Respiratory Care Informatics: Birth of a New Discipline?

Medical informatics has its roots in the 1950s, with the integration of digital processing and health care research. Most of the early work was simply finding faster ways to calculate values from then-exotic tests, such as cardiac output via dye-dilution.[1] The 1960s found time-sharing systems used as little more than communication devices to send orders and results between different hospital departments. Hand-written information in one location was manually entered on a Teletype device that would route the message to the right receiver, where it was often transcribed again, by hand, from a roll of paper into a patient chart.[2,3]

It was not until the 1970s that patient information began to be regularly put into electronic databases, with the appearance of systems such as MUMPS, HELP, and MYCIN. MUMPS (the Massachusetts General Hospital Utility MultiProgramming System) was the first database designed specifically to store medical information.[4] It thrives today as VistA (Veteran's Health Information Systems and Technology Administration), which is used to manage the largest medical system in the world, the United States Veteran's Health Administration. The HELP and MYCIN programs were early consultation systems that stored patient information and warned about abnormal test results, antibiotic resistances, arrhythmias, and adverse drug interactions.[5,6] HELP began as a clinical information system operational at Intermountain Health Care, LDS Hospital, Salt Lake City, in 1967.[7] MYCIN was developed in the early 1970s at Stanford University originally designed to identify bacteria causing severe infections, and to recommend antibiotics; many antibiotics have the suffix "mycin," so the name was derived from the antibiotics themselves).[8]

In 1989, nursing informatics gained recognition as a separate discipline within medical informatics, by developing its first graduate training programs.[9] The American Medical Informatics Association recognized that there are groups within it that have specialized focuses, so working groups were created to accommodate issues and information that are only germane to a subset of its membership. Today, medical informatics has further fragmented into a number of distinct disciplines, including community health, dental, image, primary care, and veterinary informatics, to mention a few.

Respiratory care has a distinct identity that has been developed with the efforts of the American Association for Respiratory Care (AARC). The profession has been recognized as a unique entity by the passage of state regulatory laws in the contiguous United States. Respiratory therapists are also identified by the United States Department of Labor as the primary delivery agents for respiratory care.[10]

Respiratory care has a distinct vocabulary. Not only is there a distinct vocabulary, there is a proliferation of custom naming schemes introduced to the profession by industries to create the illusion of unique products. It is a simple exercise to come up with a list of over 30 different ventilator modes. Explaining the distinctions between ventilator mode names is often an exercise best left to marketing.

SEE THE SPECIAL ARTICLE ON PAGE 488

Providing such a rich vocabulary can lead to confusion. In an effort to standardize the vocabulary and terminology, the AARC has created Uniform Reporting Manuals that define more than 80 different procedures. These make it easier to discuss therapeutic and diagnostic procedures between institutions. The AARC's benchmarking system allows a department to compare time standards and staffing to those of similar institutions.[11] Finally, the AARC's Clinical Practice Guidelines provide a framework for care and acceptable practices.

Task inventories, though, do not address issues raised in patient care, such as assessment, intervention, and outcome. As Mussa[12] points out in her paper in this issue of RESPIRATORY CARE, there needs to be a respiratory care diagnostic taxonomy that accurately describes terms such as "shortness of breath" and "increased work of breathing." The taxonomy can then be used as the basis for creating the respiratory care informatics discipline. Portions already exist in the above-mentioned works, but refinements and additions are necessary to integrate a complete image from them.

Who needs to take the next step? The existence of nursing informatics as a discipline has been debated,[13] as, no doubt, will the existence of respiratory care informatics. The primary distinction between clinical informatics disciplines and other informatics disciplines is that medical informaticians do not tend to come from

a computer science background, and then study a clinical specialty area. On the contrary, specialists in medical disciplines begin to understand the benefits to patient care of improving outcomes, improving productivity, reducing errors, reducing ambiguities, and reducing costs that can accrue from better management of information, and then approach the study of informatics.[14] For respiratory care informatics to become a recognized discipline within medical informatics, respiratory therapists will have to create it.

Steven B Nelson MSc RRT FAARC
Sun Microsystems
Overland Park, Kansas

REFERENCES

1. Warner HR, Wood EH. Simplified calculation of cardiac output from dye dilution curves recorded by oximeter. J Appl Physiol 1952;5(3): 111–116.
2. Barnett GO. Electronic network in hospitals. Science 1966;23; 154(3756):1504.
3. Baruch JJ, Barnett GO. Real-time shared on-line digital computer operations. J Chronic Dis 1966;19(4):377–386.
4. Bowie J, Barnett GO. MUMPS: an economical and efficient time-sharing system for information management. Comput Programs Biomed 1976;6(1):11–22.
5. Warner HR, Olmsted CM, Rutherford BD. HELP: a program for medical decision making. Comput Biomed Res 1972;5(1):65–74.
6. Shortliffe EH, Davis R, Axline SG, Buchanan BG, Green CC, Cohen SN. Computer-based consultations in clinical therapeutics: explanation and rule acquisition capabilities of the MYCIN system. Comput Biomed Res 1975;8(4):303–320.
7. Clayton PD, Narus SP, Huff SM, Pryor TA, Haug PJ, Larkin T, et al. Building a comprehensive clinical information system from components: the approach at Intermountain Health Care. Methods Inf Med 2003;42(1):1–7. *Erratum in: Methods Inf Med 2004;43(1):IX.*
8. Mycin [Internet]. Wikipedia, the free encyclopedia; 2008 Jan 29. Available from: http://en.wikipedia.org/wiki/Mycin. Accessed March 3, 2008.
9. Heller BR, Damrosch SP, Romano CA, McCarthy MR. Graduate specialization in nursing informatics. Comput Nurs 1989;7(2):68–77.
10. Bureau of Labor Statistics, US Department of Labor. Occupational Outlook Handbook. Respiratory therapists. http://www.bls.gov/oco/ocos084.htm. *Accessed January 25, 2008.*
11. Chatburn RL, Ford RM. Procedure to normalize data for benchmarking. Respir Care 2006;51(2):145–157.
12. Mussa C. Respiratory care informatics and the practice of respiratory care. Respir Care 2008;53(4):488–499.
13. Masys DR, Brennan PF, Ozbolt JG, Corn M, Shortliffe EH. Are medical informatics and nursing informatics distinct disciplines? The 1999 ACMI debate. J Am Med Inform Assoc 2000;7(3):304–312.
14. Ford RM. Respiratory care management information systems. Respir Care 2004;49(4):367-375; discussion 375–377.

Correspondence: Steven B Nelson MSc RRT FAARC, Sun Microsystems, 8314 W 128th Street, Overland Park KS 66213. E-mail: sbn_kc@mac.com.

Mr Nelson is an employee of Sun Microsystems, Overland Park, Kansas, which manufacturers products for medical information systems. He reports no other conflicts of interest related to the content of this editorial.