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Surgical Transfer Decision Making: How Regional Resources are Allocated in a Regional Transfer Network

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Abstract

Background—Tertiary care centers often operate above capacity, limiting access to emergency surgical care for patients at nontertiary facilities. For nontraumatic surgical emergencies there are no guidelines to inform patient selection for transfer to another facility. Such decisions may be particularly difficult for gravely ill patients when the benefits of transfer are uncertain.

Methods—To characterize surgeons' decision-making strategies for transfer, a qualitative analysis of semi-structured interviews was conducted with 16 general surgeons who refer and accept patients within a regional transfer network. Interviews included case-based vignettes about surgical patients with high comorbidity, multisystem organ failure, and terminal conditions. An inductive coding strategy was used, followed by performance of a higher-level analysis to characterize important themes and trends.

Results—Surgeons at outlying hospitals seek transfer when the resources to care for patients' surgical needs or comorbid conditions are unavailable locally. In contrast, surgeons at the tertiary center accept all patients regardless of outcome or resource considerations. Bed availability at the tertiary care center restricts transfer capacity, harming patients who cannot be transferred. Surgeons sometimes transfer dying patients in order to exhaust all treatment options or appease

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families, but they are conflicted about the value of transfer, which displaces patients from their local communities and limits access to tertiary care for others.

Conclusions—Decisions to transfer surgical patients are complex and require comprehensive understanding of local capacity and regional resources. Current decision-making strategies fail to optimize patient selection for transfer and can inappropriately allocate scarce tertiary care beds.

Each year more than 1.9 million patients in the United States are transferred between hospitals for acute care.[1] Transfer can optimize care delivery at the population level by matching patient needs to appropriate facilities and physicians, addressing the Institute of Medicine's target of efficient, coordinated, regionalized emergency care.[2] The establishment of regional networks and care algorithms for appropriate triage and transfer of patients with acute myocardial infarction, stroke, and trauma have resulted in streamlined care and improved outcomes.[3–8]

Patients with nontraumatic surgical emergencies are among the most frequently transferred subpopulations in the United States, largely on the basis of the need for surgical-sub-specialist expertise and the high illness burden of patients with acute surgical problems.[1, 9–10] Indeed, transferred patients have longer lengths of stay and markedly higher health care costs than directly admitted patients, even after adjustment for comorbidities.[11–12] While transfer can benefit some patients by increasing access to specialty care, it can also burden patients, families, and health care systems and may not provide commensurate benefit to all patients.[13–15]

There are no guidelines or formal policies to direct patient selection for transfer for non-traumatic surgical emergencies.[16–17] These decisions are left to the discretion of providers.[18] Decisions regarding transfer may be particularly challenging for gravely ill surgical patients when prognosis is uncertain and therapeutic options are limited. With an aging population and higher comorbid disease burden among acutely ill patients, transfer is often considered. Retrospective review of our regional transfer network revealed more than 20% of surgical transfers were clinically unnecessary, either because the requested services were not required or patients were too sick to benefit.[19,20]

It is unknown how surgeons decide who to refer and accept in transfer, specifically how the potential for benefit is evaluated in these transfer decisions. The objective of this study was to characterize factors that influence surgeons' decisions regarding interhospital transfer for patients with surgical emergencies.

Methods

Study Setting and Participants

We conducted this study within a multistate regional transfer network anchored by Vanderbilt University Medical Center (VUMC; Nashville, Tennessee), a 626-bed academic tertiary care and Level 1 trauma center that receives more than 12,000 transfers per year. To generate a list of participants, we asked surgeons to identify general surgeons in their transfer network who had previously referred patients. Using a snowball sampling technique, we asked referring surgeons to identify additional surgeons. We determined the practice

setting, gender, and years in practice of potential participants then purposefully sampled from this group to enhance variation in these characteristics. We selected surgeons from four community hospitals that refer patients, three regional hospitals that both refer and accept transfer patients, and VUMC, which primarily accepts patients. The study was approved by the Institutional Review Board of VUMC.

Data Collection

One member of the research team [K.K.B.] conducted semistructured interviews with participating surgeons using open-ended questions and three case-based vignettes (Sidebar 1). Interviews were conducted from March 2015 through August 2015. The interview guide addressed patient selection for transfer, challenges with transfer, and interactions with “very sick” patients and their family members (Sidebar 2). We adapted the interview guide on the basis of the surgeon’s practice: primarily referring, accepting, or both. We audio-recorded interviews with surgeons, and each recording was transcribed verbatim and edited for accuracy, with all identifiers (names, facilities, locations) removed.

Analysis

The team of coders included one surgical resident [K.K.B.], one attending emergency medicine physician [M.J.W.]), and two attending surgeons from tertiary referral centers [B.K.P., M.L.S.] We coded each transcript inductively and used constant comparison to refine the coding taxonomy. Specifically, for each code we compared the identified text to the code description and to data associated with the code in previous transcripts, managing differences by adjusting the meaning of the code or creating new codes to precisely reflect the data. At least two members of the research team coded each transcript and then met to discuss the codes aiming for consensus while examining discordance as an entrée to higher level analysis. We used NVivo 10 (QSR International Pty Ltd.) to catalogue coded transcripts. After coding the initial interviews, we revised the interview guide to intensify exploration of important themes identified in the data. We concluded data collection when the authors collectively determined that thematic saturation had been achieved. This occurred slightly earlier for accepting surgeons than for referring surgeons.

For higher-level analysis, we created a concept diagram, in which we mapped observed relationships between themes and noted the relevant context. Using this technique, we examined how key elements, such as futility, surgical culture, institutional policy, and resource allocation, influenced transfer decisions. Next, we used construct tables to describe the phenomenon in detail and confirm constructs accurately reflected supporting data.

Results

Participants

Sixteen of 31 surgeons answered our invitation and all responders agreed to participate. Participants were mostly male and had practiced a median of ten years. These surgeons worked at four community hospitals, three regional hospitals, and one tertiary care center (Table 1). Surgeons who did not respond when we attempted to contact them were all male

and represented six community hospitals, one regional hospital, and the same tertiary care center as the respondents we interviewed.

Summary of Findings

Surgeons at community or regional hospitals refer patients for transfer after recognizing limitations in the capacity to manage the patient locally. In contrast, surgeons at the tertiary care center do not decide whether to accept patients; they uniformly accept all transfers upon request. In this setting, bed availability often restricts transfer of patients. Lack of beds for patients at receiving hospitals can harm patients whose need for transfer cannot be met. At times, surgeons transfer or accept gravely ill patients to exhaust all treatment options or appease family members. Yet, surgeons express concern that transfer of dying patients reduces capacity to care for others and displaces grieving families far from home.

Themes

We organized the findings according to the following themes: reasons for transfer, challenges for transfer, and transfer considerations for gravely ill and dying patients.

Reasons for Transfer

Surgeons who work at community and regional facilities expressed a desire to manage their patients locally but stated that they must first consider their scope of practice, their technical ability to perform the operation, and any additional operations that might be needed if their operative plan is unsuccessful or inadequate (Table 2). For patients who require a high-risk procedure that surgeons “don’t do” on the basis of their training or volume-based standards, for example, a Whipple or esophagectomy, surgeons will transfer the patient to another surgeon who routinely performs these cases. Surgeons also consider whether they have adequate “backup” from surgical subspecialists in case the patient needs an unanticipated, more extensive operation—for example, a urologist to help manage obstructing colon cancer with bladder invasion. Although surgeons often have the technical skills to address the problem, they will transfer because they believe that newer, innovative strategies are available elsewhere that might enhance patient outcomes.

Even when they can technically manage the patient’s surgical problem, surgeons consider transfer because of the absence of specialized medical care or other hospital resources. Often, a medical subspecialist is not available; for example, a neurologist to care for a surgical patient’s Parkinson’s disease, a gastroenterologist who can perform endoscopic retrograde cholangiopancreatography, or an intensivist who can provide continuous critical care. Surgeons have the technical skill to operate on patients who might suffer extensive bleeding, for example splenectomy or liver resection, but they must transfer the patient because of lack of blood and personnel to prepare and transfuse blood rapidly.

Surgeons also transfer patients when their local operating room is full and the patient’s need for surgery is pressing, in the belief that the operation will be expedited at an institution with greater capacity. Surgeons recognize a conflict between treating complex patients and their ability to fulfill other duties. They cannot commit hours at the bedside of a sick patient in the ICU or perform lengthy wound care when they have a clinic full of patients; a busy elective

surgery schedule; and few, if any other, surgeons to cover. Surgeons note that such complex patients can be “too much for me,” conceding loss of sleep caring for one patient would undermine their ability to safely care for others. Instead, when needed, they involve tertiary academic centers that can “ramp up” to “rally around” a patient with significant needs with teams of residents, nurses, and mid-level providers to perform time-intensive work.

Surgeons at the tertiary care center use an “accept all” approach for transfer decisions; they do not discriminate about whom to accept on the basis of the patient’s health status or perceived benefit. They believe they have a responsibility as the “last stop” or “catch all” hospital and want to assist colleagues who call for help. They take pride in their ability to manage patients others cannot and believe accepting all patients improves their institution’s reputation within their referral network.

Challenges with Transfer

Referring surgeons frequently have difficulty transferring patients because of bed availability at accepting centers. Patient transfer is often delayed or deferred because the receiving hospital is not taking new patients. This has serious consequences for patients whose condition declines or who die while waiting for transfer. These delays can force local surgeons to provide care outside their practice scope or local capacity (for example, “He died [here] while awaiting transfer… I could not get him transferred so I did [the operation] on him here…he just died over the next two days”). Surgeons worry that other physicians transfer patients “who have no business being transferred,” thus exacerbating bed shortages. Although surgeons at the tertiary care center express a desire to accept all patients who “need to come here,” they are frustrated when their hospital has nowhere to put them. They are “constantly full” and “always on diversion.” which undermines their ability to care for patients in need. They recognize that unnecessary transfer of patients, a byproduct of their “accept all” strategy, decreases beds available for other patients.

Transfer Considerations for Gravely Ill and Dying Patients

When patients are gravely ill or dying, decisions to transfer are contentious. In some cases surgeons are confident that “there is no hospital on God’s green earth that is going to make this better.” They do not consider transfer as an option and work to persuade family members and local physicians that transfer will not change the patient’s outcome. In other situations, surgeons have less certainty about the value of transfer; for frail elderly patients, patients with multisystem organ failure, and patients who “just aren’t getting better,” they seek transfer even when they believe the patient is dying and unlikely to benefit because they feel it is important to “just check and see if they can do anything else.” They desire reassurance that the patient’s condition is terminal, fearing they have failed to consider a treatment strategy available elsewhere that could save a dying patient. Moreover, for dying postoperative patients, surgeons feel personally responsible and hope that transfer will rescue their patients from surgical complications (Table 3).

Even when surgeons are confident additional treatment is ineffective, they will transfer if the patient and/or family insist. They prioritize family requests over professional judgement, believing that transfer can help families understand the limits of medical technology and

accept death. They also believe that the need to exhaust all options is consistent with societal expectations and can help families minimize regret about their decisions on behalf of loved ones. Surgeons anguish that these patients will die in intensive care "hooked up to machines"—which they would not want for themselves. Nonetheless, they note that transfer can reassure families that death is not a consequence of receiving treatment in a small community hospital (for example, "They feel frankly much better if somebody has a bad result in an ivory tower institution than if they have a bad result in a local hospital").

Surgeons who accept gravely ill and dying patients often believe the patient is too sick to benefit from transfer and would be better off staying locally but nonetheless feel obliged to accept them. In these cases, they are taxed with breaking bad prognostic news to families who have understood transfer to be lifesaving and are challenged with supporting families in an unfamiliar environment. As one surgeon stated:

> The sad part is that we have picked an entire family up, moved them tens to hundreds of miles away from their comfort zone with some false hope that we're going to do something that no one else can do, because we are the ivory tower, then.… the patient dies and we're left with a grieving family that's now miles away from any comfort that they could've gotten from their local community.

Simultaneously, surgeons at receiving hospitals are not comfortable making a determination about death and the value of additional treatment on the basis of a telephone conversation (Table 3). They prefer personal examination to verify that the patient is dying. Some of them could recall a patient who seemed "nonsalvageable," but when they evaluated the patient in-person they discovered that the condition was treatable. They also do not feel comfortable advising a physician at another center to make an irrevocable decision; they do not want accountability for a patient not directly under their care.

Surgeons at receiving hospitals identify some transfer benefits for dying patients. They posit that their communication skills are more advanced than physicians in referring hospitals because they have more experience conducting difficult end-of-life conversations. They presume that palliative services are not available elsewhere and regard palliative care as a unique transfer benefit. One surgeon noted, "We have the resources to… get our palliative care people, get the appropriate pain management on board, and have a good death rather than a bad death." Notably, referring surgeons do not affirm this impression. They believe that local hospitals provide better palliation at the end of life, given their integration within the community and the longitudinal relationships and small-town connections between physicians, patients, and families.

Discussion

A qualitative analysis was conducted of semistructured interviews with 16 general surgeons who refer and accept patients within a regional transfer network. The findings suggest that when considering patient transfer, referring surgeons evaluate patient needs in relation to locally available resources, while surgeons at the tertiary care center accept all transfer requests without consideration of bed capacity or regard to potential benefit. Simultaneously, surgeons express frustration about the scarcity of tertiary care beds, which impedes timely

transfer of complex patients for whom there may be great benefit. This is particularly salient for dying patients who have poor prospects for survival yet receive transfer in lieu of other patients. These end-of-life challenges hinder appropriate allocation of tertiary care, harming patients who would greatly benefit from transfer and those who will not. This has important implications for surgeons, patients, and policy makers.

For surgeons, transfer decisions have serious consequences for the just distribution of scarce resources. Community surgeons provide critical access to surgical care within their region. Nearly half of all operations are performed at small or medium sized hospitals, and 2% of the most common surgical procedures are performed at critical access hospitals with less than 25 beds, yielding better or equal outcomes than larger, less isolated hospitals.[21–24] Although surgical quality is high, local resources may limit community surgeons' capacity to manage the complex needs of some patients who have higher rates of reoperation and readmission.[24] Our findings reveal conflicting duties for surgeons between individual patients with high-intensity needs and the demands on community surgeons as the primary access point for surgical care. In response, surgeons transfer complicated patients whose care may be within their scope of practice but would exhaust local resources. Conversely, surgeons at the tertiary care center are responsible for a much larger network because they provide high-volume, specialized services and can pool resources to care for complex patients. Their "accept all" policy ensures that these needs are met but has unintended harms given the limited supply of tertiary care beds.[25]

Compounding this problem, surgeons struggle to make transfer decisions given current end-of-life practices, beliefs, and attitudes, which are in direct tension with efforts to appropriately allocate scarce resources.[26–27] This problem is exacerbated by prognostic uncertainty.[28–30] Even when surgeons are confident that the patient's condition is terminal, it is difficult to be absolute in this conclusion.[31–33] Surgeons transfer patients to avoid ownership of a life-ending decision on the basis of the remote chance that the tertiary care center can provide unique, life-saving therapy. Simultaneously, surgeons accept these patients because of concerns about responsibility for end-of-life decisions without an in-person assessment of the patient.

These findings have ethical implications that mirror current struggles about end-of-life care and allocation of ICU beds. Physicians naturally focus on the immediate needs of individual patients over the unknown needs of other patients who could benefit more, effectively defaulting to a first come, first served allocation strategy.[33] Instead of considering how much patients at the end of life might benefit from transfer, allocation of tertiary care resources based on bed availability is a distribution strategy that can compromise the needs of the larger population.[34]

For patients and families, specifically, dying patients at the end of life, there are burdens to transfer that may not have commensurate benefit. Surgeons accede to fruitless transfer requests to provide reassurance that "everything" has been done, reflecting both a concern that "everything" is not available at a small community hospital and the popular notion that death can be vanquished by modern technology. Although these concerns are understandable, it is unclear whether the request to transfer care reflects an authentic patient

or family preference. As most people report a preference to avoid burdensome treatments with limited likelihood for success, dying patients and their families might have even stronger preferences to remain in their local communities if they truly understood the outcomes of transfer.[35,36] Furthermore, there are data to suggest that many patients and families would prefer to receive treatment locally, even when the risk of mortality is greater.[37] Transfer of dying patients on request may represent a miscommunication between patient and physician with respect to prognosis and the meaning of "do everything." Patients and families who want "everything" done are expressing a broad range of preferences and are generally not asking their physician to do everything that might prolong life regardless of resultant suffering.[38,39] To elicit patients' true preferences, surgeons and patients will need to participate in shared decision making regarding the burdens of transfer, chance for benefit, and the real meaning of "do everything" for each unique patient.[39–41]

For policy makers, these data reveal an opportunity to reconsider current strategies to prioritize patient transfer and allocate scarce tertiary care beds. Policies that promote universal acceptance are designed to ensure that patients in need are not denied transfer but fail to adjudicate between those who would benefit most or consider the harms of transfer when the desired outcome is not achievable. Recognizing the limitations of this ad hoc system of transfer decision making, policy makers will need to develop strategies that support a collaborative interaction between referring and accepting physicians and facilities.

With the trend in hospital mergers and consolidation of health care systems, incentives may better align over time to develop expeditious disposition strategies to determine the most appropriate care setting for surgical patients. Network-level triaging of transfer requests could radically transform nontraumatic emergency surgical care. Similarly as in the decentralization of outpatient specialty care, large hospital systems could reallocate routine cases to the community setting, thereby increasing bed capacity for more complex patients who would truly benefit from tertiary care.[42] Other strategies to secure just and effective allocation of scarce tertiary care beds include generation of guidelines to promote transfer on the basis of potential for benefit, improved mechanisms for interfacility communication and remote consultation, and increased access to palliative care resources in local communities.

Lessons learned from other surgical disciplines may be applied to the development of guidelines for nontraumatic acute surgical transfers. For example, in esophageal and bariatric surgery, volume-based standards and center of excellence designations are often used to support referral to regional or tertiary centers in esophageal and bariatric surgery[43,44] and might also be used for common but highly specialized surgical emergencies such as necrotizing pancreatitis or mesenteric ischemia. Disease-specific registries and reporting of outcomes, might be used to provide stronger signals about which patients would benefit from transfer and which patients have nonsurvivable conditions regardless of transfer status.

Although disease-specific and operation-specific referral patterns may be useful for triaging emergent surgical conditions, some patients may be perceived as "too sick" to await transfer to a major referral center. Other patients may not have a specific diagnosis at the time a determination is being made about their location of care. To address these issues, guidelines

for triage of emergency surgical patients could also incorporate physiologic metrics, analogous to field triage guidelines for injured patients.[45,46]

Efforts to improve interfacility communication and remote consultation could also build on existing practices and infrastructure used by other specialties. Specifically, remote image sharing and telemedicine have been used to bring critical care, neurosurgical, stroke, and burn expertise to isolated care settings to assist with treatment locally and identify patients who would be better served in tertiary care settings.[47–50] Use of telemedicine in general surgery could both expedite transfer in some circumstances and prevent transfer when patients are unlikely to benefit.

Next Steps

The study authors relayed the findings of this study to administrators at VUMC who manage interhospital transfers. The study was conducted at a critical time for the regional transfer network of study, as the formal affiliations between participating hospitals were only a few years old, and much work is ongoing to strengthen interfacility collaboration. Next steps for the network should include prospective collection of data regarding regional transfer volume and outcomes to inform future targets for improvement.

Limitations

Our study has both strengths and limitations. We used hypothetical scenarios to access surgeons' clinical responses to specific patient problems, but their actions in practice may deviate from those that they described to us.[51] Furthermore, this work was conducted among a modest sample of surgeons within one large referral network, anchored by one tertiary care hospital in a region that serves a diverse population of urban and rural patients. Although our results likely characterize obstacles present in other referral networks with similar structures and policies, these issues may not be present in networks with different resources or in those without an "accept all" decision-making strategy. In an informal survey of 10 surgeons from 10 different tertiary referral centers outside this network, which was conducted at the Annual Meeting of the American Association for the Surgery of Trauma and Clinical Congress of Acute Care Surgery (September 14–17, 2016, Waikoloa, Hawaii), all but one of the sites employed a similar "accept all" policy.[52] Our study design also constrains our ability to capture patient and family experiences related to requests for transfer, which account for approximately 6% of requests in this network.[19] As patients and providers may cite different reasons for requesting transfer, further study of surgical transfer from the patient's perspective would improve our understanding of transfer decision making. In addition, this study was not designed to quantify the problems of unnecessary transfer and inadequate access to tertiary care beds, so we cannot offer information about the prevalence of this problem. Finally, we did not query surgeons about solutions to the problems of interhospital transfer. However, future work should engage these important stakeholders, who have vital on-the-ground knowledge to contribute to strategies for improving patient selection for transfer.

Conclusion

Interhospital transfer provides access to tertiary care for surgical patients whose needs exceed local capacity. There is a clear tension between transfer for those patients who are dying and for those who could benefit more. Current practices fail to identify and confront the needs of dying patients and default to transfer, which limits access for patients with higher potential for a better outcome. The identification of a current problem with allocation of surgical resources constitutes an initial step for advancing the local and national conversation about improving utilization of regional emergency surgical resources.

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References

1. Kindermann DR, Mutter RL, Cartwright-Smith L, et al. Admit or transfer? The role of insurance in high-transfer-rate medical conditions in the emergency department. Annals of Emergency Medicine. 2014; 63(5):561–571 e568. [PubMed: 24342815]
2. Institute of Medicine. IOM report: The future of emergency care in the United States health system. Academic Emergency Medicine: official journal of the Society for Academic Emergency Medicine. Oct; 2006 13(10):1081–5. [PubMed: 17015421]
3. Garwe T, Cowan LD, Neas B, et al. Survival benefit of transfer to tertiary trauma centers for major trauma patients initially presenting to nontertiary trauma centers. Academic Emergency Medicine: official journal of the Society for Academic Emergency Medicine. Nov; 2010 17(11):1223–1232. [PubMed: 21175521]
4. Newgard CD, McConnell KJ, Hedges JR, et al. The benefit of higher level of care transfer of injured patients from nontertiary hospital emergency departments. The Journal of Trauma. Nov; 2007 63(5): 965–971. [PubMed: 17993937]
5. Andersen HR, Nielsen TT, Rasmussen K, et al. A comparison of coronary angioplasty with fibrinolytic therapy in acute myocardial infarction. The New England Journal of Medicine. Aug 21; 2003 349(8):733–742. [PubMed: 12930925]
6. Wang TY, Nallamothu BK, Krumholz HM, et al. Association of door-in to door-out time with reperfusion delays and outcomes among patients transferred for primary percutaneous coronary intervention. JAMA: the journal of the American Medical Association. Jun 22; 2011 305(24):2540–2547. [PubMed: 21693742]
7. Carrillo X, Fernandez-Nofrerias E, Rodriguez-Leor O, et al. Early ST elevation myocardial infarction in non-capable percutaneous coronary intervention centres: in situ fibrinolysis vs. percutaneous coronary intervention transfer. European Heart Journal. Nov 18.2015
8. Ranasinghe I, Barzi F, Brieger D, et al. Long-term mortality following interhospital transfer for acute myocardial infarction. Heart. Jul; 2015 101(13):1032–1040. [PubMed: 25736049]
9. Scott JW, Olufajo OA, Brat GA, et al. Use of national burden to define operative emergenncy general surgery. JAMA Surgery. 2016; 151(6):e160480. [PubMed: 27120712]
10. Reimer AP, Schiltz N, Koroukian SM, et al. National incidence of medical transfer: patient characteristics and regional variation. Journal of Health and Human Services Administration. 2016; 38(4):509–28. [PubMed: 27079058]

11. Rosenberg AL, Hofer TP, Strachan C, et al. Accepting critically ill transfer patients: adverse effect on a referral center's outcome and benchmark measures. Annals of Internal Medicine. 2003; 138(11):882–890. [PubMed: 12779298]
12. Durairaj L, Will JG, Torner JC, et al. Prognostic factors for mortality following interhospital transfers to the medical intensive care unit of a tertiary referral center. Critical Care Medicine. 2003; 31(7):1981–1986. [PubMed: 12847392]
13. Cullinane JP, Plowright CI. Patients' and relatives' experiences of transfer from intensive care unit to wards. Nursing in Critical Care. 2013; 18(6):289–296. [PubMed: 24165070]
14. Mackie B, Kellett U, Mitchell M, et al. The experiences of rural and remote families involved in an inter-hospital transfer to a tertiary ICU: a hermeneutic study. Australian Critical Care: official journal of the Confederation of Australian Critical Care Nurses. 2014; 27(4):177–182. [PubMed: 24878395]
15. Bosk EA, Veinot T, Iwashyna TJ. Which patients and where: a qualitative study of patient transfers from community hospitals. Medical Care. 2011; 49(6):592–598. [PubMed: 21430581]
16. Iwashyna TJ. The incomplete infrastructure for interhospital patient transfer. Critical Care Medicine. 2012; 40(8):2470–2478. [PubMed: 22809914]
17. Nacht J, Macht M, Ginde AA. Interhospital transfers from U.S. emergency departments: implications for resource utilization, patient safety, and regionalization. Academic Emergency Medicine: official journal of the Society for Academic Emergency Medicine. 2013; 20(9):888–893. [PubMed: 24033705]
18. Wagner J, Iwashyna TJ, Kahn JM. Reasons underlying interhospital transfers to an academic medical intensive care unit. Journal of Critical Care. 2013; 28(2):202–208. [PubMed: 23084130]
19. Kummerow Broman K, Poulose BK, Phillips SE, Ehrenfeld JM, et al. Unnecessary transfers for acute surgical care: who and why? The American Surgeon. 2016; 82(8):672–678. [PubMed: 27657580]
20. Kummerow Broman K, Phillips SE, Ehrenfeld JM, Patel MB, et al. Identifying futile interfacility transfers. The American Surgeon. In press.
21. Steiner, CA., Karaca, Z., Moore, BJ., Imshaug, MC., Pickens, G. Surgeries in hospital-based ambulatory surgery and hospital inpatient care settings, 2014. AHRQ Healthcare Cost and Utilization Project. May. 2017 Online document. Accessed July 12, 2017. https://www.hcup-us.ahrq.gov/reports/statbriefs/sb223-Ambulatory-Inpatient-Surgeries-2014.pdf
22. Ibrahim AM, Hughes TG, Thumma JR, Dimick JB. Association of hospital critical access status with surgical outcomes and expenditures among Medicare beneficiaries. JAMA: the Journal of the American Medical Association. 2016; 315(19):2095–103. [PubMed: 27187302]
23. Natafgi N, et al. Surgical patient safety outcomes in critical access hospitals: how do they compare? Journal of Rural Health. 2017; 33(2):117–126. [PubMed: 26880145]
24. Ibrahim AW, Regenbogen SE, Thumma JR, Dimick JB. Emergency surgery for Medicare beneficiaries admitted to critical access hospitals. Annals of Surgery. 2017 Mar. (ePub).
25. Huynh TN, Kleerup EC, Raj PP, et al. The opportunity cost of futile treatment in the ICU*. Critical Care Medicine. 2014; 42(9):1977–1982. [PubMed: 24810527]
26. Kaufman SR. Making longevity in an aging society: linking ethical sensibility and Medicare spending. Medical Anthropology. 2009; 28(4):317–325. [PubMed: 20182967]
27. Neuman MD, Bosk CL. The redefinition of aging in American surgery. The Milbank Quarterly. 2013; 91(2):288–315. [PubMed: 23758512]
28. Vigano A, Dorgan M, Buckingham J, et al. Survival prediction in terminal cancer patients: a systematic review of the medical literature. Palliative Medicine. 2000; 14(5):363–374. [PubMed: 11064783]
29. Christakis NA, Lamont EB. Extent and determinants of error in doctors' prognoses in terminally ill patients: prospective cohort study. BMJ. 2000; 320(7233):469–472. [PubMed: 10678857]
30. Gripp S, Moeller S, Bolke E, et al. Survival prediction in terminally ill cancer patients by clinical estimates, laboratory tests, and self-rated anxiety and depression. Journal of Clinical Oncology: official journal of the American Society of Clinical Oncology. 2007; 25(22):3313–3320. [PubMed: 17664480]

31. Cohen ME, Ko CY, Bilimoria KY, et al. Optimizing ACS NSQIP modeling for evaluation of surgical quality and risk: patient risk adjustment, procedure mix adjustment, shrinkage adjustment, and surgical focus. Journal of the American College of Surgeons. 2013; 217(2):336–346 e331. [PubMed: 23628227]
32. Moons KG, Kengne AP, Grobbee DE, et al. Risk prediction models: II. External validation, model updating, and impact assessment. Heart. 2012; 98(9):691–698. [PubMed: 22397946]
33. Helft PR, Siegler M, Lantos J. The rise and fall of the futility movement. The New England Journal of Medicine. 2000; 343(4):293–296. [PubMed: 10911014]
34. Truog RD, Brock DW, Cook DJ, et al. Rationing in the intensive care unit. Critical Care Medicine. 2006; 34(4):958–963. quiz 971. [PubMed: 16484912]
35. Fried TR, Bradley EH, Towle VR, et al. Understanding the treatment preferences of seriously ill patients. The New England Journal of Medicine. 2002; 346(14):1061–1066. [PubMed: 11932474]
36. Barnato AE, Farrell MH, Chang CC, et al. Development and validation of hospital “end-of-life” treatment intensity measures. Medical Care. 2009; 47(10):1098–1105. [PubMed: 19820614]
37. Finlayson SR, Birkmeyer JD, Tosteson A, Nease RF Jr. Patient preferences for location of care: implications for regionalization. Medical Care. 1999; 37(2):204–9. [PubMed: 10024124]
38. Quill TE, Arnold R, Back AL. Discussing treatment preferences with patients who want “everything”. Annals of Internal Medicine. 2009; 151(5):345–349. [PubMed: 19721022]
39. Curtis JR, White DB. Practical guidance for evidence-based ICU family conferences. Chest. 2008; 134(4):835–843. [PubMed: 18842916]
40. Hofmann JC, Wenger NS, Davis RB, et al. Patient preferences for communication with physicians about end-of-life decisions. SUPPORT Investigators. Study to Understand Prognoses and Preference for Outcomes and Risks of Treatment. Annals of Internal Medicine. 1997; 127(1):1–12. [PubMed: 9214246]
41. Cooper Z, Courtwright A, Karlage A, et al. Pitfalls in communication that lead to nonbeneficial emergency surgery in elderly patients with serious illness: description of the problem and elements of a solution. Annals of Surgery. 2014; 260(6):949–957. [PubMed: 24866541]
42. Ibrahim, AM., Dimick, JB. Redesigning the delivery of specialty care within newly formed hospital networks. NEJM Catalyst. Mar 30. 2017 http://catalyst.nejm.org/redesigning-specialty-care-delivery/. Accessed July 14, 2017
43. Reames BN, Ghaferi AA, Birkmeyer JD, Dimick JB. Hospital volume and operative mortality in the modern era. Annals of Surgery. 2014; 260(2):244–251. [PubMed: 24368634]
44. Zevin B, Aggarwal R, Grantcharov TP. Volume-outcome association in bariatric surgery: a systematic review. Annals of Surgery. 2012; 256(1):60–71. [PubMed: 22584692]
45. Haskins IN, Maluso PJ, Schroeder ME, Amdur RL, Vaziri K, Agarwal S, Sarani B. A calculator for mortality following emergency general surgery based on the American College of Surgeons National Surgical Quality Improvement Program database. Journal of Trauma and Acute Care Surgery. 2017; 82(6):1094–1099. [PubMed: 28328681]
46. Sasser, SM., Hunt, RC., Faul, M., et al. Guidelines for field triage of injured patients: recommendations of the National Expert Panel on Field Triage, 2011. Centers for Disease Control and Prevention. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6101a1.htm. Accessed July 14, 2017
47. Latifi R, Hadeed GJ, Rhee P, et al. Initial experiences and outcomes of telepresence in the management of trauma and emergency surgical patients. The American Journal of Surgery. 2009; 198(6):905–910. [PubMed: 19969150]
48. Fabbri A, Servadei F, Marchesini G, et al. Observational approach to with mild-to-moderate head injury and initial non-neurosurgical lesions. Journal of Neurology, Neurosurgery, and Psychiatry. 2008; 79(10):1180–5.
49. Wechsler LR, Demaerschalk BM, Schwamm LH, Adeoye OM, et al. Telemedicine quality and outcomes in stroke: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2016; 47:00–00.
50. Saffle JR, Edelman L, Theurer L, et al. Telemedicine evaluation for acute burns is accurate and cost-effective. Journal of Trauma. 2009; 67(2):358–365. [PubMed: 19667890]

51. Peabody JW, et al. Comparison of vignettes, standardized patients, and chart abstraction: a prospective validation study of 3 methods for measuring quality. JAMA. 2000; 283(13):1715–1722. [PubMed: 10755498]

52. Personal communication between an author [K.B.K.] and Angela M Ingraham, MD, MS, Assistant Professor of Surgery, University of Wisconsin, Madison, Sep. 21, 2016

Sidebar 1

Case-based vignettes used by interviewer to elicit responses from surgeon participants*

Case 1: Mr. Jones is a 78 year old male with an unresectable brain tumor and significant recent decline in his mental status. His oncologist recently started him on high dose steroids and Avastin to minimize the functional impact of the growing tumor. The family was told that his estimated survival was weeks to months. [He presents to your Emergency Room/You are called by the transfer center to accept him from a hospital about 100 miles away], he is hemodynamically stable, awake, oriented, and complains of abdominal pain. His abdominal CT scan demonstrates large pneumoperitoneum and stranding adjacent to the right colon suggestive of colonic perforation.
Case 2: Mrs. Neuman is a 72 year old female who you [are asked by the ER physician to see/receive in transfer to your emergency surgery service]. She has insulin-dependent diabetes, coronary artery disease, chronic kidney disease, and severe COPD, on 6L of oxygen at home. She came in with abdominal pain and hypotension. Her CT shows poorly enhancing dilated loops of bowel with diffuse small bowel pneumatosis. Her lactate is 7.
Case 3: [Referring surgeon version] Mr. Taylor is a 49 year old male on whom you performed repair of his recurrent ventral hernia a week and a half ago. You subsequently had to take him back 5 days ago for a small bowel resection due to a missed enterotomy. He was doing better, but today developed septic shock. On takeback, you find his small bowel anastomosis has completely broken down. You staple off both ends, leaving him in discontinuity, and place a temporary abdominal closure device. Postoperatively, he continues to do poorly. He has severe ARDS, is requiring increasing ventilator support and pressors, and has acute renal failure. Hemodialysis is initiated. [Accepting surgeon version] You are called by a colleague at a nearby hospital who you know from American College of Surgeons State chapter meetings. She asks you to accept one of her patients in transfer. Mr. Taylor is a 49 year old male who has been hospitalized at her facility for the past two and a half weeks after a recurrent ventral hernia repair complicated by missed enterotomy. She has taken him back to the OR twice for abdominal sepsis and he is currently in bowel discontinuity with an open abdomen and is very sick in the ICU. He has severe ARDS and is requiring increasing ventilator support and pressors. Hemodialysis has been initiated for acute renal failure.

*Cases included in the interview script are hypothetical scenarios constructed based on the collective clinical experiences of the authors. All names and identifying features are completely fictional.

Sidebar 2

Interview Guide. Script Used by Interviewer to Elicit Responses from Surgeon Participants

Domain 1: Considerations for transferring patients with acute surgical problems

1 Tell me the story of the last patient with an acute surgical problem [for whom you considered transfer to a different facility/who you were asked to accept in transfer].

- **a.** How did you decide to [transfer or not transfer/accept or not accept] the patient?
- **b.** [Accepting surgeon only] What did you recommend? What guided you as you formulated this recommendation?
- **c.** What did you think would happen with the patient?
- **d.** What happened with that patient?
- **e.** What was the patient and/or family's response to this?

2 Tell me about a similar patient who you felt was very sick.

Domain 2: Challenges with patient transfer

3 What challenges do you face when [transferring/accepting] very sick patients?

- **a.** How do you decide which patients to [transfer/accept]?
- **b.** How do you manage the challenges of [transferring/accepting] patients?

Domain 3: Institutional concerns with patient transfer

4 [Referring surgeon only]]Describe a time when you recommended transfer and the patient and/or family declined.

5 [Referring surgeon only] Describe a time when a patient's care needs exceeded the capabilities of your facility but you did not transfer the patient.

6 [Accepting surgeon only] Describe a situation when you were asked to accept a patient in transfer but declined OR felt it would be appropriate to decline.

7 [Referring surgeon only] When considering whether to transfer a patient, are there different considerations if you see the patient in the ER versus hospital?

Domain 4: Patient and family interactions

8 [Accepting surgeon only] What expectations do very sick patients and their families have about their transfers?

- **a.** How do these compare with your expectations/plans for their care?
- **b.** How do you manage differences in expectations?

Domain 5: Improving transfers

9 What recommendations do you have for improving transfer processes?

Table 1

Surgeon participants grouped by their role in inter-hospital transfer

Surgeon characteristic	Refer N=3	Refer and Accept N=6	Accept (Tertiary) N=7
Years in practice, median (range)	12 (8 – 29)	9 (1 – 25)	4 (1 – 16)
Gender, N (%)			
Male	2 (67)	5 (83)	5 (71)
Practice scope, N (%)			
General surgery only	2 (67)	4 (67)	1 (14)
General surgery and trauma	0 (0)	0 (0)	6 (86)
General surgery and bariatric or vascular	1 (33)	2 (33)	0 (0)
Transfer frequency, median (range)			
Refer/month	8 (<1 – 10)	<1 (<1 – 3)	0 (0 – 0)
Accept/month	<1 (0 – 3) *	3 (1 – 10)	4 (2 – 6)

* One surgeon who worked at two community hospitals and one regional hospital is included in the “refer” category, given their primary role in referring transfers.

Table 2

Resources that surgeons at community and regional hospitals consider when evaluating their capacity to care for patients locally

Resource Type and Description	Representative Quotes
Surgeon technical ability and experience	I don't do pancreatic surgery or esophageal. I don't even do gastric anymore, so a gastric cancer I would want to transfer if I was consulted….It would be a case like that that I just say, 'I don't do, I can't do, they need to transfer.
Surgeon availability	"I was in the operating room myself, when I took the call…I was tied up in the OR… I didn't want him transferred to [this hospital] and then be sitting in the ER with bleeding, and not in the operating room." "It's someone I technically could manage it's just something that's really hard so in private practice … You know I'm not at the hospital all day. I'm gone all day. I don't have a resident that is going to come to see this patient; it's just hard to get things to happen."
Surgical subspecialist "back-up" to assist when case is surprisingly more complex	"Every once in a while you get a call for a torsed paraesophageal hernia or something like that and those I don't like to do emergently without some backup because if you have to crack the chest or something, I just don't do that anymore."
Operating room capacity	"If I'm already looking at the schedule and our rooms are all booked out, and it's going to be more than eight to ten hours before I could operate on her, I probably would actually decline."
Access to newer, less invasive alternatives to surgery that are highly specialized	"I need an ERCP for a gallbladder that has a stone in the common duct or a pancreatitis something that's usually for an ERCP. I'd say 3–4 of the ones that I do are for that specific reason." "We don't have interventional radiology in terms of angio very available. If…they need something coiled because of bleeding or stented…sometimes we do have to transfer."
Intensivists, critical care teams, resuscitative equipment, intravenous medications	"I would accept that patient if I had the critical care doctor's approval to accept the patient as well… I would do it with the understanding that I'll take care of the abdominal issues, but the critical care specialist, the pulmonologist, would be taking care of the other issues." "This small hospital doesn't have an intensivist and they have a 2-bed ICU that is used for, kind of, overnight guests or Cardizem drips so they are really not set up for an extremely ill patient."
Medical subspecialists to manage patient comorbidities	"I had a little kid with some weird bleeding disorder with appendicitis… that I had to transfer out to [tertiary referral center], the pediatric hospital…I had spoken to our hematologist here and they were like, 'Yeah. I don't really know what to do with that.'"
Supply, protocol, and personnel to prepare and transfuse blood rapidly	"We do not have a trauma protocol. We do not have a massive transfusion protocol. There is basically 2 units of blood in the whole hospital…if she's hemorrhaging from her liver and we can't get it controlled, she's going to die because there's no way to keep up with the blood products, period."

Table 3

Reasons surgeons transfer and accept dying patients

Reason	Description	Representative Quotes
Inability to make the determination that additional treatment will be ineffective	Local surgeons fear they will miss an additional treatment option available at a higher level center	**Referring surgeon:** It would be hard to not just check and see if they can do anything else.
	Surgeons at higher level centers cannot rely solely on information from phone conversation to make life-ending decisions	**Accepting surgeon:** "Sometimes they're probably just not appropriate for surgery either, and perhaps comfort measures need to be taken….It's very hard to be able to say that over the phone. There's no way I could make that decision not seeing the patient."
Need to do "everything"	There is a cultural expectation to exhaust all treatment options which can be assured by transfer to the highest level of care	**Referring surgeon**: "Some families and some patients just need to die in town; they won't ever feel that everything was done unless it's there." **Accepting surgeon:** "We have gone away from the social fabric that says, 'Grandpa's going to die. We're going to celebrate that with casseroles and good conversation around the dinner table with our friends and family, and we're going to be okay with that.' What we've gotten to is everything means ventilators, pressors, renal replacement therapy, you name it, sitting in a sterile bed somewhere where two people at a time can come in and hold the hand, and whisper in the ear of some loved one."
	Surgeons seek rescue of postoperative patients with complications	**Referring surgeon:** "I want a person that I have messed up on…to not die….I'd really want to make sure that I have come up with everything possible…. If I want to know if there's anything else I could possibly do for them that [transfer] would be it and certainly on my own complication, I would be wanting to throw the kitchen sink at what I could do to make him live and do okay."
Tertiary center has unique resources for dying patients	More experience conducting difficult conversations	**Accepting surgeon**: "When they do finally end up dying or moving towards that there's somebody else out there that's going to have that conversation. That's a conversation that we have as trauma surgeons everyday.…It's the ability to do that, know how to do it, and do it in a way that may give some solace to this family. I'd rather have that happen than some guy fumble through it and say he's going to die."
	Palliative care services are more available at tertiary care centers	**Accepting surgeon**: "The other thing is that we have very strong palliative care services at this tertiary center which they're not going to have at other centers…. I'm going to have palliative care involved immediately, preoperatively as well. That's a service that we have that other places don't."