Implications of an Electronic Medical Record in Different Healthcare Environments

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An electronic medical record (EMR) is a computerized system that expands upon the basic functions of a patient's paper medical record. A medical record typically presents patient's symptoms, the observations of physicians and other healthcare professionals, discussion with patients, laboratory tests, imaging studies, and treatment information (Luo, 2006). The goal of a medical record is to detail a story of the patient care process. EMRs intend to add unto these basic roles by managing and delivering data for patient care in the form of "an integrated view of patient data, clinical decision support, clinician order entry, integrated communications support, and access to knowledge resources" (Luo, 2006, p. 1). The intents of an EMR are to improve the quality, safety and efficiency of patient care while reducing disparities, engage patients and family in care, promote public health, improve care coordination, and promote the privacy and security of health records (Thompson, O'horo, Pickering, & Herasevich, 2015). The intents of this paper are to identify whether EMRs deliver on their intentions by examining the benefits and drawbacks of these systems in different healthcare environments: ambulatory and inpatient care.

Ambulatory Care Impacts

Ambulatory care environments are defined as those in which health services are provided to patients not restricted to a hospital bed during their care (Safety & World Health Organization, 2009). The most common ambulatory care environments and the ones that will be focused on in this paper are provider offices. Benefits and drawbacks of EMRs will be examined within this type of environment using past research and observations at outpatient cardiology and women's health clinics that will remain unnamed for anonymity.

Benefits

Communication. There are many potential benefits to an EMR in ambulatory care such as improvements in patient understanding of conditions and their associated treatment plans in addition to an increase in sharing and confirmation of medical information (Alkureishi et al., 2016). This is seen in providers who are able to utilize the benefits of the system. For example, Alkureishi et al. cited four studies that examined EMRs as tools that appeared to facilitate clarification, improve the quality of patient questions and discussions, and increase the use of open-ended questions in the provider-patient communication (2016). Specific behaviors contributed to these improvements such as sharing the screen with patients, signposting computer use, keeping eye contact, ceasing computer use during sensitive topics, continuing verbal and nonverbal signals of listening, and reading out loud while typing (Alkureishi et al., 2016). Observations at the cardiology clinic support these findings. Many providers at the clinic have appeared to actively invite patients to view their computer screen, suggesting it as an educational tool. For example, one nurse practitioner at this cardiology clinic makes it a habit to show test results to patients directly off her screen, as discovered through observation (Participant 1, observation, 2018). Another nurse practitioner at the women's health clinic makes it a habit to stop using her computer when patients speak about certain topics. An example of this was illustrated during a patient appointment. This nurse practitioner stopped charting and focused all her attention on her patient when the patient opened up about experiencing sexual assault in the past (Paricipant 2, observation, 2018). Therefore in the right instances, EMRs can present benefits in patient-provider communication when providers and other end users use them appropriately.

Efficiency. Another benefit of EMRs that some end users cite in ambulatory environments is improved efficiency within the workplace. One study examined the perspectives

of primary health care providers two years after EMR implementation in their respected practices (Terry, Brown, Dnomme, Thind, & Steward, 2012). They interviewed participants on factors that motivated EMR use, finding that continued use and upkeep of skills contributed to it being an efficient tool. One participant illustrated this idea and said regarding the EMR, "…once it's there if you keep it up it is simpler for us which means it's better for the patient. It's even more efficient, and [I] have more time to spend on maybe some other things" (Terry et al., 2012, p. 524). One of the nurse practitioners at the women's health clinic mentioned in conversation that she was proficient with the EMR before she went on maternity leave but had trouble when she returned to work (Participant 3, observation, 2018). These accounts suggest that the EMR can improve workflow if the system and skills are kept up to date. Another provider apart of the same study but from a different clinic supported the idea of increased efficiency in saying, "Well, I think life is easier with this program. I feel like I'm more efficient, I can do things like consult letters, chart summaries much faster and easier than before" (Terry et al., 2012, p. 524). Thus, the EMR proves to benefit providers and patients as a tool that has the potential to increase productivity in the workplace.

Drawbacks

Productivity. While the aforementioned study by Terry et al. credits the EMR as a source of efficiency after continual use, this technology can cause disruptions to workflow and in effect, decrease productivity in early implementation and if proper training is not present. One study that examined internal medicine clinics supports this notion as it estimated a collective productivity loss of 20% the first month, 10% the second month, and 5% the third month after the implementation of EMRs (Wang et al., 2003). This loss in productivity is also supported by the findings of Fleming, Culler, McCorkle, Becker, and Ballard; these researchers found that

EMR end users spent approximately 134.2 hours learning the new system (2011). This includes aspects such as formal training and individual time spent practicing. In addition to the learning curve of an EMR, these systems do not always match the workflow of every environment and providers are forced to adapt their work style to the technology which often slows them down (McDonnell, Werner & Wendel, 2010).

These losses in productivity often lead to decreases in revenue. In the aforementioned study by Wang et al., the loss in productivity that the EMR caused that first year of implementation lead to a decrease in revenue by $11,200 per provider (2003). Similarly, a study by Miller, West, Brown, Sim, and Ganchoff found that during the early stages of EMR implementation at a number of primary care practices, providers needed to reduce visits and thus, the clinics lost approximately $7,500 per provider (2005). Therefore, the decreased productivity and losses in revenue serve as drawbacks that EMRs cause for ambulatory care environments.

Reduced satisfaction. One of the drawbacks of EMRs that has been continually cited is reduced satisfaction of providers and end users using the technology (Vishwanath, Singh & Winkelstein, 2010). A study by Babbott et al. that examined physician stress with EMRs in primary care environments supports the aforementioned statement (2014). One finding from this study is that physicians using EMRs with a larger number of internal functions reported more stress and less job satisfaction (Babbott et al. 2014). The finding above by McDonnell et al. stating that EMR systems do not always match workplace processes and flow not only impacts clinic productivity, but it also places a lot of stress on the provider. When a provider has to constantly adapt when working with unfamiliar technology and processes, it is more difficult to be time efficient with their patients. Therefore, providers in a primary care environment tend to become stressed as they try to quickly work around issues while patients are present.

Inpatient Care Impacts

An inpatient care environment is defined as one in which a patient is admitted to and discharged out of after one or more days (Safety & World Health Organization, 2009). The most common inpatient environment is a hospital. Benefits and drawbacks that an EMR causes for inpatient care will be identified using research studies of hospital environments and observations of an IT EMR inpatient clinical team.

Benefits

EMRs have shown to be beneficial in terms of clinical outcomes involving improvements in quality of care. Quality of care is rated using six dimensions, three of which EMRs appear to improve upon: patient safety, effectiveness, and efficiency (Menachemi & Collum, 2011).

Patient safety. Patient safety is measured in terms of best practice guidelines. Sometimes providers do not adhere to best practice guidelines when seeing patients. This could be caused by not knowing the guidelines, not realizing that a guideline applies to a certain patient, and lack of time with patients during visits (Menachemi & Collum, 2011). EMRs function to combat these issues with preventative services. One study founded that computerized reminders in an EMR increased the use of influenza from about 0% to 35% and pneumonia vaccines from about 0% to 50% in hospitalized patients (Dexter et al., 2001). A firsthand example of this improved patient safety guideline is illustrated by an observation of the EMR inpatient clinical team. At the hospital in which this team works, there were increased efforts to add more Best Practice Advisories (BPA)—applications within a specific EMR that present alerts with hyperlinked order sets to the provider during a patient encounter. These customized alerts can be programmed by the institution's clinical leadership to fire according to predetermined triggers, using logic, ranging from patient chief complaints entered by nurses, vital signs, or diagnoses

entered by providers (Lurio et al., 2010). The clinical leadership at this medical center continually added more BPAs in a span of three months, notably with documenting allergies. For example, the team added a BPA that would stop nurses and medical assistants if they left the allergy field blank. The background behind this BPA is that a good number of end users were leaving the allergy field blank instead of documenting 'no known allergies' (Participant 4, observation, 2018). This served as a problem that impacted patient safety because providers could not tell whether the patient had no allergies or if the end user failed to ask the patient about allergies. Therefore, this example shows a way in which EMRs positively influence patient safety.

Effective care. Another benefit of EMRs in terms of improving quality of care is that they make care more effective in terms of prevention. An example of this is in a study by Kucher et al. in which it was hypothesized that computerized alerts directed towards physicians possibly increased the use of prophylactic care for patients at risk for deep vein thrombosis in the hospital (2005). The 19% increase this study found in the use of anticoagulation prophylaxis by being alerted by the system illustrated a 41% reduced risk of deep vein thrombosis and pulmonary embolism 90 days after patients were discharged (Kutcher et al., 2005). Another example of inpatient EMRs proving to be preventative and therefore effective is shown by another observation of the EMR inpatient clinical team. As aforementioned, there was an increase in BPAs added to the inpatient EMR that this team works on. One particular BPA within this EMR is one that alerts a provider when they are prescribing medications that might react poorly with other medications (Participant 4, observation, 2018). This EMR therefore has preventative measures that improve quality of care and thus, make it more effective.

Efficiency. Efficiency is the third dimension of quality of care that EMRs appear to improve upon. This dimension is defined as avoiding the waste of resources; these include supplies, equipment, ideas, and energy. As aforementioned EMRs have been shown to increase efficiency in ambulatory care environments when used correctly. This is also the case with inpatient care environments. For example, Nies et al. looked at the impact of EMR functionality on the redundancy of blood tests in a surgical department (2010). This study showed the efficiency of EMRs as it found that the computerized reminders of previous blood tests decreased the amount of unnecessarily repeated tests (Nies et al., 2010). This ensured that the department did not waste any resources—time and materials—performing unnecessary tests. Furthermore, all providers at the medical center are able to see a patient's chart if authorized, as observed on the EMR inpatient clinical team (Participant 4, observation, 2018). This is especially useful in the hospital in which patients are often transferred to different units. In this case, providers do not need to order redundant testing if they can see the results of testing done somewhere else in the hospital. Thus, EMRs prove to be beneficial because they increase quality of care in terms of patient safety, effective care, and efficiency.

Drawbacks

Financial burden. There are a lot of associated costs with EMR implementation that are partial drawbacks of the technology. These costs include "adoption and implementation costs, ongoing maintenance costs, loss of revenue associated with temporary loss of productivity, and declines in revenue" (Menachemi & Collum, 2011, p. 51). A clearer illustration of this is shown in a study conducted on an acute care hospital after a 7-year-long EMR installation; the cost approximated to $19 million (Schmitt & Wofford, 2002). In addition to this initial cost of the

technology, maintenance costs become steep as hardware and software need to be updated on a regular basis (Menachemi & Collum, 2011).

Privacy and security concerns. Privacy concerns regarding patient information can serve as a drawback because of the vast amount of health information that is being exchanged electronically (Menachemi & Collum, 2011). Although there are many regulations set by legislation about inappropriately accessing electronic data, most of this information is not entirely secure (Menachemi & Collum, 2011). Furthermore, observations of the EMR inpatient clinical team revealed that it is not difficult for providers to view other patients charts (Participant 4, observation, 2018). While these employees cannot make changes to patient charts and actions like these are highly prohibited and would cost providers their jobs, it is still a risk. Therefore, privacy concerns serve as a drawback of the EMR systems.

Conclusion

In conclusion, EMR technology presents benefits and drawbacks to both ambulatory and inpatient care environments. A key finding of this review is that many of the issues associated with EMRs in both environments are ones that appear to surface during implementation and early use of the systems. Furthermore, the literature reviewed illustrates benefits that are noticeable after the EMR has been in place for a while. Therefore, it can be suggested that EMRs pose initial problems with finances and workflow, but that the positive impacts are not present until providers learn how to properly use the technology. One limitation of this review is that many of the articles and studies that examine the impacts of EMRs are ones that were published around the time that EMRs were heavily implemented. It may be more useful to look at more recent impacts of the technology, after many employees have had the chance to learn how to use the EMR. Another limitation of this review is that the environments observed both use the same

EMR system, limiting variability across systems. Therefore, this review presents both positive and negative impacts of EMR technology to two different healthcare environments. However, more research is needed on the topic to make solid conclusions.

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