ABSTRACT

The term healthcare innovation has been floating around different healthcare systems for quite some time, but it is becoming more and more common for healthcare systems to place an emphasis on innovation in their company.

There are many forms of healthcare innovation, three forms of innovation will be discussed in this paper: technology innovation, financial innovation, and process innovation. The majority of the paper is focused on process innovation and the different ways to approach process innovation.

There are two major approaches to process innovation, systematic and design thinking. A systematic approach follows and orderly process with clearly defined goals and objectives, where the end solution is often seen from the very beginning of the project. The second approach is design thinking. The key to design thinking is being able to take on another’s point of view and work on the project from that stance, the key is empathy. Design thinking also differs from a systematic approach, as design thinking places a large emphasis on iterations of the solution, to allow for the best possible solution.

It is up to the individual hospital system to decide with process innovation approach they will choose. Intermountain Healthcare and the University of Utah are two notable organizations who apply the principles of a systematic approach. A design thinking approach is used by the Mayo Clinic and two University of Utah think tanks.

Healthcare innovation is allowing an industry that has been using antiquated business processes to be brought into the 21st century.
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Introduction

"While the public generally marvels at the scope and pace of innovation in high-profile medical technologies, there is less praise about innovation in basic clinical, business, and service delivery processes. We routinely take the latest medical technologies of the 21st century and embed them within a service delivery and patient flow process—with its appointments, waiting rooms, and so on—that has remained fundamentally the same since the 1950s." (Plsek, 2003)

As mentioned in the above quote there have been numerous healthcare innovations in the 21st century, innovations that have saved millions of lives. In the 21st century the healthcare industry has combined HIV drugs to form a "drug cocktail" to better treat HIV, created targeted cancer therapies, has perfected the art of a laparoscopic surgeries, created an HPV vaccine, and many, many more advancements (CNN, 2013). These medical advancements a contributing factor to why life expectancy has risen from 49 in 1900 to 78 in 2006 (Leonhardt, 2006), but these advancements are used in business processes and practices that are 60 years behind the medical advancements. This problem is gaining more and more recognition and a current buzzword in the healthcare is "innovation."

What exactly is healthcare innovation? The focal point of this paper will focus on healthcare innovation in regards to process improvement and the different methods that can be used to improve a process. There will also be a discussion about healthcare innovation made in technology as well as innovation in healthcare finance. The paper will also focus specifically on healthcare innovation at the University of Utah.
Healthcare Innovation and Technology

While healthcare business technologies have lagged behind the medical improvements in the 21st century, there are many recent advancements in business technologies that are revolutionizing how healthcare is delivered.

Using the University of Utah Healthcare System (UUHS) as an example, in the past three years the UUHS has implemented the use of MyChart, and the use of electronic medical records (EMRs) through an updated software system, EPIC (Gulbransen). All of these advancements are strictly IT based, but when used to their full capacities they can help with the process flow of hospitals and clinics.

MyChart is a tool that can be used by both doctor and patient. It allows the patient to view their health summary that includes medications, allergies, and test results online. Patients can also request prescription refills, schedule appointments, and communicate electronically with medical staff. MyChart also helps patients keep track of their insurance benefits. Patients who are a part of the University Health Plan can view benefit information, check eligibility, and much more regarding their insurance (Epic Systems Corporation, 2014). MyChart allows for better clinic flow by allowing patients access to their own medical records so nurses and medical assistants receive fewer calls regarding test results and other vital information that patients may need.

EPIC, a state of the art software system, has allowed the University of Utah to have an integrated medical record system that spans the entire network. (Epic Systems Corporation, 2015) This is the ideology of one patient, one record. This one record saves time when a patient meets with a new doctor within the network because the new doctor will have quick access to the patient's
past medical history. The one record across the network also improves clinic flow by eliminating the need for clinic staff to transfer medical records to other in-network clinics.

**Healthcare Innovation and Finance**

In the recent years, there has been much discussion about the rapidly rising costs of healthcare. Accompanied by that discussion is a push to know the costs associated with healthcare. This push to know costs was a driving force behind the Physician’s Lean Program at the University of Utah, which will be discussed in greater detail later. Dr. Vivian Lee, CEO of University of Utah Health Care felt it was important to gain a greater understanding of healthcare costs and so an essential part of the conclusion of a project was that the team include some measurable contribution in regards to costs. This contribution could have been through traditional cost savings, expanded volume to allow for more patients to be seen, cost avoidance or enhancing the quality of the service provided (Schmidt).

Along with the discussion of knowing the costs associated with healthcare is the discussion of insurance payments and new methods of paying providers. Currently, the main method of insurance payments are fee-for-service. According to the Medicaid website (Medicaid, 2014) fee for service is a delivery system in which providers are paid for each service provided, this could range from office visits to tests to procedures. This payment process aligns incentives on a patient becoming sicker and a doctor running more test to be paid more.

There has been some recent discussion about whether or not fee for service really drives up healthcare costs, but the bottom line is that fee for service does not pay for quality it pays for quantity. In an article on fee for service on the Physicians for a National Health Program website (Kemble, 2012) the author states that very few physicians would perform completely unnecessary
testing because of the fee for service payment model and that is true in most cases. The problem with fee for service, though, is the misaligned incentives. While most doctors may not perform unnecessary tests for more revenue the option is still there and under certain pressures a doctor may take advantage of the fee for service payment model.

A new payment process though is taking steps to realign incentives. The bundled payment model is a new payment process that Medicaid and Medicare and many private insurance companies have also started to use. A bundled payment is a single lump sum for all the services provided for a certain condition during an episode of care (Delbanco, 2014). Bundled payments aim for quality over quantity by looking at a patient’s entire experience during that episode of care.

There are some roadblocks though in the bundled payment process. The first being how does the insurance company decide what the lump sum should for a certain condition? An important factor in determining a lump sum payment is to first determine the standard protocol for certain conditions. A standard protocol allows for the government and insurance companies to estimate how much a certain episode of care may cost based on the cost of the standard protocol.

The government currently has 48 episodes of care that a provider can choose from (Center for Medicare and Medicaid Services, 2014) they range from chest pain to urinary tract infections. Bundled payments not only aim at emphasizing quality over quantity, but it also captures a broader view of the patient experience. Bundled payments allow for a better coordination of care between primary care physicians and acute care physicians because the treating physicians must work together to provide the best quality of care given the insurance payment. Many hospitals have implemented care coordinators who work with the patient to ensure that the care is well coordinated during the episode of care (Zigmond, 2014).
Another major roadblock that faces bundle payments are chronic conditions that do not have a defined beginning and ending. Having a gallbladder removed is a clear episode of care that a bundled payment could easily cover. A chronic condition, such as diabetes, unfortunately, does not have an easily defined ending and treatment is an ongoing process. Bundled payments are a great innovation that help with episodes of care that fit into a well-defined episode. There is still room for improvement in financial innovations when it comes to the care and payment model of chronic conditions.

In a recent meta-analysis of the effects of bundled payments on spending and quality, conducted by the Agency for Healthcare Research and Quality, there was "weak, but consistent evidence that bundled payment programs have been effective in cost containment without major effects on quality." (Agency for Healthcare Research and Quality, 2012) Bundled payments are a promising innovation in healthcare financing that helps align incentives with a focus on quality patient care.

One last innovation that has played a major role in hospital financials, within the last two years, is the Affordable Care Act. In states that chose to expand Medicaid hospitals saw a decrease in charity cases and a decrease from 2.5% to 2.3% of revenue due to bad debt (Kutscher, 2015). States with expanded Medicare also saw a 10.8% increase in revenue compared to 2.2% increase in revenue in non-expansion states.

The Affordable Care Act (ACA) appears to be good for those in Medicaid expansion states, but the same study found that the increase in high-deductible plans due to ACA led to patients only using the healthcare system for higher acuity care and not for basic preventative care that could lead to less high acuity care in the future.
Due to the newness of the ACA the effects on both hospital financials and patients health have not been fully realized, but will play out in the coming years.

**Healthcare Innovation and Process Improvement**

What is process improvement? The Cambridge dictionary defines process improvement as, "the job of examining the processes used in a company, department, project, etc. to see how they can be made more effective. There are many names of healthcare process improvement including continuous quality improvement, performance improvement, six sigma and total quality management (Centers for Disease Control and Prevention, 2011).

While there are many advances being made in the way of process improvement in healthcare there are still many barriers and obstacles that must be overcome to help the healthcare sector become fully integrated with current technologies and practices that currently exist.

The healthcare sector is one of the largest sectors of the economy, with estimates of around 17.9% of the gross domestic product spent on healthcare related expenses (Wayne, 2012) and this number is only expected to rise as the Affordable Care Act is fully implemented and thousands of new patients enter the system. Healthcare is a unique industry in regards to supply and demand and who affects the supply and demand is often the reverse of a typical business.

In a typical business model there is supply from the company and demand from the customers, if the demand is no longer present the supply is, also no longer present, unless the supplier reinvents their business in a way that increases demand. In some industries there are many suppliers, and customers are able to choose from the best and are able to influence the market by deciding which suppliers stay in business and which suppliers do not, put simply there is competition.
Healthcare, though, has an entirely different structure when it comes to supply and demand. The supplier can be an individual doctor, a hospital, or a whole hospital network. The demand is created by the patients. Because the service in question is not optional, is often life saving and there are few to no substitute in certain fields of medicine, the patient has very little say in which suppliers stay in business and which do not. Instead, patients are told who they can see based off of their insurance coverage and in return the suppliers hold a majority of the power because the patient has to use their service. There are very few other industries in which this type of supply and demand plays out.

A good illustration of this point is an experience had by the Spark Health Lab at the University of Utah. Spark had been working with a local cancer doctor to improve wait times in his clinic, at the time patients could be waiting up to four hours at the clinic before they saw the doctor. This cancer doctor was only one of three in the Intermountain West who was trained to treat this particular cancer and while patients were highly put off and frustrated with the wait times, they had nowhere else to go.

During the period of time that Spark worked with the clinic, the fellow and intern worked in conjunction with support staff to find suitable solutions that would work for the clinic. After a couple of months of observation and working with staff, a proposal was sent to the doctor, who disregarded the ideas and said that the ideas proposed were of no help to him and his clinic. This is an extreme illustration of the above point, but it helps show the point that suppliers often times have the final say in the healthcare setting.

The above doctor was an extreme case where patients could not switch doctors even though they did not like the way he ran his clinic. In specialties where there are more doctors, such as internal medicine or gastroenterology, patients have more of a choice and a voice regarding clinic
procedures. In these specialties if a patient does not like the practices of the clinic there are often many more providers to choose from. There are still limits such as the location of a doctor and the provider network available due to insurance constraints

Most businesses would not survive if they only improved the product/service they offered and not their customer service/business processes. Healthcare is not like most other businesses, the product/service is life-saving and non-negotiable and because of this uniqueness the sector has seen little need to improve upon the customer service/processes that currently exist.

Process improvement starts with a critical analysis of a system and the processes within the system and then moves on to the improvement phase. Improvement can happen in many different ways. Companies can choose to improve in a systematic way or they can improve through the design thinking process.

There are two general theories on how to approach process innovation in the healthcare sector, systematic innovation and design thinking innovation. Each approach has specific characteristics that set it apart from the other. In systematic innovation, the company needs logical thinking, data-driven decision makers to improve the system. Design thinking innovation has a much different set of characteristics, design thinking innovation requires that decision makers be creative in problem-solving. Design thinking is not driven by data, but by taking on the perspective of the customer.

Systematic Approach

A systematic improvement approach is an often used approach to process improvement especially, in larger, more structured organizations. This approach is the way most people would
choose to approach process innovation. It is logical, it is based on data, it is easier to understand for many people, it is thinking inside the box through a very methodical process.

A systematic approach to healthcare innovation is what the majority of corporate America is used to, it is data driven and methodical. Projects/solutions are selected based off of the ability of the project to increase value to the firm (Esmail, 2014). This approach involves thoroughly planned out ideas, defined steps, and defined goals and objectives (Healthy People, 2010). In a systematic approach, the end solution is often seen early on in the process.

It is not hard to think or envision what systematic approach would look like because it is the primary way corporate America operates.

*Intermountain Healthcare*

Intermountain Healthcare is nationally known for being one of the first healthcare system to recognize the importance and benefit of using an electronic health record (EMR) and in 1972 Intermountain Healthcare implemented the first version of an EMR (Baker, 2008). Intermountain Healthcare recently opened a formal innovation center in August of 2013 (Murno, 2013), but they have been improving upon the patient experience for decades. Intermountain Healthcare approaches process innovation in a systematic way that delivers the best outcome for patients and is cost effective. President Obama referenced Intermountain Healthcare as one healthcare system that offers superior quality healthcare at a significantly lower cost (Intermountain Healthcare, 2009).

At Intermountain Healthcare interdisciplinary teams are assembled to look at the data provided by their EMR system for a certain project, say labor induction, as these teams look at the data they also offer their own personal experiences when it comes to the project. After teams look
at the data that include patient outcomes they write a companywide best practice that should be followed, except for when a doctor feels the best practice does not apply to the patient. Intermountain Healthcare encourages deviation from the best practice when deemed necessary so that more data can be gathered and the best practice can be further refined.

For the project regarding labor induction, Intermountain Healthcare does not allow elective inductions before 39-week gestation. The data gathered showed that if a mom elected to have an induction before 39 weeks for non-medical reasons mom and baby were far more likely to have complications that could lead to a longer, more costly hospital stay (Daley, 2009). This simple best practice has saved hundreds of thousands of dollars to both the system and the patient.

Intermountain Healthcare has developed evidence-based practices for about 50 clinical conditions (Elsevier, 2010). They gather working professionals to examine data that spans 40 years due to their EHR and work to create a solution that will both life-saving and cost effective to both the system and patient.

*The Physician’s Lean Program*

A main healthcare innovation program at the University of Utah is the Physician’s Lean Program (PLP). This program was started by Dr. Vivian Lee, she had previously worked on a similar program at New York University and wanted to start the program somewhere else. Different university healthcare systems bid to have the program brought to their healthcare system, the University of Utah Healthcare System bid for the program. Before the bidding process began the system realized that they had very little idea of their costs and saw the program as a way to help figure out costs, as figuring out the cost benefits of projects was a crucial part of the program (Schmidt).
The University of Utah won the bid and the Physician's Lean Program (PLP) came to Utah. The program was led by Dr. Vivian Lee and Dr. John Langell, who led the University of Utah's Center for Medical Innovation. Together these two doctors selected team leaders for each of the four cohorts that took place in 2013 (Johnson).

Team leaders were selected because they were either already in the beginning phases of a project or Dr. Lee and Dr. Langell felt an area was in need of improvement. Dr. Langell was a student former at the David Eccles School of Business (DESB) executive MBA program and it was through him that a one of a kind relationship was formed. The hospital supplied the teams while the DESB supplied the coaches (Johnson).

During the year 2013 there were four cohorts, each cohort consisted of around 15 teams, in total there were 58 teams and projects during 2013. Each team leader was trained for half a day on principles of lean operations, this gave the team leaders an opportunity to refine their problem and gain an understanding of what was expected during the program. Before the half day of training the team leaders were told to already have their specific projects/idea chosen so that they could apply what was being taught to the specific project, they had in mind. (Johnson).

After the half day of training, team leaders were given the assignment of creating their teams. Teams ranged in size from four to ten members and were interdisciplinary. Some teams also had a DESB intern as part of their projects. Interns were selected based off of previous classroom training in lean principles.

A key component of the program was the group facilitator. The facilitator of the group was looked to as the leader and point person on the project. The facilitator and the team leader were often not the same person. The instructors emphasized that the highest ranking person based off
of hospital hierarchy (i.e. the doctor) would not always the best fit for the group facilitator. The facilitator had to be someone who could see the big picture and bring all the different moving pieces together. This person was also someone who worked well with others and listened to their perspective. Often when an interdisciplinary team works together it is hard to get much done because everyone is approaching the project from varied angles and that makes creating a common goal difficult. The facilitator of each group worked to understand each viewpoint and create a cohesive viewpoint for the project.

Once teams were in place the entire team attended a full day of training on lean principles. From there teams set up their own timetables and went to work on their projects. During the four month time span of each cohort, there were three coaching sessions for each team. During these sessions, the program instructors met with the individual teams to help refine their ideas and to help keep them on track. At the end of each cohort, the team leaders presented their projects to senior executives of the University of Utah Healthcare System.

The projects were selected based on what the team leader saw as an area of improvement for their area of the system. The program required measurement of improvement through any number of ways, most teams showed improvement through cost savings, cost avoidance or through expanding volume. The projects were not always clinically based and ranged from decreasing endoscopy lab turnover time to purchasing process enhancement.

One of the biggest challenges faced by teams during the course were defining the scope of their projects. It was easy to get going and realize that to solve A, B should also be fixed. Through the coaching process instructors encouraged the teams put these "B" ideas in a parking lot to be worked on at a later date. The program wanted to ensure that participants did not take on more
than they could handle in a four-month timeframe and often had to help teams narrow the scope of their project.

Success for Dr. Vivian Lee was not implementation, as implementation was expected, success was publishing the findings of the projects in an academic journal. Out of the 58 teams during 2013 four of the projects were published in an academic journal. 15 of the projects were presented at various medical conferences across North America (Johnson).

After the four cohorts in 2013, the Physician's Lean Program was shifted from a partnership with the DESB to the value engineering department at the hospital. The DESB now works with participants during the coaching sessions (Johnson).

At the beginning of 2014 the DESB sent a follow-up survey to all 2013 cohort participants to see if the project they worked on had published or presented at a conference and what problems they had encountered after the end of the program. The problems faced by teams were lack of time, software issues (during 2013 the University of Utah switched to a new software system, Epic), lack of monetary support, lack of management support/feedback, enthusiasm had faded for the project, and the biggest challenged faced was gathering useful data (various University of Utah Healthcare Physicians).

When interviewed about the challenges of implementing lean initiatives, Professor Glen Schmidt, the lead instructor of the program, said that it is easy for initiatives to flounder after the initial push and success of a project. People often wonder, "what now", and lose the motivation that they once had (Schmidt). Programs for specific projects are wonderful and give the projects a timetable, but as the University of Utah is finding the continued efforts after the program often fall by the wayside.
As mentioned previously select teams had interns on their team and I was selected as an intern. I worked with the pediatric clinic on balancing same-day access with preventive care access.

Below is the A3 summary that was provided for the final presentation of my team’s project.

In October of this year, one year after the cohort's completion, I spoke with the clinic manager, Jen Burgi, of the pediatric clinic to discuss implementation after the end of the cohort. One of the biggest challenge faced as by the pediatric clinic team was adapting the existing software to the clinic's specific needs. When asked about the current state of the software challenges Jen said that they worked with the IT group in the hospital to train the front office staff
on template training. This training allowed the staff to create and hold appointments for same-day visits.

When asked about how the change in scheduling procedures affected the doctors Jen said that the entire staff of doctors took the change very well. The clinic management makes an effort to emphasize quality improvement over personal preference and because of this culture they saw little pushback from the doctors. Jen also mentioned that in their clinic and many others throughout the hospital it is not about what the doctor prefers, in terms of processes, but it is about what is best for the patient. There are still some older doctors, though, who are weary of change in processes. The pediatric clinic has made an effort to always have supporting data, whether it be patient satisfaction scores or how a certain change has led to an increase in volume of appointment times, to show these doctors that the changes taking place are for the good (Burgi). The clinic is constantly looking for data on how to better allocate appointments between same-day and preventative visits (Burgi).

The Physician’s Lean Program allowed many hospital staff members the opportunity to learn the fundamentals of process improvement and work on a specific project to apply those fundamentals, with the hope that they will be able to use what they learned in future endeavors throughout the hospital.

*Value Oversight Committee*

The University of Utah Healthcare system's value oversight committee (VOC) follows a systematic approach to process improvement. The VOC gathers each year to determine which process improvement projects the team will fully support. This committee is made up of 22
members who are part of the C-suite of the company, chairs of clinical departments and directors of programs (University of Utah Healthcare).

The process starts by listing the top 50 medical conditions and from there the top three conditions in each service line are listed. Once those three conditions have been chosen the committee looks at the areas of opportunities within a service line that include business drivers, impact on bundled payments, and which conditions are currently in the public spotlight. After those opportunities have been looked the committee must prioritize and talk to the department's leadership about the possibility of working on those areas of opportunities. From there the top seven projects are started right away (Gulbransen).

The University of Utah Healthcare system has an equation for value that is repeated often when process improvement is brought up, it is: value = (quality + service)/ cost (University of Utah Healthcare).

Once projects are selected, projects are guided by the value engineering department, who are operations management and engineering professionals. These individuals have been trained to fix systematically. When an engineer is assigned to a project they are given the task to look at the value equation and work from there with the department personal.

The VOC has a methodical system set in place that works for them, but when they start from the list of the 50 top medical conditions some medical conditions that are not as prevalent may be overlooked. As mentioned previously, the Spark Health Lab worked to improve a local cancer clinic's wait times. The type of cancer the clinic deals with is quite rare and would most likely not make the top 50 medical conditions and would be overlooked by the VOC because it is a smaller medical condition. Because this smaller medical condition is overlooked it may not be
given the attention needed to improve processes in the clinic. It is great to start from a methodical place, such as the top 50 medical conditions, but this lets those smaller conditions where there may be a need for serious process improvement fall through the cracks.

A systematic approach to healthcare innovation is often needed to help those involved in the process. This approach is a guided process that is easy to understand and follow. Many of life's experiences are set up systematically and it allows participants to know what to expect. It is like starting a college course, you receive a syllabus and see the outline for the course, yes the class may get behind or skip a chapter, but overall the student knows what to expect. There are class objectives to be met and students can clearly see how to meet the objectives based on the schedule. Most healthcare innovators have experienced something similar and so it is comfortable and familiar which makes the changes and innovation process easier to understand and comprehend.

A systematic approach can feel constricting, though, some people do not want to follow such formal steps as data review and would rather receive inspiration and go from that point forward. A systematic approach is very business driven and if the company does not perceive that the change will greatly impact the company is may be overlooked. Lastly, a systematic approach leaves little room for creativity whether the creativity is in the form of looking for a problem or looking for a potential solution.

**Design Thinking Approach**

Design thinking process improvement differs from systematic process improvement in the mindset of the innovator. In design thinking, there is a very creative process brought to process improvement. The creatives of the world thrive on this out of the box improvement technique, but for those who prefer and have been trained to perform systematically this form of process improvement can be uncomfortable.
In a Harvard Business Review article entitled "Design Thinking" by Tim Brown, (Brown, 2008) it goes into great detail about what a design thinking approach to innovation actually is. Most think that design thinking would mostly focus on the layout/aesthetics of the innovation but the main focus of design thinking innovation is gaining a deeper understanding of what the customer needs and wants out of the system. Design thinking innovators position themselves to see from the customer's point of view and design from there, giving design thinking a human-centered approach.

In the Harvard Business Review article, Brown explained the three main steps that must take place in design thinking, the first being inspiration. The inspiration for an innovation often comes from personal experiences or stories of personal experience. After the inspiration for a project comes the ideation for the project. This ideation is often the most challenging part of design thinking for most individuals. Ideation is not a simple come up with a solution and move forward. Brainstorming is a crucial part of the ideation phase, it is where multiple valid solutions are created. Once those solutions have been created they must be revised to fully fit the need of the customer and the company. The revision process includes thinking through the strengths and weaknesses of the solution. Rough prototypes serve as the cornerstone of the ideation process. It allows innovators to gain a better understanding of how the possible solution might look when implemented in the system. The last and final step of the design thinking process is implementation if the innovators took their time with the ideation phase implementation should go fairly smoothly because the solution has been fully vetted. The implementation phase is about implementing the best solution and executing the vision that the design thinker had when designing the solution (Brown, 2008).
The three main steps mentioned previously are not the only way to approach design thinking. The d.school at the Institute of Design at Stanford University (d.school, 2015) has five steps to approach design thinking innovation, they are: empathize, define, ideas, prototype, and test. These five steps are similar to the three that Brown mentioned, but it allows for more structured understanding of what needs to be accomplished.

As mentioned previously design thinking starts from the customer point of view. It is crucial that the innovator is able to empathize/understand the problem with the customer. From that point, the innovator would define the issue that is at hand and start generating ideas for possible solutions. Once ideas are in place it is crucial to prototype in order to see which how the idea would play out once it is integrated into the system. From there the prototype is actually tested within the future system of use.

Mayo Clinic

The Mayo Clinic (Mayo Clinic Center for Innovation) is one of the most notable healthcare systems that is using a design thinking approach to address problems within their system. Under “the what” we do tab of the Center for Innovation there is a quote from a design strategist, Lorna Ross, "Designers challenge old concepts, facilitate open discussion, and bring new ideas and a can-do attitude." This quote is the perfect description of design thinking.

As mentioned previously, Mayo Clinic takes the approach of design thinking when it comes to process improvement. The Mayo Clinic has a Center for Innovation that, "fuses design principles with the scientific method to uncover human needs in the health care environment, which include empathy, creativity, systems thinking and a human-centered focus. Design methods include ethnographic and observational techniques, visualization, prototyping, sketching,
storytelling, brainstorming and more. The complement of design allows the center to think beyond what it normally does and serve as a translator for ideas and possibilities." (Mayo Clinic Center for Innovation, 2013)

The goal of the Mayo Clinic's Center for Innovation is to focus on the human experience and make that experience better. Current projects that are being worked on at the center include a patient application that allows patients to view their medical record, a jack and jill exam room that allows for better discussion between doctor and patient, many telemedicine projects that will help doctors in remote regions have better access to world-class physicians and many more projects that aim to enhance the patient experience (Mayo Clinic Center for Innovation, 2013).

The Mayo Clinic is nationally known as one of the best healthcare systems in the nation for top medical care (Mayo Clinic, 2015). With the help of their Center for Innovation, they are making sure that patients do not just receive the best medical care, but that patients also have the best experience possible while at the Mayo Clinic.

The Patient Experience Think Tank

In the Patient Experience Think Tank, (PETT) students are guided through design thinking process improvement. As an accounting student who had just recently completed a more systematic approach to process innovation through the Physician's Lean Program, this design thinking process pushed me to think of different solutions. The design thinking process when used in healthcare often focuses on the needs of the patient and creates the improvement from the patient's point of view.
The PETT started with an idea by Professor Jim Agutter, who pitched the idea to the University of Utah Honors College and the idea was funded through an honors professorship (Agutter).

The idea for the PETT was to give students interested in healthcare, the knowledge and resources necessary to examine a problem within the University of Utah Healthcare system and find an appropriate solution. At its conception, in 2009, the think tank was a semester-long course, but after that first semester it was decided that to truly teach students how to innovate, a year-long course was necessary. There have been a total of four PETTs and each year there were five to six projects that were generated. In total around 30 project ideas have been developed from the PETT. Of those thirty only five projects have been successfully implemented in the University of Utah Healthcare system (Agutter).

Any student with an interest in healthcare and a member of the Honors College is invited to participate in the PETT. Most participants are pre-medical or pre-nursing. The students are from all different locks of life with different stories and often times those stories are a starting place for the problem they choose to work with. Some approached their projects from a very rational place while others approached from an emotional/emphatic place.

During my year in the think tank, there were many discussions on how to balance the practical and emotional sides of healthcare. The emotional/emphatic thinkers and dreamers helped those who were practical to think outside of the box and to focus the patient's emotions during their healthcare journey. While the rational and practical thinkers helped bring the dreamers' big ideas back to reality. The yin and yang of the PETT helped students find a happy medium in improving the patient experience both rationally and emotionally.
My project, which dealt with improving the scheduling of patients on the clinical side, was heavily influenced by the dreamers in the group. As an accounting major, rational is my mode of operation, certain students and discussions helped me see that healthcare is not entirely processes that are rational, the emotional needs of a patient must be met through healthcare processes. Because of our discussions my final recommendation was that to improve scheduling at clinics we should not set an average time for certain types of visit. Instead a clinic, should schedule times based on the individual patient and their needs, based on a short series of questions asked when the appointment is made. Some people are more talkative and like to ask questions while others are a bit more reserved. Some patients have very serious medical needs that need discussion between physician and patient while other patients need a simple prescription refill. The dreamers in the group helped me come up with this concept that makes sure that patients are not seen as the average, but as an individual in the clinic setting.

During the first semester, students are introduced to current problems faced in the healthcare system. This is done through readings, hospital tours, guest speakers, and class discussions. That first semester students are continually working on developing their problem statement, at the end of the semester students present their problem statements and their plans for next semester to classmates and stakeholders from both the University of Utah Healthcare System and the Honors College.

The second semester if where solutions are formulated and reworked until the innovation is both usable and useful. Through Agutter, each student works with different stakeholders within the system to find a suitable solution to the problem. Those solutions are then constantly reworked and vetted through think tank discussions and exercises until the student feels like they have a solution that is innovative and solves the problem that the system faces.
A sample picture of how solutions came to be in the PETT.

Once solutions are finalized there is an end of year presentation, where again different stakeholders from both the Honors College and the University of Utah Healthcare are in attendance. There is no guarantee that these ideas will be chosen for implementation. Because of the nature of the problem picking process (students being allowed to select a problem they see and are interested in, instead of the hospital giving problems that need to be worked on) the University of Utah stakeholders may not always choose to implement these projects at the time of the presentation.

Just because an idea was not selected at the presentation does not mean it will not continue forward. In my personal experience, it depends on how committed the student is to making their projects happen. Some may choose to let go of their projects while others may give it a cooling off period and continue work on implementation at a later date.

During my year projects ranged from gathering data on low income, non-English speaking patients, to helping remove the stigma surrounded by depression, to improving the scheduling procedures in a clinical setting.
As mentioned previously, there have been five projects that have been selected for implementation. They range from building a garden for patients at the Huntsman Cancer Institute, to the Spark Health Lab (which will be discussed later on), to starting the Connect2Health organization, a volunteer organization that connects health resources and people in need.

While the PETT may only have an implementation rate of 16%, future stakeholders within the healthcare sector are taught to critically observe problems, and methods on how to create innovative solutions.

*Spark Health Lab*

At the University of Utah there is a lab that exist outside of the University Hospital that fully embodies the design thinking approach to innovation, it is the Spark Health Lab (SHL). The SHL was started from the patient experience think tank. A student who participated in the think tank saw the need for a place in the University of Utah campus where students could be active participants in healthcare innovation. The director of the SHL is Jim Agutter who has a background in design and medical informatics. The SHL also employs several fellows, these fellows have a creative and business background that allows them to guide students through the design thinking process (Agutter).

Hospital professionals come to the SHL to have them help in the process of solving complex issues. The SHL has worked on wait times at a cancer clinic, has worked with hospital administration on creating better layouts for the hospital to assist in wayfinding for patients, and many other projects that have enhanced the patient experience at the University of Utah. Since the inception of the SHL, there have been over 50 projects that have been worked on. Only five projects have been fully implemented, but that does not mean that the others were unsuccessful.
Often time SHL is brought in to help gather data that allows the staff to better understand the problem and allows the staff to work in solving the problem using the data given by the SHL. (Agutter).

During my time at the SHL, the data was the most valuable tool that could have been provided with the project I was working on. It allowed the nurses and doctor to better understand their reasons for the clinic's astronomical wait times. The data was collected simply, by observing the clinic and using a stopwatch to clock when a patient entered an exam room to when a patient exited the exam room and all that happened in between those two times. While the ideas that the SHL brought to the clinic were not implemented, the data provided gave the clinic a valuable asset that could be used internally to adjust processes.
One project that the SHL has worked on was innovation station. Innovation station was a project that allowed employees of the hospital to submit innovation ideas for their areas of work within the hospital. Innovation station could be used by anyone from MDs to janitors, whoever felt that an innovation could benefit the hospital (Agutter.)

**Innovation Station**

From there ideas would be taken and the SHL in conjunction with the hospital lean engineering department would work with the department to find a suitable solution to the problem/idea suggested by the employee. Unfortunately, innovation station was not supported by the administration of the hospital. When I spoke to a member of the administration about innovation station they informed me that they did not need more innovation ideas, that the value
oversight committee already had plenty of ideas (Gulbransen). This is a big loss for the hospital because innovation station gave a voice to employees who are in the trenches, but may not have the means of making the changes necessary create a more efficient department.

The SHL follows a design thinking approach to innovation. Once projects ideas are brought to the SHL the fellows and students work to observe the problem from the patient's point of view and create ideas that would benefit both doctor and patient. Ideas are not created in solitude without the input of staff. The staff is often the key to creating a solution that will function in the department. Through interviews and observation of staff members, fellows and students are able to create solutions that not only enhance the patient experience, but also enhance the work experience of the staff.

*The design thinking approach used in the SHL*
Design thinking is a great approach for healthcare innovation, but the principles of design thinking may not work for every project or every organization. One pro of design thinking is that it has the ability to take an abstract idea and gives the individual a guideline to actualize a solution. Design thinking is not an overly formal process that includes set steps or set timelines, this allows innovators to move how they see fit when innovating. A key element of design thinking is the organization/innovator taking on the point of view of the customer. Often innovation happens from the innovator's point of view, but design thinking emphasizes that importance of taking on the customer's point of view.
Taking on a customer’s point of view and innovating from that point will often lead to happier, more satisfied customers. In regards to healthcare innovation, design thinking starts with empathy which is an important emotion for those in the healthcare field to have.

While design thinking is a great approach to innovation it is not the best for every scenario/every person. Because of the lack of defined steps it can often feel chaotic and unstructured as if what you are doing is leading nowhere, which can be very frustrating to individuals. Design thinking may feel unnatural because of the different point of view that is required. Also, design thinking emphasizes the importance of iterations, meaning that projects are not completed rapidly. It takes time to find the right fit for both customer and company.

Healthcare innovation takes on many forms from technology, to financial, to process improvement. Process improvement, also, has many forms, from a systematic approach to a design thinking approach. These innovations have allowed many healthcare systems to offer an exceptional patient experience. It is up to the individual system as to how they approach these innovations, but in the end any innovation approach that updates an antiquated system is a great step forward.
References


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