardial infarction	HospitalCompare for 30-day mortality[a]	Perhaps the best-described and validated measure [35,43,48]
Pneumonia	HospitalCompare for 30-day mortality	
Congestive heart failure	HospitalCompare for 30-day readmission	Methods and validation have been published [49]
Surgeries	Leapfrog evidence-based survival predictor	Soon to be released [36]
Patients with the U.S. Veterans Health Administration	VA HospitalCompare 30-day mortality	http:// www.hospitalcompare.va.gov/

[a] To access the risk-adjusted death rates: first, go to http://www.hospitalcompare.hhs.gov; second, select nearby hospitals that are likely to be of high quality based on what you know of them; third, click the 'Compare' button'; fourth, go to the 'Outcome of Care Measures' tab; fifth, click 'View Tables'; and finally click on the link to 'Click here to view more information about individual hospital's death (mortality) rates'. This will bring up a table with the actual numbers that can be used to guide decisions.

Table 3 Potential barriers to guided transfer

Potential barrier	Explanation	Evaluation
Habits	Existing transfer patterns are engrained habits and are often easier than getting the data and making a guided transfer	If published estimates of the potential mortality benefits are correct, there is substantial potential benefit worth the extra time [8•]
Interest in outcomes other than 30-day mortality	Prevention of 30-day mortality is not the only goal of care for patients	This is as true for guided transfer as for the evaluation of most therapies, for which RCT-evidence is available for only a subset of valued outcomes. Where data are available (e.g., CHF readmission rates), that can be used. Elsewhere, reasoned clinical extrapolation is necessary; is hospital quality on the values outcome likely to be inversely correlated with quality on the measured outcomes? Additional research should make other measures publicly reported
Applicability to other patients	Existing quality metrics often only evaluate a subset of patients. What should be done with patients outside of those metrics?	This is an important problem on which too little research has been done; for now, clinical judgment is required in extrapolation here as in many other clinical decisions
Capacity constraints at best referring hospitals	Wouldn't sending all these patients to the place where they can get the best care overwhelm those hospitals, and degrade the quality of care they can provide?	Transfers for patients with clear critical illness should be given precedence over patients admitted to the ICU for observation [51•]. Modeling suggests that there may be adequate resources for the truly critically ill [52], and that high quality centers are able to maintain quality even when operating at unusually high patient volumes [53]. Moreover, it seems plausible that receiving hospitals may have better information about their capacity at any given moment than potential sending hospitals, and so receiving hospitals can make these triage decisions
Distinguishing hospitals that are 'not significantly different'	Existing quality metrics have large standard errors, and so often nearby hospitals are not significantly different from each other	Even if hospitals are not different enough to reach a standard of proof of difference suitable for policy use at penalizing a hospital, patients will still do better on average if consistently transferred to hospitals with better outcome measures [54]
Patient preferences	Patients may be skeptical of any transfer, or not wish to go to the designated center [55,56]	Current transfer decisions may put very little weight on patient preferences, [30•] so any consideration may be an improvement. Careful patient counseling should focus on the magnitude of the potential mortality benefit that could be achieved [57,58]

interfacility transfers according to safety, timing, location, and potential risks and benefits. One might plainly consider the scenario in which a provider's own family may need specialized medical care, i.e., 'it's what I would do for my own family'.

There are a number of other potential barriers to guided transfer, outlined in Table 3 [8•,30•,51•,52–58]. Some of these are relevant to individual clinical decision-making, whereas others are challenges to system-level implementation. One such system-level challenge is the fear that widespread implementation of guided transfer would overwhelm the best hospitals in a region. This concern is fueled by anecdotes of 'locked-in' ICUs unable to accept additional patients, which clearly occurs, although we lack good data on how commonly. But those same hospitals often also supply anecdotes of frequent low-risk admissions to the ICU, and of the inability to transfer patients out of the ICU to a floor bed after they are no longer critically ill. Widespread implementation of guided transfer would require careful evaluation of both the number of beds, and probably more importantly, throughput of those beds, and may require targeted reallocation of beds. However, this will be a problem facing late adopters; early adopters of guided transfer should still have substantial opportunities to improve their patients' outcomes. All of the obstacles in Table 3 can be overcome to some extent.

Conclusion

Our contention is that physicians can and should hold themselves accountable for the quality of care at the hospitals to which they transfer patients. This is an issue of professional excellence just as assuredly as giving appropriate discharge prescriptions and insuring access to follow-up care. The destination and timeliness of transfers can be considered a target for ongoing quality improvement. (Timeliness has been well reviewed by others [59], including recent linking of rapidity of transfer to outcomes [60•].) The predictable psychosocial challenges of transfer can be anticipated and mitigated [58]. Insuring that a critically ill patient gets to the best facility seems tenable as a measure of quality suitable for rigorous self-assessment at the level of the referring physician and referring hospital. Although individual HospitalCompare ratings often lack the precision necessary to dictate which hospital is best for any given patient, physicians can incorporate these into their own rich experiential evidence on quality of care. The data suggest that guiding

transfers to consciously chosen hospitals could offer palpable, direct benefits for patients.

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Conflicts of interest

There are no conflicts of interest.

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Papers of particular interest, published within the annual period of review, have been highlighted as:

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Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 671).

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