Lean Healthcare: A Medical Records Application

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Masters of Business Administration

by
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Prof. Norman Faull
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Secondly, I extend special tribute to the Senior Medical Superintendent, Dr. G.M Perez and other members of the management of GF Jooste hospital for their commitment, moral support and providing information for this research. Management commitment and support were key success factors for this project.

Thirdly, I express special thanks to the GF Jooste project team members namely Witness Mgedezi, Owen Oliver, Vuyisile George and Cheswyn Walker for their dedication and commitment to the project. Working as a team cleared my passage for project execution.

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Abstract

Patient medical records management at GF Jooste hospital had been experiencing operational problems in terms of handling, accessibility, misplacement and getting lost. Such problems caused creation of duplicate files when originals could not be found, delays in issuing patient files when required and redoing of medical procedures. The latter consequences are costly both in terms of endangering patients’ lives and financial resources for redoing medical procedures.

The GF Jooste hospital hosted the Best Practice Workshop (BPW) this year during which four projects were studied. The study results indicated significant improvements in the “Reduce Duplicate Files” project. Such improvements include reduction in missing files from 40% to 19% and the file issuing time from 8 minutes to 3.5 minutes. These results showed that research on process improvement technologies has relevance and practical use. Researching this area also enabled the researcher to generate theory on and suggestions for service delivery improvements for similar environments as discussed under section six (6) of this report.

The purpose of this study was to investigate whether application of TPS/Lean in the service delivery environment, for example the Medical Records department at GF Jooste, could result in sustainable process improvement. For this study, the researcher stated four hypotheses that guided the research process. Action Research methodology was followed as it is believed to be the most appropriate in determining the validity of the four hypotheses.

The research findings led to acceptance of all four hypotheses. Value Stream Mapping (VSM) was successfully used to describe the patient file movement process, to identify areas that needed improvement and to create a Future State Map (FSM). Secondly, application of TPS/Lean resulted in reducing missing files from 19% to 0% and thirdly, the time for issuing a file was reduced from eight (8) minutes to three (3) minutes (BPW improvement of 3.5 minutes was not sustained, thus the researcher observed a time of 8 minutes during the start of the follow-up project). Lastly, management and employees’ attitudes studied after the end of each experiment indicate positive results in terms of being committed and supportive to sustaining improvement initiatives.
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Glossary of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>Cycle Time- the time required to complete one cycle of an operation</td>
</tr>
<tr>
<td>Flow</td>
<td>The progressive achievement of tasks along the value stream so that a service proceeds from order to delivery with no stoppages</td>
</tr>
<tr>
<td>JIDOKA</td>
<td>Make any production problems instantly self-evident and stop producing whenever problems are detected</td>
</tr>
<tr>
<td>JIT</td>
<td>Just in time (JIT) is a system for producing and delivering the right items at the right time in the right amounts</td>
</tr>
<tr>
<td>KAIZEN</td>
<td>Continuous incremental improvement of an activity to create more value with less muda</td>
</tr>
<tr>
<td>Lean</td>
<td>Lean Thinking - a cyclical process of seeking perfection by eliminating waste and thereby enriching value from a customer perspective.</td>
</tr>
<tr>
<td>Muda</td>
<td>Waste – an activity that consumes resources but creates no value</td>
</tr>
<tr>
<td>Perfection</td>
<td>The complete elimination of waste so that all activities along the value stream create value</td>
</tr>
<tr>
<td>Sensei</td>
<td>A personal teacher with a mastery of a body of knowledge, in this context Toyota Production System and Lean Thinking</td>
</tr>
<tr>
<td>TPS</td>
<td>Toyota Production System</td>
</tr>
<tr>
<td>VSM</td>
<td>Value Stream Map – A map of all the essential actions/steps (both value added and non-value added) required to bring a product or service to a customer. It shows material and information flows as a product makes its way through the value stream.</td>
</tr>
<tr>
<td>Value Stream</td>
<td>Understanding which steps within process flows add value and which do not from the customer perspective</td>
</tr>
<tr>
<td>5S</td>
<td>Five terms beginning with S utilized to create a workplace suited for visual control and lean service delivery</td>
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1. Proposal Summary

This research intends to study the “patient medical records project” as a follow-up of the “Reduce Duplicate Files” project, which was among the four projects studied during the Best Practice Workshop (BPW). The BPW was held between 30th July 2007 and 03rd August 2007 at G.F. Jooste hospital. The four projects studied were “Improve efficiency of trauma and emergency theatre”, “Improve the flow through the outpatient theatre”, “Reduce the waiting time for patients to get to a bed” and “Reduce duplicate patient files”. During the BPW delegates were introduced to Toyota Production System (TPS), Lean Thinking (Lean) and Value Stream Mapping (VSM) principles, and applied the techniques for the purpose of learning what works, what does not work, why and how to do better in due course.

This study focuses on further exploring the patient medical records movement within the hospital. This follows satisfactory improvement observed within five weeks after BPW by the management of the hospital (Perez, 2007). The improvement objectives of this project are:

- To identify the sources of unnecessary patient file delays and propose ways for minimizing such delays,
- To reduce the number of missing patient files in the Medical Records department,
- To reduce the time taken to issue patient files in the Medical Records department, and
- To investigate ways to sustain performance improvement through studying employee attitude after the improvement process.

Overall, this action research study will explore ways to help management to standardize and sustain the performance improvements achieved and apply the tools on other areas of their business. In addition to the objectives mentioned, it is also aimed through this study to generate theory that will contribute to the body of knowledge of applying TPS/Lean to healthcare.

2. Area of Study

2.1. Background of research environment

G.F Jooste is a public referral hospital situated in Heideveld in Cape Town. The hospital serves the low-income surrounding suburb of Manenberg, and the townships of Gugulethu, Nyanga and Phillipi. The hospital also receives patient referrals from
surrounding clinics (day hospitals). The hospital is part of the University of Cape Town’s training rotation scheme for medical students. On average the hospital handles about 200 patients per day (Perez, 2007).

2.1.1. Description of the “Reduce Duplicate Files” Project

Patient files at GF Jooste hospital contain personal details, medical procedure results, doctor’s diagnoses and other data recorded. The hospital maintains electronic and physical files for each patient. These files are kept in the Medical Records Section from where they are retrieved if a patient visits the hospital. During the BPW it was learnt that 40% of files were duplicates opened because the original files either could not be retrieved from the computer system (CLINICOM) or the physical files could not be found. The consequences of the latter are redoing of laboratory tests, delayed treatments and loss of patients’ history. The preliminary study shows that the reasons for missing files are:

- Patients giving different names to reception during visits
- Doctors keeping files in their drawers for follow-up
- Files are misfiled in Medical Records
- Unrecorded withdrawal of physical files by staff
- Improper file search in the computer system

Consequently, these causal factors need to be addressed in order to reduce the number of duplicate files, which will minimize the negative consequences to delivering the health care service at GF Jooste (Takeyuki, 2007).

2.2. Statement of the Problem

The health care sector consists of highly educated and talented employees namely doctors, nurses, administrators and technicians and yet they do not deliver services to the desired quality, safety, efficiency, reliability and timeliness (Spear, 2005). The timeliness phenomenon is commonplace at GF Jooste (Takeyuki, 2007). A legitimate question is why the health care system does not deliver services to the desired levels of quality, efficiency, reliability and timeliness? Spear (2005) holds that the cause of the problem is two-fold. Firstly, the nature of the service delivery system is complex, which creates many wastes in terms of how an individual’s work should be performed and how teamwork
should be successfully coordinated. Secondly, it is common for health care workers to react to ambiguities when they face them by working around problems to meet patients’ immediate needs but not resolving the root causes (Spear, 2005). In particular, missing patient medical records at GF Jooste causes loss of patient history and redoing medical procedures. Consequently, the latter leads to delays in attending to patients that may endanger patients’ lives. Inefficient processes call for process improvements that will lead to efficient service delivery and patient satisfaction, and ultimately minimize unnecessary deaths.

2.3. Rationale

Wastes, inconveniences and deaths caused by poorly designed and implemented health care processes are catastrophic to the well-being of human beings. Understanding and applying process improvement technologies is thus vital to the health care sector. During the BPW some remarkable improvements were recorded. Missing files were reduced from 40% to 19%, time to retrieve files was reduced by 30%, the proportion of patients waiting for beds was reduced from 29% to 16%, bed occupancy was increased from 85.6% to 95% and number of cases per shift per theatre was increased by 67% (BPW Team, 2007). Hence research on process improvement technologies has relevance and practical use. Researching this area will also enable the researcher to generate theory on service delivery improvements for similar environments. It is therefore anticipated that this research will benefit other service delivery environments.

2.4. Research Questions

The researcher will study the tools and principles of the TPS, Lean and VSM to answer these questions:

- Can the patient file movement process at GF Jooste be mapped via Value Stream Map and the map be used to clarify that movement to the Medical Records department staff and other key role players?
- Can TPS/Lean be applied in the patient file movement process at GF Jooste to improve file handling as measured by the number of missing files per day?
- Can TPS/Lean be applied in the Medical Records department at GF Jooste to improve patient file issuing as measured by time taken to issue a file?
Can the introduction of TPS/Lean in the Medical Records department at GF Jooste result in a positive attitude amongst employees that could lead to sustained performance improvement?

2.5. Research Hypothesis

The change agent (researcher) will assume the following hypotheses:

- Value Stream Mapping can be used to describe and clarify the patient file movement at GF Jooste.
- Application of TPS/Lean principles and tools can contribute to improved file handling as measured by the number of missing files per day.
- Application of TPS/Lean principles and tools in the Medical Records department at GF Jooste can contribute to improved patient file issuing as measured by time taken to issue a file.
- Introduction of TPS/Lean principles and tools in the Medical Records department at GF Jooste can result in a positive attitude amongst employees that could lead to sustained performance improvement.

2.6. Research Assumptions

For this study the following assumptions have been made:

- Delays in attending patients affect quality of health care services provided.
- If application of TPS/Lean will be proven beneficial, then this research can be applied to similar environments within the hospital
- The research report will ultimately focus on reducing missing files at Medical Records department and decreasing the time to issue files at the admission reception.

2.7. Research Objectives

In answering the above narrated questions and testing the relevant hypotheses the research project focuses on the following objectives:

- Identify the sources of unnecessary patient file delays and propose ways for minimizing such delays
- Reduce the number of missing files in the Medical Records department
- Reduce the time taken to issue patient files in the Medical Records department
• Investigate the possibility to sustain performance improvement through studying employees attitude after the improvement process

3. Literature Review

The literature review focuses on principles of the Toyota Production System (TPS), Lean Thinking, Value Stream Mapping (VSM) and practical applications of these methodologies to the health care sector.

3.1. The Toyota Production System (TPS)

Mishina & Takeda (1995:2) point out that Toyota Production System is based on two guiding principles, namely:

• Just In Time (JIT) – product uses only what is needed, only how much is needed and only when it is needed. Any deviation from true production needs is regarded as waste

• Jidoka – make any production problems instantly self-evident and stop producing whenever problems are detected. Building quality into the production process is insisted and any deviation from value addition is regarded as waste.

In TPS “needs” and “value” are defined from the viewpoint of the customer. TPS is based on the scientific method, which is described by Toyota’s four rules (Spear & Bowen, 1999) listed below:

• First rule: All work shall be highly specified as to content, sequence, timing and outcome

• Second rule: Every supplier-customer connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses

• Third rule: The pathway for every product or service must be simple and direct

• Fourth rule: Any improvement must be made according to the scientific method under the guidance of a teacher at the lowest possible level of the organization.

In applying the four rules discussed above, Brooks (2005) and Spear & Bowen (1999) argue that the organization aims for output that is defect free, that can be delivered on request at a specific time, and that is produced without waste.
3.2. Example of effective application of Toyota Production System in health care

Spear (2005: 13-14) argues that if one asks the question, “Can Toyota Production System be applied in health care?”, the quick answer is yes. According to Spear (2005), to realize the full potential of TPS, senior health care leaders need to do more than just provide support for pilot projects. Such leaders need to embrace and embody TPS in their own work. An example cited here is the Virginia Mason Medical Centre (VMMC), a US based hospital. VMMC’s management first became interested in TPS in 2001, after executives from local businesses described the dramatic improvements they had achieved in quality, customer satisfaction, safety, staff satisfaction and profitability. The hospital was struggling to retain its best people, and issues of quality, safety and morale were on everyone’s mind. VMMC adopted the TPS in 2002 after senior management visited Toyota factories. Since then VMMC has adopted TPS as a model for its management system and began to train its entire staff. VMMC has been very successful on process improvement and takes change as a regular part of work, according to Spear (2005).

3.3. The Lean Thinking (Lean)

Womack & Jones (1998) and Harrison & Van Hoek (2005: 171) argue that Lean Thinking is a cyclical route to seeking perfection by eliminating waste and thereby enriching value from the customer perspective. These authors also discuss the principles of Lean Thinking as follows:

- Specifying value from a customer perspective
- Identifying the value stream:
  Create the value stream map and identify the sources of value to the customer. Any step that does not add value to the customer is a form of waste.
- Making value flow:
  Using the key principles of Just in Time by minimizing delays, inventories, defects and downtime, while ensuring simplicity and visibility
- Pull scheduling- initiating the process only in response to customer demand
- Striving towards perfection

Liker and Meier (2006: 6) argue that the principles of Lean are embodied in Toyota Production System principles, which are:

- Philosophy:
The foundation of Lean thinking is first to create value for the customer, society and associates of the organization

- **Process:**
  To create pull-flow within the value stream by identifying sources of value to the customer and also to identify and eliminate waste

- **People/Partners:**
  To grow leaders, to develop exceptional people and to respect the extended network in order to help partners improve

- **Problems:**
  By adopting a “go and see” approach in order to understand problems, and identifying the root cause of problems and instituting counter-measures which are implemented through PDCA cycles, organizational learning can be achieved through continuous reflection and improvement

Liker and Meier (2006: 35-36) also argue that Lean thinking identifies eight non-value adding activities, which are:

- Over-production
- Waiting
- Transportation and conveyance
- Over-processing
- Excess inventory
- Unnecessary movement
- Defects
- Unused employee creativity

Lean Thinking is applied by examining processes, quantifying wastes, identifying root causes of wastes and ultimately developing and implementing solutions. The aim of Lean Thinking in business processes is therefore to get parts and data to flow evenly and in harmony and is therefore associated with operational practices like small batch production and rapid changeovers that help minimize waste.
Liker and Meier (2006) also argue that the 5S process (a process that seeks to remove clutter in a work area) is likened to clearing the clouds (a metaphor comparing processes to a photograph: often cloudy conditions obscure the underlying view). The 5S process is illustrated in the figure below:

![5S Process Diagram](image)

The “5S” process has various benefits such as:

- Creating a clean, uncluttered, and efficient environment
- Contributing to a safe work environment
- Providing a great image to portray to visiting customers
- Fostering teamwork and discipline needed for improvement and growth
- Showing if simple, standardized work procedures are being adhered to

### 3.4. Example of How to Measure Lean Initiatives in Health Care Services

Kollberg & Dahlgaard (2005:7-9) points out that Swedish health care developed a measurement system for following up lead-times in order to deal with long waiting times and delays. The developed measurement called “flow model” makes it possible to follow an individual patient’s path through the health care system by focusing on eight measures, all of which measure a certain date or time in the patient care chain. The model aims to prevent long
waiting times and delays and to make comparisons between clinical departments and over time. See the figure below showing the “flow model”:

![Flow Model Diagram](image)

**Figure 2: The Flow Model (Source Kollberg & Dahlgaard, 2005)**

From figure 2 above, the first step starts with the patient’s demand for care (Measure 1). This is assessed when a referral arrives at a clinical department. Thereafter the referral is evaluated and the patient is booked for a visit (Measure 2). The time for the first contact is measured when the patient meets with the physician for the first time (Measure 3a and 3b). Both the expected time (3a) and the actual time for the visit (3b) are measured. After the diagnosis is made (Measure 4) the treatment is decided (Measure 5), and the treatment starts when the patient is registered for a service (Measure 6a and 6b). The time between expected time (6a) and actual time (6b) is measured. The time for control (Measure 7) is measured and if the patient has recovered or the care goal has been achieved, the care chain is completed and the case is closed (Measure 8).

### 3.5. Value Stream Mapping (VSM)

Rother & Shook (1999: 3) define a value stream as comprising all steps (value adding and non-value adding) required to bring a product through the main flows essential to every product, that is the production flow from raw material into the arms of the customer and the design flow from concept to launch.

Value Stream Mapping is a visual aid that describes the various stages in the consumption process. A complete value stream consists of consumption stream and the provision stream, where the consumption stream visualizes the consumption as experienced by the customer and the provision stream visualizes the activities involved in delivering a product or service by the provider (Womack & Jones, 2005: 42). Liker and Meier (2006: 37-41) suggest that seeing the VSM in reverse from the customer’s perspective can form the basis for the future desired state VSM by creating “pull” within the process flow. The latter authors discuss the following tips with regard to the use of VSM:
• The current state VSM can be used as the foundation for the desired future state
• The future state map (FSM) represents what the organization attempts to achieve
• Future state map facilitation should be performed by a lean expert
• The purpose of a VSM is a basis for action
• Do not develop any VSM before its time
• Senior personnel should lead process improvement
• Plan-Do-Check-Act (PDCA) cycles should occur on a continuous basis in order to facilitate continuous improvement

Faull (1998:169-173) discusses the positioning of the PDCA cycles at different levels of strategy as described by the “3S” model. According to him “PLAN” is about giving strategic direction and is linked to “S1” (strategic) level, which is the responsibility of the top management in the organization. “DO” deals with implementing and trying out situations in reality, thus linked to the third (situational) level of strategy called “S3”. “CHECK” is about using the performance measurement system to evaluate whether the “doing” was beneficial, thus it is the responsibility of middle management and linked to “S2” (systemic) level of strategy. Finally, “ACT” is about implementing the learning philosophically at the strategic (S1) level of the business and practically at the situational (S3) level of strategy.

Liker and Meier (2006: 75) argue that “the 80/20 rule is useful when considering divisions in products that will isolate variation. To reduce variability in processing time we consolidate similar products based on required processing time”. It is expected that for this study, the 80/20 rule will provide a useful guideline for selecting the group to focus on during value stream mapping and in undertaking improvement initiatives within this study.

3.6. The service process categories

The health care services, similar to other services, can be categorized into different service types depending on their nature. Silvestro (1999) describes how the classification of services was integrated into the service process model. This model considers the volume of customers (patients visiting medical records would correlate to specific customers) and the variety of service types processed. The significance of the model lies in its classification of services as predominantly one of three types (see Figure 3 below):

• Professional Services – high variety and low volume
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- Service Shops – medium variety and medium volume
- Mass Services – low variety and high volumes

Each of these types gives rise to very different management, service strategy and performance measurement concerns (Silvestro, 1999).

One may assert that the Medical Records department lies within mainly the Mass Services type. This is because mass services are essentially non-varying, like the issuing and movement of patient medical records. Several routes or choices might be available (like files, x-rays, medical procedure reports can be involved), however the process for handling each of these document types is basically unchanging. The figure below illustrates the service process model according to Silvestro (1999).

![Service Process Model](image)

Source: Silvestro et al, 1992

**Figure 3: The service process model**

This classification of services holds significance for the management of the GF Jooste, because the services can only be cost effective if it remains on the diagonal, that is maintain...
the designed volume variety balance. If it deviates from this intended design, the GFJ runs the risk of running the Medical Records less cost effectively.

4. Research Methodology

Action Research methodology has been chosen for this research study. Coughlan & Coghlan (2002: 220) define Action Research as an approach to research that aims at taking action and creating knowledge or theory about that action. I chose this methodology because

- It relates to describing an unfolding series of actions over time in a given group, community or organization;
- It creates understanding for a member of a group of how and why their action can change and improve the working of some aspects of the system, and
- Understanding the process of change or improvement in order to learn from it.

The principles are aligned with the objectives and hypotheses of the research study I have described above, and are further elaborated upon below.

4.1. What is Action Research and when is it appropriate?

Coughlan et al (2002) argue that Action Research is research in action rather than research about action in the sense that it uses a scientific approach to study the solutions for important social or organizational issues in collaboration with those who experience the issues directly. Action Research takes place through an iterative four step process, namely consciously and deliberately taken planning, taking action and evaluating the action leading to planning for new action. Due to the participative nature of Action Research, members of the system being studied must participate actively in the iterative process mentioned above. The desired outcomes of Action Research are not only solutions to the immediate problem, but important learning from the findings contribute to scientific knowledge and theory.

4.2. Features of Action Research

Coughlan et al (2002) citing Gummesson (2000) argue that Action Research has ten characteristics which are briefly discussed below.

- The role of the Action Researcher is not merely observing what is happening, but also working actively to make it happen.
- The purpose of Action Research is always two-fold, namely solving a problem and contributing to science. In this regard it doesn’t seek to explain the distinction
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between theory and action. The main challenge to the researcher is to engage and make the action happen, while not forgetting to reflect on it with a purpose to contribute theory to the body of knowledge.

• Action Research is a collaborative work between the researcher and members of the client personnel

• The purpose of research should be developing holistic understanding during the project. This means being able to work with dynamic complexity because of multiple causes and effects over time.

• The fundamental of Action Research is change, thus it is applicable to understanding, planning, and implementing desired change in the organization.

• Authentic relationships between researcher and members of the client system are essential. In this regard it is imperative for the researcher to know how they understand the process and take significant action.

• Both qualitative and quantitative tools of data gathering can be used to collect data in Action Research; however the researcher must apply the tools in such a way that critical data is not missed.

• The researcher requires prior understanding of corporate environment, conditions of business, the structure and dynamics of the operating systems.

• Action research should be conducted in real time though retrospective approach is also acceptable.

• Action research has its own quality criteria which involve reflection on the cooperation between researcher and members of the client system, reflexive concern for practical outcomes, methodological appropriateness, significance of research and sustainability of change.

4.3. Roles of the action researcher and the Client System

The action researcher assumes the role of the outside agent who acts as a facilitator of the action and reflection in the organisation. He is a helper to the members of the client system who participate in the research process. According to Coughlan et al (2002) citing Schein (1999) there are two models of helping. One is the expert model like doctor-patient model. The other is the process consultation model in which helpers work in a facilitative manner to help clients inquire into their own issues and create and implement solutions. The latter model is suitable for action researchers. The process consultation model will be
adopted for this study thereby facilitating the client system. This model is suitable for this research because members of the client system are experts on their business areas, so the researcher cannot work with them as an expert, but rather as a facilitator.

4.4. The research Design
The scope, involvement of members of the client system and access to the research process were jointly decided by the research supervisor, management of the client system and the researcher prior to commencement of the project. The hospital management was advised to note that it is common for the action researcher to have a project steering group, which enables project management. In particular, the project steering group will facilitate planning, implementing, evaluating and building inside knowledge of the organization. It is anticipated that evaluation for every action will take place prior to commencing the next action. This is a fundamental requirement of action research (Coughlan et al, 2002).

4.5. Research Implementation
Action Research employs a spiral of sequential steps (Thornhill, Lewis, Millmore & Saunders, 2000). Similarly, Coughlan et al (2002) argue that implementation of Action Research involves three stages namely a pre-step, execution steps and a Meta step. These steps are briefly detailed below

- The **pre-step** is aimed at answering two questions for rationale of action and research. This step is already addressed under section 2.3 “Rationale”.
- **Execution** steps involve Data Gathering, Data Feedback, Data Analysis, Action Planning, Implementation and Evaluation. All these steps will take place when doing the actual research.
- The **Meta** step will involve the researcher in monitoring and inquiry on cycles. The inquiries referred to in the **Meta** step will take any of the three forms:
  - **Pure Inquiry** where the researcher will prompt telling of the story of what is taking place and listens carefully.
  - **Exploratory Diagnostic Inquiry** where the researcher will manage how the content is analysed by others; and
  - **Confrontive Inquiry** where the researcher will be challenging others by sharing his ideas.

Since each cycle will involve planning, implementation and evaluation, there will be continuous opportunity for learning.
The figure below illustrates a spiral of sequential steps involved in implementation of Action Research:

![Action Research Cycle Diagram](image)

**Figure 4: Action research cycle (Source: Coughlan & Coghlan, 2002)**

The subsequent cycles of Action Research involve revising the previous change process to ensure it meets the needs of organization. Such cycles make use of information gathered through monitoring and evaluation processes. Subsequent planned action steps are amended and implemented taking into account the unforeseen changes, their effects monitored and evaluated and further amendments made. In completing this process Saunders, Lewis & Thornhill (2003: 95) suggest that this stepwise approach requires the completion of at least two cycles within the Action Research methodology.

### 4.6. Theory Generation from Research Findings

Theory generation will be based on a synthesis of what emerges from the data and that, which emerges from the use in practice of the body of theory, which informed the intervention and research intention. In this context theory generation will be incremental, moving from particular to general cases in small steps (Coughlan & Coghlan, 2002:236). The “Lessons from the project” section will summarize this (see section 6).
5. Testing of Hypotheses

Gathering, documenting and analysing the research findings were conducted within the context of testing the four hypotheses suggested earlier in this document. In addition, Action Research methodology steps were applied in the context of testing these hypotheses.

The data tabulated below each subsequent hypothesis is intended to illustrate the following information:

- The Action Research cycle stages during which the relevant hypothesis was tested
- Method employed in testing the hypothesis
- Evidence document to support the hypothesis testing

5.1. First Hypothesis

\( H_0 \): Value Stream Mapping can be used to describe and clarify the patient file movement process at GF Jooste

\( H_a \): Value Stream Mapping is not an effective tool for mapping and clarifying the patient file movement process at GF Jooste

<table>
<thead>
<tr>
<th>Action Research Cycle Stages Applied</th>
<th>Method of Hypothesis Testing</th>
<th>Evidence to Support the Hypothesis testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data gathering and Data Feedback</td>
<td>Qualitative</td>
<td>Exhibit 1: Meetings log</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figure 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figure 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figure 7</td>
</tr>
</tbody>
</table>

5.1.1. Value Stream Mapping

The project team was formed by the hospital management in collaboration with the medical records department. The researcher trained the team on TPS/Lean principles prior to Value Stream Mapping (VSM). VSM took place for two days, namely 26 and 27 September 2007.
Three different maps were drawn according to three different patient groups (refer to figures 5, 6 and 7 below). Patients were grouped into “Emergency”, “Booked” and “Walk-in and Referred” groups because they report to different departments and follow different process flows, thus causing different file movement processes. VSM was conducted for the purpose of data gathering on patient file movement and lead times, and understanding how the process worked (Rother & Shook, 1999). Patient files at GF Jooste move throughout the hospital, which means that the floor layout of the file movement process is the whole hospital. However, a layout of the building housing the Medical Records department and the Admission reception (see figure 11) was constructed for the purpose of understanding the main environment in which this research was conducted.

Key findings of the VSM are tabulated below.

<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency acceptance</td>
<td>• Taking the patient off the ambulance</td>
<td>• Average cycle time is 5 minutes</td>
</tr>
<tr>
<td></td>
<td>• Taking the patient to casualty</td>
<td>• Waiting time is between 0 and 5 minutes</td>
</tr>
<tr>
<td>Taking file</td>
<td>• Interview for patient information at admission reception</td>
<td>• Waiting time is between 5 and 45 minutes</td>
</tr>
<tr>
<td></td>
<td>• Retrieving patient details from CLINICOM system</td>
<td>• Average cycle time for issuing a file is 8 minutes</td>
</tr>
<tr>
<td></td>
<td>• Printing the file request</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Retrieving the file from medical records</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between 5 and 15 patients in the queue</td>
<td></td>
</tr>
<tr>
<td>Doctor and Nurse</td>
<td>• Triaging the patient</td>
<td>• Average cycle time is 30 minutes</td>
</tr>
<tr>
<td></td>
<td>• Treatment if not referred</td>
<td>• Waiting time is between 20 and 60 minutes</td>
</tr>
<tr>
<td></td>
<td>• Refer the patient to consultant if necessary</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Up to 30 patients are found waiting to be attended</td>
<td></td>
</tr>
<tr>
<td>Process Involved</td>
<td>Activities</td>
<td>Times</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| Consultant       | • Treat the patient  
• If consultant not available patients wait till next day  
• Between 0 and 10 patients wait for a consultant | • Average cycle time is 10 minutes |
| Pharmacy         | • Reading patient file  
• Preparing medication  
• Writing medical instructions  
• Explain medical instructions to the patient  
• Issuing medicines and file  
• Between 1 and 5 patients are found in a queue | • Average cycle time is 10 minutes  
• Waiting time is between 5 and 15 minutes |
| File drop off    | • Patient move with the file to be dropped at drop off point | • Medical Records clerks take between 80 and 180 minutes to collect files |

Table 1: Key Findings on Patient File Movement for the “Emergency” Patients during Value Stream Mapping on 26/27 September 07

<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
</table>
| Security booth   | • Patients arrive and queue  
• Provide patient numbers and be allowed to enter the building.  
• Between 0 and 15 patients are found in the queue | • Waiting time is between 3 and 20 minutes  
• Average cycle time is 2 minutes |
| Issue file       | • The Triage Nurse reads the referral letters  
• Interview for patient information at admission reception  
• Retrieving patient details from CLINICOM system | • Waiting time is between 5 and 45 minutes  
• Average cycle time is 8 minutes |
<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
</table>
| Nurse and Doctor triage  | • Triage Nurse measures patient’s vital signs, tests and observations as appropriate  
|                          | • Triage doctor does medical screening of patients and decides on further treatments as appropriate  
|                          | • Between 5 and 15 patients are found in the queue                            | • Waiting time is between 20 and 60 minutes  
|                          |                                                                            | • Average cycle time is 20 minutes         |
| Casualty                 | • Medical doctor assesses patient’s complaint, patient history and physical examination  
|                          | • Nurses assist the doctor on additional procedures  
|                          | • Number of patients waiting to be attended is between 5 and 30               | • Average cycle time is 25 minutes         |
| OPD reception            | • A clerk receives a patient file  
|                          | • Retrieve patient details from CLINICOM system  
|                          | • Book the patient entry  
|                          | • Assign patient to clinic  
|                          | • Take the file to Nursing Unit  
|                          | • Between 0 and 60 patients are found in a queue                             | • Average cycle time is 5 minutes          
<p>|                          |                                                                            | • Waiting time is between 5 and 150 minutes|
| Surgical                 | • Doctors observe and attend the patient as appropriate                      | • Average cycle time is 90 minutes         |
|                          | • Between 0 and 5 patients are found waiting to be attended                  |                                            |</p>
<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopaedic clinic</td>
<td>• There are interns working on this area making the number of doctors sufficient to cope with demands</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Clerks read patient information</td>
<td>• Average cycle time is 20 minutes</td>
</tr>
<tr>
<td></td>
<td>• Assign patient to doctor</td>
<td>• Waiting time is between 20 and 90 minutes</td>
</tr>
<tr>
<td></td>
<td>• Doctor attend the patient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between 5 and 20 patients are found in the queue</td>
<td></td>
</tr>
<tr>
<td>X-ray</td>
<td>• Read patient file</td>
<td>• Average cycle time is 7 minutes</td>
</tr>
<tr>
<td></td>
<td>• Take x-ray</td>
<td>• Waiting time is between 5 and 20 minutes</td>
</tr>
<tr>
<td></td>
<td>• Document x-ray details in the file</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Advise a patient when to come back</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between 5 and 15 patients are found in the queue</td>
<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td>• Reading patient file</td>
<td>• Average cycle time is 10 minutes</td>
</tr>
<tr>
<td></td>
<td>• Preparing medication</td>
<td>• Waiting time is between 5 and 15 minutes</td>
</tr>
<tr>
<td></td>
<td>• Writing medical instructions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Explain medical instructions to the patient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Issuing medicines and file</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between 1 and 5 patients are found in a queue</td>
<td></td>
</tr>
<tr>
<td>OPD reception</td>
<td>• Patients come back for appointments and returning files</td>
<td>• Waiting time is between 5 and 20 minutes</td>
</tr>
<tr>
<td></td>
<td>• A clerk receives a patient file</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Retrieve patient details from CLINICOM system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Book the next appointment in CLINICOM system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Give the appointment card to</td>
<td></td>
</tr>
</tbody>
</table>
Lean Healthcare: An Application in Medical Records Department at G.F. Jooste Hospital in Cape Town

<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>File drop off</td>
<td>• Clerks take up to 5 minutes to drop off the file</td>
<td>• Medical Records clerks take up to 180 minutes to collect files</td>
</tr>
</tbody>
</table>

Table 2: Key Findings on Patient File Movement for the “Walk in and Referred” Patients during Value Stream Mapping on 26/27 September 07

<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take files from Medical Records</td>
<td>• Medical Records clerks prepare files for next day’s appointments</td>
<td>• Average file preparation time is 30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Take files to OPD reception 18 hours (1080 minutes) before patient arrival</td>
</tr>
<tr>
<td>Booked patients reception</td>
<td>• Clerk retrieves patient details from CLINICOM system</td>
<td>• Average cycle time is 12 minutes</td>
</tr>
<tr>
<td></td>
<td>• Verifies appointments</td>
<td>• Waiting time is between 10 and 150 minutes</td>
</tr>
<tr>
<td></td>
<td>• Prepare files for different clinics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Take the files to Nursing Unit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between 0 and 60 patients are found in a queue</td>
<td></td>
</tr>
<tr>
<td>Nursing station</td>
<td>• Arrange the patient files for doctors</td>
<td>• Average cycle time is 20 minutes</td>
</tr>
<tr>
<td></td>
<td>• Communicate to doctors</td>
<td>• Waiting time is between 5 and 90 minutes</td>
</tr>
<tr>
<td></td>
<td>• Call patients for doctors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Between 0 and 60 patients are found in a queue</td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>• Observe patient progress</td>
<td>• Average cycle time is 20 minutes</td>
</tr>
<tr>
<td></td>
<td>• Decide other procedures as</td>
<td></td>
</tr>
</tbody>
</table>

Venance J. Mwolo: FT MBA 2007
<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
</table>
| appropriate      | • Prescribe medication for the patient  
                    • Between 20 and 40 patients are found in a queue | • Waiting time is between 20 and 120 minutes |
| Pharmacy         | • Reading patient file  
                    • Preparing medication  
                    • Writing medical instructions  
                    • Explain medical instructions to the patient  
                    • Issuing medicines and file  
                    • Between 1 and 5 patients are found in a queue | • Average cycle time is 10 minutes  
                    • Waiting time is between 5 and 15 minutes |
| Counselling      | • Nurses communicate to doctors about the patients  
                    • Nurses provide counselling to patients as advised by the doctors  
                    • Between 0 and 15 patients are found in a queue | • Average cycle time is 45 minutes  
                    • Waiting time is between 50 and 180 minutes |
| Booked patients reception | • Patients come back for appointments and returning files  
                    • A clerk receives a patient file  
                    • Retrieve patient details from CLINICOM system  
                    • Book the next appointment in CLINICOM system  
                    • Give the appointment card to patient  
                    • Between 0 and 15 patients are found in a queue | • Average cycle time is 8 minutes  
                    • Waiting time is between 5 and 70 minutes |
<p>| File drop off    | • Clerks take up to 5 minutes to drop off the file | • Medical Records clerks take up to 180 minutes |</p>
<table>
<thead>
<tr>
<th>Process Involved</th>
<th>Activities</th>
<th>Times</th>
</tr>
</thead>
</table>

Table 3: Key Findings on Patient File Movement for the “Booked” Patients during Value Stream Mapping on 26/27 September 07

5.1.2. Feedback from participants

The feedback meeting was held on the afternoon of 27th September 2007, after completing the Value Stream Mapping (See red colors on figures 5, 6 and 7 for Current State Maps). During this session all participants indicated that they understood the Value Stream Map that was shown as an example (ACME VSM as per Furuhashi’s presentation on 30th July 2007 was used for illustration). Furthermore, participants acknowledged the value of VSM as an effective tool for understanding the patient medical records movement within the hospital, and that VSM enabled them to see easily areas of waste that needed improvement as argued by Liker and Meier (2006) (See green colors on figures 8, 9 and 10 for Future State Maps). Some areas identified to have waste include admission reception, medical records registry, pharmacy and file drop off points. Their general opinion was that VSM can be used to understand the existing process and illustrate the future desired state.

5.1.3. Conclusion

Based on this feedback we do not reject the null hypothesis ($H_0$) and conclude that Value Stream Mapping can be used to describe and clarify the patient file movement process at GF Jooste.
Note: The red colour (Figure 5, 6 and 7) indicate areas that needed improvement while green colour (figure 8, 9 and 10) indicate the future desired state.

Figure 5: Current State Map for Emergency Patients
Figure 6: Current State Map for Walk-in and Referred Patients

Venance J. Mwolo: FT MBA 2007
Figure 7: Current State Map for Booked Patients

Venance J. Mwolo: FT MBA 2007
Figure 8: Future State Map for Emergency Patients
Walk-in and referred patients Future State Map: Reduce missing files to 0%

Figure 9: Future State Map for Walk-in and Referred Patients

Venance J. Mwolo: FT MBA 2007
Figure 10: Future State Map for Booked Patients
Note: Please be informed that this diagram is not drawn to scale and that is intended to illustrate where Medical records is housed.

Figure 11: Schematic View of Trauma Emergencies Unit
5.2. Second Hypothesis

H₀: Application of TPS/Lean principles and tools can contribute to improved file handling as measured by the number of missing files per day.

Hₐ: Application of TPS/Lean principles and tools cannot contribute to improved file handling as measured by the number of missing files per day.

### Action Research Cycle Stages Applied

<table>
<thead>
<tr>
<th>Method of Hypothesis Testing</th>
<th>Evidence to Support the Hypothesis testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation and Evaluation</td>
<td>Table 4</td>
</tr>
<tr>
<td></td>
<td>Table 5</td>
</tr>
<tr>
<td></td>
<td>Table 6</td>
</tr>
<tr>
<td></td>
<td>Exhibit 1: Meetings log</td>
</tr>
</tbody>
</table>

TPS/Lean principles were applied during the three experiments conducted on 1st October, 9th-11th October and 22nd October 2007. The number of missing files (out of issued files) were recorded and feedback was collected qualitatively from Doctors, Nurses and other staff of the hospital.

This hypothesis was tested during Implementation and Evaluation stages of the Action Research cycle by means of experiments as argued by Coughlan & Coghlan (2002). The results of the three experiments conducted during this Action Research are summarized below.
5.2.1. First Experiment: Conducted on 1st October 2007

5.2.1.1. Guidelines for experiment 1

<table>
<thead>
<tr>
<th>Problem</th>
<th>Hypothesis</th>
<th>Waste</th>
<th>TPS/Lean principle applied</th>
<th>Expected outcome</th>
</tr>
</thead>
</table>
| Before the BPW, missing files were 40% of the issued files and after BPW, missing files were 19%, thus causing loss of patient history, redoing of medical procedures and creation of duplicate files for the same patients and ultimately causing delayed medical service to patients | By reducing the number of missing files, files will be issued quickly to patients, patient history will be available and this will reduce patient delays at Medical Records | • Waiting for files at Medical Records and admission reception  
• Duplicate files  
• Unauthorized access to files  
• Long schedule for collecting files | • Involve and empower employees  
• Specify value from the customer perspective  
• Understanding which steps within process flows add value and which do not (Value Stream)  
• Keeping work moving and eliminating waste that creates delay (Flow) | Decrease the number of missing files in the Medical Records to 5% and enable quick access to medical records by patients, doctors and other users within the hospital |

Table 4: Guidelines for Experiment 1

5.2.1.2. Findings of experiment 1

The first experiment was conducted over a period of 5 hours. In this experiment, three (3) medical records staff were involved and results were compared to those achieved during BPW on 3rd August 2007.

The experiment focused on collecting files soon after daily use from various places like OPD receptions, pharmacy, wards, other file drop off points and other user departments; controlling unauthorized access to medical records, retaining files at end points of patient service, issuing files soon after receiving the request and doing a quick and friendly patient interview at admission reception. At the end of the business day reconciliation between the issued and collected files was done. Reasons for uncollected files were identified and were used as inputs to discussions on future improvements. The results are summarized below.
<table>
<thead>
<tr>
<th>Improvement objective</th>
<th>Measurement</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce missing files to 5%</td>
<td>Number of missing files per day (Except admissions)</td>
<td>5 out of 103 missing (4.85% missing)</td>
</tr>
<tr>
<td>Reduce time to issue patient file to less than 4 minutes</td>
<td>Time to find and issue file</td>
<td>4.0 Minutes</td>
</tr>
</tbody>
</table>

Table 5: Findings of experiment 1

Prior to conducting the experiment the researcher already observed a sign of improvement achieved between the end of the BPW and the start of the research, however no data was recorded that could serve as the basis for evaluating the observed improvement achieved. In this regard the researcher and the client system decided to take the BPW data as the basis for comparison. The table below illustrates.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Measure</th>
<th>After BPW on 3rd August 2007</th>
<th>After Experiment 1 on 1st October 2007</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce missing files to 5%</td>
<td>Number of missing files per day (Except admissions)</td>
<td>15 out of 77 missing (19% missing)</td>
<td>5 out of 103 missing (4.85% missing)</td>
<td>67% improvement</td>
</tr>
<tr>
<td>Reduce time to issue patient file to less than 4 minutes</td>
<td>Time to find and issue file</td>
<td>3.5 Minutes</td>
<td>4.0 Minutes</td>
<td>A slowdown of 0.5 minute</td>
</tr>
</tbody>
</table>

Table 6: Comparison between BPW and experiment 1 results

During the evaluation stage the project team observed that experiment findings outperformed the improvement objective under this hypothesis (reducing missing files to 5%) by achieving...
4.85% missing files. Again, in comparison to the 19% missing files achieved during BPW, the experiment gives a 67% improvement.

Apart from the latter improvements, the TPS/Lean principles applied in testing this hypothesis revealed the following results:

- Employees were successfully empowered since they were thoroughly involved in the experiment and were able to perform experiment activities and realize the improvement. During evaluation employees were keen to give ideas for future experiments.
- Value was successfully specified in customer perspective as doctors gave feedback on satisfaction of availability of original files (Dr. Perez: 15th October 2007 see Exhibit 1).
- File waiting time at drop off points and long file collection schedule were identified as not adding value (Value Stream) and therefore were reduced.
- Files available in the medical records were issued immediately after getting the request and patients did not spend as much time waiting for files as before (Flow).

5.2.1.3. Evaluation

Results of the experiment surpassed the improvement objective for this hypothesis (reducing missing files to 5%) and the experiment was therefore deemed successful. However, during evaluation, the project team agreed that they could do better if more interventions were introduced. The suggested interventions were:

(a) Introducing a 24-hour operations to the Medical Records department, and
(b) Issuing of files with relevant x-rays.

These interventions were aimed at enabling 24 hour access to medical records and reducing the number of patients returning to medical records looking for x-rays respectively. It was for this reason that experiment 2 was scheduled from 9th to 11th October 2007.

5.2.2. Experiment 2: Conducted between 9th to 11th October 2007

5.2.2.1. Guidelines for experiment 2

<table>
<thead>
<tr>
<th>Problem</th>
<th>Hypothesis</th>
<th>Waste</th>
<th>TPS/Lean principle applied</th>
<th>Expected outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient medical records were</td>
<td>• By making Medical</td>
<td>• Closing</td>
<td>• Involve and empower</td>
<td>• Decrease the number</td>
</tr>
</tbody>
</table>
Lean Healthcare: An Application in Medical Records Department at G.F. Jooste Hospital in Cape Town

<table>
<thead>
<tr>
<th>Problem</th>
<th>Hypothesis</th>
<th>Waste</th>
<th>TPS/Lean principle applied</th>
<th>Expected outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>not accessible at night and files were issued during the day without x-rays causing creation of duplicate files during nights and returning patients looking for x-rays respectively</td>
<td>Records department operate 24 hours a day patient medical records will be accessible and reduce creation of duplicate files • Issuing files with relevant x-rays will reduce the time the patient spends looking for medical documents and consequently speed the service delivery</td>
<td>Records at night • Issuing patient files without x-rays if available</td>
<td>employees • Specify value from the customer perspective • Understanding which steps within process flows add value and which do not (Value Stream) • Keeping work moving and eliminating waste that creates delay (Flow) • Just In Time (JIT) issuing of x-rays • All work shall be highly specified as to content, sequence, timing and outcome • Every supplier-customer connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses</td>
<td>of missing files in the Medical Records to 3% and enable quick and timely access to medical records by patients, doctors and other users within the hospital • Issue patient file with relevant x-ray in 3.5 minutes</td>
</tr>
</tbody>
</table>

Table 7: Guidelines for Experiment 2
The findings in the first three stages of Action Research cycle in experiment 1 (Data Gathering, Data Feedback and Data Analysis) played a guiding role in planning for experiment 2 which was done during the Action Planning stage of Action Research cycle. The project team made the following decisions:

- The problem of returning patients looking for x-rays was identified and so had to be addressed. In keeping with the first two rules of TPS (All work shall be highly specified as to content, sequence, timing and outcome and Every supplier-customer connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses) and JIT, the team decided to intervene by issuing the patient files with their relevant x-rays when requested.

- The problem of doctors keeping files instead of returning them to medical records was attributed to closing operations of Medical Records department at night, thus making medical records not accessible. In keeping with Value Stream, Flow, JIT principles and TPS rule 2, it was decided that intervention be made by making Medical Records department operate 24 hours a day. It was fortunate that planning for such intervention was already done and therefore the project team had to enforce its execution.

- The Medical Records department started operating 24 hours a day on 8th October 2007 in order to facilitate the improvement process.

- One member of the project team was assigned to work during night shifts in collaboration with others as per staff roster.

- Experiment 2 took place from 9th to 11th October 2007.

5.2.2.2. Findings of experiment 2

The second experiment was conducted over a three-day period (for 5 hours each day). In this experiment three medical records staff were involved and results were compared to those achieved during the first experiment.

The experiment focused on collecting files soon after daily use from various places like OPD receptions, pharmacy, wards, other file drop off points and other user departments; controlling unauthorized access to medical records, retaining files at end points of patient service, issuing files with x-rays soon after receiving the request and doing a quick and friendly patient interview at admission reception and operating 24 hours every day. At the end of the business day reconciliation between the issued and collected files was done. Reasons for missing files
were identified and were used as inputs to discussions on future improvements. The table below summarize results of experiment 2.

<table>
<thead>
<tr>
<th>Improvement objective</th>
<th>Measurement</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce missing files to 3%</td>
<td>Number of missing files per day (Except admissions)</td>
<td>0 out of 199 missing (0% missing)</td>
</tr>
<tr>
<td>Reduce time to issue patient file to less than 3.5 minutes</td>
<td>Time to find and issue file</td>
<td>3 Minutes and 36 seconds (24 seconds improvement)</td>
</tr>
</tbody>
</table>

Table 8: Findings of experiment 2

The table below shows a comparison between experiment 1 and experiment 2 results

<table>
<thead>
<tr>
<th>Objective</th>
<th>Measure</th>
<th>After Experiment 1 on 1st October 2007</th>
<th>After Experiment 2 on 11th October 2007</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce missing files to 3%</td>
<td>Number of missing files per day (Except admissions)</td>
<td>5 out of 103 missing (4.85% missing)</td>
<td>0 out of 199 missing (0% missing)</td>
<td>100% improvement</td>
</tr>
<tr>
<td>Reduce time to issue patient file to 3.5 minutes</td>
<td>Time to find and issue file</td>
<td>4.0 Minutes</td>
<td>3 Minutes and 36 seconds</td>
<td>24 seconds improvement</td>
</tr>
</tbody>
</table>

Table 9: Comparison between experiment 1 and experiment 2 results

5.2.2.3. Evaluation

Results of this experiment surpasses the improvement objective for this hypothesis (reducing missing files to 3%), and the experiment was therefore deemed successful. However, during evaluation, the project team agreed that they could do even better if more interventions were introduced, namely:

(a) Introducing file dividers for all shelves, and
(b) Filing and sorting of x-rays.
These interventions were aimed at speeding up the file and x-ray retrieving process. It was for this reason, as well as the development of a sustainability plan, that experiment 3 was scheduled from 22nd to 23rd October 2007.

5.2.3. Experiment 3: Conducted between 22nd and 23rd October 2007

5.2.3.1. Guidelines for experiment 3

<table>
<thead>
<tr>
<th>Problem</th>
<th>Hypothesis</th>
<th>Waste</th>
<th>TPS/Lean principle applied</th>
<th>Expected outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initially file dividers were introduced in only one (1) shelf, thus there were still misfiling and delays in retrieving files. Also, x-rays were not well grouped and sorted to allow easy and quick access when required</td>
<td>• By introducing file dividers in all file shelves, time to retrieve file and misfiling will be reduced. • By grouping and sorting of x-rays, time to retrieve x-rays will be reduced and ultimately both file and x-ray issuing will take shorter time than before</td>
<td>• Large number of files stored in the same shelf cabinet making it difficult to retrieve and causing misfiling. • Large number of x-rays grouped together without sorting</td>
<td>• Involve and empower employees. • Understanding which steps within process flows add value and which do not (Value Stream). • Keeping work moving and eliminating waste that creates delay (Flow). • All work shall be highly specified as to content, sequence, timing and outcome</td>
<td>• Decrease the number of missing files in the Medical Records to 0% and enable quick and timely access to medical records by patients, doctors and other users within the hospital. • Issue patient file with relevant x-ray in 3.5 minutes</td>
</tr>
</tbody>
</table>

Table 10: Guidelines for Experiment 3

The findings in the first three stages of Action Research cycle in experiment 2 (Data Gathering, Data Feedback and Data Analysis) played a guiding role in planning for experiment 3 which was done during the Action Planning stage of Action Research cycle. The project team made the following decisions:

- The problem of delays in retrieving files from shelves without file dividers was identified and so had to be addressed. In keeping with the first rule of TPS (All work shall be highly specified as to content, sequence, timing and outcome), Value Stream...
and Flow principles, the team decided to intervene by implementing file dividers in all ten (10) file shelves.

- X-rays were stored in large groups and were not sorted. This caused delays in retrieving x-rays when requested. In line with Value Stream and Flow principles, the team decided to intervene by introducing smaller sorted groups of x-rays to enable easy and quick retrieval when required.
- Experiment 3 took place from 22\textsuperscript{nd} to 23\textsuperscript{rd} October 2007.

5.2.3.2. Findings of experiment 3

The third experiment was conducted over five hours on 22\textsuperscript{nd} October 2007. In this experiment three medical records staff were involved and results were compared to those achieved during the second experiment.

The experiment focused on observing, recording results, analysing and evaluating data on file and x-ray issuing as the impact of interventions introduced. The research team also continued collecting files soon after daily use, controlling unauthorized access to medical records, retaining files at end points of patient service, doing a quick and friendly patient interview at admission reception and 24 hours operations at Medical Records every day. At the end of the business day reconciliation between the issued and collected files was done. Reasons for uncollected files were identified and follow-up done. The table below summarizes results of experiment 3.

<table>
<thead>
<tr>
<th>Improvement objective</th>
<th>Measurement</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce missing files to 0%</td>
<td>Number of missing files per day (Except admissions)</td>
<td>0 out of 121 missing (0% missing)</td>
</tr>
<tr>
<td>Reduce time to issue patient file to less than 3.5 minutes</td>
<td>Time to find and issue file</td>
<td>3 Minutes (36 seconds improvement)</td>
</tr>
</tbody>
</table>

Table 11: Findings of experiment 3

The table below shows a comparison between experiment 2 and experiment 3 results
Reduce missing files to 3%  
(Except admissions)  
Number of missing files per day  
0 out of 199 missing  
(0% missing)  
0 out of 121 missing  
(0% missing)  
Maintained improvements of experiment 2

| Reduce time to issue patient file to 3.5 minutes | Time to find and issue file | 3 Minutes and 36 seconds | 3 Minutes | 36 seconds improvement |

Table 12: Comparison between experiment 2 and experiment 3 results

5.2.3.3. Evaluation

The experiment achieved the improvement objective for this hypothesis (reducing missing files to 0%) and was therefore deemed successful. However, during evaluation, the project team agreed that sustaining these achievements would be made easier if file dividers were implemented in all ten (10) file shelves. File dividers were implemented in only five (5) shelves due to delays in getting adequate boards. It was therefore agreed that implementing file dividers would be completed within one week.

5.2.4. Conclusion

The experiment results indicate that missing files have been reduced from 19% (during BPW) to 0% (during a follow-up project). Based on these results the research team does not reject the null hypothesis (H₀), and conclude that application of TPS/Lean principles and tools can contribute to improved file handling as measured by the number of missing files per day.

5.3. Third Hypothesis

H₀: Application of TPS/Lean principles and tools in the Medical Records department at GF Jooste can contribute to improved patient file issuing as measured by time taken to issue a file.

H₁: Application of TPS/Lean principles and tools in the Medical Records department at GF Jooste cannot contribute to improved patient file issuing as measured by time taken to issue a file.
5.3.1. Summary of experiment observations

This hypothesis was tested during Implementation and Evaluation stages of the Action Research cycle by means of experiments as argued by Coughlan & Coghlan (2002). The results of the three experiments conducted during this Action Research have been summarized as follows:

- Table 8 in experiment 2 gives the average time recorded in issuing one patient file (4 Minutes), while Table 6 compares the average time recorded during BPW (3.5 Minutes) and average time recorded after intervention (4 Minutes). The time recorded after BPW was 3.5 minutes, however, such improvements were not sustained, thus the project team had to observe how much time was taken to issue one file. It was observed that on average it took 8 minutes to issue one file prior to any intervention during the follow up project. This shows an improvement of 4 Minutes during experiment 1.

- Table 8 in experiment 2 shows the average time recorded in issuing one patient file (3 Minutes and 36 Seconds), while Table 9 compares the average time recorded in experiment 1 (4 Minutes) and average time recorded in experiment 2 (3 Minutes and 36 Seconds). This shows an improvement of 24 seconds during experiment 2.

- Table 11 in experiment 3 shows the average time recorded in issuing one patient file (3 Minutes), while Table 12 compares the average time recorded in experiment 2 (3 Minutes and 36 Seconds) and average time recorded in
experiment 3 (3 Minutes). This shows an improvement of 36 seconds during experiment 3.

During the three experiments a total of thirty observations were recorded (ten from each experiment), thus the data given above serves as a summary of the individual observations given in the table below:

<table>
<thead>
<tr>
<th>Record Number</th>
<th>Experiment 1</th>
<th>Experiment 2</th>
<th>Experiment 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Admission inquiry</td>
<td>File retrieval</td>
<td>Admission inquiry</td>
</tr>
<tr>
<td>1</td>
<td>01:40</td>
<td>02:20</td>
<td>01:40</td>
</tr>
<tr>
<td>2</td>
<td>02:01</td>
<td>02:00</td>
<td>01:51</td>
</tr>
<tr>
<td>3</td>
<td>01:50</td>
<td>02:10</td>
<td>01:35</td>
</tr>
<tr>
<td>4</td>
<td>01:40</td>
<td>02:30</td>
<td>01:40</td>
</tr>
<tr>
<td>5</td>
<td>02:00</td>
<td>02:20</td>
<td>01:25</td>
</tr>
<tr>
<td>6</td>
<td>02:01</td>
<td>02:20</td>
<td>01:25</td>
</tr>
<tr>
<td>7</td>
<td>01:50</td>
<td>02:30</td>
<td>01:35</td>
</tr>
<tr>
<td>8</td>
<td>01:40</td>
<td>02:20</td>
<td>01:40</td>
</tr>
<tr>
<td>9</td>
<td>02:00</td>
<td>02:00</td>
<td>01:40</td>
</tr>
<tr>
<td>10</td>
<td>01:40</td>
<td>02:10</td>
<td>01:51</td>
</tr>
<tr>
<td>Average</td>
<td>01:50</td>
<td>02:16</td>
<td>01:38</td>
</tr>
<tr>
<td>Total average</td>
<td>04:06</td>
<td>03:36</td>
<td>3.00</td>
</tr>
</tbody>
</table>

Table 13: Time recorded in issuing one patient file

5.3.2. Conclusion

Based on the evidence gathered from the three experiments as given on the summary above, we do not reject the null hypothesis (H₀) and conclude that application of TPS/Lean principles and tools in the Medical Records department at GF Jooste can contribute to improved patient file issuing as measured by time taken to issue a file.
5.4. Fourth Hypothesis

H₀: Introduction of TPS/Lean principles and tools in the Medical Records department at GF Jooste can result in a positive attitude amongst employees that could lead to sustained performance improvement

H₁: Introduction of TPS/Lean principles and tools in the Medical Records department at GF Jooste cannot result in a positive attitude amongst employees that could lead to sustained performance improvement

<table>
<thead>
<tr>
<th>Action Research Cycle Stages Applied</th>
<th>Method of Hypothesis Testing</th>
<th>Evidence to Support the Hypothesis testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>Qualitative</td>
<td>Exhibit 1: Meetings log</td>
</tr>
<tr>
<td></td>
<td>Opinions were gathered from members of the project team, individual nurses, admission clerks, receptionists upon completion of each experiment and management in the management meeting held on 29th October 2007</td>
<td>Exhibit 2: Sustaining plan</td>
</tr>
</tbody>
</table>

5.4.1. Findings from staff attitude

The researcher used the evaluation stage of the Action Research cycle during each of the three experiments to study and gather opinions from staff involved in the project. These staff included members of the project team, admission receptionists, other medical records staff, clinic receptionists, nurses and doctors. The study indicated that 100% of the opinions gathered favoured sustainability of the project. The researcher also arranged a meeting between the research supervisor and the project team for the purpose of studying their attitude on sustaining the project. Feedback from the supervisor revealed that during the meeting staff indicated their positive attitude towards sustaining the improvements. The researcher involved
the project team to propose and document the sustainability plan during the last day of the third experiment (see exhibit 2 attached).

The hospital management invited the researcher to attend the management meeting held on 29\textsuperscript{th} October 2007 for the purpose of discussing the final report of the project. The proposed sustainability plan was tabled for discussion and all the management members that were present agreed with all the items proposed. At this point the members of management informed the researcher about the positive feedback they had been getting from doctors and nurses about the remarkable improvements achieved (see actual data on analysis of second hypothesis). Management agreed to sustain the project and implement the proposed sustainability plan.

5.4.2. Conclusion

Based on the evidence gathered from the evaluation of employees’ and management’s attitudes toward sustaining the project (as discussed above) and the “5S” process (Liker & Meier, 2006), we do not reject the null hypothesis (H\textsubscript{0}) and conclude that Introduction of TPS/Lean principles and tools in the Medical Records department at GF Jooste can result in a positive attitude amongst employees that could lead to sustained performance improvement.

6. Lessons from the project

The researcher learned various lessons while doing this research. I may be inclined to say that such lessons are important aspects to observe when implementing Lean healthcare projects. These lessons are summarized below:

6.1. Management and people key success factors

The researcher is inclined to suggest that the positive results of the research were primarily attributable to the commitment and support exercised by the top management and the project team. This was very clear in the early stages of the improvement process when the hospital hosted the Best Practice Workshop in July/August this year. Furthermore, this was evidenced through involvement of top management in the project by regular audits, reading progress reports and providing facilities requested. Four projects were studied for the purpose of learning what works, what doesn’t work and subsequently implementing follow-up projects for projects showing satisfactory improvement.
Liker & Meier (2007) argue that without highly capable people, the TPS today would quickly disintegrate. They further point out that a selected few front-office experts could not possibly deal with all situations in the organization. It is argued in this document that in order to get multi-skilled people, management needs to be patient and think about developing people who would be able to support the methods. Furthermore, it is argued that challenges presented by the application of new ideas from management require people with thinking capability. With this short explanation the researcher emphasizes the importance of management’s view of people as human capital and therefore, the need to develop them.

6.2. Sustaining process improvement is living TPS/Lean

Another question posed by this research is the sustainability of the improvements achieved. Liker and Meier (2006) address this issue in their “5S” process, where “sustaining” is the fifth “S”. They argue that in order to sustain the improvements, it is necessary to stay disciplined and therefore the use of regular audits is essential. The research findings revealed that management and employees of GF Jooste hospital are committed to sustaining the project. This was observed during evaluation of each experiment, the project exit meeting with the management and an acceptance of the sustainability plan prepared by the project team in collaboration with the researcher. There is no doubt that this project will be sustained as long as employees and management remain committed to the project.

“If you don’t take them with you on this, you will never get them back” Drew, McCallum & Roggenhofer (2004)

During the project, evidence of employees’ involvement in finding solutions to problems through weekly departmental meetings and open-door communication amongst employees and their leaders, was observed. It is the researchers’ opinion that this involvement is very important in sustaining the improvements as it provides room for doing better. Drew, McCallum & Roggenhofer (2004) in their book titled “Journey to Lean: Making operational change stick” emphasize the importance of working with the team to find a solution with which everyone could agree. Involving team members in finding solutions to the problem is considered necessary in establishing a performance culture.

6.3. Living TPS/Lean at organisation level is vital

Having implemented TPS/Lean in the Medical Records department, the researcher is of the opinion that implementation in other departments is crucial. In order to do this, it is suggested
that the hospital adopts the *Lean Action Plan* framework as argued by Womack and Jones (1996). These authors outline four steps for the *Lean Action Plan* framework which are getting started, create an organization to channel your streams, install business systems to encourage Lean and complete the transformation. These steps are briefly discussed below:

6.3.1. **Getting started**

The top management of the hospital was the main change agent through strong leadership shown during TPS/Lean implementation. The management commitment and support were supported by enthusiastic and committed employees that were involved in the project. It is important for other members of the management and staff of the hospital to get comprehensive training on TPS/lean principles in order to “live lean” in the hospital. It can be foreseen that if this is not done, other process improvement initiatives may not be adequately successful. In this stage the use of Value Stream Mapping is essential as suggested by Rother and Shook (1999).

6.3.2. **Create an organisation to channel your streams**

There is evidence that the hospital has been organised according to functions, though administrative departments do exist. Functional organisation is seen when visiting various working areas and find people from different departments working together. One such example is a combination of doctors, nurses and ward attendants working together in a ward. This facilitates solving inter-departmental problems. Womack and Jones conducted a four-year research for the book “Lean Thinking” which supports this claim after analysing over fifty (50) companies.

6.3.3. **Install business systems to encourage Lean**

The CLINICOM health management system used in the hospital is of world class standard, however not configured for living TPS/Lean. The researcher studied the system and found that it contains most of hospital functions that are not currently used. A good example of such functions is a “doctor functions” section. In this aspect we learned that if doctors were using the system, there could be an electronic version of patient history and this could assist when physical files get lost. The use of the entire CLINICOM system is suggested in order to eliminate waste that is caused by unnecessary manual processes.
6.3.4. **Complete the transformation**

This stage would require the hospital to ensure that all employees “live TPS/Lean”. The researcher understands that a small team of employees are well trained on TPS/Lean, however all employees need to have adequate knowledge on TPS/Lean in order to improve the entire value chain from the customer perspective. One approach could be to use the small available team as a change agent to train other employees and guide them in implementing process improvements. The use of an external *sensei* in collaboration with the internal team could add more value.

6.4. **Way forward**

Finally, the researcher believes that what was observed at GF Jooste over the course of this research was good implementation. However, I am also of the opinion that enormous opportunity exists for the hospital to realize massive savings through further implementation of TPS/Lean primarily by performing a full value stream mapping exercise and rearranging the hospital by service categories and not by division. Following this the researcher feels that the appointment of a proven TPS/Lean *sensei* will be able to identify a number of areas where *muda* can be eliminated (as done during Best Practice Workshop in 2007) and, in doing so, free up resources that can be used for other purposes within the hospital.

This report discusses the findings in the context of the GF Jooste hospital, however at least two more questions need to be answered. The first question is “*Is the Best Practice Workshop an effective tool for introducing process improvement initiatives*”? The researcher feels that this is an effective tool because it is both a cost effective opportunity to get trained by a *sensei* and a pilot study of process improvement projects. The second question still asked by the researcher is “*Will the management and staff of other hospitals exercise the same commitment and support to lean projects as those observed at GF Jooste*”? This question remains unanswered. In this regard it may be worth to research further on this question.
7. Bibliography

BPW Team (2007), "Findings of Pilot Study", papers given at the Best Practice Workshop, Cape Town, 03 Aug.

Brooks, S. 2005, 'A lean services environment experiment: Introducing TPS and Lean principles to a pathology laboratory'. MBA research proposal presented to Cape Town Graduate School of Business: University of Cape Town.


Faull, N. & Booysen, T. 2007, Lean Healthcare: Learning via action review research, Graduate School of Business, Cape Town.


Takeyuki, F (2007), "Workplace Best Practice", paper given at the Best Practice Workshop, Cape Town, 31 Jul-03 Aug


### 8. Exhibit 1: Meetings log

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Participants</th>
<th>Activity</th>
<th>Objectives</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>30/07/2007-03/08/2007</td>
<td>GF Jooste (GFJ)</td>
<td>Furuhashi Takeyuki Prof. Norman Faull Dr. Gio Perez Dr. Tony Booysen Arnold Botha Witness Mgedezi Venance Mwolo Some GFJ staff and other invitees</td>
<td>Best practice workshop</td>
<td>Introduction to TPS/Lean principles Implementing a Kaizen project focus on four projects identified for the workshop  * Improve Efficiency of Trauma and Emergency Theatre  * Improve the Flow through the Outpatient Theatre  * Reduce the Waiting Time for a Patient to Get to a Bed  * Reduce Duplicate Files</td>
<td>Successful training on Toyota Production System/ Lean  Preliminary study on the four projects  Tested Lean application to the four projects and recorded some improvements</td>
</tr>
<tr>
<td>24/08/2007</td>
<td>Health Care Department</td>
<td>Prof. Norman Faull Dr. Keith Cloete Dr. Gio Perez Dr. Tony Booysen Arnold Botha Venance Mwolo</td>
<td>Deliberations of sustainability of some projects at GFJ,</td>
<td>Identification of projects to sustain at GFJ  * Achieve improvement of patient journey  * Identify expertise required to living Kaizen model  * Implementing process improvements at other hospitals</td>
<td>Dr. Tony Booysen awarded a consulting contract to work at Casualty at GFJ  Venance Mwolo allowed to do research at GFJ</td>
</tr>
</tbody>
</table>
### Lean Healthcare: An Application in Medical Records Department at G.F. Jooste Hospital in Cape Town

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Participants</th>
<th>Activity</th>
<th>Objectives</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| 04/09/2006   | GFJ      | Dr. Gio Perez Venance Mwolo           | Meeting to agree on research process          | • Confirming permission to do research at GFJ  
• Confirming area of research                                                                  | • Permission to do research granted  
• Medical records project was assigned for research  
• Witness Mgedezi was identified as a contact person at Medical Records Department |
| 07/09/2007   | GFJ      | Venance Mwolo Witness Mgedezi          | Meeting to plan the first meeting             | • Agree on how to move forward                                                                  | • Meeting scheduled on 12/09/2007 with other stakeholder leaders to agree on the general project plan |
| 12/09/2007   | GFJ      | Witness Mgedezi Tembisa Sotomela Owen Oliver Venance Mwolo | Meeting to discuss the project startup         | • Agree timeline for project startup  
• Agree on plan for first round  
• Formulation of project team                                                                | • Project first round to be between 25/09 and 28/09  
• Departmental meeting to introduce the project to employees and forming project team scheduled on 21/09  
• Model for first round to be 1 day training project team on lean principles  
1 day data gathering and drawing the current state map  
2 days first experiment Dr. Gio and Prof.                                                     |
### Lean Healthcare: An Application in Medical Records Department at G.F. Jooste Hospital in Cape Town

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Participants</th>
<th>Activity</th>
<th>Objectives</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| 18/09/2007   | GSB      | Venance Mwolo & Norman Faull          | Feedback on project start-up plan | ● Inform Norman about the start-up plan  
   ● Get more insights on implementing lean project | Norman was successfully informed and supported the start-up plan  
   ● Project team to attend the projects briefing workshop on 26/09/2007  
   ● One project member to present the project progress for 5 minutes |
| 25/09-01/10  | GFJ      | Venance Mwolo  
   Owen Oliver  
   Vuyisile George  
   Cheswyn Walker | First phase of the project          | ● Train project team on Lean principles and Value Stream Mapping  
   ● Map the patient file movement process  
   ● Identify the waste and its sources  
   ● Identify the countermeasures for eliminating the identified wastes  
   ● Draw map for future state  
   ● Run the first experiment to test the improvement objectives | Successful training on Lean and VSM  
   ● Drawing three maps for “Emergency”, “Booked” and “Walk-in and Referred” patients  
   ● Successful intervention, observation, recording and evaluation of results  
   ● Presented progress report to the management  
   ● Successful planning for second phase |
<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Participants</th>
<th>Activity</th>
<th>Objectives</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/10/2007</td>
<td>UCT GSB</td>
<td>Venance Mwolo</td>
<td>Feedback on the first phase</td>
<td>• Analyse results and plan for second phase</td>
<td>• The supervisor was impressed by improvement achieved</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Norman Faull</td>
<td></td>
<td></td>
<td>• Advised on thinking how to do better in future</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Discussed similarity between Lean and Action Research</td>
</tr>
<tr>
<td>09/10-11/10/2007</td>
<td>GFJ</td>
<td>Venance Mwolo</td>
<td>Second phase of the project</td>
<td>• Intervene by making Medical Records operate for 24 hours a day and enforce issuance of files with relevant x-rays</td>
<td>• 100% improvement on missing files</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Owen Oliver</td>
<td></td>
<td></td>
<td>• 24 seconds improvement on issuing files</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vuyisile George</td>
<td></td>
<td></td>
<td>• 1 minute and 49 seconds improvement on opening files for new patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Walker</td>
<td></td>
<td></td>
<td>• Planned for the third phase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof Norman Faull</td>
<td></td>
<td></td>
<td>• Prof Norman Faull visited the hospital on 11/10/2007 and was given feedback by Medical Records, Admin Reception and Pharmacy</td>
</tr>
<tr>
<td>15/10/2007</td>
<td>GFJ</td>
<td>Dr. Gio Perez</td>
<td></td>
<td>• Discuss progress report</td>
<td>• Dr. Gio Perez was impressed with a report</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Venance Mwolo</td>
<td></td>
<td>• Discuss plan for</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Location</td>
<td>Participants</td>
<td>Activity</td>
<td>Objectives</td>
<td>Outcomes</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>-------------------------------</td>
<td>---------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 23/10/2007 | GFJ      | Venance Mwolo, Owen Oliver, Vuyisile George | Project final meeting    | • Evaluate results of the third experiment  
• Brainstorm options for sustaining the project  
• Documenting the sustaining plan | • Experiment three deemed successful  
• Members showed positive attitude towards sustaining the project  
• Documented a proposal sustaining plan  
• Ended the research project |
| 29/10/2009 | GFJ      | Hospital management, Venance Mwolo | Discuss the final report | • Review the final report  
• Clarify and answer the questions asked  
• Discuss the sustaining proposal | • Questions asked were answered  
• Sustaining plan was accepted |
| 29/10/2007 | GSB      | Prof. Norman Faull, Venance Mwolo | Feedback on projet progress | • Inform the supervisor on the project status  
• Get feedback from the meeting the supervisor had with the project team | • The supervisor was successfully informed  
• Positive employee feedback on sustaining the project |
9. **Exhibit 2: Sustaining plan**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Control measure</th>
<th>Responsible</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appoint a medical records staff to be the in-charge of sustaining project</td>
<td>In-charge to report directly to the top management</td>
<td>Senior Medical Superintendent</td>
<td>Monthly</td>
</tr>
<tr>
<td>Maintain filing system according to file dividers</td>
<td>Spot checks on proper filing Make one staff in each shift responsible for proper filing</td>
<td>In-charge sustaining project</td>
<td>Daily for the first month and weekly thereafter</td>
</tr>
<tr>
<td>Maintain x-ray filing according to shelve groups and dividers when implemented</td>
<td>Spot checks on proper x-ray filing</td>
<td>In-charge sustaining project</td>
<td>Daily for the first month and weekly thereafter</td>
</tr>
<tr>
<td>Twenty four (24) hours operations for Medical Records</td>
<td>Operate two (2) shifts everyday to cater for twenty (24) hours operations</td>
<td>Medical Records team leader</td>
<td>Daily</td>
</tr>
<tr>
<td>Maintain hourly file collection from drop off points</td>
<td>Dedicate one staff to do hourly file collections Random checks of files at drop off points</td>
<td>In-charge sustaining project</td>
<td>At twice a week</td>
</tr>
<tr>
<td>All files must be accompanied with x-rays if any</td>
<td>All files must be issued with latest x-rays</td>
<td>All Medical Records staff on duty</td>
<td>Whenever issuing a file</td>
</tr>
<tr>
<td>Complete implementation of file dividers</td>
<td>Implement dividers on the remaining shelves and sort files accordingly</td>
<td>Owen Oliver Vuyisile George Cheswyn Walker</td>
<td>When dividers are available</td>
</tr>
<tr>
<td>Maintain a file drop off box in the pharmacy</td>
<td>Drop files in this drop off box</td>
<td>Muhammad Sunday</td>
<td>Daily</td>
</tr>
<tr>
<td>Training Medical Records staff on CLINICOM file disposing to cater for file disposal (from trauma and triage) after hours in order to keep filing up to date</td>
<td>Trained staff to work on both day and night shifts</td>
<td>Information Officer</td>
<td>In two weeks time</td>
</tr>
<tr>
<td>Training Admission Officers and other Medical Records staff (not involved in the project) on sustaining operations</td>
<td>Make sure every staff is conversant with improvement operations and can work independently</td>
<td>Owen Oliver Vuyisile George Cheswyn Walker</td>
<td>In two weeks time</td>
</tr>
<tr>
<td>Monthly evaluation on sustaining improvements</td>
<td>Conduct two days Kaizen operation</td>
<td>In-charge sustaining project</td>
<td>Monthly</td>
</tr>
<tr>
<td>Activity</td>
<td>Control measure</td>
<td>Responsible</td>
<td>Frequency</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>----------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>every month</td>
<td>Owen Oliver</td>
<td>Vuyisile George</td>
<td></td>
</tr>
<tr>
<td>Vuyisile George</td>
<td></td>
<td>Cheswyn Walker</td>
<td></td>
</tr>
<tr>
<td>Construct two cubicles in admission reception for privacy during patient interviews</td>
<td>One patient to come to the cubicle at a time</td>
<td>Admission clerks</td>
<td>Daily</td>
</tr>
</tbody>
</table>