Successful patient diagnoses are a reflection of timely and accurate information and knowledge sharing between a patient and his healthcare provider. Sometimes, not all meaningful information regarding a patient’s care is effectively communicated due to differing levels of expertise and assumed responsibilities in the healthcare delivery system. This leads to gaps in knowledge and information sharing, electronic medical record (EMR) management, and the patient-provider relationship. The concepts of knowledge sharing and information alignment are discussed as well as their contributions to EMR ownership, EMR management rights, and information synchronization.

INTRODUCTION

Information sharing and information support systems are two key elements to successful healthcare. In order for these two components to work to a patient’s advantage, both patient and medical care team need to be aware that not all important healthcare information is shared. Even if unintentional, the lack of sharing can strongly affect quality of care. For the information support system to be part of a highly functioning healthcare delivery system, the other two components of information alignment, team coordination and production outputs, must also be working. This paper will discuss three types of knowledge sharing, information alignment, and their contributions to healthcare. A small example is provided to demonstrate how knowledge sharing and information alignment work together in the determination of record ownership.

EXPLICIT, IMPLICIT, AND TACIT KNOWLEDGE

In the healthcare setting, there are three different types of knowledge that both healthcare professionals and patients use when communicating. This communication can be done between the healthcare professional and a patient and also among multiple healthcare professionals. The first type of knowledge is called explicit knowledge. Explicit knowledge is information about a particular artifact (tangible or intangible) that stays with the artifact no matter where it goes. This knowledge can be a fact, policy, rule, or relationship (Wyatt, 2001). Furthermore, anyone in that area of expertise can understand the knowledge about the artifact without having any extra information about the artifact being provided. The next type is implicit knowledge. Implicit knowledge refers to information that is relevant to a particular environmental or situational context. No one outside the environment or situation would understand what the information about the artifact would mean unless they were either in that context or received more information regarding the artifact. Therefore, implicit knowledge cannot be understood by itself (Wyatt, 2001). Finally, tacit knowledge is information that is part of an expert’s internalized body of knowledge (Guinery, 2011). As is true with implicit knowledge, those without a shared understanding of the context of the information might not understand the information being shared. Furthermore, individuals with tacit knowledge might not even realize that their knowledge is specialized.

To further demonstrate how explicit, implicit, and tacit knowledge work in the healthcare domain, a medication prescription bottle of a common allergy medicine from a nationally-recognized pharmacy supports all three types of knowledge. The explicit knowledge from the bottle is evident; anyone who picks up the bottle knows who the prescription is for, what the medication is and how to take it, who the prescribing physician is, and if there are refills available, and so forth. The implicit knowledge about the bottle from this particular nationally-recognized pharmacy relates to how this pharmacy dispenses its medications. Every prescription bottle comes with a colored ring around the top. If different members of a household are getting their prescriptions from this pharmacy, each member will receive a different colored ring in order to indicate whose medicine belongs to which person. This helps eliminate the possibility of someone taking the wrong medicine. The only ways for someone to understand this information about the rings on the bottles is to either work at this pharmacy or to fill their prescriptions there. Finally, the tacit knowledge about the prescription relates to the information regarding the medication. For instance, this specific allergy medicine cannot be taken with juice. Only pharmacists and the drug manufacturers know this information since medication is their specialty and area of expertise. A patient taking this medication would not know this simply by taking it; the patient would have to read the information packet that comes with the medication, talk to a pharmacist about how to take the medication, or watch a recent television commercial for a competitor allergy medicine.

INFORMATION ALIGNMENT

Information alignment is a concept that teams in multiple environments are using in order to help minimize the complexity of team tasks (Caldwell et al., 2008). The team’s performance and coordination efforts are affected by certain elements of the environment and the task to be completed such as time constraints, the demands of the environment, and both
outcomes and goals of the team. Therefore, in order to accommodate all of these factors, there are three components of information alignment: team or organizational coordination, information flow systems, and production or system outputs. Due to the intricacies of team coordination in a variety of situations, information alignment can be difficult to achieve. In order to help alleviate some of the complications of diverse tasks and teams, many organizations have tried looking at not only assessing the team’s situational awareness (SA) but also the SA of each team member (Caldwell & Palmer III, 2011).

An example of information alignment in a manufacturing environment is how demand for a specific product is met. The information regarding the amount of the product demanded and any time constraints are placed into some kind of information system whether it is electronic or in paper format. The way that the production output can be met is by having all team members be aware of the amount being demanded and the time constraint in which it needs to be met (explicit knowledge) and also knowing how the each member of team plays a role in the production system and how each individual acknowledges and carries out his own role in the task (implicit and tacit knowledge). If the team can coordinate task activities along with the information being provided in the information system, the system will have no problem meeting the demand in the given time constraint.

With technology rapidly advancing, large amounts of information can be quickly moved into a variety of settings and information support systems. Therefore, not only is the transfer of this information important, but also the ability for one to be able to understand and recognize how the information support system is vital in information alignment. The lack of timely information can lead to a delay in the outputs of the production system. For this reason, information alignment is important in many diverse environments including production and manufacturing environments as illustrated above (Caldwell et al., 2008; Caldwell & Palmer III, 2011) and also space flight operations (Caldwell et al., 2008).

**RELATIVE CONTRIBUTION OF INFORMATION SHARING ON INFORMATION ALIGNMENT IN HEALTHCARE**

Since information alignment can be applied to complex environments such as manufacturing and space flight, it can also be applied to an environment as diverse as healthcare. Even though the production outputs of healthcare are not as tangible as those in manufacturing, both environments rely on team coordination and an information system in order to produce successful production outputs. In healthcare, the information system related to patient care used to be hard copy patient records. However, patient records are migrating to a class of information systems generally known as electronic medical records (EMRs). An EMR gives healthcare professionals immediate access to patient information, decision support systems, and even expert knowledge in a variety of emphases (Buchbinder & Shanks, 2007).

Information updating is an important concept in the information system component of information alignment. It is especially serious in the healthcare environment since patients are usually placed into either one of two tracks: outpatient services or inpatient services. In the outpatient setting, patients who see their primary care physician are there because they need an annual physical, a prognosis on their ailment or chronic condition, or they are not feeling well (Caldwell & Garrett, 2006). While all health conditions should be treated with some degree of sensitivity and urgency, the outpatient visit is usually not as life-threatening as an inpatient visit and healthcare providers are under less-sensitive time pressures (Caldwell & Garrett, 2006). It is only after a physician’s or other healthcare provider’s evaluation of the patient and any complementary laboratory tests that the patient’s condition might be considered urgent. Therefore, the focus of the outpatient visit might now shift to getting the patient to an inpatient setting rather than simply sending them home with a medication prescription. In healthcare settings that have both paper and EMR systems, updating the patient’s EMR might not take priority and instead, the physician or healthcare provider will first focus on updating a hard copy of the patient’s record and then update the patient’s EMR at a later and more convenient time (Mikkelsen & Aasly, 2000). The term for this kind of relationship between the medical team receiving knowledge and the length of time before updating the EMR is known as long-cycle information updating.

Due to the fact that life-altering decisions are made within minutes or even seconds in both emergency and inpatient settings, focus needs to be put on short-cycle information updating in these two environments. The updating time frame should be shorter than a nurse’s shift, which ranges from 8 to 12 hours. However, the short-cycle information update rate may not be the same for each hospital or inpatient facility due to the culture of that particular facility. For instance, if a hospital updates its records every few minutes, the physician reviews the EMR every hour, there is a large amount of energy wasted on the system to maintain this frequent update rate. This reasoning should also apply in the opposite direction. If a physician reviews a patient record every ten minutes and the system updates every hour, the physician is viewing potentially incorrect information which could lead to an incorrect diagnosis or a premature medical decision.

One important factor in any information updating cycle is that the information being provided in the EMR is correct and complete. In order for the medical team to give an optimal diagnosis, the team must not only use their own tacit and implicit knowledge of medical information but they also must have access to the tacit and implicit knowledge related to the patient. If a patient forgets to provide information about certain allergies or even financial constraints regarding his care, his healthcare team cannot align the information being provided to make an optimal production output, a successful and feasible diagnosis. Not sharing tacit and implicit information from both the medical team and the patient can cause delays in treating the patient and can therefore be viewed as a “min-max” problem. A main goal of healthcare is to maximize the amount and accuracy of relevant information being placed into a patient’s EMR so that physicians and other
healthcare professionals can make sound decisions regarding the patient’s care. Accordingly, another main goal of healthcare is to minimize delay in gathering the information and also to minimize the number of errors in patient care such as receiving false or incomplete information that can lead to detrimental patient outcomes.

EXAMPLE OF INFORMATION SHARING AND INFORMATION ALIGNMENT IN MEDICAL RECORD OWNERSHIP

As discussed in the previous sections, medical professionals are viewed as experts regarding medical care since they have acquired tacit and implicit knowledge in their area of expertise. This argument can be made for patients in that they are experts about themselves (Vallette et al., 2011). Patients maintain specialized information about themselves that their medical team would not know about unless the patient explicitly told the team. Therefore, there is a disconnect between a patient and his medical team regarding who is the expert of the patient’s medical information. Furthermore, both patients and medical professionals need to realize that by having this disconnect, there can be an opposite effect on the min-max problem in that there will be a lack of complete or accurate information in the EMR and the increased potential for medical errors.

Medical professionals need to understand how EMRs work: what information to place into them and also how to retrieve patient information that will help support them in making medical decisions. On the other hand, even though the patient is an expert about himself, he might not be trained in using the EMR. This might lead the patient to not sharing information about himself when speaking to his medical team since he might not know how the information he provides will be used in during the course of healthcare services (Caine, 2009; Caine & Hanania, 2012). While patients are trying to become more proactive in their own care, they are hindered by healthcare literacy barriers such as not only being able to give and receive health information but also to understand and be health literate (Douglas & Caldwell, 2011; Vallette et al., 2011). Physicians and other medical professionals are attempting to be more patient-focused by taking the time to communicate health information to their patients. However, this information can sometimes be filled with jargon, or specialized terminology that only medical professionals understand (Douglas & Caldwell, 2011; Vallette et al., 2011).

Health communication is simply the act of communicating health information in order to improve health outcomes (Nutbeam, 1998). However, simply communicating the information and using specialized terminology does not mean that the recipient of that information will understand it. Those who are health literate are able to understand and interpret the health information being given to them in order to make decisions regarding their own care (DeWalt et al., 2004; Nutbeam, 2000). Individuals who are health literate have better health outcomes and are more likely to take an active approach in their healthcare management (Douglas & Caldwell, 2011). Therefore, health communication and health literacy are two unique aspects to healthcare and are dependent on how active a role a patient takes in his care and the information that is provided in the EMR.

Other important aspects of healthcare management relate to the privacy, security, and accuracy of an EMR. If a medical professional or organization is held accountable for the medical record, the patient, as a partner with the medical team or organization, is also responsible for the EMR. In a study conducted by Vallette (2011), students and healthcare providers from a college campus were surveyed on various issues relating to an EMR including who was responsible for the EMR’s accuracy, security, and privacy, how comfortable individuals felt understanding the information provided in the EMR, and also the trust in the ability of the campus’s health center to be able to provide such information. There were 15 students surveyed and 25 healthcare providers surveyed from the student health center. Of the students, there were four males and 11 females. The overwhelming majority (11 students) were upperclassmen in the school of Health and Human Sciences. Of the healthcare providers, there were three males and 22 females surveyed. Seven of these providers were physicians, 15 were nurses, and the remaining three were from other provider areas such as physical therapy or counseling.

The study showed that both students and healthcare providers believed that the health center should provide EMRs to students and also that students had the right to have EMRs. However, both sets of surveys indicated that there were mixed reviews regarding the ability for the health center to complete such a task and negative results indicating students’ abilities and health providers’ beliefs in students being able to be health literate. The main area of disagreement was the discussion on who was responsible for EMR privacy, accuracy, and security. The students overwhelmingly picked the physician as the party responsible for EMR accuracy but could not come to a consensus on who was to be held accountable for privacy and security. However, the healthcare providers generally picked that all parties were involved in ensuring the privacy, accuracy, and security of the EMR. Once again, these results show a disconnect between the patients (students) and healthcare providers (college campus’s health center providers) in the battle of working together as a team. While the survey results indicated there were somewhat negative feelings about students being health literate, there was the sense that not only did the healthcare providers want to help communicate to the college students their health records but also to work together to let students know that they were somewhat responsible for both their health records, and their health outcomes.

It is imperative for both patient and his medical team to work together in order for information alignment to work properly. Physicians and other medical professionals need to realize each other’s roles on the patient care team and also understand what is expected of them as individuals. If this does occur, there is the reduced risk of sharing extra or contradictory information (Jenkins et al., 2001). This can also work with patients and physicians being part of the same team, or having the patient receive care that is centered on the patient (Ledford et al., 2010). Patients who understand that their knowledge sharing and input are valued are more likely to adhere to the physician’s instructions and have a much
better relationship with their healthcare team. This is due to patients feeling comfortable sharing both implicit and tacit knowledge to their healthcare team. Therefore, both team coordination and information support systems are fully functioning and they can then produce successful patient outcomes. Furthermore, the patient is partially responsible for the content of the medical record and takes part ownership in it; he is responsible for what information goes into the record and it also held liable if he does not fully acknowledge pertinent information related to his care. The patient is not only able to communicate about his health but he is also health literate in he is fully aware of what information is being placed into the record and what effects this information, or there lack of, will have on his care.

CONCLUSION AND FUTURE RESEARCH

Both the patient and medical care team are two important components of successful patient care. There are different kinds of knowledge—explicit, implicit, and tacit—being communicated during the course of a patient’s treatment. In order to provide an optimal solution to the min-max problem, that of reducing errors and time delays while maximizing important healthcare information, both patient and medical team need to work together. In order for both patient and provider to work effectively, the gaps of EMR management must be identified and overcome. As discussed previously, these gaps are record responsibility, trust in ownership and security of the record, health literacy, and the expectation that individuals have the right to be an active participant in their own care. Even though there is a willingness for providers to accept patients as experts about themselves, there is still the burden of patients not being experts in healthcare record management and health literacy.

Future research should explore perceptions of whether or not a patient needs to be a specialist in information management and/or medicine in order to access his individual health records. From the world of finance, it is known that an individual does not need to be a financial expert in order to access his finances, manage his accounts, and dispute any errors. Since finances and medical information are both viewed as private and confidential information, an argument can be made that EMRs should be treated in the same light as financial records. A second research focus should then address the question of when and how does a patient know enough information management and/or medicine in order to get access to his medical records. Answers to these two research questions can help address the gaps of health literacy, trust, and information management. Furthermore, the answers to these questions will help allow for information alignment to be successful; team coordination between the patient and the medical team will enhance the accuracy of the EMR, or the information system, and will lead to positive patient outcomes.

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