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Clinical Knowledge Base Prevents Medical Errors

Author

Nick van Terheyden, *MD*

Chief Medical Officer,

Philips Speech Recognition Systems

Email: nick.van.terheyden@philips.com

Real-time availability of clinical information will improve patient safety Medical errors occur in any part of the treatment process and typically involve the wrong medication, improper treatment, or incorrect or delayed test results. Last year the European Commission, DG Health and Consumer Protection, observed that “the health sector still lags behind other industries and services that have introduced systematic safety processes.”1 The conference recommended to “optimise the use of new technologies, for example, by introducing electronic patient records.” A survey launched by the EU Directorate-General of Health and Consumer Protection2 found that almost four in five EU citizens classified medical errors as an important problem in their country. In Italy, where 97% believed that errors in medical care were an imminent issue, medical errors have been reported to result in up to 90 deaths a day3.

From Handwritten Notes to Digital Records

The lack of adequate information at the point of care is a common cause of medical errors. Physicians often do not have sufficient information to make the right decision. Today, medicine has become more and more a team-based approach which involves multiple clinicians and a multi-disciplinary approach.

Last year, the case of a patient in the UK, who had been speaking to eight different doctors over a bank holiday weekend, sadly demonstrated the ineffectiveness of a paper-based system. The patient died after doctors from an out-of-hours service in north London failed to diagnose that she was developing septicaemia. Investigators found that her care was based on a series of handwritten clinical notes and crucial clinical information was missing.

Apart from earlier conditions and treatment history, physicians need up-todate information about the prescribed drugs in order to identify any contraindicated medications based on pre-existing therapies and treatments. If physicians capture data at the point of care and a clinical information system ties that information back to a patient record, the system could warn a physician about this potential contraindication. As of today this does not typically happen. The best we can do is report errors after the fact instead of catching errors before they occur.

Disadvantages of the Transcription Model

When handwritten notes turned out to be inefficient, many hospitals adopted a transcription model to manage the documentation process with the help of administrative staff. However, transcription does not only add personnel costs but has several major disadvantages. As an additional step in the process, it causes delays in the turnaround of medical reports and introduces another opportunity for errors in the capture of clinical data. The transcription model has become increasingly inefficient; time is of the essence in modern healthcare not just for improved efficiency and throughput but for higher quality care. In most facilities patients are better served with rapid capture of clinical data, diagnostic imaging and testing information, and the subsequent sharing of that information with the whole clinical team, leading to the early identification of treatment and a quick discharge.

Financial restraints and safety issues are also important factors. The longer a patient stays in hospital, the higher the chances are that an error will occur. The average error rate is believed to be about 50% a day. Thus if a patient is in hospital for just two days there is a high likelihood that they will suffer some clinical error in the diagnosis, examination or treatment of their condition. Speaking from personal experience, my own daughter had to undergo minor surgery recently, a process that entailed less than a 7- hour visit to the hospital. In that short time frame I witnessed a total of three non-critical errors, two process-related, and one medication related. Luckily, none of them were life-threatening.

Evidence-Based Medicine

A change of paradigm is needed to speed up the overall process of documentation and make it become more efficient for establishing the correct diagnosis. Nowadays, a physician can capture all clinical data just by dictating their reports, with speech recognition immediately converting the spoken words into data. This clinical data can be made available to all members of the multi-disciplinary clinical team if it is fed into an electronic medical record (EMR). Today, mobile computing already allows realtime access as physicians move around from bedside to bedside, documenting at the point of care. Speech is not the only tool available and many systems allow the instantaneous capture of clinical data using pen-based tablet devices. As with the use of speech, this data becomes immediately available to others within the clinical care team, allowing clinicians to compare data from the patient's clinical history. Instead of reviewing single data points, the clinician is presented with a larger, more comprehensive data set that includes important trends in the patient's condition.

Some remote monitoring companies already apply large historical knowledge base data to real-time monitoring of patients in intensive care units. Historical data is made available from the last five or more years. By comparing historical data and outcomes with current monitoring data and trends for current patients, it is possible to highlight small changes in patient monitoring data and identify trends that are likely to result in development of left-sided heart failure. Such comparison of data was previously impossible since the information was not captured in real time and in digital form. With evidence-based medicine, applied with remote real-time monitoring, the IT system predicts what is likely to happen. Guided by this additional realtime data and experience, physicians can avoid a potential predictable deterioration of the patient's condition from actually happening.

New Knowledge Base

In the future, the EMR will also work as a knowledge-base for diagnosis and treatment. Clinical knowledge is estimated to double every 18 months and it is impossible for any physician to keep up with all new developments. A new study on a specific condition or its treatment might have been published just the day before the physician sees a patient. A knowledge base integrated into the EMR will help him find the link to these new research results.

Physicians are trained to identify conditions based on the occurrence of signs and symptoms. But as medicine expands and the number of diagnoses increases it becomes harder to use this data to identify specific conditions and their cause. Based on a differential diagnosis, the patient will undergo additional investigation and with the help of this additional data and the application of evidencebased medicine, the differential diagnosis will be refined in order to come to a single diagnosis. If the EMR is able to provide real-time access to clinical data, the physician becomes much more of a pilot, navigating and taking decisions as critical and relevant information is presented to him in a clear and effective way. Using these tools, the doctor will be equipped to make informed decisions at any time. While speech recognition and electronic medical records are reality, there is still much to be done to bring existing technologies to the workplace. Tying everything together in the EMR will allow clinicians to apply their knowledge together with real-time patient data, existing best practices in medicine, and diagnostic imaging and investigations. Medicine is undergoing an explosion of data and we must utilise technology to assist the clinical team in prioritising information, highlighting key data and guiding the care process. Otherwise we will continue to be "drinking from a fire hose", the unacceptable rate of errors will continue to occur or get worse and costs will continue to increase without a corresponding improvement in outcomes and quality of care.

1 Luxembourg Declaration on Patient Safety, April 5, 2005,

http://ec.europa.eu/health/ph_overview/

Documents/ev_20050405_rd01_en.pdf

2 Special Eurobarometer "Medical Errors",

January 2006, http://ec.europa.eu/public_opinion/archives/ebs/ebs_241_en.pdf

3 Italy On Line, Special service by AGI, October 23, 2006, http://www.agi.it

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