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# Technical Considerations for Implementation of Tele-Ethics Consultation in the Intensive Care Unit

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## ABSTRACT

### Background

Robust ethics consultation services cannot be sustained by all hospitals; consultative service from a high-volume center via teleconferencing is an attractive alternative. This pilot study was conceived to explore the feasibility and understand the practical implications of offering such a service.

### Methods

High-definition videoconferencing was used to provide real-time interaction between the rounding clinicians and a remote clinical ethicist. Data collection included: (1) evaluation of the hardware and software required for teleconferenc-

ing, and (2) comparison of ethics trigger counts between the remote and on-site ethicist during rounds.

### Results

Issues with audio represented the majority of technical problems. Once technical difficulties were addressed, the on-site ethicist's count of "triggers" was not statistically different from the count of the remote ethicist.

### Conclusion

Remote clinical ethics rounding is feasible when the equipment is optimized. Remote ethicists can identify similar numbers of "triggers" for possible ethical issues when compared to on-site ethicist numbers.

## INTRODUCTION

With ever-increasing ease of use and access to technology evident in daily life, enthusiasm for applying new technologies to fundamental problems in medicine has likewise increased. Lack of access to physicians and other healthcare providers is one such critical problem that impacts patients around the world.<sup>1</sup> Telemedicine has been examined as a solution in medical fields ranging from burn surgery to psychiatry, and healthcare fields that parallel medicine (such as pharmacy), with positive results.<sup>2</sup> How-

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ever, to date, no one has looked at the utility of using videoconferencing to provide remote ethics consultation and rounding services to hospitals that do not have an ethics team available around the clock. While the Joint Commission mandated an inhospital mechanism for addressing ethical issues in all hospitals in the United States in 1994,<sup>3</sup> the nature and type of that mechanism was left purposely vague to allow hospitals flexibility in meeting the requirement. However, fully mature ethics consultation and rounding services are not common across the U.S., leaving many programs at a disadvantage in addressing problems beyond those identified as critical.

In order to provide year-round ethics consultation and rounding services in the critical care setting to a wide variety of hospitals and medical groups, many of whom may only have a limited need over the course of an academic year, a tele-ethics service line could be of tremendous value. However, the feasibility of such a service depends on technical and human factors, both of which need to be investigated in a small, well-controlled environment.

#### MATERIALS AND METHODS

This pilot study was conceived and conducted within the medical and surgical intensive care units (ICUs) of a large, urban medical center after approval by its institutional review board as a quality improvement project. Standard of practice at this institution is weekly participation in ICU rounds by a member of the ethics consultation service, during which time he or she directly interacts with attendings, residents, medical students, nurses, and associated healthcare providers on-site. The Center for Ethics at Medstar Washington Hospital Center, established in 1982, is a mature clinical ethics program that is fully integrated within the hospital and sees a large, diverse number of consultations during an academic year (300 to 400). The center is staffed by a medical director, three full-time clinical ethicists, and a clinical ethics educator, totaling approximately 70 years of clinical ethics experience.<sup>4</sup>

While the same ethicist would be present for multiple patient evaluations during a given session, ethicists were purposely rotated throughout this study. The rotation included sessions conducted between remote and on-site ICUs and between the ethicists' "home" ICUs

and other ICUs over multiple sessions. The architectural design of all of the ICUs in which this service was tested is the same, resulting in the same technical challenges across the units. During rounds, the rounding ICU attending joined the virtual ethics consults, and a video feed of the remote ethicist appeared on a workstation on wheels (WoW). On-site ethicists assumed their usual position in the group of physicians, resident physicians, and allied careproviders present on rounds.

To facilitate the participation of the remote ethicists, videoconferencing capability was added to the existing mobile computer units that are used during rounding on the ICUs. Mirroring what the authors expect to occur at medical centers with their own information technology departments, a videoconferencing software platform that was already in use within the system was used. Each of these WoWs was equipped with videoconferencing software as well as a USB (universal serial bus) camera and echo-cancelling speaker/microphone. Equivalent software and hardware were installed in the ethics office for use by the remote ethicists. The system provided a HIPAA-compliant (Health Insurance Portability and Accountability Act of 1996) platform for real-time high-definition videoconferencing. A link to a virtual ethics consult videoconference "room" was placed on the desktops of the WoWs and of the remote ethicists' computers. This room was accessible via a six-digit PIN (personal identification number) access code and allowed participants to see and hear each other and view and discuss patients and patients' information securely. No financial support was provided to this initiative by either the hardware or the software manufacturers.

Two types of data were collected during this phase of the project: technical data and consultant-specific data. The technical data encompassed a list of the technical problems encountered with the implementation of real-time videoconferencing, and included issues of system connectivity, device utilization, and audiovisual problems. Consultant-specific data were collected to identify any potential differences between remote and on-site ethicists' rounding evaluations of clinical ethics issues with patients. Verbal and nonverbal cues ("triggers") are major sources of information for rounding clinical ethicists because they indicate possible ethical dilemmas among team members. Nonverbal cues can include everything from changes

in facial expression, shifts in position or other movement by staff during presentations, to removal of self from rounding. The static focus of the video camera raised concerns that such cues could go unnoticed. Notes made by the tele-ethics consultants regarding the potential need for consultations, educational topics, and pending problems were compared to lists of the same issues gathered by a standard weekly rounding ethicist (see table 1). "Ethics consultation triggers identified" were a marker to evaluate the ability of tele-ethics consultation to identify subtle cues that were often the first signs of an ethical conflict.

**TABLE 1.** The standard ethics consultation "triggers" list

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Patient's wishes are unclear
Patient refuses treatment
Capacity
Noncompliance with treatment
Interfamily disagreement relatives/surrogates/caregivers
End of life
Advance directives
Power of attorney for healthcare
Allow natural death order
Withdraw/withhold treatment
Life-sustaining treatment versus comfort care
Need for clarification of the goals of care
Ethical concerns about the appropriateness of current treatment
Confidentiality/disclosure
Resource management considerations
Financial systems problems
Fairness/justice
Allocation/utilization
Communication
Poor communication across providers
Poor communication between patient/family/providers
Poor communication amongst family members
Disruptive family
Increased decision making complexity
Frequent admissions
Involvement of life-sustaining technologies
Multiple comorbidities
Single system problem
Disruptive/threatening patient/family behavior
Resource allocation/utilization
Power imbalance between/among providers
Unresolved pain (as a potential marker of unaddressed issues)
Unclear surrogate

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The study was designed to evaluate the feasibility of the initiative and to identify the technical and human factors of using videoconferencing to facilitate participation in remote ethics consultation. A noninferiority design was used to compare the ability of on-site ethicists and remote ethicists to identify triggers for possible ethical issues during ICU rounding. A noninferiority design potentially increases the number of available interventions for a particular problem if a new intervention is deemed to be equivalent to a current intervention. A Poisson distribution analysis, used to assess the true incidence of uncommon events in populations, was used to evaluate the difference in counts on these lists of ethical issues identified by the differently located ethicists.

## RESULTS

A total of seven separate rounding days were performed with 30 separate patient encounters evaluated in three separate ICUs. The ICU populations encompassed a broad range of medical and surgical patients, although the ICU teams rounded separately, depending on whether a patient was admitted to the medical ICU or to one of two surgical ICUs. It is worth noting that patient-centered rounds were not mandated in any of the units during the time of this study; the presence of patients' family members was variable as a result.

### Technical Evaluation

Following a brief tutorial at the initiation of the study, both the rounding team and the remote ethicists judged the videoconferencing platform to be simple to use. The hardware setup on both the WoW and the computer in the ethics office was straightforward and consistent with modern "plug and play" electronics. However, the placement of the camera/speaker on the WoW was modified several times over the seven days to improve visibility and audio quality. The original configuration can be seen in figure 1. It was noted very quickly that the field of view provided by the webcam was rather limited and that a camera with a wider viewing angle or pan/tilt capabilities would be helpful to better evaluate group dynamics. Audio function was somewhat more difficult to optimize due to the high degree of ambient noise in the ICUs, most often from ICU alarms (ventilators/

cardiac monitors/intravenous pumps), and the conversations of unit staffs. A total of 14 of the 30 patient encounters were judged to be “inaudible” by the remote ethicists.

Both of these issues were addressed simultaneously after two sessions through the use of a telescoping arm that extended up from the top of the WoW (see figure 2). This modification helped to better orient the speaker/microphone and camera toward the “circle” of the rounding team. It resulted in improved audio quality and the ability to more accurately hear more of the clinical staff. Also, positioning the camera to capture more of a “birds-eye” view helped to minimize the number of obstructions to the view of the remote ethicists.

### Consultant Evaluation

Each of the 30 patient encounters involved a remote ethicist and an on-site ethicist. Remote sessions were performed by each clinical ethicist at least twice, with one of the other two ethicists on-site in the ICUs; 14 of the encounters were judged “inaudible” by the remote ethicists; the majority of those were in the first two sessions and were remedied by equipment adjustments. The remaining 16 encounters occurred with six surgical ICU patients and 10 medical ICU patients. Overall, the inperson ethicists observed more triggers than the remote ethicists did. However, comparing trigger counts for all patient encounters in which there were no audio difficulties, the on-site ethicists’ counts fell

within the 99 percent Poisson confidence interval of the remote ethicists’ counts, indicating no significant difference (68 versus 53). (See figure 3.)

### DISCUSSION

The integration of technology and medicine in the modern age has resulted in advances ranging from face transplantation to exoskeletons for paraplegics. And yet, the need to deliver ethically appropriate and sensitive care continues to be a challenge for healthcare practitioners.<sup>5</sup> Often, a voice from outside the medical team can provide the necessary perspective on difficult choices about patients and their potential treatment pathways.<sup>6</sup> Equally relevant in an era of cost-conscious provisioning of care, early ethics intervention has been suggested to decrease patients’ length of stay and resource utilization.<sup>7</sup> But not all hospitals can afford to maintain clinical ethics consultation services, and not all services have the same breath and depth of experience. A brief review of the existing literature indicates that the volume of cases for ethics consultation services ranges from eight to 500 cases per year.<sup>8</sup> Both patients and physicians could benefit from a way to access a robust clinical ethics consultation service that is not necessarily available at their home institution. Tele-ethics consultation and rounding are increasingly feasible solutions to this problem. As electronic medical records become more prevalent and wireless devices deliver information seamlessly,

the infrastructure to support secure telecommunication regarding patients’ care is increasingly accessible to healthcare practitioners at the bedside.<sup>9</sup>

We begin to evaluate the necessary components of a tele-ethics rounding service with this pilot study. Noise is an ongoing source of stimulus in ICUs, and recent data report noise levels that are con-



**FIGURE 1.** Initial workstation configuration, showing limited field of view for remote ethicist. Photographs by L.S. Johnson, MD. Used with permission.

sistently above U.S. Environmental Protection Agency standards.<sup>10</sup> It is not surprising that noise was the most significant detriment to a successful remote ethics rounding. However, once noise is better controlled, remote ethics consultants can identify enough audio and visual triggers to suggest that ethical issues might need to be addressed. Even one cue can be enough to trigger a more involved discussion that ultimately can shed light on a wide variety of ethics-related topics.

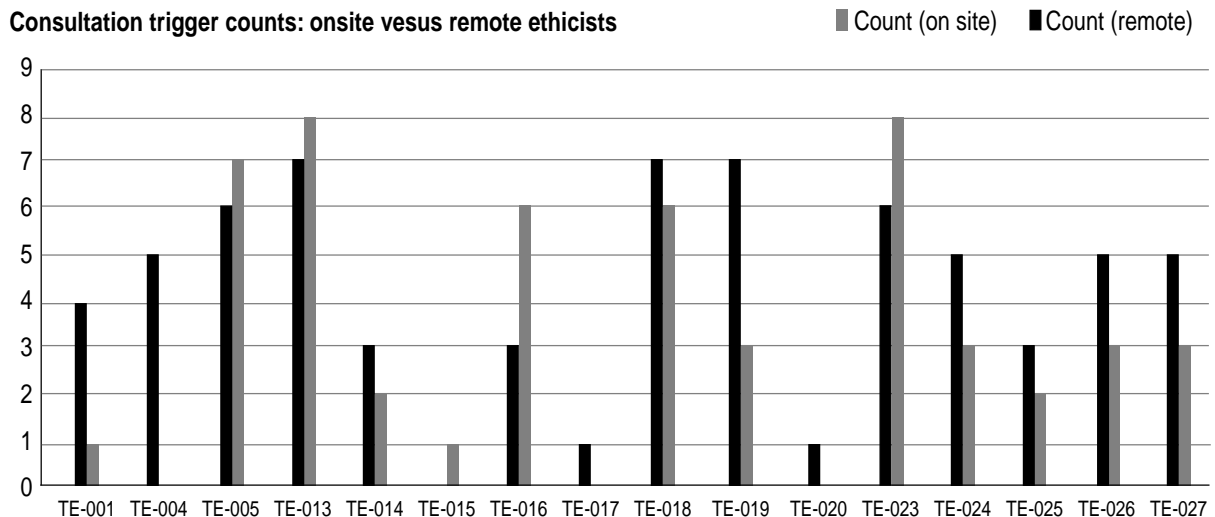
There are several limitations to this study. As it was a feasibility study, only a limited number of sessions were observed; this prevented a detailed analysis of the type and quality of triggers identified, including whether or not some triggers were impossible to identify via tele-

ethics consultation. Further work will address these issues. The lack of 360-degree visualization of the team was raised as a potential problem. However, even on-site consultants do not have eyes in the back of the head; when team members want to avoid discussing a problem, they can usually do so. It is conceivable that “off-camera time” by staff would itself cue remote ethicists to problems that need group discussion. Ultimately, familiarity between the regular members of a medical team and ethics consultants does allow for more inferences to be drawn, even via remote consultation, than perhaps a consultant who is unfamiliar with a team might be able to make.

This study looked primarily at technical feasibility. To gain a greater sense of the impact and



**FIGURE 2.** Revised workstation configuration, showing improved field of view for remote ethicist. Photographs by L.S. Johnson, MD. Used with permission.



**FIGURE 3.**

potential for the participation of remote ethicists to meet a growing clinical need, a follow-up study is currently underway that explores the ability of a remote ethics consultant to render more than just a technical decision. Participation in meaningful, authentic interactions with staff allows ongoing learning and growth from the discussion; preliminary assessments seem to suggest positive interactions with resident physicians and ancillary staff are possible.

### CONCLUSIONS

It is feasible to have remote clinical ethics rounding as long as the equipment used is optimized to maximize audio and video quality. Remote ethicists appear to be able to identify triggers for possible ethical issues in similar numbers to on-site ethicists, likely sufficient to prompt further appropriate in-depth discussions. Having access to a mature clinical ethics department with remote consultation and rounding abilities will be beneficial to improving care for patients in the ICU setting and for assisting clinical staff in making good clinical judgments.

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