Railroads, Weed, and EMRs

By Barry P. Chaiken, MD, FHIMSS

As independent companies built railroad lines in the 19th century, each company chose a different gauge—the distance between the inner rails—for their track. As the railway industry first grew out of the need to transport mined materials, most early railroad companies chose a gauge that approximated the distance between the wheels of a horse-drawn cart. Similarly, as electronic medical record (EMR) companies built their software, they chose their own standards for data elements, database architecture, and exchange of patient information.

The standard gauge—also known as the Stephenson gauge (as in, George Stephenson, inventor of the first railroad locomotive powered by steam), international gauge, or normal gauge—makes up more than 60% of all the railroad track in the world. In the United States, Canada, and Britain the distance between the rails is 4 feet 8-½ inches, and in the rest of the world 1,435 mm, with the latter representing approximately a 1/2-mm variance and acceptable track tolerance.

Although track gauge varied widely throughout the 19th century sparking many "gauge wars," an 1845 Royal Commission of the United Kingdom, Great Britain, and Ireland set the standard gauge at 4 feet 8-½ inches rather than the competing 7-foot gauge proposed by the Great Western Railway.

Even though the wider gauge used by the Great Western Railway offered greater passenger comfort, larger carrying loads, and more efficient transport of passengers and goods, the gauge was rejected simply because most of the track in the U.K. conformed to the 4-foot, 8 1/2-inch standard.

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Today, our EMRs designed on a proprietary framework to primarily capture clinical documentation to optimize payment, and secondarily record data for patient care, suffer from their weakness to exchange personal health information and present patient data to drive high quality, efficient patient care. Like the railroad gauge, EMR standards evolved from commercial circumstances unrelated to the best possible technology or desired public outcomes.

Learning from Weed

The effort to design frameworks to document care in a systematic way to help deliver better clinical outcomes began in 1964 when Larry Weed, MD, in the *Irish Journal of Medical Science*, described SOAP notes, a structure for documenting medical care organized around four key areas:

Subjective – Information obtained directly from the patient, including the patient's chief complaint or reason for the visit.

Objective – Factual information about the patient, including vital signs, data obtained from physical exam, and lab values.

Assessment – Medical diagnosis for the patient visit (or differential diagnosis if unsure of final diagnosis) with factual explanation of the decision-making.

Plan – Description of the treatment steps addressing each diagnosis/problem independently.

At that time, clinicians used highly personalized formats for documenting patient care that proved unwieldy and of dubious value for sharing patient information with other providers. With SOAP notes, Dr. Weed tried to establish an exchangeable standard for documenting care that allowed easier sharing of patient data and clinical reasoning among clinicians.

Four years later, Dr. Weed wrote a sentinel article in the *New England Journal of Medicine* titled "Medical Records that Guide and Teach." In that article, Dr. Weed laid out his reasoning

for standardizing the organization of a patient's medical record:

> *...it will be necessary to develop a more organized approach to the medical record, a more rational acceptance and use of paramedical personnel and a more positive attitude about the computer in medicine....*
>
> *Among physicians there has been uncritical adherence to tradition in the first phase of medical action, which is the collection of data, upon which complete formulation and management of all the patient's problems depends.*

In the early 1970s, Dr. Weed further developed his structured documentation approach and described the problem-oriented medical record (POMR). This approach organized the medical record around patient problems with underlying structure based on his SOAP note approach. Over many years of evangelizing by Dr. Weed and others, the POMR and its underlying SOAP structure became the de-facto "standard" for documenting patient care. Nevertheless, this "standard" is not universally applied by all organizations and clinicians.

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The Wrong Standard

The POMR and SOAP notes were based on unstructured data (e.g., physician notes), so health information technology companies built their electronic medical record systems (EMR) to accommodate this unstructured data approach to clinical documentation rather than develop a new system of clinical documentation that would have leveraged the capabilities of information technology. Although Dr. Weed advocated this unstructured approach to paper-based clinical

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documentation, he envisioned a time when computers would eliminate the need for unstructured data:

> *It can readily be seen that all narrative date presently in the medical record can be structured, and in the future all narrative data may be entered through a series of displays, guaranteeing a thoroughness, retrievability, efficiency and economy important to the scientific analysis of a type of datum that has hitherto been handled in a very unrigorous manner (Weed, 1968).*

Today, organizations and clinicians cling to the importance of their unstructured record and refuse to consider a new approach to electronic-based clinical documentation. Data scientists espouse the potential value of natural language processing to release the value of the information contained within the unstructured data of the medical record.

Perhaps it is time to heed the advice of Dr. Weed and construct a new approach to electronic documentation of the patient record that would focus on promoting the best patient care while reducing the burden of electronic documentation on physicians, nurses, and all other clinical providers. In addition, the clinical data requires a format where it is truly interchangeable in a clinically meaningful way that directly drives patient care, rather than remain hidden in a hard to utilize, verbose format that satisfies technical criteria of clinical information exchange. Clinical care does not suffer from a paucity of patient information. In fact, the opposite is true as clinicians struggle to identify the useful information among the tsunami of insignificant data.

Reboot the EMR

EMRs currently contain more information than clinicians have time to either review or synthesize. Our EMRs mimic the workflow of clinical care in a paper-based, clinical documentation world, rather than one that leverages the best of information systems. EMRs burden clinicians with many documentation tasks that have little or no impact on clinical outcomes. In some instances, the documentation burden lowers the effectiveness of the clinical encounter, thereby reducing the quality of patient care.

EMRs require a reboot; the workflow of clinical documentation should leverage the information flowing from the EMR, and from other systems utilizing integration engines that are driven by HL-7. Engaging user experiences that use existing, familiar technologies that are part of our everyday experience (e.g., smartphone application interfaces) must be employed to present meaningful, digestible, and actionable patient data, as well as to collect additional patient information for future use. The clinical workflow of next-generation EMRs will also use medical knowledge from guidelines and algorithms to request useful documentation from the clinician and present meaningful information to the clinician.

As the number of potential sources of patient data expands from the clinical setting to the personal realm of smart devices and sensors (e.g., Fitbit, Smart Scale), clinicians require a documentation system that organizes all this data into a useful package that can effectively help direct patient care. Continuing to burden clinicians with documentation tasks driven by an outdated paper-based approach to medical records seems foolish and wasteful. It is time for us to discard the "standard gauge" and move on to a better "gauge" for clinical documentation that puts patient care first while lessening the unproductive documentation burden currently assigned to clinicians. In addition, the presentation of patient data must be synthesized and formatted to allow for maximum utility by the clinician in the delivery of patient care. ▌

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