INTRODUCTION

“Computers in the future may weigh less than 1.5 tons.”

Popular Mechanics, 1949

The use of computers in health care, specifically in pain medicine, has the potential to improve the quality of care provided to patients, increase its efficiency, and decrease costs.

For the past half century, computer technology has undergone rapid evolutionary change. In 1948, the first computer program ran on “Baby” in Manchester, England; in 1949, the first computer bug was reported—a moth stuck between relays in the Harvard Mark II computer. The IBM selective sequence electronic calculator used from 1948 to 1952, which occupied 1,000 square feet of floor space, produced the first moon position tables for the 1969 Apollo flight.

In the 1960s, a student might spend hours punching holes in cards to run a program to solve a monumental problem such as finding the mean and standard deviation of a column of numbers. After submitting the “job” to the administrators of the only computer around, the “new job” got in line for processing, and the user waited for days before learning the results. If there were even one mistake on a single card, a new card had to be typed, reinserted into the deck, and all the cards resubmitted.

Eight-inch floppy disks were invented in 1971, and 3-inch floppies became available in 1982. Kenbak Corp. began selling the first personal computer for $750 in 1971 and went out of business 2 years later after selling only 40. The first computer worm was discovered as recently as 1979 and was named after a powerful “tapeworm” that infected computers, as described in John Brunner’s book *The Shockwave Rider*.

Today’s computers and the Internet are the modern representatives of this evolutionary development, and their impact on society is equivalent to that of the automobile in the early part of the last century. Until very recently, however, this technological evolution has been far less evident in medicine. Berner et al. wrote in 2004 that for 30 years clinicians have felt that the widespread use of computers in clinical practice was imminent. Yet, the wave never seemed to break. The barriers to implementation included immature technology, health administrator focus on financial systems, application unfriendliness, and physician resistance. Many of these have now been overcome or circumvented, and it is possible that the wave is finally about to break.

The intent of this supplement is to present informative articles by well-respected clinicians and researchers on topics related to information technology and computers in pain management. Why do we need a special issue on computers and information technology? Consider that close to one in five adults in America experience chronic pain, and the incidence of noncancer pain will escalate with an ever-aging population. Increasingly, clinicians are under pressure to see more patients as efficiently as possible while at the same time patients want to have a one-to-one relationship with providers, to be informed of their diagnoses and treatment, and to take a more active role in their own care as educated consumers. Information technology has been shown to improve communication and potentially enrich the clinician–patient relationship with electronic medical records, email, and disease-specific web sites. These technologies are designed to improve efficiencies and reduce barriers to access. Future progress in the use of information technology for pain management will lead to its use in almost all clinical offices and health clinics, and possibly in millions of homes as clinicians utilize patient self-rating tools over the Internet to assess and manage chronic disease.

The contributors to this issue were invited to cover a wide range of topics related to computers and information technology. Arthur Stone and Joan Broderick begin with an overview of real-time data collection for pain. The authors discuss recall bias, dense data collection, types of sampling protocols and collection modalities, and issues of patient and provider acceptance. This article raises provocative questions and gives a glimpse into the future of this area of study. David Goldstein, Rosemary Wilson, and Elizabeth VanDenKerkhof...
describe the development and implementation of a portable electronic chart used in an acute pain management service. This article addresses the issues encountered during the development process of an electronic monitoring system, and, based on the collection of acute pain data over a year, has clear implications for clinical practice. Lisa Marceau and others present preliminary data to address the uses of electronic diaries in clinical practice and their potential for changing behavior. Their findings suggest that electronic tracking may provide information to positively influence pain management decisions. Madelon Peters and Geert Crombez focus on how attention to pain can be assessed using pain diaries. They outline theoretical models of the interaction between attention and pain and argue for the benefit of electronic diary assessment to understand the interrelationship between pain and focus of attention.

The article by Gilbert Fanciullo et al. presents a new computerized method to assess pain in children. The authors point out some of the difficulties in measuring pediatric pain and describe the psychometric properties and feasibility of a Computer Face Scale to improve pediatric pain assessment. The article by Janine Becker and coauthors describes the development and evaluation of a six-item pain impact questionnaire (PIQ-6), which measures both pain severity and impact on health-related quality of life. With the use of large sample populations, the authors demonstrate the validity and reliability of the PIQ-6. The article by Diana Higgins et al. describes an interactive voice response program for chronic pain patients used as part of a clinical study at a Veterans Administration (VA) medical center. The article includes informative anecdotes about the program's incorporation into the VA system for the measurement of pain and quality of life.

The article by Meredith Smith, Judith DePue, and Christine Rini reviews computerized decision support systems for pain management within the primary care setting. The authors discuss deficiencies in the literature and the potential of these systems for improving the management of chronic pain patients. David Provenzano and coauthors focus on the benefit of computerized assessment data in validating the diagnoses of chronic pain patients. Although some computerized information is not beneficial in distinguishing among diagnoses, computerized pain drawings and certain verbal descriptors show promise for future investigations. Samar Jasser et al. review some of the problems encountered when using electronic medical records and coded data. Relying on the VA medical record database, they discovered inaccuracies between electronically extracted data and manual chart reviews when identifying patients for clinical research based on previously determined diagnoses. They discuss some risks and necessary precautions associated with automated data extraction.

The article by Mark and Brenda Wiederhold presents information on the potential benefit of virtual reality software and interactive computer simulations to serve as distractions for persons experiencing acute and chronic pain. This innovative area of study is based on newly available software and portability of hardware that induces distraction in the patient by using electronic, interactive guided imagery. Finally, the article by Podichetty et al. describes the use of computer systems and information technology in a pain management program. Benefits, limitations, barriers, and future integration into the health care networks are discussed.

This supplement differs from other special issues that focus on treatment guidelines or interventions for pain. Rather, we hope that these articles give a sampling of the state of innovative technology currently available within the field and offer a glimpse into the future of pain medicine practice for decades to come.

We would like to acknowledge and thank Purdue Pharma, Cephalon, Endo, Ortho-McNeil Janssen and Medtronic for their generous, unrestricted educational grants to sponsor this volume. We welcome feedback and hope that this effort stimulates further discussion of the use of computer and information technology in the field.