

# Editorial

## THE MEDIUM AND THE MESSAGE: OPPORTUNITIES AND CHALLENGES

By Cindy L. Munro, RN, PhD, ANP



Critical care was born in the belief that coupling clinical expertise with state-of-the-art technology for monitoring and care delivery would improve outcomes for the sickest patients. That promise has continued to be fulfilled, with additional improvements in care as clinical technologies have advanced dramatically. The movement to use technology to enhance providers' abilities to care more effectively and efficiently for critically ill patients is exemplified by the electronic intensive care unit. Whereas technology for patient care has expanded rapidly, technology for research dissemination has proceeded at a much slower pace. The next frontier for critical care may be integration of new media technologies to enable better application of research at the bedside.

### A Revolution in Media Technology

The current media revolution presents opportunities and challenges for those producing research as well as for users of the data and findings. Authors, editors, and publishers must now wrestle with how best to transmit information in a way that leads to accurate understanding of that information. Researchers and clinicians consider how to access information in

a way that best facilitates application. As technology advances, we will find ourselves learning to function in an increasingly complex "living, breathing mediascape"<sup>1</sup> that encompasses our personal and professional lives.

### Increasing Flexibility

How are you reading this month's *American Journal of Critical Care (AJCC)*? This question would have seemed odd several years ago, when printed journals were the primary method for scientific communication. Now, with the movement of *AJCC* from exclusively printed pages to digital formats (including digital replica and Internet availability), and in the context of the communications technology explosion, the question is not quite so strange.

As professional publications extend their use of alternate forms of media, the options for how we disseminate and access research will expand as well. Some of these opportunities can be anticipated from current leading edge technologies in popular media culture. Currently, casual readers have a wide choice of how to enjoy their favorite novel. Some will read the novel on a computer screen provided by a commercial publisher or through sites such as the Google Library Project.<sup>2</sup> Instead of reading on a computer screen, many readers download electronic material to personal media devices. Audiobooks are

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another popular format. And, yes, some readers may actually be turning the pages of a physical book!

Scientific literature has parallel options. Scientific journals, traditionally published in hard copy, may also have digital formats or online access. Bibliographic databases have traditionally indexed printed materials, but many are expanding to encompass digital media as well. PubMed (which encompasses MEDLINE) is perhaps the best-known bibliographic source for research. PubMed provides free searchable online access to scientific citations (many with links to full-text availability) from medicine, nursing, dentistry, veterinary medicine, the health care system, and preclinical sciences.<sup>3</sup>

Presently, the same content is usually shared by all readers no matter how the material is accessed, although there are occasional variations among formats in the availability of lagniappes (eg, supplementary material available only online). In the future, formats likely will diverge regarding what content is included; the divergence in content between print and digital forms could accelerate if research reports are expanded to include material that cannot be presented in print, such as audio or video content.

Such divergence poses interesting questions. Which format is the archival copy of the work? Will expanded and contracted information presented in different formats constitute duplication in the research record? How will digital information be reliably archived? Will accessibility of digitally archived information be jeopardized by lack of backward compatibility when hardware or software changes occur? The ephemeral nature of Internet-based information is problematic. Wren<sup>4</sup> found that 20% of Internet addresses (Uniform Resource Locators, or URLs) of abstracts in MEDLINE were inaccessible in 2007, and that the percentage of inaccessible URLs varied among journals. Digital preservation projects are important to ensuring stability of the research literature.<sup>5</sup>

## Internet Hunting and Foraging

Slawson and Shaughnessy<sup>6</sup> describe 2 sets of information acquisition tools—“foraging” and

“hunting”—necessary to the application of research evidence to practice. Foraging is keeping up with the literature—updating one’s clinical knowledge base with current and valid information relevant to practice. Foraging is done outside the context of a specific clinical question. As one foraging strategy, many clinicians rely on synopses of research that interpret research in the context of practice. *AJCC* provides such synopses in the “Clinical Pearls” section of every issue. Foraging is most useful when the information is tailored to clinical specialty and delivered automatically to the user.

Hunting tools are used to obtain information regarding a specific clinical question that arises in the context of patient care. The effectiveness of hunting tools depends upon how much work is involved in their use. Slawson and Shaughnessy<sup>6</sup> define this work as time, money, or effort required to obtain an answer to a clinical question. The most effective tools are easy to use and can be employed at the bedside to provide accurate and reliable guidance as questions arise.

Current formats and processes present distinct barriers to accessing research in a way that permits application at a patient’s bedside. The sheer volume of literature available makes identification of information relevant to a particular patient difficult; PubMed currently houses 20 million scientific citations, with more than 40 000 added monthly.<sup>3</sup>

Retrieving references from bibliographic databases requires specific skills to search effectively, including knowledge of how the citation database is structured and how it indexes search terms. This problem is now being addressed by harnessing improved computer algorithms in search engines to improve hunting. Using an engine such as “askMEDLINE”<sup>7</sup> (a free resource from the National Library of Medicine), searchers type clinical questions in plain text, as if asking a question of a colleague, rather than entering specific keywords. The program identifies keywords in the questions, queries PubMed, and returns relevant citations. For example, entering *Saline for endotracheal tube suctioning* yielded 20 research reports, spanning 1992 to 2009 (4 of them published in *AJCC*!). The developers of askMEDLINE intended that the platform improve access to research literature via a handheld device at the bedside. This clearly expands accessibility to relevant research and reduces the search burden at the bedside.

### About the Author

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## A Critical Care Net

If today we can retrieve research at the bedside by entering a plain text question into a handheld device, and our electronic medical systems can alert clinicians to clinical guidelines that should be considered based on patient characteristics, what might tomorrow hold?

I can envision technology that connects to a specific patient's electronic medical record in the ICU; searches and categorizes all of the patient's information; builds a search strategy to retrieve information most relevant to that patient's unique characteristics and conditions; searches all of the literature; reports the most relevant data and findings, including an integrated systematic evaluation of the evidence; and suggests actions for the provider to consider in the care of that patient. At that point, research and patient-oriented care can truly be united to improve outcomes for every individual patient—and critical care will have entered the next frontier.

The statements and opinions contained in this editorial are solely those of the coeditor.

## FINANCIAL DISCLOSURES

None reported.

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