Improving Medication Reconciliation in a Private Emergency Department

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Improving Medication Reconciliation in a Private Emergency Department

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Declaration Form

I declare that this dissertation, which I submit to RCSI for examination in consideration of the award of a higher degree MSc Physician Associate Studies, is my own personal effort. Where any of the content presented is the result of input or data from a related collaborative research programme this is duly acknowledged in the text such that it is possible to ascertain how much of the work is my own. I have not already obtained a degree in RCSI or elsewhere on the basis of this work. Furthermore, I took reasonable care to ensure that the work is original, and, to the best of my knowledge, does not breach copyright law, and has not been taken from other sources except where such work has been cited and acknowledged within the text.

Signed: Jessica Talbot
Date: 25th September 2021

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Abstract

Medication reconciliation is the challenging process of obtaining the most accurate and up to date list possible of all the medications a person is taking. The World Health Organisation state that medication errors are one of the leading causes of injury and preventable harm in health care systems worldwide. They believe the yearly cost associated with these errors to be approximately $42 billion USD. They, along with other organisations, such as the Health Information and Quality Authority are dissatisfied with the accuracy of medication reconciliation in health care settings around the world and have called for improvement. The aim of this quality improvement project was to improve medication reconciliation in a private Emergency Department using the Define, Measure, Analyse, Improve and Control (DMAIC) framework of quality improvement, along with other tools such as process flow maps, a stakeholder analysis and a fishbone diagram. Data analysis found thirteen out of nineteen patients (68%), aged between twenty-one and eighty-two, who attended the Emergency Department took regular medications. Just one out of the thirteen patients (8%) was able to correctly provide their medication names and doses from memory alone. By using quality improvement tools, it was determined that the introduction of medication passports for patients could improve medication reconciliation within the department. It is believed that these passports would not only improve medication reconciliation but will also decrease medication errors and more importantly, increase patient safety.

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Chapter 1 Introduction

1.1 Introduction

This opening chapter introduces the Quality Improvement Project Plan (QIPP) to the reader. Firstly, the organisation, in particular the specific department, where the QIPP took place is discussed. Following on from this, the rationale for the QI project is explained, along with research that has explored similar projects to this one, the objectives of the QI project are defined, followed by a brief description of the Physician Associate (PA) student's role in the organisation and in the QI project itself. The chapter concludes with a brief summary of the above.

1.2 Description of the Organisation

This QI project was carried out in one of the Royal College of Surgeons' (RCSI) teaching hospitals which is located on the outskirts of Galway City. It is a private hospital which opened in 2004, with the main aim of introducing cancer services to the west of Ireland. At the moment, the hospital employs one hundred and forty doctors and surgeons and has the capacity for nearly one hundred and fifty inpatients. Over sixty different specialities are catered for, including services such as cardiology and oncology treatment. They also provide the largest range of treatment for prostate cancer in the west of Ireland (Galway Clinic, 2021).

The QI project was undertaken within the hospital's Emergency Department (ED). It is open Monday to Friday, from ten in the morning until six in the evening, and Saturday from ten until five. Due to Covid-19, it is appointment only, meaning patients must provide a referral letter from their GP to the ED consultant before an appointment can be made for them.

1.3 Rationale for Quality Improvement

During my time on placement with the ED team, an issue arose around medication reconciliation within the department. It was clear that the majority of patients who presented to the ED did not know the names or doses of their daily medications when asked by the ED staff and the medication lists obtained from them often did not match the lists in their GP referral letter or from their pharmacy. This made medication reconciliation very difficult for the staff to complete and compromised patient safety.

Medication reconciliation can be described in many different ways, one of which is 'the process of creating the most accurate list possible of all medications a patient is taking …and comparing that list against the physician's admission…with the goal of providing correct medications to the patient at all transition points' (IHI, 2021). The main aim of medication reconciliation is to identify and correct medication discrepancies before they cause harm to patients (Patel *et al*., 2019).

The European Collaborative Action on Medication Errors and Traceability (ECAMET) alliance states that the majority of adverse events that occur in hospitals are due to medication errors and that they are the most likely errors to lead to patient morbidity and mortality (ECAMET, 2021). The World Health Organisation (WHO) also state that medication errors are one of the leading causes of injury and preventable harm in health care systems worldwide, while they believe the yearly cost associated with these errors to be approximately $42 billion USD (WHO, 2021). The WHO, in 2017, introduced a global patient safety challenge called 'Medication Without Harm' in response to these findings which aims to reduce severe, avoidable medication-related harm by 50% worldwide within the following 5 years. The results of this challenge are

not yet available, but it is evident that the WHO and other institutes appreciate the significance of reducing medication errors and believe that it could improve patient safety.

After observing how medication reconciliation was completed in the ED firsthand and researching the topic, it is clear that there is room for improvement and that a QI project in this area could be beneficial.

1.4 Aim and Objectives

The main goal of QI projects is to identify an issue within an organisation, construct a plan that could lead to improvement of the issue and implement a strategy in order to enhance results. One of the most reliable methods used for developing quality objectives is applying the 'SMART' acronym which stands for Specific, Measurable, Achievable, Realistic and Timebound.

1.4.1 Aim

The aim of this QI project is to improve medication reconciliation in a private Emergency Department (ED).

1.4.2 Objectives

The objectives of this project are to:

1. Investigate how and where in the patient's ED journey medication reconciliation takes place by February 2021

2. Measure what percentage of patients that present to the ED can correctly provide the names and doses of their regular medications without the use of an aid by February 2021

3. Determine which intervention would be the most likely to improve medication reconciliation within the ED by May 2021

1.5 My Role in the Organisation and in the QIP

As a physician associate student undertaking the PA Masters in RCSI, I must complete a quality improvement project in an area I have identified as needing improvement. My role within this organisation was as a PA student. I spent six weeks on placement with the ED team which allowed me to observe how medication reconciliation is currently carried out by the ED staff and gather relevant QI data. I was an outsider coming into the ED as a PA student who had very little power and influence, so it was important for me to work closely with the team who would have much more power and influence than me. I worked with the different staff members, including a PA on the team, as part of my QI project. I needed to communicate with administration staff, staff nurses and doctors in order to complete all of my tasks. I gathered information from patients, their charts, analysed the data and constructed suggestions regarding quality improvement.

Furthermore, I liaised with the ED PA regularly to update her on my progress and received feedback on how I could better the project. I also kept in contact with my project sponsor, the ED consultant, to get their input as well to ensure I was carrying out this project to the best of my ability. It was crucial to involve the project sponsor as

much as possible as I would not be able to introduce any proposed changes myself as a PA student but the project sponsor, along with the other relevant stakeholders, would be able to facilitate the implementation of this QI project.

1.6 Summary

This chapter provided an overview of the QI project beginning with an introduction to the organisation that hosted the project, before discussing the rationale behind choosing this project in particular, the aim and objectives selected and finally the student's role within the organisation and the project itself. Chapter two reviews literature relevant to the QI project. Following on from that, chapter three outlines the methodology, and what QI tools in particular were relevant to identify where improvements could be made, while methods considered for evaluating data and ensuring sustainability of changes is discussed in chapter four. Lastly, chapter five describes the final conclusions of the project, including the impact of the project on the stakeholders and the organisation, its strengths and weaknesses, learnings taken from developing a QI project and an overall summary of the findings.

Chapter 2 Literature Review

2.1 Introduction

This chapter reviews literature that is relevant to improving medication reconciliation in a private ED. The literature was identified by using a search strategy and three themes emerged which are discussed in more detail below. The first theme examines medication recall and errors during transition of care, the second theme explores the approach to medication reconciliation in Ireland, while the third theme discusses strategies currently being used to improve medication reconciliation. The implications of this literature review on the QI project and an overall summary are included.

2.2 Search Strategy

The first step of sourcing literature involved carrying out a broad search of the topic using the phrase ‘medication reconciliation’ using PubMed and Google Scholar. In order to identify more relevant papers, key words such as ‘emergency department, transition of care, medication recall, medication accuracy, error rate, quality improvement and improvement strategies’ were used. All studies published before 2016, excluding key papers, were omitted. In total fifty-eight papers and websites were referenced as part of this QI project, including eight sources from Ireland. Information was obtained from websites such as hse.ie, stateclaims.ie, privatehospitals.ie, citizensinformation.ie, hiqa.ie, who.int, ihi.org and jointcommission.org.

2.3 Review of Themes

Three key themes emerged from reviewing the literature. They are as follows: medication recall and errors during transition of care, approach to medication reconciliation in Ireland and strategies to improve medication reconciliation.

2.3.1 Medication Recall and Errors During Transition of Care

It is common practice for patients to transition between healthcare settings, such as from a Primary Care Provider (PCP) office to an Emergency Department, or from being an in-patient in hospital to home (Lester *et al*., 2019). Due to this frequent transition between settings, a process known as medication reconciliation can be used to ensure patients and the people caring for them have the most accurate and up-to-date list of medications to help prevent complications such as adverse drug events (ADEs) and polypharmacy (Lavan *et al*., 2016).

Organisations such as the WHO, the Institute for Healthcare Improvement (IHI) and The Joint Commission (TJC) have all acknowledged that medication reconciliation is an important process to promote both medication and patient safety, however, their definitions differ slightly (Almanasreh *et al*., 2016). The TJC states 'the best medication reconciliation requires a complete understanding of what the patient was prescribed and what medications the patient is actually taking', they acknowledge that it can be difficult to gather an accurate list but 'a good faith effort to collect this information is recognised as meeting the intent of the requirement' (TJC, 2020). Meanwhile, the WHO describes medication reconciliation as 'the formal process in which health care professionals partner with patients to ensure accurate and complete medication information transfer at interfaces of care' (WHO, 2014).

It is evident that the WHO consider medication reconciliation an important topic as they launched the ‘High 5s Project’ in 2006. This aimed to develop and implement Standardised Operating Procedures (SOPs) to address five worldwide patient safety concerns in five countries over five years, one of which was assuring medication accuracy in transitions of care as medication errors often occur at this point (WHO, 2008). The countries included were Australia, Canada, Germany, the Netherlands, New Zealand, the United Kingdom and the United States. They also introduced their global patient safety challenge, ‘Medication Without Harm’ in 2017. Even though these projects were launched in 2006 and 2017, it is evident medication errors still occur regularly throughout the world.

The accuracy of older adult patient medication recall in an American ED was explored (Goldberg *et al*., 2021). One hundred and sixty-four patients over the age of fifty were asked to list their mediations to see if they could match their pharmacy medication list. The patient and pharmacy lists were then compared to their electronic health record (EHR). 23% of patients completely matched up their own lists with their pharmacy record, while 21% of pharmacy records matched with the EHR. Patients were allowed to consult family members, medication lists or refer to their medication boxes if they had them and it was found that those who relied on memory alone were significantly less likely to match their pharmacy record. The study concluded that recall errors could lead to ADEs, especially in those of older age or those with polypharmacy. It also stated that aids such as medication lists or linking pharmacy and EHR records could improve the accuracy of medication reconciliation.

Two hundred and thirteen patients with chronic conditions were interviewed about their knowledge of their medications (Rahman, 2020). Individual interviews were carried out

with the patients where they were asked a number of medication related questions. 26% of patients were able to name the brand names of all of their medications when asked but 55% could not identify the doses they took. Nearly 25% did not know the purpose of all of the medications they were taking. They advised that routine medication reviews could help improve patient's understanding of their medications.

Medication error rate was evaluated in an American hospital for patients being discharged from the ED (Gregory *et al*., 2020). Over 115,00 prescriptions written by both emergency residents and non-emergency medicine residents were analysed retrospectively over a four-year period. Medication errors were found in 16.5% of those prescriptions. Emergency residents were more likely to give incorrect directions for taking the medications, while non-emergency residents were more likely to make mistakes regarding medication quantity and refills. Drug categories that had the highest rates of error were lipid lowering, antiplatelet, topical, antidiabetic and anaphylaxis medications. The study concluded that these results could help organisations develop strategies to reduce the amount of medication errors in prescriptions given on ED discharge.

Similarly, a study carried out in Malaysia explored the amount of medication errors that occurred in their ED over a 9-week period and if they led to adverse events (Shitu *et al*., 2020). Three hundred and eleven patients that attended ED were randomly selected to take part in this study. The medication list from their medical records was compared to the medication list obtained from the patients by the ED nurses during medication reconciliation. The results showed that 95% of the nurse's medication lists had at least one medication discrepancy when compared to the medical record lists.

The three most common mistakes were wrong time error (46.9%), unauthorised drug error (25.4%) and omission error (18.5%), while the most common drug category for errors were analgesics. No adverse events occurred but the study stated that intervention measures were required to help reduce medication errors in the ED.

Medication error rate was also studied for patients who were referred from a PCP office to an ED of an Australian hospital over a period of twelve months (Prior *et al*., 2019). A medication list was provided by the PCP for each patient, and this was compared to a Best Possible Medication History (BPMH) taken by a hospital pharmacist. One hundred and forty-three patient records were analysed, with at least one medication error identified in 94% of cases, similar to findings by Shitu *et al*., (2020). 15.3% of discrepancies were deemed 'moderate to major' by an emergency medicine physician, while 15.6% of discrepancies carried a 'high or extreme' risk to the patient. They believed increased medication reconciliation in the community could lower the rate of medication errors in the ED.

The findings of these studies suggest that efforts should be made to improve the medication reconciliation processes worldwide, which could reduce the risk patients can be subject to when medication errors occur.

2.3.2 Approach to Medication Reconciliation in Ireland

Ireland's healthcare system is divided into the public and the private sector. The Health Service Executive (HSE) manages and funds the public sector, where services are free of charge or at a reduced cost, while private hospitals have the ability to set their own charges, which you must pay if they are not covered by private health insurance

(Citizens Information, 2018). This is similar to healthcare systems in the United Kingdom and Australia where a certain proportion of healthcare is free, but some people still pay for private insurance to avoid waiting lists or to have a wider range of services to choose from (Thomas, 2021). This differs from the United States where they do not have universal, free healthcare and most hospitals and clinics are privately owned, meaning many people cannot access the care that they need. Private EDs in Ireland are usually open during the day only and often transfer or divert very sick patients to public hospitals as they tend to have more resources than private hospitals and are open 24 hours a day. This specific project is being carried out in a private ED.

The Health Information and Quality Authority (HIQA) monitors the safety and quality of public hospitals in Ireland, while the Irish private hospitals have also voluntarily adopted their standards (PHA, 2017). Between 2016 and 2018, HIQA inspected 44 hospitals around Ireland as part of a medication safety monitoring programme. They subsequently released a report that outlined five recommendations to improve medication safety at a national level which included the need to develop a process to enhance medication reconciliation (HIQA, 2019). They define medication reconciliation similar to the IHI.

Researchers investigated medication reconciliation in two acute public hospitals in Ireland by reviewing patient health care records (Grimes *et al*., 2011). The charts of 1,245 adult inpatients who were discharged with at least one regular medication prescribed were reviewed. Results found there was at least one medication error in 50% of the charts. One hundred of the charts containing medication errors were selected to determine the potential impact on patient health. The study found 63% of

these errors had the potential to cause moderate harm to patients, while 2% had the potential to cause severe harm. They suggested that medication reconciliation should occur at patient admission and discharge from hospital. Medication incidents including medications that were not reconciliated accounted for 14.7% of the 10 most common clinical incidents in Irish public hospitals from 2010-2014 (State Claims Agency, 2017).

A study from 2019 explored how much time was spent on medication reconciliation and if it was cost-effective (Walsh *et al*., 2019). Pharmacists in an Irish geriatric medicine ward were asked to time how long it took to complete medication reconciliation for each patient admitted over a three-month period. They were asked to document if there were challenges when performing medication reconciliation and if that had an impact on the time spent completing it. From their research of the literature, they found the time taken varied between twenty and ninety-two minutes. Eighty-nine patients were included in the study. Medication errors were identified in 46% of patients, while 'additional time' to complete medication reconciliation was required for 47% of patients. The study predicted the annual five-year cost for the mean additional time of 3.75 minutes for reconciliation would cost over €1.8 million. It concluded that spending additional time on medication reconciliation is associated with economic burden and that there is a need to improve communication about medications between primary and secondary health care.

In 2020, a study was carried out exploring the barriers and facilitators of medication reconciliation during transitions of care in Ireland (Redmond *et al*., 2020). Semi structured interviews were held with thirty-five different healthcare providers (HCPs) – eleven community pharmacists, eight hospital pharmacists, nine hospital consultants,

five GPs and two Non-Consultant Hospital Doctors (NCHDs). Barriers included but were not limited to; the fact that medication reconciliation is a complex process needing input from many types of HCPs, poor communication pathways between HCPs in Ireland currently, lack of staff training, unclear responsibilities, time pressure and lack of computerised systems. Facilitators, or solutions, included creating relevant SOPs, improving staff training, creating high risk medications and situations lists, enhancing communication between HCPs, increasing funding and creating prescribing databases. The study states medication reconciliation processes could be developed using quality improvement projects such as the Plan-Do-Study-Act (PDSA) cycle.

2.3.3 Strategies to Improve Medication Reconciliation

There are many different ways medication reconciliation can be improved. Some of the techniques used are discussed in this section.

Following on from the WHO 'High 5s Project' mentioned in section 2.3.1, a study aimed to determine the feasibility of introducing the use of their medication reconciliation SOP into EDs (Stark *et al*., 2020). The WHO SOP involves staff carrying out a structured interview with the patient and/or their carer with the aim of compiling an accurate and up-to-date list of all their medications. This list is then confirmed using at least two other sources of information such as consulting the patient's pharmacy, their GP or previous healthcare records. Any discrepancies are corrected, and the new confirmed list is added to the patient's healthcare record for future reference. Implementation of this SOP was evaluated by using PDSA cycles. The study described undocumented intentional discrepancies as additions, changes or discontinuations that a prescriber

intended to make but were not documented, and unintentional discrepancies as additions, changes or omissions made to medications the patient was taking prior to admission unintentionally by the prescriber that could have led to an ADE or a negative patient outcome. Results found that the mean number of undocumented intentional medication discrepancies per patient decreased from 0.34 to 0.08 after introducing the SOP, while unintentional discrepancies decreased from 0.21 to 0.16, both of which were deemed significant. This study concluded that the introduction of the WHO SOP was challenging but that it was feasible and produced significant improvements of medication accuracy for those who required admission from the EDs.

One study wished to improve their medication reconciliation process and in turn decrease their medication errors by 50% over a one-year period (Russ *et al*., 2020). Similar to studies discussed previously, this project used the PDSA methodology to determine if improvements were being made. This study focused on paediatric patients who were admitted to their hospital. Previous investigations carried out by the same authors determined that their medication error rate prior to any quality improvement project was 15% over a nine-month period. Four cycles of PDSA were used. Cycle 1 involved medication documentation training of nursing staff, data was collected during cycle 2, cycle 3 improved staff medication reconciliation and cycle 4 altered the reconciliation process to include the patient's nurse reviewing the final medication list with the home caregivers after medication reconciliation was complete. After four cycles of PDSA, the medication error dropped to 2.9% and was sustained for a twelve-month maintenance period. The study was written up at this point and no further data was available. They stated the incorporation of a feedback loop can improve accurate medication reconciliation.

In 2013, the National Health Service (NHS) in England developed a ‘My Medicine Passport’ that is now available in two formats – a passport size booklet or a phone app (Barber *et al*., 2019). The purpose of the passport is to have an easily accessible, up-to-date record of current patient medications, allergies and recent changes made to those medications to prevent miscommunication during transitions of care. It also encourages patients and/or their carers to learn more about their medications and why they are taking them. It was originally developed for those being discharged from hospital back to the community but is now available for anybody who is interested. Although studies investigating an improvement in medication reconciliation with the NHS passports could not be identified, the paper, Barber *et al*., (2019), discussed patient and/or carer experiences with the tool. One carer brought the passport with him in an ambulance and gave it to the consultant on arrival to the hospital who welcomed it and stated, ‘every patient should have one’, while another interviewee said the typical response he receives when he gives a passport to someone is ‘Can I have another for my mum/husband/sister?’. Similarly in Ireland, a ‘HSE Health Passport’ was launched in 2019 for patients with intellectual disabilities who must access a healthcare setting, which documents information about the patient, how they communicate, their medical history including any medications taken and more. However, medication passports are not available to the general public (HSE, 2019).

These studies outline just some of the strategies that could be used to improve medication reconciliation in a private Emergency Department.

2.4 Implications for the Project

The aim of this QI project is to improve medication reconciliation in a private Emergency Department. The importance of having a strong medication reconciliation process was discussed in many of the studies reviewed as part of this QI project. Multiple studies called for reconciliation to occur at both admission to and discharge from hospital. Data collection methods reviewed, such as retrospective analysis of patient charts and patient interviews, will be considered and will help inform this quality improvement project in the next chapter of this dissertation.

2.5 Summary

This chapter discussed the relevant literature on medication recall and errors during transition of care, approach to medication reconciliation in Ireland and strategies to improve medication reconciliation. The impact the literature had on how this QI project proceeds was also outlined. Chapter three explores the different methodologies that can be used as part of a QI project and what one was chosen for this particular project. It also discusses the data that was collected, the significance of the findings, what intervention was chosen and how it could improve medication reconciliation.

Chapter 3 Methodology

3.1 Introduction

Multiple factors must be considered in order to design a quality improvement project that will make a difference and quality improvement tools are used to evaluate the likelihood of a project being successful. This chapter discusses the different methodologies available for quality improvement within a healthcare setting, which one was selected for this project, the data that was collected and how that led to an intervention being developed to improve medication reconciliation in the ED.

3.2 Approaches to Quality Improvement

Quality improvement is widely used in the healthcare sector to ensure a certain level of care is provided to patients. The HSE describes quality care as care that is person-centered, effective, safe and leads to better health and wellbeing (HSE, 2021). Many QI tools have been developed to assist in the execution of QI projects and include models such as the IHI Model for Improvement, Lean, Six Sigma and Lean Six Sigma, which are often used in combination with each other.

3.2.1 IHI Model for Improvement

Walter A. Shewhart and Dr W. Edwards Deming are known as founders of quality improvement (Best and Neuhauser, 2006). In 1924, they started developing the Plan-Do-Check-Act (PDCA) cycle, later coined the Plan-Do-Study-Act (PDSA) cycle, which involves identifying an issue, trialling solutions, assessing results and implementing successful changes. Although initially developed for industry, the process has also been successfully transferred to healthcare where it is often used as part of quality improvement projects. The IHI Model for Improvement has combined the PDSA cycle

tool with three fundamental questions (IHI, 2021) which provide guidance for improvement within healthcare systems, as seen in Figure 1. The model is used by answering three questions, then moving onto the PDSA cycle and revisiting any of the sections when necessary. The most important concepts when it comes to using this quality improvement tool are setting out a clear and concise aim from the beginning and ensuring that results obtained are easily measured in order to determine if improvement has occurred as a result of the intervention implemented.

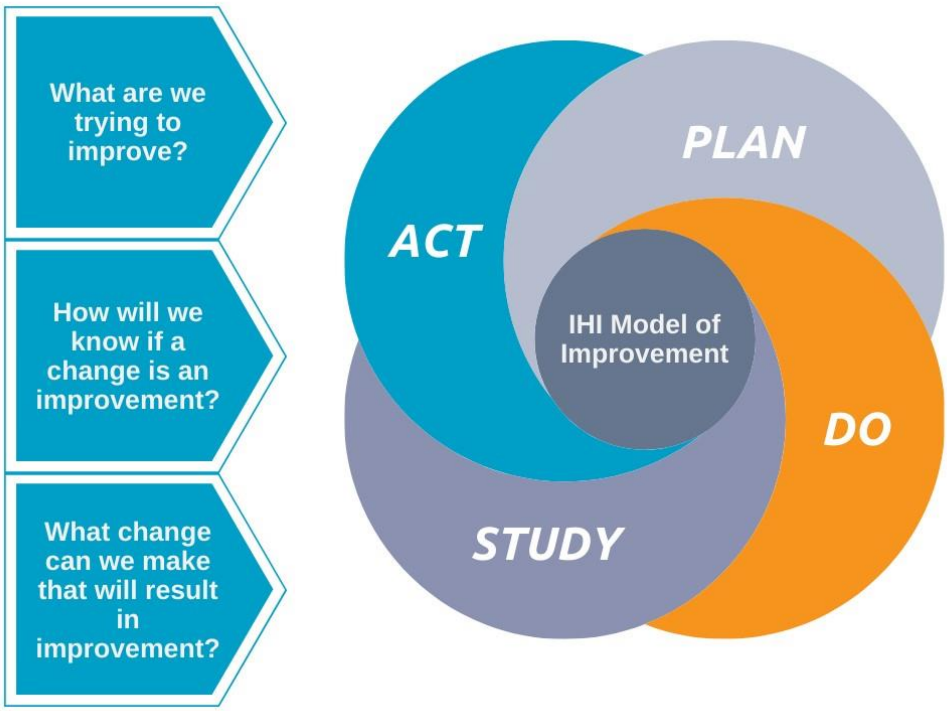

Figure 1 – IHI Model of Improvement

Research published by Reed and Card (2016) investigated studies that relied on the PDSA cycle alone for their QI projects and they found that these studies often did not yield impressive results. It was determined that the PDSA cycle would function better if it was used in tandem with another QI tool such as Six-Sigma which is discussed in a later section.

3.2.2 Lean

Similarly, to the PDSA cycle, Lean is a quality improvement process that first originated in industry and has now also been applied in the healthcare setting. The concept of Lean was first described in 1991 in a book entitled, ‘The Machine that Changed the World’, which was written by three authors who studied manufacturing at the car company Toyota (The Lean Way, 2021). They described the five principles of Lean; identify value, map the value stream, create flow, establish pull and seek perfection. The idea of Lean from a healthcare perspective is to minimise ‘waste’ by introducing, and constantly assessing, interventions that will lead to better outcomes such as reducing patient wait times or improving patient flow through a process.

3.2.3 Six Sigma

Six Sigma is a quality improvement tool that was developed for industry. Bill Smith introduced the concept of minimising errors while working as an engineer for Motorola in 1986 (Coskun and Lalongo, 2020). Six Sigma is a process that expects 99.99966% of product manufacturing to be defect free, or only 3.4 defects per million opportunities. In healthcare, a ‘defect’ can range from an issue that leads to patient dissatisfaction, such as long waiting times, to a patient dying due to a mistake that could have been avoided. Although there are differences between how Lean and Six Sigma operate, they both strive to create the most efficient system possible and have recently been combined to maximise benefits.

3.2.4 Lean Six Sigma

Lean focuses on eliminating waste, while Six Sigma focuses on eliminating errors and together, they work synergistically to guide successful quality improvement projects.

The Lean Six Sigma process often uses the DMAIC model, which is an acronym for Define, Measure, Analyse, Improve and Control (Ahmed, 2019). Research has shown that using Lean and Six Sigma in combination provides better outcomes when compared to studies that used either one or the other (Lee *et al*., 2018).

3.3 Rationale for Chosen Methodology

It is clear from section 3.2 that all of the aforementioned QI tools have their own advantages, but it is obvious that Lean Six Sigma is the most advanced option and that it's defined DMAIC framework provides a structured approach that would suit this particular quality improvement project.

3.4 DMAIC

Figure 2 outlines the DMAIC framework, the main Lean Six Sigma tool that has been chosen for this quality improvement project. The stepwise approach to improvement starts with the Define stage. During this stage, the scope of the project, the team and the stakeholders should be outlined. By the end of the Define stage, it should be clear where 'waste' is present in the current process, where the opportunities to make improvements lie and how patients would benefit from the proposed improvements (Godina *et al*., 2021). A clear Define stage is essential to keep the project focused. Following on from this, the next DMAIC stage is Measure. Here, the current process is evaluated, and a baseline is generated to see how the process is functioning before any changes are made (Smetkowska and Mrugalska, 2018). It is critical that the problem being investigated can be measured and quantified as it will eventually be possible to determine if an improvement has been made or not by comparing data from before and after the changes were introduced. The team must decide how and

what data will be collected and ensure it is reliable data based on facts as opposed to opinions. Once data is collected, the next stage is Analyse. After analysing data accurately, it will become clear what the actual cause of the problem is (Jamil *et al*., 2020). Without proper data analysis, changes can be implemented that will not actually resolve the issue as it is not targeting the correct area, therefore possible solutions should only be considered after reviewing all relevant data. From the Analyse phase, the team can then move forward to the Improve phase. As the root problem has already been identified in the Analyse phase, improvements can now be developed and implemented in the hope of improving the current process. A pilot solution is often tried and tested and can then be refined as necessary to strengthen the level of improvement (Fadol *et al*., 2019). Invested stakeholders are informed of the solutions being applied and data is collected to ensure the changes are successful in addressing the target problem. If improvements are occurring, it is important to ensure they will last long-term, and this is done so via the Control stage. Without controlling and documenting how the solutions are performing, it is easy for the process to revert back to what it once was as it can feel as though the project is completed once the solution is implemented (Ponsiglione *et al*., 2021). It is common for the Control phase to continue until a new opportunity for improvement arises and the DMAIC process begins again.

Figure 2 – Lean Six Sigma DMAIC Framework

3.4.1 Define

The purpose of this quality improvement project plan must be clearly defined by developing a problem statement. The aim of this QI project is to improve medication reconciliation in the Emergency Department of a private hospital. Stating the precise aim of the QI project provides clarity to everyone involved and ensures organisation.

3.4.1.1 Stakeholder Analysis

The first step in creating a successful quality improvement project is to determine who has a vested interest in it, who will support the proposed changes and who will be influential in ensuring that the changes are actually implemented and sustained (Lean Manufacturing, 2021). Although this step might not seem challenging, the creation of a supportive team will improve the likelihood of the project's success and longevity. Figure 3 shows all of the stakeholders involved in this quality improvement project based on how much power and interest they have in it. The most important section is the high interest and high power section which includes the consultant sponsor, other ED consultants, the ED PA, NCHDs, GPs and pharmacists. After observing medication reconciliation within the ED, the project sponsor and ED PA were the first people contacted to discuss the potential for a quality improvement project. The people within this section are labelled as 'manage closely' as they have the most interest in improving the issue of poor medication reconciliation and those that work in the ED have the most power within the hospital to make the changes required. GPs and pharmacists are also included in the high interest, high power section. Although they were not informed about the QI project, if an improvement was implemented successfully in the ED, they could also implement it themselves to help with medication reconciliation during the transition of care. The PA student writing this dissertation, ED

nursing staff and patients are included in the low power, high interest category. They do not have as much influence when it comes to this QI project, but it is important to regularly update the nursing staff and patients. Patients in particular would be highly interested as they are likely to be the primary beneficiaries of this project. The ED administration staff are placed in the low power, low interest category as the intervention will probably not affect them and in this case, they do not hold much influence over the project. With that being said, that could have changed during any part of the project if they were more involved with the roll out. No stakeholders were identified for the high power, low interest section. Now that the team is established, it is key to determine why patient medication reconciliation within the ED is poor.

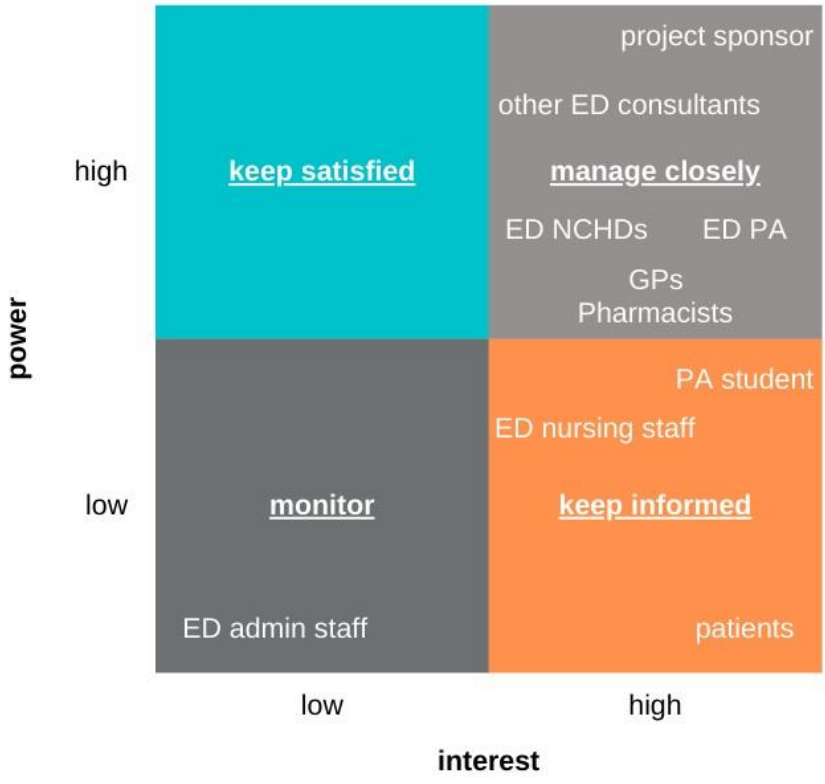

Figure 3 – Stakeholder Analysis

3.4.1.2 Process Flow Map

Process flow maps are often used as part of quality improvement projects to identify areas of waste or where improvement could be made. In order to fully understand the problem at hand, a patient's journey was followed from when they arrived to the ED to the point of medication reconciliation. As shown in Figure 4, all of the patients go through the same process up until the PA visits the patient to discuss their presenting complaint and their medications. In the patient journey that was followed, the patient did not know their medications but there was a GP letter in their chart. As it is always preferable to cross match a patient's medication list, their pharmacy was therefore called, and they were able to confirm the list. In this case, medication lists from two sources were cross matched to complete medication reconciliation. After following one patient through the process, it could be seen that many different outcomes that can occur. The patient might not know their medications, they may have a GP letter, but the pharmacy might be unavailable leading to the patient being treated with only one medication list source which is not favourable. The patient might not know their medications, they might not have a GP letter, but the pharmacy is available so again, they are treated without the medication list being cross matched as only one source is available. The worst possible situation occurs if the patient does not know their medications, no GP letter is available and their pharmacy is not available either, as seen in Figure 5. When this happens, the patient must be treated without any knowledge of their medications, which puts the patient at a higher risk of adverse drug reactions, morbidity and mortality. The ideal situation is when the patient knows exactly what medications they are on and it can be compared to a GP letter, with their pharmacy, or both. If a patient knows their medications, or has them documented correctly, it will only require either referring to a GP letter or contacting the pharmacy

to confirm the list instead of needing to rely on both the GP and the pharmacy. Overall, the patient is at a much lower risk compared to the patient with no medication list. Ideally, no patient should be treated without at least two sources of a medication list.

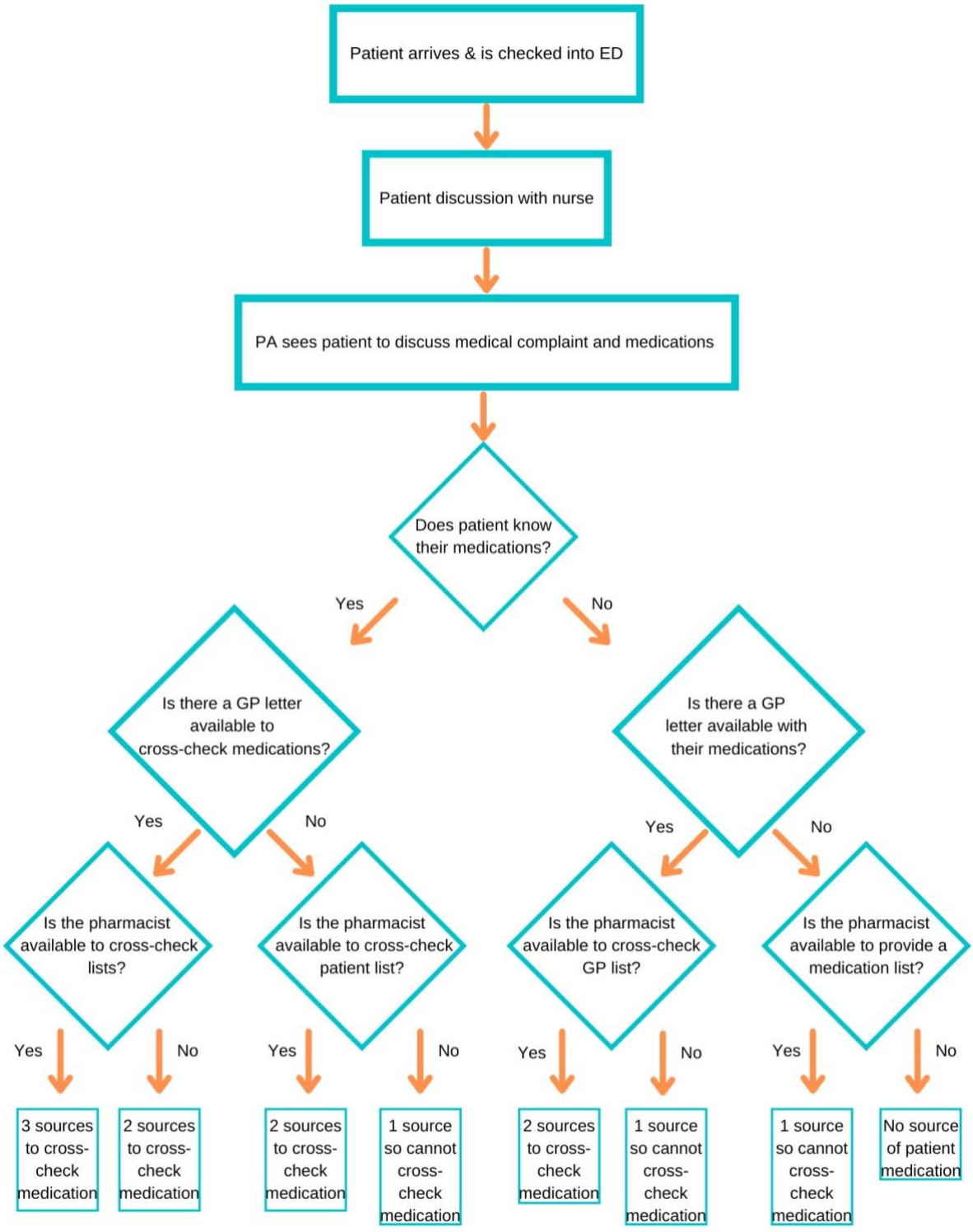

Figure 4 – Process Flow of Medication Reconciliation in the ED

Figure 5 – Issue When No Medication Source

3.4.2 Measure

The overall aim of the project, to improve medication reconciliation in a private ED, was set out in the define phase while the aim of the measure phase is to collect data in order to define a process baseline. A data collection plan was established after discussing the problem statement with the project sponsor and other members of the team.

3.4.2.1 Data Collection

It was agreed that data would be collected by asking each patient that arrived in the ED on a particular day about their medications. Data such as the number of medications they take daily, the name and dose of those medications, if they used an aid, if they were fully compliant with their medication and if they had any known drug allergies was collected. Once that data was collected, the patient files were checked for a GP letter that included their medications and their pharmacies were contacted to obtain the pharmacy's version of the medication list. Data such as the number of medications listed by the GP letter and the number listed by the pharmacy was also collected if possible.

3.4.2.1.1 Patient Demographics

As shown in Table 1, twenty patients presented to the ED and their medication details were collected for this quality improvement project. The ages ranged from twenty-one to eighty-nine years of age. The mean age was sixty-one years, while the median was sixty-two. Fourteen were females, six were males. Out of the twenty patients, fourteen took regular medications but one (patient 20) was excluded due to their diagnosis of dementia Therefore thirteen patients who took daily medication were questioned further. Figure 6 shows 68% of patients (thirteen) who were admitted to ED did take regular medications while 32% (six) did not. Of note, three patients stated they had known drug allergies as seen in Figure 7. One stated that they were not compliant with their prescribed medications which is also important to clarify with patients, as they may have medication lists but that does not mean that they actually take them.

Table 1 – Patient Demographics of ED Patients

Patient	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Age	21	38	39	43	45	49	57	59	60	60	64	66	68	68	73	75	77	78	82	89
Gender	F	F	F	F	F	F	M	F	F	M	M	F	F	F	M	M	F	F	M	F

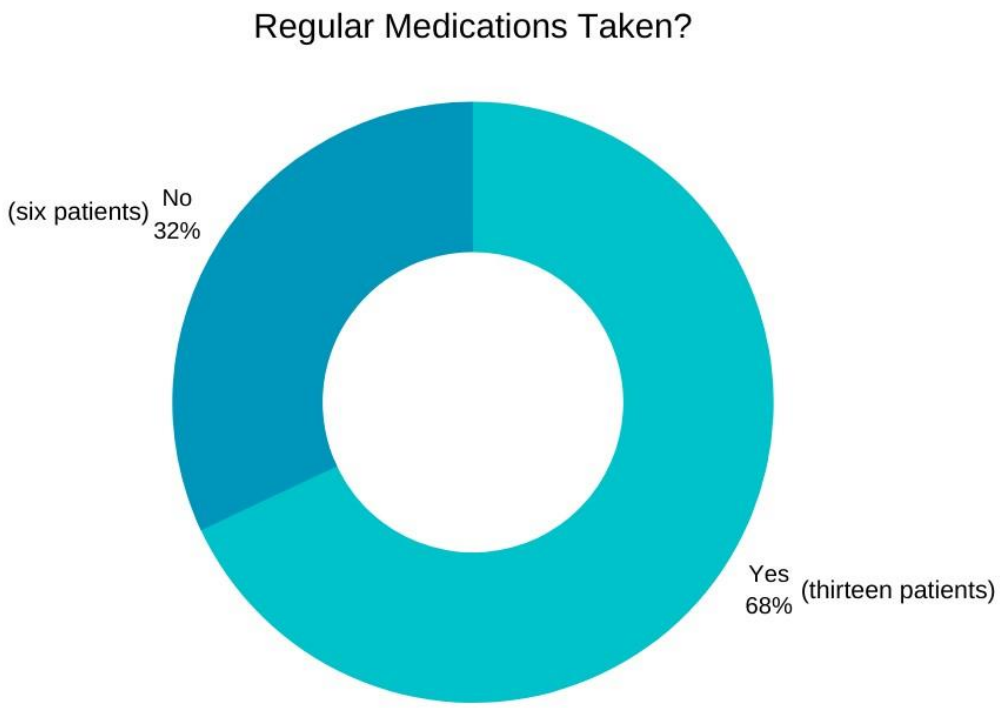

Figure 6 – Regular Medications Taken

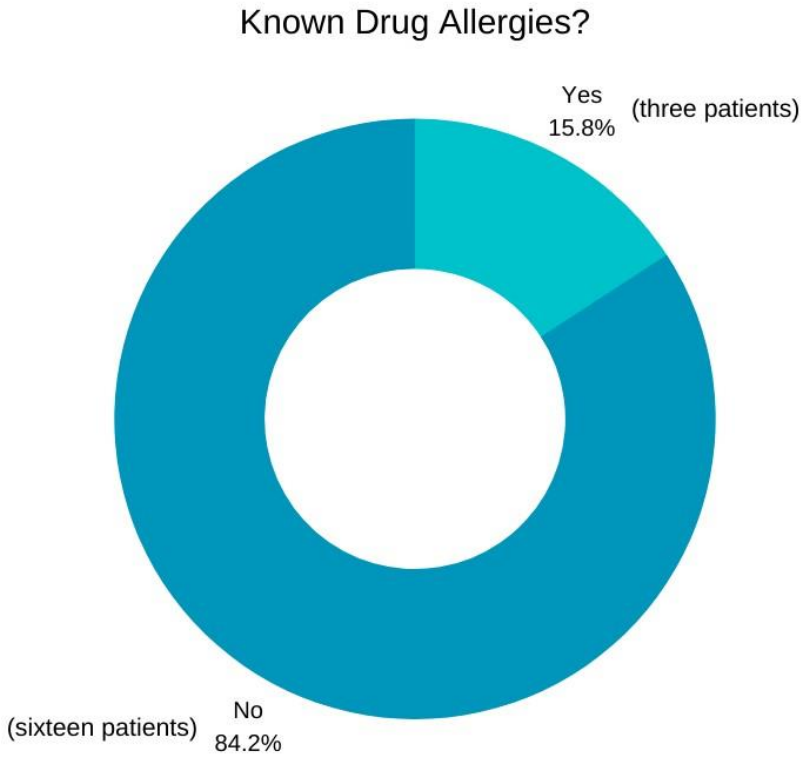

Figure 7 – Known Drug Allergies

3.4.2.1.2 Medication Reconciliation

The thirteen patients were asked to name their medications (brand name or generic) and provide the dosage taken. Once they did that, their list was compared to the GP and the pharmacy list where available. Figure 8 shows that just 8% of the patients (one) was able to correctly provide their medication name and dosage from memory alone when the list was compared to other sources.

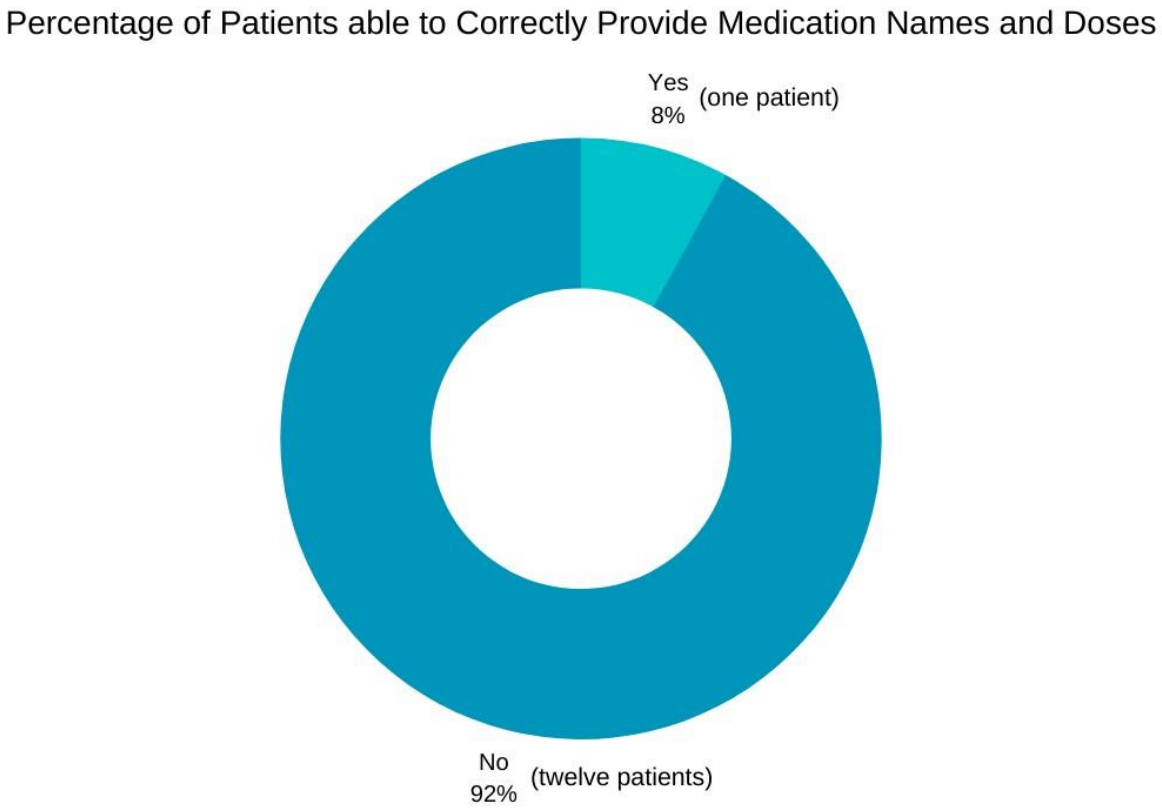

Figure 8 – Patients able to Correctly Provide Medication Names and Doses

Six patients had an aid to help them remember the medications, four had lists they had written themselves and two had the medications physically present with them. Patient number eleven had their medications with them and both name and doses matched up correctly when they were compared to the GP and pharmacy lists. Patient number nine also had their medications present and they matched up with the

pharmacy list, but a GP list was not available. Out of the four patients who had their own written medication lists with them, three matched completely with either the GP or pharmacy list but none were consistent across all three sources.

Nine patients had a GP letter with a medication list available, while four did not. All pharmacies were contacted to obtain the patient medication lists, eleven answered and provided a list, while two were unavailable. Figure 9 compares the number of medications listed per patient by each of the different sources. Two patients had consistency across all three sources of medication lists, while eight had consistency across two sources.

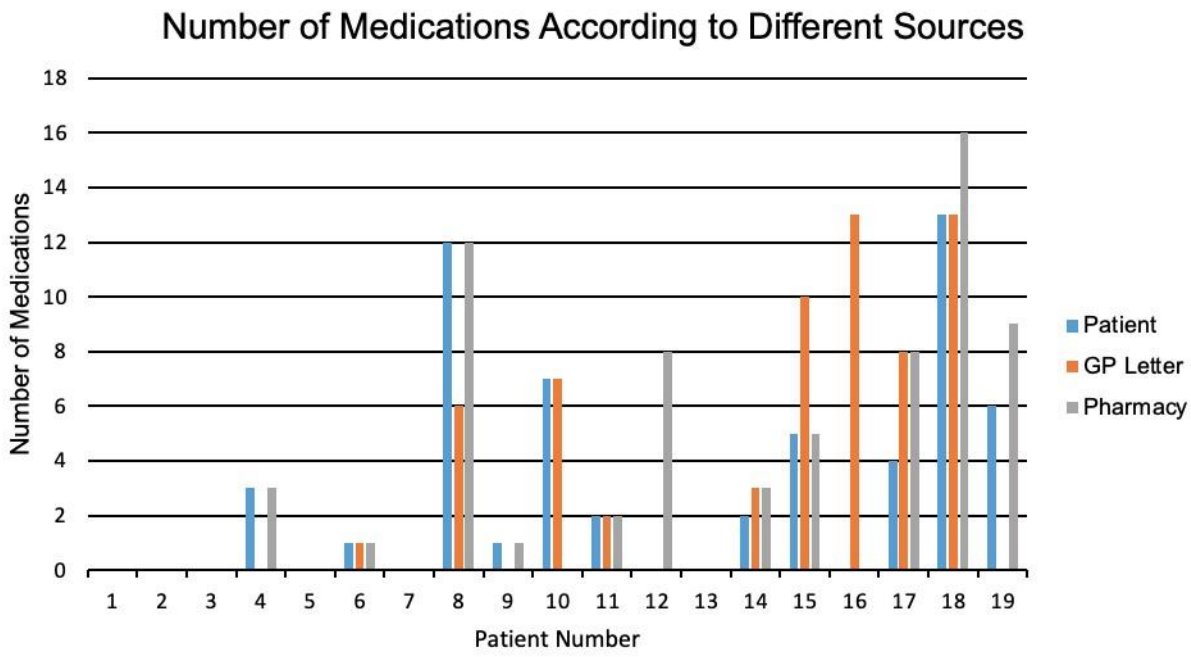

Figure 9 – Number of Medications According to Different Sources

3.4.3 Analyse

The third phase of the DMAIC framework is the Analyse phase, which aims to identify possible causes of the problem being discussed in the quality improvement project by

reviewing the data gathered in the Measure stage. Many different methods can be used as part of DMAIC to identify such causes. One of them is the fishbone diagram.

3.4.3.1 Fishbone Diagram

Fishbone diagrams, also known as Cause and Effect or Ishikawa diagrams, are tools used when trying to identify possible causes of a problem (Gartlehner *et al*., 2017). When a problem is present, it is important to explore all of the possible reasons why it is occurring, this way the true cause of the problem is identified from the outset (Suarez-Barraza and Rodriguez-Gonzalez, 2019). The tool is used by establishing a problem statement and brainstorming what might be causing it. Brainstorming is carried out by asking the question ‘why does this happen?’ at each stage.

The problem statement in question for this quality improvement project is inaccurate or incomplete patient medication lists in the ED. The question ‘why does this happen?’ was then asked and this led to three broad categories which are displayed in Figure 10. The first group was the patients themselves. There is often a lack of knowledge of their own medications and therefore they can find it more challenging to recall them. As seen in section 3.4.2.1.2, those who had aids with them, such as handwritten lists, were more likely to match at least one other medication list. Those that had their medications physically with them were even more likely to correctly match them up, but most patients would not remember or have the time to gather their medications before coming to the ED.

Next, the category of technology was focused on. Possible issues included the fact that the GPs, pharmacies and hospitals do not have an interconnected database with

patient information and/or their medications, that there is no automation to update the GP, for example if a medication is changed in the ED, and that there can often be an issue with obtaining a GP letter or contacting the pharmacy to cross match the medication list.

Lastly, the possible causes discussed were the staff and that they might not always have the time to contact the pharmacy, especially if they have to call multiple times before they get through to the pharmacist. They also may not have the time to fully explain why they might be adding or removing a certain medication to a patient's medication list and therefore the patient might not understand fully for the future.

After applying the DMAIC framework to the problem in question, it was decided that this quality improvement project would mainly focus on the patients and that a tool, such as a medication passport, could be introduced in order to improve medication reconciliation in the ED.

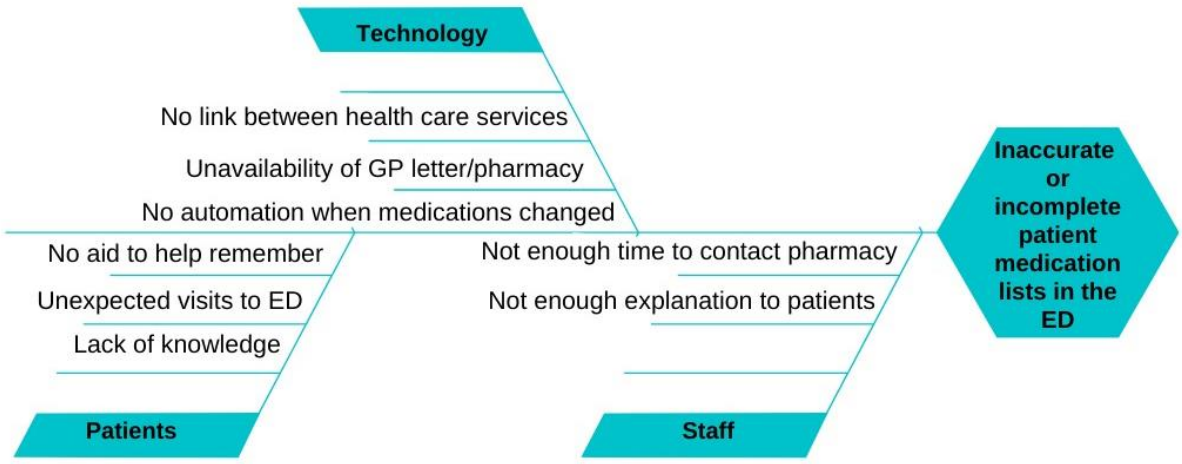

Figure 10 – Fishbone Diagram Regarding Inaccurate/Incomplete Medication Lists

3.4.4 Improve

Improve is the fourth stage of the Lean Six Sigma DMAIC process. Now that the cause of the problem is understood, the main focus of this phase is to generate a solution that will improve it. Solutions are discussed and created by brainstorming with the quality improvement team. Ideally, the solution should target the root cause of the problem and be easily implemented at no, or a low, cost (Yenkner, 2017). Following discussions with the team, it was decided that this quality improvement project would focus on introducing medication passports for patients as it was felt this change would have a significant impact on improving medication reconciliation in the ED.

3.4.4.1 Medication Passports

There were many reasons for choosing medication passports as the solution for this quality improvement project. After analysing the data that was collected in the Measure phase, it was clear that there was a problem with medication reconciliation in the ED as only one person from the sample could correctly name their medication along with the dose from memory alone. It is important to note that the patient who was able to correctly do this was only taking one regular medication and therefore was at an advantage compared to other patients who were taking multiple medications. The data collected also showed that those that had a memory aid to help them correctly recall their medications were more likely to have medication lists from different sources match up. This finding led the team to research memory aids that have been used in healthcare settings previously. As mentioned in chapter two, the NHS developed ‘My Medication Passport’ in 2013, which is used in healthcare settings throughout England. Medication passports should include space for either healthcare practitioners, or the patient themselves, to fill in details such as medication names,

doses, indications and patient allergies. This is similar to the contents of the NHS medication passport app, which can be seen in Figure 11 (PM Live, 2013). Ideally, it would be brought by the patient to all medical appointments or better still, be kept with the patient as often as possible in case of an emergency. Research completed as part of the My Medication Passport development found that 81% of thirty-two patients stated they would take the passport with them to health care appointments, while 33% said they carried it with them at all times (Barber *et al*., 2014).

Figure 11 – NHS ‘My Medication Passport’ App Screenshot

A new process flow map that included medication passports was generated. Figure 12 shows that if a patient brought their medication passport with them to the ED, they would automatically have at least one source of a medication list and it would be likely

that they would have at least one other medication source (GP letter or pharmacy list) to crossmatch theirs with. The process flow seen in Figure 4 had three outcomes where only one medication source is available and cross checking cannot take place, and one outcome where no medication source is available, which is the most dangerous situation. However, as seen in Figure 12, if patients had medication passports, there would only be one outcome where one source of medication was available and there would not be an outcome where no sources of medications were available, eliminating the worst situation.

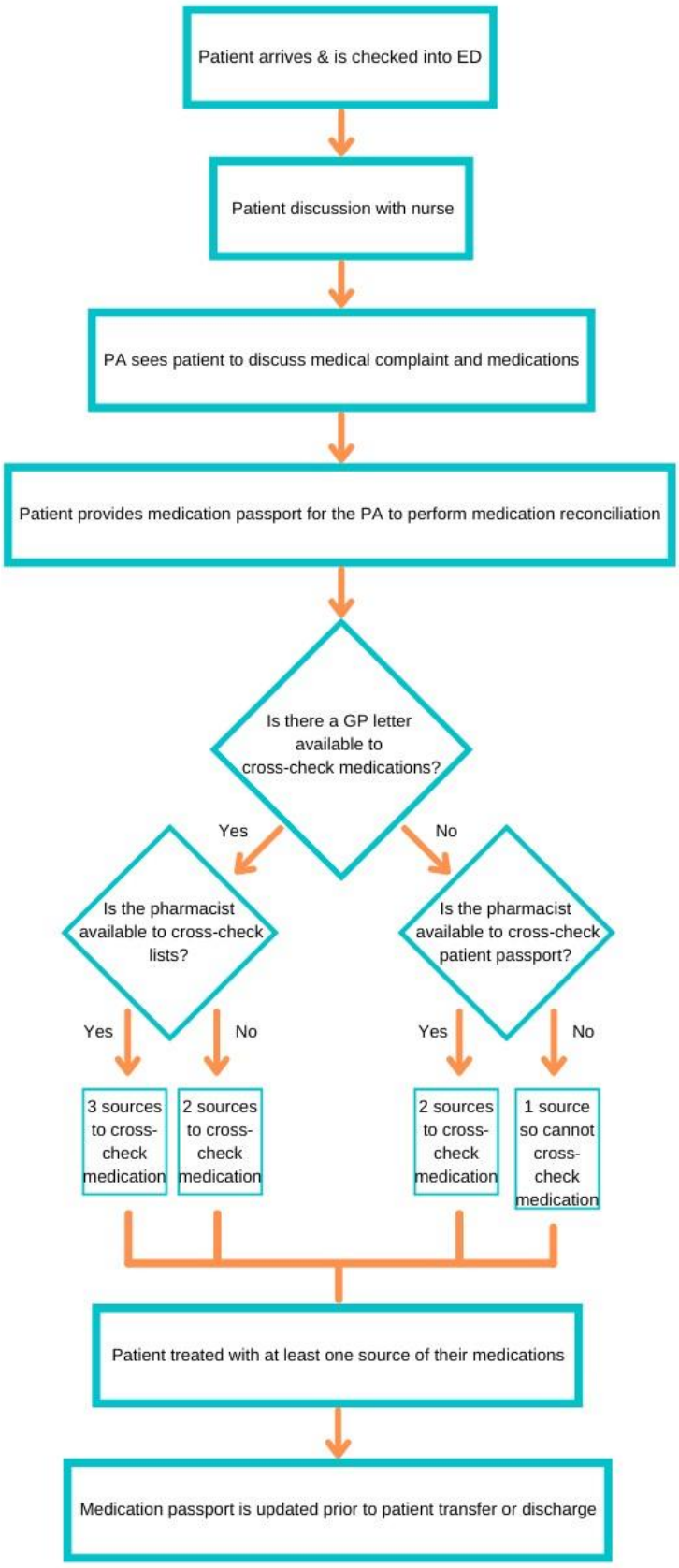

Figure 12 – Medication Passport Process Flow Map

3.4.4.1.1 Education

It is hoped that the medication passports could impower patients to learn more about their diagnoses, why they are actually medications and give them more sense of control over their own health and wellbeing. Ideally, the passports would have an ‘indication’ section where the healthcare professional or the patient could write the reasons why they are taking certain medications, or why they were changed or discontinued.

Education is also important for the staff working in the ED. They would need to be educated about the medication passports and how they could improve medication reconciliation It would be important to stress that they should ask for the passports when a patient attends the ED and if possible, update them before the patient is moved to a ward or discharged home as seen in Figure 12. Educating the ED staff is paramount to ensure that any improvement seen once the medication passports are introduced is sustained.

3.4.5 Control

Control is the final phase of DMAIC, and it involves ensuring that the proposed solution described in the Improve phase is maintained over a defined time period. Due to the nature of this phase, it is discussed further in the next chapter.

3.5 Summary

Chapter three described the different QI tools used to improve healthcare processes around the world. Lean-Six Sigma, and in particular the DMAIC framework, was discussed in detail and was chosen as the QI tool for this project. The different phases

of DMAIC were outlined and applied to this QI project. Finally, the idea of introducing medication passports into the ED was discussed. Chapter four outlines the expected outcomes of the project and how they could be monitor and reviewed in the future.

Chapter 4 Evaluation

4.1 Introduction

This chapter provides an overview of the proposed quality improvement plan along it's expected results based on the data that was gathered and analysed in chapter three. The last phase of the DMAIC framework, the Control phase, is then explored in order to ensure the maintenance of the proposed changes. A dissemination plan is discussed before a summary of the chapter is provided.

4.2 Overview of the QI Plan and Expected Outcomes

The aim of this QI project was to improve medication reconciliation in a private Emergency Department. It was seen that medication reconciliation was often difficult to complete in the ED, with the majority of patients unable to list their medications when asked. Therefore, it was believed a QI project could be beneficial. A literature review was carried out in order to examine similar projects that had been completed and to identify the main themes seen within them. After analysing multiple QI methodologies often used as part of QI projects, the Lean Six-Sigma DMAIC model was selected for this project as it was deemed the most appropriate for what needed to be measured due to its clear, structured approach. The data that was collected and analysed using the DMAIC framework demonstrated that medication reconciliation within the ED could benefit from some improvement and that an intervention could be introduced to facilitate that. Following on from analysing the data and determining where potential problems lie by using a fishbone diagram, it was decided that the process of medication reconciliation within the ED would be altered by introducing a medication passport for patients, which can be seen in the process flow map in Figure 12.

Expected outcomes of this project include both short- and long-term goals. It is likely that the effect of the medication passports on medication reconciliation may take some time to observe. Patients will need to present to the ED, receive a medication passport and get discharged with a passport that has been filled in by the hospital staff. However, it will not be until the following ED visit that an effect on medication reconciliation will be seen. The patients should have an up-to-date medication passport that they can present to the staff which should improve their medication reconciliation by decreasing the likelihood of medication errors occurring (Garfield *et al*., 2020).

In the short term, the patients that receive a medication passport on discharge from the ED should feel more empowered about their medications and their medical issues as it is believed they will have a greater understanding about them, it would give them more confidence when discussing their conditions and would inspire them to learn more. A study carried out by Bailie *et al*., (2020) designed a Uveitis Patient Passport (UPP) as a self-care tool for their patients and surveys were conducted two to six months after patients were given the passports. They found that 97% of twenty-nine patients felt their confidence in managing their condition had increased with use of the passport, while 93% believed their knowledge about uveitis increased. Interestingly, 93% of patients used the passport to record their regular medications as well. Similar passports were created for glaucoma patients in an English hospital (Badran *et al*., 2019). Feedback on the self-care tools was received six months after they were distributed to sixty-two patients. 73% of patients found their knowledge of glaucoma increased and 75% felt more confident speaking with health care practitioners. Patients would also be encouraged to share their medication passports with their GP

and pharmacy so that they can also update it when necessary and check if there have been any medication changes since they last saw the patient. Patients that were given the NHS 'My Medication Passport' were advised to share their passports with healthcare practitioners in the same way (NHS, 2014). The data collected as part of this project showed that three out of nineteen patients that attended ED had a known drug allergy. Those patients would be encouraged to document this in the dedicated section within the medication passport as well. A study carried out in Poland designed drug allergy passports for patients with known drug hypersensitivities (Branicka *et al*., 2021). Phone interviews were carried out with 54 patients who received the passports three, six and twelve months later. Although not documented what percentage, those who carried the passport in their purse or wallet 'felt safer' and 100% of the patients found them useful at the twelve-month interviews.

Combining both short and long term expected outcomes could lead to increased patient confidence and knowledge, improved communication during transition of care and increased patient safety due to documentation of known drug allergies and improved medication reconciliation.

4.3 Evaluation

4.3.1 Aim of Control Phase of DMAIC

The Control phase is the last phase of the DMAIC framework. It involves developing ways to ensure that changes made within the QI plan are monitored, reviewed and maintained. The goal of this phase is to create a monitoring plan to measure how successful the implemented changes are and to develop a response plan which will come into effect if there is a decline in performance. If the Control phase is not

implemented correctly, it is highly likely the process will revert to the baseline measured prior to any intervention.

4.3.2 Monitoring and Review

It is of upmost importance to maintain any improvements made during the course of a quality improvement project, despite all other potential variables within a hospital (Silver *et al*., 2016). If the improvements are not maintained, the QI project will have failed, and the time and effort of every stakeholder would have been wasted. Monitoring and reviewing the changes implemented will help ensure the success of the QI project.

As the main aim of this QI project is to improve medication reconciliation, the most logical method to evaluate this would be to continue collecting data similar to what was collected for this QI project. Patients would be asked to provide the names and doses of their regular medications and the results could be compared to the results of this project. Firstly, the number of medication passports given out to patients could be monitored and also how many patients attending the ED have the passports with them. In order to accurately determine if this project had a positive impact on medication reconciliation itself, a medication list taken from the patient would be compared to the one provided from the GP letter and/or pharmacy, similarly to how the data was collected earlier on in this project. If the medication passports were shown to be beneficial in improving medication reconciliation within the ED, GPs and pharmacists could be encouraged to use them as well to improve communication and ease patient transition of care.

Once the intervention is put in place it would also be important to survey the patients and hospital staff about the medication passports to see how they are working in reality. As mentioned previously, patient knowledge and confidence should increase with use of the medication passports, however it would be useful to design a patient survey to assess what they liked about the passports and if anything needed to be changed. Regular meetings with stakeholders would also need to take place, while discussions with hospital staff in other departments, GPs and pharmacists would be beneficial to see if they have seen the medication passports being used or if they have introduced them themselves. Monitoring and reviewing the data will also help identify if there are any problems occurring with the new intervention and possibly how it could be rectified.

4.3.3 Expected Results

It is believed that changes implemented as part of this QI project will lead to improved medication reconciliation within the ED, which will benefit both the patients and the hospital. The use of medication passports will improve medication reconciliation, but it is also expected to increase patient knowledge, confidence and safety (Bailie *et al*., 2020 and Badran *et al*., 2019). A study carried out in London explored how patient held medication lists could enhance patient safety (Garfield *et al*., 2020). They interviewed and held focus groups with patients and carers, both those who carried lists and those who did not, and HCPs. From discussing the topic with the participants, they concluded that medication lists can contribute to the reduction of medication related risk, especially during transition of care and emergency situations.

4.4 Dissemination Plan

This QI project will only be successful if it is disseminated appropriately to the relevant stakeholders. The project's findings and proposed improvements should be presented to the project sponsor firstly, and then to the other stakeholders mentioned in chapter three. This included other ED consultants, the ED PA, ED NCHDs, GPs, pharmacists, ED nursing staff, patients and ED administration staff. Ideally, a PowerPoint or poster presentation could be used to display the information, as well as a mock-up of the medication passport if possible. As the intervention is directed towards the patients themselves, it would be beneficial to create leaflets and posters informing them that a medication passport is now available, how it works and where they can get one. GPs could be notified about the introduction of the passports by including an update at the end of patient discharge letters that are sent to them or they, along with pharmacies that are regularly involved with ED, could be sent an email containing information about the passports and how they could also improve their medication reconciliation and transition of care.

4.5 Summary

This chapter discussed how the proposed improvement of this QI project would be evaluated and the results that are expected, such as an improvement in medication reconciliation and therefore increased patient safety, knowledge and confidence. This was carried out by applying the DMAIC framework, and specifically, it's Control phase. Finally, a dissemination plan was devised to ensure all relevant stakeholders are accurately informed. Chapter five discusses the potential impact of the project, its strengths and limitations, recommendations for the future and lessons learned.

Chapter 5 Discussion and Conclusions

5.1 Introduction

The aim of this final chapter is to critique the QI project as a whole. The potential impact of the project on the stakeholders and the practice are discussed before the strengths and limitations of the project are analysed. Recommendations for future quality improvement are considered and finally, the lessons learned by undertaking this QI project are outlined.

5.2 Project Impact

This QI project plan involved introducing medication passports to a private ED in order to improve their medication reconciliation process. The impact this would have on stakeholders and the practice will be addressed here.

5.2.1 Impact on Stakeholders

The involvement of stakeholders within a quality improvement project is a key step to ensure the successful implementation of changes. This specific QI project is patient-centered, and it is hoped they will benefit the most from the introduction of medication passports. The potential benefits include increased patient confidence and knowledge when discussing their medications, which would benefit both the patients and the ED staff (Bailie *et al*., 2020 and Badran *et al*., 2019). However, more importantly, patient safety should increase as those with known drug allergies will be able to document that in their passport and medication error rate should decrease with improved medication reconciliation, putting the patient at a lower risk for ADEs (Branicka *et al*., 2021, DeCourcey *et al*., 2017 and IHI, 2021). A study from Canada found that an electronic system introduced to help with medication reconciliation led to decreased

medication error rates but did not change ADE rate (Tamblyn *et al*., 2019). However, a study already discussed in chapter two found that 15.3% of their medication errors were deemed 'moderate to major' by an emergency medicine physician and 15.6% carried a 'high or extreme' risk to the patient (Prior *et al*., 2019), while another found 63% of their medication errors had the potential to cause moderate harm to patients and 2% had the potential to cause severe harm (Grimes *et al*., 2011). Therefore, it is believed that introducing medication passports into the ED will improve medication reconciliation, which will in turn increase patient safety by decreasing the risk of ADEs.

In order to see these benefits, the cooperation of the ED staff is crucial as the benefits are only likely to occur if the staff are invested in using the medication passports and informing the patients about them. The knock-on effect of the medication passports on patient safety will also make the hospital a safer place and ease transition of care for ED staff when discharging patients home or transferring them to a ward (Garfield *et al*., 2020).

5.2.2 Impact on Practice

Although it was not measured as part of the QI project, it seemed that a significant amount of time was frequently spent by the ED staff trying to complete medication reconciliation, whether it was trying to get patients to remember their daily medications, searching for medication lists in GP referral letters, looking for a pharmacy number or trying multiple times to get through to them. It is anticipated that the ED staff will spend less time attempting to complete medication reconciliation as the new process flow map seen in Figure 12 should not be as time consuming as it previously was. The hospital should benefit from this intervention as it has been shown

that there is less of a financial burden when the time spent performing medication reconciliation is reduced (Walsh *et al*., 2019).

5.3 Strengths of the Project

The key strength of this QI project is that it addresses a topic that is known to be an issue around the world, with many organisations calling for change. As mentioned in previous chapters, the IHI, TJC and ECAMET have all acknowledged that improved medication reconciliation is seriously needed to help prevent medication errors in healthcare settings which can lead to patient morbidity and mortality (IHI, 2021, TJC, 2020 and ECAMET, 2021). The gravity of the situation has been seen again as the WHO selected the topic of medication reconciliation for their 'High 5s Project' in 2006 and also dedicated its global patient safety challenge, 'Medication Without Harm', to it in 2017 (WHO, 2017). Closer to home, HIQA also agreed in 2019 that a process was needed to enhance medication reconciliation in Ireland as well (HIQA, 2019). Each of these organisations have the overarching aim of increasing patient safety which is also what this QI project is trying to achieve by improving medication reconciliation.

A second strength is that the introduction of the medication passports to the ED should not place a significant financial burden on the hospital as it would just require the passports being designed and printed as necessary, along with some posters and fliers to raise awareness of their availability.

5.4 Limitations of the Project

A limited number of patients were included in this QI project as the project was only confirmed on my last day of placement in this hospital and therefore, I unfortunately

did not have the opportunity to gather more data. Although it is anticipated that the results would be the same, ideally, more data would be collected in order to strengthen the points made within this QI project.

If I was to do the project again, I would include GPs and pharmacies more. In order for the medication passports to really make a significant difference, GPs and pharmacies do need to believe in them as well and fill them out when necessary, otherwise they will not contain the correct information when the patient brings it with them to the ED.

Hospitals around the country were affected by both Covid-19 and the HSE cyberattack this year so although I believe neither of these had a direct effect on this QI project or the collection of the data, it is possible that they had an effect on patient behaviour, such as when patients decide they need to go to the ED, and therefore the results could be different because of those exceptional circumstances.

5.5 Recommendations

As previously mentioned, the success of this QI project relies on the ED staff informing their patients of the newly available medication passports and ensuring they ask for them when completing medication reconciliation in the future. It is also critical that the current staff inform any new staff that may join the ED team so that they can ask their own patients for their medication passports.

Although it is outside of the scope of this project, an app could be developed in the future as an addition to, or to replace physical medication passports. The NHS have

launched an app, ‘My Medication Passport’, as well as a physical option to facilitate as many people as possible as the app may not be suitable for certain groups of people, such as people with disabilities or those of an older age (Barber *et al*., 2019). However, General Data Protection Regulation (GDPR) and patient security could be a challenging task if an app was to be developed, especially after seeing the destruction the HSE cyberattack caused to the Irish health system this year.

Another topic that is outside the scope of this project but that impacts medication reconciliation in Ireland is the fact that public hospitals, private hospitals, GPs and pharmacies do not share an official patient database that would significantly improve transition of care. The NHS provides a unique NHS number to each person that registers with a GP in England which can be used by any health care professional caring for that person to view relevant health records (NHS, 2021). This makes it much easier for health care professionals to obtain the information they require but similarly to the medication passport app, GDPR and patient safety would need to be ensured when developing such a system.

5.6 Learning About QI

This QI project was my first time being exposed to quality improvement within the healthcare setting. I had limited knowledge of quality improvement in a previous industry job but never truly engaged in it fully. Initially, I found concepts like the PDSA cycle and DMAIC very alien as I was coming from a science background and it took some time to understand them but after receiving lectures on the topic and doing my own personal research, it began to make sense. It was clear from what I had read that using a structured QI framework, such as the DMAIC framework, was key to a

successful project and researching information for chapter three really helped me make that connection. Another realisation was the importance of the Control stage of the DMAIC process. One could argue that this is the most crucial stage, as without the proper implementation, QI projects would not be sustained, and all of the hard work put in by the different stakeholders would be pointless.

Before I started working on this QI project, I thought it might be difficult to complete it as a student and that I could struggle to connect with the relevant stakeholders who are at a much higher level than I am. It was not long before I realised that this would not be the case as all of the staff I contacted were extremely helpful and interested in the QI project.

Although it was a steep learning curve for me, I believe I have gained a multitude of skills and knowledge by completing this QI project and that I will be able to transfer those skills to my future career where QI is often seen.

5.7 Summary and Conclusions

Medication reconciliation is the challenging process of obtaining the most accurate and up to date list possible of all the medications a person is taking. Research has shown that although emphasis is placed on the importance of performing medication reconciliation efficiently, errors are still seen in health care settings worldwide, with numerous organisations calling for improvement (Prior et al., 2019, Gregory et al., 2020 and WHO, 2021).

The aim of this quality improvement project was to improve medication reconciliation in a private Emergency Department. After completing a literature review on the topic,

the DMAIC framework was used to identify the possible issues leading to poor medication reconciliation within the department and to develop a potential solution. Data analysis found just 8% of patients asked were able to correctly provide their medication names and doses from memory alone and it was therefore determined that medication passports for patients would be introduced to the department with the aim of improving medication reconciliation. Following on from this, how the project could be evaluated was discussed, as well as the impact it could have on stakeholders and the hospital itself, before future recommendations were made.

It was determined that the introduction of medication passports to the ED could improve patient confidence, patient knowledge and transition of care, all of which are of interest. However, the evidence suggests they could also lead to increased patient safety by improving medication reconciliation, which would be of major benefit.

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