Using Computers as Clinical Tools to Improve Patient Care

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It is almost impossible to read a healthcare magazine without encountering an article about managed care – an idea some have called a contradiction in terms. The truth of the matter is managed care is a socio-political-economic reality. It is here to stay in one form or another. Renal clinicians (nephrologists, renal nurses and patient care technicians) have no choice but to grapple with the horns of managed care; namely, economics, quality, and their consciences.

To survive economically, they must wrestle with providing high-quality, low-cost care. To survive in good conscience, they are forced into the unenviable position of having to take both a defensive and offensive posture towards the same clinical reality. On one hand, renal clinicians must defend their standards of care; on the other, they must take the offensive and protect their traditional independence by proving that the care they give their patients is not only appropriate but also reimbursable by the managed care organization.

Squeezed by cost, quality, and conscience, the renal care delivery system will experience one of two things: either it will implode or technology will offer the solution. I believe the latter will bridge the cost, quality, and conscience issues endemic to managed care.

The technology alluded to is the technology of information, or, in the clinical setting, medical informatics. Although there are other technologies which can assist in bridging the gap, I will preview only information technology.

Active, Intelligent Healthcare Information System

Information technology is no longer a passive, data collecting information system. Rather, it is an active, intelligent system cruising data, recognizing patterns, and helping renal clinicians to care for their patients holistically. If used appropriately, it can become a proactive tool used to provide more cost effective care. It can, at the same time, improve treatment (offensive) by continuously monitoring quality (defensive).

Think of today's healthcare information system as a series of educated filters that act as early warning alerts for targeted action – that is, preventive care. It provides information on exceptions to the norm, needed for dynamic intervention so important to cost effective healthcare. For example, by incorporating outlyer alerts, the system warns renal clinicians when the patient's dry weight increases by a selectable percentage over time, when the HCT varies by a selectable percentage over the last one, when the WBC is outside of range, and when other guidelines warrant notice. The system then reports associated labs which, in combination with the original warning, define a probable cause. For example, when HCT varies from the guideline, the system, in addition to publishing the alert, provides the patient's last iron, TIBC, percent saturation, ferritin, and EPO dosage, and identifies any problems the patient may have currently or in the past which relate to the drop in HcT, such as aluminum toxicity. Once alerted, renal clinicians can drill down from the early warning to the details supporting the alert – an excellent diagnostic tool for disease management.

Today's information systems can autonomously and continuously target thresholds of care, early warnings to a patient's advancing morbidity. At the heart of case management, they are the guideposts to better patient outcomes and fewer hospitalizations. Simply stated, today's information systems can immediately warn renal clinicians about a patient's test result that is approaching a level where an adverse outcome will most likely occur. This advance warning is one of the reasons why an information system, when properly implemented and utilized, can optimize patient care.

How do these self-monitoring environments come about? When the information system is installed and operational, the first step is to install an automated interface between the information system and the facility's lab of choice. Through special interface programming, the information system transfers the test results from the lab without anyone at the facility entering them. This means that as soon as the test results are transferred to the information system, they are entered directly into the patient's lab file.

The second step is to enter the outlyer values for each lab test. These values are the facility's thresholds of care. The system can then evaluate each patient's test result immediately for out-of-range levels. If one or more of the test results are out of range, the system reports them to the appropriate renal staff for targeted action. For example, should a patient's albumin level decrease from 3.6 to 3.1, the magnitude of this

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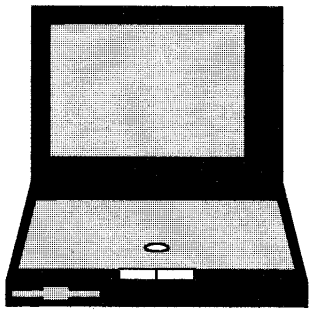
change triggers an alert prior to a 3.0 "panic-value" level. The patient's test result bubbles to the top for clinical intervention – before the routine panic level demonstrates an exceptional need for care. This is patient care at its very best, preventive and proactive, at once defensive (the facts demand clinical intervention) and offensive (the facts not only support the clinical intervention but the intervention will most likely avoid more costly care in the long run). It is a win for the patient, the renal clinician, and the dialysis facility.

This is almost like having a medical assistant employed full-time reviewing medical records, refining patient data so that, by the time the renal clinician comes on board, his/her job becomes a high-level one of establishing the diagnosis.

Universal Medical Record

However seductive an information system is in concept, the practical fact of the matter is that it's far less relevant if the clinical and financial information is fragmented. The managed care model demands near-total control of the patient's care whether the patient is treated in the hospital, the nephrologist's private practice, or in the dialysis unit. Each segment of patient care is interrelated and the missing link may become the one which controls the ultimate outcome. Therefore, patient care must be centralized in a universal, computerized patient record which is available to authorized personnel, and accessed through communication, privacy, and data standards.

Communication, Privacy, and Information Standards



Establishing communication, privacy, and data standards in a large, complex country like the United States is one of the most thorny challenges within the medical informatics discipline. While significant progress has been made, much still needs to be accomplished. In most cases, the best that can be said is that there are a limited number of standards.

One of the best-known working medical informatics standards in the world is the Netherlands Model. Scripted by pragmatism, uniform national policy, and technology implementation, it compels healthcare providers and software developers to comply with its established standards. Providers in the Netherlands must communicate over a common, commercial electronic network, and Dutch patients must carry a medical number from cradle to grave wherever they move within their country.

While the Netherlands Model is not functionally operative in the U.S., its implementation offers valuable lessons for the U.S. as we create our own universal medical record.

Information Warehouses

One of the lessons is the need to connect electronically with other entities. Renal information systems can no longer be islands unto themselves, checking only their own data. They must actively and aggressively interface with other systems (payors, hospitals, pharmacies, labs, other renal clinicians, research databases, etc.). In so doing, renal clinicians can draw on enormous outside data complements, pass them through educated filters, and continually develop more objective information. This information will become the de facto standards to help structure contracts holistically, evaluate risks with cost/outcome/revenue information, assess practice standards against other renal clinicians, and produce the best demonstrated protocols.

In this context, information systems are the management scientists every institution needs but does not necessarily have. They actively join clinical and financial data in an interactive, seamless information environment. They simplify enormous amounts of data so that what appears complicated becomes both clinically and financially understandable and manageable.

Theory and Practice

The information system I have described is at once theoretical and practical. It is theoretical because it incorporates sophisticated statistical techniques to wade through stacks of stored data. In the past, it was preferable to take inventory only on the data required for the task. Today, it is more prudent to create a data infrastructure which the system can cruise in search of pattern recognition rather than assume knowledge exists only in the present tense. In other words, it is preferable to warehouse as much readily-available, pertinent data as possible for future, perhaps yet-to-be-defined, needs.

The information system I have characterized is also practical. At once the medical assistant and management scientist, it effortlessly and flexibly combines data in such a way that the information derived is solid, down-to-earth, and usable. For example, I can demand clinical information about dialysis patients whose prescription delivery varied by 10% over a specified time-line. I can take these results, and, if necessary, statistically graph them in a variety of formats. These results can be tallied, averaged, weighted, and trended. The combinations of data are limited mainly by our imaginations. Hospital days, missed treatments, infection rate, low kt/v, average HCT, average creatinine clearance/liter, cost per treatment/machine/employee – these are statistics today's information system can calculate and consolidate with other data, quickly and accurately.

The technology of information is no longer a tool reserved for the elite. It is the working tool renal clinicians and administrators must have in order to steer their present through the future of managed care issues. □