Best Practices for Outpatient Diagnostic Imaging

By

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Abstract

This paper detailed the variables that affect the reimbursement rates, and efficiency. The literature review expanded on the challenges faced by outpatient diagnostic imaging centers. The main themes that were identified in the scholarly literature were the rate of reduction in reimbursement and the rate of utilization. The measures focused on patient-centered care, marketing, and compliance. The paper constructs the finding of the research study based upon the systems theory. A content analysis was done in order to see what has been done in order to increase profitability, productivity, efficiency, and effectiveness of the outpatient diagnostic imaging centers and to evaluate the best practices. Analysis highlighted the reasons why there is limited research published in textual materials about best practices for diagnostic imaging centers. These reasons included the fact that data analytics are kept private, academic researchers might not be active in this area, outpatient diagnostic imaging services are location specific, and the market of diagnostic imaging is referral based. Analysis concluded that more research needs to be conducted to better understand and implement best practices for diagnostic imaging centers. Furthermore, the recommendations were made based on the content analysis.

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Chapter One: Introduction

Changing health care regulations and policies have impacted the field of radiology significantly (Jackson, 2015). Modifications to workflow, adaption of new strategies, and abandoning of long used systems is sometimes required to keep up with the evolving health care system (Jackson, 2015). The changes have largely impacted and crafted challenges for outpatient diagnostic imaging. Traditional diagnostic imaging centers have been forced to re-evaluate their imaging practices' workflow and strategies to provide the best possible care.

Various factors and circumstances distinct to each facility influence the facilities workflow. These facilities deal with competition, decreased reimbursement, and the need to increase patient satisfaction on a daily basis. According to Bassett (2017), freestanding outpatient diagnostic imaging centers are migrating to hospital-operated outpatient centers causing increase in competition. Ratio of freestanding outpatient diagnostic imaging to hospital outpatient imaging fell from 1.67 in 2008 to 1.03 in 2013 (Bassett, 2017). The growth rate of advanced imaging procedures has declined significantly over the years. There was only 1.9 percent growth in the imaging procedures from 2006 to 2007 and an even slower growth rate of 1.1 percent from 2007-2008 (Zettel, 2010). Moreover, MRI utilization decreased by 0.3 percent and CT volume was cut in half.

Inefficiencies in diagnostic imaging can result in negative outcomes. According to Wolman and Wang (2016), communication errors have contributed to as much as 98,000 medical error-related deaths annually in United State. Communication errors resulted in negative impact on patient care, including unnecessary procedures, delays in diagnosis, decline in patient satisfaction and workflow inefficiencies (Wolman & Wang, 2016). Moreover, lack of timely reporting of the diagnostic imaging results is another issue that creates delays in patient care.

According to a study conducted by MModal, half of the respondents responded to the survey reported income loss of 5 to 10 percent due to incomplete documentation (MModal, 2013). Only 20 percent of the respondents reported turning around reports in less than one hour (MModal, 2013). The lack of timeliness in reporting is the biggest problematic area in radiology workflow. Such insufficiencies create delays and mistakes in patient care. The inadequacies question the six aims of the Institute of Medicine (IOM). The aims are safe, effective, patient-centered, timely, efficient, and equitable (Agency for Healthcare Research and Quality, 2018).

Statement of the Problem

Declining growth in imaging volume is an ongoing problem for many outpatient diagnostic-imaging centers. Since the Deficit Reduction Act (DRA) of 2005, rates for reimbursement have decreased along with the volume of diagnostic imaging tests. Are outpatient diagnostic imaging centers productive, efficient, and effective now? What are the best practices?

Purpose of the Study

The purpose of this study is to research how healthcare reforms have impacted outpatient diagnostic imaging centers and identify what are the best practices for workflow. This study will contribute towards finding best practices for imaging facilities to increase the profit.

Significance of the Study

This research may help contribute to the understanding of the causes of a decrease in the volume of exams performed at outpatient diagnostic imaging centers. Moreover, it may also help improve the workflow at outpatient diagnostic imaging centers.

Chapter Two: Literature Review

The purpose of this literature review is to expand on the challenges faced by outpatient diagnostic imaging centers. The first part of the review will elaborate on diagnostic imaging centers and the types of the medical imaging exams done at diagnostic imaging facilities. Moreover, the literature review will expand on the conventional radiological workflow. Declining growth in imaging volume is an ongoing problem for many outpatient diagnostic-imaging centers. Reimbursement cuts and outdated workflow have impacted these outpatient centers drastically. The theoretical approach will be used to as framework for understanding the conventional workflow of the diagnostic imaging centers.

Outpatient Diagnostic Imaging Centers

According to the Centers for Medicare and Medicaid Services (CMS, 2018), outpatient refers to a patient who leaves the facility after treatment on the same day. Outpatient diagnostic imaging centers have the equipment and trained specialists to perform tests that do not require the patient to stay overnight. There were 6,534 outpatient diagnostic imaging centers in the United States in the year 2016 (U.S. Census Bureau, 2018). Compared to 2008, that number has decreased by almost 546 facilities. In 2016, California had 802 outpatient imaging centers making it the state with the most outpatient diagnostic imaging centers. Whereas, North Dakota had just 4-outpatient diagnostic imaging centers making it a state with the least outpatient diagnostic imaging centers. As seen in *Figure 1*, there has been a drastic decline in number of diagnostic imaging centers in the U.S. The total number of employees working at an outpatient diagnostic imaging center in 2016 was 90,303. The total number of employees includes paid employees (full and part-time); salaried officers and executives of corporations; employees on

sick leave, holidays, and vacations. The total number does not include proprietors or partners of unincorporated businesses.

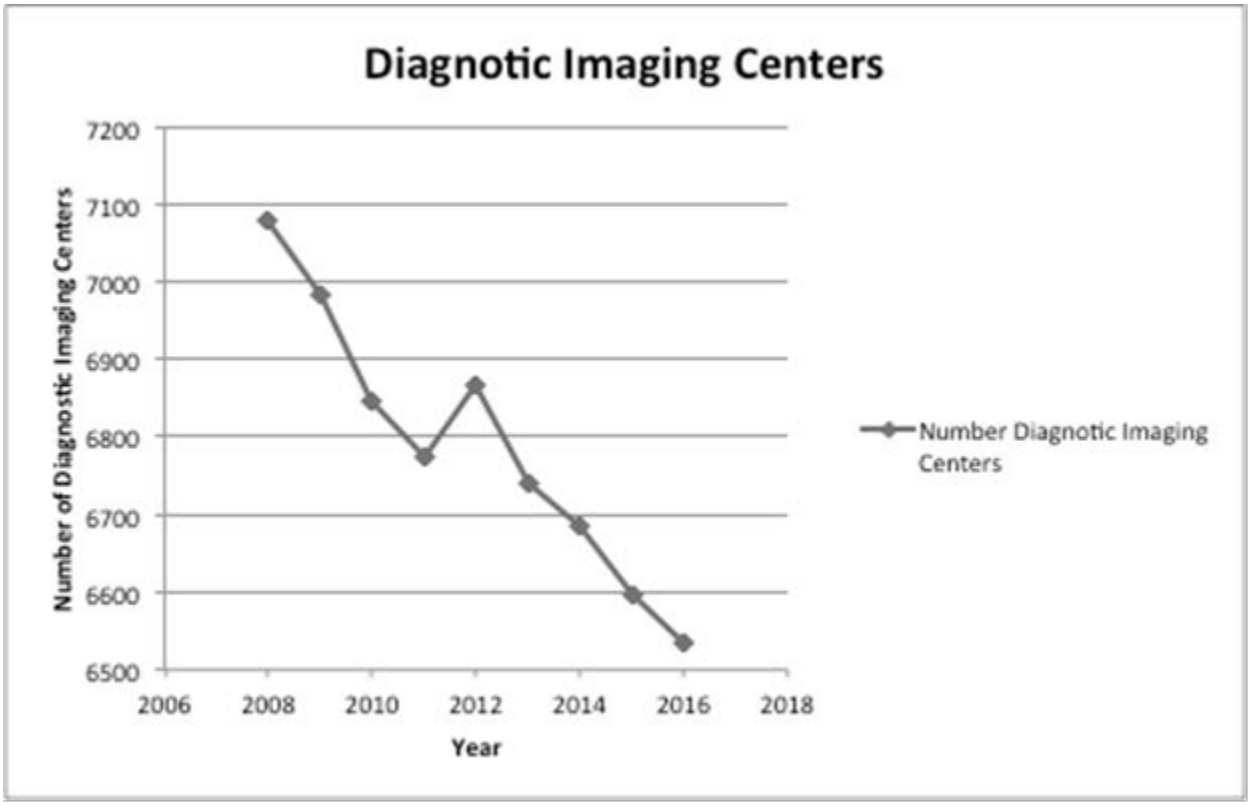

Figure 1. Number of Diagnostic Imaging Centers. Adapted from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

Diagnostic Imaging

Diagnostic imaging is also known as medical imaging. According to the U.S. Food and Drug Administration (FDA), medical imaging refers to “several different technologies that are used to view the human body in order to diagnose, monitor, or treat medical conditions” (U.S. Food and Drug Administration, 2018). Diagnostic imaging uses non-invasive procedures, which means that medical professionals can look inside the patient’s body without a surgical procedure. Medical professionals use diagnostic imaging to look at the function of internal organs, joints, etc. to help with the diagnosis of a disease or to determine the severity of an injury to further assist with surgical procedures if need be (Hanson, 2017). Diagnostic imaging consists of several

different types of modalities such as X-ray imaging, computed tomography (CT), mammography, nuclear medicine and molecular imaging, magnetic resonance imaging (MRI), ultrasound imaging, and fluoroscopy.

X-rays. A German scientist named Wilhelm Conrad Rontgen invented X-rays in 1895. (History.com Editors, 2009). It became an important diagnostic tool in medicine. First X-rays were used during the Balkan War in 1897, to find bullets and broken bones inside patients (History.com Editors, 2009). According to an article by Brian Krans, X-rays use electromagnetic radiation to see through skin and show images of the bones underneath it (Krans, 2016). Most common uses of X-rays are to examine the areas of pain or discomfort; monitor progression of diagnosed disease, and to check how well the prescribed treatment is working (Krans, 2016). X-ray may be used for conditions such as bone cancer, breast tumor, fractures, arthritis, etc. During the X-ray, the radiologists may suggest wearing comfortable clothing and remove all the jewelry or metals from the body depending on the area of examination. To improve the quality of the images, contrast material is given to the patient before the X-ray. Images are taken with a specialized plate that contains X-ray films or sensors (Krans, 2016).

Mammography. According to Centers for Disease Control and Prevention, mammography is “an X-ray picture of the breast” (Center of Disease Control and Prevention [CDC], 2018). Mammograms are done to look for any early signs of breast cancer. During the mammogram, patient stands in front of a special X-ray machine. The technologist places the breast on a clear plastic plate while another plate presses the breast from the above. The plates flatten and hold the breast still while the X-ray is taken (CDC , 2018). The same procedure is repeated with the other breast.

Computed Tomography (CT). CT scans are also known as computed axial tomography (CAT) scans (Davis, 2018). CT scans produce detailed cross-sectional images better than traditional X-ray (Hanson, 2017). First CT was installed in 1974. CT was invented by British engineer Sir Godfrey Hounsfield and Dr. Alan Cormack who then received the Nobel Prize in 1979 for their work (Davis, 2018). CT scans are performed in a large donut shaped machine, which is operated by a technologist from a control room to prevent unnecessary exposure to radiation. The technologist moves the patient slowly through the center of the machine to take images (Hanson, 2017). In some cases, just like X-rays, the patient might be given oral or injectable contrast to improve the quality of the images of inside the body. The contrast helps distinguish from abnormal tissue from normal and blood vessels from other structures such as lymph nodes (Davis, 2018). CT scans also involve exposure to safe level of radiation just like X-rays. The cost of the CT scanner depends on the slice count of the machine. The slice count is the number of cross-sectional images obtained with each rotation of the CT's gantry (Hough, 2019). The cost of new 16-slice CT scanner is between $285,000 and $360,000, 64-slice is between $500,000 and $700,000, 128+ slice is between $675,000 and $2,100,000 (Hough, 2019).

Nuclear Medicine and Molecular Imaging. Molecular imaging provides detailed pictures of what is happening inside the body at molecular and cellular level. It helps physicians to see how the body is functioning and to measure its chemical and biological processes (Society of Nuclear Medicine and Molecular Imaging, 2018). Molecular imaging includes nuclear medicine, which uses radiopharmaceuticals to help diagnose and treat disease. Special cameras (gamma camera, SPECT or PET scanners) and computers detect radiopharmaceuticals and create detailed pictures of area of the body being scanned (Society of Nuclear Medicine and Molecular Imaging, 2018). Positron emission tomography (PET) imaging uses radiotracers such as

fluorodeoxyglucose (FDG), a compound like glucose, or sugar. Radiotracers are injected into the bloodstream, accumulating in areas of high metabolic activity. PET scanner is then used to create images to show the distribution of radiotracers throughout the body and to help determine any abnormalities (Society of Nuclear Medicine and Molecular Imaging, 2018). Just like PET imaging, Single-photon emission computed tomography (SPECT) imaging also involves injection of radiotracers into the patient's blood stream. A gamma camera is then used to create three-dimensional images of radiotracers distributed throughout the body to display blood flow and organ function (Society of Nuclear Medicine and Molecular Imaging, 2018).

Magnetic Resonance Imaging (MRI). According to an article written by Judith Marcin, an MRI "uses a large magnet, radio waves, and a computer to create a detailed, cross-sectional image of internal organs and structures" (Marcin, 2018). Though, CT machines and MRI tend to look similar, their functions very different. Since MRI uses strong magnetic field and radio waves to produce images some special precautions need to be taken. It is important that there are no metal objects present during the scan. The technologist asks the patient to remove any metal jewelry, etc. that might interfere with the scan. Any metal inside the body may also prevent a person have an MRI considering strong magnet can pull the metal out of the body. It is important that the technologist is made aware of any foreign metallic bodies as they may cause harm to the patient. It includes devices, such as aneurysm clips, cochlear implants, and pacemakers (Marcin, 2018). During an MRI, claustrophobic patients can be given medication prior to the exam to help the patient feel relaxed and to make the procedure more comfortable. In some cases, patients receive IV contrast to improve the visibility of certain tissue (Marcin, 2018). The price of MRI machines depends on the size and power. The power of MRI machine is measured in Teslas. Low-field or open MRI machines are 0.2 to 0.3 Teslas costing anywhere from $150,000 to $1.2

million. High-end 3 Tesla MRI machine can cost as much as $3 million (Glover, 2014). MRI suite, the room that houses the MRI machine, can add additional cost. Suite with one machine, installation costs and patient support areas can cost anywhere from $3 million to $5 million (Glover, 2014).

Ultrasound. Often called sonography, an ultrasound uses high-frequency sound waves to capture images from within the body (Hanson, 2017). It helps used to look at soft tissues such as organs and vessels. Since there is no ionizing radiation involved with conducting an ultrasound, there are no major health and safety issues associated with its use. Therefore, ultrasounds have become a popular tool to examine pregnant women (Hanson, 2017). The cost of an ultrasound machine can vary. The average cost of an ultrasound machine is around $115,000. On average, a low-end system costs around $25,000 and a high-end system costs around $250,000 and higher (Lee, 2014).

Fluoroscopy. According to the U.S. Food and Drug Administration (2018), fluoroscopy is a type of medical imaging where an X-ray beam is passed through the body to produce a continuous X-ray image on a monitor, similar to an X-ray movie. Fluoroscopy is used for many different procedures to diagnose or treat patients. Some of the common procedures, fluoroscopy is used for are barium X-rays and enemas to view gastrointestinal tract, catheter insertion, placement of devices within the body, angiograms, orthopedic surgery (FDA, 2018).

Traditional Radiology Workflow

A traditional outpatient diagnostic imaging facilities workflow consists of three main areas: exchanging of information with referring physicians, radiological interpretation process, and billing and coding process. The manual processes can be a limiting factor in turnaround time and delivery of reports back to the referring physician.

During the referring physician process, the patient is referred to an outpatient-imaging center. The physicians generate paper requisition for referred services. The paper requisition is then faxed to imaging center by the physician's office or brought in to the imaging center by patient to perform the exam (Corepoint Health, 2018). When the order is physically processed, the patient demographic information is entered or updated in the appropriate applications. Once the information is in the system, patient is scheduled for the exam. Like any other healthcare facility, imaging centers also have a wait before the patient is "pulled back" to perform an exam. The amount of time a patient waits before getting a diagnostic imaging test done contributes significantly towards the health and healthcare experience of a patient. Long wait times lead to waste of patient's time, as well as possible frustration and dissatisfaction with the quality of care. A study conducted by Halim and Pooja (2017), reported 11% of people waited 29 minutes for outpatient interventional radiology procedures, 21% waited 30-59 minutes, 21% waited 60-89 minutes, and 43% reported to have waited more than 90 minutes (Figure 2). Longer wait times correlate negatively to patient's care.

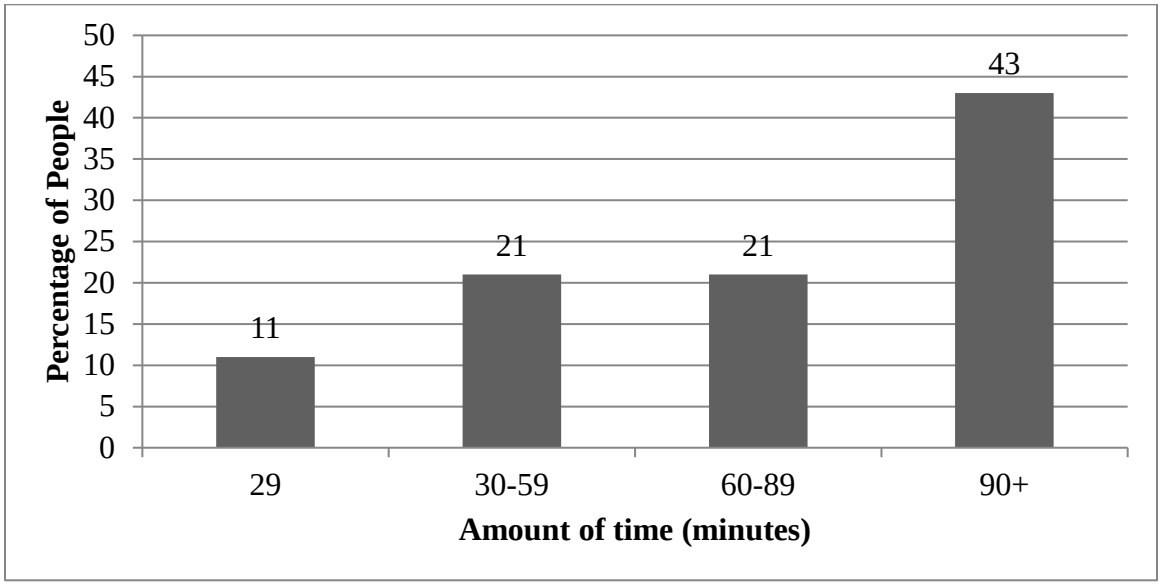

Figure 2. Wait times for outpatient interventional radiology procedures.

After the patient visit, the imaging center correlates patient data, images, and reports to deliver final patient report back to the referring physician. This manual effort can cause significant delays in delivery of patient report, sometimes up to many days. Once the referring physician's office receives the final faxed report, data must be manually entered into EMR system, creating high possibility of entry error.

During radiological interpretation, clinicians match images with patient data to be read by radiologist. Radiologist reviews the data from multiple sources and images from Picture Archiving and Communication System (PACS), and dictates the report using a dictaphone (Corepoint Health, 2018). As a result, often time is lost juggling between digital images, paper documents and dictation equipment. The transcriptionist then transcribes and creates a preliminary report for the radiologists to review (Corepoint Health, 2018). Radiologists review the preliminary report along with the data and images and sign the report once it's approved.

Lastly, during the billing and coding process, the imaging centers use the information such as insurance, demographics, etc. from various sources for review, sometimes requiring paper records to be manually acquired from different applications (Corepoint Health, 2018). Billing department employees enter the codes depending on the exams done into billing system and send the claim to the payer(s).

Each process above contributes to long turnover times for reports. Long turnover time for reports impacts the patient's care, and satisfaction of referring physicians and radiologists. Continuity of care is often limited when paper becomes the only item connecting a patient and physician with outpatient imaging centers. Apart from the facility's workflow, healthcare policy changes have impacted the volume of the outpatient diagnostic imaging.

Reimbursement Cuts

According to Yee (2017), medical imaging use rapidly increased in early 2000s due to many reasons. The improvement of technology had a drastic impact on the increase of imaging use. Improvements in CT and MRI technology allowed better identification of disease and more accurate diagnosis. Along with that, CT angiography and CT colonography expanded the use of medical imaging. Due to malpractice concerns, physicians began ordering imaging tests to save them from liabilities. Moreover, in the early 2000s, physicians started installing equipment in their own offices for exams (Yee, 2017). Advanced imaging began to spur and experienced drastic growth. However, the growth in imaging use did not last very long. Much of the growth slowed down due to number of reimbursement cuts that went into effect between 2007 and 2013 in response to disproportionate imaging costs (Yee, 2017). The most impactful of them all, the Deficit Reduction Act of 2005, and current procedural terminology (CPT) code bundling.

The Deficit Reduction Act (DRA). Republican President George W. Bush aimed to bring mandatory spending under control, while leaving money in the hands of American people (Office of the Press Secretary, 2006). Signing the Deficit Reduction Act of 2005 was one of the steps taken by the republic administration to contain government spending (Office of the Press Secretary, 2006). The Deficit Reduction Act of 2005 took effect on January 1, 2007 in response to noticeably excessive Medicare imaging costs (Kennedy & Forman, 2012). The reform aimed to save $300 per taxpayer over the period of five years. According to Kennedy and Forman (2012), DRA “reduced payments for imaging in the office setting for those procedures for which payments had been higher than in the outpatient hospital setting”. The payments were reduced to the outpatient hospital payment level. Before the DRA took effect, echocardiography rates grew 42% between 2001 and 2008. However, after DRA the rates fell 61% between 2008 and 2009

(Arndt, 2017). The federal policy also affected other modalities such as CT and nuclear medicine, which also saw a decline in utilization.

Current Procedural Terminology (CPT) Code Bundling. Medical providers get reimbursed based on the reimbursable CPT codes. Each CPT code represents a specific service, product or procedure provided to the patient. CPT codes are used to bill the patient to be paid by payer or insurance. To reduce the use of imaging, many procedure codes were bundled in the fourth edition of American Medical Association's (AMA) Current Procedural Terminology, used for billing along with the ICD codes. Code bundling happens when some codes are bundled into one code considering they always go together and are billed together (Torrey, 2018). Though it does not affect patient care, bundled codes become a problem when a patient needs care that is not included in a bundled payment (Torrey, 2018). Insurances or payers may not reimburse cost for out of the bundle care, which makes medical providers unwilling to provide services that will not be reimbursed. Code bundling changed healthcare and led to a significant drop in rate of utilization. Three major areas that code bundling occurred in were: echocardiography in 2009, nuclear medicine in 2010, and CT in 2011 (Yee, 2017). MRI and non-cardiac ultrasounds did not experience code bundling, and therefore did not demonstrate any major decline in utilization. The utilization rates peaked off between 2008 and 2010. After 2010, the utilization rates started to decline (Figure 3).

Utilization rates for advanced imaging per 1,000 Medicare beneficiaries

	2001	2008	2009	2010	2011	2012	2013	2014
CT	361	625	637	626	**500**	498	500	514
Echocardiography	462	656	**257**	256	251	244	240	237
MRI	113	189	189	183	184	181	181	183
Noncardiac ultrasound	293	428	444	448	446	441	438	435
Nuclear imaging	218	296	285	**117**	110	101	93	87

Rates in bold represent years in which code bundling was implemented.

Figure 3. Utilization Rates for Advanced Imaging per 1,000 Medicare Beneficiaries. Adapted from https://www.auntminnie.com/index.aspx?sec=sup&sub=imc&pag=dis&ItemID=117021

Systems Theory

Structure of outpatient diagnostic imaging centers can be better explained with the systems theory. Systems theory states that in order to survive the organizations must be interactive with and adapt to the environment (Saylor Academy, 2012). Diagnostic imaging centers use an open-systems approach. Open systems approach was initially developed by Ludwig Von Bertanlanffy in 1956. In an open-system approach, organizations perform in a repeated cycle of exchanging information or resources with its external environment (Saylor Academy, 2012). Similarly, in diagnostic imaging centers, the theory can help understand the traditional referring physician process (Appendix A), radiological interpretation (Appendix B), and billing and coding process (Appendix C). Systems theory can help with better understand the aspects of diagnostic imaging centers' structures, existing routines, and necessary changes in what and how the workflow works (Figure 4).

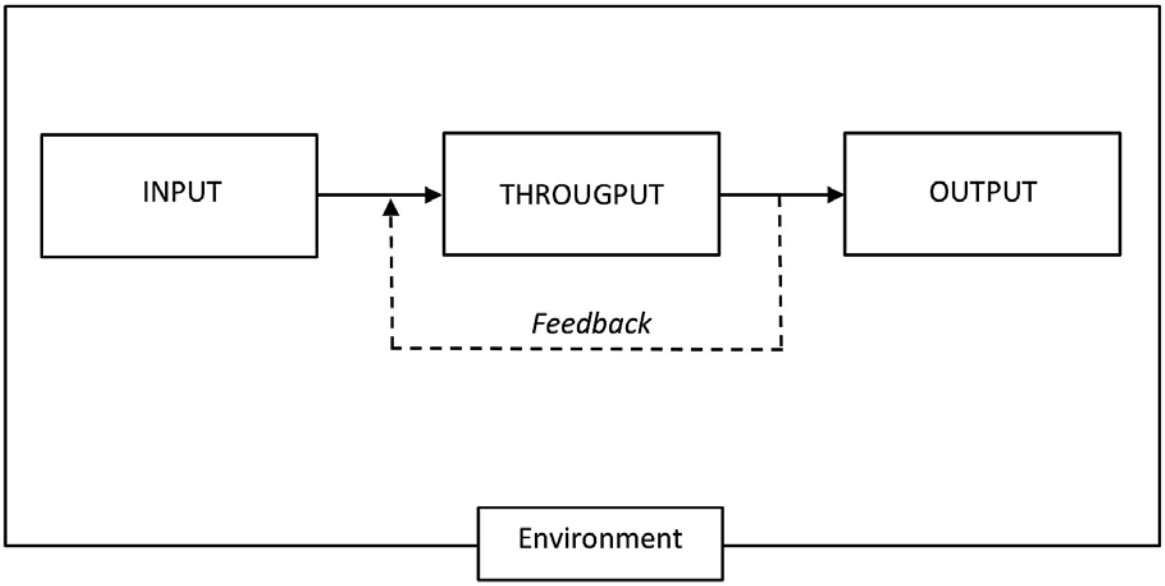

Figure 4. Systems theory diagram.

Literature Summary

The main themes that were identified in the scholarly literature were the rate of reduction in reimbursement and the rate of utilization. Some of the decline happened due to the policy changes, whereas some are related to the workflow of the outpatient diagnostic imaging centers. For the outpatient diagnostic imaging centers to work efficiently, the practices need to be revised. All the research done on this issue will also help to further identify best practices.

Chapter Three: Methods

The purpose of this section is to distinctly define the research design, the sample, data collection, data analysis, mythological rigor, Institutional Review Board (IRB), and limitations. The research is designed to understand what are the current best practices used in outpatient diagnostic imaging centers and what can be improved upon in order to increase profitability and enhance workflow. The limitations of the study are going to be addressed, as there is insufficient research in this area.

Research Design

The design for this study was non-experimental. In a non-experimental design the researcher describes a group or examines relationships with preexisting groups (Salkind, 2010). Non-experimental research lacks the manipulation of an independent variable, random assignment of participants to conditions or orders of conditions, or both (Price, 2012). A hermeneutics approach was used as the method for the study. According to the Stanford Encyclopedia of Philosophy (2015), hermeneutics is method of interpretation of human actions, texts and other meaningful material. Hermeneutics practice was originally developed for interpretation in Greek ancient times to interpret oracles, dreams, myths, philosophical and poetic works, laws and contracts (Stanford Encyclopedia of Philosophy, 2015). For this study, hermeneutics was used to interpret the textual material that already exists. Qualitative content analysis was done.

Sample Frame and Size

Because the study was based on literature and analysis of different textual materials, the sample size and frame was difficult to determine. The sample consisted of online sources, journals, and other sources related to the subject matter. Source information was collected from

the year 1995 to the year 2018 to see how policies and practices in radiology have changed over the years. Once sufficient amount of texts was reviewed and no new information was discovered for the study, the saturation for this textual material was met. According to W. Newton Suter (2012), saturation is the point in continuous data collection that signals little need to continue because additional data will serve only to confirm an emerging understanding.

Data Collection

The research design of this study was non-experimental. The research material was derived from journal articles, newspaper articles, credible websites, and Internet articles. Various search engines were used to find textual material. The search engine includes California State University Bakersfield library search, Google Scholar, Aunt Minnie, Journal of Radiology, and others. Search terms used in the search include imaging centers, diagnostic imaging centers, outpatient imaging centers, best practices for outpatient diagnostic imaging, diagnostic imaging centers reimbursement and others.

Data Analysis

Content analysis was used to interpret meaning from the context of the text data. Content analysis is a technique where texts are thoroughly evaluated to make replicable and valid inferences (University of Georgia, 2012). Even though it is a valuable tool for organizational research, many challenges can arise if it is not correctly used (University of Georgia, 2012). The analysis method helped identify the common themes in the textual materials. The themes were arranged in different categories to helped come up with the appropriate recommendations in regards to best practices for outpatient diagnostic imaging centers.

Methodological Rigor

Rigor is defined as consistency in conceptual development, epistemological stance, and application of analytical tools and transparent reporting of their use, and subsequent interpretation and reporting of findings (Köhler, Landis, & Cortina, 2017). Due to the research being qualitative, credibility, dependability, conformability and trustworthiness of the study will be kept in mind.

Institutional Review Board

To meet the requirements for the Institutional Review Board (IRB), the researcher successfully completed the Human Subject Protection Training prior to the start of the study (Appendix D, E, F, & G). The researcher submitted the study to Institutional Review Board for approval. Due to the study not being human subjects, Institutional Review Board granted permission for the study to continue without any further review needed from IRB (Appendix H).

Limitations

One potential limitation that affected the quality of the research is time. Specific project due date and the researcher trying to balance work and school also caused some limitations. It was a limitation in terms of how much time the researcher could dedicate to the study. Another limitation was the limited textual material and data available on the research topic.

Chapter Four: Findings and Analysis

Organizational Culture

Patient centered care. Patient centered care is care organized around the patient by healthcare provider to satisfy the needs of patients and their families. The traditional radiology practice model that undervalues interaction between patients and radiologist need to be changed to patient centered care where radiologist focuses more on patient needs and preferences (Itri, 2015). With the reimbursement cuts continuing, radiologists need to focus more on the patient to increase quality and patient safety, reduce costs, higher – value care, improve patient care, increase patient and provider satisfaction (Itri, 2015). The chosen article discussed the dimensions of patient centered care for radiology and opportunities to redesign imaging process to stimulate patient centered atmosphere. Dimensions of patient – centered radiology include: effective communication, patient education, physical comfort, emotional support and alleviation of fear and anxiety, respect for patients' values' preferences and expressed needs, coordination and integration of care, and involvement of family and friends (Itri, 2015).

Effective communication is necessary to build a good patient-radiologist relationship. Quality of care and patient satisfaction can both be improved by shifting to patient centered model. Effective communication starts with verifying patient's identity and procedure to be performed, collecting patient health histories, safety screening, providing clear instructions and answering questions, explaining post examination care, and effective use of resources (Itri, 2015). Using active listening skills can eliminate medical jargon that can confuse patients. While delivering bad news, it is important that it is delivered in a private and appropriate environment to ensure patient's privacy. Disclosure of medical errors needs to be communicated with the patient honestly and openly to maintain doctor-patient trust (Itri, 2015).

Patient education is another aspect of patient centered care. The Radiological Society of North America (RSNA) and the American College of Radiology (ACR) collaborated to form a website, RadiologyInfo (http://www.radiologyinfo.org), to provide information about radiological studies (Itri, 2015). The website describes the procedures, explains how to prepare for the procedures, and provides pictures of the equipment used to perform the procedures. Such resources are to maintain and improve health literacy (Itri, 2015).

The physical environment can have a significant impact on patient's physical comfort and experience. Supportive environment can help prevent patient lighten patient's stress and depression. Use of windows, skylights, indoor plants, fountains, and landscaping can humanize the facilities and reduce stress (Itri, 2015). The waiting areas needs to be designed so the patient's can converse, watch television, read, or nap. Access to telephones, reading materials, movable chairs and sofas, special chairs for elderly and handicapped can improve patient experience (Itri, 2015). Patient centered designs also include using sheets and pillows to minimize patient contact with cold metal equipment, monitoring room temperature to make patient's comfortable in gowns, and ensuring patient privacy (Itri, 2015).

Addressing patient emotional needs can satisfy patients with care. According to the chosen article providers should focus more time assessing patient's fear of pain and attempt to reduce fear that lodging on the technical aspects of procedures (Itri, 2015). Radiologists should provide and promote emotional support and show genuine sense of caring and concern. Patients have different fears and emotional needs, therefore radiologists should talk to patients about their fears and the kind of emotional support they need and find helpful (Itri, 2015).

Understanding and respecting the patient's values, preferences, expressed needs also helps increase patient satisfaction (Itri, 2015). Patient's culture, belief and practices, involving

patient's in their own care, and understanding and respecting patient's therapeutic goals should always be the priority (Itri, 2015).

Coordinated and integrated care is a symbol of quality care. Interviewing patients and reviewing electronic medical records can help in obtaining necessary information to provide accurate, and high quality interpretations of imaging examinations (Itri, 2015). Staff should be trained to answer questions and provide help for the patients.

Family involvement is an important component of patient centered care. Families play a vital role in long tern promoters of health and wellbeing, and provide social and mental support (Itri, 2015). Including family members in discussions of the risks and benefits of imaging procedures gives them an opportunity to provide information about the patient and ask questions. Family members can also help cope patients in case of a bad news (Itri, 2015).

Another article listed the best practices for overcoming the challenges that can affect medical imaging, patient quality of care. To provide patient centered care, Watson and Odle (2013) highlight seven best practices: (1) developing staffing policies and procedures that facilitate safe patient care; (2) facilitating radiologist/radiologic technologist collaboration on care, feedback and quality improvement; (3) providing effective and efficient applications training for new and upgraded medical imaging equipment; (4) recognizing that multivendor environments introduce new layers of complexity and require cooperation among vendors and management; (5) departments have quality management processes in place, vendors provide documentation and analysis tools that management uses efficiently; (6) technologists are educationally prepared, clinically competent and certified in their respective modalities; (7) vendors and managers collaboratively develop a detailed training agreement that outlines both parties' expectations before finalizing a medical imaging equipment purchase (Watson & Odle,

2013). It is the technologist's responsibility to protect and educate the patients. Promoting safety and learning can effect change in medical imaging and patient care (Watson & Odle, 2013).

Automated radiology workflow. In the past, radiology workflow has been dependent on the limited technology and to compensate the gaps between systems manual processes were developed (Corepoint Health, 2018). The automated processes are crucial advances to help reduce cycle time and increase overall effectiveness. Innovating technology offer imaging centers more proactive, efficient and profitable planning and designing process (Corepoint Health, 2018). Just like the traditional radiology workflow, an automated radiology workflow also consists of three main areas: exchanging information with referring physicians, radiological interpretation processes, and billing and coding process (Corepoint Health, 2018).

Exchanging patient information in a cost–affective way as quickly and efficiently as possible is vital for referring physicians. While web portals can give access to patient results, it does not do a complete job. Web portal does not eliminate the manual re-keying of information, which can cause mistakes and inefficiencies. This problem can be solved by electronically integrating directly with the physician's EMR system. The referring physician can directly send patient's demographics and order information to the Radiology Information System (RIS) using the HL7 interface (Appendix I). HL7 stands for Health Level 7, which is a set of applications used by healthcare organizations to communicate with one another (Shaver, 2007). Advancements in HL7 interface are improving workflow in healthcare organizations and enhancements in technology improve the quality, accuracy, and efficiency of healthcare providers (Shaver, 2007).

The benefits of electronically transmitting data include enhanced service levels. Complete patient reports are directly delivered back to physicians EMR resulting in quicker

turnaround times (Corepoint Health, 2018). Electronic data exchange also reduces operational costs by reducing the needs to fax orders and results from one facility to another. Clerical errors are eliminating with decreased need for manual data entry (Corepoint Health, 2018).

Integration between multiple applications and the ability of radiologists and clinicians makes the radiological interpretation workflow easy (Corepoint Health, 2018). Picture Archiving and Communication System (PACS) get the patient data from RIS (Appendix J). If an imaging center has the voice recognition system and a document management solution implemented then the RIS also has the ability to send relevant patient information to both systems. This allows the radiologists to view images and supporting documentation and also dictate with a single click (Corepoint Health, 2018). HL7 interface allows different applications to share data control efficiencies in workflow. Moving towards integrated radiological interpretation leads to increased radiologist productivity. Radiologist does not have to waste time to locate the paper patient records while trying to dictate and interpret results (Corepoint Health, 2018). Once the interpretation process is complete, the report can be signed off immediately. The turnaround time for reports decreases and the number of completed reads increases. Electronic delivery of reports back to the referring physicians takes minutes rather than hours or days (Corepoint Health, 2018). Electronic report delivery to referring physicians Electronic Medical Records (EMR) increases customer satisfaction and retention (Corepoint Health, 2018). Automated Radiological interpretation can increase the revenue of diagnostic imaging centers by improving the productivity of the radiologists and by providing valued services. Automation can match the radiologists to patient’s needs regardless of the location of the procedure or the patient (Corepoint Health, 2018).

The billing and coding process starts with integration to EMR system of the referring facility. The HL7 interfaces routes the patient demographics, reports, and other supporting documents directly to RIS or elsewhere for insurance coding (Corepoint Health, 2018). Electronic communication can reduce the billing process to a few manual steps (Appendix K). Automating the billing process can reduce the operational costs by eliminating large workforce needed to do the complex billing paperwork and instead utilizing the workforce for more value added role (Corepoint Health, 2018). Additionally, costs associated with processing, management and storage of paper-based billing can also be reduced. Automated workflow allows more control over billing, patient, and insurance data, and increases the accuracy of claims with less scope for manual data entry errors. Each less or improved step contributes to faster reimbursement (Corepoint Health, 2018).

Automated workflow allows the imaging centers to enhance the delivery of care to their patient, increase the productivity of the staff, and provide great customer satisfaction. Electronic data exchange helps the imaging centers to improve or strengthen the reputation of amongst the referring physicians (Corepoint Health, 2018). It also opens doors for opportunities to support expanding referral community, increase volume, and revenue of the business. Modern workflow at diagnostic imaging centers results in improved service delivery, greater customer loyalty, the capture of new business, and efficiencies to improve profitability (Corepoint Health, 2018).

The physicians and patients are satisfied with their experience at a facility, it is likely for them to come back. In an article by Jennifer Blaha, an outpatient diagnostic center in the San Francisco Bay Area, California created a program to listen to the customer feedback and develop a roadmap for improvement. The technologists chatted with patients in the lobby, the medical assistants talked to physician’s office managers, and the radiologists talked with referring

physicians to learn about the strengths and weaknesses (Blaha, 2019). One common theme that showed up in their conversations was – decrease report turnaround time (TAT). Six- Sigma toolkit was used to determine the cause of current TAT. All the steps in the report turnaround time were mapped with current calculated TAT of 64 hours (Blaha, 2019). The facility implemented new software with voice recognition to help radiologists dictate, and sign off reports in minutes rather than hours (Figure 5). After the implementation of new software the facility's report TAT went from an average of 64 hours to an average of 9 hours, which accounts for 85 percent improvement (Blaha, 2019).

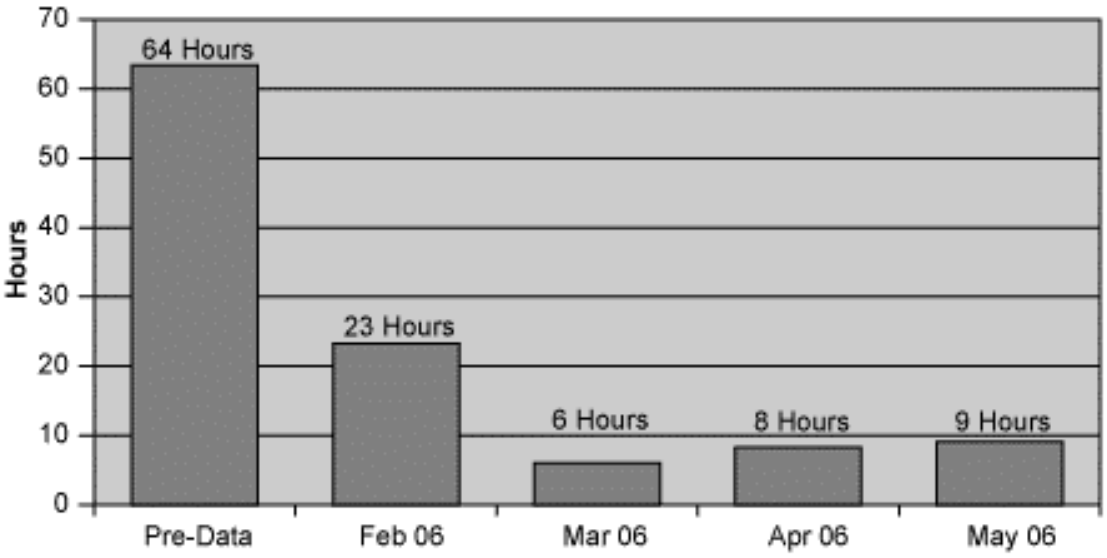

Figure 5. TAT from End of Exam to Release of Report. Adapted from https://www.isixsigma.com/new-to-six-sigma/dmaic/outpatient-imaging-reports-tat-cut-64-9-hours/

Krishnaraj, Lee, Laws, and Crawford studied the effects of voice recognition software on the radiology reports. The study found that the average turnaround time for the radiology department before the implementation of voice recognition was 28 hours (Krishnaraj, Lee, Laws, & Crawford, 2010). After the implementation of the voice recognition software the turn around

time was cut by more than half, 12.7 hours. The volume of verified reports also increased by 5 percent. Another study reported that PACS improved efficiency of the facility by eliminating the need to hang films, track down films, and lowering the number of lost films (Krishnaraj, Lee, Laws, & Crawford, 2010). Residents reported improved diagnostic accuracy with the use of image manipulation, comparison to prior studies and multimodality comparison (Krishnaraj, Lee, Laws, & Crawford, 2010).

Marketing

Market and strategic plan

Health care is continuously changing, and so is the diagnostic imaging. Due to the reimbursement cuts and increasing competition between diagnostic imaging centers, the importance to stand out from the crowd becomes fundamental (Jackson, Business of Radiology: Marketing, 2015). Having a marketing plan is an essential part of diagnostic imaging centers to maintain a successful radiology practice. According to Jackson (2015), the 5 P's approach can help strengthen the marketing strategies for imaging centers. The 5 P's are product, price, placement, promotion, and people (Jackson, Business of Radiology: Marketing, 2015).

Product. Product means products and services offered by a business as a whole (Department of Industry, Innovation and Science, 2018). It includes the function, packaging, appearance, warranty, quality, etc. In diagnostic imaging centers the imaging services and personnel who provide them are considered products.

Price. The price of the products and services and how it might affect the consumers (Department of Industry, Innovation and Science, 2018). It includes the selling price, discounts, payment arrangements, credit terms, etc. Prices of diagnostic imaging tests may vary, but in some settings pricing competitively per study can be important.

Placement. It refers to the place where the product or services will be offered (Department of Industry, Innovation and Science, 2018). For diagnostic imaging centers, it is important to consider how easily accessible the product or services are to the targeted customers when needed.

Promotion. It refers to making the business, services, and products known to consumers (Department of Industry, Innovation and Science, 2018). Diagnostic imaging centers need to be more proactive in the community to spread the word about the services provided.

People. It refers to the staff and employees that work at the firm (Department of Industry, Innovation and Science, 2018). Diagnostic imaging centers need to make sure the providers and staff is pleasant and easy to work with offering exceptional customer service.

One of the most important aspects of marketing is to know who the customers are. The marketing plan for diagnostic imaging centers should include approaches to satisfy customers such as the staff of referring physicians' offices, patient families, payer, and technologists aside from just patients and referring physicians (Jackson, Business of Radiology: Marketing, 2015). To capture business, the expectation of patients and referring physicians from the diagnostic imaging facility needs to be kept in mind. Independent imaging centers are more likely to benefit from providing direct referral process to providers (Jackson, Business of Radiology: Marketing, 2015).

The efficiency and effectiveness of a diagnostic imaging centers depends on a good strategic plan. According to Jackson (2015), a workable marketing plan has five steps. First is analyzing data. Diagnostic imaging centers need to examine the procedure, dates, and patient collection history including the hospital based revenue (Jackson, Business of Radiology: Marketing, 2015). Second is to observe the outside market. It is important to take into account

the location and patients' average annual income based on the location to get familiar with the local health care treads of competitors and other major businesses (Jackson, Business of Radiology: Marketing, 2015). Third is to survey the staff. Gathering ideas could help improve internal communication and identify strengths and weaknesses of the organization (Jackson, Business of Radiology: Marketing, 2015). Fourth is to plan a retreat. Discussing internal and external research could help understand the influence of it on the organizations goals and marketing strategy (Jackson, Business of Radiology: Marketing, 2015). Fifth is to solidify the plan. By creating a mission statement, outlining an implementation plan and distributing the tasks amongst the staff members, a diagnostic imaging center can finalizes the marketing strategy (Jackson, Business of Radiology: Marketing, 2015).

In times of constantly changing health care environment, it has become even more crucial and difficult to distinguish from contenders. That does not mean that outpatient diagnostic imaging centers do not have opportunities for improvement. It is important for diagnostic imaging centers to know the strengths, weaknesses, opportunities and threats (Jackson, Business of Radiology: Marketing, 2015). Identifying the business sources and nurturing relationships can help with the revenue growth. Knowing where the most volume is coming from can determine whether the marketing efforts are effective. Rather than focusing on the areas that have been successful, it is also important to focus on areas that can use some improvement (Jackson, Business of Radiology: Marketing, 2015). Another way to bump up the revenue is by meeting the referring physicians and potential patients face-to-face and talking to them about the services provided by the diagnostic imaging center (Jackson, Business of Radiology: Marketing, 2015). Diagnostic imaging centers can also take advantage of screening studies that are accepted and reimbursed by insurance companies. Though some screening studies still require a referral from

a physician, the services can still be marketed directly to the patients such as mammography and lung CT scans (Jackson, Business of Radiology: Marketing, 2015).

One selected article suggested 10 effective radiology-marketing strategies that put the diagnostic facility ahead of its competitors. First, getting ranked on Google to grow the radiology market. Having the right content on the diagnostic imaging website is important to get to the top of the searches since Google only shows the most relevant searches (JHouseMe, 2019). Second, keeping the radiology marketing focus local. Tracking the zip codes where the most business comes from can make the marketing efforts most effective (JHouseMe, 2019). Third, consistent diagnostics patient outreach. Implementing an email-marketing tool to send automated emails to existing and new patient can help bring in more sales. Fourth, educate the patients. Many patients who have already gotten the exam done will not needs another one but their family or friends might. Sending innovating diagnostic imaging technology interesting articles, information about patient's health along with special discounts and coupons to share with family and friends can be beneficial (JHouseMe, 2019). Fifth, make the rounds. Making rounds to referring providers to promote and grow referrals is essential. Sixth, staying in front of the diagnostic customers. If patients have opted to receive educational email, sending surveys, educational emails, and letting the patient refer one another can also help expand the referral market (JHouseMe, 2019). Seventh, stay relevant by showing personality. The simplest way to show people that the diagnostic center is trustworthy is by interacting through social media such as Facebook, and Instagram. Some of the things that should be posted to gain customers trust are the patient testimonials, employee(s) of the month, office events or parties, provider's testimonials, and walkthrough of the facility (JHouseMe, 2019). Eighth, know the neighbors. Getting out and knocking on doors or sending direct mail to neighborhood residents or business

can also draw attention of new patients. Ninth, majority of referrals come from 20 percent of providers. Knowing the top referring providers and keeping them happy is vital for keeping up the volume of diagnostic imaging centers. Tenth, don't tell but ask. Rather than talking about the facilities equipment, etc., asking referring physicians how the diagnostic imaging center can better assist with their needs is crucial (JHouseMe, 2019).

Compliance

Accreditation

The accreditation requirement for advanced diagnostic imaging supplier went into effect in January 2012. The Medicare Improvements for Patients and Providers Act of 2008 requires suppliers of advanced diagnostic imaging services who bill CMS for advanced diagnostic imaging services under Part B of the Medicare Physician Fee Schedule to be accredited by a designation accrediting organization in order to receive Medicare reimbursement (Centers for Medicare and Medicaid Services, 2018). The modalities that define advanced diagnostic imaging are magnetic resonance imaging (MRI), computed tomography (CT), and nuclear medicine imaging procedures, such as positron emission tomography (PET) (Centers for Medicare and Medicaid Services, 2018). The Centers for Medicare and Medicaid service (CMS), has full authority to assign a designated organizations to an advanced diagnostic imaging services suppliers. There are four CMS designated advanced diagnostic imaging accrediting organizations. They are American College of Radiology (ACR), Intersocietal Accreditation Commission (IAC), RadSite, and The Joint Commission (TJC) (Centers for Medicare and Medicaid Services, 2018). Each designated accrediting organization has rights to establish its own individual quality standards as long as they address the minimum standards in the following areas: staff qualifications; equipment standards and safety; safety of patient's, family and staff;

medical records; and patient privacy (Centers for Medicare and Medicaid Services, 2018). Each accrediting organization must meet the standards established by stature and in the Medicare regulations.

American College of Radiology (ACR). According to the American College of Radiology website, ACR accreditation ensures that the facility is providing the highest level of image quality and safety (American College of Radiology, 2019). The ACR accreditation process documents that the facility meets requirements for equipment, medical personnel and quality assurance. ACR Accreditation has accredited more than 38,000 facilities in 10 imaging modalities and is recognized as the gold standard in medical imaging (American College of Radiology, 2019).

RadSite. RadSite began its assessment program to promote quality and reduce the cost o f diagnostic imaging in 2005 (RadSite, 2019). In 2013, the CMS designated RadSite as an official accrediting body for diagnostic imaging under the Medicare Improvements for Patients and Providers Act of 2008 (MIPPA) (RadSite, 2019). RadSite also works with private payer organizations and Radiology Benefit Management (RBM) to increase quality initiatives and deliver better care to patients (RadSite, 2019). RadSite helps payers with tracking and reporting of imaging trends to improve imaging procedures and outcomes.

Intersocietal Accreditation Commission (IAC). The Intersocietal Accreditation Commission (IAC) is a nonprofit organization that evaluates and accredits facilities since 1991 (Intersocietal Accreditation Commission, 2019). It accredits facilities that provide diagnostic imaging and procedure based modalities to improve patient care provided in private offices, clinics, and hospitals. The IAC provides accreditation programs for vascular testing, echocardiography, nuclear/PET, MRI, diagnostic CT, dental CT, carotid stenting, vein treatment

and management, cardiac electrophysiology and cardiovascular catheterization (Intersocietal Accreditation Commission, 2019). Since 1992, IAC has granted accreditation to more than 14,000 sites. In 2015, IAC also started offering accreditation services to facilities beyond the U.S. and Canada (Intersocietal Accreditation Commission, 2019).

The Joint Commission (TJC). The Joint Commission is non-profit organization. According to the website, TJC vision is “all people always experience the safest, highest quality, best value health care across all settings” (The Joint Commission, 2019). Its mission is to continuously improve heath care by collaborating with stakeholders, and by evaluating health care organizations and inspiring them to provide safe and effective care. The Joint Commission has almost 21,000 health care organizations and programs in the United States (The Joint Commission, 2019).

Theory

The systems theory suggests imaging centers to adapt to the environment and appeal to the consumer via patient centered care, accreditation, and marketing techniques. Staying in touch with the market will give diagnostic imaging centers a competitive edge. Paying attention to patient, provider and staff feedback is important for administrative teams to identify and correct workflow issues. Additionally, administrative team needs to also pay attention to feedback from the outside environment. Imaging centers need to evaluate if their marketing schemes are successful, reaching target audiences, and are inclusive to all patient populations. Incorporating changes based on external and internal feedback with be vital to centers to maximize patient satisfaction and organizational profits (Figure 6).

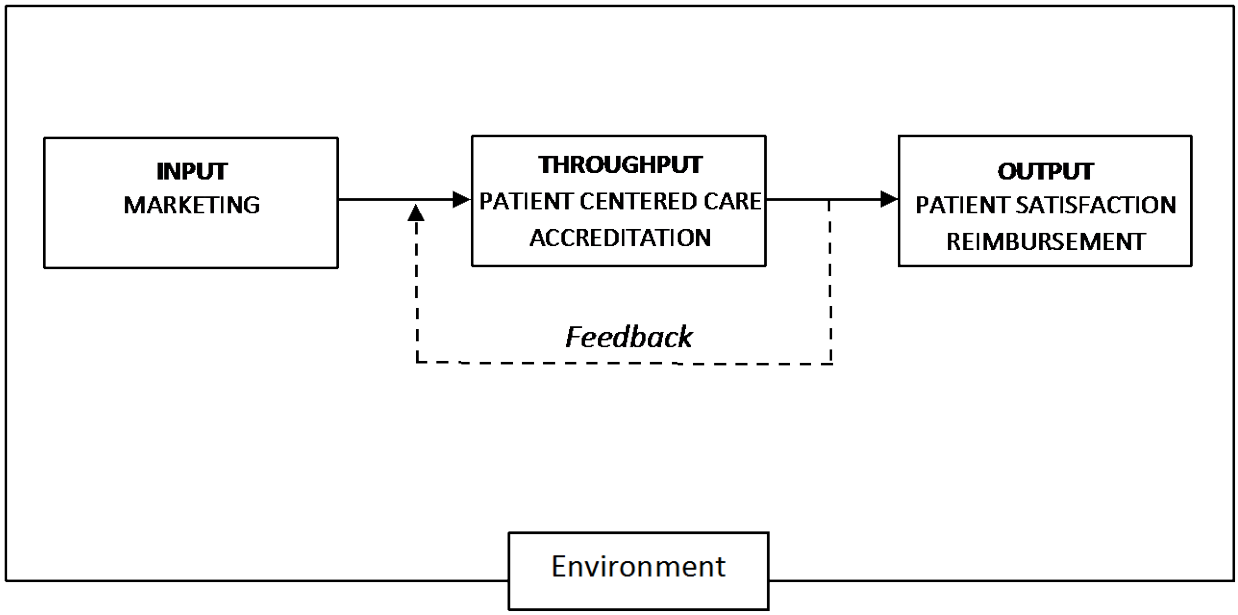

Figure 6. Systems theory diagram for diagnostic imaging centers.

Analysis

Currently, limited research has been published on best practices for the outpatient diagnostic imaging centers. It is reasonable to say that patient centered care is a critical driver of outpatient diagnostic imaging centers. To make the diagnostic imaging centers more productive, efficient and effective, it is necessary to move towards patient centered care and automated workflow technology to increase patient satisfaction as well as the referring physicians with less report TAT. Results also show that marketing is a major part of bringing in more business to the diagnostic imaging centers. It is crucial to make the diagnostic imaging center gain name recognition and trust in the market. Reimbursement is also partially effected by whether the diagnostic imaging center is accredited. Diagnostic imaging centers that are not accredited, do not receive Medicare reimbursement leading to decreased business and revenue. Accreditation is an emblem of quality and standards that meets certain criteria in professional field, therefore

there is potential for referring physician to refer patients to accredited imaging centers over non-accredited centers.

One of the reasons why there is limited research published in textual materials about best practices for diagnostic imaging centers is due to the fact that data analytics are kept private. Information that is needed to conduct vital and informative research is kept secret and protected within institutions. These practices impede efforts to advance research with the limited data available. Additionally, why there is limited research on this topic is because academic researchers might not be active in this area. Moreover, outpatient diagnostic imaging services are location specific. These outpatient diagnostic imaging centers tend to limit their marketing and services to one location rather than expanding beyond the established community. Furthermore, the market of diagnostic imaging is referral based. Physicians that own diagnostic imaging centers tend send referrals to self owned centers, limiting business for other diagnostic imaging centers. More research needs to be conducted to better understand and implement best practices for diagnostic imaging centers.

Chapter Five: Summary and Recommendations

Summary

In summary, this paper detailed the variables that affect the reimbursement rates, and efficiency. The literature review expanded on the challenges faced by outpatient diagnostic imaging centers. A content analysis was done in order to see what has been done in order to increase profitability, productivity, efficiency, and effectiveness of the outpatient diagnostic imaging centers and to evaluate the best practices. The measures focused on patient-centered care, marketing, and compliance. The paper constructs the finding of the research study based upon the systems theory.

Recommendations

First recommendation: Out of the box marketing

For example, mobile diagnostic imaging services include transportation of the diagnostic equipment back and forth to the location. Mobile diagnostic imaging services can offer increased efficiency of healthcare services. A practice or facility that provides mobile diagnostic imaging services, and a practice that is hesitant to make a large investment, but may want provide in-office diagnostic imaging to patients can both be benefited by mobile diagnostic imaging services. Facilities that provide mobile diagnostic imaging services can contract with the nursing home or clinics that do not have diagnostic imaging centers near by to provide better accessibility. For hospitals or clinics that have lack of space due to increased volume, low demand for specific type of scans or investing in permanent diagnostic equipment is financially challenging can also be profited by mobile diagnostic imaging services. Specific days and times can be set up once a week to provide services at a specific location.

Moreover, marketing is a great way to attract business. While marketing for diagnostic imaging centers, it should not be kept limited to the local community. Another important step would be to expand marketing locations and location-based marketing. The marketing representative should take initiatives to expand marketing by expanding the target audience. Instead of marketing just in local areas or cities, marketing and advertising in nearby cities can also be beneficial and profitable. Advertising and marketing to physicians' clinics outside local cities can increase the number of referrals. Marketing representatives can also use location-based marketing. Marketing representatives for diagnostic-imaging centers should also consider using location based marketing or geo-fencing. Geo-fencing will allow delivering the organizations advertising messages to the mobile devices of individuals who enter a specific location and continue to deliver ads to their devices after they leave the building. Location based marketing method should be considered to send advertising messages to patients or consumers who enter a designated physical area near a physicians' clinic or the organizations competitor diagnostic imaging center.

Second recommendation: Sharing satisfaction survey results with employees

There is a continuous need for management to keep the employees engaged. Letting the employees know the outcomes of a patient satisfaction survey is critical to keep the employees fully aware. Sharing the result can become a catalyst for change in the organization by making the employees aware of what patients' expectations are from them. Making the employees aware of the patients' expectation can contribute towards more productivity, profitability, and patient satisfaction. It is necessary for the management to communicate honest feedback from the patients. Making employees mindful of areas that the organization is doing well as well as the areas where the organization can improve is essential. Ultimately coming up with a corrective

action plans for the areas that need improvement and educating employees can heighten the chances of the organizations' success. Repeating the process of sharing the patient satisfaction survey results with the employees biannually or triannually should be taken into consideration to keep the employees knowledgeable.

Third recommendation: Expanding administrative team

Diagnostic imaging centers are flat organizations. Most of the flat organizations do not have specifically trained administrative personnel. For various diverse and independent tasks, managerial team should consider hiring specially trained employees. These additions to the organization could improve workflow, resulting in a better experience for patients and an opportunity for organizational growth. These changes should be carefully evaluated against cost benefit analysis. Questions such as 'Will increased wages for highly trained personnel results in higher dividends for the company?' are important to ask. Administrative teams need to determine whether the investment would result in a net gain for a company using a ten-year plan or foresight.

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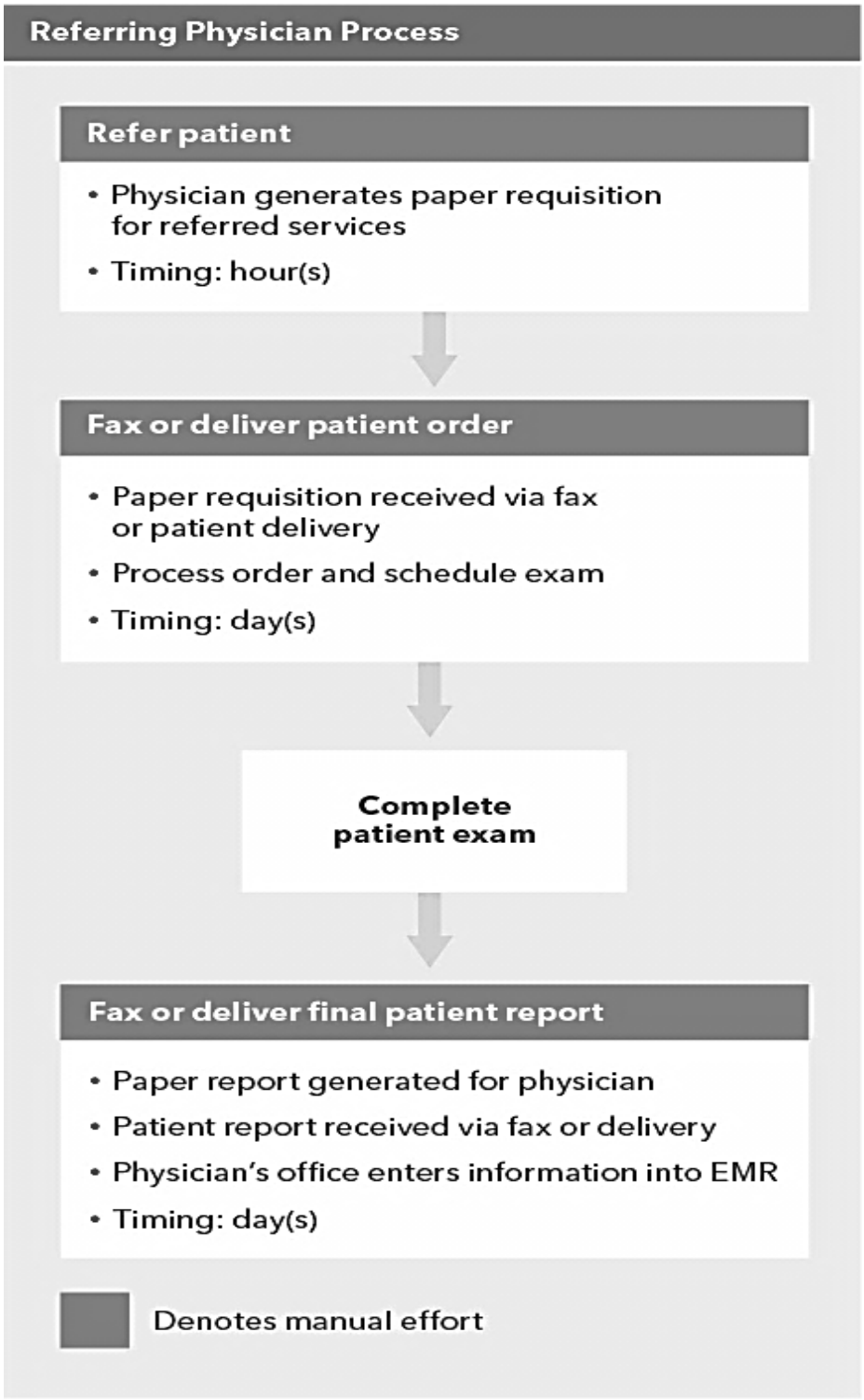
Appendix A



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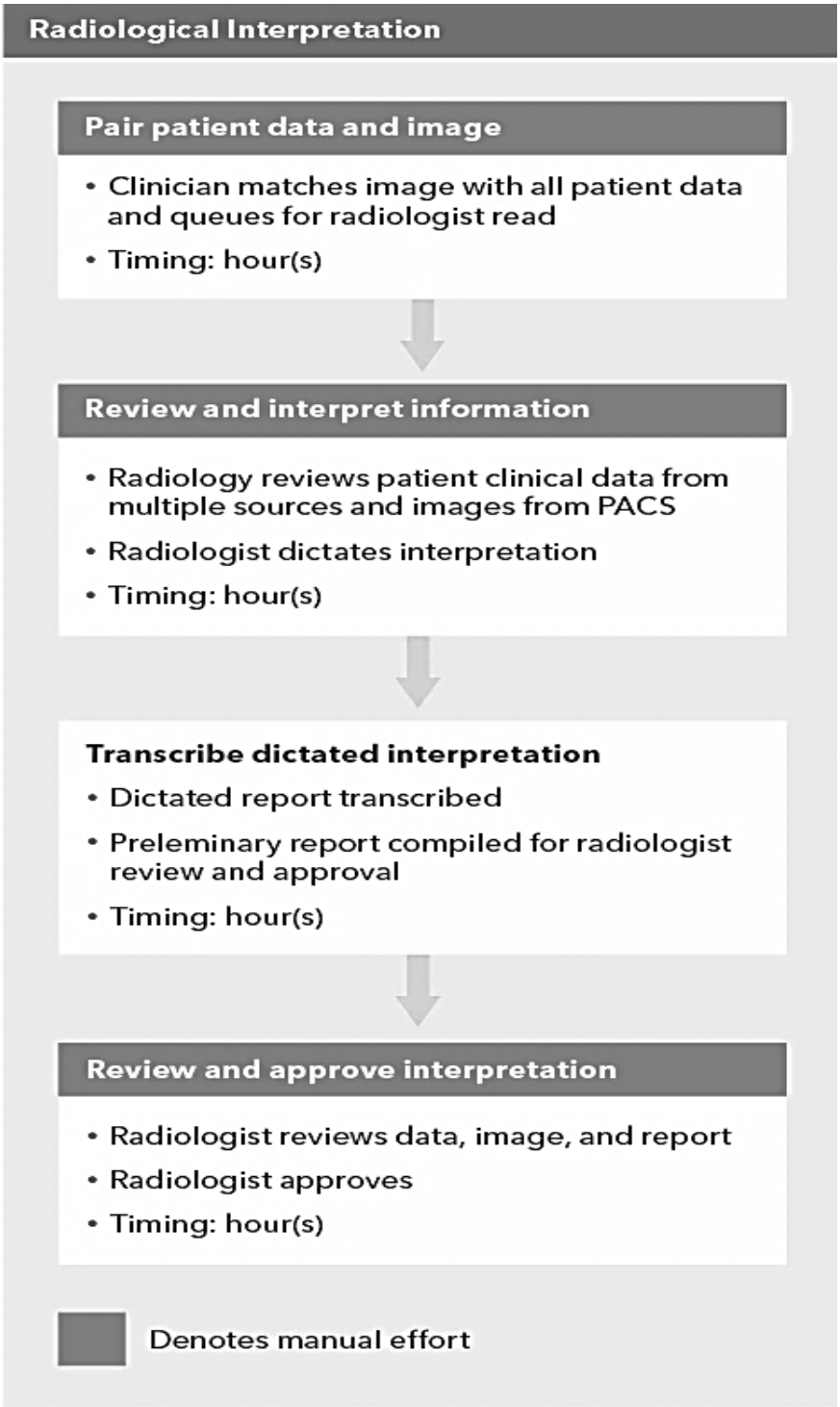

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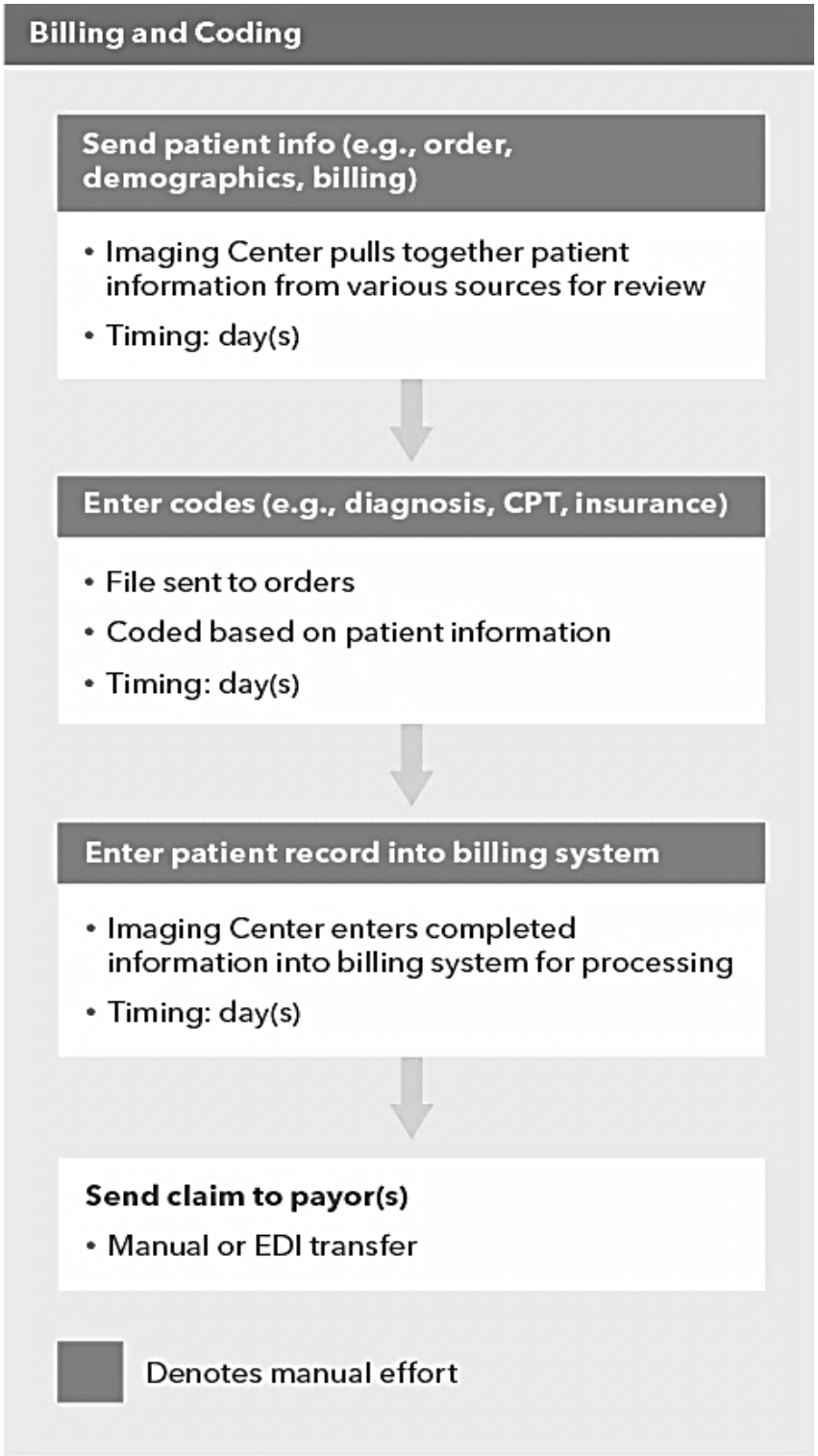
Appendix C



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Appendix D

CITI PROGRAM

Completion Date 06-Sep-2017
Expiration Date N/A
Record ID 24391603

This is to certify that:

AMANPREET SEKHON

Has completed the following CITI Program course:

Information Privacy Security (IPS) (Curriculum Group)
Students and Instructors (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

California State University, Bakersfield

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w90378cf6-854c-4015-b37d-94560a81c195-24391603

Appendix E

CITI PROGRAM

Completion Date 06-Sep-2017
Expiration Date 05-Sep-2021
Record ID 24391601

This is to certify that:

AMANPREET SEKHON

Has completed the following CITI Program course:

Social, Behavioral, and Education Sciences Responsible Conduct of Research (Curriculum Group)
Social, Behavioral, and Education Sciences (RCR) (Course Learner Group)
1 - RCR (Stage)

Under requirements set by:

California State University, Bakersfield

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wa76f827e-4e48-44e2-9791-7f7b8d7cff9d-24391601

Appendix F

CITI PROGRAM

Completion Date 07-Sep-2017
Expiration Date 06-Sep-2021
Record ID 24391600

This is to certify that:

AMANPREET SEKHON

Has completed the following CITI Program course:

Social & Behavioral Research - Basic/Refresher	(Curriculum Group)
PI/Researchers (SBE)	(Course Learner Group)
1 - Basic Course	(Stage)

Under requirements set by:

California State University, Bakersfield

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w0d42cdf6-4bf8-40e6-84cd-0a424918095f-24391600

Appendix G

CITI PROGRAM

Completion Date 06-Sep-2017
Expiration Date 05-Sep-2021
Record ID 24391602

This is to certify that:

AMANPREET SEKHON

Has completed the following CITI Program course:

CITI Conflicts of Interest (Curriculum Group)
Conflicts of Interest (Course Learner Group)
1 - Stage 1 (Stage)

Under requirements set by:

California State University, Bakersfield

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wcaab33a6-1070-4455-9112-68e2eab41c3c-24391602

Appendix H

Date: February 5, 2019

To: Amanpreet Sekhon, Student Investigator, Department of Public Administration
BJ Moore, Faculty Sponsor, Department of Public Administration

cc: Chandra Commuri, IRB Chair
From: Isabel Sumaya, University Research Ethics Review Coordinator

Subject: Master's Thesis Project 19-79: Not Regulated Research Status

Thank you for bringing your Master's Thesis Project, "Best Practices for Outpatient Diagnostic Imaging Centers" to the attention of the HSIRB.

On the submission form you indicated the following:

I want to interview, survey, systematically observe, or collect other data from human subjects, for example, students in the educational setting. **NO**

I want to access data about specific persons that have already been collected by others [such as test scores or demographic information]. **NO**

Those data can be linked to specific persons [regardless of whether I will link data and persons in my research or reveal anyone's identities]. **NO**

Given this, your proposed project will not constitute human subjects research. Therefore, it does not fall within the purview of the CSUB HSIRB.

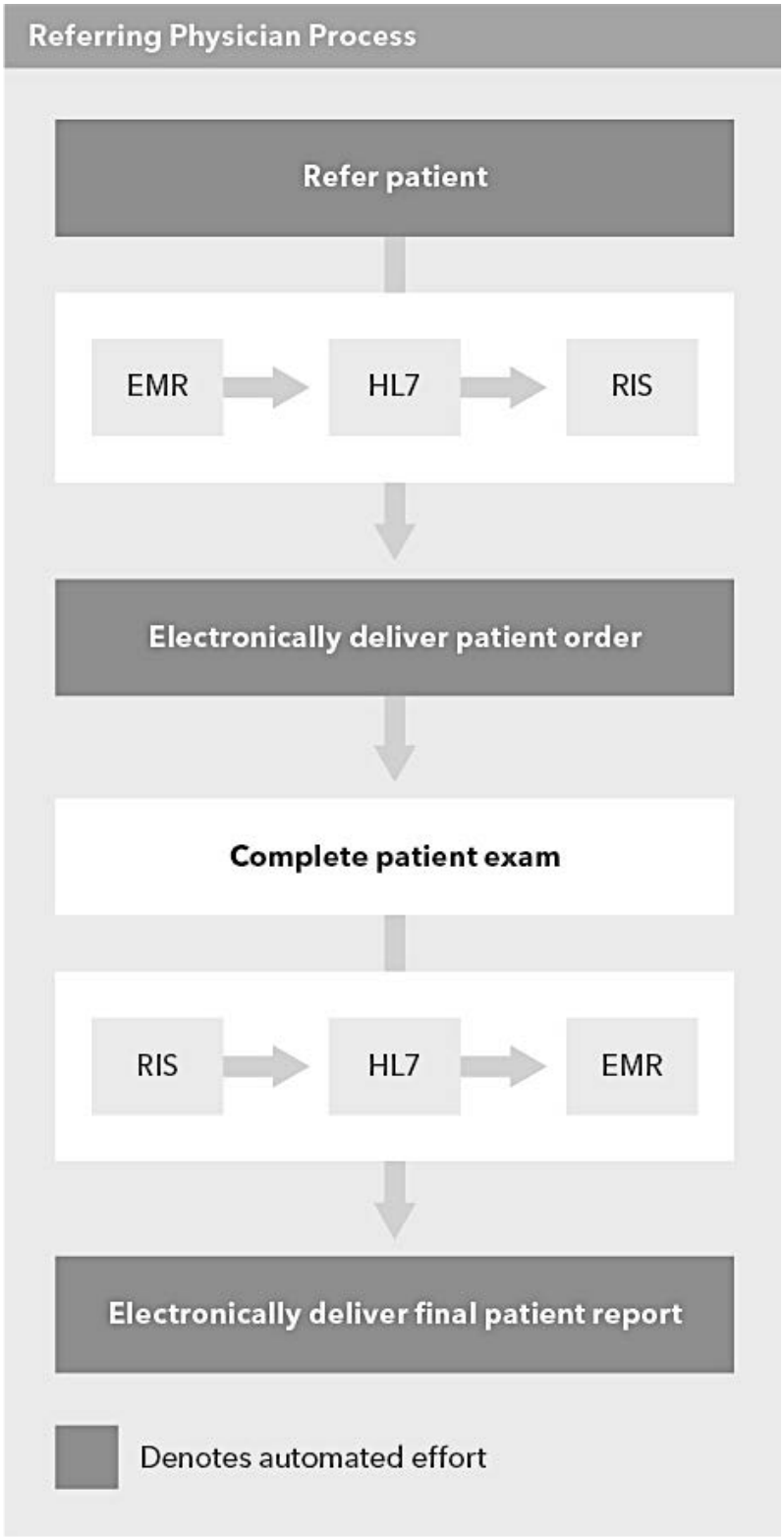
If you have any questions, or there are any changes that might bring these activities within the purview of the HSIRB, please notify me immediately at (661) 654-2381.

Good luck with your project.

Thank you.

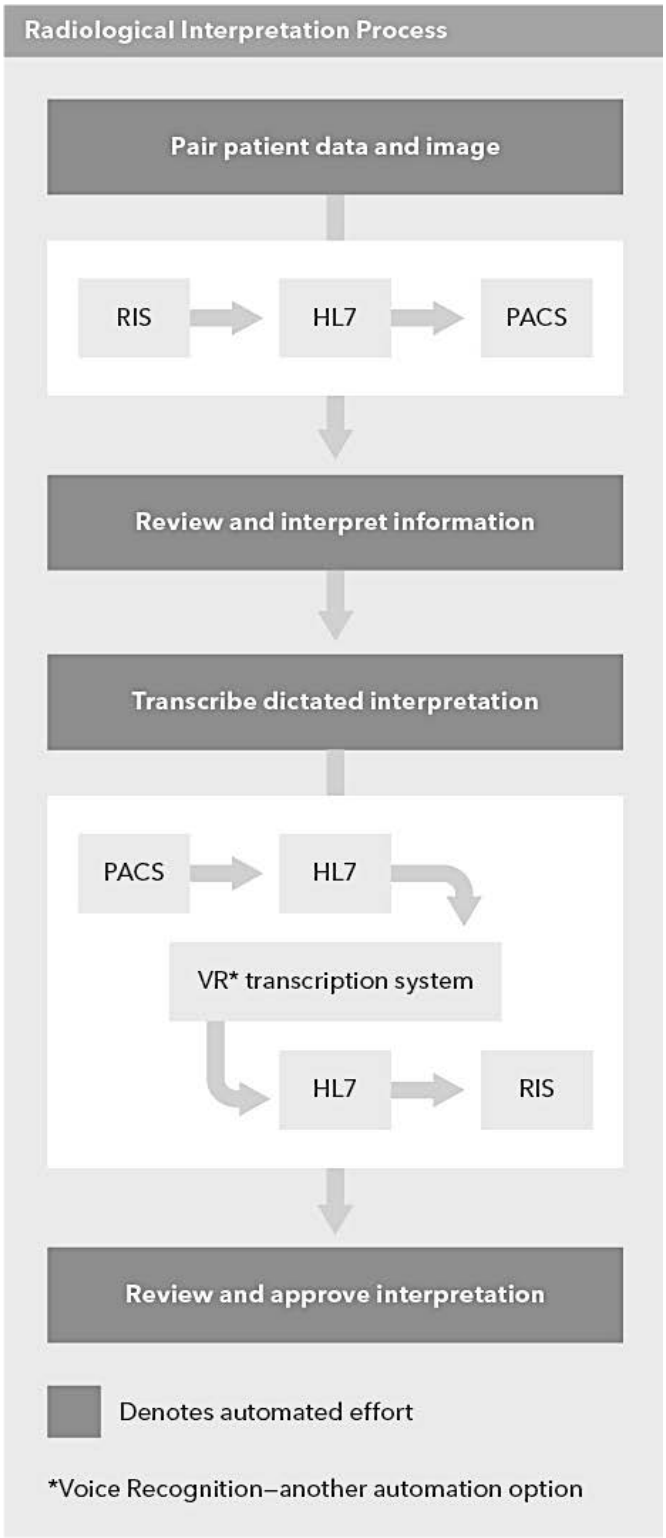
Isabel Sumaya, Ph.D.
University Research Ethics Review Coordinator
California State University, Bakersfield

Appendix I



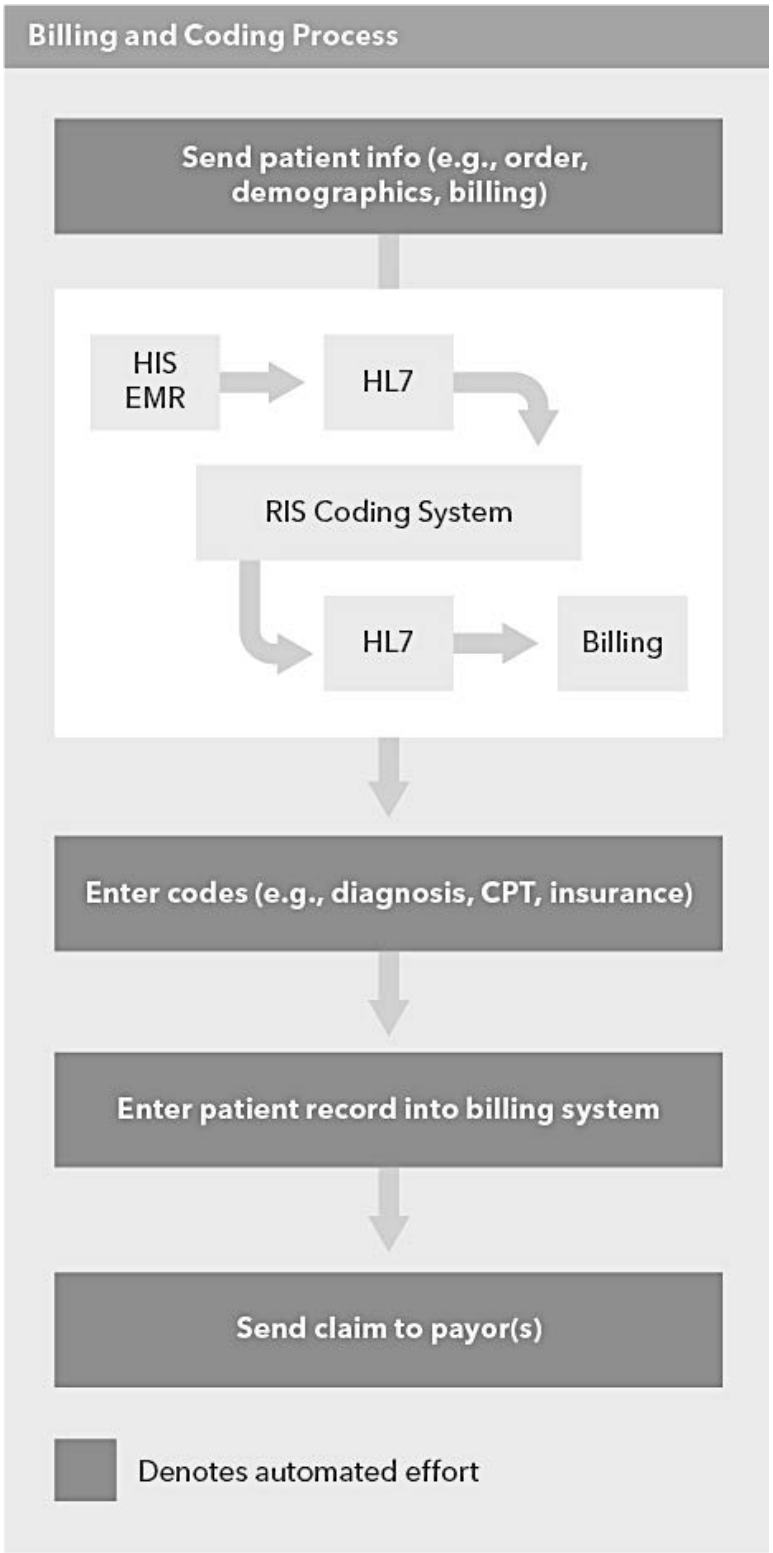
Retrieved from https://corepointhealth.com/resource-center/white-papers/rethinking-radiology-workflow/

Appendix J



Retrieved from https://corepointhealth.com/resource-center/white-papers/rethinking-radiology-workflow/

Appendix K



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