Improving Inpatient Belonging Process to Eliminate Reimbursement Costs and Improve Patient Satisfaction

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Abstract

UPMC Presbyterian Shadyside is a two-hospital campus, including a Level I trauma center and another 500-bed hospital in Pittsburgh, PA. The hospitals combined to spend $50,975.82 in 2020 in reimbursements for lost patient belongings in the hospitals. Belongings are broadly defined as items that are not considered valuable, but valuable items such as clinical items also tend to be bundled into this definition. Through interviews with key departmental leaders, a staff survey completed by 57 employees involved with patient belongings, and process analysis, the root causes of process deficiencies were analyzed to develop opportunities for improvement. Through the measurement and assessment of the process, it was made apparent that nurses are often untrained, or too busy, to document patient belongings, and that there is uncertainty at multiple levels regarding who is responsible for keeping track of belongings. In order to create a long-term solution to these problems, it was recommended that the hospitals develop a specific and standardized set of procedures to handle patient belongings, incorporate common belongings, including denture, hearing aids and eyeglasses, onto the communication boards in patient rooms, and add visible storage spaces in patient rooms to house these items so they will be easily found if forgotten. This project is important to public health because the hospital industry is continually shifting toward quality metrics for reimbursements instead of traditional fee-for-service models. These interventions improve communication with patients and improve patient satisfaction, both of which are incorporated into national quality metrics.

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Preface

      I wish to thank all of the employees at UPMC that made this project develop into a valuable learning experience. Special thanks goes out to Kitty Zell, VP of Operations at UPMC Presbyterian Shadyside, for her guidance and mentorship throughout this project by helping to connect me with the proper people and resources to develop valuable process improvement recommendations. Thank you to Dr. Kimpel and Professor Fisher for their expertise and education of Lean Six Sigma project management, helping me to build valuable skills that assisted with the completion of this project. It was incredibly valuable experience for me to be able to take on a project like this and customize the direction it took to best meet the needs of the hospital.

1.0 Lean Six Sigma Introduction & Background

Lean Six Sigma is a project management approach that incorporates data-driven tools into its decision making. Lean and Six Sigma are two different process improvement philosophies that are each independently designed to improve process quality, cost, and time efficiency. The primary difference between these two philosophies is that "…whereas Six Sigma is focused on reducing process fluctuations and improving process output by following a problem-solving approach using statistical metrics, Lean is primarily concerned with the elimination of wastes and improving the in-house workflow" ("Difference Between," 2017). The goal of reducing waste is to simplify tasks to have the minimum complexity required to get the task done to improve efficiency in both time and costs. Reducing variation, on the other hand, is valuable for improving processes by standardizing the steps of a process that can lead to producing different outcomes. Lean Six Sigma principles can be applied to projects in various fields. Anything from manufacturing to people-driven processes can improve their efficiency by utilizing the tools of these philosophies.

Lean Six Sigma follows the DMAIC framework, which stands for define, measure, analyze, improve, and control. Each of these phases is essential for understanding the problem at hand and the goals to improve the problem, as well as developing recommendations for improvement and long-term sustainability of those recommendations. There is a plethora of different tools available to use during each phase of the DMAIC project framework that can be employed by a project team to understand where the root causes of many inefficiencies are and to help identify what interventions can target those root causes in the simplest ways possible. Root cause analysis draws inspiration from the Pareto Principle, also known as the 80/20 rule. The Pareto Principle states, "…that in any given scenario, 80% of the outcomes are the result of 20%

of causes" ("What is the Pareto Principle?", 2021). Applicable to many scenarios, this principle helps project managers to identify the few fixes that will have the largest impact on the process, rather than focusing on every possible improvement that could be made.

Before starting a DMAIC project, it is important to first assess whether the project is something that can be improved by the DMAIC process. A few guiding principles to determine whether something is a viable DMAIC project are to choose a process with an obvious problem, ensure the project is meaningful but manageable, and make sure that improvement is measurable ("DMAIC – The 5 Phases", 2020). Although nearly all processes can be optimized, the benefits realized from improvement are the greatest for processes with the most obvious problems. Choosing a process that is well-functioning will likely result in a high cost to improve but will only see marginal benefits from the improvement. It is also important to choose a project that targets something that is not overly complex to solve. Much like the whole goal of Lean Six Sigma is to improve efficiency in processes, the project to improve efficiency should also exhibit good stewardship of resources. Maintaining focus of the scope of the project helps to prevent a project from getting out of hand in complexity. Lastly, an improvement is only valuable if it is sustainable. Being able to collect data to continuously measure the results of the improvement is the only way to ensure long-term sustainability of the intervention, so it does not revert back to its pre-project state after a few months or years.

1.1 Define Phase

The define phase of the Lean Six Sigma framework is the essential first step of any project. This phase seeks to adequately define the problem at hand and the goals of the project. The success

of the entire project relies on this phase because the project team needs to understand the direction that the customer wants the project to go in order to deliver a final product that satisfies the customer. This phase relies on the "voice of the customer to understand feedback from current and future customers indicating offerings that satisfy, delight, and dissatisfy them" ("The DMAIC Process", 2022). Any miscommunication of the problem and the goals can cause the scope of the project to increase to an unattainable size, or can cause it to veer outside of the true problem. Through discussions with stakeholders of a various process, Critical-To-Quality (CTQ) helps to bridge the gap between the customer wants and the deliverables of the project. "[CTQ] is best used when customer's requirements are complicated, unspecific, and broad" ("Six Sigma DMAIC – Define Phase", 2022). Some projects have an identifiable problem with no clear direction for the outcome, but the CTQ chart can help take broad goals and dissect them into specific and measurable parts of a process that impact the quality of the process. Once it is well understood what the problem is and the overall goals of a project, the project team can advance toward collecting data to evaluate the current state of operations for the process.

1.2 Measure Phase

The measure phase of a Six Sigma project is concerned with understanding the current performance of the process. The main ways to go about this include collecting data where possible to use numerical measurements of the process's capability and filling in the gaps with observations and stakeholder interviews for parts of the process that cannot be easily quantified. Understanding which metrics are most impactful to process success is a main goal of the measure phase to target the analysis and improvements moving forward. One of the most essential tools in the measure

phase is a process map. "A process map is a graphical demonstration showing the stream of work through the course in changeable degrees of factor … illustrated as the relationship between X and Y" ("Six Sigma DMAIC – Measure Phase", 2022). Process mapping enables the project team to see which inputs to the process are controllable and critical to quality and to identify areas of intervention. Furthermore, each step in the process can be classified as value adding (VA) or non-value adding (NVA). Value adding steps are the most important part of a process because these steps transform the product or service into the final product. There are three requirements that process must meet to qualify as value adding, "the process should be completed correctly right the first time, customer doesn't have any complaint about it and very much willing to pay for the final product or service" ("Six Sigma DMAIC – Measure Phase", 2022). The goal of the measure phase is to use data and observations to come away with a strong understanding of how the process operates, and what factors are most meaningful to the successful completion of the process. Upon completion of this phase, the data collected should be used to inform decisions for the future.

1.3 Analyze Phase

As the measure phase was primarily focused on collecting data to understand the current state of the process in question, the analyze phase is concerned with using that data to develop informed recommendations to improve the process. The primary method undertaken in the analyze phase is root cause analysis. Various tools exist to aid in determining the root causes of process inefficiencies. One of the first tools to use are the 5 Whys. This simple exercise consists of asking why a process is underperforming five times, with the goal being that each time you ask the question, you will get deeper into the process and closer toward the real cause of inefficiency. The

purpose of this tool is that the superficial answer is likely not the root cause, but instead there are underlying factors that contribute to that initial response. The next tool is an Ishikawa Diagram, or Fishbone Diagram. This diagram takes into consideration the different categories that could be the cause of problems. These categories are called the 6Ms – man, machine, measurement, method, material, and mother nature (or environment) ("Six Sigma DMAIC – Analyze Phase", 2022). Not only is this a great visual representation of the different areas where problems may occur, it also helps to narrow the focus of interventions toward not just the cause, but also where that issue is taking place. Using all of the tools up until this point in a Lean Six Sigma project, the project team has a firm grasp of the goals of the project, what the problems are, and where those problems exist. The project team is then able to take the next step and develop recommendations for improvement that specifically target the areas of the process that will have the largest impact on the success of the process. These recommendations can then be approved or revised by the customer, and the team can move forward with enacting those changes.

1.4 Improve Phase

The beginning of the improve phase is where solutions to the problem are developed, screened, tested, and ultimately implemented. Root cause analysis has allowed the project team to narrow down the problems to their most granular levels so that optimal improvement strategy can be formed. Choosing the best improvement requires three things, "(1) brainstorming by project owners and members whose goal is to create a solution that will address the main problem, (2) testing the solutions, and (3) assessing the outcome of the executed solutions" ("Six Sigma DMAIC – Improve Phase", 2022). All ideas, no matter how obscure, should be given

consideration, but this phase allows for the project team to assess the feasibility of each idea independently to determine the best options. Once the best few options have been determined, the team can opt to pilot test any of the changes on a smaller scale to ensure that they produce the desired outcomes before implementing largescale changes to an entire process or organization. According to Bharsakade et al., "The seven wastes that are identified by Taichi Ohno for the manufacturing domain are transportation, inventory, motion, waiting, over-processing, overproduction, and defect" (Bharsakade et al., 2021). Each of these are examples of non-value adding steps of a process that increase the time, costs, and errors associated with that process. For people-centered processes, a greater emphasis is placed on the wastes such as waiting for steps to complete, transportation of information between people, and defects when the process is done improperly. The solutions aim to reduce these wastes by simplifying the process. A tool used to objectively rate different solutions against each other is the Solution Selection Matrix. This matrix assesses each possible intervention based on factors such as cost, ease, speed, and impact, as well as assigning weights to each criterion based on customer preferences ("Six Sigma DMAIC – Improve Phase", 2022). The matrix will quantify the value of each solution based on those given criteria, which helps the project team and customer determine the priority of each possible solution. Once implementation of the final improvements is underway, the final stage of the process is ensuring that the improvements will last.

1.5 Control Phase

Improvement projects are commonplace in any organization and in any industry. There are always things that can be improved, whether it be increasing efficiency, decreasing costs, or any

other metric that could be optimized. Another common occurrence is that a project concludes, processes improve, but after a few months or years the process reverts back to its previous, suboptimal state. The control phase of a Lean Six Sigma project aims to prevent regression by methodically planning out how to ensure the long-term sustainability of the interventions made from the improve phase. Data driven processes tend to use control charts to continuously monitor process performance and ensure that it never goes beyond the control limits. Another aspect of the control plan is an Out-of-Control Action Plan (OCAP). This tool lists the different process steps, how it is monitored, what the specifications for that step are, which stakeholder is responsible for that step, and what the response plan is for corrective action ("Six Sigma DMAIC – Improve Phase", 2022). Utilizing a tool like this provides the team a reference over time, even long after the intervention initially took place. Periodic audits or review of the process are also essential to make sure the process is operating well and that there are not steps that need updating. Although easy to overlook, the control phase of a Lean Six Sigma process is imperative to seeing sustained success of the project. The more thoughtful the control plan is, the higher the chance that the benefits of the project will continue long into the future.

Each of these five DMAIC phases of a Lean Six Sigma project allows the project team to address an issue and develop specific and sustainable recommendations for improvement to solve that issue. In the following sections of this paper, the DMAIC project management philosophy will be applied to a project for UPMC Presbyterian Shadyside to address issues with patient items getting lost in the hospitals.

2.0 Lost Patient Belongings

Hospitals are incredibly complex organizations. Over the past few decades, UPMC has built up a massive health system that includes 43 hospital campuses, many more outpatient centers, an insurance division, an international division, and an enterprise division. UPMC Presbyterian Shadyside is the flagship hospital campus for the entire health system, and as such, the two hospitals that make up this campus are large, fast-paced, and integrated. Inpatients at these hospitals navigate large and complex buildings and may see themselves transported between different units and rooms within the hospital multiple times over the course of their inpatient stay, sometimes even transferring from one hospital to another. UPMC Presbyterian is also a Level I trauma center, which further adds to the complexity and pacing of the environment when patients come in with time-sensitive emergencies.

Patients and providers are operating in a high-stress environment with many moving parts, opening the window for a lot of logistical errors. Patients come into the hospital in a number of different states. A patient entering the emergency department at one of these hospitals is likely arriving directly from the activity that resulted in their injury or illness without any planning before arriving. On the contrary, patients arriving for planned, elective surgeries are likely to have put much more thought into how they plan to arrive to the hospital and what items they need to bring with them. This broad spectrum of patient backgrounds means the hospital needs to adapt to be able to handle the logistics of admitting patients from all parts of this spectrum.

One primary concern for the hospital when admitting patients is handling the items they have with them when they arrive to the hospital. This entails everything from cell phones, keys, and wallets to the clothes that patients are wearing upon arrival to the hospital. It is essential that

patients do not have any of these items with them when entering an operating room for a procedure, so these items need to be taken care of somehow. Space is also a major limiting factor for the hospital, as there is very little extra space anywhere on the hospital campuses to dedicate for patient items. As a result, UPMC Presbyterian Shadyside developed a system to deal with these items. In order to accommodate for space constraints at the hospitals, the hospitals decided to differentiate between patient "valuables" and "belongings." The hospitals will securely store patient valuables over the course of their inpatient stay, but belongings are left up to the patient to keep track of. Patient "items" broadly includes both valuables and belongings in cases that they are mixed together since they are not always perfectly separated.

Pairing a disjointed process with the complexity of the work environment and the broad spectrum of states in which patients arrive for care, it is no surprise that there are issues with adequately keeping track of patient items over the course of their stay at the hospital. UPMC Presbyterian Shadyside has had a growing number of instances of items going missing, and the hospitals suffer financial consequences from reimbursing patients for lost items. In 2020, UPMC Presbyterian Shadyside spent $50,975.82 in reimbursements for lost belongings across 51 cases. These reimbursements are only a fraction of the total problem, however, because patients sign a waiver when entering the hospital that acknowledges that UPMC is not responsible for any lost, stolen, or damaged items. As a result, UPMC is not legally liable for any instances of items going missing. The hospitals do, however, reimburse patients for clinical items that are lost during their inpatient stay if the patient can prove that they had the item with them while they were at the hospital. This $51,000 cost over 51 cases instead represents a microcosm of the total problem with tracking belongings.

2.1 Define Phase

Many stakeholders in the processes related to patient belongings noticed the increasing number of instances of items being lost and an increased cost burden to the hospital as a result. As such, this issue caught the attention of hospital leadership, and the project idea was given to me by the Vice President of Operations for UPMC Presbyterian Shadyside. A brief background of the problem was presented to me, along with a list of some of the important stakeholders for the process. I was given control over next steps for the project.

As with any Lean Six Sigma project, the first step was to define the problems and the goals for the project. The best way to go about defining this project was to meet with various different stakeholders to understand their qualms and observations as to what was causing problems with patient belongings. Some of the major stakeholders to consider were nursing, transportation services, patient relations, and security. Nursing staff are heavily involved with patients throughout the entirety of their stay at the hospital. Nurses regularly check in with patients to do routine assessments, so they are involved in any process that relates to patients. Patient transportation services are required when patients move between units, from a unit to an operating room, and other opportunities for movement around the hospital. They are responsible for ensuring the patient and their belongings get to the right place at the right time. The patient relations team deals with problems pertaining to hospital patients. When belongings are lost, this team is primarily involved in helping to resolve problems, and to process reimbursements. Security is responsible for storing any patient valuables, so they are also integrated deeply into this process. Through interviews with members from these different teams, it became clear that the true problem of interest was not the cost of reimbursements, but rather it was the number of cases of belongings being lost by patients while they stayed at the hospital. It was also suggested by multiple people that UPMC Presbyterian

was the most significant part of the problem, as a majority of the problems stemmed from the chaotic environment of its Level I trauma center emergency department. Stakeholders also believed that problems resulted largely from lack of ownership by other stakeholders and miscommunication between these different areas of the hospital. Nurses often thought security was responsible for items, while security believed that it was the nursing staff's responsibility, so ultimately no one would keep track of items and items and processes were easily forgotten.

The main goal of this phase was to develop a specific and quantifiable problem statement and goal statement to set the scope for the project moving forward. The issue peaked at the onset of this project, totaling $50,975.82 across 51 cases in 2020. The four-year average cost was $32,960.67 across an average of 32 cases, but this number had increased for three consecutive years. The problem statement was created as follows: "UPMC Presbyterian Shadyside spent over $50,000 in 2020 reimbursing patients for lost belongings across 51 cases. This has been a perennial problem but has increased in magnitude since the onset of the COVID-19 pandemic of March 2020." A clear understanding of what exactly the problem was allowed for the development of a goal statement to guide the project. The goal statement was: "Reduce the number of cases and the cost of reimbursements for lost patient belongings in half for UPMC Presbyterian Shadyside within one year by improving tracking of patient belongings." One common theme that emerged through stakeholder interviews was that the perceived reason that items were lost was because there was inconsistent tracking of what items patients had with them, so there was no way to recover them or to know that they went missing. Creating a concise and direct problem and goal statement helped to be the guiding light for the rest of the project.

2.2 Measure Phase

After developing an adequate project scope, the next essential task was to get a deep understanding of all of the processes relating to patient belongings to assess the current operating state. This was done through a second series of stakeholder interviews with the Directors of Nursing, Director of Transportation Services, Director of Community & Volunteer Services, and the Directors of Security on both hospital campuses, as well as a survey that was sent out to all employees working in functional units related to patient belongings. Annual data has been tracked for the past few years that documents how much total money is spent on item reimbursements as well as the number of cases.

Table 1. Annual Case and Reimbursements for Lost Belongings at UPMC Prebyterian Shadyside

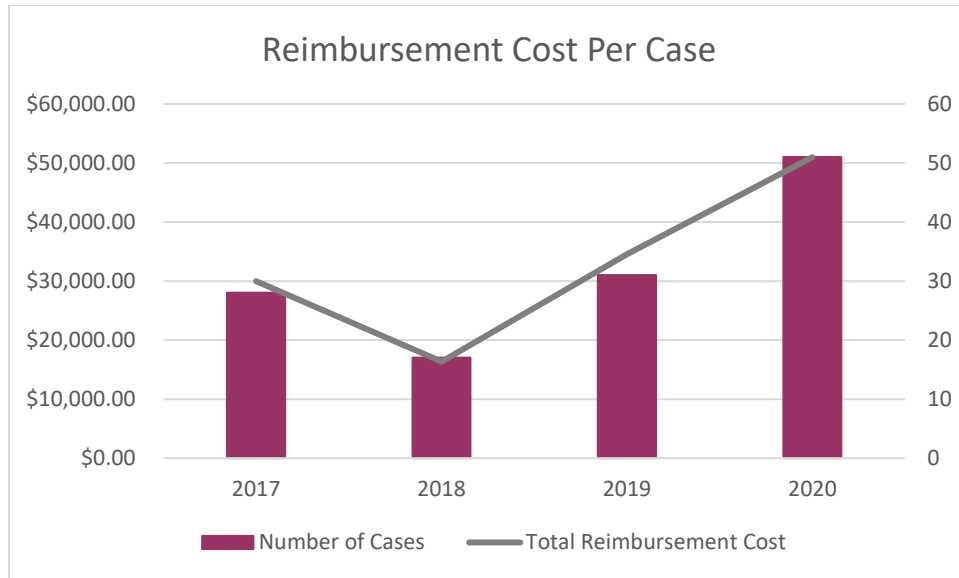| Year	Number of Cases	Total Reimbursement Cost
2017	28	$29,956.80
2018	17	$16,353.67
2019	31	$34,556.39
2020	51	$50,975.82

Figure 1. Lost Belongings Reimbursement Cost Trends at UPMC Presbyterian Shadyside

One of the first pieces of information valuable to understanding the patient belongings process is learning the difference between "belongings" and "valuables," since the hospitals only securely hold onto valuables during a patient's stay. According to UPMC's Lost and Found policy, "*Valuables* shall include: money, jewelry, purse/wallet, credit cards, identification cards, electronics, any documents that contain personal identifiers, any documents that would likely be needed by their owner, dentures, and eyeglasses" (Heckman, 2021). The same document defines belongings more broadly, stating that "*Personal Belongings* shall include those items not otherwise defined as *valuable*" (Heckman, 2021). When a patient is admitted into the hospital, if they are determined to have any valuables with them, the nurse will call security, who will send a representative to the unit to document and collect the valuables. Both the security officer and the patient will sign the form, acknowledging that those items were collected by security and nothing more. This system works well for liability purposes; however, the policy considers a lot of items to be valuables that are not likely to be collected by security. Clinical items such as eyeglasses,

dentures, and hearing aids, although considered valuables, are likely to stay with the patient because the patient needs those items to assist them with daily living. As such, these items along with a few others, like cell phones, are classified as valuable yet are left up to the responsibility of the patient and the nursing units. Once security has collected all valuables from the patient and the patient has signed off on the items, security holds those items in secure lockboxes for the duration of the patient stay. Upon discharge, security is notified and returns the items to the patient, having them sign off again to acknowledge they received exactly the same items that were originally collected.

The valuables process is very clearly defined, strictly adhered to, and there are rarely problems with those items. The patient belongings process, on the other hand, is not so clearly defined. According to the Lost and Found policy, "All *personal belongings* will be controlled by the UPMC Transportation Department; or, other appropriate department as determined" (Heckman, 2021). Patients spend very little of their time in the hospital with the transportation team. Only when patients are being moved from one place to another does patient transport get involved, so there is a large gap of undefined responsibility. According to the policy, nurses are supposed to fill this gap in responsibility, but it became apparent through conversations with nurses and other staff that this tends to not be true. Nurses have a dedicated section in a patient's eRecord that they are able to take note of any patient items, but this section of the eRecord goes underutilized. Causes for this underutilization include improper training for new nurses when sometimes they are not taught about this section of the eRecord, as well as the chaotic environment that nurses operate in, needing to manage multiple patients at once with a plethora of checklist items they are expected to cover with every patient. Ownership of the belongings process is also dynamic throughout the course of a patient's stay at a hospital, being owned by transportation,

nursing, and occasionally other departments at different times without an explicit transfer in responsibility. Even when patient belongings are documented by nurses, there is rarely an update when patients move throughout the hospital. If it is known that a patient comes into the hospital with certain items, but an item goes missing over the course of their stay, there is no audit trail that allows hospital staff to identify where an item went missing. If the eRecord was updated each time a patient entered a new nursing unit, it could be quickly identified that items went missing during their transportation, for example.

Not only is the belongings process confusing among hospital staff, but also there is little value-adding activity encompassed in it. Rather than being a process that enhances the patient experience, the belongings process is more of a defense against a poor patient experience. As such, one of the goals of a project like this is to reduce the amount of non-value adding steps and time. One of the largest non-value adding steps is the patient relations involvement when items go lost. This team spends time and resources to investigate each reported case of missing belongings, as well as processing the reimbursements if it is determined that UPMC shall assume fault. This non-value adding step can be eliminated by ensuring a consistent tracking process of items, so the percentage of patient stays resulting in lost belongings decreases.

The final note of this process is that UPMC does not inherently assume responsibility for items going missing. Patients sign a waiver that clears the hospital of responsibility for any lost, stolen, or damaged items. Despite this official stance, the hospital does acknowledge that it can be at fault for these cases, so it treats lost items on a case-by-case basis to determine next steps. The one classification of items that will always be reimbursed are clinical items, such as eyeglasses, dentures, and hearing aids because those are the types of items that patients need to assist them with their daily living. UPMC also makes exceptions and will consider reimbursing for cell

phones, jewelry, and other missing items if it can be proven that the patient did enter the hospital with those items. This practice conflicts with the organization's official stance, because leaders in the hospital recognize that there is a patient experience component associated with this process. If an item is lost and the hospital refuses to take any responsibility, patients will be disgruntled. Not only does this hurt the hospital's chances of retaining that patient for future medical events, but also it hurts UPMC's public image and can even have an impact on federal reimbursement rates, which are partially tied to patient experience metrics.

The main findings from the measure phase of this project highlighted the inconsistencies in practice at different levels of this process. The process of securing valuables is a highly functioning process with rare issues or concerns, but the belongings process finds itself with more problems. The best opportunity for improvement is to avoid items going missing altogether, which pertains to proper documentation and tracking of items throughout a patient's stay at the hospital. The analyze phase will use the information learned during the measure phase to consider the root causes contributing to the issue and assess the data collected on the process to inform decisions.

2.3 Analyze Phase

Being a people-oriented process, there are limited quantifiable key performance indicators available to assess the process beyond the annual report of the number of cases and costs associated with those cases. As noted before, the problem with lost belongings peaked in 2020 totaling $50,975.82 from 51 cases. However, valuable information was obtained by sending a survey out to the staff of the various departments involved with the belongings process. The goal of the survey was to ask questions to understand how well each functional area knew the policy and to identify

inconsistencies between different areas in how they each approach handling patient belongings. This survey allowed for information to be collected from a broad range of members working in the hospital, and not just the leaders of particular departments. In total, 57 different stakeholders responded to the survey, consisting largely of nursing staff, but also had sufficient representatives from patient transport, patient relations, and security.

Survey respondents were split on one of the most telling questions of the survey: "Do you feel the lost belongings process works in your area?" Only 45% of respondents believed that the process is adequate for handling belongings for patients, with 40% saying that they did not believe it was an adequate process. The remaining 15% of respondents believed that the process worked some of the time. Another question, designed to gauge how consistently units are tracking the belongings that patients have, suggested that there is a clear ownership problem in this process. In response to, "Does your unit keep an inventory log of valuables and/or belongings?", 82% of survey respondents indicated that they do not keep track of any items. To further emphasize this issue, 77% of those who do keep track of items only keep a paper log of any patient items, leaving no ability to track this information across multiple units or functional areas. There are two main goals of keeping track of patient items. First, knowing what items patients have with them makes it less likely that they will be lost, because staff will be able to check that a patient is still in possession of those items. Second, having record of these items makes it easier to track down a lost item. Unfortunately, these paper logs are not very helpful in aiding this recovery process, because other units are not able to access this information. Survey respondents were also asked if they knew the difference between valuables and belongings, or if they were trained on the difference between the two. A shocking 23% were well-informed on the difference between valuables and belongings, highlighting one of the main issues in this process. Without knowing

the difference in how these items are defined, it is impossible to involve the correct parties, security or otherwise, to keep track of them. This survey was a helpful tool in understanding where issues are originating and what can be improved to tackle these issues.

The next step in this phase was to perform root cause analysis. Performing the "5 Whys" (see Figure 1) emphasized the points made earlier through stakeholder interviews and the staff survey that there is a lack of ownership of belongings and that there is an issue of education among staff. Nurses often will not document belongings in the patient's eRecord because they are too busy completing other clinical tasks or because they simply do not know that they are supposed to document belongings at all. This brings light to one issue with the current process, it is not easy or convenient to document in the current process.
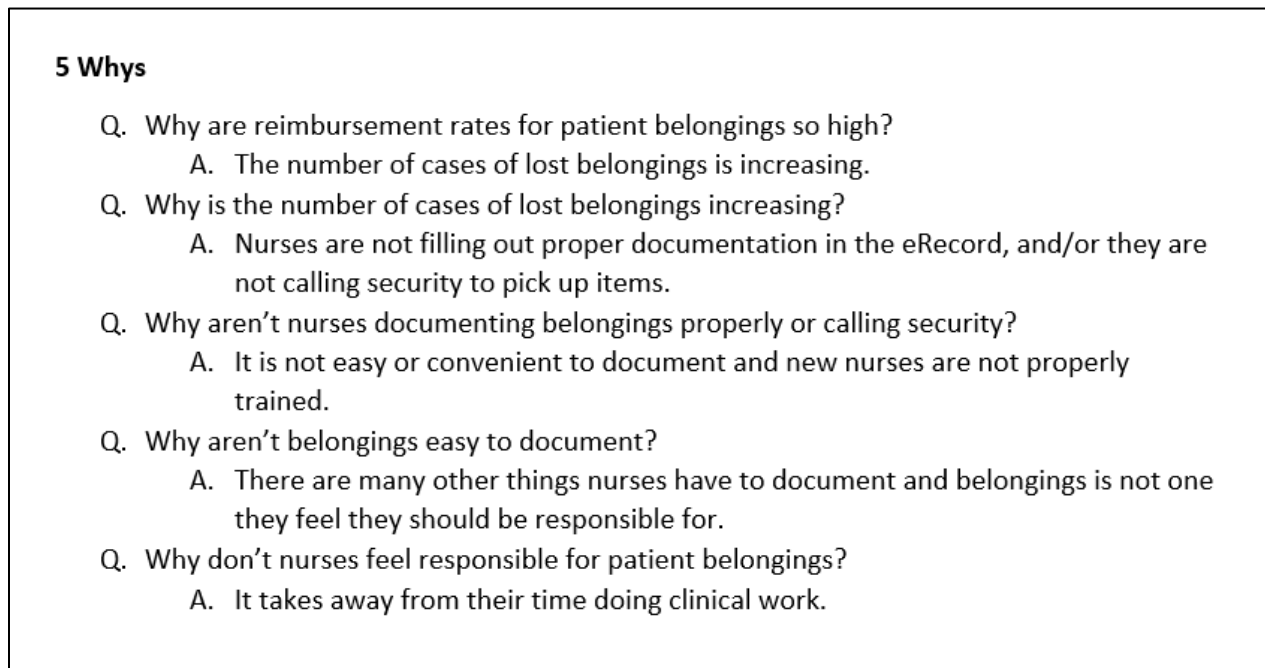
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5 Whys

Q. Why are reimbursement rates for patient belongings so high?
   A. The number of cases of lost belongings is increasing.
Q. Why is the number of cases of lost belongings increasing?
   A. Nurses are not filling out proper documentation in the eRecord, and/or they are not calling security to pick up items.
Q. Why aren't nurses documenting belongings properly or calling security?
   A. It is not easy or convenient to document and new nurses are not properly trained.
Q. Why aren't belongings easy to document?
   A. There are many other things nurses have to document and belongings is not one they feel they should be responsible for.
Q. Why don't nurses feel responsible for patient belongings?
   A. It takes away from their time doing clinical work.

Figure 2. Lost Belongings "5 Whys"

Creating a Fishbone Diagram (see Figure 3) was also helpful in the root cause analysis for this project. The diagram helped to analyze the entire process, and divide causes into six different cause categories from which problems can occur, as well as take note of what can be controlled and where the greatest areas of opportunity are. Method and environment were the two areas of the process that were identified to be the most impactful opportunities for improvement. Two particular methodological issues were identified as being key drivers of the problem among the nursing staff. First, as discussed prior, the process of documenting patient belongings by nurses was identified as being a problem area. The lack of documentation, the incorrect or non-involvement of security to deal with patient valuables, and the poor training of staff all lead to items never being documented at all, ultimately allowing items to be lost more easily. Second, the inconsistencies between different nursing units in how they handle lost and found items is another methodological issue. Some units do not hold onto lost and found items at all, others hold onto them in different locations (and sometimes violate Joint Commission standards by storing too close to ceiling or in hallways); there is no standard practice for how long lost and found items are held; and documentation and tracking of lost and found is inconsistent, if performed at all. Standardizing these processes across all units in both hospitals will allow for greatly improved documentation and ability to recover lost items in a timely manner. Another key problem area is the patient's physical room. There are no obvious indicators with the patient room, for the patient or the nurses, that patients have items in their possession. Making it visibly obvious that patients have items will help both parties to remember to keep track of them at multiple stages throughout the inpatient stay.
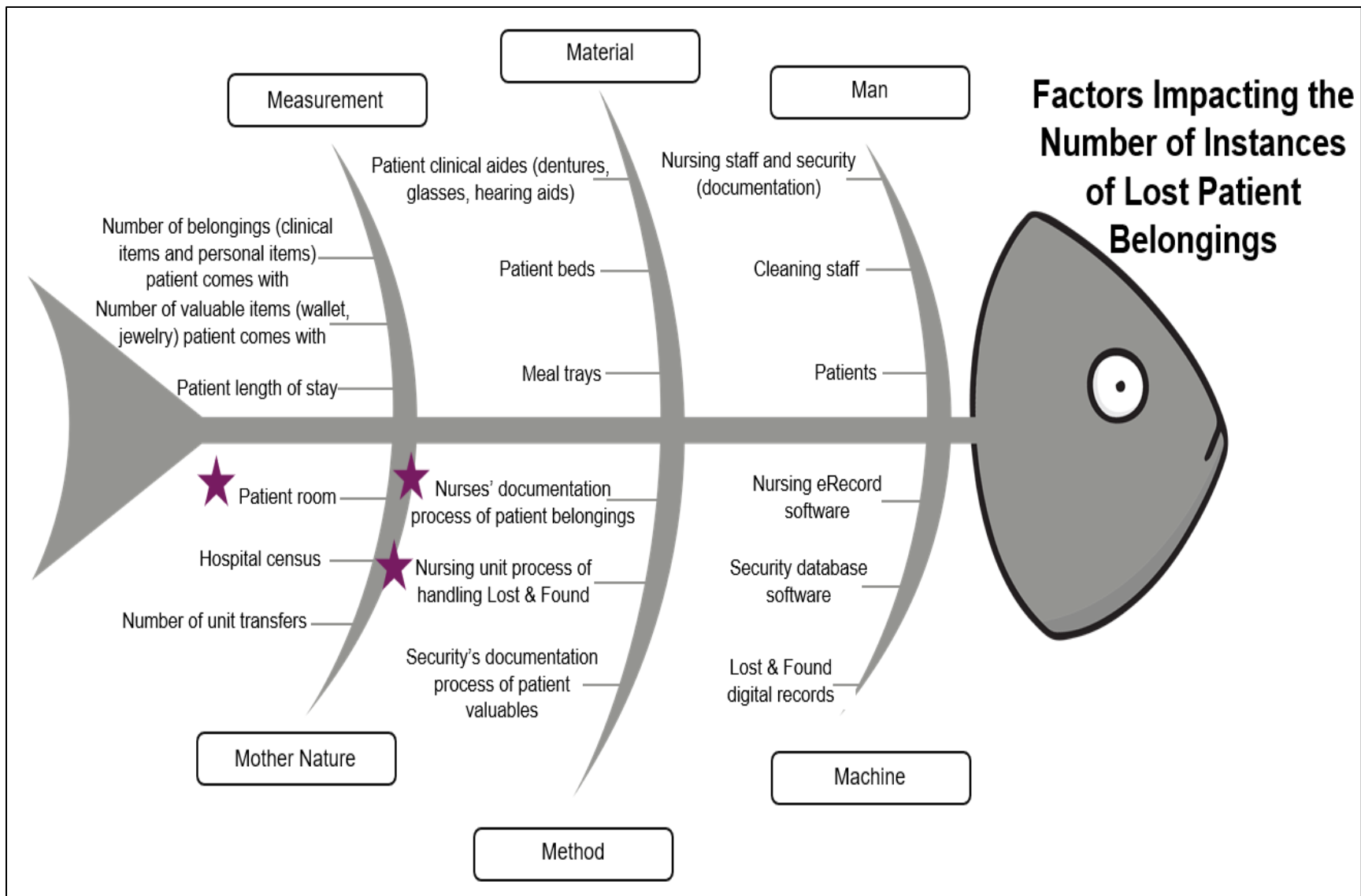
Figure 3. Lost Belongings Fishbone Diagram

Analyzing the data and assessing the information gathered by hospital staff during the analyze phase allowed for the identification of the vital few problem areas with the current process. Understanding the most important deficiencies helps for the development of recommendations that will address each of these target areas to improve the process moving forward.

2.4 Improve Phase

The primary goal of the improve phase was to synthesize the findings from the analyze phase into a few concrete recommendations to present to the Executive Management Group for UPMC Presbyterian Shadyside. Being primarily a people-centered process, the best opportunities for improvement are reducing waste at different steps in the process to reduce the number of errors and ultimately reduce the number of cases of lost belongings. According to Bharsakade et al., "Almost every healthcare process consists of wastes like wasteful motions, procedural errors, communication errors, etc. It is critical to identify the presence of these wastes in day to day healthcare delivery" (Bharsakade et al., 2021). The biggest wastes identified throughout the project are procedural errors and communication errors. Staff not completing the required steps to keep track of items and miscommunication between functional areas both lead to errors, creating waste for the entire process. Therefore, the improvements that will have the largest impact on the success of the patient belongings process are those which make it easier to identify and keep track of items and those which improve communication between functional areas.

The first recommendation is to develop a set of standard operating procedures (SOP) to deal with patient belongings. The valuables process has a very regimented process with security picking up items, patient signing off on those items, and security storing those valuables until the

patient is discharged. This process also has very few errors, because all procedures are standardized across both campuses and there are no questions about what to do. The emergency department at UPMC Presbyterian Shadyside has its own set of operating procedures to handle belongings, but that SOP is not generalizable to other nursing units because of the time-sensitive nature of emergency department patients. The ED takes all valuables *and* belongings from a patient, because staff there do not have the time to sort through and categorize items. The new standard operating procedures that are written for the nursing units should clearly identify who is responsible for patient belongings *at each stage of a patient's hospital stay.* This should include multiple points of documentation when patients are transported from one unit to another. Once all staff know who is responsible for the process, there will be less confusion that and it will result in fewer incorrect documentations or non-documentations. A well-communicated policy paired with proper training and education among staff will help to reduce a large portion of the errors that result in patient belongings getting lost.

The second recommendation is that the white boards in patient rooms should be designed to include a section for common patient belongings. The most common belongings that patients have on their person in the hospital are cell phones, eyeglasses, hearing aids, and dentures. If a small section of the patient white board included checkboxes to note which items a patient has, the nurses and patients would both be able to keep track of items better. One quality standard for the hospital is that nurses are expected to round on their patients every hour to check in with them. The patient white board is used as a communication tool to help inform the patient about different parts of their procedure, and a lot of the information on this white board is communicated during nurse rounds. With a checklist in place, every hour the nurse can check with the patient that they still have all of their belongings to keep inventory. If the patient accidentally left their dentures on

their meal tray that was disposed of, this communication between nurse and patient would allow for the missing dentures to be identified early so they could be recovered. The more time that passes, however, the less likely it is that those disposed off dentures will be found, and the hospital will end up bearing that cost burden.

The last recommendation to impact the success of the patient belongings process is to dedicate a small section of the room for a clearly visible self-storage space for items. An apparatus such as a clear box on the patient's bedside would not only be a dedicated space for patients to store items, but it would also make it very easy for patients, nurses, and other staff to see that a patient has items with them. The best way to prevent errors is to have it immediately obvious when something is wrong. Making it clearly visible will prevent items from being forgotten altogether, and it will be quick and easy to find them and return them to the patient in the event they do get left behind.

There are two elements to implementing these improvements. UPMC Presbyterian Shadyside is in the early stages of building a brand-new bed tower to house inpatients at the Presbyterian campus. This project is offering the hospital a chance to design patient rooms with a clean slate, allowing for the most innovative and advanced technology to be incorporated into the design. These physical recommendations – white boards and storage boxes – can easily be included in the design plans. The white boards in particular are expected to be digital patient communication boards, so there will be tremendous flexibility in the design elements. Another benefit of this is that the patient communication boards are already being incorporated into the building design, so there will be no added cost associated to including a belongings checklist.

Working within the existing infrastructure is more difficult because patient rooms are already laid out. It is recommended to adapt a phased approach to adding white boards and storage

boxes to spread costs over a few years. The existing white boards in patient rooms include a glass cover with room for an insert with all of the necessary nursing information on it. It is only essential to update the white board inserts, not the entire apparatus. Each of these custom inserts costs approximately $150, but the per unit cost may decrease depending on the vendor and the number purchased. The bedside storage bins can also be purchased for as low as $10 per unit. If adopted, these changes would be recommended to be made over the course of five years to make the annual costs of the changes manageable.

There are plenty of opportunities for improvement in the patient belongings process. Reducing the waste associated with errors and miscommunication between teams will help to dramatically decrease the rate of lost belongings, reducing the annual reimbursement burden for the hospital as well. The hospital can choose which of the implementation strategies it would like to adopt, but the new bed tower project being undertaken by the hospitals provides a tremendous opportunity to start fresh with these additions.

2.5 Control Phase

Any intervention needs to have a proper control plan to ensure the sustainability of that intervention. With the recommendations put forth in the previous section, the control plan should revolve around the continued use of the tools provided from the interventions, as well as ensuring the adequacy of the process procedures. First, it is essential to continue to monitor both the number of cases of lost belongings each year and the costs of those cases. There are no leading metrics associated with this process, so it is difficult to monitor any predictive values of process capability. However, if either of those metrics starts an increasing trend, the process should be reviewed to

assess if there are any problems with procedural compliance. Second, the standard operating procedures should be reviewed annually to determine if there are any amendments that need to be made to best fit the model of healthcare delivery. Modern hospitals are constantly changing how they operate, so an annual review will allow the policies to stay updated with current practices in the hospital. Third, a quarterly audit should be conducted of the utilization of both the patient communication boards and the bedside storage bins. These tools are only useful if they are utilized, so understanding why staff may not be utilizing them at a high rate can help make adaptations to ensure the best quality and experience for patients. The DMAIC phases up through this point allowed for the patient belongings process to be analyzed and for improvement recommendations to be created. Support from hospital leadership and ongoing monitoring of the process will allow for deficiencies to be found early and will allow for benefits of these improvements to sustain for years beyond the completion of this project.

3.0 Conclusion

A Lean Six Sigma project intends to improve quality and decrease costs by reducing errors and improving efficiency. The healthcare industry is also increasingly focused on improving the quality of healthcare delivery. Insurance reimbursement rates are now determined, in part, by quality-of-care metrics and patient experience metrics. Although there are costs associated with adopting the recommendations from the improve phase, these improvements are expected to decrease the current reimbursement cost of the hospitals by around $30,000 per year. These savings compound year over year, so the long-term savings are large compared to the current operating status of the hospital. These improvements also have impacts on the quality of care delivered by the hospital. Better tracking patient belongings decreases the number of instances of poor patient experiences. Having the hospital lose something of value to a patient can instantly turn their experience from a favorable one to an unfavorable one, no matter how great the healthcare services provided to the patient were. Reducing these poor satisfaction results will improve Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores for the hospital. Improving this process also improves the overall quality of care delivered by the hospitals by improving documentation and communication with patients. Communication between patients and providers is a highly emphasized part of clinical quality in modern healthcare delivery, which is the same reason that patient white boards exist. Adding another element to this communication further enhances quality standards in the hospitals. Quality of care and innovation are the top priorities for UPMC as a health system, so improving the patient belongings process aligns with the organizational values and provides them long-term financial and clinical benefits.

Appendix A Lost Belongings Employee Survey Results

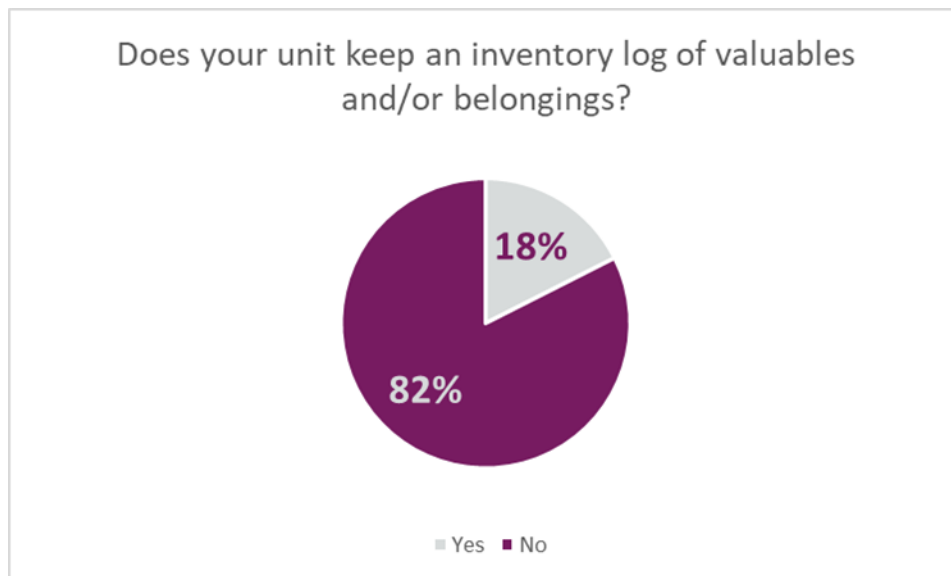**Figure 4. Percentage of Survey Respondents Who are Satisfied with Belongings Process**

Figure 5. Percentage of Survey Respondents Who Track Lost Belongings in Their Functional Area
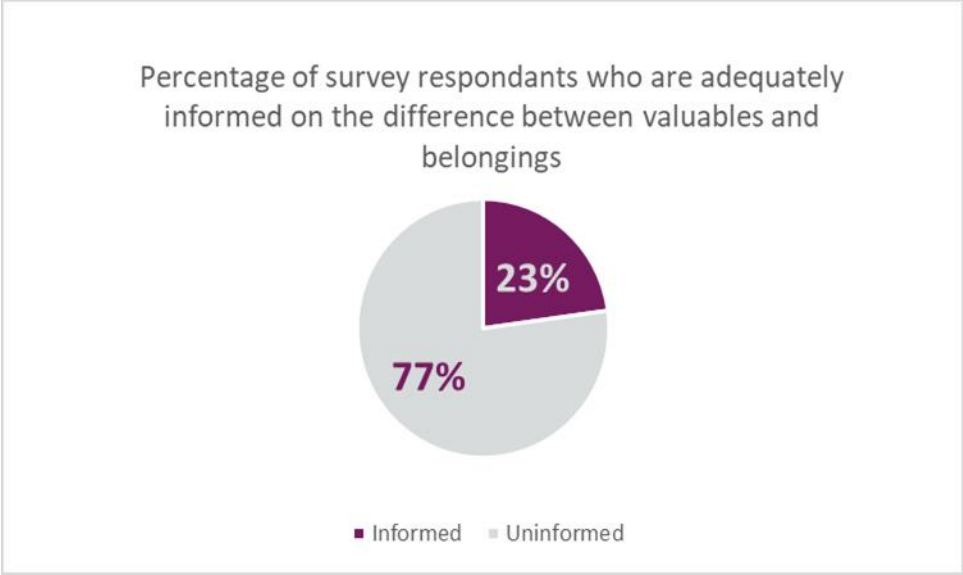
Percentage of survey respondants who are adequately informed on the difference between valuables and belongings

23%

77%

■ Informed   ■ Uninformed

Figure 6. Percentage of Survey Respondents Who Can Define the Difference Between "Valuables" and "Belongings"

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