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Benchmark Study: Impact of Electronic Health Records vs. Paper-based Records

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by

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Acknowledgments

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Executive Summary

Patient information is a valuable asset in healthcare, and proper documentation of this information is critical to delivering high quality care. Without a proper documentation system in place, patients are at risk and the safety and effectiveness of their treatment may be jeopardized. The inadequacies of Texas Orthopedics Surgery Center's paper-based system have led to an increase in patient complaints involving the exchange of their information, safety concerns and increased costs associated with paper charts. With the increase in aging population and the high demand on outpatient facilities, managing patient information while ensuring the continuity of effective care and improved outcomes is becoming very challenging. Utilizing an electronic health record (EHR) can enhance patient care by providing a more efficient way of managing and sharing patient information. EHRs can also reduce medical errors by improving the accuracy of records, make health information more readily available, and keep patients well informed (Centers for Medicare and Medicaid Services, 2023).

Texas Orthopedics Surgery Center's paper-based documentation system is not a sustainable method, nor is it best practice. By familiarizing themselves with the benefits of information technologies through training and development workshops, the facility can provide high-quality care, reduce healthcare costs, and position themselves for long-term success in an increasingly digital healthcare environment. Therefore, it is recommended that Texas Orthopedics Surgery Center adopt an EHR to replace the current paper-based record system.

Rationale for the Project

Medical documentation is an essential component in any healthcare setting. Conducted at the highest standard, documentation ensures the delivery of safe and high-quality healthcare services (Noureldin et al., 2014). In the early 1990s, a shift from paper-based health records to electronic records began as a result of the inadequacies of paper-based health records (Tsai et al., 2020). Paper records lag in modern day healthcare due to the inefficiency of accessing, entering, and retrieving medical data (Yu et al., 2013). Yu et al. (2013) also states paper charting can be inaccurate, illegible, incomplete, or repetitive. EHRs, however, have shown to be more beneficial and a better choice for medical documentation. EHRs reduce medical errors, report patient data more effectively, and reduce costs associated with paper records (Geier & Smith, 2019).

Texas Orthopedics Surgery Center, unfortunately, has seen the consequences of being a paper-based facility. The results of their Press Ganey Patient Experience Survey showed a decrease in patient satisfaction in both quarter one and two of 2022. The survey indicated areas of concern are patients having difficulty understanding their procedure information (Score 15th percentile) and trouble accessing their health information (Score 17th percentile). Patients have stated their chart information is illegible, and that it takes significant time to make their chart information accessible in their electronic medical passport. This adds to the concern of time and cost consumption of auditing and storage of paper charts. Texas Orthopedics Surgery Center estimates it costs around $40,000 (not including overtime) a year to have one chart management personnel to audit charts and upload them into patients' medical passports. This facility employs four chart management personnel and with the implementation of an EHR, cost savings could be around $120,000. Another concerning issue with being paper-based is the inconsistent documentation of patient allergies and their related reactions. Without the standardization of an

EHR, it has been difficult to locate the patient's allergies and the associated type of reactions in the paper chart. Centers for Medicare and Medicaid Services (CMS) and Accreditation Association for Ambulatory Health Care (AAAHC), both require any allergies and the type of allergic reactions to be located in a consistent area of the chart (Centers for Medicare and Medicaid Services, 2020; Accreditation Association of Ambulatory Health Care, 2020). The result of this patient safety issue has led to two allergic reactions in this year's second quarter.

With the advantages of supporting interfaces and the ability to access real-time data, EHRs are superior to paper-based records. In need of evidence-based change, the Quality Assurance and Performance Improvement (QAPI) Committee posed the following question: In ambulatory surgery centers (P), how does using Electronic Health Records (I) compared to paper-based records (C) affect quality of care and costs (O) during one quarter (T)?

Literature Synthesis

During the review of literature, several studies with strong levels of evidence (see appendix A) supported the adoption of an EHR and discussed the benefits of utilizing the system. Adoption of an EHR has many contributing factors that have a lasting influence on the performance of an organization. The common areas impacted by an EHR found in several studies are clinical, operational and financial.

Clinically, an EHR has the capability of positively impacting many aspects of quality of care. Nguygen et al. (2014) and Campanella et al. (2016) both conducted systematic reviews of literature on the impacts of EHRs on quality of care. The studies found a reduction in medication errors, decreased adverse drug effects, and a better adherence to professional practice guidelines. Holderried et al. (2020) investigated the effects of electronic records on the ability of medical professionals to identify patient hazards compared to paper charts. The study found no indication

that electronic records had a negative effect on detecting patient hazards. The advancement of data exchange in EHRs, has increased communication due to the timely and improved access to patient information resulting in increased quality of care (Nguyen et al., 2014; Seyyedi et al., 2020). Tsai et al. (2020) noted accessibility of information has led to more collaboration between patients and physicians following EHR implementation. In a qualitative study by Monturo et al. (2021), transitioning to an EHR did not have an overall effect on patient experience.

According to Tsai et al. (2020), improved efficiency and documentation time by using EHR templates led to an increase in productivity. The study also suggests documentation in EHRs are better than paper-based records due to improved documentation and data accuracy. McCarthy et al. (2018) state evidence of electronic records points to improved time spent documenting, documentation compliance and a reduction in documentation errors.

A decrease in medication errors and adverse events not only improves quality of care and patient safety, but it is also associated with decreased costs (Campanella et al., 2016). Increase in turnover time is a huge tribulation in a surgical setting. The literature revealed decrease in turn over time due to the use of an EHR which also increased cost savings and patient satisfaction (McDowell et al., 2017).

Project Stakeholders

With the magnitude of this benchmark study, it is important to involve all stakeholders in the implementation process to ensure the EHR is effective, efficient, and meets the needs of everyone involved. Stakeholders affected by this change will include the administrative team, non-clinical staff, clinical staff, licensed independent providers (LIPs), payors, information technology (IT) individuals and patients.

The administrative team will oversee the project by planning the implementation of the EHR. Non-clinical and clinical staff are important stakeholders in this project. According to Rodgers et al. (2019), staff have the best position to identify ineffective processes, and their engagement is a priority for change to be successful. LIPs have a stake in the project as they will be using the EHR to document patient care, access information, and collaborate with other healthcare members. Payors will require data from the EHR to process claims and provide reimbursement. IT individuals provide the EHR software while being responsible for maintaining security and privacy protection. Lastly, patients are a key stakeholder as they will rely on the EHR to access their information and communicate with their healthcare team.

Implementation Plan

Prior to implementing an EHR, it is imperative to establish an EHR team or "change team." The purpose of a "change team" is to guide the implementation process by following steps, evaluating each phase, educating stakeholders and providing feedback. The team leaders will consist of the administrative director and clinical director. "Change champions" will also be selected as these members are crucial for establishing an effective team. Cullen et al. (2020) describes a change champion as a "charismatic individual who throws his or her weight behind an innovation, thus overcoming indifference or resistance that the new idea may provoke...[and] can play an important role in boosting an idea" (p. 128). Change champions assisting in the implementation of the EHR include the Medical Executive Committee (one physician, one anesthesia), each department lead (e.g. Pre-op, O.R., PACU), the business manager, the quality coordinator, the infection control nurse, the Governing Board, and the QAPI committee. Once a team has been established, the selection process for an EHR system may begin. Selection of an EHR should be based on usability and interoperability of the system (Ratwani et al., 2016).

Flexibility or the ability to configure the system to meet the needs of each department should also be considered when selecting an EHR. Ultimately, the selection process must be mindful of the patient experience and patient safety. Another critical point to consider in the selection process is the importance of a thorough plan on how to disseminate and educate information on the use of an EHR. Without proper training for key stakeholders, optimal outcomes such as decrease in cost, increase in patient satisfaction, and increase in safety, may be difficult to achieve. Selecting an EHR system that provides on-site training (e.g. system IT developers) during each phase of implementation, will give the adequate training needed to enhance the usefulness and optimize the full benefits and attributes of a successful EHR.

Once an EHR system is selected, the team will work in conjunction with the system developers to determine the hardware needed to run the EHR. Hardware may include computers, laptops, tablets or routers. When the proper hardware is available, then the EHR system will be installed.

After installation, the development or customization of the EHR will begin. Workflows will be created to outline the system process a user will follow for a specific situation. The processes include but are not limited to, patient admission, insurance verification, patient transfer from pre-op to the operating room, or patient discharge. Due to the barriers associated with workflow and design, each department lead will be involved in the development of the EHR along with the help of the system IT developers. This will ensure all critical aspects of each department are included in the EHR to ease workflow and usability. Those involved in the development of workflows will have access to a Microsoft teams communication board. The board is an important opportunity to submit concerns, comments, or ideas pertaining to the workflow and usability of the EHR system. Each month the “change team” will examine the

communication board to discuss areas of concern and identify risks to quality, safety, or compliance. Workflow processes can be complex and institutions using a new EHR can lack workflow knowledge (Ratwani et al., 2016). It is imperative that the "change team" evaluate the discussion board with EHR developers who have a better understanding of workflow needs and can implement products to meet these needs.

Different levels of computer literacy and comfort pose another barrier to foresee. On-site training will be the next step and be conducted by the EHR IT developers for all stakeholders to increase comfort and computer literacy. On-site training will include one-on-one training with each member of a department. Scenarios or simulations will also be used as educational material. Employees chosen as "super-users" will be established at this time. "Super-users" are those that have proper computer skills and an understanding on how to use the EHR. Each department will have a "super-user" to supplement IT support.

After training has concluded, the EHR will be put in a "Go-Live" mode, where users will use the system in real time. The "change team" and the system IT developers will all be present to assist users if needed. Feedback will be collected at this time to help fix any issues or further customize the system.

Each month an evaluation of EHR use will be conducted. This is a way for each department to communicate workflow and usability issues of the EHR to the "change team." In addition, the QAPI committee will meet each quarter to evaluate risk data associated with the EHR. Risk data will include but not be limited to medication errors, chart completions, discrepancies, and adverse events. The feedback will be used to make changes to reduce risk, increase usability and workflow. Cost evaluation will also be performed using a budget to examine if there has been a Return On Investment (ROI) post implementation. A pre and post

budget will be compared and evaluated. ROI should be evaluated every quarter to see if there is a positive trend. If there is a negative trend, then the "change team" will evaluate where costs can be saved.

Timetable/Flowchart

In March 2022, evidence was presented to the leadership team and the QAPI committee suggesting the adoption of an electronic record system. After deliberation, the leadership team decided to move forward and developed a "change team" made up of department leads and the administration team. Over the course of a month, the "change team" consulted with different EHR programs to determine the best fit for the organization. On May 5, 2022, the "change team" developed a flowchart to illustrate the implementation plan (see appendix B). Due to unforeseen events, the "change team" could not implement the EHR. The following is an estimated timeline that describes the events for each implementation phase:

- Phase One: Resources (four weeks)
    - Hardware installation (Computers/laptops)- 3 weeks
    - EHR software installation- 1 week
- Phase Two: Training (1.5 months)
    - On-site training for all staff
    - "Super-users" established
- Phase Three: "Go-Live"
    - EHR use in real time by all personnel
- Phase Four: Evaluation period (Begins when "Go-live starts)
    - Corrections are made to enhance usability
    - Software issue updates

Data Collection Methods

The QAPI committee will pull data generated by incident reports. The data will specifically be related to patient safety and quality incidents. To evaluate the data, patient safety incidents such as falls or adverse reactions will be calculated as a rate. The rate will be based on per one thousand cases. Each quarter the information collected will be presented to the "change team." The "change team" will compare each quarter data to analyze trends and determine if there needs to be a change in the EHR system. To evaluate costs, the Medical Executive committee will meet each quarter to analyze costs. The committee will evaluate overall investment of the project by utilizing a monthly budget that incorporates the fixed and variable costs associated with EHR use.

Cost/Benefit Discussion

Implementation costs associated with this project are broken down into two categories: software and hardware. The initial cost to install the software for the EHR was quoted at $37,000. The software also requires a yearly cost which was quoted $8,000. Additional hardware needed to be purchased totaling $10,540. The network infrastructure was adequate to support the EHR and did not require any additional costs. To effectively train the healthcare providers and staff required the EHR software company to be onsite for training sessions. The total training costs were $4,000. The total costs for the initial set up of an EHR is over $59,000. The price does not include any additional fees associated with upgrades or maintenance.

The benefits of an EHR have an indirect and direct effect on costs. EHRs decrease costs by minimizing the need for paper supplies and the costs associated with storing paper charts (Geier & Smith, 2019). The data accuracy of an EHR can eliminate salary costs of chart auditors or transcription costs supporting a return on investment. Indirectly, EHRs ability to improve

quality of care by reducing medical errors or adverse events reduces organizational costs associated with these events.

Discussion of Results

The project was not successful because of the inability to implement an EHR. To successfully implement an EHR, all key stakeholders need to have full engagement with the project. Due to an unexpected death of the business office manager, the project had to be postponed. However, with a new business office manager and the support from all stakeholders, the project is expected to continue its implementation efforts.

Conclusions/Recommendations

Across the literature, the body of evidence has pointed out the importance of a thorough plan on how to disseminate and educate information on the use of an EHR. Without proper training for key stakeholders, optimal outcomes may be difficult to achieve. Therefore, it is recommended to provide adequate training and education. Proper training enhances the usefulness of an EHR and enables the full benefits and attributes of an EHR (Ratwani et al., 2016). Another important factor to consider is the usability of the EHR. One of the main gaps or barriers to the success of implementing an EHR is usability. Usability is not always initially seen as an issue and may be more apparent at different phases of implementation. A recommended strategy that would help manage the change process is using the Iowa Model (see Appendix C). The Iowa Model outlines a pragmatic multiphase change process with feedback loops and would be the optimal choice for a strategic guidance on implementing an EHR (Dang et al., 2019). Following a basic problem-solving approach, the interprofessional team will be able to utilize multiple feedback loops that assess, analyze, and evaluate data throughout the change process (Dang et al., 2019). The benefits of feedback loops are to gather information to help support the

team when it comes to identifying usability issues and ultimately promote sustainability of such evidence-based change.

Compared to paper-based record systems, EHRs provide a state-of-the-art system that improves quality of care and reduces costs. EHRs can drive performance in areas such as clinical, operational and financial. The current paper-based documentation system is not a sustainable method, nor is it best practice. In order to provide high-quality care, reduce healthcare costs, and have a position for long-term success in an increasingly digital healthcare environment, an EHR must be utilized. Therefore, it is recommended that Texas Orthopedics Surgery Center adopt an EHR to replace the current paper-based record system.

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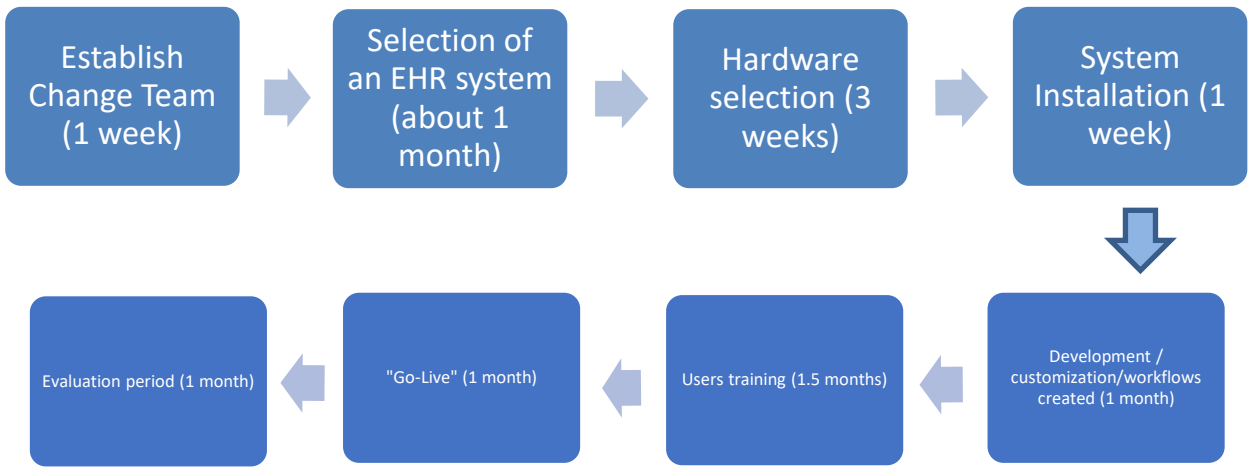
Appendix A

Synthesis Table

Level of Evidence	1	2	3	4	5	6	7	8	9	10	11	12
I: Systematic review/meta-analysis of RCTs	X			X			X	X	X	X	X	X
II: Single RCT		X				X						
III: QE/Nonrandomized controlled trial			X		X							
IV: Cohort or case-control studies												
V: Systematic review/meta-synthesis of qualitative studies												
VI: Single qualitative or descriptive studies/evidence implementation and QI projects												
VII: Expert opinion												

Appendix B

Flowchart



Appendix C

Iowa Model