Opinion

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A Critique of Interoperability, Big Data, Artificial Intelligence and Medical Care in General Currently

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Today medical records are developed for a single encounter (an outpatient visit or hospital stay). The medical records for an encounter are signed off at the end of the encounter and thereafter cannot be changed. An addendum medical record could be added later to correct misinformation in the encounter medical records, but this is seldom done.

This process enables medical documents to be legal recordings of what happened during each encounter. But often, proper diagnosis can only be done after multiple encounters, so when a diagnosis is recorded it is often prematurely done.

Treatments may thus be tailored for the wrong diagnosis. Additionally, sometimes both diagnoses and procedures are reported for financial rather than clinical reasons, sometimes even upping the recording to get maximum payment from an insurance company or the government rather than reflecting the true diagnosis or treatment.

Within encounter medical records is often a disease history of the medical condition. Combining new information from the patient, the physician could develop a thorough and complete disease history if the physician had all of a patient's medical records and thoroughly read them all, but this is seldom feasible as medical records are hard to read and most often voluminous and medical records could exist in other medical organizations that are not available to the physician. Therefore, the disease history most often comes from the patient.

Having the disease history come mostly from the patient has problems:

Humans do not often have great memories and, they don't usually know medicine that well.

No matter how the disease history was developed, the disease history does not need to be all that comprehensive to be sufficient for the encounter. Of particular importance for later research purposes, the relationship of other medical conditions of the patient to this one are often difficult to determine and thus would not be included in the disease history.

There is also usually a care plan developed by the physician for an encounter. If a patient sees different physicians for the same medical condition, then there could be inconsistent care plans or even contradictory care plans.

Rather than having a patient's medical records, what is often most useful for a physician to have is summarized medical information about a patient, such as a complete list of medications taken, allergies, current orders, significant health problems, etc. If a patient is seen at one medical organization, it may be possible to have such a summary that the physician can trust, but if the patient is seen at many different organizations, then the information is not reliable. Physicians most often assume that they have incomplete information and start from scratch during each encounter.

Interoperability enables a patient's medical records to be gathered from medical organizations where the patient has been seen.

This has a number of problems:

Instead of one pile of hard to read medical records, you have more than one and there is no guarantee that the patient has not been seen at other medical organizations also.

Big data is a process of collecting information from all these medical records, comparing the information to that of similar patients, and trying to give physician information on the best care in the future for the patient based upon care and outcomes of these similar patients. The problem is that medical records contain a lot of misinformation (e.g., tentative diagnoses) and assumptions about causation of something happening that may not be based upon statistical and epidemiological principles, removing biases and invalid correlations.

For example, in one class I took, it was shown that one's longevity was highly correlated to the number of vitamin C pills one consumes. But this is a false correlation, as the richer and more educated people take more vitamin C pills and such people are generally healthier and live longer. So if you gave

vitamin C pills to a poor person, it will not help them live longer.

I contend that determination of what outcomes are likely to result from particular medical decisions is hard to determine using big data based upon the current medical records, both due to unreliable information in medical records and due to correlations made that are not useful.

Besides interoperability and big data, another term one hears often today is artificial intelligence. When artificial intelligence was first used (MYCIN), it was rejected because physicians could not determine why MYCIN made the decisions it did. This is still true with artificial intelligence, but it now seems acceptable to rely upon artificial intelligence to make medical decisions despite this issue.

Artificial intelligence could be useful, but it also could be unreliable. I attended a class where they used artificial intelligence to evaluate x-rays for possible breast cancer. They were training the system by having radiologists identify when breast cancer may or may not be present. What was not done was looking at outcomes of later tests—to identify that breast cancer actually has occurred—to eliminate false positives and false negatives.

Further, training may not be comprehensive enough, particularly when the artificial intelligence system has not been trained on seldom seen medical conditions.

My book, "The Future of Medicine 2030" by Michael R. McGuire, available on Amazon, describes how many of these problems can be resolved. Ideas in my book include handling care beyond a single encounter; creating longitudinal (complete) and audited histories for each of a patient's medical conditions including related medical conditions; creating a complete and accurate summary of patient's medical information; using medical research to identify useful correlations; determining likely outcomes of medical decisions; and evaluating procedures and the physicians performing these procedures.

Further, the book describes a practical way to create a combined patient medical record that addresses security concerns.