

Web-based Morbidity and Mortality Conferencing: A Model for Rural Medical Education

SARAH N. PLETCHER, MD; SCOTT W. RODI, MD, MPH

Transfer of patients from rural emergency departments to tertiary centers can improve outcomes. The transfer process is complex and often ad hoc, inefficient, duplicative, and frustrating to both patients and providers. Suboptimal transfer undermines quality of care, raises costs, and delays services. Unfortunately, the same barriers that make transfer necessary (limited resources, geographic isolation) also hamper effective review. In this article, we describe a Web-based, interactive morbidity and mortality conference series in which providers reviewed cases transferred from rural emergency departments to a tertiary center. Six case-review conferences were conducted over 8 months. Each involved an average of 20 providers representing a total of 7 hospitals. Learning resources (ie, care protocols, best practice reviews, literature reviews) were developed collaboratively and disseminated among participating hospitals following the case-review conferences. Participant responses were highly favorable: 100% found the case reviews “very useful” or “useful” and 100% strongly agreed that the reviews would improve quality of patient care. We conclude that Web-based technology can efficiently facilitate review of transfers and has the potential to positively impact patient care. Future studies should utilize standard validated survey instruments of a larger number of participants to better understand the impact of this intervention.

Key Words: education, medical, continuing, learning, distance, providers, emergency, rural, morbidity, mortality, conference, improvement, quality

Transfers of patients from rural emergency departments to tertiary centers can improve outcomes.¹ These interfacility transfers are frequent in rural areas, where specialty care tends to be concentrated in relatively few tertiary centers. There is considerable literature suggesting that the transfer process is safe and improves outcomes for certain specific conditions (trauma, intracranial hemorrhage, pediatric intensive care, cardiac care, stroke, etc).^{2–6} Nevertheless, there is clearly a need for improving the transfer process. The 2006 Institute of Medicine Report titled “The Future of Emergency Care”⁷ noted that the coordination of regional emergency care is often fragmented, and in response, a national workgroup has been convened to study the topic of interhospital communications and transfers. More recent publications have emphasized the need for rural emergency provider education⁸ and quality improvement to improve the transfer

process.^{9–11} There is, however, a paucity of literature regarding how to improve the process in a systematic way through emergency provider education. Use of distance learning and telemedicine technologies for medical education,^{12,13} specifically emergency provider education, is described in the literature,^{8,14–16} with online discussion identified as a way of bridging the gap between knowledge resources available at rural vs. larger centers.^{17,18} Case-based continuing medical education is consistently described as effective,^{19,20} and distance learning continuing medical education technologies have been shown to strengthen delivery of care and reduce isolation for rural providers.¹² However, to our knowledge, there is no prior literature on use of case reviews for transferred patients or on the use of Web conferencing technology to offer morbidity and mortality conference participation to distant facilities.

This article describes our experience developing and evaluating a Web-based, interactive morbidity and mortality conference series in which providers reviewed cases transferred from rural emergency departments to a tertiary center.

Context

Community hospitals, critical access hospitals (CAHs), and the Dartmouth-Hitchcock Medical Center (DHMC) jointly provide—through emergency department patient transfers—frontline care to about 2 million people scattered across some 16 000 square miles of Vermont and New Hampshire. In 2000, Vermont was the most rural US state, with 61.8% of

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Dr. Fletcher: Dartmouth-Hitchcock Medical Center, Department of Emergency Medicine; *Dr. Rodi:* Dartmouth-Hitchcock Medical Center, Department of Emergency Medicine.

Correspondence: Dr. Sarah N. Pletcher, Dartmouth-Hitchcock Medical Center, Department of Emergency Medicine, One Medical Center Drive, Lebanon, NH 03756; e-mail: sarah.n.pletcher@hitchcock.org.

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its population living in rural counties, and New Hampshire was the 7th most rural, with 59.3% of its population living in rural counties.²¹ (Figures are given for 2000 because the Census Bureau does rurality calculations every 10 years, and 2010 figures were not yet available at time of publication.)

As the only Level 1 Trauma Center and academic medical center in the region, DHMC serves as a referral center for many patients who need the specialized, hospital-based services of a tertiary academic facility. Its emergency department (ED) receives about 3000 transfers annually from regional EDs, including about 900 helicopter transfers. Of approximately 1200 annual trauma admissions, 65% are transferred from other facilities.

The providers involved in patient transfers in our region confront a number of challenges. Emergency providers in rural settings are frequently not board-certified in emergency medicine and have inconsistent experience in managing critically ill patients. Variable experience and limited resources, coupled with unclear expectations, a lack of feedback from the receiving hospital, and the inherent complexity of the transfer process, all contribute to the fact that at present, care of the “transfer patient” is often ad hoc, inefficient, duplicative, and frustrating to both patients and providers. Referring providers face many challenging questions, including whether the transfer is necessary and, if so, when it should occur. Transferring a patient too soon can mean inadequate stabilization or workup, while transferring too late can mean avoidable deterioration of the patient or redundant diagnostics. ED providers rarely get feedback from the receiving facility which, if received, might improve future care.²² Far from being unique to DHMC and its region of service, these issues are common to many rural communities and the tertiary care centers serving them.^{5,7,11}

Program Development

In response to these issues, we formed the Center for Rural Emergency Services and Trauma (CREST) in 2007 to link rural emergency health care providers in New Hampshire, Vermont, and Maine to tertiary care using a pilot network comprised of 3 CAH sites in partnership with DHMC. The main activities of this network include clinical process improvement, educational enhancement, and research into rural emergency care.

In order to improve the care of patients transferred between facilities, we proposed a series of transfer case reviews sponsored by CREST. Given the lack of published data on improving the transfer process, we looked to best practice models (large health care centers with successful patient transfer quality improvement rural community outreach efforts) and conducted a regional needs assessment of rural emergency providers in our network. One model that had been successful in the past was a single surgeon traveling to individual hospitals to review their trauma transfers. While this feedback was much appreciated by the hospitals who participated in these reviews, the process was highly

inefficient and unsustainable. It also only benefited one institution at a time, rather than allowing a broad discourse among hospitals facing similar challenges. Based on this review, we sought to design an educational format that would be timely and efficient, and would simultaneously benefit as many institutions as possible.

Review of clinical cases through a morbidity and mortality format is well-established as a means for creating lasting education and quality improvement.^{23–27} This type of review is often undertaken in academic departments at larger facilities, but rarely in small critical access hospitals. There are regional barriers that prohibit rural providers from attending M&M conferences held away from their facility. Many rural health care sites limit travel to distant conferences due to staffing challenges, time away, cost of position back-filling, and cost of travel. Shift scheduling of ED providers tends to make joint attendance especially difficult. These obstacles are seasonally amplified by inclement weather over the region’s highly mountainous rugged terrain, which is a major deterrent to travel. Teleconferencing or a kindred technology was an obvious solution.

Choice of an appropriate remote conferencing technology required care. We knew that resource-intensive telesolutions would not work in our region, as many rural providers lack high-speed Internet access or local videoconferencing facilities. A solution was required that would allow simultaneous participation by parties equipped only with personal computers or handheld devices running diverse operating systems (Windows, Mac, etc) and having Internet access of varying type and quality. To be acceptable, a solution would have to enable parties with low-bandwidth access to participate in real time while simultaneously allowing those with high-quality access to exchange high-quality video and other data-rich materials. We determined that a commercial Web conferencing service (WebEx Meeting Center) met these criteria at an acceptable cost.

Based on regional needs, the utility of the M&M format for case review, and available technologies, the CREST network pilot-tested and implemented a series of Web-based case reviews (M&M format) to allow referring and receiving providers to jointly review the care provided to patients transferred between facilities.

Case Conference Format

Transfer cases for review are identified by providers at the referring hospital based on clinical features or process questions. A submission form is used to standardize these data (FIGURE 1). A conference meeting time (often scheduled to coincide with a staff meeting at the featured hospital, to support maximal attendance) is established to review the case, and other network facilities are invited. The referring provider team presents the case using PowerPoint, importing de-identified patient images or lab results where appropriate.

During the case conference, details of the cases, including care provided at the referring and receiving facilities, are

Center for Rural Emergency Services and Trauma (CREST)	
Request Form	
Confidential: Protected Pursuant to Vermont 26 V.S.A. 1441, 1442 and NH RSA 151:13a and 329:29a	
Organization: _____	Request Date: _____
Case #1:	
Patient Name: _____	
DOB: _____	
Transfer Date (if applicable): _____	
Sending Facility: _____	
Receiving Facility: _____	
DHMC Clinical Services Involved/Relevant to the Review: _____	
Clinical Question(s) for the Group (identify at least 2):	
1. _____	
2. _____	
3. _____	
Relevant protocols/guidelines to be reviewed (please attach, if any):	

FIGURE 1. Case-review Submission Form.

jointly discussed and clinical questions or concerns are addressed. The CREST core team, whose expertise is in emergency medicine, moderates the discussion. Depending upon the nature of the case, a team of tertiary-center specialists (representing critical care, trauma surgery, pulmonology, pediatrics, orthopedics, etc) is selected to serve as expert reviewers and are on hand to describe clinical interventions/outcomes after transfer and make suggestions for the most appropriate course of care that should precede transfer of similar patients in future. Best practices/treatment protocols are discussed, where appropriate.

The Web-based technology employed allows participants to attend using whatever connectivity is most convenient for them, from a home-based phone connection (audio discussion only) to a high-speed Internet connection allowing presentation slides, radiologic images, and other relevant information to be viewed.

As with a traditional M&M conference, patient information is shared in a manner compliant with the Health Insurance Portability and Accountability Act of 1996 and the conferences are QA (Quality Assurance) protected, allowing for a frank and open discussion. (The state QA statute protects information shared as part of a case review/quality assurance process from being subject to discovery by patients or their attorneys.) We offer continuing medical education (CME) credit to participants, which is particularly beneficial for providers employed in rural facilities that lack internal CME accreditation.

To better illustrate our model, the first of our two pilot case conferences is described here. Three pediatric cases (asthma, bronchiolitis, and gastroenteritis/dehydration) were presented by a participant from a CAH in our referral region—in this case, the hospital's ED medical director. An

expert review panel at the tertiary academic center comprised our emergency medicine core physician team and a pediatric emergency medicine specialist. Following typical M&M format,^{24,26} the cases were presented in a temporal sequence with input throughout by all participants. Focused clinical questions were pre-identified by the submitting hospital team for each case (see FIGURE 1, case review template), which the expert reviewers addressed in their remarks during the case conference. Providers from multiple other rural hospitals participated in the discussion. Outputs of this first case review included dissemination of 5 best-practice journal articles/guidelines for pediatric asthma, bronchiolitis, and gastroenteritis/dehydration, and a regional treatment protocol for pediatric bronchiolitis developed by the presenting hospital with expert input. The expert reviewer referenced the articles and best practices during the case conference and these were collected and shared with the network following the case conference.

Evaluation Plan

Although this was primarily a clinically-oriented improvement project rather than a research project, we wanted to be sure that participants found utility in this method of case review. Toward this end, we conducted 2 brief surveys in the first 8 months of the project. Participants in the first 2 pilot case conferences were asked to rate the conferences on 5 indices: (1) Did the case review meet your learning needs? (2) Will the information change your practice? (3) Will the information, tools, and resources positively impact patient care? (4) Will you develop or implement standing orders or protocols as a result of this case review? (5) Was the technology conducive to learning?

Based on this feedback, adjustments were made to the conference format, including the addition of CME credit. Subsequently, input based on the 6 reviews to date was solicited via direct e-mail survey of a subset of the participant pool representing clinical providers who had attended at least 2 reviews. For this second survey, participants were asked simply to rate the usefulness of the case reviews, their impact on quality of patient care, and to provide comments.

Results/Findings

Over an 8-month period (November 2009 through July 2010), 6 online M&M case conferences were held. Two to three cases, selected by the featured referring hospital, were discussed at each conference. Approximately 20 providers participated in each conference, representing 7 network member hospitals, 6 of which are CAHs. Feedback on the pilot case reviews was generally enthusiastic, with 100% of respondents indicating that the review met their learning needs and that the technology was conducive to learning (FIGURE 2). Given this feedback, we continued with the M&M format and Web conferencing technology. Subsequent feedback of the entire case-review series was highly favorable, with 100% of respondents reporting that the conferences were “very useful” and 100% reporting that they feel strongly that the conferences will improve patient care (FIGURE 3).

In addition to the opportunity to discuss specific questions and best practices with relevant specialists, these conferences have also resulted in the collaborative development and exchange of treatment protocols among the hospitals involved.

This report is preliminary and primarily qualitative in nature. Limitations include the use of surveys that have not been validated and less than optimal response rates. Future studies should utilize standard validated survey instruments of a larger number of participants to better understand the impact of this intervention.

Nevertheless, we believe that our preliminary data suggest that there is value in employing this educational model in a rural region to improve patient transfer. Other authors have also emphasized the important role that electronic access to and collaboration with tertiary specialists of an academic center can play in improving regional emergency care.^{10,28} The value of our model is also supported by its alignment with physician learning theory, which finds that physicians learn and make practice changes best in an informal setting where interaction and discussion with other providers is facilitated by a skilled peer.²⁹

We believe that this process could be further improved by including a framework to identify systematic errors and by developing a structured follow-up process to assess whether practice change or process improvement has in fact occurred, as has been described elsewhere in the M&M conference literature.²⁴

Question	# Yes/Total Responses (%)
Did the case review meet your learning needs?	14/14 (100%)
Will the information change your practice?	10/12 (83%)
Will the information, tools, and resources positively impact patient care?	11/13 (85%)
Will you develop or implement standing orders or protocols as a result of this case review?	3/6 (50%)
Was the technology conducive to learning?	15/15 (100%)
Total Response Rate: 15/32 (47%)	

FIGURE 2. Participant Survey Data From 2 Pilot Case Conferences.

<p>Did you find the case review(s):</p> <p>Very Useful 100% Useful 0% Not Useful 0%</p> <p>To what degree do you agree with the following statement: The case review format can improve quality of patient care?</p> <p>Strongly Agree 100% Agree 0% Disagree 0%</p> <p>Response rate: 9/15 (60%)</p>	<p>COMMENTS—complete list</p> <p><i>“As a provider and reviewer of care I found the case reviews very helpful in understanding the thought processes of the caregivers and integrating the positive aspects into my treatment of patients.”</i></p> <p><i>“I find the case reviews very useful. I strongly agree that the case reviews improve quality of care.”</i></p> <p><i>“I thought the review was very useful. I think the case reviews can definitely improve quality of care. I would be interested in being a regular member for appropriate cases.”</i></p> <p><i>“Innovative format for timely review of transfer cases—and a venue for both sides of providers to collaborate around improving quality of patient care.”</i></p>
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FIGURE 3. Survey Data From 6 Case Conferences.

Lessons for Practice

- Quality improvement is an important but overlooked process for patients transferred within rural regional emergency systems.
- A morbidity and mortality conference format for patient case review is effective.
- Web conferencing technology allows case review participation by providers based in rural locations.
- Despite a desire for review/support, actual engagement of rural providers is challenging; flexible offerings and technology that allow local participation are helpful; interdisciplinary and interfacility reviews not only improve knowledge, but also enhance communication, understanding, and goodwill.

There are other technologies that allow online participation and follow-up for electronic case review/CME purposes, and these could potentially be explored as another mechanism for this provider community to engage in a quality improvement process.³⁰

Conclusion

Our experience demonstrates that Web-based technology can effectively facilitate review of cases transferred between distant facilities. This technology is especially well-suited to rural areas such as ours, where limited resources require frequent transfers and long distances between facilities make onsite shared discussions impractical. This technology is also well-suited to the traditional M&M format, with which most providers are comfortable and which has been shown to be effective for physician education. Another advantage of Web-based technology is that the number of potential participants and their locations is effectively unconstrained; 200 is the standard maximum without special request.

Web-based M&M conferences could enhance education and communication among providers in many clinical scenarios, especially in systems of care in which time, funds, and geography are obstacles to more traditional educational formats.

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