Structured Text: Documentation Meets Technology

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by Charlotte Colburn

Background

Documentation of patient encounters through dictation and transcription processing has advanced dramatically over the past century, and current technology offers still greater opportunities for efficiency, timeliness, and completeness. Sixty years ago, the "transcriptionist" often accompanied the physician to the patient bedside and took shorthand notes while the physician examined the patient. The transcribed notes became part of the medical record. Subsequently, taped recordings of voice provided history and physical examinations and consultations, and operative, pathology, and radiology reports. Technological evolution has included endless loop systems, analog cassette recorders, and digital dictation systems for voice recording; personal computers now generate text files.

There are more than 1.2 billion reports transcribed each year in the US, and direct labor and benefit costs exceed $6 billion annually. With the development of the computer-based patient record, dictation and transcription or documentation of a patient encounter will certainly change significantly. Many have expounded computerized alternatives; however, a coexistence of technology has emerged, including point-of-care entry systems as well as dictated voice and transcription.

The Structured Medical Record

With the paper medical record, massive amounts of vital patient information are confined within narratives such as discharge summaries, operative reports, history and physical examinations, and radiology and pathology results. Primary complaints about the paper medical record include limited access, untimely results, risk of loss, and escalating costs.

The structured medical record-a record from which data can be abstracted and knowledge gained-holds the future of healthcare delivery. The current process of storage of digitized versions of today's paper record squanders the potential that computerization offers. It is akin to paving a cow path with asphalt instead of laying out a whole new road using modern surveying techniques. The structured medical record must facilitate data analysis, and thus must be organized much differently than its paper counterpart.

Information and data must be decomposed and stored on the computer as organized collections of atomic data elements or objects. These objects can then be reassembled to answer one or many needs; custom versions of the record for different purposes can be generated. Privacy and confidentiality demand that the electronic medical record exclude identifying patient identification data when it is not necessary.

The comprehensive electronic medical record must reorganize data objects into new information that is difficult, if not impossible, to obtain from paper records or their digital facsimiles (unstructured text files). For example, an electronic request may be for comparative data on all patients within a healthcare system with a primary diagnosis of (XXXX), past histories of (YYYY), and a family/social history of (ZZZZ), together with their treatment plan and outcomes. Another example of an electronic request might be the problem list for an individual patient for encounter visits (inpatient and outpatient) over a period of time including treatment parameters. With the computer-based patient record, data collected has to have a decomposition mechanism that allows such discrete data elements or data objects to be individually extracted, catalogued, and stored.

Technological Pathways

At least two approaches to this data mining are evident, essentially separated into when the structure will be derived and who will do the structuring.

One approach is to have the healthcare professional structure the information at the point of care; another is to have the data extraction performed by other personnel after entry. Currently, the majority of dictation is performed by physicians and though point-of-care entry is effective and beneficial for many healthcare professionals (recording vital signs, progress notes, prescriptions, etc.), it is not always effective, efficient, or accepted by physicians in all practice environments. Both point-of-care systems and dictation/transcription satisfy specific documentation needs, and both are vital to the electronic medical record. This comparison is primarily based on physician input within hospitals or large managed care systems.

Point-of-Care Entry

Point-of-care data collection involves the healthcare provider (often the physician) essentially creating the electronic medical record during the patient encounter with a computerized tool. Most commonly, this tool is an electronic notepad employing a point-and-click cascading pick list. Here, the care provider is presented with a sequence of selections that trigger additional possible responses. The process of selection continues until the knowledge base deriving the questions has exhausted its protocol. Subsequently, a digital facsimile of a patient report can be generated based on the input. For example, if penicillin is noted as positive under allergies, narrative text can be generated stating, "The patient is allergic to penicillin."

The benefits of such systems include:

- Immediate documentation and authentication
- No additional processing
- Consistent treatment paths from one patient to another and one healthcare professional to another

Challenges include:

- Acceptance by all users
- Development and acceptance of knowledge base by all users
- Training and lead time to proficiency
- Cost -- initial hardware, software, and ongoing support
- Demands for updates of knowledge base as medical knowledge changes
- Difficulty in capturing subjective or intuitive data, requiring an "escape" to a dictation modality and resulting in unstructured information
- Uncertain development path for voice recognition technology
- View of entry time as protracted and tedious

Unstructured Voice to Structured Text

The majority of dictation today is unstructured voice transcribed into unstructured text, which is text that cannot be regenerated to obtain further information.

Through current computer technology, however, the unstructured voice of a physician can be placed into a highly structured format (a document wrapper) with specific headings as pointers. Tools such as natural language processing (NLP), distributed common object model (DCOM), and object linking and embedding (OLE) technologies can then be incorporated to answer third-party information requests. The input mechanism for the document could be dictation or voice recognition if available at a high rate of accuracy (90 percent or above). A subgroup of the National Institute of Standards and Technology is working with academia and private industry to promote the use of effective and efficient techniques for manipulating unstructured text.

Object exchanges or data information requests for a particular patient or general information on a community can then be achieved with the advantage that 100 percent of the dictation/voice input is in a structured format, including all objective and subjective information.

Advantages to this method of record processing include:

- No change in physician documentation practices
- No capital investment
- Easier outsourcing

- Less physician time spent in clerical functions (estimated at 90 minutes per day for 30 patients: three minutes per patient for entry)
- 100 percent data capture
- Voice recognition input available, improving turnaround times that can then approach point-of-care entry time parameters

The Future of Dictation and Transcription with Structured Text

As the patient electronic medical record evolves, an information container develops in which information can be shared across multiple sites by multiple users.

Key changes and improvements with speech-to-text (dictation and transcription) and the electronic medical record include:

- Single record documentation within a healthcare system (elimination of duplicate history and physical examinations dictated and transcribed on disparate systems)
- Generation of reports or portions of reports automatically
- Ability to capture several dictators within one information session (report), for example a nurse dictating vital signs and subjective information and the physician dictating objective findings and treatment plans
- Transition from a line or character base referencing value/cost of transcribed reports to an information value/cost
- Ability to achieve vastly improved turnaround parameters with automatic text generation, voice recognition input, and editing as well as "exception" dictation (dictating only changes to a standard, structured format)
- Integration with other hospital systems to include point-of-care entry devices to eliminate repetitive data capture
- Ability to encrypt all text for secure transmission of data
- Standardized format or structured formatting
- Date/time of service to date/time of report tracking
- Integration of patient information for automatic generation of patient problem lists from transcribed reports
- Ability to contribute large quantities of information to external databases securely, with all patient-specific information removed for comparative data collection

Several years ago, many were reporting the demise of transcription as an industry with the evolution of voice recognition technology and point-of-care entry systems. The future of medical documentation will include all these systems and much more. However, looking back a century and looking forward a century, there is one constant-we communicate through the spoken and written word. Our challenge is to improve our tools and processes for capturing information and communicating universally and accurately.

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