

Virtual Mentor

American Medical Association Journal of Ethics
December 2014, Volume 16, Number 12: 969-975.

ETHICS CASE

The Tele-ICU

Commentary by Allison Harriott, MD, MPH, and Michael A. DeVita, MD

Dr. Gray, a critical care specialist in a rural emergency room, was evaluating Mrs. Mason. The 80-year-old wife and grandmother, accompanied by her daughter Sarah, had been brought in by ambulance after body aches, fever, and persistent coughing of a day's duration turned into extreme shortness of breath and shaking chills. She was febrile and had tachycardia, low blood pressure, and dangerously low oxygen saturation. A chest x-ray demonstrated a significant, severe pneumonia. In keeping with a desire previously expressed to her husband and children to "do everything," she was intubated and transferred to the hospital's four-bed intensive care unit where she received IV fluids and antibiotics. Her vital signs returned to normal on the higher level of support.

Dr. Gray began preparing to sign out for the evening at 7 o'clock. Mrs. Mason remained intubated but appeared clinically stable. Dr. Gray anticipated that she might have the breathing tube removed in the morning.

Overnight, the intensive care unit was staffed remotely by Dr. Reed, a teleintensivist—an off-site critical care specialist with real-time access to patient monitors, test results, and audiovisual information from several hospital ICUs. The rural hospital, unable to find a specialist physician to staff the intensive care units, had established the teleintensivist care model the previous year. When Sarah asked Dr. Gray who would be taking his place, he explained that all of the patients were closely watched by a remote physician on a monitor and that nurses—and additional physicians, although they were not directly involved in Mrs. Mason's case—were available in the unit at all times in case a patient's condition became unstable.

Sarah asked, "Couldn't we arrange for her to go somewhere where there's a doctor actually on duty in-person at night?"

Dr. Gray paused before replying. The nearest hospital was several hours away, arranging a transfer would take several hours and might be dangerous due to the distance and the severity of Mrs. Mason's illness.

Commentary

The rapid progress of technology in medicine has created new possibilities that might improve the level of care available to patients around the world but also raise serious questions about the consequences of moving away from traditional patient-physician interactions. Telemedicine, an area of particularly rapid growth, involves

the use of communications technology to view patient results, conduct research, exchange information, and carry on a variety of health care-related activities (diagnosis, treatment, home monitoring) across long distances [1, 2]. The term encompasses any technology that allows the exchange of health care information without in-person, face-to-face contact with a patient.

Until recently, telemedicine has not been practical for the provision of day-to-day care because its capabilities were limited. Today, however, we can transmit huge amounts of data, including real-time images of the patient, recordings of heart and lung sounds, vital signs, laboratory results, radiographic images, ECGs, or just about any other information one might wish to access [3-6]. A continuum exists between “store-and-forward” telemedicine and “synchronous” telemedicine. Store-and-forward technology collects and transmits static patient information to a clinician who reviews it and returns a diagnosis and management plan, without interacting directly with the patient. Synchronous telemedicine, on the other hand, takes advantage of real-time videoconferencing for consultation. Most uses of the technology involve some of both.

Intensive care, a particular area in which telemedicine has shown promise, poses unique challenges because it requires a high ratio of clinicians to patients. The inadequate supply of critical care physicians, particularly in underserved areas of the United States and many areas of the developing world, remains a serious concern and appears likely to worsen over time. [7]. Commonly cited reasons for hospitals not staffing ICUs with critical care physicians include a shortage of trained practitioners, the rising cost of specialty care, and physicians’ preference to live in metropolitan areas [6, 8]; perhaps intensivists also tend to prefer to practice in larger medical centers. Numerous studies have demonstrated that outcomes are better in intensive care units managed predominantly by a full-time intensivist [9-11], but having one present at all hours may not be possible.

Advantages of Tele-ICUs

Technology has made possible one method to address the shortage of critical care physicians. Telemedicine intensive care units (tele-ICUs) share data between the patient care location and a command center, which might be hundreds or even thousands of miles away. The command center monitors the incoming data, detects trends, and recognizes patients whose clinical conditions are worsening, enabling earlier expert intervention and patient stabilization than would be possible without an intensivist’s involvement [6, 7, 12, 13]. Intensivists at the command center can talk directly with the patient or on-site care team, all of them seeing and hearing each other on in-room monitor screens. But the benefits of tele-ICUs go well beyond the benefits to individual patients.

Increasingly, US hospitals are integrating the tele-ICU model, enabling a single off-site physician to cover many care centers, thereby increasing efficiency and cutting staffing costs [5]. More importantly, several studies have shown that tele-ICU programs consistently improved clinical outcomes, including decreasing mortality,

shortening length of stays in the ICU and hospital, and increasing staff adherence to changes in best practices [14-16]. Other benefits of telemedicine could include a reduction in the number of hospital transfers for specialty care, fewer patients needing to travel long distances to see their physicians, and the ability to provide more comprehensive care to physician-poor areas—in short, greatly increased patient access to medical care [2].

Possible Disadvantages of Tele-ICUs

While the possibilities seem very exciting, troubling questions remain about the effects technology will have on the provision of care. One potentially serious concern involves determining what constitutes the “standard of care” in an interconnected world [4-6]. If medical decision making is at least partially outsourced, can the standard that exists in the patient’s community be maintained or is it reasonable to expect treatment to conform to the standards and customs of the place on the other end of the line? How can standards be enforced if the command center is located in another state or even another country? Currently, there are no methods for making standards consistent across locations. That is, each hospital makes its own rules (albeit all drawn from a similar set of scientific data and practice guidelines). While international standards of care for some common treatments are being developed, consensus about care for many diseases is lacking. This raises the specter of conflict between telemedicine physicians and physically present physicians and, hence, the question of who the ultimate decision maker should be. While the obvious answer seems to be the on-site community physician, studies evaluating patient outcomes and the role of teleintensivists suggest another answer because telemedicine offers 24/7 critical care physician expertise, while the hospital lacks that skill set outside of the local intensivists’ working hours [14-16].

And what happens if telemedical equipment malfunctions, resulting in patient harm? Whose responsibility is it? Who will the patient, the public, and the courts blame? Less drastically, reliance on telemedicine equipment may have unintended effects on the quality of care. If an ICU comes to rely on telemedicine support, other staffing, skills, and knowledge may be withdrawn or deteriorate. If there are interruptions, malfunctions, or losses of the service, the quality of care delivered on site would be below the “baseline” level of care that existed before telemedicine was introduced. While there are no data on this point, continued surveillance is likely to improve compliance with standards of care and, therefore, staff knowledge and skills, rather than worsen them.

Even more worrisome are concerns about the effect of telemedical care on the patient-physician relationship, a bond based on confidentiality, consent, caring, expertise, trust, and, historically, person-to-person contact [4, 16]. In the critical care environment, particularly, physicians see patients at their most vulnerable, and maintaining the patient’s, family’s, and health care team’s trust and confidence in each other is a key facet of the intensivist role. Viewing patients—or in some cases only their images or numbers—on a screen threatens to reduce them to collections of

“data points,” potentially dehumanizing them and making compassionate care more difficult to achieve.

Furthermore, when talking to a physician in a quiet exam room with the door closed, patients—rightly or wrongly—generally trust that the discussion is private, but there are substantial barriers to privacy in an interconnected environment. It is not difficult to imagine a celebrity’s ICU stay, a politician’s psychiatrist session, or any person of interest’s discussions with his or her physician becoming a high profile target for hackers. Can transmitted data ever be made secure enough to prevent the loss of data to third parties? Such dangers inherently jeopardize the confidence of the patient—and perhaps of the community—in doctors, the medical profession, and their health care institutions. Trust is essential to the willingness of patients to give important but potentially socially sensitive information to their physicians and other hospital personnel. Loss of this trust can undermine a basic component of health care.

Attitudes about the novelty of the technology may also influence its effectiveness. Skepticism about the quality of care, whether arising from patients’ own lack of trust in telemedicine technology or influenced by local physicians’ attitudes towards it [4, 6], might compromise care from physicians they have never met in person. Fortunately, the few studies regarding patients’ attitudes have shown a generally positive opinion [16-19].

Even if patients would readily accept telemedicine in the ICU, is the current informed consent process adequate? Some would argue that technology is just one additional tool for providing care—telemedicine already allows physicians to reference patient data, radiologists to interpret studies after hours, and health professionals to monitor vital signs and lab results remotely—and that the patient gives a sort of implied general consent to a facility’s treatment methods when he or she agrees to be treated there [4]. But one could also argue that telemedicine differs so much from patients’ expectations of typical medical treatment—particularly in terms of the risks to privacy entailed by electronic storage and transmission of information [4, 9]—that they should be informed of and consent to it specifically. This may be complicated by the difficulty of obtaining adequate, specific consent for telemedical care from ICU patients, who are often on sedating medications or have serious injuries that might impair their ability to make care decisions.

And suppose patients do not consent to remote treatment? It is technically feasible not to provide the remote monitoring and treatment; it is possible to turn off the tele-ICU link for an individual room or prevent the tele-ICU physician from “turning on” the video link. But in a tele-ICU environment, as we noted before, workers may become dependent upon this technology as a new standard of care. Although acquiescing to a patient’s request to withdraw from tele-ICU care or transfer to a hospital that has in-hospital 24/7 intensivists may involve risks to the patient, in our opinion, such refusals should be treated like any other refusal of care: any person with decisional capacity (or that person’s surrogate) has the right to refuse any

therapy at any time, as long as he or she is informed of the choices and potential risks and benefits of each option.

Conclusion

The rapid development of medical informatics and supporting technologies has expanded the boundaries of critical care medicine. The issues raised by this rapid progress, the increasing demand for physician services, and the growing need for cost containment will become more complex in the future. The tele-ICU model would seem to present a viable and safe means for providing high-quality care to underserved communities. We believe tele-ICUs are here to stay and will continue to expand in breadth and impact because of the cost savings they can bring.

Fortunately, they are also associated with a quality-of-care benefit. Their expansion, however, forces us to consider standards of care, informed consent, and the fundamental relationship between critically ill patients and their clinicians and the health system at large. Telemedicine is neither ethical nor unethical. It is a tool that can enhance the ethical delivery of health care or harm it, albeit inadvertently. Our challenge is to ensure that these new capabilities do not undercut essential components of medicine and unintentionally cause harm.

References

1. Scannell K, Perednia DA, Kissman H. *Telemedicine: Past, Present, Future: January 1966 through March 1995*. Bethesda, MA: National Library of Medicine; 1995. Current Bibliographies in Medicine.
2. World Health Organization. Telemedicine: opportunities and developments in member states: report on the second global survey on eHealth; 2009. http://www.who.int/goe/publications/goe_telemedicine_2010.pdf. Accessed October 15, 2014.
3. Craig J, Patterson V. Introduction to the practice of telemedicine. *J Telemed Telecare*. 2005;11(1):3-9.
4. Cornford T, Klecun-Dabrowska E. Ethical perspectives in evaluation of telehealth. *Camb Q Healthc Ethics*. 2001;10(2):161-169.
5. Kahn JM, Hill NS, Lilly CM, et al. The research agenda in ICU telemedicine: a statement from the Critical Care Societies Collaborative. *Chest*. 2011;140(1):230-238.
6. Berenson RA, Grossman JM, November EA. Does telemonitoring of patients—the eICU—improve intensive care? *Health Aff*. 2009;28(5):w937-w947.
7. US Department of Health and Human Services Health Resources and Services Administration. The critical care workforce: a study of the supply and demand for critical care physicians. May 2006. <http://bhpr.hrsa.gov/healthworkforce/reports/studycriticalcarephys.pdf>. Accessed October 31, 2014.
8. Rosenfeld BA, Dorman T, Breslow MJ, et al. Intensive care unit telemedicine: alternate paradigm for providing continuous intensivists care. *Crit Care Med*. 2000;28(12):3925-3931.

9. Wilcox ME, Chong CA, Niven DJ, et al. Do intensivist staffing patterns influence hospital mortality following ICU admission? A systematic review and meta-analyses. *Crit Care Med*. 2013;41(10):2253-2274.
10. Pronovost PJ, Angus DC, Dorman T, Robinson KA, Dremsizov TT, Young TL. Physician staffing patterns and clinical outcomes in critically ill patients. *JAMA*. 2002;288(17):2151-2162.
11. Young MP, Biurkmeyer JD. Potential reduction in mortality rates using an intensivist model to manage intensive care units. *Eff Clin Pract*. 2000;3(6):284-289.
12. Nguyen YL, Kahn JM, Angus DC. Reorganizing adult critical care delivery: the role of regionalization, telemedicine, and community outreach. *Am J Respir Crit Care Med*. 2010;181(11):1164-1169.
13. Young LB, Chan PS, Cram P. Staff acceptance of tele-ICU coverage: a systematic review. *Chest*. 2011;139:279-288.
14. Breslow MJ, Rosenfeld BA, Doerfler M, et al. Effect of a multiple-site intensive care unit telemedicine program on clinical and economic outcomes: an alternative paradigm for intensivist staffing. *Crit Care Med*. 2004;32(1):31-38.
15. Lilly CM, Cody S, Zhao H, et al. Hospital mortality, length of stay, and preventable complications among critically ill patients before and after tele-ICU reengineering of critical care processes. *JAMA*. 2011;305(21):2175-2183.
16. Currell R, Urquhart C, Wainwright P, Lewis R. Telemedicine versus face to face patient care: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2000;(2):CD002098.
17. Karp WB, Grigsby RK, McSwiggan-Hardin M, et al. Use of telemedicine for children with special health care needs. *Pediatrics*. 2000;105 (4 pt 1):843-847.
18. Finkelstein SM, MacMahon K, Lindgren BR, et al. Development of a remote monitoring satisfaction survey and its use in a clinical trial with lung transplant recipients. *J Telemed Telecare*. 2012;18(1):42-46.
19. Demeris G, Speedie S, Finkelstein S. A questionnaire for the assessment of patients' impression of the risks and benefits of home telecare. *J Telemed Telecare*. 2000;6(5):278-284.

Allison Harriott, MD, MPH, is completing a fellowship in critical care medicine at the Penn State Milton S. Hershey Medical Center in Hershey, Pennsylvania. She trained in emergency medicine in the State University of New York Downstate/Kings County Hospital residency program in Brooklyn. Her academic interests focus on medical education, simulation, and critical care in the emergency department.

Michael A. DeVita, MD, is director of critical care at Harlem Hospital Center in New York. He has been an international leader in transplantation and critical care ethics, simulation education, and rapid response systems. The Society of Critical Care Medicine has awarded him the Grenvik Family award for contributions to

critical care ethics and the Asmund S. Laerdal award for contributions to resuscitation research.

Related in VM

[Telemedicine: Innovation Has Outpaced Policy](#), December 2014

[Telemedicine's Potential Ethical Pitfalls](#), December 2014

[Teleradiology: The Importance of Communication](#), December 2014

[The George Washington University Emergency Medicine Telemedicine and Digital Health Fellowship](#), December 2014

[Does Health Information Technology Dehumanize Health Care?](#) March 2011

[The Promise of Health Information Technology](#), March 2011

The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental.

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Copyright 2014 American Medical Association. All rights reserved.