

Giselle Martinez

IT 103-B01

June 22, 2011

The Impact of Technology on Radiology

"By placing this statement on my webpage, I certify that I have read and understand the GMU Honor Code on <http://academicintegrity.gmu.edu/honorcode/> . I am fully aware of the following sections of the Honor Code: Extent of the Honor Code, Responsibility of the Student and Penalty. In addition, I have received permission from the copyright holder for any copyrighted material that is displayed on my site. This includes quoting extensive amounts of text, any material copied directly from a web page and graphics/pictures that are copyrighted. This project or subject material has not been used in another class by me or any other student. Finally, I certify that this site is not for commercial purposes, which is a violation of the George Mason Responsible Use of Computing (RUC) Policy posted on <http://universitypolicy.gmu.edu/1301gen.html> web site."

Signature: Giselle Martinez

Introduction:

There's been a rapid growth in the volume of radiological exams as well as advancement in technology. High-resolution images of the body, allow for dynamic imaging of the brain for stroke patients along with other diagnoses imaging such as those performed on cancer patients. Better imaging guidance decreases the amount of invasive procedures. New developments for MRIs have opened a path for more advanced clinical applications. Stronger magnets provide the benefits of high-resolution images of tissue and bone structure. Many beneficial advantages for the field of radiology have come about as technology advances, yet the cost of the high-tech equipment needed can also have a great negative impact in this field. As technology advances, the risk or legal and ethical issues arise and the level of security decreases.

Background:

Radiology has become adapted to digital radiography. Today's Radiologists view digital imaging as the best technological advancement because in the field of radiology the quickest and most advanced form of imaging techniques are needed for faster diagnosis of any type of disease, either pathogenic or non-pathogenic. "Digital Radiography ranks as an integral component of every radiology department's workflow" (Anonymous, 2009, p. 1). All of these technological advancements in the field of Radiology have transformed diagnoses interpretation. From the results taking three to five days to reach the ordering physician to having it reach them within a short period of just thirty minutes. This advancement is of great gain because now, the interpreted report will reach the ordering physician quick enough to treat the patient in a shorter time span. All of this will prevent diseases from spreading and in turn this will save many lives. "Advanced imaging provides fast, comprehensive information on which to base an accurate

diagnosis and enables physicians to create an effective treatment plan” (Duford, 2009, p.16-19).

Also, there now is an in-house clinical information system for Radiologists to get access to digital images and reports online. When using this system they are also able to dictate into another system where the hospital and private practices can gain access to the reports they have dictated. Although these at-home systems are convenient and beneficial to Radiologists as well as to patients and their physicians, they can also be of disadvantage to Radiologists according to Dr. Bob Bury. In his opinion films are going to be easily and rapidly accessible, but not only to Radiologists, to any physician. This could be a disadvantage because if any physician has access to the films, they will be able to interpret them without needing the Radiologist to interpret it for them (Bury, 2005, p. 1). Although, even if physicians have access to these films and images easily, they do not have the same capability as that of a Radiologist to interpret films because they are taught to look at every detail, no matter how minor it is because it could be indicative of anything malignant or pathogenic although it might seem insignificant.

Radiology has computerized management in the health field and has responded well to the demand for cost efficient and rapid communication between departments of radiology and other authorized users. Digital image attainment has become the standard for modern equipment used in diagnostic imaging including magnetic resonance imaging, and radionuclide radiology, but most radiological images are still recorded, interpreted, and stored on x-ray film. With the increasing availability of more efficient and affordable storage systems, these x-ray films will become digital and thereafter radiology will become “filmless.”

Although there are a lot of advantages to the technological advancements in Radiology, the downside is the cost of this advanced equipment. “The United States market for computed tomography (CT) scanning systems is estimated to touch \$3.6 billion by the end of 2009. The US

accounts for over 50.0 percent of the market. Cardiac imaging is a fast expanding CT application due to its utility in emergency medicine, perfusion studies and CT angiography” (Anonymous, 2009, p.1). These numbers indicate the high cost of the specialized equipment needed in Radiology. Ever since the commencement of this field, the equipment needed was at a high cost, but now it is at an even higher rate because as technology advances, the better the technology, and in turn the more expensive the equipment. “It is said that about 25% percent of imaging centers are private practices;” they are not established in a hospital setting as they used to be about twenty years ago (Anonymous, 2009, p. 1). These private practices are the ones that have the latest Radiology equipment due to the fact that they are making the most money compared to hospitals, which are public. This also means that they have a higher budget than the public radiology clinics. “One of the fastest growing applications is CT angiograms, currently at an annual rate of about half a million in the US. Overall growth in medical imaging technologies will also fuel growth in picture archiving and communication systems (PACS) and radiology information systems (RIS)” (Anonymous, 2009, p. 1).

“Advances in diagnostic radiology are revolutionizing the way disease and injuries are detected, diagnosed and treated. Services such as magnetic resonance imaging (MRI) and computed tomography (CT) scans enable physicians to visualize a patient's internal anatomy with increasing clarity and exponential benefits for the field of medicine. Yet an unprecedented growth in the use of these technologies has created a huge spike in the cost of diagnostic imaging” (Duford, 2009, p. 16-19). Radiology equipment has a 20% annual growth rate, putting it at the top of the list for the fastest growing medical expense. About \$100 billion a year is spent on imaging in the US, and according to Duford these costs will be double in just four years (2009, p.16). Radiology is a health field where employers directly impact costs. From a benefit

management perspective, there are radiology management solutions that save employers, health plans and patients money without having to change plans or transferring the costs to plan members (Duford, 2009, p.16-19).

Potential Benefits:

Some advantages of technological advancements on Radiology are the following. Magnetic resonance imaging offers benefits such as evaluation of multiple muscle or bone injuries and/or any other possible diseases occurring in the same patient at the same time. It also provides a more detailed display of images, which allows for a better understanding of the patient's pathology. These graphic images give better guidance to what the problem is and lessens the amount of invasive procedures. The advantages of ultrasound examinations are its vibrant nature, its accuracy and the benefit of including it in a patient's physical, which is equal to or maybe even better than a magnetic resonance image. The ability to obtain images in many ways makes radiology versatile and offers special advantages in every area of medicine where radiological images are used.

Potential Legal and Ethical Issues:

One of the possibilities in which a physician could be held liable, legally and/or ethically, is by sending patient images via a cell phone. One article that points out this issue is "Fears over medical picture-messaging." This article gives an example of when this could be an issue: "sending of X-ray images via mobile phones to specialists for interpretation" (Saleem, 2004, p.1), which could lead to "serious ethical and legal implications" (Saleem, 2004, p.1). If physicians are not careful enough, they could be charged or even lose his or her license because "...there are issues around confidentiality and security. These pictures need to be treated like any medical record" (Saleem, 2004, p.1). Any of these images sent via cell phones between

physicians could have serious consequences if HIPPA is violated. These consequences could be legal such as a court hearing, or something more serious such as the physician getting his/her license taken away as mentioned before.

Security Concerns/Disadvantages:

Security is one of the most important aspects and most sensitive topics in the medical field. HIPPA was created for this sole purpose of security, the security of each patient's medical record. The patient has to sign a legal form that protects their medical record from being seen by anyone else, other than his/her physician unless indicated by them. With the advancement of technology, especially in the field of radiology, this issue of security is becoming more and more sensitive due to the fact that medical records and images are accessible to many physicians. The advancement of technology in the medical field is being seen as somewhat of a disadvantage due to the decrease in security. However, the main negative impact of technology on this field and the one that pertains the most concern is that MRI equipment is way too expensive to purchase, maintain, and operate.

Social Problems:

When receptionist or a physician or a nurse, anyone in the medical field, is part of a social network and they post personal outing pictures or inappropriate comments. This might cause social problems because if a patient or the association of medicine gets a hold of these inappropriate images and/or comments, then the medical professional could lose his/her license or the privilege of practicing. An inappropriate image on a social network has the ability to destroy a professional's career as well as degrade their image as a person. For example, if a doctor posted a picture of himself with a dead body or with a patient that is under anesthesia undergoing surgery with a smile on his face, it would be inappropriate because everything that

goes on between a physician and his patient should be confidential. This would again be a violation of HIPPA. Social networking sites are very dangerous and medical professionals need to be careful if they have one, but it would be better if they did not. Thus, social networking will in turn affect medicine in a negative rather than a positive way.

Conclusion:

Radiology is at the head of technological advancement along with Cardiology (Anonymous, 2009, p. 1). A way to reduce the high costs of diagnostic imaging is to avoid unnecessary utilization and ensure that patients receive services from qualified providers (Duford, 2009, p.16-19). The truth is that technology is a huge part of Radiology so in every shape and form it will be impacted and always in a more positive way then in a negative one. The best and most beneficial advantage is the opportunities to save many lives and see expressions of gratitude in patient's faces when they have been treated just in time to live their life.

References:

Hawnaur, J. (1999). BMJ Journals. [Editorial]. *Recent Advances: Diagnostic Radiology*, 319, 168-171. Retrieved June 21, 2011, from the World Wide Web: <http://www.bmj.com/cgi/content/extract/319/7203/168>.

This article provided me with information about “filmless” radiology and it’s future.

Research and Markets: Digital Radiography - A Global Update of Market Trends &

Opportunities. (17 December 2009). *Business Wire*, 1. Retrieved June 21, 2011, from

ABI/INFORM Dateline. (Document ID: 1923841011).

<http://mutex.gmu.edu:2048/login?url=http://proquest.umi.com.mutex.gmu.edu/pqdweb?did=1923841011&sid=2&Fmt=3&clientId=31810&RQT=309&VName=PQD>

This source provided me with the benefits of going from film radiology to digital radiology.

Stuart E Mirvis. (2006). The march of technology in the radiology workplace: Are we

getting trampled? *Applied Radiology*, 35(9), 8,10. Retrieved June 20, 2011, from

ProQuest Nursing & Allied Health Source. (Document ID: 1140254871).

<http://mutex.gmu.edu:2048/login?url=http://proquest.umi.com.mutex.gmu.edu/pqdweb?did=1140254871&sid=2&Fmt=3&clientId=31810&RQT=309&VName=PQD>

This source states the advantages of being able to work from home as a radiologist by having access to all of the patient reports and images.

Bob Bury. (2005, October). Radiology. *Hospital Doctor*,30. Retrieved June 20,2011, from

ABI/INFORM Trade & Industry. (Document ID: 918968171).

<http://mutex.gmu.edu:2048/login?url=http://proquest.umi.com.mutex.gmu.edu/pqdweb?did=918968171&sid=2&Fmt=4&clientId=31810&RQT=309&VName=PQD>

This article talks about job security and the possibility of radiologists losing their jobs due to the fact that other physicians are trying to learn how to interpret images and other radiology results.

Research and Markets: Computed Tomography (CT) Systems Market Worldwide. (19 May).

M2 Presswire, 1. Retrieved June 21, 2011, from ProQuest Computing. (Document ID: 1717560231).

<http://mutex.gmu.edu:2048/login?url=http://proquest.umi.com.mutex.gmu.edu/pqdweb?did=1717560231&sid=1&Fmt=3&clientId=31810&RQT=309&VName=PQD>

This source provides cost information and it points out the disadvantages of radiology such as the cost of machines.

Duford, D. (2009). Managing Today's Rapid Growth in Diagnostic Radiology Costs. *Benefits & Compensation Digest*, 46(6), 16. Retrieved June 22, 2011, from Associates Programs Source database on.

<http://search.ebscohost.com/login.aspx?direct=true&db=oih&AN=39249229&site=ehost-live>

This source talks about the cost of radiology equipment and the benefits of diagnostic radiology.

Amena Saleem. (2004, March). Fears over medical picture-messaging. *Hospital Doctor*, 9. Retrieved June 23, 2011, from ABI/INFORM Trade & Industry. (Document ID: 589682021).

<http://proquest.umi.com.mutex.gmu.edu/pqdweb?index=6&did=589682021&SrchMode=1&sid=2&Fmt=4&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1308856120&clientId=31810>

This article provides information on ethical and legal issues that are in the medical field.

Grade: 140