

History Of The Electronic Health Record (EHR)

The EHR has been around longer than you think.

Even before the current desktop style microcomputers existed, a few hospitals implemented early versions of this product. One of the first was the Latter Day Saints Hospital in Salt Lake City. It installed what it called the HELP system, an acronym for Health Evaluation through Logical Programming.

As computing power increased and the size of the computer box and its cost decreased, a series of advances in medical software systems began to occur. In 1983, a software product geared toward resource scheduling was introduced, and became one of the leading applications of its kind. Most people recognize the name **Cadence**, but few realize that this was one of the earliest product releases from Epic Systems Corporation.

In 1988, the US government contracted out to develop an electronic record system for the military, much of which is still in use today. On a smaller scale, PC type computers were almost 10 years old in 1990 when Microsoft introduced what I consider the first real version of Windows, version 3.0. Epic was once again an innovator, and it released a product called EpicCare for Windows.

INSIDE THIS ISSUE

- 1 **History Of The Electronic Health Record (EHR)**
- 1 **EHRs By The Numbers**
- 2 **The EHR And Productivity In The ED**
- 3 **Trauma Patient Stay In The ED After EHR**
- 3 **The EHR Trauma Flow Sheet**
- 4 **What's The Real Bottom Line?**

UPCOMING TRAUMA MEETINGS

PENROSE ST. FRANCIS TRAUMA, CRITICAL CARE, AND EMS SYMP.

LOCATION: COLORADO SPRINGS MARRIOTT, CO

DATE: FRIDAY, MAY 6, 2016.

75th Annual Meeting of the AAST

Location: Hilton Waikoloa Village, Waikoloa, Hawaii

Date: September 14-17, 2016

Beginning in 2004, there was a move within the government to emphasize implementation of EHRs across the US, spearheaded by President George W. Bush. And as expected, this led to a number of products developed by a variety of software makers. The push to roll out an EHR universally continues to this day, with no end in sight.

Is this a good thing or a bad one? Although much maligned, the EHR can certainly offer benefits. However, like anything touted as a miracle drug or device, there are always downsides. I'll review both over the next few pages, but my focus will be on one very specific trauma problem: use of the EHR during trauma resuscitation. Many trauma programs either voluntarily adopted the use of an electronic trauma flow sheet (eTFS), or were forced into it by their hospital administration or IT department. Good idea or not?

Let's go over what we know, and I'll offer my opinions at the end.

EHRs By The Numbers

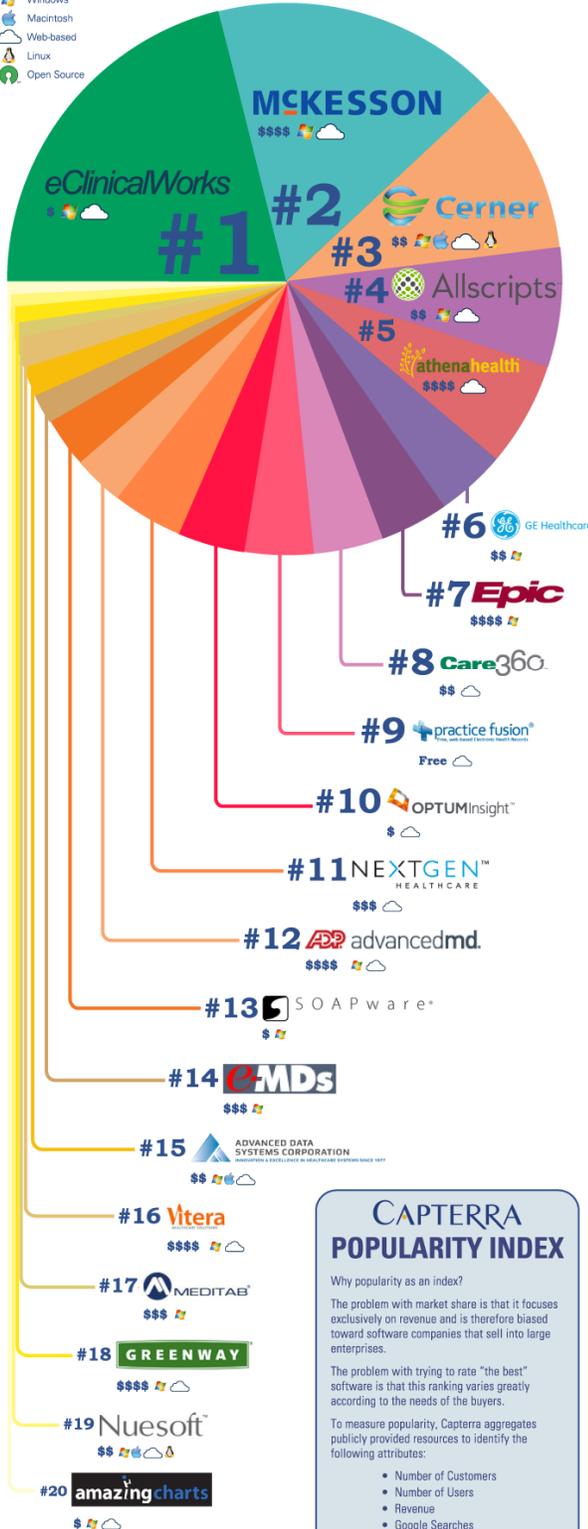
There are more brands and versions of EHR out there than you think. The following graphics will help sort out the array of products available.

Here are the most popular, based on several factors, including number of customers, number of users, revenue, and some internet factors:

TOP 20 MOST POPULAR EMR Software Solutions

Electronic Medical Records Software helps doctors and medical practitioners keep track of health-related information for their patients and gives staff access to these records through a centralized electronic system.

- Price
\$ - \$\$\$\$
- Platform
 Windows
 Macintosh
 Web-based
 Linux
 Open Source



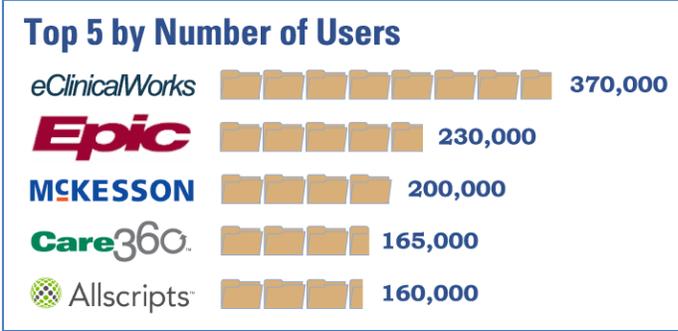
CAPTERRA POPULARITY INDEX

Why popularity as an index?
 The problem with market share is that it focuses exclusively on revenue and is therefore biased toward software companies that sell into large enterprises.
 The problem with trying to rate "the best" software is that this ranking varies greatly according to the needs of the buyers.
 To measure popularity, Capterra aggregates publicly provided resources to identify the following attributes:

- Number of Customers
- Number of Users
- Revenue
- Google Searches
- Social Media Followers
- Alexa/Compete Rankings

This list contains a lot of names that many of you have never heard of. And from a practical standpoint, most Level I and II trauma centers across the US utilize McKesson, Cerner, Allscripts, or Epic. But not all of these offer an eTFS with their product, either.

Let's look at the actual number of users:



Interestingly, even though eClinicalWorks has the largest number of users overall, I've never visited a hospital using this product. You probably won't see Care360 because it does not support large group practices.

Reference: This data was provided by Capterra, a company that finds the best software for a business. www.capterra.com/infographics/top-emr-software

The EHR And Productivity In The ED

In 2009, the Health Information Technology for Economic and Clinical Health (HITECH) act was passed. This provided an incentive for all US hospitals to demonstrate "meaningful use" of the EHR. For those of you interested in the details, search for this phrase on my blog.

Hospitals rushed to comply, shelling out lots of money to try to recoup some of it through these incentives. In theory, using an EHR should allow better record sharing, increase patient satisfaction, reduce unnecessary testing and medical errors, and ideally, improve billing. But does it work?

A community hospital with a medium-sized ED looked at physician productivity in the ED while using an EHR. In this case, the software product was McKesson, and 16 clinicians were monitored prospectively over a 30 hour period.

Here are the factoids:

- The group consisted of attending physicians, residents, and nurse practitioners / physician assistants
- The distribution of how they spent their time is shown below:

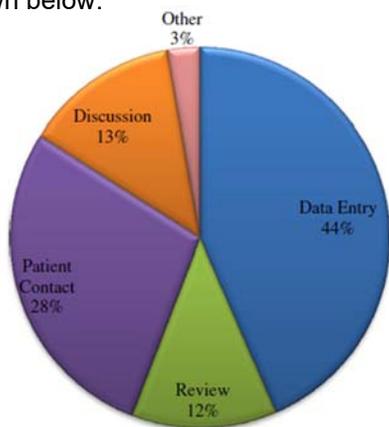


Fig. Emergency department practitioner time allocation.

- In order to complete an assessment in the EMR, it took an average of 160 mouse clicks
- On average, clinicians saw 2.12 patients per hour, requiring nearly 4000 mouse clicks to complete their charting

Bottom line: Overall, this is not a very good or coherent or even well-designed study. But it does show us one thing. Clinicians spent only 28% percent of their time seeing patients, and 56% of their time reviewing or entering data into the EHR! Note the blue and green wedges in the pie chart. How can they possibly earn their salaries? Other studies have confirmed that using an EHR does decrease throughput slightly, yet reimbursements increase anyway. How can this be? EHRs were originally designed to facilitate billing, and it looks like they still do, making up for the fact that fewer patients can be seen. But this seems like a perverse incentive to me. Adopt the EHR, see fewer patients, get paid more!?

Reference: 4000 Clicks: a productivity analysis of electronic medical records in a community hospital ED. Am J E Med 31:1591-1594, 2013.

Trauma Patient Stay In The ED After The EHR

So we spend less time and see fewer patients if we use an EHR. One would think that ED length of stay (LOS) would then increase. But does it?

A 2 year observational study from Greece looked at throughput before and after implementation of an electronic trauma documentation system. A total of 101 patients were processed under the paper charting system, and 99 were handled after implementation of the electronic system.

Here are the factoids:

- **Injury severity was high overall**, with half going for emergent surgery and an overall mortality rate of about 12%
- **Total ED LOS decreased from 206 to 127 minutes** with the EHR
- This was accomplished by decreasing time between arrival and completion of care from 149 to 100 minutes, and from completion of care to leaving the ED from 47 to 26 minutes

Bottom line: Looks great! Badly hurt patients, moving through the ED at breakneck speed after implementation of an EHR. The problem is that it was not really an EHR, but an “electronic documentation system.” Upon close inspection, this is a homegrown system with very specific functionality for monitoring care, providing checklists, and offering case-specific guidance. This is not the type of complex documentation system one usually thinks of when visualizing an EHR. But it does go to show that well-designed and focused software can be beneficial.

The effect of an electronic documentation system on the trauma patient's length of stay in an emergency department. J Emerg Nursing 40(5):469-475, 2014.

The EHR Trauma Flow Sheet

I started voicing my concerns about trying to use an eTFS way back in 2008. There are very few reports in the literature that specifically detail using the EHR as a trauma flow sheet. The first (see ref 1 below) described an early experience with the conversion process. It outlines lessons learned during one center's experience, and I've not seen any published followup from there.

Now, on to a report of a “positive” experience. A Level I pediatric trauma center made the same change to the eTFS. They designed a custom menu-driven electronic documentation system, once again using Epic. Specific nurses were trained to act as the

electronic scribe, and had to be present at every trauma resuscitation. The goal of the study was to compare completion rates between paper and electronic documentation. One year of experience with each was collected.

Here are the factoids:

- There were about 200 trauma activations each year that were admitted, and only 50 or so were highest level activations (in a year!)
- 11 data elements were compared, including treatments prior to arrival, vitals, fluids, primary survey, level and time of activation, patient and surgeon arrival, and disposition
- The eTFS was better at capturing time of activation, primary survey components, attending arrival time, and fluid administration

Yes. That's it. They looked at 11 data points. It says nothing about the wealth of other information that has to be recorded and needs to be abstracted or analyzed. And nothing about the reports generated and their utility. Or how much additional time must be spent by the trauma PI program to figure out what really happened. Or how good their paper documentation was in the first place (not so good, apparently). Or the bias of knowing that your documentation under Epic is being scrutinized for the study.

And to get to that level, this hospital had to maintain a complement of highly trained nurses who were facile with the Epic trauma narrator. And they had to maintain their skills despite seeing only one highest level trauma activation patient per week, or one activation at any level only every other day.

References:

1. *Using the electronic medical record for trauma resuscitations: is it possible? J Emerg Nursing 36(4):381-384, 2010.*
2. *A comparison of paper documentation of electronic documentation for trauma resuscitations at a Level I pediatric trauma center. J Emerg Nursing 41(1):52-56, 2015.*

What's The Real Bottom Line?

After more than 8 years of experience, **moving to an**

electronic trauma flow sheet is still not ready for prime time. In my opinion. I've seen many, many hospitals struggling to make it work. And all but a very few have failed.

There are two major problems. **First, existing computer input technology is underdeveloped.** Trying to rapidly put information into small windows and having to switch between mouse and keyboard and back is slow. **And second, report output is terrible.** Humans cannot scan 26 pages of chronological data and reconstruct a trauma activation in their head. There is so much extra data in the reports, the signal (potential PI issues) gets lost in the noise.

The technology exists to remedy both of the problems. However, the EHR vendors keep tight control over data exchange in and out of their products. Sure, there is CareAnywhere and it's ilk, but the user is still forced to use the vendor's flawed input and output systems.

Bottom line: You can't make a complex system (trauma care) easier or safer by adding complexity (the EHR). Yet.

The eTFS will never work as well as it could until all the vendors settle on a strong data interchange standard to put data into and get reports out of the EHR. Once that happens, scores of startup companies will start to design easy input systems and report displays that are actually meaningful. There's not enough interest in this niche market to make it worthwhile for a company the size of Epic, but there is definitely enough for a lot of young companies just chomping at the bit in Silicon Valley.

Need A Speaker For Your Meeting?
Grand Rounds?
Trauma Symposium?
Invite The Trauma Pro!
For details and availability, contact me at:
TheTraumaPro@gmail.com



www.TheTraumaPro.com



[@regionstrauma](https://twitter.com/@regionstrauma)



www.Linkedin.com/in/MichaelMcGonigal



Michael.D.McGonigal