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Telemedicine&Mobile Technologies

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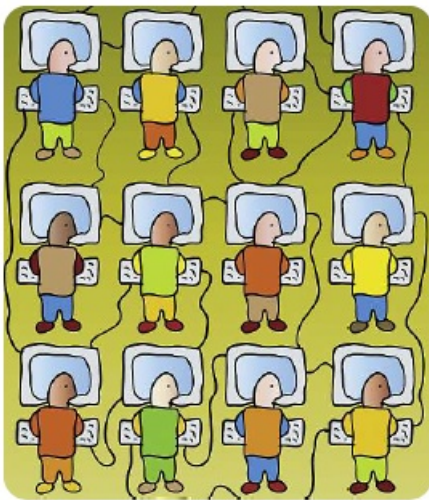
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About the Author

Bill Crouse, MD, is Healthcare Industry Director for the Microsoft Corporation. Prior to joining Microsoft, Dr. Crouse was Vice President and Chief Medical Information Officer for Overlake Hospital Medical Center and the Overlake Venture Center in Bellevue, Washington. Dr. Crouse has also served as a physician broadcaster and medical editor for numerous networks. Most recently, he was also the keynote speaker at the National Meeting for the American Telemedicine Association in May 2006.

Entering Into a New Era of Telemedicine By the year 2010, approximately four out of ten people in Western Europe will be over the age of 65. Like most older people, many will have at least one chronic medical condition, with large numbers suffering from two or more. This aging population will have a significant impact on a healthcare system already straining to overcome labour shortages and budget limitations. With growing demand and constrained resources, the cost of treating more and more people with chronic conditions such as diabetes, cancer, and congestive heart failure could stretch government healthcare budgets to the breaking point.

In the face of inevitable demographics, we must find ways to deliver more efficient, cost-effective, personalised care to our patients. But how? Of course there is no simple answer to such a complex challenge. Nonetheless, I believe that any affordable solution must include the effective use of advanced communication and collaboration technologies.

In particular, telemedicine promises greater access to healthcare and, in some cases, higher quality care, at reduced overall costs to the patient and the medical system.

Affordable Technology Improves the Viability of Telemedicine

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Broadly defined as the use of information technology and telecommunications to deliver health care at a distance, telemedicine was once considered a good choice only in cases where there simply was no other alternative - for example, to treat patients in locations where healthcare resources were scarce or non-existent. Its limited role for delivery of routine care had in part to do with preconceptions about how medical services should be delivered, and in part with its related costs, as telemedicine was once an expensive and hardware-intensive way to reach out to patients.

Advances in technology during the past ten years have been so great, however, that anyone with a notebook computer, a personal digital assistant (PDA), or even a wireless telephone can do what just a few decades ago required a multimillion dollar broadcasting facility, namely linking individuals or groups with rich media, text, graphics, audio, video, and interactive applications.

Consider how things have changed. Dr. Joseph Kvedar, founder and director of Partners Telemedicine and Vice Chair of Dermatology at Harvard Medical School, tells me that ten years ago he began researching the role digital imaging might play in dermatology. His camera was a Kodak model that sold for \$8,500 and took photos with 1.5 megapixels of resolution. "Plus, at the time," Dr. Kvedar says, "we didn't have a clear path to digital storage. Hard drives were small, we didn't have burnable CDs, and web browsers weren't yet prominent. Now you can pick up a cell phone or SmartPhone, with a great lens and two megapixels of resolution. It's about \$290, with the network built right in."

What does this mean for medicine? In the case of Dr. Kvedar's specialty, dermatology, it means that anyone with a wireless phone has more imaging and transmission capability today than what was available to researchers a decade ago. Patients and physicians can quickly and easily exchange photos of a healing wound, bedsore, or rash, possibly eliminating a trip to the doctor's office - or identifying a problem early enough that it is still easily treatable.

More significantly, it means that many of the routine tasks involved in preventative care and health maintenance can now be performed from a remote location without a daunting investment in equipment and infrastructure. That is why I am convinced that telemedicine and home monitoring may be part of the answer to many of the crises we currently face in healthcare, including a growing population of elderly patients and a shrinking supply of healthcare providers.

Changing Healthcare For a Changing Population

Advances in wireless technology have been one key to the rapid evolution of applications and services. Wireless technology today is not only inexpensive, it is simple and reliable. It can be adapted for use in recognizable cell phone form factors or embedded in any number of other medical devices. And it can easily be used to record, analyse, and display relevant health information about a patient.

Scientists have developed software that can connect inexpensive physiological monitors to SmartPhones by using Bluetooth technology. The SmartPhone serves as a computer to analyse the data and as a communicator to transmit the data to a relevant caretaker. Likewise, a small wireless device for monitoring heart rates has also been developed. Worn on a belt clip or around the waist, the device transmits a patient's heart rhythm to a wireless phone-like device that transmits ECG information to a monitoring station. Should a patient experience an arrhythmia, information about the heart's condition is beamed to a monitoring centre for evaluation, and a doctor can be immediately consulted.

Such technology not only makes it feasible and less expensive to monitor patients, it makes better use of limited healthcare resources. Consumers benefit from unobtrusive, but effective, home monitoring and interventions when necessary. Healthcare workers can now watch over many patients at once and intervene in a timely manner—possibly circumventing a crisis—when a patient's vital signs indicate a need for medical assistance.

MOVING TO A Proactive Model of Care

Recording information and transmitting an analysis is just one step in the continuum of what we can do with telemedicine. The technology is capable of much more than this. And we need to exploit its full capabilities if we are to truly extend our care model.

Instead of only monitoring a patient's current state, telemedicine can also include the dispensation of advice and medical education, even proactive intervention.

One new development is a wireless phone with an embedded chip for monitoring glucose. Diabetes patients can insert a blood test strip into the phone. The phone reads the test strip, and then sends blood-sugar levels to a doctor, nurse, or even a parent. In this manner, a patient in need of rapid intervention can be summoned promptly to a hospital or doctor's office. This is a great start.

But how about giving patients a gentle reminder to check their blood sugar before a crisis requires an office visit? This type of proactive care is exactly what Dr. Harold Goldberg set out to do when he employed video games and SmartPhones to help teens with diabetes monitor and control their disease. Goldberg devised software that can be connected to a game system or SmartPhone and used to entice adolescents to check their blood sugar, to exercise, and to eat right, in addition to giving them an easy way to report glucose levels to their managing physician. The software, which can send a text message or pop-up reminder, has been shown to improve compliance and adherence to insulin protocols

among diabetic teens.

Call it telemedicine, or call it home-based “co-management” of disease, as Goldberg notes, it changes the paradigm of chronic disease management. No longer something that happens once every four months for 15 minutes inside an examining room, it goes on every day, with the patient taking more responsibility for his or her health, and the provider giving prompt, regular, personalised feedback. Such feedback is an important and often overlooked element in helping *all* patients to adopt and maintain healthier behaviours. In other words, telemedicine, thoughtfully implemented, enables healthcare practitioners to deftly provide just the right amount of care when and where it is needed, strengthening the bond between patient and provider.

The Need for Standards for Interoperability

Given that it has the potential to address some of the most serious healthcare challenges in industrialised countries today, the recent explosion of interest in and activities around telemedicine is not surprising.

In fact, in 2003 the European Union funded two projects with the expressed goal of developing a roadmap for the implementation of telemedicine and other eHealth services in Europe by the year 2010. One catalyst for such a roadmap may be the numerous studies that have demonstrated the efficacy of telemedicine in increasing the efficiency and quality of home healthcare and decreasing the number of patient visits to the emergency room. Not coincidentally, the number of companies manufacturing home telehealth devices has tripled in the past three years, according to Jonathon Linkous, executive director of the American Telemedicine Association.

Of course, with such rapid growth, we must make sure that devices are able to interact and work together, regardless of the manufacturer. That underscores the need for clear, consistent standards worldwide, so that data can be collected, transmitted, stored, and analyzed anywhere, any time, without errors or confusion.

Industry-leading corporations are doing their part by helping to establish the standards, and by implementing the standards-based technology, that can make telemedicine and e-health services a reality worldwide. Industry-standard products such as SmartPhones and Pocket PCs using mobile software are already helping physicians, nurses, and other clinicians track patient visits, communicate, collaborate, and deliver services more efficiently.

Perhaps even more important, when healthcare organisations select commonly utilised industry solutions, they can be confident that they are investing in integrated, long-term solutions, not standalone products headed for obsolescence.

Barriers are no Longer Technological

Clearly the need for telemedicine is here now, and will only grow. The good news is that the technology is available today to implement effective, economical solutions. In fact, with the growing popularity of networked digital TVs, a whole new interface for telemedicine is emerging right in our living rooms. It is surprising then, that telehealth technologies currently account for only an estimated \$273 million out of \$120 billion spent globally on healthcare technologies. The problem, I believe, is that this method of delivering care still faces many social and cultural barriers to widespread adoption and use, despite the maturity and effectiveness of the technology.

Though the impetus for telemedicine is undeniable and the technologies that support it are well evolved, its full potential will not be achieved until we have incorporated it into the training and practices of healthcare professionals, and have raised the awareness and expectations of patients as to the benefits and economies telemedicine has to offer.

The technology is ready. When will we be?

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