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**The digital transformation of the Healthcare Industry. The lab test directory software selection process in Beaumont Health System.**

**Abstract**

Electronic Health Record (EHR) systems have a great impact in upgrading and improving the quality of care for patients. EHRs have the ability to bridge the gap of interaction between healthcare providers and patients. A government regulation in 2009 requires the implementation of an Electronic Health Records in all healthcare institutions in the United State. The purpose of this Act was to store, integrate and consolidate patients’ protected health information. In terms of laboratories, there is an increase in demand for electronic delivery of laboratory results. Therefore, for laboratories to establish connectivity with an EHR, it is important to make a smart choice.

This paper tries to identify some of the main issues that laboratory staff come across at Beaumont, provide a comparison of the top three EHR software vendors and find the best alternative that can be used in order to create a multichannel software which will incorporate the intensive agenda. In light of my research, I believe that there is an alternative software for the laboratory department at Beaumont Health System, which would be more efficient compared to the current EHR and I provide a set of recommendations on why to replace the current EHR with a new one, which may sound difficult to implement.

**Key Words:** EHR, healthcare provider, Epic, lab test directory, alternative.

**Introduction**

With digital technologies reshaping every industry, it is safe to say that digital transformation has become a marketplace itself, generating billions in value. In fact, a report by Markets and Markets forecasts that the global digital transformation market will grow from $469.8 billion in 2020 to $1,009.8 billion by 2025, at a CAGR of 16.5% during the forecast period. The end-users for such solutions vary, and healthcare is not exempt. Amid the COVID-19 pandemic, companies started relying largely on digital technologies to keep up with their daily operations in a changing setting. Even more so, healthcare industry players were pushed to accelerate the adoption of new technologies within their environment to keep up with the growing number of patients, all while posing a pressure to their employees to get up to speed with internal processes. Every kind of transformation in the workplace is hard, which is especially the case with digital transformation. The healthcare industry, in the process of digital transformation, has been (and probably will continue) facing changes in structuring employee workflow, storing and sharing patient records, and ensuring compliance with changing regulations, among others.

**Beaumont Health System**

Beaumont health is Michigan’s largest health care system. Today, Beaumont Health System includes eight hospitals in Michigan, and it is the exclusive clinical teaching site for the Oakland University William Beaumont School of Medicine. Beaumont has become the leader during the Coronavirus outbreak, caring for more COVID-19 patients in Michigan than any other hospital. While Beaumont staff and managers expect to care for COVID-19 patients within

limited areas of hospitals, they have taken extra steps to create a safe and secure environment for patients.

 The Act on Health Information Technology for Economic and Clinical Health (HITECH)[[1]](#footnote-1) requires all public and private healthcare institutions in the US to use an Electronic Medical/Health Record System (EMR/EHR) to store, integrate and consolidate patients’ protected health information.[[2]](#footnote-2)

Laboratories must ensure the accuracy, completeness, and usability of information that is transmitted to the patient’s electronic health record (EHR) (Perrotta et al. 2017). Historically, laboratories have met regulatory requirements for verifying test result accuracy and completeness by reviewing test results within the LIS. As hard-copy paper reports have increasingly been replaced by electronic reporting, HCPs manage test results and other aspects of patient care within an integrated EHR.

Some of the main problems that lab test directories face include truncated results, missing comments, results that are mapped to incorrect tests, not detected errors, turnaround time etc. For this reason, EHR choices should be made carefully. There are multiple reported benefits of EHRs, including the ability to follow patient data longitudinally, cost savings, reduction in adverse drug events, and an increase in patient provider interactions. Implementation of the EHR in laboratories have positive impacts in terms of improving the workflow in the laboratory, decreasing turnaround time, reducing preanalytical errors, and a more effective electronic add-on ordering process (Petrides et al. 2017).

Beaumont Health System uses Epic software in all departments and recently the lab test directory started using the same software which is the most widespread health record software with 28% of the market. Epic is considered to capture more than 50% of new large hospitals in the USA and aims to be the single EHR vendor in the market (Koppel et al. 2014). Chief Executive Officers (CEO) believe that Epic is the favorite choice of most healthcare providers not because it is the best one, but because a considerable number of other EHR systems are inferior (Koppel et al. 2014). While there are many advantages that make Epic outstanding, there are also some drawbacks when compared to other systems.

The lab test directory at Beaumont Health System made a transition from Soft to Epic EHR system. Taking into consideration the fact that all other departments at Beaumont use the same software it might be considered as the best possible choice for the lab test directory since there is no extra fee charged when transferring data from laboratory to other departments. In the following chapter I will provide a brief analysis of the advantages and disadvantages of Epic EHR System.

**Advantages and disadvantages of Epic.**

Epic Systems was one of the first providers of electronic health records since its founding in 1979. Epic holds the sixth place in the list of American Academy of Family Physicians (AAFP). Capterra and Software Advice, the leading online resources for software selection process rate Epic with an average of 4.3/5 respectively. The overall evaluation is done on the basis of ease of use, customer support, features and functionality and value for money. Taking into consideration the advantages of Epic EHR system in terms of improved workflows, quality of care, improved data analysis, increased productivity and compliance, we can argue that Epic

was the best choice for the Beaumont in general and also for the lab test directory. However, while we cannot ignore the advantages, let’s have a quick look at the disadvantages of this EHR system and try to provide an alternative software that could be used.

First of all, Epic is not so friendly for beginners to navigate and use. There are many features, and the department may struggle in using advanced features and tools. In addition, Epic sometimes can be confusing in terms of medical records because there is not enough space to list all the problems, it is not clear enough how the service will be delivered, pulling reports for different tasks regarding patients or lab test services can be challenging and sometimes the system can be really slow and poorly designed.

Also, another disadvantage of Epic EHR are the bugged updates. There is always an update and some bugs left and these extra bugs impact the workflow and support system is less efficient. There is a need for an IT department to troubleshoot the problems. Furthermore, the low-quality training may take substantial time is another concern for Epic EHR. It is considered to be time consuming when it comes to workload and patient service delivery in between. Epic’s shortcomings come in the form of integration and price. Epic charges a fee to send data to non - Epic platforms and this discourages its users from sharing data with other software systems. In terms of lab test directory Epic users have to route diagnostic testing results through the system to the appropriate caregivers manually, often via paper trails. While it still gets the job done, this more cumbersome process adds to physician overburdening and increases the downtime for the entire care team waiting on crucial lab results.

**Comparison of top three EHR vendors**

***Praxis***

In light of these facts, I will provide a comparison between three main competitors of Epic in the market that can be used as alternatives for the Beaumont lab test directory. The first and the most important competitor is Praxis, which was rated as the best EHR in 2020. It claims to be the only EHR/EMR system in the United States that is designed without template use. Thanks to the advanced Artificial Intelligence (AI) found inside Praxis, this EHR gets faster and easier as physicians start using it. Artificial Intelligence (AI) has the tendency to learn from the unique experience of its users and to get smarter. Praxis occupies the first place in the lists of American EHR Partners, it is rated as the best EHR by the American Academy of Family Physicians (AAFP), has the best reviews in terms of user satisfaction in Capterra and Software Advice, the leading online resources for software selection process.

Praxis certified as a complete EHR can be offered as cloud or server based. Praxis is considered as the most efficient EHR in terms of time saving taking into consideration the fact that even complex notes can be completed in less than 10 minutes. According to experts, Praxis offers a simple user experience that makes it fast and easy to use for providers who demand (and deserve) excellence in their healthcare institutions and offers the best customer service to come up with solutions regarding potential problems. The company's commitment to maintaining a high quality EHR system that prioritizes patient care, and the affordability of this system makes Praxis the best EHR system in the market. Praxis offers features such as appointment scheduling, charting, compliance tracking, self - service portal, voice recognition by means of artificial

intelligence and many other features. The training can be offered in person or over the internet in terms of live webinars.

***NextGen***

Another potential competitor of Epic is NextGen Healthcare, a leading healthcare software and services company that empowers the transformation of ambulatory care. NextGen has been operating as an electronic health records service since 1976 and assists nearly 155,000 physicians with their software. NextGen focuses on improving ambulatory care by offering a comprehensive, integrated technology and services platform supporting ambulatory and specialty practices of all sizes. [[3]](#footnote-3) NextGen enables the healthcare providers to be more productive and increases engagement.

 Compared to Epic, NextGen offers better diagnosis for patients through records from previous providers, better records of medications, more detailed information about patients and their medical history as well as outstanding lab results. In terms of lab results, I want to emphasize the fact that NextGen enables instant access to charts and lab results at any location allowing monitoring of a patient's record. Thus, it allows the lab test directory staff to act instantly with potentially life-saving results. On the other hand, patients can also benefit as they are allowed to access their results as soon as they are in the patient portal, avoiding long waiting times. In this way, NextGen is considered as an easy-to-use software and it can be downloaded on any smartphone or tablet and it is compatible with all browsers.

**Cerner**

Cerner is also one of the top EHR vendors in the market that provides leadership in terms of healthcare information technology. Cerner EHR system is an integrated database that provides comprehensive services which are used within some of the largest health systems in the US. Cerner is considered to be traditional and modern at the same time as well as systematic. Cerner has the ability to encode data, manage computerized medical records, alternate through information backup practices, recognize the possibilities of medical report transfer, manage the chronological appointments, incorporate internal control definitions for medical material shipping etc.

Cerner provides instant access to patients’ data records which results in time and lifesaving. Cerner also generates graphics presentations of the data records instantly. It is a user - friendly software for all levels of employees, even beginners. Clinicians can focus on the patient’s overall health and this improves the patient care quality. In addition, the team can make faster and more efficient decisions as the information is real - time and updated. Furthermore, information at Cerner can be accessed by multiple venues. Cerner is also an easy-to-use software in the laboratories and offers a full suite of solutions to support the information sharing among the network and reduce manual steps in the lab workflow. [[4]](#footnote-4)

**Barriers that should be addressed**

First of all, purchasing a new software is a considerable investment for a healthcare provider and the return on investment (ROI) should be easily earned in different ways. In addition, the healthcare provider should consider the costs to train employees i.e. clinicians.

Insufficiently trained employees can result in mistakes. These mistakes can bear major consequences for the institution. Mistakes can lead to not only loss in productivity, but major hiccups in providing services. Thus, resulting in not only major losses in unrestricted revenue, but the overall return on investment from the software. Well-trained employees can master new skills, increase overall production efficiency, cut costs. Well-trained employees have the tendency to be more productive at work by performing at higher levels. Maintaining a well-trained workforce may bear cost upfront, including reduced productivity, but result in a better return on investment and valuable team.

 Moreover, Cybersecurity should prepare for potential threats including malware, denial of service, and data breaches. A cyberattack is not the same as stealing the keys of the house and entering with force; it damages the whole reputation of the organization. The top cybersecurity threats for nonprofits nowadays include data breaches, malware attacks, and denial of service to patients.

 Except technical issues a healthcare provider should take into consideration also organizational issues when choosing the best EHR system. Most of the time staff feels resistant to the change of an existing software and this leads to more abrasive behavior. To alleviate this problem, the EHR vendor should be always available to train clinicians.

**Recommendation**

In light of the facts and arguments, I believe that the best alternative that can be used in order to create a multichannel software which will incorporate the intensive agenda is Praxis EMR/EHR. Praxis is more than a simple EMR/EHR, it is an excellent software that through its Artificial Intelligence (AI) allows the users to get rid of cumbersome traditional templates. Praxis

is ranked as number one in usability and customer satisfaction. It ranked first after a review of hundreds of EHR systems. While Epic does not reveal pricing for a market analysis, Praxis EHR offers fast and easy use for all providers in all departments and also for laboratory departments for only $259 per month with full clinic training and software implementation included. In addition, Epic does not provide information for a free trial on its page, while it is known that Praxis offers a free trial for its customers. Thus, the return of investment (ROI) will be higher in terms of efficiency and effectiveness by using Praxis.
 The training process is more personalized compared to other software. Praxis training is considered to be an “eye - opening” experience as it allows physicians/clinicians to gain a new perspective of the EMR/EHR systems. Furthermore, as stated above Praxis training fee is included in the purchase fee. Each provider is assigned a personal Praxis Trainer as well as a Praxis Implementation Manager. Training sessions can be completed online, in person, or with a combination of these two. The trainer is responsible for designing an implementation plan to meet the specific needs of the provider. This process includes individual provider training and staff instruction. Training consists of 20 hours of personalized sessions and at the end of the personalized sessions, once the provider is ready to use the software, the next step is clinic training.

Praxis training offers one-on-one, webinars, audit training sessions, tutorials and videos. Training can take place from the office or from home, anytime during day and even on weekends. Having staff who have additional knowledge of the software, along with multiple instruction/training guides in different formats, will allow lab technicians to feel confident and at ease in this transition.

In terms of cyber security, Cloud hosting is the safest of all software. Praxis cloud hosting is completely HIPAA-compliant, which means that encryption technology is used to ensure that all critical data i.e., patient data are not readable. In addition, the remote server is designed to run automatic backups in case of any data loss in order to make data even more secure. Laboratory technicians will have unique passwords to access the system and once they try to access them, they will have to complete authentication first, will be able to update the software in a secure way, encryption methods will be embedded in order to protect unauthorized access to patients’ data.

In addition, Praxis offers 24/7 IT live chat and email support, phone support and knowledgebase. Also, a “frequently asked questions'' section is available for all technicians. It contains questions about software use that are continuously brought up along with their answers to these questions. If necessary, for certain questions, this section contains additional instructions on how to complete a specific task in the software or how to fix an issue that does not require IT. Especially when it comes to the lab test directory of Beaumont, Praxis allows to send lab orders and receive results in a direct way. All the lab orders which are linked to the Concept Processor, are sent automatically whenever a note is approved. Results arrive automatically to Praxis and wait in the lab inbox as well as the patient chart. [[5]](#footnote-5)

**Conclusion and Final Thoughts**

To summarize, in this paper I tried to analyze the current EHR software at Beaumont Health System and especially in the lab test directory and recommend an alternative, more

efficient software. In brief, is Michigan’s largest health care system, which includes eight hospitals in Michigan, and it is the exclusive clinical teaching site for the Oakland University William Beaumont School of Medicine. My purpose was to find an alternative software that would address proper training, support, and integration in different laboratory services regarding patients to ensure that the Beaumont and laboratory staff feels comfortable with it.

Taking into consideration the features mentioned above, I came to the conclusion that Praxis EMR/EHR would be the most effective software for the laboratory department of Beaumont. Overall, Praxis EMR/EHR satisfies the desired criteria, fits all digital platforms, and offers discounts to its users. In conclusion, Praxis EMR/EHR is the standout software for delivering the best service within the lab test directory. With Praxis, Beaumont health system lab test directories’ return on investment will be maximized in terms of quality, efficiency and effectiveness and the service will be optimal.

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