

Telemanagement — The Third Wave of Telecare

Telemedicine: An Old and Evolving Concept

Although it is one of the hottest topics in home care today, the concept of telemedicine dates back nearly to the invention of the telephone. In fact, video-conferencing as a means for doctors to care for patients was envisioned and illustrated on the cover of *Radio News* in April 1924!

According to the California Telemedicine and eHealth Center (CTEC)¹:

[In the early 1900's] there had been experiments using radio telecardiology (from the 1910s), telephone-mediated telestethoscopy (from the 1920s), and radiology image transfer and videophone experiments (from the early 1950s).

The first generation of telemedicine using video conferencing began in the late 1950s with Dr. Cecil Wittson's microwave-mediated rural telepsychiatry program in Omaha, Nebraska, and with Dr. Albert Jutras' cable-mediated teleradiology program in Montreal.

It is likely that any idea this old will have undergone changes as society and the capabilities of technology evolved. Telemedicine is certainly no exception.

Moreover, as with any business, healthcare inevitably responds to the economic system within which it operates.

This paper will examine the technologic evolution of telemedicine within the context of the substantial changes that have taken place and continue to take place in our healthcare system.

The First Wave: The Televisit

While it seems almost quaint today, healthcare prior to the early 1980's was provided almost entirely under "fee-for-service" payment. Physicians, hospitals and home care agencies charged someone – the government, an insurance company or the patient – whatever they felt was needed to cover their costs plus, where called for by their business model, a profit.

Attitudes toward healthcare were dramatically different under this economic system than they are today. For example, during the 1950's, the employer-provided prescription drug benefit was introduced by PCS as a benefit to attract employees, not unlike vacation pay.

It isn't surprising, therefore, that the earliest ideas about telemedicine were based on improving or increasing the delivery of services. To accomplish this objective the goal was a "televisit". An article by K. T. Bird in 1975 describes telemedicine as "the practice of medicine without the usual physician-patient physical confrontation via an interactive audio-video communication system".

This first telemedicine paradigm still exists today and is quite useful when the delivery of service is the primary objective, such as when the military attempts to deliver medical care far up front in the battlefield or in providing specialized care to poor and/or remote areas of the world.



However, a televisit is still a visit. It depends upon a two-way video link and, depending on what is being done, that link may require more bandwidth than is provided by “Plain Old Telephone Service (POTS)”. Moreover, under the televisit scenario, it is obviously essential that the patient and the caregiver synchronize their schedules. While under certain circumstances this type of technology may be beneficial, these requirements imply a cost for televisits that might be difficult to justify in many scenarios within today’s healthcare economic realities.

Technology and Prospective Payment

If anything, it is an understatement to say that the invention of the microprocessor in 1971 has had a dramatic impact on the world. Virtually everything from the computer on our desktops to the subsystems within our cars to the microwave in our kitchens is now operated for us – better than we could run it – by one or more micro-processors. This ubiquitous new technology has also found its way into healthcare devices from IV pumps to implantable cardiac assistance devices.

This ability to embed computer “intelligence” into virtually anything, at an increasingly modest cost, will lead to the development of increasingly sophisticated monitoring devices for patients in their home.

For example, work is in progress at the Massachusetts Institute of Technology (MIT)², Georgia Institute of Technology³ and a number of other universities and major corporations to devise non-video sensors that can monitor factors such as whether an elderly patient is ambulating normally around their house or may have fallen. Some researchers even hope to infer behavior (e.g., taking of medications) from observations made by these non-video sensors.

These new technologic capabilities have occurred in parallel with dramatic changes in the landscape of health care services. Reimbursement is now typically tied not to the cost of care delivery but to some fixed idea of what that care is actually worth (a concept often referred to as Prospective Payment). Prospective Payment is a complex subject well beyond the scope of this article but, for our purposes, it is important to remember two of its more important attributes:

- 1) It provides an incentive for health care providers to invest in new technologies if they believe the technology will allow them to provide more cost-effective care.
- 2) Over time, it drives all care delivery to the lowest cost “provider”. For our purposes we will define potential “providers” as including the patient and/or their family.

With this background, it is not surprising that over the past decade or so we have seen the emergence of “Disease State Management (DSM)” as an important new concept in healthcare. Gurnee and Sivla writing in *Managed Care* magazine define DSM as “an integrated system of interventions, measurements and refinements of health care delivery designed to optimize clinical and economic outcomes within a specific population.”

The Second Wave: Telemonitoring

Given these two developments (“intelligent” technology and Prospective Payment), it isn’t at all surprising that a new generation of “telemonitoring” devices has come into the market. As with the televisit, the technologies were designed to achieve a particular benefit within the context of the then current healthcare economics. The focus of telemonitoring technology has largely been remote physiologic monitoring – the “measurement” within Gurnee and Silva’s definition. The potential economic benefit is to detect patients who are getting out of control in time to intervene and avoid costly hospitalizations and/or emergency room visits.

In the past few years, many telemonitoring devices originally designed for DSM have also been marketed to home care agencies who are attracted to them by the economics of PPS. This case for use of telemonitoring in home care is succinctly made by an article posted on the website of HomMed⁴, a leading provider of telemonitoring technology:

Home telemonitoring provides the nurse with daily clinical knowledge, allowing for visits to be made not on anticipated patient need, but on demonstrated patient need. What nurse would not visit a patient if they knew that the patient needed them on that particular day?

This impact on patient care is not a disease-specific one, nor should it be – provided that the agency has selected a telemonitoring system that addresses multiple disease states and allows all patient types to benefit from it.

From a patient care perspective, however, telemonitoring is inherently reactive. As suggested by the HomMed white paper, telemonitoring detects patient problems (i.e., “demonstrated patient need”) which are then responded to by a remote clinician. This may be an entirely appropriate paradigm from the point-of-view of a PPS-driven home care economic model, but it may well not be optimal model from the broader perspective of a payer who is at global risk, nor is it the most satisfactory model for the ultimate consumer – the patient – whose interest is in achieving the best possible clinical outcome.

The Third Wave: Telemanagement

Briefly reviewing, we have looked at the two currently operative paradigms of telecare – the televisit and telemonitoring.

The televisit provides service to patients who are remote from a professional healthcare provider. For the most part, the goal is service delivery where it might otherwise not be available. The potential benefits will typically depend on reduced travel time and expense for the patient and/or the availability of needed expertise that is not locally available.

Telemonitoring provides physiologic data to a remote clinician for the purpose of early detection of disease exacerbation and expense avoidance in the DSM scenario or more intelligent scheduling of expensive home visits in the home care scenario.

What might be next? In looking toward its future, the Norwegian telemedicine expert, Birger Nymo, defines telemedicine as "the investigation, monitoring and management of patients and the education of patients and staff using systems which allow ready access to expert advice and patient information no matter where the patient or relevant information is located".

This definition anticipates several aspects of telecare which we have come to feel are essential if the goal is to be expanded to include improved clinical outcomes for the patient – a concept we call "telemangement". In what follows we will look more closely at three terms used by Nymo: "monitoring and management of patients", "education of patients" and "ready access to expert advice". First we need some added perspective.

In the landmark book "*Crossing the Quality Chasm: A New Health System for the 21st Century*" the Institute of Medicine (IOM) of the National Academy of Science provides perhaps the most comprehensive view yet of the issues surrounding the quality of healthcare delivery in the United States. When they focused on patients in their home, IOM noted issues like these:

The need for "Supportive information systems ... to issue reminders ... and to provide feedback to the provider practice on patient compliance."

[Patients] reported, however, that hospital discharge often meant an abrupt transition without information on how they should care for themselves, when to resume activities, what side effects of medications should be monitored, or how to have their questions answered.

These comments should come as no surprise to anyone familiar with outpatient care. A 1992 study done at UCLA looked at patients immediately after discharge from the hospital. It found that "64% used at least one medication that was not ordered by the physician at discharge, and 73% failed to use at least one medication according to the way it was ordered. Of all drugs ordered at discharge, 32% were not taken at all."⁵

In an article written in 2003, Peter Jaret gives ten specific recommendations to physicians to improve compliance with medication orders. Among them are:

- Explain the treatment plan and why it will work.
- Explain how each drug works.
- Explain how each drug should be taken.
- Explain each drug's major side effects.
- Provide reminders.
- Monitor compliance.
- Obtain clinical status information from the patient.

Clearly, with medications as the mainstay of most outpatient treatment for chronic disease, no telemangement strategy is likely to succeed unless these principles are incorporated.

Telemanagement Revealed

We believe the next evolution of telecare will be *telemanagement*. The goal will be to achieve the best possible clinical outcome for the patient. The economic model remains to be determined, but it is interesting that current experimentation within the Medicare program (e.g. the Chronic Care Improvement Program and the Care Management for High-Cost Beneficiaries Demonstration) is directed at the long-term management of patients in their home through a highly individualized “case management” strategy. This approach seems to be tailor-made for telemanagement technology.

The specifics of telemanagement will be worked out in time. What follows is an initial prescription based on our own work at Patient Care Technologies:

- The technology should follow a “case management” approach which means, we think, that it should be driven by each patient’s personalized plan-of-treatment.
- Patient education should be provided in the context of actual care tasks and it should be as specific to the patient’s plan of treatment as possible.
- Instructional information specific to each patient’s plan of treatment should be provided in “real time” as tasks are being performed by the patient.
- Medication management and compliance monitoring should be a cornerstone of the technology.
- The technology should integrate as fully as possible with other electronic medical records (EMR) and care management systems being used in the community.

Let’s take a look at each of these to see why they are so important.

Electronic Case Management – Disease State Management is the broad application of evidence-based medicine to a cohort of patients. Case Management develops an individualized plan-of-treatment based on an in-home assessment of each patient’s abilities and limitations, his support system and the available resources. To be used in a case management scenario, telemanagement technology must be capable of being individualized to each patient’s orders, daily routine and clinical needs.

This requirement complicates the design of the technology, shifting substantial emphasis to the software capabilities of the device, rather than on the hardware capabilities (e.g., measurement).

Indeed, a true electronic case management device must be both flexible and remotely programmable as the patient’s plan-of-treatment evolves to meet changing clinical requirements.

Case-Specific Education – The paradigm of surfing the web to find needed clinical information is attractive to many younger, more technologically adept people.

However, it places a tremendous burden on the patient to identify valid sources and content relevant to their situation. Patients under active case management have known and well understood educational needs, so it is certainly within the realm of possibility to provide them with the most relevant information to their situation in their homes when they request it.

Case-Specific Instruction – Patients in their home often struggle with self care. They must master surprisingly complex and intimidating procedures. If the data from physiologic measurement devices is to be useful then proper procedures must be followed in its collection. This situation is exacerbated by the short-term memory problems commonly experienced by the sick and elderly. The value of highly specific instructional material at the time when a care task is to be performed would seem to be self-evident.

Medication Management – Medications are the mainstay of outpatient treatment for virtually all chronic disease. The average patient with congestive heart failure is taking some six medications. We have earlier cited data on the significant problems with non-compliance with medication orders.

No approach to telemanagement can be considered complete if it does not include reminders tailored to each patient's daily routine and their specific medication orders. Ideally, this would be combined with some approach to help patients know which medication is the correct one and to collect information from the patient about the actual administration of the medication.

Finally, where patients document non-compliance, an attempt should be made to also document the reasons in order to

guide the physician toward adjustments that might be made to overcome non-compliance due to side effects or other issues.

Integration with the EMR – While physician acceptance of the EMR is still low in the United States, the federal government has announced a 10-year project (the National Health Information Infrastructure⁶, or NHII) to achieve universal use of at least a basic electronic health record. In fact, President Bush made the success of this project a priority in his January 2004 State of the Union Address.

Since the Medicare program alone accounts for 40% of all health care spending, it is likely that this degree of federal pressure will succeed in achieving at least more widespread use of electronic health records.

A second factor likely to increase physician use of the EMR (at least over the web) is payment for online consultations. This is now being done by Florida Blue Cross⁷. Other Blue Crosses, such as Massachusetts, are experimenting with the technology.

As physicians adopt this new technology, they will resist using electronic telemanagement systems that necessitate duplicate data entry, or referring to a separate source for information about the patient's clinical status at home.

Attention to the clinical data standards and data exchange standards being proposed by the federal government will be an increasingly critical factor in the design of successful telemanagement systems. The availability of web-based records from telecare systems will also be an important factor for physician adoption.

The Bottom Line

The state of telemedicine technology, the economics of healthcare, and federal policies are all rapidly changing and evolving. We believe that many, if not most, of these changes point to the telemanagement paradigm as the future direction of telecare. As your organization considers its strategy for telecare, you may want to keep this new paradigm in mind and question potential vendors about their plans for it in the future.

Mark L. Braunstein, MD
Chairman and CEO
Patient Care Technologies, Inc.
404-425-7777 mlb@ptct.com



¹ http://www.cttconline.org/telemedicine_history.html

² http://architecture.mit.edu/house_n/

³ http://www.cc.gatech.edu/classes/cs6751b_99_winter/projects/smarthome/

⁴ http://www.hommed.com/_pdfs/truth.pdf

⁵ http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=10119187&dopt=Abstract

⁶ <http://aspe.hhs.gov/sp/nhii/>

⁷ <http://www.bcbsfl.com/>