STORING PERSONAL MEDICAL INFORMATION

BACKGROUND OF THE INVENTION

The invention relates to storing personal medical information.

Personal medical information is typically stored in a centralized database and is typically accessed by identification number. Storage schemes that call for storing personal medical information on portable data cards have been proposed.

In today's increasingly mobile society, medical treatment is provided at a variety of locations, including offices of primary care physicians, specialists, clinics, hospitals, nursing homes, schools, homes, etc. When away from home on holiday or business, unexpected treatment is often delivered by yet another set of providers. Over a lifetime, an individual's medical records are distributed over a range of locations often separated by large distances. Even though this medical information is regularly needed, often or an urgent basis, its wide distribution over multiple locations does not lend itself to efficient communication. Even when records are available, they are primarily in the form of paper-based charts containing voluminous handwritten encounter notes, test results, files, hospital discharge summaries, diagnostic evaluations, laboratory images, etc. The difficulty of reviewing, extracting, and communicating vital information quickly from these paper charts is a known, serious problem. It is for this reason among others that traditional medical records in paper chart form are ineffective at the point of care. In several recent studies of paper-based medical records conducted by the General Accounting Office, the American Medical Association and others, it was found that in 30 percent of all medical encounters, the paper chart was unavailable. In one study performed by a principal of the Emergency Medical Association, the finding was that 50 percent of handwritten emergency department charts could not be properly evaluated due to poor handwriting. Paper charts are not only slow to arrive from medical records departments, but even when delivered, they are slow to communicate the necessary information to the clinician.

A recent paradigm associated with and conceptually dependent upon the Electronic Patient Record ("EPR") is the "portable" medical record. The concept is not new and the technology has been available in the form of patient cards or "smart cards" which have evolved in several industries over the past few years. The EPR is designed to be a comprehensive medical record containing detailed medical history along with clinical and demographic information. In some examples even the radiological images or other laboratory test graphics are included as well. The portable record contains a meaningful subset of such information. The prime advantage of the portable record is its mobility. Its main drawback compared to the EPR is that it has limited capacity to store information. As a result, it is not of much use to clinicians for decision support purposes since it does not have the capacity to store original information, e.g., images, discharge summaries or even "free text" physicians' notes. To help alleviate this drawback, the portable medical record should use compression schemes. These schemes effect faster information transfer and improve data storage efficiency.

The state of the art in compression/decompression technology employs several techniques to accomplish similar objectives. Of particular interest are dictionary based text compression schemes where such dictionaries may be static

or dynamic. In general, dynamic or adaptive dictionaries may be appropriate when large amounts of repetitive information are to be exchanged between sender and receiver and where benefits can be derived via compression to minimize transmission time and also auxiliary storage requirements. A dynamic dictionary scheme is one where both the sender and receiver dictionaries are gradually created or adapted in "realtime: as the data exchange progresses. The only requirement for such a process to work is that both dictionaries must be synchronized with each other. As each new piece of information is being sent, the sender must determine whether it has this item in its dictionary. If not, then the new item must also be transmitted (uncompressed) to the receiver. This means that the new data item will be "recognized" from that time onwards. Dynamic compression schemes work because new data items and their dictionary entries are exchanged each time. This "overhead" may increase the time and storage requirements for each transmission. Existing dynamic dictionary techniques may not lend themselves to portable medical record applications because the structured personal health history information is of small quantity and normally non-repetitive. The dynamic dictionary concept may not achieve the high levels of data compression required.

Schemes which use the dynamic, adaptive approach are referred to as universal data compression schemes. The most famous is the Lempel-Ziv algorithm. Popular compression systems such as the Unix compress, PKZIP and PKUNZIP also use the dynamic, adaptive method. There are many examples of dynamic dictionary compression schemes in the literature.

The portable medical record provides a means of transport of medical information from one physical location to another. It does this by allowing the patient to carry his own medical record on his person wherever he goes, and to produce it whenever treatment is required. The individual can decide to share the information with anyone he chooses or not. The issues of privacy or security do not arise since the individual has total control.

Previously, several types of medical card technologies have been developed. There are medical cards with barcodes, magnetic stripes, optical and microprocessor chip technology, all competing technologies. Microfiche medical cards have also been proposed over the years but they have not proliferated because they are very difficult to update.

Each of the foregoing methods has its features related to cost, information capacity, and operational characteristics. There are several features in common to these systems. Special cards, usually of plastic media format, are required to hold the medical information or, alternatively, the patient identification (ID) and personal identification (pin) number. Barcodes which are imprinted on the surface of plastic cards normally contain patient ID and pin number information which are used to retrieve the patient's medical records from remote computer databases. The barcode imprint is normally fixed and the barcode itself has limited storage capability.

The magnetic stripe is of limited capacity, but it may be updated over time with new information. The optical card or microprocessor chip technology contains the greatest storage capacity, presently several millions of characters. The information recorded on these media are updatable over time. Thus, in the case of "smart cards" which utilize this technology, enough information may be stored on the card to reduce the requirement for access to remote computer databases. Recently, barcode technology has been enhanced with the arrival of the two dimensional barcode. Essentially,