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Commentary

PDAs in Clinical Practice

Having a Database in Your Hand but Keeping the Decision in Your Brain

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Programmable personal digital assistants (PDAs) are excellent tools in medical practice, allowing easy and timely access to extensive reference materials which immediately translates into improved cost-effectiveness in patient care. PDAs have also proved able to reduce medication error and to greatly improve processes such as charting, consults, and sign-out. Many applications are available online (several in the public domain, *see* Web Resources at the end of the article), with specific problem-solving abilities for different aspects of health care provision. The News Item of this issue of Neuroinformatics (Jao et al., 2003) describes the development of a novel, palm-based mini-mental state examination (MMSE). MMSE is widely used for assessing cognitive mental status. The test has limited specificity regarding particular clinical syndromes, but represents a brief, standardized, quantitative measurement of cognitive disorders.

Without a doubt, a handheld, electronic MMSE form saves the time of transcription by allowing direct data-entry in digital format. Additional saving in examination time may depend on specific logistic settings. In our experience, the MMSE can be administered in 3–7 min, and most (>70%) of this time is spent interacting with the patient during data collection. In addition, an early decision for patient management is not usually prompted by the detection of cognitive impairment by MMSE. More appropriate tests, using for example, the Glasgow coma scale (Teasdale et al., 1974) and the trauma and injury severity score (Champion et al., 1981), are available and routinely used in clinical emergencies. Given the need to purchase a license for Pendragon Form 3.2 in order to use the Palm-based MMSE, health care providers should evaluate the cost benefit on an individual basis.

A more general question regards the use of portable electronic devices as diagnostic aids. The diagnosis process becomes more complex with increasing data input. It has been argued that the decision-making process in the med-

ical field is deficient because the cognitive inputs to those decisions are incomplete, resulting in a limitation of possible diagnostic and management options (Weed 1999). The use of information systems as decision support tools for the health care professional is thus suggested both by the intrinsic limits of the human mind as well as by the overwhelming immensity of medical knowledge.

Different knowledge-based clinical decision support systems have been developed over the last 30 yr. Invaluable systems are available (e.g., for automated laboratory results interpretation [Oosterhuis et al., 2000], drug dosing [Lenert et al., 1989], clinical practice guideline application [Tierney, 1996], ventilator and electrocardiogram monitoring in intensive care unit patients [Sittig et al., 1990; Factor et al., 1990; Studzinski, 2002], and medical education [Ryan et al., 1999]). However, the more complex diagnostic process is hard to translate into algorithms, and the clinical consultation systems developed so far are of limited efficiency. Consultation systems carry on an interactive dialogue with the clinician and help determine the appropriate test or procedure to confirm or rule out a specific diagnosis (e.g., MDX, Dxplain, *see* Web Resources). The computer—clinician interaction consists of a series of questions concerning the patient's clinical state. Unfortunately, with the current technology, this interaction is very time consuming and not always conclusive.

Decision-making is based on available patient data. Data collection is performed by the clinician who selects in real-time important vs unimportant variables, thus filtering the information entered in the system. Not only are clinicians reluctant to spend extended periods of time exhaustively logging data of dubious use into a computer, but also recording all variables (without selection) combinatorially increases the complexity of the diagnostic process, ultimately leading to greater margin of error. We cannot afford, in managing a patient, to consider many marginally relevant possible solutions to each problem. An ultimately meaningless suggestion is too common an outcome in current computer-based diagnostic support systems for these to constitute a truly valuable aid in clinical practice.

Despite these reservations, it is undeniable that the application of IT to medicine has progressed at amazing speed in the last few years. The interest has spread, and a great deal of research is currently underway. A near future can be foreseen when the application of artificial intelligence to clinical reasoning will also result in systems capable to effectively contribute quality and accuracy to the clinical decision process.

Web Resources

http://www.pediatricsonhand.com

http://www.epocrates.com

http://www.palmspot.com/software/detail/ps7303a_9888.html

http://www.pdacentral.com/palm/reference_default.html

http://www.aan.com/pda.cfm

http://www.lcs.mgh.harvard.edu/dxplain.htm.

http://technology.ksc.nasa.gov/WWWaccess/Stories/MDXss.pdf

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