DRIFTING TOWARDS DEATH: A SOUTH AFRICAN PATIENT SAFETY INCIDENT THROUGH AN HFE SYSTEMS LENS

BY

SARAH AGAR

MASTERS THESIS

Submitted in fulfilment of the requirements for thedegree
of
Master of Science

Department of Human Kinetics and Ergonomics
Rhodes University, 2021
Makhanda/Grahamstown, South Africa

DECLARATION

I declare that this thesis is my own, unaided work. It is being submitted for the Degree of Master of Science at Rhodes University, Makhanda/Grahamstown. It has not been submitted before for any degree or examination at any other University.

X

Sarah Agar

ABSTRACT

Patient Safety Incidents (PSI) are a frequent occurrence within the South African public healthcare system wherein a patient is unnecessarily maimed, harmed, killed, or put through significant trauma, emotional or physical. These incidents have a significant impact on the performance of the system and the well-being of individuals involved. Often PSI are the result of multiple system failings that provide the necessary preconditions for the PSI to occur. Thus, to provide appropriate patient safety recommendations to address and aid in the prevention of future PSI it is necessary to apply a systems approach to PSI analysis. A systems approach supports a 'bigger picture' view of an incident which includes looking beyond the immediate causes of a PSI and taking the different levels of the healthcare system into consideration during incident analysis.

Human Factors and Ergonomics (HFE) is at its core a systems discipline and has been successfully applied to multiple fields including healthcare. HFE offers multiple incident analysis tools grounded in systems theory.

The Life Esidimeni incident, a PSI that resulted in the death of 144 MHCU, is the biggest PSI in recent South African history and is therefore an important potential case study for the application of HFE systems tools within the South African healthcare context (an area that is lacking in existing literature).

The objectives of this research were to (i) Systematically uncover the causal factors that led to the outcome of the of the Life Esidimeni incident; (ii) Identify critical faults, and gaps within the healthcare system that led to the Life Esidimeni PSI; and (iii) Provide proactive recommendations for future prevention of PSI.

To fulfil these objectives a descriptive case study research method design was adopted using a qualitative systems-based tool, AcciMap. The application of AcciMap to Life Esidimeni enabled both the sharp end and blunt end causal factors that contributed to the outcome of the incident to be identified. Importantly this provided insight into the critical faults and gaps of the South African public healthcare system.

The results of the AcciMap indicated that there were four main broad systemic faults in the system. These broad areas were categorized as key themes, which include: (i) competency, (ii) safeguards, (iii) time pressures, and (iv) vertical integration. From these key themes recommendations aimed at addressing the critical faults and gaps in the system and preventing future PSI were made.

Table of Contents

List of Figures

List of Tables

Abbreviations

DSM Dynamic Safety Model

FRAM Functional Resonance Accident Method

GDoH Gauteng Department of Health

GDP Gross Domestic Product

HAI Healthcare-Associated Infections

HFE Human Factors and Ergonomics

HFE Human Factors and Ergonomics

HoD Head of Department

MEC Member of Executive Council

MHCA Mental Healthcare Act

MHCU Mental Health Care User

NDoH National Department of Health

NGO Non-Government Organization

PSI Patient Safety Incidents

S.A South Africa

SADAG South African Depression and Anxiety

SASOP South Africa Society of Psychiatrists

SEIPS Systems Engineering Initiative for Patient Safety

SPO Structure-process-outcome model

STAMP Systems Theoretic Accident Modelling Process

WHO World Health Organization

Acknowledgments

This thesis has been one of the most challenging tasks I have ever embarked on thus far in my life. I am grateful for what I have learnt through the process of writing this thesis and the extent to which it has pushed me to be better and to keep going especially when I no longer wished to.

Firstly, a big thank-you to Andrew Todd for the opportunity to study under your guidance, for your patience, multiple corrections, constant support, and great office chats – I really appreciate it. Secondly, thank-you to Dr Jonathan Davy for your time, support, and guidance through co-supervision.

To Rhodes University and the Human Kinetics and Ergonomics department, thank-you for your resources and opportunities. I was awarded the Ada and Bertie Levenstein Bursary 2019-2020 which helped me a great deal through my studies and for that I am very grateful.

Lastly, a very special thank you to Brett Mason for being a constant pillar of strength through my journey of writing this thesis, my grandparents for their support both financially and otherwise to undertake this opportunity, and to my mom and dad, family, and friends I appreciate all your love, strength, and support.

Thank you, Sarah Agar.

CHAPTER 1: INTRODUCTION

1.1. Introduction: Healthcare in the international view

According to the World Healthcare Organisation (WHO) the purpose of a public health system is “to promote greater health and well-being in a sustainable way, while strengthening integrated public health services and reducing inequalities" (World Health Organization, 2012, p. 1). As such the healthcare system is fundamental to the sustainable operation of society, due to the evident link between the health of a population and that population’s ability to carry out various activities (Colombo & Clark, 2020).

The WHO established key benchmarks and mandates on a global level to assist country level healthcare systems. The WHO disaggregates a healthcare system into six unique “building blocks”, namely: financing, governance and leadership, healthcare workforce, information, medical products, vaccines, and technologies, and service delivery (World Health Organization, 2010).

These basic building blocks provide a basis from which a healthcare system can be analysed, and policy recommendations made to address one or more of the building blocks. The usefulness of the building blocks is evident, but they are no more than a simple heuristic provided to help understand a complex and diverse series of organisations, institutions, individuals, and resource’s whose primary purpose is to improve health (World Health Organisation, 2010; World Health Organization, 2012). It is this diverse series of entities that are the effective embodiment of a healthcare system. While the building blocks provide a useful way of clarifying essential functions, the challenges facing countries rarely manifest themselves in this way (Manyazewal, 2017). Rather, they require a more integrated response that recognizes the inter-dependence of each part of the health system (Reid *et al.,* 2005).

These entities, and by extension the healthcare system, are not immune to adverse events or errors. Where these adverse events or errors result in harm to a patient, that would not have otherwise experienced said harm, they are referred to as Patient

Safety Incidents (PSI) (McDonald *et al.,* 2010). PSIs are problematic not only because they lead to a loss of life or unnecessary harm, but they often result in malpractice litigation (Gqaleni & Bhengu, 2020). Malpractice litigation can lead to an erosion of the sustainability of a healthcare system given the associated economic pressure related to malpractice litigation (Gqaleni & Bhengu, 2020). PSI are events that occur from a failure of patient safety (Gqaleni & Bhengu, 2020). Patient safety is a property of the healthcare system that is targeted by policy and initiatives to mitigate against the likelihood of PSI occurring (World Health Organisation, 2017). Although an issue on a global level, PSI are particularly notable in the South African healthcare system (Mgobozi & Mahomed, 2021).

Relative to other Low-to-Middle-Income Countries (LMICs) South Africa has a notably higher percentage of PSI (World Health Organisation, 2017; Mgobozi & Mohammed, 2021). The high prevalence of PSI in the South African healthcare system may be a result of the extensive challenges faced by the system. Most notable of these challenges are:

1. **Burden of disease** (communicable and non-communicable) (Maphumulo & Bhengu, 2019; Katuu, 2017);
2. **Inadequate infrastructure** (Maphumulo & Bhengu, 2019);
3. **Lack of staffing capacity** (overburdening of staff) (Katuu, 2017);
4. **Medical error** (Maphumulo & Bhengu; Conmy, 2018;
5. **Medicine shortages** (Maphumulo & Bhengu, 2019);
6. **Poor contagion protocols** (Maphumulo & Bhengu, 2019);
7. **Poor management and leadership** (Maphumulo & Bhengu, 2019; Katuu, 2017); **and**
8. **Underfunding** (Maphumulo & Bhengu, 2019).

These challenges place pressure on the South African healthcare system, contributing to the increased prevalence of PSI (Maphumulo & Bhengu, 2019). The increased prevalence of PSI further adds to the challenges faced and inhibits the South African healthcare system from performing its purpose as outlined by the WHO.

The nature of PSI is that they are often reflected in singular, case study like, events

(Bates, 2022). These can impact individual or multiple patients, depending on the context. Perhaps the most significant and important PSI in recent South African history is the Life Esidimeni incident. The Life Esidimeni incident involved the deaths of 144 mental healthcare users (MHCU) at Non-Government Organisations (NGOs) and psychiatric facilities in the Gauteng province. The effects of the Life Esidimeni incident have led to it being called "the greatest cause of human rights violation" in democratic South Africa (Makgoba, 2017).

PSIs are often the result of multiple failures within the healthcare system, in contrast to, the result of a singular decision or act (Carayon & Woods, 2009). Given the nature of PSIs and the complex interactions between the various building blocks that constitute a healthcare system, PSI analysis would be best achieved through a systems-based approach (Wilson, 2014). Human Factors and Ergonomics (HFE) is, at its core, a systems-based approach (Wilson, 2014; IEA, 2003). HFE offers numerous systems-based incident analysis methods which have been utilised in multiple safety critical industries including healthcare (Nayak & Waterson, 2016; Hollywell, 2014; Carayon, 2012; Chen *et al.,* 2014).

Given that PSIs are the result of adverse events or errors and that PSIs have a negative impact on the healthcare system, understanding what systems elements facilitated and/or permitted an adverse event or error to result in a PSI will provide recommendations on how to avoid the same or similar outcome from occurring. These recommendations may reveal critical systems faults or gaps across the building blocks of the healthcare system (Xie & Carayon, 2015). Failure to address these faults may permit the same or similar PSI occurring. Given that PSI are embodied by case study like events, the application of HFE methods to a case study could indicate what and where the critical faults or gaps in the system are (Xie & Carayon, 2015; Xie *et al.,* 2014). Thus, applying an HFE method to the Life Esidimeni incident could serve to uncover critical faults or gaps in the South African healthcare system that can be targeted by appropriate socio-technical systems changes to eliminate their impact.
To demonstrate how HFE can contribute towards improving the healthcare system and the well-being of those within the healthcare system, an HFE method will be applied to the Life Esidimeni incident. The Life Esidimeni incident being used as a case study proxy for a PSI of the South African healthcare system. There have been

several studies analysing the Life Esidimeni case (Kabagame, 2019; Durojave & Agaba, 2018; Ferlito & Dhai, 2018), however, these studies have analysed the incident from a human rights perspective and not from an HFE perspective.

Therefore, this study will be a first attempt to analyse the Life Esidimeni incident from a HFE perspective. To achieve this the study is separated into 6 main chapters. Firstly, an introduction providing an overview of the South African healthcare system (within which the study is conducted), PSI, and the Life Esidimeni incident is presented. The aim of providing an overview of the South African healthcare system is to provide a contextual background to this study as well as the Life Esidimeni incident of which is the focal point of this study. Secondly, pertinent literature relating to understanding Human Factors and Ergonomics (HFE) and PSI is presented. The review of literature section concludes with the expression of the research objectives. Thirdly, the study presents the methods sections which provides insight into the methods used to investigate the research objectives. Fourthly, this study provides in depth results of the Life Esidimeni incident analysis. Fifthly, the results from the Life Esidimeni incident analysis are discussed and recommendations aimed at preventing future PSI are made based on these results. And lastly, the study is concluded and the limitations of this study and future research recommendations are made.

1.2. The South African Healthcare system

The South African healthcare system is comprised of several hierarchical levels. These levels have been outlined below using the structure and underlying basis of the Structural Hierarchy of Risk model (SHR) developed by Rasmussen, (1997). The SHR model is discussed in greater detail in chapter 2 of this current study. Deconstructing the South African healthcare system into the format of the SHR provides for the following levels:

1. **Ministry of Health**: The Minister of Health (MoH), in the South African government, is the member of the national Cabinet responsible for the National Department of Health (NDoH), and therefore for national health policy and the administration of public health (van den Heever, 2019);
2. **National Department of Health** (NDoH): is responsible for policy

formulation, coordination, and support to provincial departments, as well as the monitoring, evaluation, and oversight of the healthcare sector (van den Heever, 2019);

3. **Provincial Departments of Health** (DoH): are under the supervision of the NDoH and are mandated to provide public healthcare services to their respective province (van den Heever, 2019); **and**
4. **Healthcare institutions**: are divided into primary, secondary, and tertiary. Healthcare services can be provided through different health facilities such as hospitals, clinics, and NGOs. These facilities are located within and managed by the different provincial departments (Mahlathi & Dlamini, 2015).

The levels presented above provide the hierarchical structure. The structural hierarchy of the South Africa healthcare system is in part the result of previously fragmented application of care (Maphumulo & Bhengu, 2019). This was a consequence of the apartheid era and the governance that resulted from this political ideology. The apartheid era in South Africa is characterised by discrimination against people of a different race to the white minority (Maphumulo & Bhengu, 2019). This governance led to a healthcare system that had been fragmented between different racial groups (Maphumulo & Bhengu, 2019). This fragmented approach led to poorly managed resources and a healthcare system focused on supporting an apartheid state (Katuu, 2017). The residue of fragmentation is evident in the current system as it is divided into two parallel sectors – a private and a public sector, with the latter having disproportionately lower amounts of financial and human resources at its disposal than the former (Katuu, 2018).

Under apartheid ten “ethnic” homelands were established which were assigned their own departments of health (Maphumulo & Bhengu, 2019). These departments were poorly resourced and mismanaged which led to worsening health indicators in the poor and rural communities (Maphumulo & Bhengu, 2019). The election of the first democratic government in 1994 resulted in many of these apartheid era legacies being reversed however, the lingering effects of these policies can be seen and are being felt to this day (Maphumulo & Bhengu, 2019).

The South African healthcare system faces several pressing challenges (Maphumulo

& Bhengu, 2019). Some of these challenges are the result of previous apartheid policies, others are the result of the non-political factors (Maphumulo & Bhengu, 2019). Below are 4 common challenges in the South African public healthcare system. These are:

1. **Burden of disease** (Maphumulo & Bhengu, 2019; Mayeni & van Aswegen, 2017);
2. **Unequal distribution of resources** (Maphumulo & Bhengu, 2019); **and**
3. **Shortage of human resources** (Oleribe *et al.,* 2019).

These challenges are individually and briefly discussed below. The challenges are not the sole focus of this thesis and will not be discussed at length; however, they are important to highlight as they provide context and insight into the functioning of the South African public healthcare system. As mentioned above, context is a necessary component to an HFE systems approach as it gives meaning and insight into why people and systems behave or function the way they do (Branford, 2007).

1.2.1. Burden of Disease

South Africa is challenged by a quadruple burden of disease, which includes HIV and AIDS epidemic, high levels of Tuberculosis, high maternal and child mortality, and a growing burden of non-communicable diseases (Maphumulo & Bhengu, 2019; Mayeni & van Aswegen, 2017). Healthcare-associated infections (HAI) have also been a major challenge in clinics and hospitals in South Africa (Maphumulo & Bhengu, 2019). According to Hopper, (2021), one in seven patients admitted to South African hospitals is at risk of acquiring a HAI. The risk of HAI is a result of poor infection prevention and control management, overcrowding in clinics/hospitals, high patient-staff ratios, lack of isolation facilities, aging infrastructure, and inadequate disinfection of medical equipment (Maphumulo & Bhengu, 2019).

The effects of the burden of disease and HAI place immense pressure on the healthcare system (Oleribe *et al.,* 2019). These effects include lengthened hospital stays, increase in healthcare costs for an already financially constrained system and increased workload for healthcare staff (Maphumulo & Bhengu, 2018; Oleribe *et al.,*

2019). This burden of disease is further exacerbated by the unequal provision of resources across the healthcare system.

1.2.2. Unequal Distribution of Resources

In South Africa there is an unequal distribution of resources between the public and private healthcare sector. Roughly 84% of South Africans rely on the public healthcare sector for their healthcare needs and only about 16% belong to medical aid schemes (Maphumulo & Bhengu, 2019). The 16% that belong to the private sector amount to more than 50% of the total healthcare expenditure (Maphumulo & Bhengu, 2019). In addition, about 80% of medical specialists serve the 16% that belong to the private sector (Maphumulo & Bhengu, 2019). This translates into an unequal distribution of total healthcare expenditure and medical specialists in favour of the private sector, placing the public healthcare sector that serves the majority of South Africa under undue pressure.

Unequal distribution of resources may also be attributed to the rapid urbanization in South Africa (Maphumulo & Bhengu, 2019). The rapid influx of people into cities causes healthcare facilities to function beyond their capacity. This has led to overcrowding, and, in turn, a lack of resources, placing pressure on an already strained healthcare system, causing a drop in the quality of healthcare delivery. This influx of urban dwellers strains the human resources of the various healthcare facilities in the region

1.2.3. Shortage of Human Resources

There is also a shortage of human resources within the South African public healthcare sector, characterized by an inadequate number and distribution of healthcare personnel (Oleribe *et al.,* 2019). The shortage is the result of numerous factors which include:

1. The ‘brain drain’ to the Northern hemisphere;
2. Inadequate output from training institutions; **and**
3. Unfavourable government policies (Oleribe et al., 2019).

4. Poor distribution and retention due to undesirable work environments;
5. Increasingly overburdened staff with shrinking staff establishments;
6. Unmanaged remuneration for work done outside of the public sector; **and**
7. Lack of a nationally integrated information system to accurately calculate human resource supply needs (Van Ryneveld *et al.,* 2020).

The main ramification of these factors is a lack of professional staff. Additional ramifications are noted such as the migration of staff from public to private practices, healthcare worker strikes, a lack of qualified healthcare workers and a poor attitude to work (Oleribe, *et al.,* 2019). Each of these individual ramifications creating additional pressure and stress for the healthcare system.

These ramifications are problematic as every component of the healthcare system depends on people to manage and deliver outcomes (Oleribe *et al.,* 2019). The effects of a shortage of human resources limits the response to public healthcare emergencies, which has been demonstrated to the response of the Covid-19 pandemic, increases physical and mental exhaustion of the existing health workers due to an unacceptable workload and results in long waiting times for patients to be attended to (Nyasulu & Pandya, 2020). These factors indirectly contribute to or directly result in PSI.

1.3. Patient Safety Incidents approach (PSI)

Efforts have been directed at restructuring the healthcare system and improving patient safety (Maphumulo & Bhengu, 2019). PSI pose a threat to patients and increase litigation of the healthcare system (Whittaker, 2021). This in turn necessitates the use of additional financial resources and may impact on the levels of care provided to current patients. According to Whittaker, (2021), the South African Department of Health's expenditure was estimated at R 215.8 billion ($13.9 billion) for the year from 1 April 2019 to 31 March 2020. The contingent liability for medico-legal claims as of 31 March 2020 was reflected as approximately R 111.5 billion ($7.2 billion) (Whittaker, 2021). This amount is more than half of the total health expenditure which could be better spent on improving the system. Given the previous challenges outlined above,

it is evident that this additional financial drain can have a serious impact on the ability of the healthcare system to fulfil its mandated role.

An example of a well-known PSI in South Africa is the Life Esidimeni incident which occurred in the province of Gauteng in South Africa. These challenges, outlines above, are important to highlight as they are pivotal in informing the likelihood of the risk of PSI occurrence as well as providing context to the PSI that have occurred, therefore being explanatory of the Life Esidimeni incident.

The Life Esidimeni incident is regarded as a substantial failure of the healthcare system that was characterized by poor leadership led by fear, a lack of accountability and disciplinary procedures; poor and rushed planning, and a total disregard of human rights (Makgoba, 2017). Given the prominence and scale of this incident, the case study of Life Esidimeni will be analysed and discussed at length in this current study. A summary of the Life Esidimeni incident has been provided below.

1.4. Overview of the Life Esidimeni Incident

During March 2016 to December 2016, the PSI known as the “Life Esidimeni incident”, which refers to a host of deaths and patient related incidents that resulted from the “inhumane” relocation of Mental Health Care Users (MCHU) from the Life Esidimeni hospital to alternative NGOs (Makgoba, 2017). This relocation was initiated when the Gauteng Department of Health (GDoH) terminated a 40-year contract with Life Esidimeni for the provision of mental health services. The decision to terminate the contract was described as “unwise and flawed, with inadequate planning and a chaotic, rushed and hurried implementation process” (Makgoba, 2017, pg. 1). According to the Health Ombud’s report, the rationale stated by the GDoH to terminate the contract with Life Esidimeni was:

1. The National Mental Health Policy Framework and Strategic Plan 2013 - 2020 on de-institutionalisation; and
2. To curb budget costs (Makgoba, 2017).

Figure 1.1 is provided below to contextualise the location of the Life Esidimeni incident.

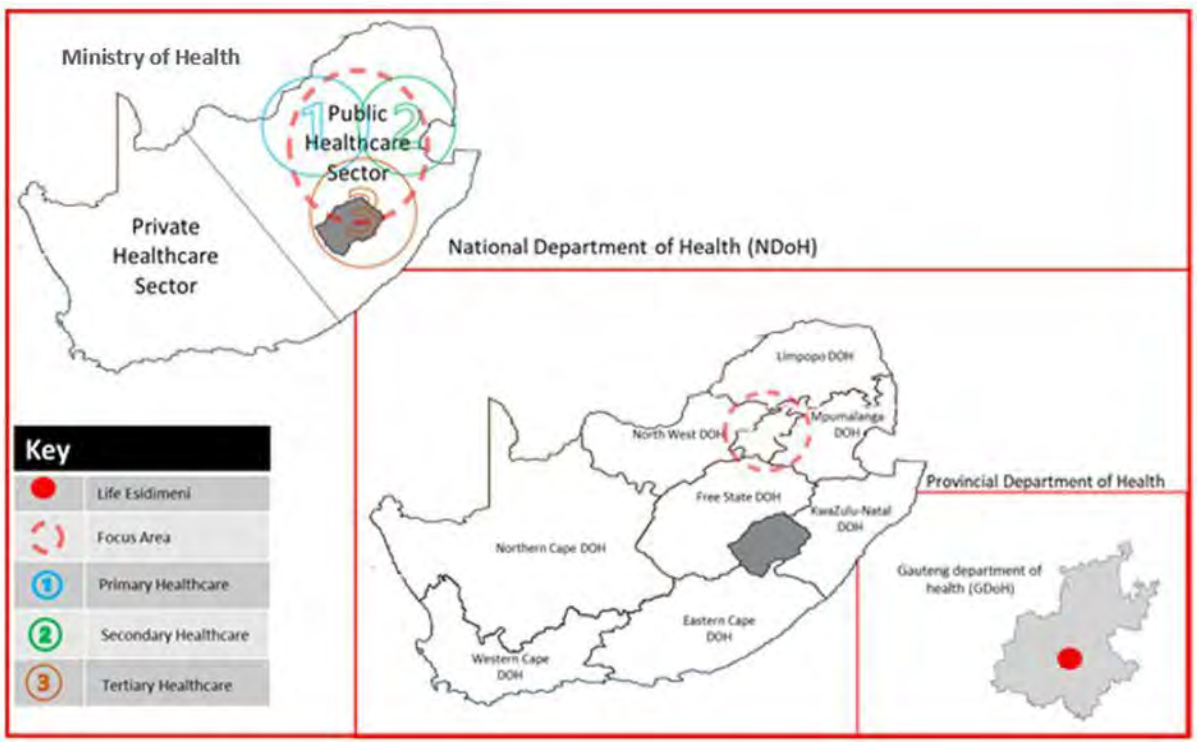


Figure 1. 1: Diagram of the structure of the South African healthcare system and the location of the Life Esidimeni incident

From the 1st of April 2016 to 30th June 2016, 1398, MHCU were transferred “rapidly and in large numbers within a short timeframe” from Life Esidimeni to a mixture of 27 non-governmental organisations (NGOs) and 3 psychiatric hospitals (Makgoba, 2017). The relocation effort occurred against widespread civil societies, expert, and professional advice (Makgoba, 2017). As majority of the NGOs were unlicenced, or/and ill-equipped, and lacked the capacity and experience to care for MHCU (Makgoba, 2017).

The relocation effort, and transfer management resulted in the death of 144 MHCU and exposure of multiple MHCU to neglect, trauma, and poor health outcomes. Due to these outcomes, the Life Esidimeni incident has been referred to as the “greatest cause of human rights violation” in democratic South Africa (Durojaye & Agaba, 2018, pg. 161).

The deaths drew public attention in September 2016. A particularly noticeable event was a parliamentary session in which the Member of the Executive Council for health

(MEC), Ms. Mahlangu Q, responded to a query on the Life Esidimeni incident and indicated that “about 36 former residents of Life Esidimeni had died under mysterious circumstances” (Makgoba, 2017). South Africa’s minister of health, Dr Aaron Motsoaledi, then requested that the newly established Office of the Health Ombud investigate the circumstances surrounding the deaths of mentally ill patients and advise on the way forward (Makgoba, 2017). The result of this parliamentary session being the launch of a Health Ombud’s investigation of what was termed the “Life Esidimeni incident.”

The Policy to deinstitutionalise mental healthcare was envisioned to improve mental health for all in South Africa by 2020 (Department of Health, 2013). The objective of this policy is directed to empower local communities, especially mental health service users (MHCU) and carers, to participate in promoting mental wellbeing and recovery within their community, to decrease the stigma and discrimination associated with mental illness, to increase public awareness regarding mental health, and to improve decentralized mental health services (Department of Health, 2013).

According to the Policy, the Provincial Departments of Health are responsible for developing provincial and district strategic plans for mental health, with specific strategies, targets, timelines, indicators, and budgets to give effect to the National policy Framework and action plan (Department of Health, 2013). To ensure compliance with the basic requirements of professional practice and human rights, and the development of mental healthcare deinstitutionalisation plans to be appropriate, multiple roles and responsibilities were required to be met. These requirements are outlined in Table 1.1 below.

Table 1. 1: Roles and Responsibilities of the Provincial Departments of Health

Category	Notes
Collaboration and Participation	All mental health professions and with representative service user organizations, and MHCU family members in the design plan for mental health services and specification of NGOs

Category	Notes
Human rights	The human rights of people living with mental illness will be promoted and protected, through the active implementation of the Mental Health Care Act (2002)
Gradual systematic process	Process of de-institutionalization should be a gradual systematic process accompanied by the development of community psychiatry
Culture of Information	A culture of information use for mental health service development will be promoted, through capacity development activities addressing the various stages of collection, processing, dissemination, and use of mental health information
Staff provisions	All health staff working in general health settings will receive basic mental health training, and ongoing routine supervision and mentoring
Provincial level budgeting	Provinces are to develop budget plans, in keeping with national policy

Source: (Department of Health, 2013).

According to the Department of Health, (2013), Table 1.2 outlines the cited required points to affect the policy of deinstitutionalisation. These points are revisited in the results and married to the results. The second rationale provided by the GDoH for the termination of the contract was to curb budget costs (Makgoba, 2017). The GDoH stated that the cost of care at LE was not sustainable (Makgoba, 2017). These two rationales for the termination of the contract between Life Esidimeni and the GDoH as well as the Life Esidimeni incident itself will be unpacked in greater detail in chapter 3 of this study.

At the time of writing this thesis (February 2022), according to current news reports

(2021-2022), as of 2021, no criminal charges had been laid against any individuals involved in the Life Esidimeni incident, but a judicial inquest into the deaths was ongoing (Maphanga, 2020; Chaskalson, 2021; Seleka, 2021). According to Seleka, (2021), there were eight MHCU, that were sent from Life Esidimeni to NGOs, who are still missing after five years as a result of their names, surnames, date of birth, and physical addresses not matching those on the system.

As tragic as the Life Esidimeni incident is, the incident has enabled insight into the functioning of the public healthcare system. This insight is important as it enables evaluation of the system shortfalls that failed to prevent an incident of such magnitude from occurring. This data is valuable as it can be used to address the shortfalls in the system, preventing future PSI such as Life Esidimeni, from occurring.

CHAPTER 2: REVISION OF LITERATURE

The following provides a general overview of the literature review. The literature review is split into 2 main parts:

1. **Confluence of HFE in Healthcare**: the confluence of Human Factors and Ergonomics (HFE) and Healthcare will be discussed. Paying attention to HFE as a systems discipline and its place in healthcare. An in-depth overview of patient safety appropriate HFE models, notably the Swiss Cheese Model, the SEIPS Model, and the Structural Hierarchy of Risk and Dynamic Safety Model will be discussed. As well as HFE systems-based tools of which can be applied to patient safety incidents (PSI) will be briefly outlined.
2. **Synthesis of Literature Review and Research Objectives:** the literature review will be synthesised, and the objectives of this thesis will be formulated and stated.

2.1. The Confluence: HFE and Healthcare

Healthcare is often described as a complex socio-technical system (Carayon, 2012). A socio-technical system refers to the interrelation of the social, organizational, and technical aspects of a work system (Carayon *et al.,* 2014). Where a work system is a network of entities that engage in interactions directed at the accomplishment of certain goals. A socio-technical system is a system in which there are myriad interactions between the different elements of the system be they human or non-human (Carayon *et al.,* 2014). Within healthcare this would be considered the interaction between patients and healthcare professionals, tools, and technologies such as communication systems and medical equipment used to carry out care tasks, which are supported or limited within a physical environment influenced by organisational factors.

Similarly, Human Factors and Ergonomics, which is also referred to simply as Ergonomics (HFE), is defined as:

> "The scientific discipline concerned with understanding the interactions among humans with other elements of the system and the profession that applies theory, principles, data, and methods to design to optimize human well-being and overall system performance. HFE professionals contribute to the design and evaluation of tasks, jobs, products, environments, and systems to make them compatible with thecapabilities and limitations of people."
>
> - (IEA, 2003, pg. 1).

Thus, HFE is a discipline that is concerned with the study of human-centric systems (IEA, 2003). Of principle note in the definition is the positive connotation of HFE. It is not merely concerned with monitoring systems from a neutral perspective, rather HFE is principally considered with monitoring systems with the objective of improving the system. The intention of this improvement being upliftment of the well-being of the people working within the system and overall performance of the system. The use of HFE thinking and methods has resulted in the improvement of systems functioning in several industries such as the food safety industry (Nayak & Waterson, 2016), aviation (Chen *et al.,* 2014), Healthcare (Igene *et al.,* 2021), and the railway industry (Hollywell, 2014). This makes HFE a prime discipline to partner with healthcare as both are, at their core, concerned with the betterment of human wellbeing (Carayon, 2012).

The fundamental purpose of HFE is to optimize human wellbeing and overall system performance (Carayon *et al.,* 2014). Whereas the fundamental objective of a healthcare system is to promote better health and wellbeing in a sustainable way (World Health Organisation, 2019). Thus, it becomes evident that healthcare is a system designed to achieve positive outcomes for society whilst HFE is a discipline designed to facilitate a system in achieving its outcomes in the most optimal way. In this manner, HFE would serve as a supporting discipline to the optimisation of the healthcare system.

The pursuit of better health and human wellbeing is, in part, achieved through promoting patient safety in the healthcare system (Nieva & Sorra, 2003). Due to this patient safety often forms the basis of policy and is prioritised in the healthcare system (Nieva & Sorra, 2003). Optimal achievement of patient safety requires that the complexity of the healthcare system be understood (Xie & Carayon, 2015). This

complexity stems from the six building blocks of the healthcare system and the interaction between human and non-human entities that operate within and between the six building blocks (Ishwerwood & Waterson, 2021; World Health Organization, 2010).

HFE has multiple methods aimed at the rigorous analysis of systems (Waterson & Underwood, 2021). As such, HFE provides the means to understand complex socio-technical systems such as the healthcare system (Carayon, 2006). In the same way that an understanding of the healthcare system must be attained before improvements, and resilience and self-reflection, can be incorporated, the HFE discipline must be understood before its methods can be utilised. Therefore, the following sections will provide a background into patient safety as a key priority for healthcare systems and then secondly into HFE as a systems discipline that can contribute to the patient safety and healthcare.

2.1.1. Patient Safety: A priority for HFE

The focus on patient safety has, in part, been driven by the need to mitigate against PSI (Carayon & Wood, 2009). Patient safety is often promoted through the development of patient safety culture (Nieva, 2003) which can define as: “an organisations shared perceptions, beliefs, values, and attitudes that combine to create a commitment to safety and an effort to minimise harm” (Emergency Care Research Institute, 2019, p. 1). Given that patient safety culture is a culture, it is affected and determined by the beliefs and influences of those that are part of the system (Sammer *et al.,* 2010). As such, a culture of patient safety requires that the beliefs and influences of the professionals within the system are aligned to those that are deemed supportive of patient safety culture. These beliefs extend to all levels of healthcare as a system and influence the actions and behaviours of staff throughout the different organisations in the system (Sammer *et al.,* 2010, p. 156).

Furthermore, the benefits of developing an appropriate patient safety culture includes improved patient satisfaction with healthcare services, improved professional satisfaction within the workspace, a reduction of both avoidable harm during care and mortality, as well as reduced litigation, and health care costs (WHO, 2017).

According to Sammer *et al.,* (2010), promoting patient safety culture is the result of promoting patient safety sub-cultures which includes:

1. **Communication;**
2. **Evidence-based approach;**
3. **Just culture;**
4. **Leadership;**
5. **Learning;**
6. **Patient-centred; and**
7. **Teamwork.**

Thus, if the focus was to improve patient safety culture, there would be an overall improvement of the healthcare system due to the multiple subcultures that together create safety culture. This would be more beneficial than focusing on one aspect such as teamwork. Just as a system is made up of multiple components that interact with each other, the same can be said about patient safety culture. To improve one property of patient safety culture the other properties need to also be taken into consideration as they complement each other and are interlinked. Each of these sub-cultures is briefly discussed below.

Patient safety sub-culture: communication

Communication in the healthcare system is regarded as the passing of information within and between the levels of the healthcare system. Communication is one of the most important subcultures of patient safety for the performance of the healthcare system (Sammer *et al.,* 2010). All the other sub-cultures are dependent on effective communication to function. Communication is essential within system levels and communication extended to family or support persons of patients (Sammer *et al.,* 2010). Furthermore, frontline staff need to know that communications with managers are heard and acknowledged. Providing feedback or closing the loop builds trust and openness which are important properties of safety culture (Stavrianopoulos, 2012).

Patient safety sub-culture: evidence-based approach

An evidence-based practice is patient care practice that integrates research evidence, clinical expertise, standardised procedures and patient values and preferences to improve health outcomes, service quality, patient safety and clinical effectiveness, and employee performance (Stavrianopoulos, 2012). Healthcare organizations that demonstrate evidence-based best practices, including standardized processes, protocols, checklists, and guidelines, are considered to exhibit a culture of patient safety (Sammer *et al.,* 2010).

An example of this is a standardized checklist to use by a team before operative procedures. Although protocols and checklists will not on its own prevent patient safety incidents, they do provide a protective barrier against patient safety risks or incidents (World Health Organization, 2017). The evidence-based approach ensures that the processes occurring with the system are led by tried and tested methods (Sammer *et al.,* 2010). The issue of innovation, or deviation, from the typical systems processes was previously raised and refers to this exact sub-culture. If a system is exhibiting evidence-based practices, a deviation from those practices may well be a deviation from evidence-based approaches.

Patient safety sub-culture: just culture

A just organisational culture promotes transparency, fairness, accountability, communication, and learning by understanding human behaviour, disciplining unlawful behaviour, and educating at-risk behaviour between all levels of the healthcare system (Daniels, 2020). Trust is an important element of just culture in which the distinction between blameless and blameworthy actions are understood (Daniels, 2020).

While it is more satisfying to blame individuals for the occurrence of an incident, effective risk management is dependent on an effective reporting culture, whereby trust plays a key role (Reason, 2000). The reporting of adverse events by healthcare staff should not be supplemented by the feeling of the fear of blame or victimisation but should rather be treated in a way that supports learning from error (Reason, 2000). Punitive culture has been discussed in the literature as a non-effective way to manage or mitigate risks (Reason, 2000). The punitive action in the aftermath of an

accident/incident creates a sense of fear that destroys the willingness of healthcare staff to voluntarily report errors.

Reporting errors is an important ingredient to the creation of patient safety cultures (Dekker, 2011). Healthcare organizations should encourage honest disclosure with the aim to learn from failures to improve the quality and safety of healthcare delivery (Dekker, 2011). However, a common response to accidents/incidents in healthcare appears to be the undermining of evidence and an un-just culture (Dekker, 2011).

Through establishing a just culture and empowering and improving clinical performance, adverse events can be reduced, and patient safety and care improved (Boysen, 2013). Therefore, a just culture should be established that seeks to harmonise between a system of excessive punishment and one of blamelessness (Daniels, 2020). Healthcare organizations and their employees should therefore be held accountable for their actions and decisions, however, monitoring of risks, system design, human behaviour and patient safety must remain a focus (Daniels, 2020).

Leadership refers to the leaders of the healthcare system seeking to align vision, staff competency and fiscal and human resources from the blunt end to the sharp end (Stavrianopoulos, 2012). A common theme discussed in the literature is the role of leadership as a key element to creating, fostering, and nurturing a culture of safety. Engaged and strong leaders drive the culture by employing strategies and structures that guide safety processes and outcomes (Sammer *et al.,* 2010). The culture of safety should begin with stakeholders and leaders from the top of the system and permeate throughout every level of the healthcare system (Stavrianopoulos, 2012). The lack of leadership presents itself a major barrier to safety culture (Stavrianopoulos, 2012).

A culture of learning exists when the organizational culture is open and seeks to learn from mistakes (Sammer *et al.,* 2010). A learning culture creates safety awareness among employees and promotes an environment of learning through educational opportunities. Learning is not solely focused on mistakes but success too. As a learning culture progresses, it may become more proactive in identifying and improving potential risks or unsafe processes to prevent PSI.
Sir Liam Donaldson stated that “To err is human, to cover up is unforgivable, but to fail

to learn is inexcusable" (Edozien & Clements, 2006, p. 87). The focus should not only be on reporting as it is only one element of implementing an effective system, if learning does not occur then the data collected though reporting is insignificant.

Patient-centred care is centred around the patient and family (Stavrianopoulos, 2012). Such a culture promises to value the patient and to promote health and well-being as a continuum of care (Stavrianopoulos, 2012).

A patient-centred sub-culture is clearly evidence by the SEIPS 3.0 model (Carayon *et al.,* 2020). This evolution toward the human factor of the system is evidence by the transition of the SEIPS model over time. The same evolution appears to be borne out in healthcare systems with a strategic focus on patient safety, coupled with an increased awareness of the human factors that make up the healthcare system (Carthey, 2013).

Patient safety sub-culture: teamwork

Teamwork within the healthcare system refers to a spirit of collegiality, collaboration, and cooperation that exists among stakeholders, staff, independent practitioners, and non-professionals (Stavrianopoulos, 2012).

As the complexity of healthcare increases, the need for teamwork and collaboration among professionals and non-professionals is essential. To create an effective team, supportive and good leadership is needed (Daniels, 2020). Communication and teamwork are the most significant strategies for effective patient safety culture (Daniels, 2020).

Furthermore, a cross-sectional study done by Piper et al. (2018), aimed to investigate the effect of handover on patient safety within a healthcare organisation. A "handover" refers to a change of shift within a healthcare organisation when those professionals currently working are replaced by a new batch of professionals that continue with the work. Importantly the study aimed to identify the impact of teamwork on maintaining patient safety in the handover process. The results of the study indicated that strong teamwork and management support maintained a higher quality of patient safety than

when these factors were absent (Piper *et al.,* 2018). Generating a good patient safety culture is reliant on developing each of the sub-cultures identified above.

A way to understand and analyse patient safety and patient safety culture is through the application HFE systems-based models and incident analysis tools of which will be discussed next.

2.1.2. HFE: A Systems Discipline

The application of HFE, as a systems-based approach to accident investigation, has been applied to methods have been used in other systems where the risk for adverse events is high. Of note here is the dominant use of HFE methods in accident analysis across various industries such as aviation, transportation, and healthcare, (Underwood & Waterson, 2014). Several disasters over recent years, such as the Chernobyl disaster (Medvedev, 1991) and the Beirut explosion (Pasman *et al.,* 2020), there has been an increasing recognition of the need to manage risks in a proactive and systematic way (Hutchings, 2017). Disasters such as these have provided the impetus for the use of HFE methods in addressing the underlying causes of such incidents.

Historically, the central focus of HFE was on human-machine interaction, specifically the mismatching of humans-machines and resulting accidents/incidents (Hutchings, 2017). However, as the advancements of technology and the complexity of organizations increase, there is a need to go beyond the human-machine interactions and pay attention to the larger system (Hutchings, 2017). The larger system includes both the physical (human, technology, and physical environment) and non-physical (context which the system is embedded in and the organizational culture) aspects of a system (Wilson, 2014). HFE is considered a systems discipline and, as such, seeks to view both the individual building blocks of a system and the interactions between them (Wilson, 2014).

This viewpoint is referred to as the application of systems theory (Hutchings, 2017). Systems theory includes the principles, models, and laws necessary to understand complex interrelationships and interdependencies between the components, or

'blocks', of a system. This can include the human, technical, organisational, and management components that make up a system (Wilson, 2012). Emphasis is placed on the concept that the "whole is greater (more powerful and beneficial, and purposeful etc.) than the sum of its parts" (Wilson, 2012). This means that to understand the processes and/or outcome of a system, the components, or 'blocks', that make up a system should not only be observed individually, but rather their interactions and interconnectedness be monitored as well. It is systems theory that underpins the HFE methods applied to understand complex socio-technical systems (Wilson, 2014).

Therefore, the outcomes of HFE methods are centred on what constitutes the 'building blocks' of a system and understanding how those 'building blocks' interact (Dul *et al.,* 2012). It is through this understanding that critical faults or gaps in the system could be revealed. It is these critical faults and gaps that are the outcomes of the HFE method and provide the basis for recommendations to be made (Rodriguez & Hignett, 2021). These recommendations are aimed at eliminating or mitigating against the critical faults and gaps and, by so doing, improving the systems operation, and well-being, which translates into increased system resilience and, as such, reduced likelihood of PSI (Rodriguez & Hignett, 2021).

2.1.3. Healthcare as a Socio-Technical Work System

Healthcare can be described as a system. However, the exact type of system that healthcare can be described as is dependent on which features of the healthcare system are considered. On one hand, the healthcare system is described as a socio-technical system (Carayon, 2011). This description being the result of the evident involvement of human and technological entities within the healthcare system (Carayon, 2011).

On the other hand, the healthcare system can also be described in terms of the legal architecture or framework for health. Health laws are used to formalize commitment goals, create different organizations, such as hospitals, and establish relationships, such as contracts for providing healthcare services (World Health Organisation, 2021). Additionally, healthcare organizations have policies and strategies underpinned by legal rules that guide healthcare operations (World Health Organisation, 2021). This

interaction between different health laws results in the way healthcare is carried out and delivered. This is relevant within the current context because understanding the different health laws and policies gives meaning to why certain decisions and actions were made in the Life Esidimeni incident.

Additionally, the healthcare system has also been described as a work system (Perry *et al.,* 2021). Specifically, a macro-ergonomic work system (Werner *et al.,* 2020). The macro-ergonomic work system incorporates the structure-process-outcome (SPO) model of healthcare quality. The SPO model was developed by Donabedian (1978) and provides a foundation for systematic research and can be aimed at achieving healthcare quality (Naranjo & Kaimal, 2011). Donabedian suggests that the SPO components are interdependent and that these relationships influence the next dimension either positively or negatively (Naranjo & Kaimal, 2011). Thus, the work system elements allow for a broader and deeper understanding of the factors that can either limit or contribute to patient safety and healthcare quality (Carayon *et al.,* 2014; Naranjo & Kaimal, 2011).

From the above, it is evident that there are several ways of classifying the healthcare system as a system. These classifications are usually dependent on the desired aim of the assessment as shown above. A common element to all healthcare systems, regardless of classification, is patient safety.

Patient safety is seen as an emergent property of the healthcare system (Carayon, 2011). An emergent property is a quality of a socio-technical system that results from interactions that occur within the system (Carayon, 2011). A failure of patient safety can result in a PSI. Similarly, the sufficient presence of patient safety, within a healthcare system, is reflected in a lack of PSI. Thus, PSI are the outcome by which patient safety can be measured.

Outcomes in the case of patient safety refer to both positive and negative outcomes (McDonald *et al.,* 2010). Positive outcomes can be said to be achieved when no PSI occur. Negative outcomes are reflected in the occurrence of a PSI (McDonald *et al.,* 2010). These outcomes are the result of interactions that occur within and between processes and structures within a SPO model (Naranjo & Kaimal, 2011). Where a PSI

occurs, this indicates a critical fault or gap in the healthcare system. This critical fault or gap is likely to reflect a critical diminishment of the quality of patient safety. Thus, it is evident that the healthcare system must be viewed from multiple system lenses to understand which interactions, within the various systems, created the conditions capable of producing a PSI.

It is for this reason that a holistic systems-centric approach should be adopted. The intention being to accommodate as many of these various systems lenses as possible and permit the refinement of policy and systems interventions to the most impactful actions.

Patient safety researchers clearly recognises the need for human factors engineering and systems approaches to patient safety research, analysis, and improvement (Carayon, 2006). HFE methods argues that to understand patient safety in a way that supports suitable interventions, it is the relationships between components of the system and the overall behaviour that emerges from the interactions that are of interest, not the individual components (Wilson, 2014).

The application of these HFE methods to healthcare was driven by the publication of ‘Design for Patient Safety” (Hignett *et al.,* 2013). The publication brought attention to the prevalent systemic nature of poor-quality care by recognising the potential to prevent many adverse events through appropriate system redesign.

The most prominent models that have led to HFE methods include Reason’s Swiss Cheese model (Reason, 1990), Carayon’s Systems Engineering for Patient Safety (SEIPS) models ((Carayon, 2006); (Holden *et al.,* 2013); (Carayon *et al.,* 2020)), and Rasmussen’s Structural Hierarchy of Risk (SHR) and Dynamic Safety Model (DSM) (Rasmussen, 1997). These models represent some of the most influential work within the field of HFE and patient safety and are the most well-known models within the patient safety community (Carayon, 2006). The focus on patient safety by these models reflects the view that patient safety lies at the heart of mitigating PSI. Understanding the interaction between these models and patient safety is critical to deriving the critical faults and gaps that created the conditions conducive to the Life Esidimeni incident.

2.1.4 Patient Safety: Appropriate HFE Models

Each model outlined above is discussed individually below**.** These models are important as they offer a different perspective of a systems approach to healthcare. While none of these models are perfect, they enable an understanding of the systemic factors that contribute to PSI. The imperfection of these models highlights the importance of not relying on one model's perspective, thus this section will present multiple models to ensure a well-rounded understanding of the systems approach to healthcare. This understanding is essential if patient safety is to be improved and PSI mitigated against.

Firstly, Reason's Swiss Cheese model will be discussed. Reason's model was a significant factor in changing the traditional view that PSI were the result of individual failings and not a systems issue. Secondly, Carayon's three SEIPS models will be presented. The first SEIPS model expands on Reason's Swiss Cheese model by linking PSI to the processes and structures that operate within the system. Lastly, both of Rasmussen's models will be presented. The SHR is introduced as it highlights the various 'levels' of system functioning and the need to examine the vertical interactions that occur – from bottom-up and top-down – across the system hierarchy. The DSM reflects the position of the healthcare system relative to critical operating boundaries.

Each model offers a unique perspective to understanding the complexity of the healthcare system. These models are fundamental to the subject matter of this thesis and will be discussed in greater detail below.

The Swiss cheese model (SCM) was one of the most widely used models in safety critical industries to understand complex accidents (Perneger, 2005; Larouzee & Le Coze, 2020). The SCM makes complex ideas easily understandable, and thus has significantly contributed significantly to promoting the organisational accident paradigm in many domains (Larouzee & Le Coze, 2020). The SCM proposes that latent failures, longstanding organizational deficiencies, can create the necessary conditions for the frontline workers, e.g., nurses or doctors, to trigger an accident/incident (Reason, 1990). The SCM provides an understanding that critical faults or errors in the structural or procedural blocks of a system, that if not addressed or amended, can generate a latent capacity which is expressed as a PSI.

The SCM supports looking beyond the immediate causes of a PSI and instead focusing on the preconditions of that PSI (Reason, 2000). These “preconditions” are termed “latent failures” at the time of the PSI. Latent failures are contrasted with active failures (Reason, 2000). Active failures are the activities that precipitate the PSI (Reason, 2000). They can be entirely independent of latent failures as well as the precipitating mechanism of a latent failure (Reason, 2000). Latent failures are, by contrast, critical faults or gaps within the system that provide the conditions necessary for a PSI to occur.

The SCM name is derived from the mechanism by which it purports PSIs to occur. The SCM is presented below in Figure 2.1.

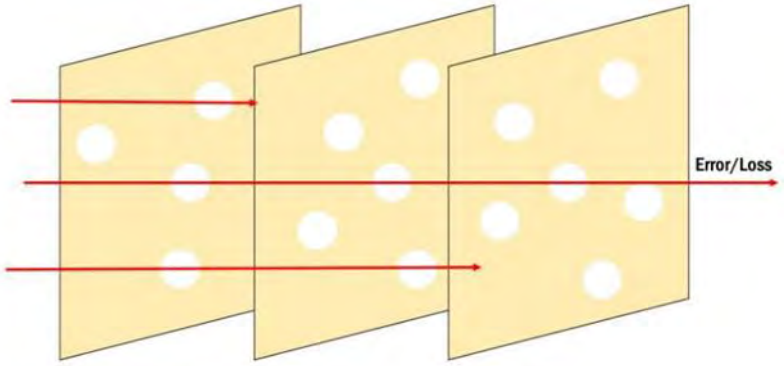


Figure 2. 1: Reason’s Swiss Cheese Model (Mirra, 2020)

The SCM mechanism is described using several slices of cheese. These slices of cheese represent barriers or layers of defences that protect the system from adverse events or errors (Perneger, 2005). Examples of these layers, specific to healthcare, could potentially be education, training, policies, technology, and communication (Mirra, 2020). Each slice represents a specific element of the system that mitigates against the occurrence of an adverse event or error from resulting in an accident or PSI (Perneger, 2005). However, critical faults or gaps within each slice, represented by holes in the cheese slice, represent preconditions that lower the patient safety of the system (Perneger, 2005). When a critical alignment of several of these preconditions occurs, it results in the lowering of patient safety below a critical threshold and heightens the probability of an accident or PSI (Perneger, 2005). This

suggests that systems may not fail due to a single precondition, critical fault, or gap, but are more likely due to several preconditions (Perneger, 2005). There have been multiple applications of the SCM in the healthcare domain such as the application of the SCM to determine the effectiveness of a surgical safety checklist in correcting and preventing errors in the operating theatre (Collins *et al.,* 2014), application of the SCM to patient safety incidents (Stein & Heiss, 2015), and developing leading indicators for the assessment of occupational health performance using the SCM (Karimi *et al.,* 2015).

The SCM creates the framework to understand the complex preconditions, critical faults, and gaps within a system that, when confronted with certain adverse events or active failure can provide the pathway for an accident or PSI to materialise. Equally as important, is the fact that SCM lays the foundation to enact preventative measures and identify preconditions as latent failures before an accident or PSI precipitates (Reason, 2000).

Although laying the foundation for latent failure identification and the improvement of patient safety through policy measures, the SCM does not clearly specify the systems components that contain these latent failures (Carayon, 2006). It is this shortfall that the SEIPS model, which will be discussed next, aims to address.

The development of the SEIPS model of work system and patient safety was developed using Balance Theory and the Work System model developed by Smith and Carayon, (2000) and the Structure-Process-Outcome (SPO) model of healthcare quality by Donabedian (1988). Although these models are not the focal point of this section, they are important to mention as they form the base of the development of the SEIPS model of which will be discussed in this section.

Originally, Balance Theory was developed to improve worker quality of working life, stress, and health (Carayon, 2009). Balance theory suggests that negative elements in the work system that are hard to change may be overcome by focusing on the positive elements. For example: the strain of having an inadequate number of nurses may be overcome by strong teamwork and collaboration (Carayon *et al.,* 2006). It is not always possible or realistic to eliminate all negative aspects of a work system

therefore the entire work system needs to be balanced so that the overall impact on the individual is optimal performance, low job stress, good health, and high safety and well-being (Carayon, 2009). This 'Balance' can be achieved by identifying aspects of the work system that can be used to compensate for the negative aspects (Carayon, 2009).

The work system model on the other hand provides a way of describing all the elements of work that affect workers and outcomes. The emphasis of this model is on the systemic aspects of work: the work system elements interact with each other (Carayon, 2009). The work system model is complemented by a series of design principles that are at the core of the Balance Theory (Carayon, 2009).

The SPO model proved beneficial in examining the clinical processes and outcomes of care, but it is limited in its recognition of the interactions and interdependencies among system components (Carayon *et al.,* 2006). However, the SEIPS model builds on this idea by showing how the work system design (structure) is linked to patient safety (outcome) through care (processes) (Carayon *et al.,* 2006). This extension in important because, unlike the SPO which focuses on the providers and their relationship with the processes and outcome, the SEIPS places greater emphasis on the work system with equal focus on the different components that make up the system and their relationship with process and outcome (Carayon *et al.,* 2006).

There are three versions of the SIEPS model, naming the SEIPS, SEIPS 2.0, and the SEIPS 3.0. Each model evolved over time to encapsulate the complexity of the healthcare system at a different point in time over the course of the last two decades (Werner *et al.,* 2020). According to Werner *et al.,* (2020), the models have been used to analyse and make recommendations for improving patient safety in multiple healthcare settings, e.g., the intensive care unit and theatre. All three versions share a common tri-element framework composed of: (i) the work system, (ii) processes, and (iii) outcomes. These three elements are referred to as SEIPS components and bear a resemblance to the SPO model, presented previously.

Given the relevance of the suite of SEIPS models to patient safety and the reduction of PSI, this section discusses each of the SEIPS models individually in chronological

order.

The first model, published in 2006, is a simplified and practical illustration of the most essential SEIPS components (Carayon *et al.,* 2006). The simplicity of this model conveys that a work system is made up of multiple components that interact with each other. This model provides an overview of the system under focus (Carayon, 2006). This contrasts with other approaches that focus on one component of the system (Carayon, 2006). Often this component is then treated in isolation from the rest of the system (Carayon, 2006). The utility of the SEIPS model is derived by its generic nature (Carayon, 2006). This generic nature makes it applicable across various healthcare settings including intensive care units (ICUs), paediatric hospitals, cardiac operating rooms, outpatient surgery centres, primary care clinics, and home health nursing (Holden *et al.,* 2013).

Importantly for healthcare, the SEIPS model explains how the design of a work system can impact on patient safety (Carayon, 2006). The SEIPS model begins to reveal the concept that patient safety is a healthcare system quality pertinent to both patients and practitioners. The SEIPS model is presented below in Figure 2.2. This figure clearly illustrates a sociotechnical work system (left) which produces work processes

(middle), of which shape outcomes (right).

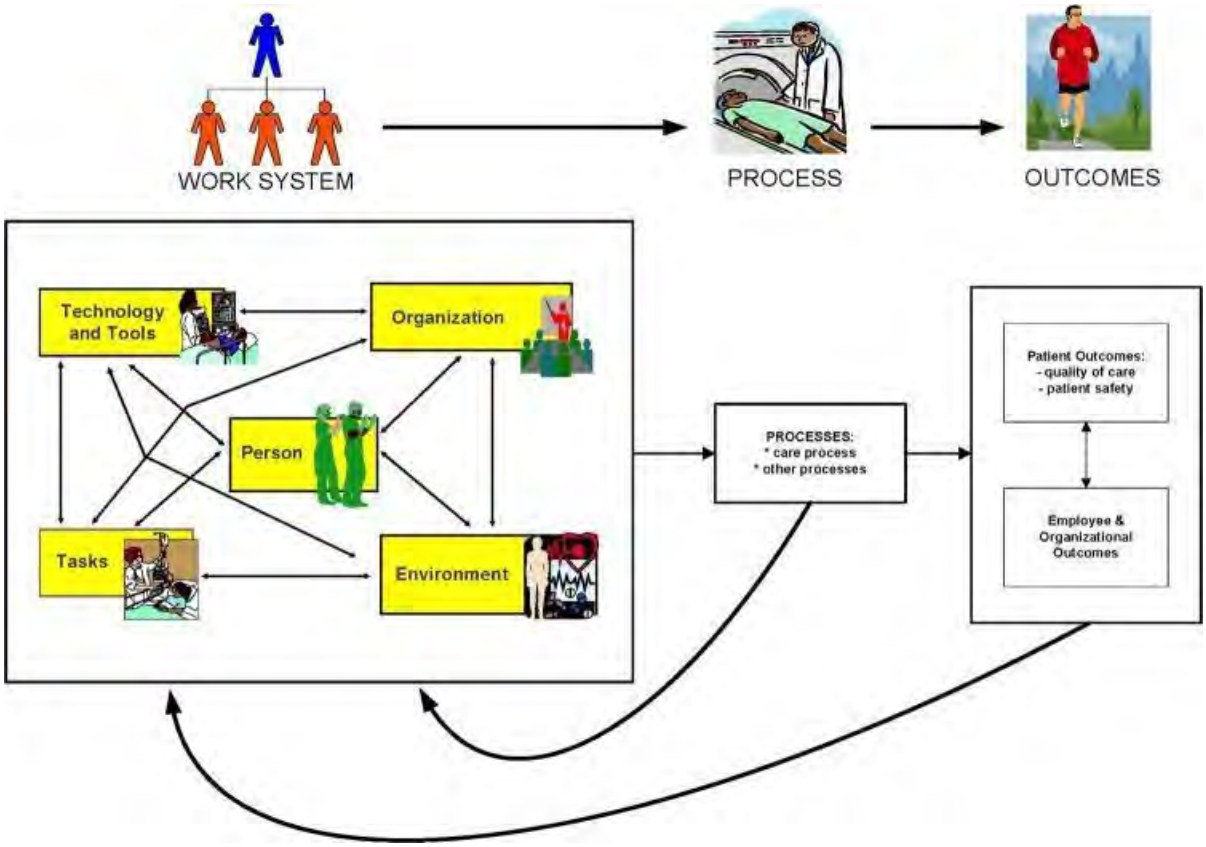


Figure 2. 2: Systems Engineering for Patient Safety (SIEPS) model adapted from (Carayon *et al.,* 2013)

As evidenced in Figure 2.2, above, the work systems component of the SEIPS model exhibits five interacting components:

1. The person(s) at the centre;
2. Performing tasks;
3. Using tools and technology;
4. In a specific physical environment; **and**
5. Within a form of organization (Carayon, 2006; Carayon *et al.,* 2013).

In turn, this work system generates institutional level processes that shape patient and employee, and organisational, outcomes.

The five components of the work system interact and influence each other (Carayon, 2006). The deliberate placement of a person(s) in the centre of the work system correlates with the HFE approach emphasizing that system design should support the person(s) engaged in the system.

The interactions between these five components influence processes which in turn lead to outcomes (Carayon, 2006). The outcomes are the result of the processes which can either be patient-centred outcomes or employee-centred outcomes. Patient- centred outcomes refers to the quality of patient care and patient safety. Employee outcomes refers to the quality of working life and performance of the healthcare workers (Carayon, 2006).

The arrows between the system processes and outcomes represent the causal feedback loops (Carayon, 2006). Feedback is an integral part of the system. The work system relies on communication and feedback pathways from the processes and the outcomes to adapt structure and processes (Carayon, 2006). Adaption is critical in healthcare settings. The nature of healthcare is varied and often unpredictable. Thus, adaption enables changes between the work system components to ensure the work processes produce a favourable or the best outcome given the circumstances (Werner *et al.,* 2020).

The SEIPS model provides a broad overview of the entire system and reconstitutes this system in three broad categories. The SEIPS 2.0 however shows a distinct shift towards patients and non-professionals.

The second model is the SEIPS 2.0 model (Carayon *et al.,* 2014). This model was created in response to a shift in the healthcare system towards a patient centred model and to address the work done by non-professionals such as the patients and their families (Carayon *et al.,* 2020). The SIEPS 2.0 model kept many of the key properties from the original SEIPS model, but it has evolved to include several clarifications and additions (Holden *et al.,* 2013).

According to (Werner *et al.,* 2020), there are four main differences between the original SEIPS model and the SEIPS 2.0, which are:

1. **Adaption**: the expansion of feedback loops to include adaption. Adaption refers to the ability of the system to change based on feedback (Werner *et al.,* 2020);

2. **Configuration**: this suggests that there is a finite number of interactions that shape the performance of work processes. However, only a subset of those possible interactions is relevant to understand a given work process (Holden *et al.,* 2013).
3. **Engagement**: engagement enables the differentiation of work done based on who is involved and performing the work tasks (Holden *et al.,* 2013); **and**
4. **Expansion of "Person" category**: the expansion of the person placed at the centre of the system to include non-professionals such as patients and family caregivers (Holden *et al.,* 2013).

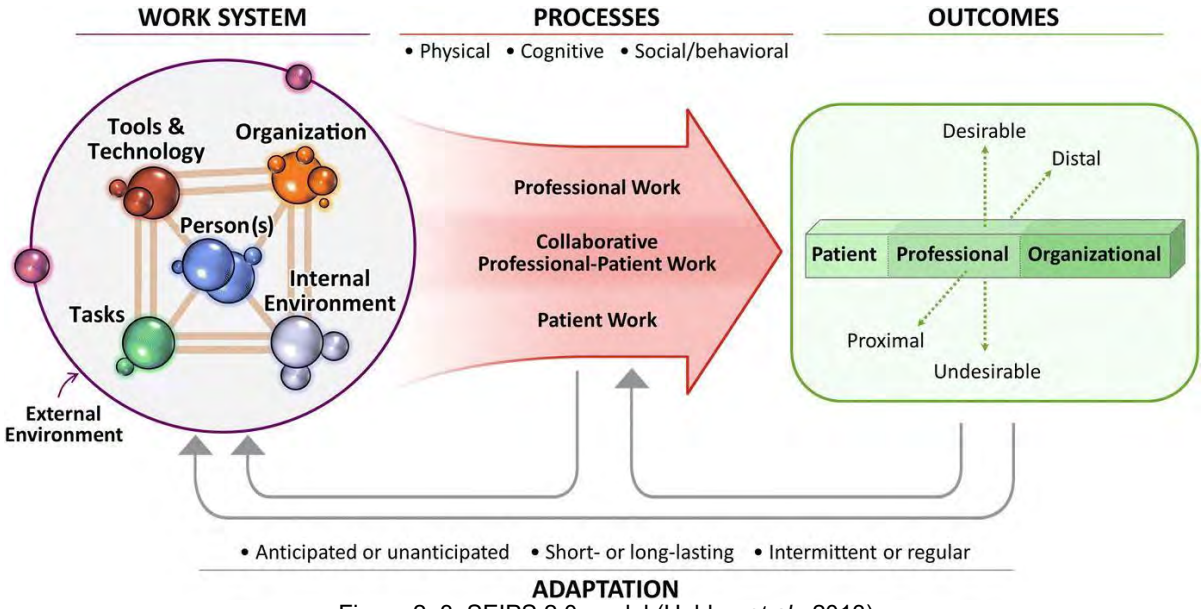


Figure 2. 3: SEIPS 2.0 model (Holden *et al.,* 2013)

Each of the differences between the models is incorporated at the level of the SPO component (work system, process, and outcome component). Thus, each of these SPO components is discussed below.

These changes primarily facilitate:

1. System design and analysis could consider patient characteristics including preferences, needs and goals; **and**
2. In some cases, the non-professionals are the person(s) who do the "work". "Work" may entail several health-related tasks such as treatment of illness or injuries, maintaining of physical, mental, or social well-being, or illness-related, and

everyday life work (Holden *et al.,* 2013).

Thus, the main aim of the SEIPS 2.0 model is primarily to address the work done by patients, families, and other non-professionals (Holden *et al.,* 2013). Their role in the care process is equally important to that of a healthcare professional thus their capabilities need to be taken into consideration (Holden *et al.,* 2013).

The work system contains many of the interactions that occur to produce the end outcome (Werner *et al.,* 2020). Thus, the introduction of the idea of "configuration" between SEIPS and SEIPS 2.0 is reflected in the understanding that of all these interactions occurring, only a particular subset of them will shape a specific outcome (Holden *et al.,* 2013). There are many different outcomes and each of these can be traced back to a specific sub-set of interactions, or a configuration. Thus, an outcome, such as PSI, can be traced back to a specific set of interactions within the work system (Holden *et al.,* 2013). These interactions in turn may be manifestations of critical faults or gaps. This idea is essential to using HFE methodologies to understand PSI.

The relevance of configuration is that it makes it possible to investigate a PSI that occurred when a particular work system factor or combination of factors, e.g., workload and worker fatigue, were an active component of the configuration (Holden *et al.,* 2013; Carayon *et al.,* 2020; Werner *et al.,* 2020).

Within the process SPO component of the SEIPS 2.0 model, the idea of "engagement" has been introduced. Engagement refers to the level of involvement of various work systems person(s) in specific processes. This concept is used to differentiate the person(s) based on activity (Werner *et al.,* 2020). There are those who are active person(s), known as agents. There are those who are inactive person(s), known as co-agents (Werner *et al.,* 2020).

For example: In an out of office patient visit by a primary care physician to an infant with influenza attended by their mother, the mother and physician are considered agents and the infant a co-agent. The mother and physician engage in the activities of assessing, talking, treating, planning, and remembering. The child, patient, is a co-agent by being present as being the source of the problem, the impetus. SEIPS 2.0

outlines three ideal-type categories of engagement (Werner *et al.,* 2020):

1. **Professional work**: this includes the work done by doctors, nurses, hospital clergy or medical assistants etc.;
2. **Non-professional (patient) work**: which refers to the work done by the family, caregivers and/or any non-professionals; and
3. **Collaborative work**: instances where both professional and non-professional work are actively engaged together.

The type of engagement that occurs in the healthcare system is deemed important in the SEIPS 2.0 model and furthers the understanding that system interactions underpin PSI outcomes.

Lastly, the outcome SPO component of the SEIPS 2.0 model has been modified to include the concept of “adaption”. This concept depicts feedback loops between the SPO components of the system. These feedback loops result in both intended and unintended adaptions (Holden *et al.,* 2013). Adaptions are considered an important feature of dynamic systems and reflect the ability of the system to adapt to changing circumstances. The concept of adaptations leads to an understanding of the importance of monitoring of system processes and outcomes (Holden *et al.,* 2013). Monitoring of the system enables intended adaptations to be pursued. These intended adaptations are aimed decreasing the gap between actual versus optimal systems performance (Holden *et al.,* 2013). As has been established, the ability to optimise the system has implications for patient safety and, as such, could impact the likelihood of PSI occurring.

Thus, the SEIPS 2.0 has improved the understanding of each component of the SPO system in the SEIPS model. The changes between SEIPS and SEIPS 2.0 are important as they reflect the increased understanding of HFE in the healthcare system. Amongst other implications, this evolved understanding is important as it led to the evolution of SEIPS 2.0 to SEIPS 3.0.

When compared to the prior two models the SEIPS 3.0 model displays an evident focus on the process component, paying special attention to the patient journey over

time and space (Holden & Carayon, 2021). Focusing on the patient's journey gives the reader a different perspective of the interactions of the work system, a more patient-centric perspective. This is done by viewing the patient as a continuous participant in all interactions that happen in the healthcare system and by so doing, have a constant entity across the SPO model of the healthcare system through which to identify critical faults and gaps.

The patient focus is reflected in an appreciation of the complexity of the patient, their values, needs, preferences, economic and social context, language, and communication mediums (Beleffi *et al.,* 2020). Focusing on these unique elements of a patient is intended to facilitate incident reporting and analysis (Beleffi *et al.,* 2020). Improved incident reporting and analysis will aid in the design and implementation of solutions and guidelines in healthcare system. The proposed method of focusing on the patient in SEIPS 3.0 is accomplished by monitoring a patient's journey through the healthcare system. However, although the SEIPS model is a conceptual framework to understand the patient's journey, it does not in of itself provide the necessary methods or tools to bring the various interactions to light. These interactions can be brought to light using additional HFE systemic tools.

The patients journey represents key engagements that occur between a patient and professional or non-professional work representatives over a period during which they can be deemed part of the healthcare system. The patient is the only entity who is continuously active and has a first-hand experience of their heath journey and the interactions that constitute that journey. This contrasts with professionals who only experience a portion of the patients care for which they are responsible (Beleffi *et al.,* 2020). Thus, the patient alone holds information that characterizes the entire care experience. Every point of the patient's journey offers data on experiences that should be used as feedback to better design healthcare systems in terms of adaption, learning, and improvement (Beleffi *et al.,* 2020). The SEIPS model is presented below in Figure 2.4.

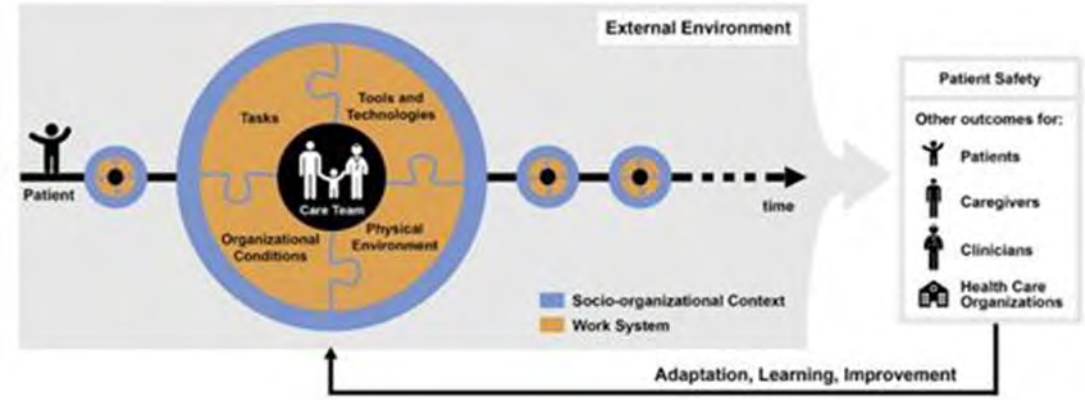


Figure 2. 4: SEIPS 3.0 model: Sociotechnical systems approach to patient journey and patient safety adapted from (Carayon *et al.,* 2020)

The general structure of the SEIPS 3.0 model represents the patient journey as a temporal series of work systems that interact with each other and involve work at the sharp end and work at the blunt end (Carayon *et al.,* 2020). The sharp end refers to professionals, such as healthcare workers, and non-professionals, such as family and care givers, that have direct patient interactions. It is at the sharp end where active failures usually occur. The consequences to these failures are often immediate and have a short-lived impact of the integrity of the defences of the system (Reason, 2000).

Examples of active failures include mistakes, slips, and procedural violations (Carayon *et al.,* 2020). The blunt end on the other hand is the upstream decision makers, such as stakeholders or healthcare policy makers, that frame the operating environment of the healthcare system through legislation, policy, and general regulation (Holden & Carayon, 2021). At the blunt end latent failures occur (Reason, 2000). Latent failures are weaknesses in the defences of a system. Latent failures may arise from decisions and actions made by the blunt end and may lie dormant within a system until the combine with an active failure (Reason, 2000).

Both the sharp and blunt end are subliminal to the SEIPS 3.0 model in Figure 1.4 (Holden & Carayon, 2021). Sharp end interactions happen in the inner, orange, circle. This is the work system and is made of various sub-categories but of importance is where the sharp end interactions occur. Blunt end interactions occur within the outer, blue, circle. This outer circle represents the larger socio-organizational context of

which the work system is embedded in. The blunt end interactions that occur within the outer circle result in the decisions that lead to the formation of the socio-organisational context. Therefore, as the patient goes through their journey, they interact with multiple work systems at multiple points in time within a socio-organisational context that is framed by sharp and blunt end interactions (Carayon *et al.,* 2020).

These work systems continuously adapt or respond to external environmental changes (Carayon *et al.,* 2020). These adaptations may occur because of new technology, new management, new clinical decisions, new organisational patterns, and a change in socio-organizational context (Carayon *et al.,* 2020).

The SIEPS 3.0 model, like SEIPS and SEIPS 2.0 models, illustrates the importance of a feedback loop. A feedback loop is important as it provides information regarding the outcome to the structure component of the SPO (Holden *et al.,* 2013). This feedback is vital as it can indicate the state of the system and provide learning opportunities and continuous improvement (Carayon *et al.,* 2020). This feedback enables various measurable qualities within the system and can be used to identify a lack or reduction of such qualities as resilience and patient safety (Carayon *et al.,* 2020). Equally as important, these feedback loops can convey information regarding a PSI. This information can be used to adapt the work system or socio-organisational context to mitigate against further PSI occurring (Carayon *et al.,* 2020).

Collectively, the SEIPS models demonstrate an evolution in HFE systems thinking. Moreover, there is a clear sense that the SEIPS models are moving HFE systems thinking toward developing improved systems. The SEIPS models have also conveyed a focus on ensuring that the human element of the systems under consideration are a pivotal element.

A discussion of the SEIPS models highlights the importance of looking at a PSI from both a systems perspective by looking at the work system and considering the interaction between the system components at both the blunt and sharp end. As well as from an individual interaction/individual entity perspective whereby the SEIPS 3.0 pays special attention to the patient's journey over time and space. Focusing on a

single element or entity of the work system, at one point in time, is limiting and does not consider the temporal adaptations and changes that occur (Carayon *et al.,* 2020). However, failing to acknowledge individual entities and interactions does not permit a holistic systems perspective. As such, the SEIPS models attempts to convey the necessity of looking at both the systems level of PSI and the individual patient/individual interaction level. The need to observe a PSI from both a systems perspective and individual interaction perspective is essential to the methodology applied in this thesis.

Rasmussen, (1997), developed two models that are of interest to HFE in the healthcare system and considering the nature of the Life Esidimeni incident, are of particular interest within the current thesis. The first model is the structural hierarchy of risk (SHR) and the second is the dynamic safety model (DSM). The SHR reveals how decisions made at the top level, blunt end, of a system filter down through subsequent levels and affect the operations and actions of the bottom levels, sharp end, of a system (Rasmussen, 1997). Whereas the DSM is principally concerned with the effects on a system that either drive a system toward or away from failure (Rasmussen, 1997; Rasmussen & Svedung, 2000).

Rasmussen, (1997), states that risk management is a control issue in the socio-technical system, and that PSI or other disasters such as a financial disaster occurs due to a loss of control over physical processes capable of placing people or systems at risk. Rasmussen, (1997), further suggests that safety then depends on the control of work processes in the context of the pressures and constraints in the operational environment. There are many systems hierarchical levels involved in the control of safety. These levels are presented in Rasmussen's SHR model.

Rasmussen's SHR model includes several hierarchical levels which starts with the government, at the top level, and ends with "work" or the bottom level which is where the sharp end interactions occur (Rasmussen, 1997). In between government and work are four unique levels each reflective of a subsequent category of role players and stakeholders within the system. The layout of the SHR is presented in Figure 2.5 below.

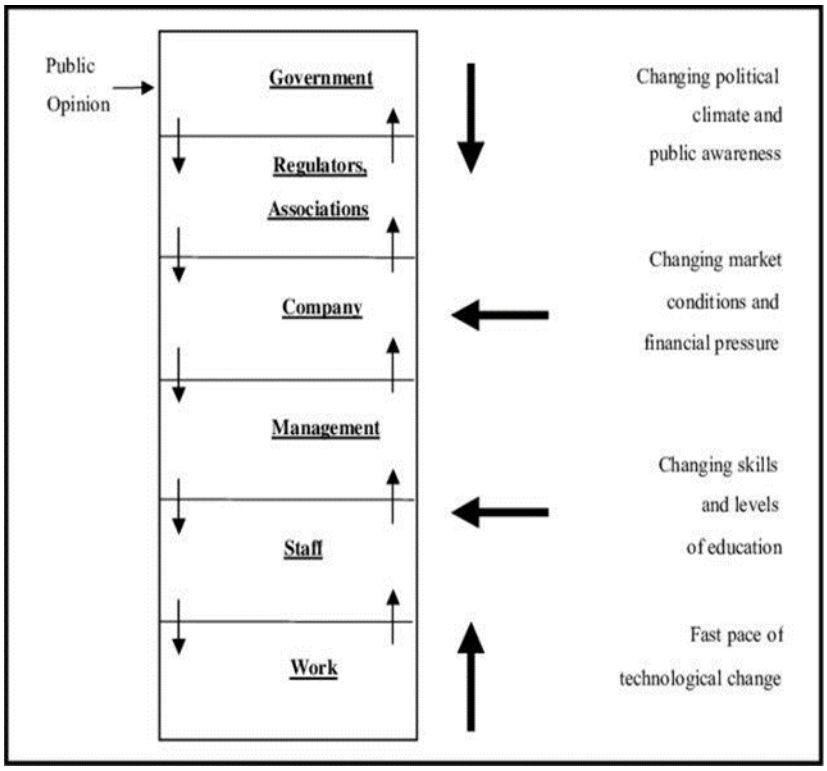


Figure 2. 5: Rasmussen's Structural Hierarchy of Risk Management (SHR) model adapted from (Cassano-Piche *et al.,* 2006)

The SHR model also considers various external influences that impact the system. These influences span from public opinion and the impact that this has on the government level, to the ramifications of technological change on the system from the bottom up (Rasmussen & Svedung, 2000). These external influenced are presented on the right-hand side of the model.

Rasmussen argues that for systems to function efficiently and safely, decisions made at governmental, regulatory, and managerial levels of a system should funnel down and affect the decisions and actions occurring at the lower levels (Rasmussen & Svedung, 2000). Additionally, information at the lower levels regarding the system's status need to transfer up the hierarchy to inform the decisions and actions occurring at the higher levels (Rasmussen & Svedung, 2000).

Rasmussen, terms this phenomenon 'vertical integration', the decisions at the higher levels of the hierarchy should propagate downwards, and information about the current position of the system should propagate upwards (Rasmussen & Svedung, 2000). This

vertical integration is centred on creating feedback paths which are critical to the operation of the system. Rasmussen further argues that without vertical integration, systems can lose control of the processes that they are designed to control, creating an opportunity for a system failure (Rasmussen & Svedung, 2000). In the healthcare system, this “system failure” would be manifested as a PSI.

The structure provided by the SHR can be applied to the healthcare system of South Africa. The categorical entities can be filled with the appropriate and corresponding healthcare entity that represents that category of entity. The results of such an exercise are reflected below in Figure 2.6.

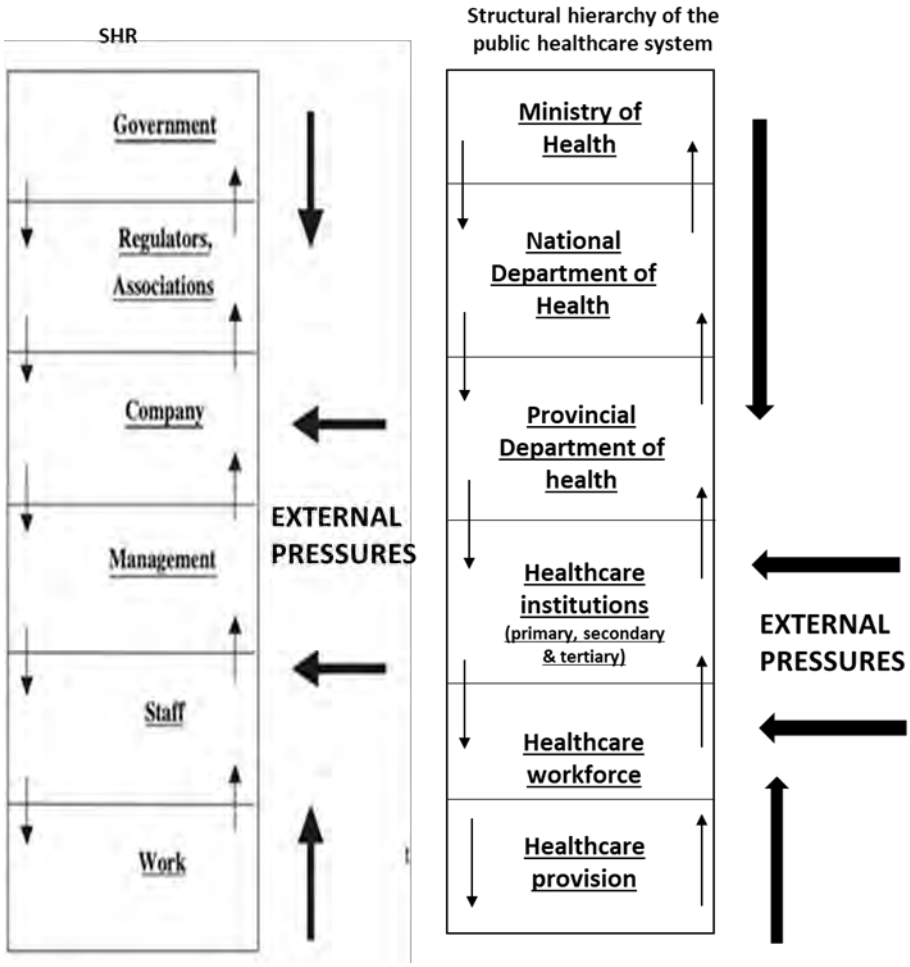


Figure 2. 6: Rasmussen's SHR applied to the South African healthcare system adapted from (Rasmussen, 1997)

It is clear in Figure 2.6 those different institutions within the South African healthcare system can be matched with categories from the SHR. This permits a further understanding of the South African healthcare system and the various systems perspective that can be developed. Furthermore, these different levels, like the SEIPS

3.0 model, highlight the different work systems and/or system levels that impact a patient on their journey at the sharp end of the system.

Rasmussen's SHR illustrates the importance of each level of a system and how that level contributes to the performance of the system (Woo & Vincent, 2003). Therefore, all levels of the healthcare system play a different but important role in maintaining system performance (Woo & Vincent, 2003). As previously mentioned, a key focus of the healthcare system is patient safety (World Health Organisation, 2019). As such, each level of the healthcare system plays a vital role in promoting and establishing patient safety within the healthcare system (Rasmussen, 1997). Given that all levels of the healthcare system play a role in patient safety, it is clear patient safety is impacted by the decisions and actions of all the actors in the system i.e., policy makers, government officials, managers, project planners, and not simply the sharp end workers (Rasmussen, 1997).

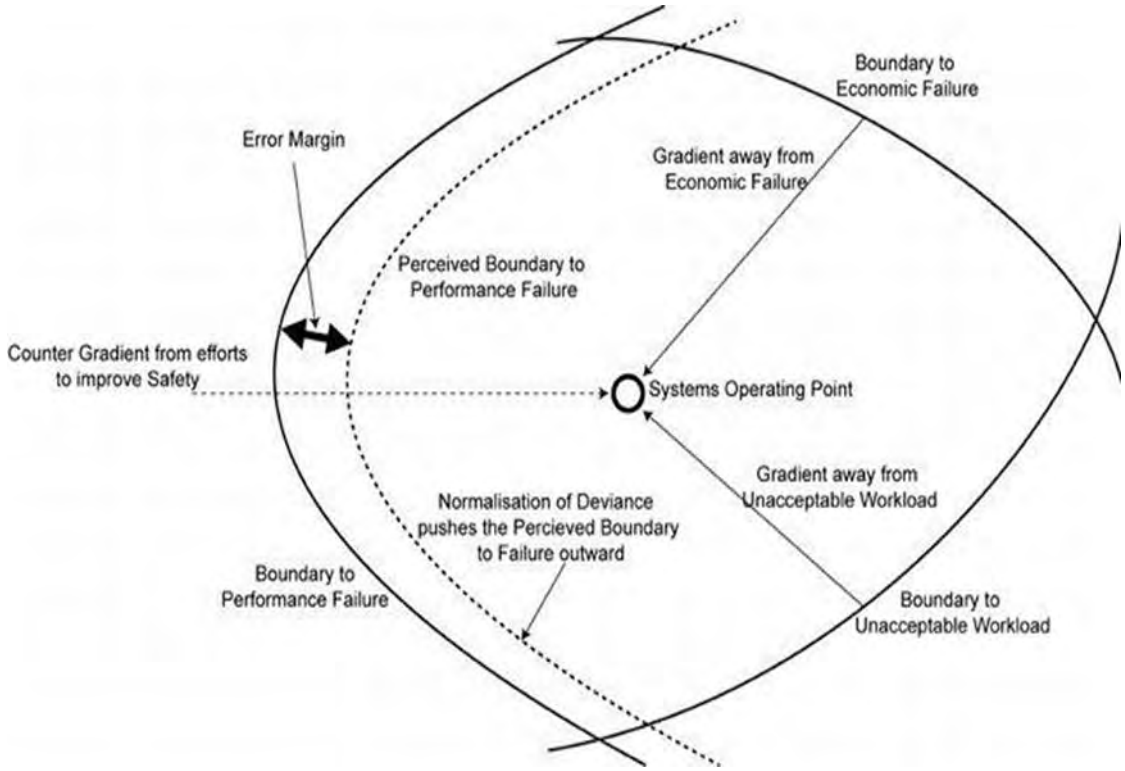
In line with this view, patient safety can be viewed as an emergent property of the healthcare system. This emergent property being a quality or characteristic of a system that is the common result of the actions and activities of the levels of that system (Wilson, 2012).

Aside from insight into the shared burden of all system's levels in achieving optimal system functioning, the SHR provides insight into the risk that is latent within a system. This refers to the interconnectedness of the various levels of the SHR model and how a critical fault or gap in any of these levels, can result in an error or PSI at the sharp end of the system (Nemeth *et al.,* 2004; Hignett *et al.,* 2013). Several PSI have been the result of a critical fault or gap at the government level of the system (Nemeth *et al.,* 2004). The risk associated with this critical fault or gap then 'moves' down the system and can manifest as a PSI at the sharp end of the healthcare system. This insight promotes the idea that patient safety should be a critical focus of each level of the healthcare system. A patient safety centric healthcare system recognises that PSI are manifested at the sharp end even though they may be the result of a critical fault or gap in a higher level of the system (Stavrianopoulos, 2012).

Rasmussen's SHR model provides useful insights when it comes to understanding the

role of levels in a system as well as the nature of risk. The second component of Rasmussen's framework is that of Rasmussen's dynamic safety model (DSM) which will be presented as figure 2.7 and discussed below.

The Dynamic work safety model (DSM) is a descriptive model which describes the



feasible operating space for a socio-technical system within three boundaries that form an envelope (Cook & Rasmussen, 2005). The model portrays how dynamic forces can cause a system to modify its structure and behaviour over time (Woo & Vincente, 2003). Because this model addresses the dynamic aspects of safety, it is suited to understanding and illustrating the pressures in today's healthcare system and the way these pressures may lead to PSI (Waterson *et al.,* 2017). The DSM is provided below in Figure 2.7.

Figure 2. 7: Dynamic model of safety and system performance adapted from (Rydenfalt *et al.,* 2013)

The DSM is comprised of three 'imaginary' boundaries (Cook & Rasmussen, 2005). These boundaries encapsulate an operating environment. The central circle in Figure 2.7 represents the operating point of a system. Various forces act on this circle to move it towards or away from the boundaries (Cook & Rasmussen, 2005). If the systems operating point (circle) crosses one of these boundaries, a system failure is

likely to occur. Which boundary is crossed will determine the nature of the failure experienced (Cook & Rasmussen, 2005).

For instance, if the “Boundary to economic failure” is crossed, this will reflect an economic failure of the system. This “economic failure” is likely to be manifested by the system entering bankruptcy. Likewise, if the boundary to performance failure is crossed, this would reflect a performance failure of the system. The performance failure is likely to manifest as an PSI or accident.

The purpose of the DSM is to stress that systems, and the entities they represent, are in a state of flux (Clegg, 2000). The operating point of the system (circle in Figure 2.7) is affected by different forces (Cook & Rasmussen, 2005). These forces act both for and against one another. By so doing, they cause the operating state of the system to change and can either push a system towards or away from failure at a certain boundary (Cook & Rasmussen, 2005).

Given that a system is in a state of flux, it is necessary to question to what extent the processes within that system can adapt to the changing conditions. Failure to adapt to the state of flux may lead to a lack of resilience which in turn can result in a system collapse (Clegg, 2000). The state of flux will inevitably introduce new elements to processes, or sharp end interactions, that are not explicitly designed for within the process component parameters of the system (Clegg, 2000).

These new elements may be either good or bad (Clegg, 2000). This is particularly evident in healthcare whereby deviating from typical processes may save a patient’s life (Vincent & Woo, 2003). However, the same risk-taking deviation may result in their death or maiming thereby manifesting a PSI (Vincent & Woo, 2003). Furthermore, such adaptations permit persons within the system to innovate, and potential derive new means of completing systems processes (Vincent & Woo, 2003). However, deviation from typical system processes may gradually erode the systems resilience over time, making the system vulnerable to PSI (Vincent & Woo, 2003).

The dilemma of transitioning from typical systems processes to new innovative processes is rooted in the understanding that not all threats to safety are clearly visible

before an incident occurs (Rasmussen, 1997). In other words, not all innovations or changes to typical system processes will lead to an immediate PSI, nor does the erosion of patient safety have to be present in the same level of the system that the innovation is present, but there may be unseen critical faults or gaps brought about by changes to the typical system process (Rasmussen, 1997). This unseen critical faults or gaps contribute to a reduction in patient safety within the system and thereby, increase the probability of a PSI.

Transitions are not always sudden and can occur over different time scales (Vincent & Woo, 2003). Therefore, when a PSI occurs often professionals may wonder what went wrong because their actions were no different than the day before. This phenomenon according to Cook and Rasmussen, (2005), is a result of a 'tightly-coupled system'. In the past healthcare delivery systems were 'loosely coupled'. This means that the activities and conditions that occurred in one part of the system had only limited effect on the other parts of the system (Rasmussen & Cook, 2005). 'Loose coupling' enabled professionals to notice problems and intervene before they cause harm, creating a "buffer" to pressures placed on the system.

However, as the complexity of the healthcare system has increased, the system, in general, has become more 'tightly coupled'. This means that there are greater interdependencies where activities in one area of the healthcare facility become critically dependant on different (distant) parts of the healthcare facility. The problem that arises from 'tight coupling', which Cook and Rasmussen term as 'going solid', is the change in system dynamics, which does not directly produce PSI. Instead, it makes a PSI "more likely, more difficult to foresee, harder to defend against, and harder to recover from" (Cook & Rasmussen, 2005).

Rasmussen and Cook, (2005), further argue, that although the top levels of the SHR hierarchy, i.e., government, has a reasonable amount of influence over the gradients, management cannot directly control the gradients. Instead, creating and sustaining a powerful counter gradient to counteract the economic and workload forces placed on the system may be of better value. Thus, there has been a growing interest in culture of healthcare and discussion around patient safety of how it can used as a counter gradient and control mechanism to prevent the system from drifting towards the

boundary of performance failure (Rasmussen & Cook, 2005).

The inclusion of these models is important as each model provides a different system lens to the manifestation of PSI. These different systems lenses stress that PSI are the result of the interactions or the lack of interactions between the different components of the work system and between the different hierarchical levels of the system. As opposed to looking at one component or level of the healthcare system which provides a limited view of the 'bigger picture'. A limited view provides limited resolutions to PSI prevention, thus the likely hood of that same or similar PSI re-occurring is high. Furthermore, HFE offers numerous PSI analysis tools that are underpinned by systems theory and approach. The following will discuss some of the dominant tools used for PSI analysis.

2.1.5. Patient Safety: Appropriate HFE Tools

The objective of investigating a PSI is to learn from it by identifying the contributing factors (Sampson *et al.,* 2021). An investigation should also aim to understand the interactions between these factors and how they contribute to or dimmish patient safety (Sampson *et al.,* 2021). Systems theory has been advocated since the late 1980's in accident analysis research (Underwood & Waterson, 2012). However, since the 1990's researchers such as Rasmussen, (1997) and Hollnagel, (2004) have identified that the linear cause-effect basis of existing analysis models are limited as they are unable to adequately explain non-linear complexity of modern-day socio-technical system incidents (Underwood & Waterson, 2012). Describing accidents in a linear fashion also leads the analyst to find the 'root cause' of an accident and stopping the analysis when this 'root cause' is found which is often in the form of an individual found to blame (Underwood & Waterson, 2012). This is only a superficial fix as it may not address the broader system, limiting the development of recommendations for improvement (Underwood & Waterson, 2012). However, the systems approach has been adopted to resolve these limitations and used as a conceptual foundation for various accident analysis tools (Underwood & Waterson, 2012). Some of the various tools underpinned by systems theory will be discussed below.

According to Thatcher *et al.,* (2020), Accident Mapping (AcciMap) (Rasmussen, 1997), Systems Theoretic Accident Modelling Process, (STAMP) (Leveson, 2004) and

Functional Resonance Accident Method (FRAM) (Hollnagel, 2004; Hollnagel, 2012) are the dominant HFE tools used for analysing PSI. This was further supported by Underwood & Waterson, (2012), who highlighted that AcciMap, STAMP and FRAM are most frequently cited incident analysis tools in the domain of HFE literature. Due to the popularity and the extensive application of these models these three models were chosen to be discussed. With a large selection of tools, techniques, and models available to various industries, it is therefore evident that incident investigations are an important safety tool for organisations to utilise for the reduction and prevention of incident occurrences (Hutchings, 2017).

To determine which tool would be best suited to carry out the purpose of this study, each tools' strengths and weaknesses will be outlined. Each tool is briefly described below:

1. **AcciMap** is a retrospective accident analytical approach used for representing and analysing systemic failures (Rasmussen, 1997). This systematic approach was developed for graphically illustrating multi-causal chains consisting of actions, decisions, events, and system failures that all contributed towards the outcome (adverse event);
2. **STAMP** can be described as a 'hierarchy of control based on adaptive feedback mechanisms and provides an understanding of how a lack of systems safety control, at both the design and operational stages produce accidents' (Underwood & Waterson, 2016, p. 1712). STAMP has been used in both retrospective and prospective analysis within various fields such as led outdoor activities (Salmon *et al.,* 2016); **and**
3. **FRAM** was developed to be utilized in both accident analysis and as a risk analysis tool. FRAM provides a way to describe outcomes using the idea of resonance arising from the variability of everyday performance (Hollnagel, 2012). FRAM has been used to analyse both aircraft collisions and rail network control (Salmon *et al.,* 2012).

All three tools apply an underlying systems approach such as SHR or SEIPS to derive contributing factors of a PSI (Hutchings, 2017). However, although these models are underpinned by the systems approach, they are unique in their approach to analysing

PSI and have noticeable differences between them. Each method has different:

1. **Theoretical assumptions**;
2. **Usability requirements** (expertise, time, and cost); **and**
3. **Validity and reliability** (Underwood & Waterson, 2012).

These differences are important criteria for determining the applicability of the tools to PSI analysis. Table 1.1, below, outlines the strengths and limitations of each of the three models. Table 1.1 was adopted from Karanikas & Roelen, (2019), minor changes have been made, and additional information from Filho *et al.,* (2019), incorporated. The green blocks represent the strengths of the tools, with the red blocks represent the limitations of the tool.

Table 2. 1: Strengths and Limitations of three systems-based incident analysis methods

Category	AcciMap	STAMP	FRAM
Graphical Representation	The whole accident can be described and illustrated with a single diagram	The findings are very heavily text based. The graphical representation offers very little communication of an accident	The whole accident can be described with a single diagram
Timeline	There is a proximal sequence of events and influences	The lack of a single graphical representation results in a lack of a clear timeline	There is a proximal sequence of events and influences.
System structure	Little information about system structure and its boundaries	Boundaries of systems are defined by safety constraints	System boundaries can still be unclear
Validity	Sets out to analyse the	Deliberately addresses how dynamic behaviour that	complexity within a system exists within a system and
Usability	Guidelines provided by Nayak & Branford, 2007) are relatively easy to apply	Guidance material is difficult to apply and use	A lack of guidelines
System levels	The system levels (6) are explicitly stated	The systems levels and columns are explicitly stated.	System levels are only implicitly stated.
Time required Training	Not time demanding Not required but a	Time demanding Training and	Time demanding Training and expertise

Category	AcciMap	STAMP	FRAM
	systems theory background is beneficial	expertise are required	are required

According to Karanikas & Roelen, (2019) and Filho *et al.,* (2019), it is evident in Table 2.1 that all three models exhibit both strengths and limitations. The decision of which tool to utilise comes down to the usability and limitations for the user. In the case of this study, time and access to training and expertise were considered a constraint. Time was considered a constraint because this study is a master's thesis which must be completed in a certain time frame. According to Karanikas & Roelen, (2019), FRAM and STAMP, in comparison to AcciMap, are more resource intensive to learn and use and require training and expertise and are therefore more time demanding. This limitation of FRAM and STAMP is supported by (Salmon *et al.,* 2012; Filho *et al.,* 2019). This was seen a limiting factor to the utilisation of FRAM and STAMP in this research.

Furthermore, the guidance material for both FRAM and STAMP is difficult to find, apply and both models use extensive jargon language (Karanikas & Roelen, 2019). Whereas AcciMap has guidance material that is both easy to understand and apply as well as to access such as the AcciMap guidelines published by Branford *et al.,* (2009). For these reasons AcciMap was chosen to be the incident analysis tool of choice due to the limitations of STAMP and FRAM mentioned above.

In terms of graphical representation of an incident, STAMP offers very little visual communication of an incident and the representation of the findings in the STAMP model is illustrated in several documents using texts rather than a single diagram (Hutchings, 2017). Whereas AcciMap graphically depicts a multi-causal diagram of contributing factors and analyses systemic failures relating to the adverse outcome in one 'tree-like' diagram which makes the diagram easy for HFE specialists and non-specialists to read and interpret the diagram (Igene, 2021). The causal factors are linked using causal chains, depicting a cause-and-effect relationship, which enables the user to understand the chain of event that occurred enabling the incident outcome (Igene, 2021). FRAM on the other hand can also describe the whole accident with a single diagram, however, due to the above-mentioned limitations of FRAM and

STAMP, AcciMap was still deemed to be the most appropriate incident analysis tool of choice.

Furthermore, the advantage of using AcciMap is the broad system scope that AcciMap enables. Whereby external factors of the system (such as the effect of economics, politics, and policies) as well as internal factors of the system (such as frontline activities and managerial decisions) are taken into consideration (Hutchings, 2017). This feature ensures:

1. **Context**: it provides a more comprehensive idea of how and why PSIs occur. Methods without the capacity to incorporate external factors ignore the context within which the organisation operates, thereby providing only a limited understanding of the circumstances in which the accident occurred (Branford, 2007). Context is important as it shapes the understanding of why and how certain behaviours and actions emerged, this is especially important in a South African setting because applying international norms and ideologies to a context that is economically, socially, and culturally different should be avoided (Ogrinc *et al.,* 2016). Thus, context specific knowledge enables effective and sustainable context specific interventions (Coles *et al.,* 2017). Context is described by Ogrinc *et al.,* (2016) as key features of the environment in which the work is immersed, and which are interpreted as meaningful to the success, failure, and unexpected consequences of the intervention(s), as well as the relationship of these to stakeholders (e.g., the improvement team, clinicians, patients);
2. **Increasing the scope of prevention**: identification of top-level causes promotes the implementation of high-level corrective action, increasing the scope of prevention of unwanted events (Hopkins, 2003; World Health Organization, 2012); **and**
3. **Avoids unfair blame**: the provision of contextual detail helps to avoid unfair blame particularly toward professional staff. Often these staff members are attributed blame for PSI simply because PSI manifest at the sharp end (Branford, 2007). Such a consideration fails to appreciate the role of the system in providing the latent failures and pre-conditions necessary for this manifestation.

However, it must be noted that AcciMap is not without its limitations. According to Underwood & Waterson, (2014), the reliability of AcciMap is doubtful given the qualitative nature of the model and there is little information about the system structure and its boundaries therefor the AcciMap diagram may differ from user to user.

Having covered the topics: the South African healthcare system, the Life Esidimeni incident, HFE, and HFE systems PSI tools the key elements and themes of these topics are synthesised below

2.4. Synthesis of Literature Review

As discussed above, the South African healthcare system is under immense pressure. The pressure placed on the system is a result of the challenges that healthcare faces at both the blunt and sharp end of the system. Many of the current challenges are rooted in the social and economic disparities which are a result of the apartheid era. These challenges effect the performance of the healthcare system, increasing the likelihood of patient safety incidents. In South Africa, patient safety incidents are a major problem as they bear financial, moral, and legal impacts on the healthcare system as well as threaten the lives of many patients (Hutchings, 2017). One way of managing incidents and accidents is through effective investigations (Hutchings, 2017). Investigations are an important aspect of patient safety improvement as they identify why and how the incidents/accident occurred, remedial actions to prevent recurrences, and patient safety incidents provides a means of learning (Hutchings, 2017).

Human Factors and Ergonomics has been shown to be a good tool to analyse incidents and accident to bring to light the nature, causal factors at various levels of the healthcare system. Up to date there is very little research on patient safety incidents in a South African context, despite the burden they carry. Thus, there is a need for research efforts to find ways of effectively managing and alleviating patient safety incidents in South Africa.

To address this issue, the Life Esidimeni incident, which is the most prominent patient

safety incident in South African recent history, will be analysed using a Human Factors and Ergonomics (HFE) systems-based approach. Adopting a systems approach allows for a holistic and comprehensive identification of the external and internal components within and between the different hierarchical levels of the healthcare system and their interactive nature (Wilson, 2012). Rasmussen's (1997) Risk Management Framework and dynamic safety model provides the theoretical framework for this research and is used to illustrate the structure of the South African healthcare system.

Therefore, the objectives of this study are to:

1. Systematically uncover the causal factors that led to the outcome of the of the Life Esidimeni incident;
2. Identify critical faults, and gaps within the healthcare system that led to the Life Esidimeni PSI; **and**
3. Provide proactive recommendations for future prevention of PSI.

To achieve the objectives of this study an AcciMap PSI analysis tool was applied. The methodology of this application is discussed below.

CHAPTER 3: METHODS

Chapter 3 provides a detailed explanation of the research method. These methods are employed to investigate the causal factors that influenced the outcome of the Life Esidimeni incident. The chapter firstly provides insights into the research design used to explore the research questions. Secondly a description of the research tool, AcciMap, used to fulfil the objectives of this study is provided. Thirdly, the procedural steps provided by Branford *et al.,* (2009), used to construct the AcciMap in this study are outlined. Fourthly, the sources of information used to construct the AcciMap are provided. And lastly, the reliability and validity of this study is discussed.

3.1. Research Design

The objectives of this thesis, stated above on pg.60, are exploratory therefore, a descriptive case study design was used to address the research problem using qualitative research methods.

HFE methods have been shown to be useful for qualitative research within PSI across a wide range of research (see pages 42-52 of literature review) and were therefore deemed appropriate for the purpose of this research. Furthermore, it is not possible to apply all methods to a single case study, therefore a single tool, AcciMap, was selected as being appropriate for this current study. The rationale behind the selection of AcciMap is highlighted in the literature review.

To understand how the system processes, decisions, and actions as well as the causal links between these lead to PSI, it is necessary to obtain qualitative data. Although, quantitative data are available in the instance of the Life Esidimeni incident, this research method was more concerned with the qualitative information pertaining to system processes, decisions, and actions that contributed to the incident. As well as the resultant fallout of these system processes, decisions, actions, and the causal links between them. Branford, (2007), argued that the use of qualitative data within AcciMap provides the necessary information for a systems view of the incident.

The utilisation of qualitative tool was necessary to build an in-depth, largely narrative, description of the healthcare system and causal factors involved in the Life Esidimeni incident. Although there were many MHCU that were individually affected, the Life Esidimeni incident was characterized as one major PSI by the Health Ombud. Thus, the Health Ombud's report is a single report that does not pay specific attention to each individual MHCU but rather pays attention to the incident as one whole. Thus the aggregation of the experiences of individual MHCU into a single PSI for analysis and assessment the study was able to draw key causal influences on patient safety because of critical faults and gaps within the broader South African healthcare system. Of importance is the ramifications that these key faults and gaps have for the socio-technical system that is the healthcare system. The key faults and gaps provide insight into the system of where efforts of improvement need to be directed too. The use of AcciMap enabled the identification of these critical faults and gaps in the South African public healthcare system, a more thorough overview of AcciMap is provided below.

3.2. Research Tool

The AcciMap approach provides a means of analysing incidents in complex socio-technical systems (Igene *et al.,* 2021). Salmon *et al.,* (2020), argued that AcciMap is considered one of the most popular accident analysis methods in the peer-reviewed literature. The following are examples of studies that have utilised the AcciMap approach specifically in the healthcare domain (Igene, 2021; Nayak & Waterson, 2016; Waterson, 2009; Woo & Vicente, 2003; Vicente & Christofferson, 2006).

The AcciMap is beneficial for organising and communicating information concerning the events and conditions contributing to a PSI, for promoting a systemic view of PSI causation, and for assisting researchers to shed light on problem areas within the system (Waterson *et al.,* 2017). From these problem areas safety recommendations that address the events and conditions that lead or contribute to PSI can be made (Igene *et al.,* 2021). Within the context of Life Esidimeni, shedding light on problem areas within the South African healthcare system and consequently provide recommendations for improvements would address PSI in a South African context in both a meaningful and systemic manner.

An AcciMap can be used to identify key causal factors of a PSI or an accident and are organised into levels representing the different levels of the sociotechnical system in which the accident occurred (Branford, 2007). Traditionally AcciMap typically focused on failures across six levels of analysis: government policy and budgeting; regulatory bodies and associations; local area government planning & budgeting (including company management, technical and operational management); physical processes and actor activities; and equipment and surroundings (Isherwood & Waterson, 2021). However, Branford *et al.,* (2009), condensed these six levels into four levels. These levels are considered to represent the different levels of a socio-technical system (Branford, 2007). These different levels are described by Branford *et al.,* (2009) as:

1. **External level**: includes the causes that are beyond the control of the organisation(s);
2. **Organisation level**: incorporates causes relating to organisational processes. Factors are placed in this level if they were within the control of the organisation;
3. **Physical actor/events/processes and conditions level**: are immediate precursors to the outcome(s); and
4. **Outcome(s) level**: refers to the actual incident/accident outcome.

Below, Figure 3.1 is a standardised AcciMap structure.

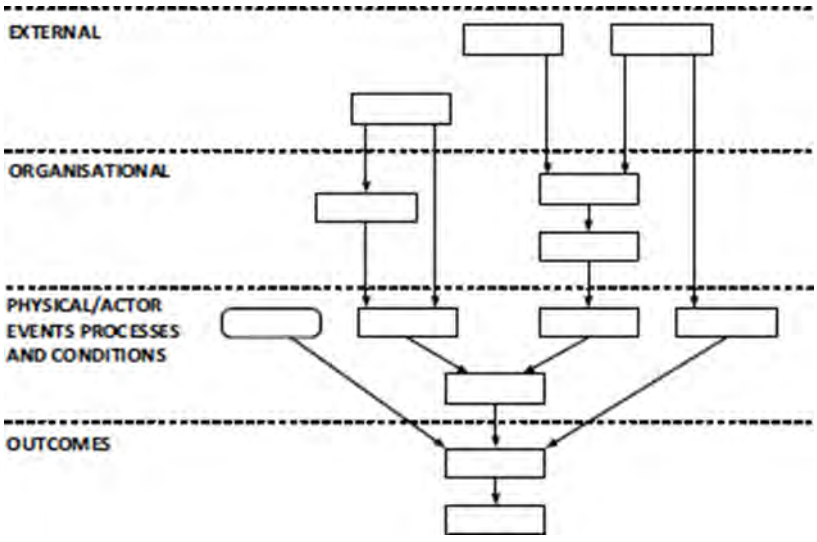


Figure 3. 1: Standardized AcciMap structure adapted from Branford *et al.,* (2009)

An advantage of AcciMap method is its ability to identify causal factors from all levels of the system which includes both internal (causal factors within the control of an

organisation such as a managerial decision) and external (causal factors that are not within the control of an organisation such as political or regulatory factors) causal factors (Goode *et al.,* 2019). The focus on both external and internal causal factors permits the analysis to provide a more holistic insight into a PSI, as there is recognition of both the sharp and blunt end of the system (Salmon *et al.,* 2020). This feature of AcciMap is important to this current study because healthcare is a complex socio-technical system and socio-technical systems do not operate in isolation or independent of the external factors (such as economic and political decisions) that are the result of forces outside of the healthcare system and, as such, it is imperative to take these factors into consideration (Carayon, 2011; Baxter & Sommerville, 2011). By considering external factors the analyst can understand the context behind the incident (Branford, 2007). The external factors have been shown to be important for context, increasing scope of prevention and avoiding blame as outlined in the literature review (Branford, 2007).

According to Branford *et al.,* (2009), there are several ways to construct an AcciMap although, they are all based on the same principles, the processes of information extraction and construction of the AcciMap may differ. The method proposed by Branford *et al.,* (2009), incorporates factors common to all the varieties of AcciMap approaches. Branford *et al.,* (2009), argued that it is best for analysts to adopt the same rules and processes so that any differences in the results of their analyses will not be attributable to differences during the process. Thus, Branford *et al.,* (2009) put forward guidelines to facilitate the creation of credible and reliable AcciMap. Subsequently several studies (Isherwood & Waterson, 2021 and Igene, 2021) have adopted the Branford method within the context of healthcare HFE studies. As such, the Branford *et al.,* (2009) guidelines are used to apply the AcciMap method to the Life Esidimeni case study within this current study.

3.3. Procedural Steps to Constructing the AcciMap

The AcciMap technique involves arranging the causal factors of the incident/ accident into a tree-shaped diagram, with the outcome(s) of the incident/accident at the bottom and the causal factors branching upward (Branford *et al.,* 2009). The Branford *et al.,* (2009) guidelines highlight 9 steps to follow in creating an AcciMap. The first 8 steps

are required for the construction of the AcciMap and have been followed in the current study. The final step (9) relates, not to the AcciMap itself, but rather to the recommendations stemming from the outcomes of the AcciMap. These (9) steps that have been followed to create the AcciMap and develop recommendations have been outlined below.

Step 1: Create a blank AcciMap format. A blank AcciMap format on which to arrange the causal factors was created. This was done by separating a white board into five sections of the AcciMap, with the headings of the five levels on the left-hand side and horizontal lines separating each level. These heading represent the levels of a socio-technical system in the AcciMap diagram. Life Esidimeni represents a complex multi-organisational PSI which is considered atypical for AcciMap. Traditionally AcciMap consists of four broad levels, as depicted in Figure 3.1, these four levels are: external, organisational, physical/actor events, processes and conditions, and outcome. To recognise the Life Esidimeni complexity and to clearly delineate system boundaries and key stakeholders, the AcciMap layout has been adjusted accordingly to incorporate an additional level. This additional level is that of “government”. Thus, instead of 4 levels, the AcciMap layout used in this study consists of 5 levels. These 5 levels were:

1. **External;**
2. **Government;**
3. **Organizational;**
4. **Physical/Actor Events, Processes and Conditions**
5. **Outcomes**

Introducing government as its own separate level was deemed relevant given the context of the Life Esidimeni incident and the magnitude of the role played by government. Wilson, (2014), argued that system boundaries are typically arbitrary but are important for defining the scope of analysis for system HFE tools. Therefore boundaries have been clearly established and defined to define the scope of the Life Esidimeni incident analysis.

Step 2: identify negative outcomes. The negative outcomes of the Life Esidimeni

incident were identified from the incident data. The data used have been outlined in chapter 4. The outcomes were then written in the “Outcome(s) level” of the AcciMap;

Step 3: list all causal factors. All the causal factors that were identified using the same incident data, were listed on a separate page.
To prevent the list from expanding unnecessarily, boundaries were set based on the guidelines provided by Branford *et al.,* (2009). These boundaries were defined as:

1. Causes are only included if they are of "practical significance" (that is, if something could conceivably be done about them); or
2. If they are necessary for making sense of how and why the accident occurred (that is, if the sequence of events does not make sense without them) (Branford *et al.,* 2009).

Step 4: link causal factor to appropriate AcciMap level. The appropriate AcciMap level was identified for each causal factor. The AcciMap level to which the causal factor applied most was noted down next to the causal factor.

Step 5: separate listing of individual causal factors. The identified causal factors were then written down on their own small piece of paper. When citing each causal factor Branford *et al.,* (2009), suggested the following guidelines:

1. Keep it brief;
2. Use words to make what happened clear; **and**
3. Use wording that suits the level that the causal factor is located in.

Each causal factor was then inserted at the appropriate AcciMap level.

Step 6: cause and effect arrangement. The causal factors were arranged in the AcciMap so that their causes lie above their effects. This is regardless of whether the cause and effect were in the same level or different levels. A causal link was then inserted between a cause and its effect. Figure 2.1, below, is an illustration of how this

process was completed on the whiteboard before transcribing the AcciMap electronically. It is a demonstration of the first attempt at creating the AcciMap of the Life Esidimeni incident, using the Branford *et al.,* (2009), steps. This AcciMap differs from the final AcciMap as changes have been made including the digitalisation of the AcciMap.

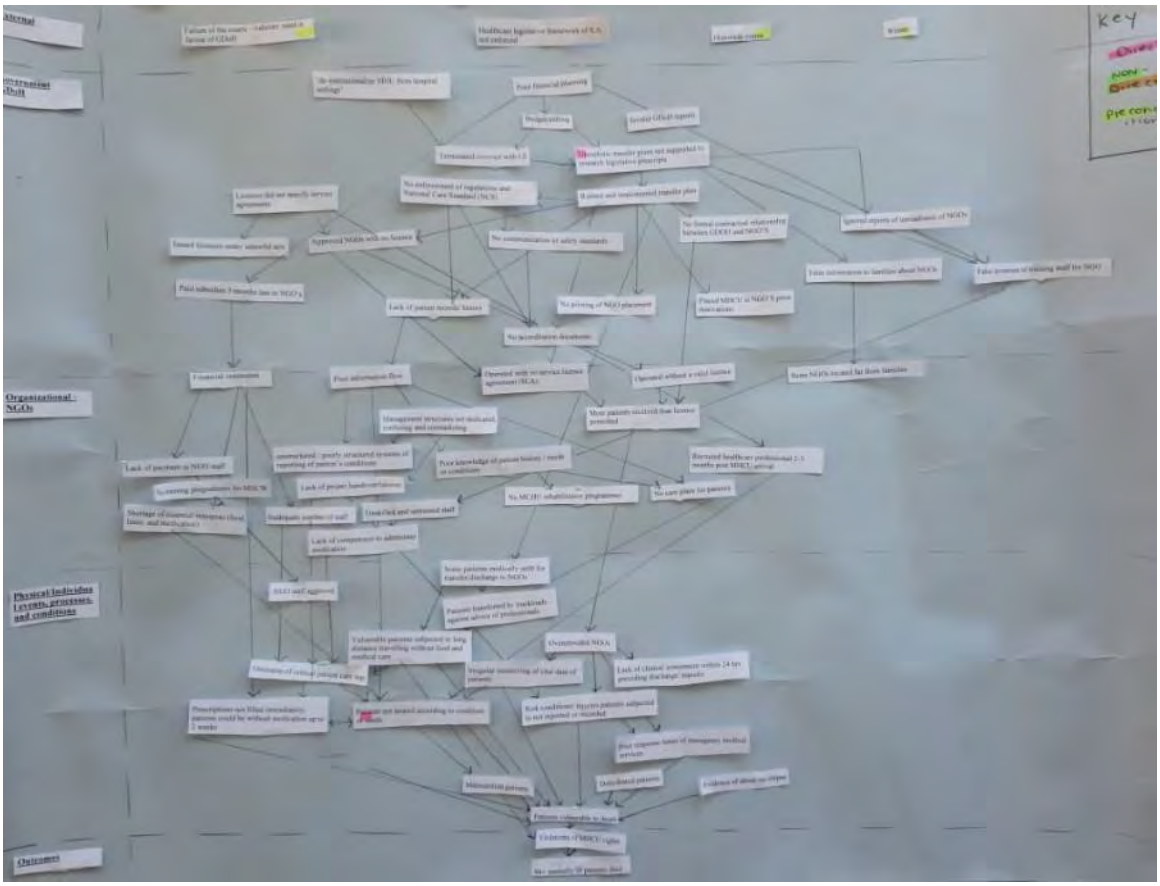


Figure 2. 2: 'Mock' AcciMap

Step 7: fill in the gaps. This step was aimed at filling in the gaps in the diagram to make sure that the causal chains are unbroken. This was done by following each causal chain as far as possible and making sure it extended too at least the organizational level. It was stated in Branford *et al.,* (2009), guidelines that only the factors that are necessary for someone reading the AcciMap diagram to understand the sequence of events and conditions without difficulty should be included in the AcciMap. Thus, if a causal chain did not extend to at least the organisational level, the causal factors relevance was re-evaluated.

Step 8: review and reflect. Each causal chain the AcciMap diagram was double checked to make sure that:

1. All the arrows were facing downwards, towards the outcomes;
2. No cause was listed more than once and causes that were similar were sensibly combined; and
3. To make sure that anyone reading the AcciMap would be able to make sense of the sequence of events (Branford *et al.,* 2009).

These 8 steps allowed for the completion of the AcciMap, showing the causal factors and the links between each of them. However, before the construction of recommendations in step 9, some additional steps were undertaken. These steps were necessary to firstly convert the rough AcciMap into an electronic form.

These steps were:

1. Once satisfied with the AcciMap, the same AcciMap was replicated using
2. SimpleMind Pro for Windows software to create a digital version of the AcciMap;
3. Once the AcciMap was completed using SimpleMind Pro, the AcciMap was ‘copied’ and ‘pasted’ into Microsoft Word;
4. Additional tables for each level of the AcciMap were created. Each table contained the causal factors at each level and a description of those causal factors. This was done to ensure a good understanding of each causal factor.

Step 9: provide recommendations. This step required that key recommendations be made on the findings of the AcciMap. According to Branford *et al.,* (2009), each causal factor in the AcciMap was to be reviewed and those which could potentially be changed, controlled, or compensated for so that a similar outcome could not occur again must be identified.

Branford *et al.,* (2009), further argued that safety recommendations must be practical to implement and if there were two or more causal factor relating to the same problem a recommendation to address the problem area should be made rather than each individual causal factor. Furthermore, it must be noted that not all recommendations

made will be accepted by those responsible for implementing them, Issues or practicality, redundancy, and cost-effectiveness may be relevant and alternative solutions may be taken into consideration (Branford *et al.,* 2009).

The AcciMap enabled the critical faults and gaps in the healthcare system to be identified. In turn, these elements permitted the development of context specific recommendations. These recommendations are aimed at reducing or preventing PSIs and improve patient safety in the South African public healthcare. Branford *et al.,* (2009), emphasized that recommendations should aim to prevent similar accidents from occurring regardless of the individuals involved or the specific circumstances. It is this ethos that embodies the recommendations made.

To make the recommendations relevant to the South African context and to include an HFE lens in the recommendations it is necessary to not only use the report of Life Esidimeni but also the relevant literature from the literature review. It is for this reason that the recommendations are listed as part of the discussion rather than in the results section of this thesis to reflect the nature of the recommendations made and the sources of information used to make the recommendations.

3.4. Sources of Information for AcciMap Construction

The AcciMap method is dependent on accurate data, usually in the form of accident report(s) or official document(s) and/or interviews with Subject Matter Expert (SME) (Branford *et al.,* 2009). At the time of data collection (roughly April-May 2020), the Covid-19 pandemic made interviews or access to SMEs an impossible task. However, to a large degree interviews with SME were included in the Health Ombud's report. Thus, the main source of data used to support the construction of this AcciMap was the official Health Ombuds report of the Life Esidimeni incident titled: "The Report into the Circumstances surrounding the Deaths of Mentally ill Patients: Gauteng Province".

The Health Ombuds is an independent body established in terms of the National Health Amendment Act of 2013 and is a branch of the Office of Health Standards Compliance (OHO, 2016). The Health Ombuds is an independent reputable

organization that functions to protect and promote the health and safety of users of health services (OHO, 2016). This is done by considering, investigating, and disposing of complaints in both private and public healthcare (OHO, 2016). Such activities can relate to non-compliance of prescribed norms and standards, lapses, and malpractice in healthcare settings (OHO, 2016).

Health Ombuds are not unique to South Africa. England, New Zealand, and Australia all have Health Ombuds, however, their powers differ. In South Africa the powers given to the Health Ombud by the National Health Amendment Act are, to a large extent, “recommendatory” (Durojave & Agaba, 2018). The National Health Amendment Act enables the ombud to investigate an incident and submit a report. This report must include the ombuds findings and recommendations to the chief executive officer of the Office of Health Standards Compliance (OHSC).

Durojave & Agaba, (2018), argued that the establishment of the office of the Health Ombud is a commendable step towards improving health accountability in South Africa and it must be recognized that the Health Ombuds has played a role in promoting justice in the Life Esidimeni incident. The reputable reputation of the Health Ombuds worldwide strengthens the argument for using the Health Ombuds official report as the primary source of secondary data for this AcciMap analysis.

The Minster of Health asked the Health Ombuds to investigate the Life Esidimeni incident. The Health Ombuds investigated the incident through numerous stakeholder engagements and presents “voices” from multiple parties involved in the incident. The report provided an in-depth account of the circumstances surrounding the deaths of the mental healthcare users (MHCU) and sufficient data to carry out the AcciMap analysis.

The main author of the Health Ombud official report is Professor Malegapuru Makgoba. However, the report is the work of teams: the Expert Panel, the Office of Health Standards Compliance (OHSC) Inspectors and all the 73 individuals, families, and relatives of the deceased, who came to give evidence during the investigations. The Expert Panel comprised 8 independent clinical, mental, and public health experts to examine and analyse the clinical records, investigate, and report. The 8

independent clinical mental and public health experts have been listed below in Table 3.1.

Table 3. 1: Composition of the Expert Panel adopted from the official report

Name	Designation
1. Bodemer, Wilhelm (Prof)	Psychiatrist
2. Janse van Rensberg, Bernard (Prof)	Psychiatrist
3. Mkize, Dan (Prof)	Psychiatrist
4. Nkonzo-Mtembu, Lulama (Dr)	Mental Health Clinical Nurse Specialist. PhD. RN. (Chairperson)
5. Rangaka, Thabo (Dr)	Psychiatrist
6. Robertson, Lesley (Dr)	Psychiatrist (Deputy Chairperson)
7. Shasha, Welile (Prof)	Public Health Consultant
8. Seape, Sebolelo (Dr)	Psychiatrist

Source: (Makgoba, 2017, pg. 4).

The Office of Health Standards Compliance (OHSC) inspectors, Mr. Tebogo Dioka and Ms. Deborah Lamola, were responsible for onsite visits, inspections, and interviews at the 27 NGOs. These onsite visits were directed at establishing the facts of the circumstance and conditions at the NGOs as well as number of deaths that occurred. In addition, 73 individuals, families, and relatives of the deceased, were interviewed during the investigations for evidence purposes (Makgoba, 2017).

Furthermore, additional journal articles regarding the Life Esidimeni case were also reviewed to ensure a full understanding of the PSI. These journal articles also allow for consideration of different perspectives. Table 2.2, below, is provided for reference regarding the additional journal articles utilised in constructing the AcciMap.

Table 3. 2: Additional articles used during data collection

Research title	Focus paper	URL link
The Life Esidimeni tragedy: The court are also to blame (Dhai, 2018)	This paper focuses on the role the Court played in the Life Esidimeni incident. The paper describes “international, regional and South African Human Rights Law, the attempts to avert the tragedy through the court, and the need for	file:///C:/Users/sa rah/Downloads/The Life Esidime ni tragedy The courts_are_also_to_blame.pdf

Research title	Focus paper	URL link
	those responsible to be held accountable for this injustice" (Dhai, 2018, pg. 155)	
Contribution of the Health Ombud to Accountability: The Life Esidimeni Tragedy in South Africa (Durojaye & Agaba, 2018)	This paper focuses on the health ombuds findings regarding the Life Esidimeni incident, what the health ombud does, how they contribute towards promoting health accountability in South Africa and the importance of using the health ombuds reports for educational and information sharing roles.	file:///C:/Users/sa rah/Downloads/life_case_harvard.pdf
Life Esidimeni: Applying a Human Rights Lens (Agaba, 2019)	This paper focuses on the Life Esidimeni incident from a human rights perspective by understanding the role that poverty, gender inequality and systemic exclusion and political failure play in promoting human rights violations	file:///C:/Users/sarah/Downloads/Li fe_Esidimeni_Applying_a_Human.pdf
In the Arbitration Between Families of Mental Health Care Users Affected by the Gauteng Mental Marathon Project (Moseneke, 2017)	The arbitration is a detailed account of the death and torture of the MHCU involved in the Life Esidimeni incident. The arbitration was established following the Recommendations of the Health Ombuds report.	http://www.saflii.org/images/LifeEsidimeniArbitrationAward.pdf

A comprehensive report and several other key journals were therefore used as the data source for the AcciMap of the Life Esidimeni incident.

3.5. Validity and Reliability

Reliability and validity in research are important to ensure that data is sound and replicable, and the results of the research are accurate (Golafshani, 2003). The reliability of a method is the consistency with which the method can measure the attribute or concept of a study and the degree to which the study can be replicated (Daniels, 2020). And the validity of a method determines whether the research truly measures that which it was intended to measure or how truthful the research results (Golafshani, 2003). The evidence of reliability and validity assure the integrity and quality of the tool, method approach being used.

According to Branford, (2007), there are three main constraints that jeopardize the

reliability and validity of AcciMap, which are:

1. Variations to the purpose of the approach;
2. Formats of the different AcciMap varieties; and
3. The lack of instructions to perform the AcciMap.

To resolve these issues, Branford *et al.,* (2009) developed a standardised AcciMap format with written instructions so that the technique would be controlled. This ensures that the analysts have the same purpose, logic, formats, and processes in their AcciMap construction. This creates consistency of application, especially for new users (Igene, 2021; Hutchings, 2017).

Furthermore, the AcciMap method is accessible and suitable for almost any field wishing to apply a systems-based PSI analysis tool (Waterson *et al.,* 2017; Hutchings, 2017). The use of the AcciMap approach does not need specialized training nor does the analyst need to have a background in systems-based PSI analysis (Underwood & Waterson, 2014). However, a background in HFE or systems thinking would be beneficial. The primary analyst of this study is an MSc student in the discipline of HFE, of which is grounded in systems theory.

Assessments of the validity and reliability of the AcciMap cannot be made in an entirely objective manner (Waterson *et al.,* 2019). The reliability of assessments that have previously been conducted have been based on qualitative observations by the researcher regarding similarities and differences between results and the nature of those differences (Branford, 2007). However, since the publication of Branford *et al.,* (2009) standardised and formalised AcciMap guidelines, it is possible to apply these methods so that the extent to which different analysts using this approach in practice produce the same results, and the extent to which those results are valid, can be established (Igene, 2021).

To ensure reliability of the chosen causal factors, this method sought the input of two HFE specialists (Andrew Todd & Doctor Jonathan Davy). These two HFE specialists were asked to independently review the primary sources of secondary data used in the study. The HFE experts accepted, and the researcher sent a ‘worksheet’ (see

appendix A) which included:

1. A summary of the Life Esidimeni incident;
2. Description of the different levels with examples of what type of causal factors coincide with their respective levels;
3. Instructions of what was expected of the HFE experts; **and**
4. An explanation of why this step was necessary

Following on from the initial meeting, a second meeting was held. This second meeting consisted of a workshop that centred on the AcciMap of the Life Esidimeni incident. The various causal factors all parties had identified were discussed, the levels that these factors were attributable to decided, and the causal links derived. Discussing the AcciMap results with two HFE specialists allowed for feedback and insight to reach a consensual judgment concerning the relevant causal factors that were deemed relevant in the incident. Any discrepancies or disagreements were resolved through discussion between the researcher and the HFE specialists until an agreement was reached.

The aim of this step was to reduce subjective bias, contributing to the validity and reliability of this research as well as ensuring that no causal factors were left out and due diligence was carried out.
Svenson (1999), who adopted a similar approach, to his study, argued that in the absence of external assessment criteria, this seems to be the most effective way of identifying the causes of accidents and the most appropriate safety recommendations. According to Branford *et al.,* (2009), guidelines, this step is not required, however, previous studies have implemented this step as it allows for redundant or missed causes to be identified (Nayak & Waterson, 2016; Jiang, 2016).

3.6. Ethics

All sources of data used in this current study (as highlighted in section 2.5 above) are freely available in the public domain. Only information, details, etc used in these documents are used within the results of the study, as such it was not necessary to apply for ethical clearance from the Rhodes University human ethics committed.

CHAPTER 4: RESULTS

An objective of this thesis was to systematically identify the causal factors that contributed to the Life Esidimeni incident. To fulfil this objective an AcciMap of the Life Esidimeni incident was created. This chapter will firstly, outline the source material used to construct the AcciMap. Secondly, a timeline of the sequence of events of the Life Esidimeni incident will be presented. Thirdly, the AcciMap diagram will be presented as Figure 3.2. And lastly, the relevant identified causal factors contributed by each individual level of the AcciMap will be reported and described in the form of tables.

4.1. Source material

The previous section outlined the HFE systems-based approach, AcciMap. This outline indicated that the AcciMap method requires the analysis of a reliable secondary data source. In the case of the Life Esidimeni incident this refers to the Health Ombuds official report (Makgoba, 2017), and supporting journal articles relating to the Life Esidimeni incident (see pg. 71-72 of the methods chapter for details).

Before presenting the AcciMap it is necessary to reflect on the Life Esidimeni incident timeline. This is a necessary first step as the timeline presents many of the main events of the PSI and provides a much-needed context to the analysis.

4.2. Life Esidimeni Incident Timeline

The timeline presented below is the sequence of events of the Life Esidimeni incident from June 2015 to February 2017. The timeline of events has been split into three stages: ‘Before the transfer’, ‘Transfer’ and ‘After the transfer’. These events and the timeline capture the policy process of deinstitutionalisation which is manifested in this instance by a transfer of MHCU from a large institution, Life Esidimeni, to multiple smaller organisations, NGOs. These three stages signify the three major stages of the Life Esidimeni incident and are critical to understanding the PSI and are outlined below:

1. **Before transfer**: the events and key dates prior to the transfer of MHCU from Life Esidimeni to the NGOs;
2. **Transfer**: the events and key dates during the transfer of MHCU to the NGOs; **and**
3. **After transfer**: the events and key dates once the MHCU had been transferred from Life Esidimeni.

Figure 4. 1: Life Esidimeni Timeline

Figure 4.1 provides an overview of the Life Esidimeni incident timeline. The key dates and events are utilised in the AcciMap analysis to ensure that an accurate

understanding of the various systems elements is formulated. Firstly, the ‘before transfer’ stage is characterised by the termination of the long-standing contract between Life Esidimeni and the GDoH and the numerous concerns raised by mental healthcare professionals, civil society, and family members about the termination. Secondly, the ‘transfer’ stage is characterised by the time frame of the transfer of MHCU from Life Esidimeni to NGOs and psychiatric hospitals. And lastly, the ‘after transfer’ stage is characterised by the deaths of the MHCU and the investigations into the deaths thereafter.

4.3. AcciMap Diagram

The AcciMap, Figure 4.2, provides a diagrammatic representation of the causal factors that resulted in the Life Esidimeni incident. These causal factors are a series of interrelated decisions, events, and conditions, that together represent the critical faults, gaps, and latent failures that enabled the Life Esidimeni incident to occur.

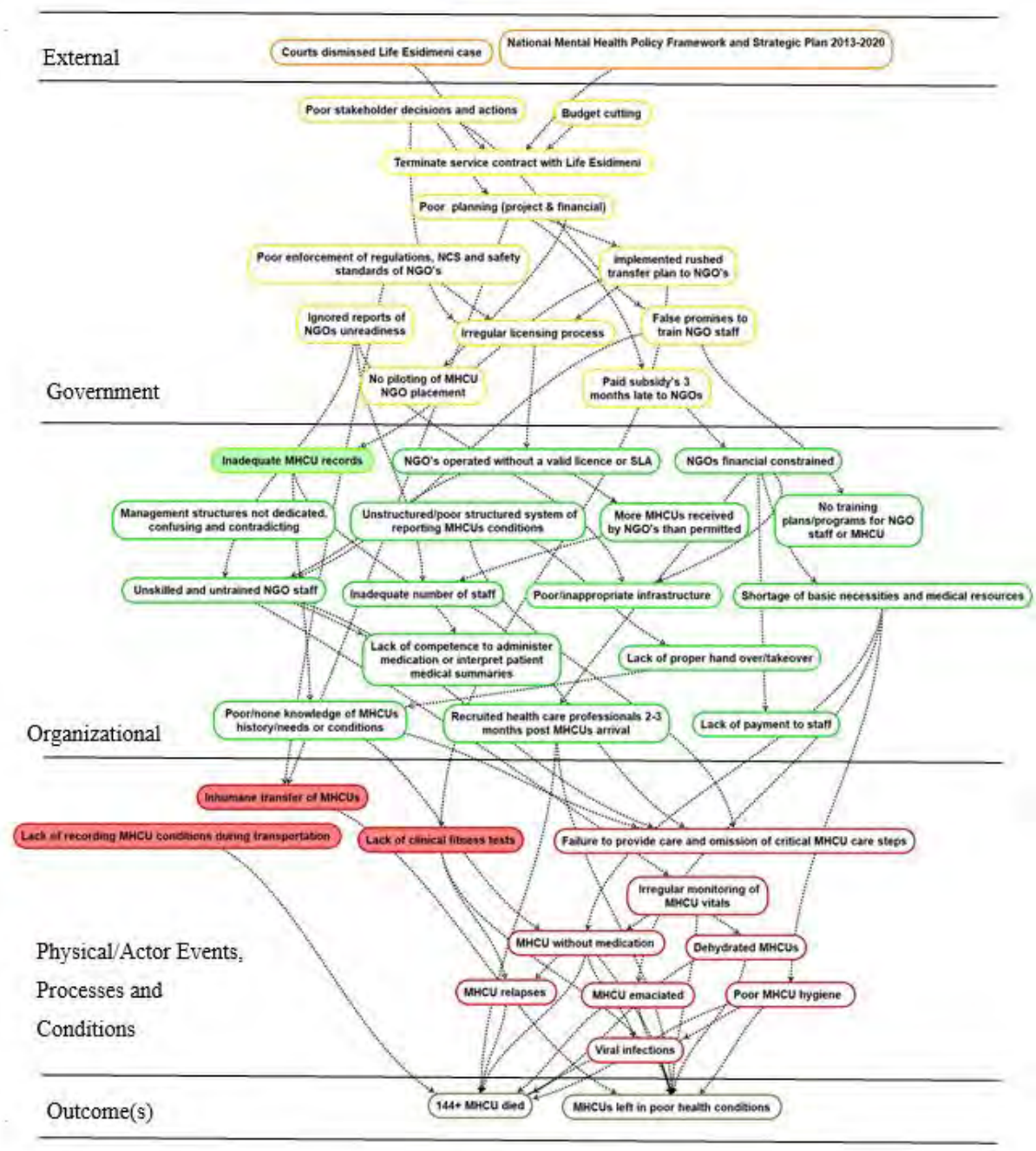


Figure 4. 1: AcciMap Diagram of Life Esidimeni incident

There was a total of 41 identified causal factors illustrated in the AcciMap (Figure 4.2). The AcciMap diagram comprises five hierarchical levels which represents the levels of a socio-technical system. These are:

1. **External,**
2. **Government,**
3. **Organizational,**
4. **Physical/individual events, processes, and conditions; and**

5. **Outcome(s).**

The AcciMap depicts each level using a separate colour to emphasize each individual level. The arrows in the diagram signify causality, with an arrow from one causal factor to another indicating that the first caused/influenced the second. By examining the chains of causes in the AcciMap, it is possible to understand the sequence of events and the interactions that produced the Life Esidimeni incident.

There are multiple chains of events that lead to the same outcome(s), i.e., deaths of the MHCU and poor health conditions of the MHCUs. The multiple chain of events contributed to the complexity of this PSI. Below is an example of the unfolding of one chain of events. This example was chosen for no specific reason, but to demonstrate that following each of the causal chains from end outcome through to the initial causal factor(s) makes it possible to develop an understanding of how each of the causal factors contributed to the PSI.

Although, the results below are presented starting from the top level (external level) to the bottom level (outcome level). To read the AcciMap, it was suggested by Branford *et al.,* (2009), to start at the bottom of the AcciMap (outcome level) and follow the causal chains upwards to follow the chains of events that led to that outcome. Therefore this example will start from the bottom level (outcome level) of the AcciMap diagram. Following the causal chain upwards from the outcome level, in Figure 4.2, it can be seen in the AcciMap that the MHCUs were left in poor health conditions, e.g., dehydrated, emaciated, and medically untreated.

This was a result of a lack of trained NGO staff, an inadequate number of NGO staff, NGO staff had a poor understanding of the MHCU mental conditions and there was a lack of basic resources at the NGOs such as food. A reason for the lack of basic resources and trained NGO staff was due to the financial constraints of the NGOs, as well as the failure of the GDoH to provide training for NGO staff, as had been promised.

Additionally, NGOs were financially constrained due to the GDoH paying the NGOs subsidies 3-4 months late and insufficient amounts. Following the arrows upwards in the AcciMap diagram the justification for late subsidy payments is deemed to be poor

planning (financial planning) and budget cutting. This example ends with poor planning (financial planning) and budget cutting as the causal chains do not extend higher than these causal factors. This does not mean that these causal factors are not a result of decisions and actions made at higher levels than the GDoH. However, there was no information in the Health Ombud's report or additional sources of information used to construct the AcciMap to state otherwise.

Therefore, to conclude these chains of events, had there been good financial planning and an appropriate budget allocated to the NGOs by the GDoH, the NGOs may have been in a better financial position to ensure basic resources were met and had the GDoH held up their promise to train NGO staff, the NGOS and NGO staff may have been better equipped and adequately trained to provide care for the MHCU. Therefore the MHCU may not have been left in poor health conditions as depicted in the AcciMap diagram, Figure 4.2.

Furthermore, the causal factors in the 'organisational' level and 'Individual events…' level have been either left transparent or highlighted in the colour specific to that level. This has been done to clearly show which organisation the causal factor(s) stemmed from. In the 'organisational' level, the causal factor highlighted in green stemmed from Life Esidimeni as an organisation and the causal factors left transparent stemmed from the NGOs as a collective. The reason for presenting the NGOs as a collective is to not attribute blame or single out the individual NGOs that presented the most failures. The 'Individual/Physical events' level on the other hand, was separated into the transfer of MHCUs from Life Esidimeni to NGOs and the day-to-day activities that occurred at the NGOs. This was done by hi ghlighting the causal factors related to the transfer of MHCU to the NGOs in red and the causal factors related to the day-to-day activities at the NGOs were left transparent.

Due to the complex nature of the full AcciMap with causal factors shown, the results section for the thesis has broken down each level of the AcciMap in more detail and the findings at each level have been highlighted. Thereafter a detailed description of the causal factors has been provided. The Causal factors have been highlighted in **Bold** throughout the text below to emphasise the causal factor discussed.

4.3.1. External level

The ‘external’ level of the AcciMap included all factors that were beyond the control of the organization(s) involved which included the GDoH, Life Esidimeni and the NGOs (Branford *et al.,* 2009). There were 2 identified causal factors in the external level:

1. The National Mental Health Policy Framework and Strategic Plan 2012-2020; and
2. Court dismissed the Life Esidimeni case.

The National Mental Health Policy Framework and Strategic Plan 2013-2020 was one of the two alleged reasons for the termination of the service contract between the GDoH and Life Esidimeni. According to the Department of Health, (2013-2020), one of the objectives of this policy was to deinstitutionalise mental health care facilities allowing smaller NGOs to be places of MHCU care. The argument presented by the GDoH was that many smaller NGOs allow for the location of care to be dispersed rather than one centralised place of care, which allows MHCU to be closer to their families or support structures.

The Court contributed to the Life Esidimeni incident by ruling in favour of the GDoH to terminate the contract between the GDoH and Life Esidimeni. The case was bought by reputable academic associations, including The South African Society of Psychiatrists (SASOP), the South African Federation for Mental Health (SAFMH), the South African Depression and Anxiety Group (SADAG), civil society organisations and professional associations (Ferlito & Dhai, 2018). If the termination of the contract was denied, the Life Esidimeni incident would have not occurred. There are several key aspects to this causal factor that are important in under pinning the incident:

1. False information provided by the GDoH; and
2. The failure of the Court to respond to multiple reports from various sources.

To further elaborate on these points, the Court ruled in favour of the GDoH and allowed the transfer of MHCU to a facility that was not able to meet their needs, thus breaching the MHCU rights under the constitution and mental health care act. However,

according to the Arbitration the Court made this decision based on misinformation presented by the GDoH (Moseneke, 2018). Although this was the case, the role the Court played cannot be ignored. More than once, professional bodies (SASOP, SADAG, and SAFMH) and families of the MHCU and stakeholder approached the Court to prevent the transfer of MHCU, however, no further investigation was instructed by the Court.

Furthermore, during March 2016 there was a second application to the court to prevent the GDoH from discharging patients from Life Esidimeni, however, the application was dismissed due to a 'lack of urgency' (Ferlito & Dhai, 2018, pg. 156). The details about why the application was dismissed due to a 'lack of urgency' was not expanded on in the academic journal article The Life Esidimeni tragedy: The courts are also to blame (Ferlito & Dhai, 2018).

Table 4. 1: Description of the causal factors in External level

Causal Factors by Level External Level	Description
National Mental Health Policy Framework and Strategic Plan 2013- 2020	A plan to de-institutionalize mental healthcare allowing smaller NGOs to take care of MHCU as well as providing multiple locations of care instead of one main institution (Department of Health, 2013-2020)
Court dismissed Life Esidimeni case	On the first account, based on misleading evidence provided by the GDoH, the court ruled in favour of the GDoH to go ahead with the MHCU transfer plans from life Esidimeni to the NGOs (Moseneke, 2018) On the second account the Court dismissed the Life Esidimeni case due to a 'lack of urgency' (Ferlito & Dhai, 2018)

Having reported the initial level that relates to external factors, the next level in the AcciMap, the 'government' level will be reported.

4.3.2. Government Level

The 'government' level is represented as the GDoH. There were 11 causal factors

identified at the 'government' level. These causal factors were:

1. **Poor leadership decisions/ behaviour;**
2. **Terminate service contract with Life Esidimeni;**
3. **Poor planning;**
4. **Budget cutting;**
5. **Poor communication/engagement;**
6. **Implemented rushed transfer plan to NGOs;**
7. **False promises to train NGO staff;**
8. **Poor enforcement of regulations;**
9. **National Care Standards (NCS) and safety standards of NGOs;**
10. **Irregular licencing process, no piloting of MHCU NGO placement; and**
11. **Late subsidy payment: 3-4 months late.**

.

These causal factors are highlighted in more detail below.

Poor stakeholder decisions and actions referred to the poor decisions and actions made by the stakeholders involved in, and who were responsible for, the Life Esidimeni transfer project. The effect of these decisions contributed to and influenced many of the subsequent causal factors.

The decisions and actions made by the stakeholders of the GDoH were described as poor. This was due to a failure to acknowledge widespread professional, expert, and civil society stakeholders' warnings and professional advice given to the GDoH.

Terminate service contract with Life Esidimeni, referred to the decision made by the GDoH to deinstitutionalise Life Esidimeni and end the long-term service contract with Life Esidimeni. Which was officially terminated on the 30th of June 2016.

Poor planning referred to both project and financial planning which were also described as poor in the Health Ombud's report. The short time frame (1st April to the 30th of June 2016) of the transfer of 1396 MHCU, which is a large-scale, project was evidence of poor planning. This, in turn, influenced the causal factor "poor stakeholder decisions and actions". The contradicting budget plan presented in the official report

was evidence of poor financial planning (Makgoba, 2017). The contradiction lay in the fact that several psychiatric hospitals were more expensive per MHCU than Life Esidimeni. According to the Health Ombud's report, the cost per MHCU per day at Life Esidimeni was estimated to be R320.00. Whereas the cost per MHCU per day at the psychiatric hospitals were estimated to be between R1386.00 - R1960.00 (Makgoba, 2017, pg. 35). Additionally, the budget planned for the NGOs was R113.00 per MHCU per day which was not enough to cover all necessary requirements to look after the MHCU (Makgoba, 2017).

Budget cutting was presented as one of the causal factors in this level. Budget cutting referred to the need to save on mental healthcare costs and was deemed by the GDoH as one of the two major reasons to terminate the contact between the GDoH and Life Esidimeni (Makgoba, 2017). However, the budget plan says otherwise. The MHCU that were sent to psychiatric hospitals incurred higher expenses than Life Esidimeni (Makgoba, 2017).

Poor communication/engagement, referred to the lack of communication from and within the GDoH. The GDoH failed to communicate and keep the families of the MHCU informed about the process of MHCU transfer (Makgoba, 2017). This lack of information included basic details such as the NGO selected for MHCU, when, and where their MHCU family member had been sent to. There is evidence that the GDoH ignored emails of unreadiness by the NGOs and transferred MHCU to NGOs despite the emails (Makgoba, 2017). The NDoH requested transfer plans on numerous occasions but were ignored (Makgoba, 2017).

Poor enforcement of regulations, NCS and Safety standards of NGOs, referred to the GDoH's lack of supervision or monitoring to make sure compliance of the NCS standards were being met at the NGOs. According to Makgoba, (2017), almost, every National Health Norm and Standard was breached by the NGOs visited and inspected.

Irregular licensing process, referred to the unlawful way NGOs were granted licences or approved to function as an NGO. Firstly, a stakeholder from the GDoH signed off on licences to certain NGOs, however they were not legally authorised to do so (Makgoba, 2017).

Secondly, NGOs were issued with licences without being properly inspected for compliance, and the licences issued did not specify the service requirements. All licenses were issued for a year from April to March the following year, irrespective of when they were signed; in this scenario no one would know when the assessments were conducted and who conducted them and there were no clear criteria document available (Makgoba, 2017).

Furthermore, some NGOs received MHCU before they were issued licences, and some NGOs did not receive a licence at all. In some cases, NGOs were requested to increase capacity and they were promised licences that never materialized (Makgoba, 2017). Additional licencing issues included licences and Service Licence Agreements (SLA) that were issued, did not correspond with the NGO titles, some SLA were not signed yet and some SLA were used as a cover to run unlicenced NGOs. It was confirmed in the official report that all 27 NGOs of which the MHCU were transferred to, operated under invalid licences. Therefore, all MHCU that died in these NGOs during the period of transfer and investigation died under unlawful circumstances.

According to Makgoba, (2017), there was **no piloting of MHCU NGO placement**, especially for new NGOs. The MHCU were also not placed as initially agreed; numbers were increased (for e.g. Mosego's licence was invalid because the number of patients received (181) was not aligned to the licensed capacity of (171) MHCU), in some instances males instead of woman were received (Makgoba, 2017). Most NGOs were not involved in identifying MHCU needing placement and therefore MHCU were not sent to NGOs that could provide the most appropriate care or was the best fit for the MHCU (Makgoba, 2017). Instead, MHCU were sent randomly as there was no planning or thought process behind placement of MHCU in NGOs (Makgoba, 2017).

The short time frame, and poor planning of the transfer project negatively influenced the decisions made which were not in the best interests of the MHCU or in accordance with the National Mental Health Policy Framework and Strategic Plan 2013-2020. Instead, the GDoH approved NGOs that were not ready for the intake of MHCU,

promises made by the GDoH (such as providing training for the NGO staff) were not kept, there was a lack of communication and licences were issued to NGOs under unlawful acts, no pilot testing of MHCU was carried out and there were inadequate preparations of the NGOs prior to MHCU arrival.

The causal factors briefly discussed above are evidenced in Table 3.2 in which the causal factors are restated and interpreted.

Table 4. 2: Explanation of the causal factors of the Government level

Causal Factors by Level Government Level	Interpretation
Poor stakeholder decisions/ actions	Three key players in the Life Esidimeni incident responsible for decision making and implementation have been identified. The transfer project occurred against widespread professional, expert, and civil society warnings and advice (Makgoba, 2017)
Terminate service contract with Life Esidimeni	Decision to go ahead with the process of de-institutionalizing Life Esidimeni and terminate service contract with Life Esidimeni (Makgoba, 2017)
Poor planning	Poor planning included both poor project planning and financial planning
Budget cutting	'Cost cutting' was said by the GDoH to be one of the two reasons contributing to the termination of the service contract between the GDoH and LE (Makgoba, 2017)
Poor communication/engagement	Families did not know how NGOs were selected; they were never provided with the criteria or document for NGO selection, the GDoH did not reply to emails from the NDoH requesting transfer plans, the GDoH ignored reports of unreadiness, and
Implemented rushed transfer plan to NGOs	'Rush in implementing the plan' within three months, whereas, normally it could take up to five years to implement successfully as stipulated in the Mental Health Policy (Makgoba, 2017)
False promises to train NGO staff	During a meeting held by the GDoH, The GDoH promised to provide training for the staff at the NGOs to be able to provide the care the MHCU needed (Makgoba, 2017)
Poor enforcement of regulations, NCS and Safety standards of NGOs	The GDoH failed to make sure that NGOs complied t the National Care and Safety standards (Makgoba, 2017)
Irregular licencing process	Refers to the unlawful and irregular process of issuing licences to NGOs. These acts were unlawful because unauthorised officials signed documents without proper delegation, NGOs were issued with licences without being properly inspected for compliance, and the licence did not specify the service requirements and continued to operate without Service Level Agreements (SLAs) (Makgoba, 2017). In some cases, NGO facilities were found to be

Causal Factors by Level Government Level	Interpretation
	operating without a valid licence on investigation by the Health Ombudsman (Makgoba, 2017)
No piloting of MHCU NGO placement	No “piloting” of the NGO placement especially for new NGOs (Makgoba,2017)
Paid subsidies 3-4 months late to NGOs	There was a discovery that the NGOs only received financial support from the GDoH 3-4 months after receiving patients from Life Esidimeni (Makgoba, 2017)

The government level of the AcciMap assessment provided important insights into those factors that contributed to and led to the eventual Life Esidimeni PSI. The level preceding the government level is that of organisational.

4.3.3. Organisational level

The Life Esidimeni psychiatric hospital and the NGOs (as a collective) are both featured at the ‘organisational’ level. Life Esidimeni and the NGOs have been split into two sections in Table 3.3 to make it clear which organisation was responsible for the identified causal factors. In the AcciMap diagram, Figure 3.2, the causal factors stemming from the NGOs are left transparent whereas the causal factor stemming from Life Esidimeni is highlighted in green. This is distinctly show which organisation was responsible for the causal factor identified. These causal factors will be discussed in more detail below.

There was one causal factor identified from Life Esidimeni. This causal factor was:

1. Inadequate MHCU records: In many cases MHCU arrived without clinical records. Where clinical records were available, they were either in summary form or incomplete. This was problematic because the health staff working at the NGOs did not know the diagnosis or medical history of the MHCU that arrived which further negatively implicated the care provided by the NGOs.

There were 15 causal factors identified from the NGOs:

1. **NGOs operated without a valid licence or Service-Learning Agreements (SLAs);**
2. **NGOs financial constrained;**
3. **Management structures not dedicated, confusing and contradicting;**
4. **Unstructured/poor structured system of reporting MHCUs conditions;**
5. **More MHCUs received by NGO's than permitted;**
6. **No training plans/programs for NGO staff and MHCU;**
7. **Unskilled and untrained NGO staff;**
8. **Inadequate number of staff;**
9. **Poor/inappropriate infrastructure;**
10. **Shortage of necessities and medical resource;**
11. **Lack of competence to administer medication or interpret patient medical summaries;**
12. **Lack of proper hand over/takeover;**
13. **Poor/no knowledge of MHCUs history/needs or conditions;**
14. **Recruited health care professionals 2-3 months post MHCUs arrival; and**
15. **Lack of payment to staff.**

The objective of this research was not to single out one institution to attribute blame to, but to rather look at the causal factors that led to the PSI from a systems perspective. Therefore, the causal factors from each individual NGOs were not presented individually but rather as a collective. These causal factors are covered briefly below.

Management structures not dedicated, confusing and contradicting, this causal factor was identified from the official report and was not elaborated on in the report (Makgoba, 2016). However, management structures are important for the managers and employees to clearly know what their role is and if an incident or issue occurs, employees know who to report to. It was evident that the NGOs lacked management structures as there were no defined roles at the NGOs, no structured daily routines, handovers, and poor communication.

Unstructured/poor structured system of reporting MHCUs conditions, referred to poor/non-existing systems of reporting (such as MHCU progress notes). There was

also a lack of proper hand over/takeover between the NGO staff. Thus, there was limited communication about MHCU conditions, what needed to be done and what had been done.

NGOs operated without a valid licence or Service-Learning Agreements (SLAs), SLA is an important document as it states and regulates the expected standard of care from the NGOs. The absence of an SLA meant that the NGOs were not held accountable for not delivering good quality care as well as the standard of care was not kept consistent between all NGOs.

NGOs financial constrained, this causal factor was partly a result of the GDoH paying subsidies three months late and partly because many of the NGOs were newly established and did not have financial security. The financial constraint of the NGOs had further implications such as lack of payment to staff, shortage of necessities and medical resources, inadequate number of staff, and the lack of training for staff. These implications were identified as causal factors as they further negatively affected the standard of care provided to the MHCU.

The combination of **unskilled and untrained NGO staff** and **inadequate MHCU** clinical records reports, sent from Life Esidimeni contributed to the causal factor poor/no knowledge of MHCUs history/needs or condition and the lack of competence to administer medication or interpret MHCU summaries. This meant that the NGO staff did not know how or what medication to administer, nor could they provide specialized care needed, partly because they did not know the diagnosis of the MHCU and what they needed as well as they did not have the competence to provide specialized care.

More MHCUs received by NGO's than permitted. This was problematic because NGOs did not have enough staff, resources, food, and beds were already limited. This meant that the limited staff, resources, food, and beds had to be spread thinly amongst the MHCU. This negatively affected the level of care provided by the NGO staff, the MHCU were left starving and malnourished and the living conditions poor.

Poor/inappropriate infrastructure referred to the unsuitable design of the NGOs to provide mental care and a lack of recreational space for the MHCUs. The

infrastructural constraints restricted MHCUs movement. MHCUs were placed prior and/or before completion of assessment recommendations made to improve the NGOs. Some NGOs were not assessed for suitability, and some were still conducting renovations to provide suitable infrastructure. During investigation it was also detected that residential areas which were converted to be NGOs were prone to security risks common in the neighbourhood.

The causal factors outlined above and the interpretation of these causal factors, i.e., how it was perceived, are outlined in Table 4.3 below.

Table 4. 3: Explanation of the causal factors on an organisational level

Causal Factors by Level Organisational Level	Interpretation
Inadequate MHCU records	In many cases MHCUs arrived at the NGOs from Life Esidimeni without clinical records and identification records. Where records were available, they were incomplete or summaries (Makgoba, 2017)
Organisations: NGOs as a collective	
Management structures not dedicated, confusing and contradicting	Good corporate governance was non-existent in some NGOs (Makgoba, 2017)
NGOs operated without a valid licence or Service-Learning Agreements (SLAs)	NGOs continued to operate without SLAs regulating the relationship and the levels of service expected by the GDoH (Makgoba, 2017)
NGOs financial constrained	Some NGOs had not received any payments for up to 3 months since the MHCUs were admitted. Many of the owners indicated that they provided supplies from their personal funds and were now bankrupt (Makgoba, 2017)
More MHCUs received by NGO's than permitted	NGOs were sent more MHCUs than their 'licences permitted'. Some NGOs were requested by the GDoH to accommodate more MHCUs than the number stipulated in their licences, and they were promised that the licences will be amended accordingly, which was never done (Makgoba, 2017)
Unstructured/poor structured system of reporting MHCUs conditions	Poorly structured systems of reporting on such including noting of progress notes and a lack of proper hand over/takeover (Makgoba, 2017).
Poor/inappropriate	The design of the NGOs was unsuitable for MHCU care as well as

Causal Factors by Level Organisational Level	Interpretation
infrastructure	renovations to improve NGOs were either ongoing or had not started (Makgoba, 2017)
Shortage of necessities and medical resources	Refers to the unlawful and irregular process of issuing licences to NGOs. Most of the NGOs did not have emergency equipment, fire extinguishers, nor appropriate storage facilities for medical supplies and food. Facilities did not have systems for disposal of medical waste (Makgoba, 2017)
Lack of payment to staff	Lack of payments/ remuneration to the staff employed by NGOs and existence of other unstated labour conditions which left the staff upset (Makgoba, 2017)
Recruited health care professionals 2-3 months post MHCUs arrival	The NGOs started recruiting health professionals only 2-3 months after patients were received (Makgoba, 2017).
No training plans	GDoH failed on their promise to provide training for MHCUs. Rehabilitation programmes for MHCUs were non-existent in almost all facilities (Makgoba, 2017)
Unskilled and untrained NGO staff	Unskilled, non-professional or untrained staff manned the NGOs. Where most deaths occurred, did not have the requisite health professionals to render care (Enrolled nurse, Professional nurse, visiting medical doctor). MHCUs were left in the care of care workers, that do not have basic medical knowledge (Makgoba, 2017)
Inadequate number of staff	There were not enough staff at NGOs to provide care for all the MHCUs most NGOs could not increase due to lack of funds
Poor/no knowledge of MHCUs history/needs or conditions	In many cases MHCUs arrived at the NGOs without clinical records and identification records. According to the official Ombud report (Makgoba, 2017), where records were available, they were incomplete as well as where most deaths occurred, the NGOs did not know the diagnosis and treatment that the MHCUs were taking
Lack of competence to administer medication or interpret patient medical summaries	Lack of competence or skill to administer medication leading to relapse of some MHCUs. Care workers are forced to practice outside their scope of practice and handle scheduled medications and complex medical conditions (Makgoba, 2017)

The causal factors discussed above directly influenced the causal factors identified at the physical/ individual events, processes, and conditions level. Which will be discussed below.

4.3.4. Individual/Physical events level

The Individual/Physical events level was separated into the transfer of MHCUs from Life Esidimeni to NGOs and the day-to-day activities that occurred at the NGOs. This was done by highlighting the causal factors related to the transfer of MHCU to the NGOs in red and the causal factors related to the day-to-day activities at the NGOs were left transparent.

The reason why the two have been split is to firstly, clearly show the causal factors accredited to the different events. One being the transfer process and the other being the care process. This is important because the NGOs were not responsible for the transfer. The GDoH and Life Esidimeni were responsible for the discharge and transfer of MHCU, and the NGOs were responsible for the day-to-day activities that occurred at the NGOs once the patients had arrived.

There were 3 causal factors identified during the transfer phase that contributed to the outcome of the Life Esidimeni incident. These causal factors were:

1. **Inhumane transportation of MHCUs to NGOs;**
2. **Lack of clinical fitness tests; and**
3. **Lack of recording MHCU conditions during transportation.**

The causal factors identified at this level were identified to be direct contributors to the outcome of the Life Esidimeni incident. These causal factors will be briefly discussed below.

Inhumane transportation of MHCUs to NGOs. There was no written plan for the transportation of MHCU and none of the MHCU were assessed individually and discharged or transferred by an authorised clinician (Moseneke, 2018). According to the Arbitration, “MHCU were left unattended outside the Life Esidimeni facilities and multiple NGO personnel were ‘picking’ patients” (Moseneke, 2018, pg. 28). “On instructions, the patients were loaded on busses or open trucks and driven to NGOs unknown to patients of families” (Moseneke, 2018, pg. 31). Vulnerable MHCU were also subjected to long distances without food and medical care. In some cases during transportation, MHCU without wheelchairs were tied with bed sheets to support them (Makgoba, 2017, pg. 2)

Lack of clinical fitness tests: there was a lack of clinical fitness testing, preceding the discharge and transfer of many of the MHCU. A clinical fitness test is a medical test done to make sure the MHCU is suitable for transfer. The Health Ombuds report states that many of MHCU were 'found not to be at all fit for transfer' (Makgoba, 2017, pg. 34). According to Makgoba, (2017), the lack of clinical fitness of majority of MHCU to be transferred may have contributed significantly to the deaths of these MHCU (Makgoba, 207, pg. 34).

Lack of recording MHCU conditions during transportation, MHCU conditions during transportation were not recorded which constitutes an omission of care. Risk conditions that MHCU were subjected to were not reported and MHCU conditions were not monitored. Potential injuries or harm of any nature which may have occurred during transportation were not observed nor recorded. Therefore, it was unknown if the poor state of the MHCU on arrival at the NGOs was due to the care given at Life Esidimeni or a result of the transfer process.

According to the Health Ombud's report, the inhumane transfer of MHCUs was representative of 'inadequate planning', 'chaotic' execution, and 'poor data integrity' to make justifiable decisions, monitor and evaluate the transfer process (Makgoba, 2017, pg. 1; 34). The transfer process showed the GDoH 'total disregard of the MHCU human rights' (Makgoba, 2017, pg. 2).

According to the Health Ombud's report, the NGOs were not only poorly prepared, but also lacked suitable infrastructure, finance, capacity, and adequately trained staff to provide mental health care (Makgoba, 2017). Thus, there was a mismatch between the MHCU needs and the capacity of the staff within the NGOs. Failure to provide the care needed resulted in many of the failures that directly contributed to the MHCU deaths or poor health conditions. These causal factors are outlined below.

There were 8 causal factors identified from the NGOs. Most causal factors were related to the inadequate level of care. These causal factors were:

1. **Irregular monitoring of MHCU vitals;**

2. **Failure to provide care and omission of critical MHCU care steps;**
3. **MHCUs without medication;**
4. **Poor MHCU hygiene;**
5. **Dehydrated MHCUs;**
6. **MHCUs emaciated;**
7. **MHCU relapses; and**
8. **Viral infections.**

These 8 causal factors will be discussed in more detail below.

Irregular monitoring of vitals of MHCU, referred to the 'lack of regular vital data monitoring which included body temperature, heart rate, blood pressure, respiration rate and in some cases blood sugar of the diabetic MHCUs, which would have been useful in detecting or monitoring medical problems and the deterioration of the MHCUs (Makgoba, 2017, pg. 22).

Furthermore, the lack of care, lack of monitoring and shortage of basic resources such as food meant that the MHCU were without food and water which resulted in the following causal factors illustrated in the AcciMap, MHCUs emaciated, dehydrated MHCUs, and poor MHCU hygiene. These causal factors were highlighted in the Health Ombud's report, pg. 48).

MHCUs without medication, relates to the outcome of a lack of competence of the NGO staff to administer medication, the lack of medication stock, and a poor understanding of the diagnosis of the MHCU and therefore a poor understanding of what medication they needed. Poor monitoring and record keeping also contributed to a lack of administering medication (Makgoba, 2017).

According to the Health Ombud's report, the lack of monitoring MHCU, the lack of medication and poor living conditions resulted in MHCU relapses such as uncontrolled epileptic fits and the lack of infection control, which resulted in many MHCU contracting viral infections such as community acquired Pneumonia which was left untreated (Makgoba, 2017). The Health Ombud's report stated that uncontrolled epileptic fits and Pneumonia were recorded as the highest frequency of diagnosis made at the time

of death. Other diagnoses made was sepsis, stroke, renal failure, and cardiorespiratory failure (Makgoba, 2017, pg. 37). A table of these causal factors discussed above have been provided below on Table 4.4.

Table 4. 4: Explanation of the causal factors of Individual/Physical level

Causal Factors by Level Organisational Level	Interpretation
Lack of clinical fitness tests	Lack of evidence of clinical assessment within 24 hours
Inhumane transfer of MHCUs	Some MHCU were transported in frail conditions, subjected to long distances without food and water, and in inappropriate transportation vehicles (Makgoba, 2017)
Lack of recording MHCU conditions during transportation	Not recording MHCU conditions during transportation constitutes an omission. Risk conditions that MHCU were subjected to were not reported and patients' conditions were not monitored. Potential injuries or harm of any nature which may have occurred were not observed nor recorded (Makgoba, 2017).
Day-to-day activities at NGOs	
Irregular monitoring of vital MHCUs data	Which led to delays in identifying need for and seeking medical attention (Makgoba, 2017)
No MHCU care and omission of critical MHCUs care steps	The combination of incompetent NGO staff, a lack of MHCU health records, and inadequate number of staff resulted in a lack of MHCU care and omissions to carry out critical MHCUs care steps that are outlined in domain (Makgoba, 2017)
Poor MHCU hygiene	Some NGOs did not have running water, MHCU were not bathed regularly, their clothes were not changed and washed, there was no proper linen and a lack of infection control
MHCU without medication	Prescriptions are not filled immediately, and MHCUs could be without medication (up to 14 days waiting time).
Dehydrated MHCUs	MHCUs hydration was not monitored, and, in some cases, NGOs did not have a constant supply of water (Makgoba, 2017)
Emaciated MHCUs	Lack of financial capacity contributed to inability to procure nutritious food. Some NGOs did not have funds for enough food to feed all MHCU.
Viral infections	Community acquired Pneumonia was one of the most prominent causes of death (Makgoba, 2017)
MHCU relapses	Due to the lack of medication and monitoring uncontrolled epilepsy was regarded as a common cause of death

It can be concluded that there were multiple systemic factors that

influenced/contributed to the deaths of the MHCU. The systemic factors, displayed in the AcciMap, are inherent within and between the different levels of the public healthcare system.

The final chapter of this thesis is the discussion of the results with the AcciMap integrating all the systemic factors that influenced/ contributed to the outcome of the Life Esidimeni incident.

4.4. Conclusion

The results of the AcciMap indicated that there are several systemic causal factors that contributed to the outcomes of the Life Esidimeni incident. This indicated that the outcome of the Life Esidimeni incident was the result of multiple decisions, actions, and events that occurred in the different organisational levels of the system.

The causal factors identified from the AcciMap were categorized into 6 key themes.

The next chapter of this research, chapter 5, is the discussion of the results of the AcciMap. The discussion is framed using the key themes identified from the AcciMap. These key themes provide the basis for recommendations that are aimed at preventing future PS

CHAPTER 5: DISCUSSION

The purpose of this chapter is to discuss the results of the AcciMap analysis conducted on the previous page and based off these results, provide recommendations that aim to prevent the occurrence of future PSI.

5.1. Life Esidimeni AcciMap

The Health Ombud's report and the additional sources of information (see pg. 71-72) concerning the Life Esidimeni incident provided sufficient information to successfully develop the AcciMap (see pg. 79). From the AcciMap there were three main components that will be discussed. These components are: Firstly, the AcciMap depicted that the Life Esidimeni incident was a result of multiple systemic causal factors that occurred at the different levels of the public healthcare system. These systemic causal factors were individually highlighted in the AcciMap diagram and presented in Tables (see pg. 83-97). Secondly, the AcciMap enabled identification of the multiple stakeholders involved in the Life Esidimeni incident, providing insight to the different hierarchical levels of the healthcare system. And lastly, the AcciMap diagram highlighted the causal links/relationships between the identified systemic factors. The AcciMap proved to be a useful and effective tool for highlighting the systemic issues within the healthcare system. Highlighting the systemic issues in the system provided insight to where the system shortfalls are, making it possible to develop system specific solutions to prevent future PSI.

5.1.1. Integration: AcciMap and Rasmussen's SHR/DS Models

Rasmussen's SHR model and DSM was used and adapted to build a systemic understanding of the Life Esidimeni incident, reflecting the three main components extracted from the AcciMap, outlined above. This contrasts with the conventional approach of showing the separate perspectives provided by the SHR and DSM by having two, separate, models. The reason behind using these models is AcciMap is derived from and underpinned by the SHR (Branford, 2011). The different levels of the AcciMap reflect the different levels depicted in the SHR model as a means to model

the sociotechnical context of which the Life Esidimeni incident occurred in (see pg. 39). In this way patient safety depended not only on the activities of the frontline staff, but the activities of individuals at every level of the system and the interactions between these levels. The DSM on the other hand illustrates the dynamic nature of these levels and the instability of each level as they are constantly adapting to pressures placed on the system to keep the operating point of the system away from the 'boundary of performance failure' (Branford, 2011). Thus, the adaption of the DSM illustrates the dynamic nature of the healthcare system and how the different pressures created through systemic failures at each level of the system influenced the operating point of the system. The adaption of Rasmussen's SHR and DSM is provided below as Figure 5.1.

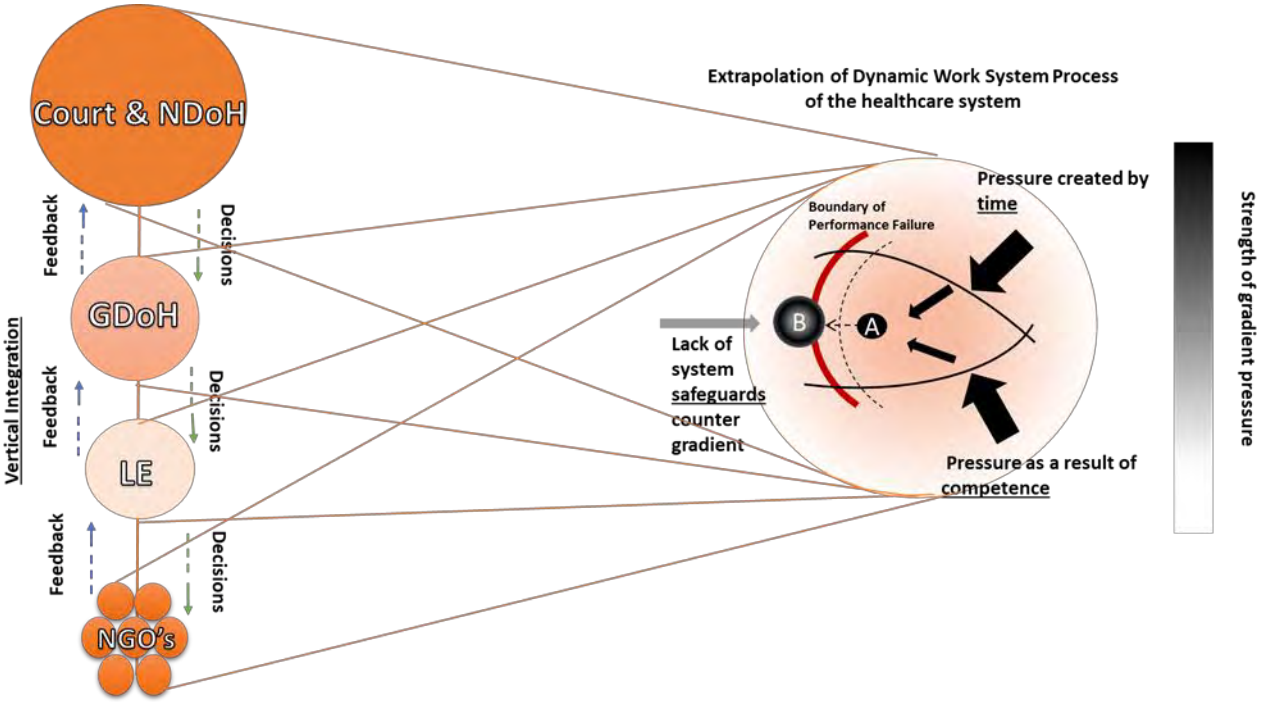


Figure 5 1 Adaption of Rasmussen's models to current AcciMap findings

The integration of these model has enabled the three main components derived from the AcciMap analysis to be clearly shown. These three components include: the multiple stake holders involved in the Life Esidimeni incident, depicted as different hierarchical levels of the South African public healthcare system, the pressures placed on the system as a result of multiple causal factors identified and depicted in the AcciMap (Figure 3.2), and how the causal links/relationships between the multiple causal factors influenced the safety of the system as a whole. An example of this would

be how the lack of system safeguards at every level of the system contributes to the increased risk of PSI. These models have been adapted to represent the context of the Life Esidimeni incident as Figure 4.1, which will be explained below.

Figure 5.1 begins on the left-hand side in the circle labelled “Court & National Department of Health (NDoH)”, from this circle down, the stakeholders involved in Life Esidimeni incident are displayed in hierarchical order. The levels, as well as associated characteristics, are described below:

1. **Top level**: represented by the Court (specifically concerning the law as it pertains to healthcare), and the National Department of Health (NDoH). The top level is characterised by institutions that hold the most influence over the public healthcare system. This invariably implies that the top level is occupied by national level institutions. Moreover, this level is responsible for upholding the law and setting public health policies;
2. **Top-middle level**: represented by the Gauteng Department of Health (GDoH). This level of the model is represented by institutions responsible for provincial level decisions and policies. These are also institutions charged with the actioning of Top-level directives;
3. **Bottom-middle level**: represented by Life Esidimeni, the mental healthcare institution that the MHCU formally resided in. This level was responsible for patient safety whilst MHCU were in their care as well as MHCU discharge (including all relevant documentation) during the time of the Life Esidimeni deinstitutionalisation process; **and**
4. **Bottom level**: represented by the 27 NGOs, as a collective, involved in the Life Esidimeni incident. This level reflects the institutions that were in effect operating on the ground and directly engaged and responsible for MHCU relocation from Life Esidimeni as well as the MHCU patient care and safety thereafter.

The literature review highlighted a generic version of the structural hierarchy of the South African healthcare system depicted as Figure 2.5. However Figure 5.1 represents the structural hierarchy of the South African healthcare system specific to the case at hand which is Life Esidimeni. However, Figure 5.1 does not stand alone it

acts in conjunction with Figure 2.6.

Each of these levels played a role in the public healthcare system within which the Life Esidimeni incident occurred. Furthermore, on the right-hand side of Figure 5.1, labelled as 'Extrapolation of the Dynamic Work System Processes of the healthcare system', represents the dynamic nature of the healthcare system. An adapted version of Rasmussen's DSM has been utilised to illustrate how the dynamic forces, labelled as the "pressures created by time" and "pressures as a result of competence" in Figure 5.1, influenced the operating point of the healthcare system, labelled as "A", to migrate past the "boundary of performance failure", resulting in the Life Esidimeni incident. These dynamic forces have been adapted to represent the dynamic forces specific to the Life Esidimeni incident, as opposed to the dynamic forces labelled as "workload' and 'economic' in the original DSM model (Rasmussen, 1997). These dynamic forces in Figure 5.1 are the result of the systemic causal factors contributed by each level presented in the AcciMap. These systemic causal factors have been categorised into 4 key themes that represent the most prevalent problem areas in the system. The classification of themes will be discussed in more detail below.

One of these 4 key themes was the lack of **system safeguards**. System safeguards are important for any system as they protect the system from drifting towards operation failure by acting as a counter gradient to the pressures placed on the system. This pushes the operating point of the system further away from the "boundary of performance failure". However in the case of Life Esidimeni there was a lack of system safeguards. As depicted in Figure 5.1, the lack of system safeguards, created a weak counter gradient (depicted as a light grey arrow in Figure 5.1), thus, the operating point of the healthcare system continued to drift towards the 'boundary of performance failure' (depicted as the migration from A to B in Figure 5.1), resulting in the outcome of the Life Esidimeni incident.

The classification of themes and what these themes are will be discussed in more detail below. These themes were created to prevent an overwhelming discussion of each individual causal factor due to the large number of causal factors identified. This step was recommended by Branford *et al.,* (2007) who recommended that if there were two or more causal factor relating to the same problem a recommendation to address

the problem area should be made rather than each individual causal factor.

Figure 5.1 is essential to contextualising the results of the AcciMap assessment. The system failures that resulted in the Life Esidimeni incident, as shown by the AcciMap assessment, are captured by four overarching themes that explain the dynamic characteristics that emerged from the healthcare system. These four themes were developed by categorising the identified causal factors that contributed to the Life Esidimeni incident into problem areas the causal factors fell into. These four themes were significant factors to the outcome of the incident. These 4 themes are presented below:

1. **Competence**: refers to the ability of institutions to perform their mandated functions. The use of the word competence in the context of this study is not intended to direct blame or label individual(s) or institutions as being incompetent. Rather competence is used to highlight the systemic factors that led to the incompetent decisions and actions attributed to individual(s) or institutions involved in the Life Esidimeni incident.
2. **Time pressures**: a key theme to the Life Esidimeni incident is that of time. Specifically, the ‘rushed’, ‘hurried’, and ‘short time frame’ that was provided for the deinstitutionalisation of Life Esidimeni (Makgoba, 2017, pg. 1). The theme of time pressure also includes the ramifications of an unrealistic time frame of deinstitutionalisation;
3. **Safeguards**: safeguards refer to safety barriers or nets put in place to protect the public healthcare system from poor decisions, actions, and unintentional violations at all levels of the system; **and**
4. **Vertical integration**: the lack of vertical integration refers to the lack of/ poor communication between and within the different levels of the system and the failure of the Life Esidimeni project leaders to listen and/or take advice.

Each of these thematic areas was critical to the PSI that manifested itself as the Life Esidimeni incident. Furthermore, these themes existed in varying ways, and to different degrees, within the levels shown in Figure 5.2. It is the four themes outlined above that form the basis of discussion moving forward.

5.1.2. Competent Decision-Making

Competence has been identified as a thematic characteristic that played a role in the outcome of the Life Esidimeni incident. The literature review outlined that a key mandate of the healthcare system (see pg. 79), and therefore the institutions engaged in the healthcare system, is the provision of sufficient patient safety. Rasmussen, (1997), highlighted the importance of understanding the various stakeholders within the hierarchy and the interactions between these various stakeholders (in terms of decisions made at various levels and feedback provided back up the hierarchy). For decisions from the upper levels of the system to be appropriate, feedback from the lower levels of the system is need (Rasmussen, 1997). Furthermore, if the decisions made or feedback is not appropriate it effects the whole system and not just the level in which the decisions were made. This phenomenon was seen in the Life Esidimeni incident whereby decisions made by the Court and the GDoH affected the NGOs level of competence to provide appropriate care to the MHCU.

This discussion will focus on the systemic factors that influenced the level of competence in each level of Figure 5.1, as it pertains to patient safety. The discussion begins with the top-level institutions to follow the order of the hierarchy in Figure 5.1

Competence: top-level institutions

The top-level institutions of the healthcare system consisted of the Court (law) and the National Department of Health (NDoH). Each of these were shown to have contributed to the outcomes of the Life Esidimeni incident. The focus will be on the role of the Court and the legal system. The role of the NDoH will be discussed further down. The Court represents the top-level level as they are an external stakeholder to the healthcare system and are the highest level of authority. Among other things, it is the Court's mandate to make sure that the South African constitution is upheld.

The South African constitution ensures that "every citizen is equally protected by law" and aims to "improve the quality of life of all citizens…" (Ferlito & Dhai, 2018, pg. 155). Furthermore, the Mental health care Act No. 17 of 2002 (MHCA) states that all humans

“have right to human dignity, the right to life and the right to healthcare” (Ferlito & Dhai, 2018, pg. 155).

The MHCA prohibits unfair discrimination against people with mental challenges and other disabilities. South Africa’s protection of human rights for MHCU is also encapsulated by international law that of which South Africa is a signatory (Ferlito & Dhai, 2018, pg.156). Thus, South Africa is legally bound to respect human rights instruments. Despite the international, and national legal provisions regarding human rights, Life Esidimeni MHCU were still violated from a human rights perspective (Ferlito & Dhai, 2018).

From a legal perspective on two occasions the Court dismissed applications to prevent MHCU from being transferred from Life Esidimeni to other establishments. On the second attempt the Court dismissed the application due to “a lack of urgency” (Ferlito & Dhai, 2018, pg. 156), despite the multiple concerns raised by professional associations and civil society organisations such as (SADAG, SAFMH, and SASOP) which are all prominent organisations within mental healthcare domain as well as family members. The rationale behind the Court’s ‘lack of urgency’ was not further deliberated on in the Health Ombuds report or in the literature (Makgoba, 2017; Ferlito & Dhai, 2018).

Thus, the Court’s decision to dismiss the Life Esidimeni incident as well as rule in favour of the GDoH seemed to lack competence by not paying due deliberation to the applications placed before them. This assumption is not labelling the Court as incompetent but rather questioning the competence of the decision to dismiss the Life Esidimeni case. Furthermore, despite the two legal applications to stay the transfer, the Court failed to instigate further investigation. It is the opinion of this work that these failings of the Court can be speculated as incompetent on the grounds of the Court mandate as stipulated in the constitution. However, it must be emphasised that this is an opinion, as the reports do not focus on how and why the Court made these decisions, thus only speculation of the reported actions can be made.

Furthermore, the lack of detail of the Court decision in the report is problematic because there needs to be an equal focus on both the sharp end and the blunt end of

the system. Focusing on the blunt end of the system holds equal importance as the sharp end to prevent future PSI from occurring. In the case of Life Esidimeni insight into the Court decisions would shed further light on the aptness of the Law. This is important to prevent the same occurrence from happening. Next time deinstitutionalisation happens the Court would then make the right decision for in the case of Life Esidimeni this was clearly the wrong decision.

The questionable competency of the legal decisions made is further exemplified by the lack of protection afforded to the most vulnerable members of the population. For this reason, the role of the Court in the Life Esidimeni incident should not be overlooked.

Competence: top-middle level institutions

The top-middle level institution is represented in Figure 5.1, as the GDoH. The AcciMap results clearly indicate that some of the decisions and actions made at this level were responsible for several of the critical failures that occurred at the lower levels of the system.

The decisions and actions made by the GDoH is reflected through the failure to meet the required mandates outlined in the policy before the process of deinstitutionalisation was able to commence. The failure to meet mandates effected the level of competence required to provide appropriate mental health care at the NGOs. The following mandates were directed at the top-middle level institutions:

1. **License and Regulation**: stipulating that Provincial Departments of Health will licence and regulate the provision of community-based mental health services by NGOs. This is in keeping with section 43 of the regulations of the MHCA;
2. **Staff provisions**: stipulating that all health staff working in general health settings will receive basic mental health training, and ongoing routine supervision and mentoring; **and**
3. **Provincial level budgeting**: stipulating that Provinces are to develop budget plans, in keeping with national policy (National Department of

Health, 2012).

The failure to meet these mandates, outlined above, exhibited by the GDoH will be discussed in the order of the Policy requirements outlined above.

Firstly, the failure of the GDoH to follow the correct NGO licencing procedures. The licencing procedure was described as “unlawful” in the official report due to:

1. Unauthorized officials signed documents without proper delegation;
2. NGOs were issued licences without being properly inspected for compliance;
3. The licences that were issued did not specify Service Licence Agreements; **and**
4. In some cases, NGO facilities were found to be operating without a licence (Makgoba, 2017).

The above points serve as an indication of the failure of the GDoH to execute its mandated function so far as the Life Esidimeni events are concerned. The AcciMap was able to show effectively how the causal factors led directly to NGOs operating with several key areas of concern including: Operating under an invalid licence and Service Level Agreement:

1. Working with inadequate number of staff;
2. Manned by untrained and unskilled staff;
3. Overallocation of MHCU to NGOs with insufficient capacity; **and**
4. Working with inappropriate infrastructure (Makgoba, 2017).

In addition to a lack of appropriate licensing and regulation, the GDoH failed to provide training for the NGO staff and any form of mentoring. This is evidently in direct contravention of the mandate assigned to the GDoH by Policy (refer to URL: http://www.safmh.org/wp-content/uploads/2020/09/National-Mental-Health-Policy-Framework-2013-2020.pdf). The direct effect of this failure was that NGOs operated without trained or competent staff which, as shown in the AcciMap, clearly played a role in the deaths of MHCU. This is a contravention of the staff provision mandates assigned to the top-middle institution.

Lastly, the GDoH failed to establish an appropriate budget plan. This is clearly reflected in the AcciMap results and evidently a failure to adhere to mandates. Table 5.1 provides an indication of the funds allocated by the GDoH to the MHCU at NGOs.

Table 5. 1: Average cost per day per MHCU by facility

Health/NGO care facility	MHCU placed (GDoH data)	Cost per day per MHCU	Cost per month (31 days) per MHCU
LE (2015/2015 budget costs)	R2 200.00	R320.00	R9 920.00
Weskoppies psychiatric hospital (2016 budget costs)	R140.00	R1 960.00	R60 760.00
Sterkfontein Psychiatric Hospital (2016 budget cost)	R77.00	R1 386.00	R42 996.00
Cullinan Care Rehabilitation Centre (2016 budget costs)	R140.00	R1 486.00	R46 066.00
NGOs (2016 government subsidy, approximate cost)	R1 039.00	**R112.00**	R3 472.00

Source: (Makgoba, 2017, pg. 35).

As indicated in Table 5.1, the average cost per day per MHCU by facility, indicated that NGOs received a subsidy of R3 413.00 per month per MHCU, which equated to approximately R112.00 per MHCU per day at Life Esidimeni. These funds were allocated for all living expenses and ‘quality’ mental healthcare services. When compared to the rate at which Life Esidimeni was being paid to provide the same services it was evident that it was R112.00 is R208.00 below the previous rate of R320.00. Furthermore, the budgeted allocation for the NGO related funds were regarded as below market related healthcare costs (Makgoba, 2017 pg. 27). This ascribed budget clearly indicates a lack of understanding with regards to current costs of living and/or a disregard of human right to dignity and quality care of MHCU. It is clear that such financial constraints are a vital component of any healthcare system and its effective functioning. In Rasmussen’s DSM, financial constraints have been shown to create a force gradient that pushes the operating point of the system towards the ‘boundary of performance failure’ or towards the ‘boundary of workload failure’

(Rasmussen, 1997). This migration of the system increases the risk of system failure such as an adverse event.

Furthermore, the GDoH paid subsidies 3-4 months late which had further ramifications for the NGOs. It was reported in the Health Ombud's report that some NGO managers had to borrow money on a personal basis to keep the NGOs functioning which led to them incurring debt. (Makgoba, 2017). The Health Ombud's report did not explicitly state the reasons as to why subsidies were paid late. However, it was assumed that there was a lack of financial planning and appropriate budget allocations.

This delay in payment together with insufficient subsidies directly affected the NGOs capacity to provide mental healthcare, leaving the NGOs financially constrained which resulted in:

1. Shortage of necessities (food, linen and running water) and medical resources;
2. Lack of payment to staff;
3. Shortage of staff; and
4. Recruited healthcare specialists (Doctor) 2-3 months post MHCU arrival.

The failure of the GDoH to meet the required policy mandates outlined above (see page). Resulted in the lower levels of the system failing to act in line with healthcare regulations and correct procedures, effecting the level of competence of care provided by the NGOs of which will be discussed below.

Competence: bottom-middle level institutions

The bottom-middle and bottom level of Figure 5.1 are represented by institutions that are at the sharp end of the healthcare system. The bottom-middle level is represented by the Life Esidimeni mental healthcare facility.

The Life Esidimeni mental healthcare facility was responsible for the well-being and safety of the MHCU during their internment. As a mental healthcare facility, Life Esidimeni has a burden of duty to provide a certain level of patient safety to the MHCU when institutionalised. Of particular importance to the Life Esidimeni incident is the

regulations pertaining to the transfer and/or discharge of patients. This process is regulated according to regulation 43 of the Mental Health Act 2002 (Department of Health, 2013-2020).

Before a patient can be transferred or discharged, they must be assessed, and a suitable environment found for transfer or discharge (Makgoba, 2017). However, it is apparent from the evidence that this process was not followed, or was disregarded, by Life Esidimeni in the Life Esidimeni incident. Of special note here is that the:

1. Majority of MHCU were found not fit for transfer, however, they were still discharged and subjected to travel (Makgoba, 2017);
2. Transfers were random, NGOs picked and chose, “like cattle at an auction” (Makgoba, 2017, pg. 34); **and**
3. Only MHCU profiles and treatment charts instead of medical records that included all MHCU details, diagnosis and treatment were received from Life Esidimeni (some were missing or incomplete). These profiles and treatment charts are only a portion of a MHCU’s portfolio and therefore NGOs were not appropriately and completely informed of the MHCUs and their mental health condition or treatment (Makgoba, 2017).

The above points indicate a breach in the mandated process that Life Esidimeni was warranted to follow. This breach had further ramifications for the NGOs. Firstly, MHCU that were not fit for transfer were transported to NGOs. This meant that some MHCU arrived in already frail and poor states. Secondly, transfers were random which meant that the NGOs were not informed or prepared for selected MHCU, and lastly, incomplete MHCU reports were sent to NGOs which meant that NGOs were not appropriately informed about the MHCU conditions or required treatment. The failure of Life Esidimeni to ensure the safety and fitness for transfer of MHCU before and during the departure from Life Esidimeni further implicated the NGOs capacity and competency to provide appropriate mental health care of which will be discussed next.

Competence: bottom level institutions

The AcciMap results clearly indicate that most of the NGOs involved in Life Esidimeni lacked competence in several areas. Many were newly established and lacked the

appropriate infrastructure, resources and trained personnel required to competently care for MHCUs. It is clear from the AcciMap that the systemic factors from the blunt end played a significant role in leading the lack of ability of the sharp end stakeholders to uphold their duty of care. The systemic failures highlighted above contributed to the poor level of competence of the NGOs to provide appropriate care.

According to the report, a clear indication of this poor level of competence was the inability of the NGO staff to interpret MHCU summaries sent from Life Esidimeni, this poor level of competence was presented in the AcciMap (Figure 3.2). A direct result of this was that NGO staff did not know:

1. The medical history or diagnosis of the MHCU;
2. The type of mental care the MHCU needed; **or**
3. What medication to administer to the MHCU (Makgoba, 2017).

These critical failures had further implications on the standard of/lack of care the MHCU received. This reduced standard of care is reflected in the following order from the AcciMap (Figure 4.2) results:

1. Irregular monitoring of MHCU vitals;
2. MHCU left without medication;
3. Dehydrated MHCU;
4. Emaciated MHCU;
5. MHCU relapses;
6. Poor MHCU hygiene; **and**
7. Spread of viral infections.

The above list reflects the domino effect that occurred as a result of the systemic causal factors contributed by the Courts, the GDoH and Life Esidimeni which had further implications on the level of competence of care provided by the NGOs. This domino effect resulted in a lowering of patient safety with each additional ‘domino’, critical fault, or gap that occurred. This ‘domino’ phenomenon emphasises that the different levels of the healthcare system do not work in isolation and that decisions made at the upper level of the system effect the actions of the lower levels of the

system. The cumulative impact of these critical faults or gaps being a litany of PSI that cumulatively represent the Life Esidimeni incident.

5.1.3. Time Pressures

The pressure of a short time frame, hurried, and rushed decisions played a pressing role in the Life Esidimeni incident. When reflecting on the theme of time pressure and the role it played in the Life Esidimeni incident, there was a degree of interplay between the institutional levels outlined in Figure 5.1. This interplay followed the same pattern as that previously identified, with the initial impetus starting at the top-level institutions and flowing down, through communication and pathway channels, to the bottom level institutions. The top-level institutional mandates created time pressure that would eventually lead to the Life Esidimeni incident.

A national mandate of deinstitutionalisation had been set by the NDoH, i.e., the top level. This process of deinstitutionalisation was, however, mandated to be a gradual and systematic process. The full concept of deinstitutionalisation was put forward in the National Mental Health Policy Framework and Strategic Plan, this was released in 2012 and set to run to 2020. The GDoH argued that the contract with Life Esidimeni needed to be terminated to conform to National Department policy of deinstitutionalising mental healthcare and make way to develop community-based services closer to the homes of MHCU (Makgoba, 2017).

The concept of deinstitutionalisation has been previously stated in the literature review (see pg. 57). The aim of this Policy was to improve mental health for all in South Africa by 2020. Through the provision of evidence-based, affordable, and effective promotion, prevention, treatment, and rehabilitation interventions the Policy of deinstitutionalisation aimed to empower local communities (Department of Health, 2013). This effort was most especially directed at MHCU and professional staff.

The Policy of deinstitutionalisation was one of two main reasons the GDoH cited for the termination of its contract with Life Esidimeni (Makgoba, 2017). Although it fulfilled the mandated task of deinstitutionalisation, the results of the AcciMap indicate that GDoH created unwarranted time pressure. The AcciMap reveals that this time

pressure contributed to the Life Esidimeni incident.

This time pressure was the result of a series of immediate and rushed actions aimed at deinstitutionalising the MHCU at Life Esidimeni. The policy of deinstitutionalisation specifically mandated that the process of deinstitutionalisation be gradual, systematic, and accompanied by the development of community facilities (Department of Health, 2013). Although no specific time frame was provided, the policy indicated a general operating period from 2013 to 2020. Thus, it can be assumed that the process was intended to take multiple years, at most eight.

However, rather than being a gradual process, the deinstitutionalisation of Life Esidimeni took place over a single year. Termination of the contract between the GDoH and Life Esidimeni was announced in October 2015. Within a year, by June 2016, all MHCU would have been transferred from Life Esidimeni to various community-based NGOs. The entire process of deinstitutionalisation was executed over a period of 9 months and the active process of MHCU was executed over a period of 3 months.

Given that 1 398 MHCU were residing at Life Esidimeni, this suggests either a remarkable feat in policy implementation and human logistics, or a poorly rushed execution of a well-intentioned policy. Some of the reflections are provided below from the various person(s) involved in the deinstitutionalisation process (Makgoba, 2017). These Reflections have been placed in hierarchical order complementing Figure 5.1, starting from the Top-level:

1. **Time Pressure Reflections: top-level institutions:**

“Haste approach.”; “No one believed in it and were concerned with the ‘approach.”- voices of NDoH Senior Staff (Makgoba, 2017, pg. 9); **and**

“Project ‘hurried’ and against the policy framework of gradual downscaling.” – voices of the GDoH Mental health directorate team (Makgoba, 2017, pg. 9).

2. **Time Pressure Reflections: top-middle level institutions:**

Many staff members felt powerless and having to implement and deliver the outcome of a project they ‘did not believe in’; an outcome they thought impossible to achieve and an outcome not do-able ‘within the short time frame’ given’.” – (Makgoba, 2017, pg. 29); and

"No one believed or bought into this 'rushed approach', this view matches the views of managers at Life Esidimeni." – voices of the GDoH Mental health directorate team (Makgoba, 2017, pg. 9).

3. **Time Pressure Reflections: bottom-middle level institutions:**
   Transfer 'too fast over a short period.'" – voices of the LE staff (Makgoba, 2017, pg. 8);
   "All 5 professional psychiatrist interrogated were not comfortable with the decision to 'rapidly close and transfer MHCUs to NGOs but 'had no choice'; all were promised MHCUs would 'be provided better facilities than LE'; this was also confirmed in Court papers; the decision to close was 'not negotiable' the GDoH made this clear."- voices of the LE staff (Makgoba, 2017, pg. 8); and
   "The transfer process was 'chaotic', no project plan was forthcoming from Dr Manamela."- voices of the LE staff (Makgoba, 2017, pg. 9).
4. **Time Pressure Reflections: Bottom level institutions:**
   "Inadequate preparations of the NGOs were done prior placement of users; words such as "hash-hash" and "rush" were used by some NGO directors." – (Makgoba, 2017, pg. 7).

The above reflections from each level of the system makes it clear that the timeline of deinstitutionalisation of Life Esidimeni was a critical contributor to the Life Esidimeni incident. The short timeframe meant that the process of deinstitutionalisation was rushed and poorly planned.

Furthermore, this led to decisions that were irrational and promoted shortcuts to major issues. This gave rise to many critical errors, which have been displayed in the AcciMap (Figure 4.2) as:

1. Poor enforcement of regulations, NCS and safety standards of NGO;
2. Irregular licensing process;
3. No piloting of MHCU NGO placement; **and**
4. False promises to train NGO staff

The time pressure created through the Policy of deinstitutionalisation was clearly

exacerbated by the lower-level institutions in the case of Life Esidimeni. It is clear that this process was pushed by the GDoH whilst the imperative was handed down by national government. The short time frame taken to execute deinstitutionalisation was a critical fault in and of itself as well as providing preconditions necessary for the development of other critical faults, gaps, and latent failures which would play out over the course of the deinstitutionalisation process. Time pressure resulted in the erosion of system safeguards by forcing these safeguards to be bypassed or ignored. Such instances are discussed below in the next section.

5.1.4. Safeguards

As discussed in the literature review, system safeguards, depicted in Reason's SCM as 'slices of cheese', are the defence layers of the system. Safeguards are an integral part to the patient safety within the system. Patient safety is often promoted through the development of patient safety culture and this culture is developed in part using safeguards (Nieva, 2003). Referring to Figure 5.1, a strong patient safety can be used as a counter measure against forces on the system that cause the operating point of the system to migrate towards the "boundary of performance failure".

The benefits of developing an appropriate patient safety culture includes improved patient satisfaction with healthcare services, improved professional satisfaction within the workspace, a reduction of both avoidable harm during care and mortality, as well as reduced litigation, and health care costs (World Health Organisation, 2017). It is for these reasons that patient safety culture is considered a system safeguard to prevent PSI. According to Sammer *et al.,* (2010), generating patient safety culture is the result of promoting patient safety sub-cultures (see pg. 25-30).

Thus, if there is a deficiency in any one of the sub-cultures, it negatively effects patient safety culture. These sub-cultures must be sufficiently present within the system to ensure that the overall system's patient safety quality is effectively maintained. Failure of any of the sub-cultures to be promoted sufficiently can provide the preconditions for a PSI or facilitate in the manifestation of a PSI.

The AcciMap results indicated that most of the patient safety sub-cultures were

deficient or not sufficiently present in the healthcare system at the time of the Life Esidimeni incident. An adapted version of Reason's SCM is presented as Figure 5.2 below. This model has been adapted to demonstrate how the deficiencies in patient safety culture failed to safeguard the system against the failures that manifested as the Life Esidimeni incident. Each 'slice of cheese' represents one of the seven sub-cultures of patient safety culture. The 'holes' in the cheese slices represents the deficiencies in each sub-culture of patient safety culture. Like Reasons SCM, when a critical alignment of several of these deficiencies in the sub-cultures of patient safety culture occurs, it results in the lowering of patient safety below a critical threshold and heightens the probability of PSI.

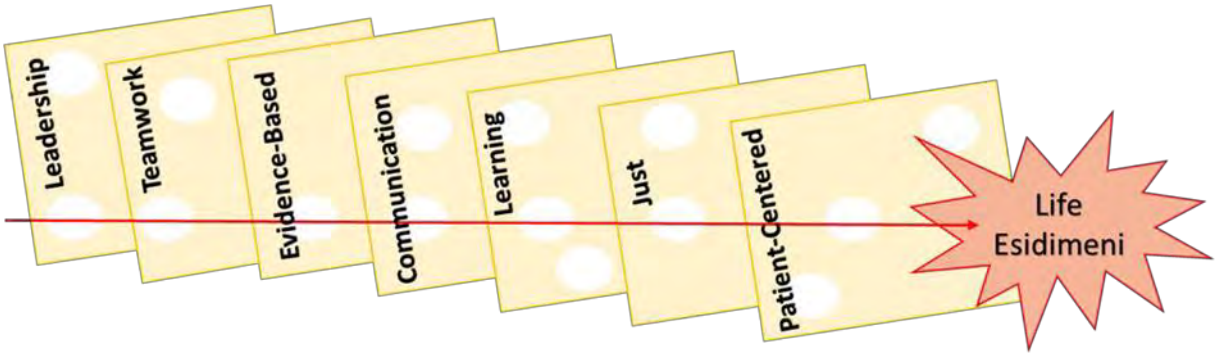


Figure 5 2: Adapted version of Reason's SCM

The deficiencies in each sub-culture and how these deficiencies resulted in the Life Esidimeni incident are discussed below.

Safeguards: Communication

Communication in the public healthcare system is regarded as the passing of information within and between levels of the public healthcare system. Communication is regarded as one of the most important patient safety sub-cultures (Sammer *et al.,* 2010). It is evident from the AcciMap, that there was a lack of communication between and within the different levels of the healthcare system that contributed to the outcome of the Life Esidimeni incident.

Furthermore, a major element of the SEIPS model was the importance of a 'feedback loop' which relies on communication to relay information to the work system, allowing appropriate adjustments to be made to keep the system functioning optimally. The

lack of ‘vertical integration’ and ‘feedback loops’ is a deficiency in patient safety culture and poses a threat to patient safety. This deficiency is evident in the reflections of the various professional staff engaged in the process of deinstitutionalisation. It is evident that feedback loops were either deficient or else ignored.

The lack of a sufficient sub-culture of communication between the levels of the system played a significant role in the Life Esidimeni incident. The sub-culture of communication is closely linked and indeed part of the theme of vertical integration. The failure of the system to incorporate feedback of evidence-based communication resulted in a non-robust system that could not self-correct.

Safeguard: Evidence-based approach

An evidence-based approach refers to patient care practice that is based on evidence. Healthcare organisations that demonstrate evidence-based best practices, including the use of standardised processes, protocols, checklists, and guidelines, are considered to exhibit this sub-culture of patient safety (Sammer *et al.,* 2010).

The National Mental Healthcare Policy provided guidelines and mandates to ensure evidence-based best practices were followed to implement the Policy of deinstitutionalisation. As mentioned throughout this discussion, the GDoH failed to fulfil and implement these mandates. Furthermore, failure of the GDoH to accommodate for evidence-based learning and, via a sub-culture of communication, engage in necessary project implementation corrections ensured that the Policy implementation could not be corrected for once started. The failure of the GDoH to follow an evidence- based approach put pressure on the other levels of the system as some of the decisions made were unrealistic and did not match the capabilities of the lower levels of the system or fit the context of which the decisions were being applied to such as the time frame of deinstitutionalisation or the budget allocation of R113.00 per MHCU per day. These decisions are decisions that are not evidence based which resulted in ramifications for the lower levels of the system, ultimately effecting the level of care provided to the MHCU and their living conditions. This is a prime example of the importance of applying a systems approach to PSI as one cannot ignore the causal links between decisions and actions of the system (Branford, 2011).

Such an approach is anti-evidence-based as it does not allow for the incorporation of sharp-end information into the original mandate and policy rollout. As such, the system is forced along a particular path of Policy implementation with no room for adjustment. This is not a resilient system and can result in conditions that create PSI. Furthermore, the failure to allow for an evidence-based approach created an unjust sub-culture as professional staff were placed in situations beyond their control in which the safety of patients was jeopardised and the just nature of the system called into question. The lack of implementation mandates by the GDoH was a key factor in the Life Esidimeni case.

Safeguard: Just culture

A just culture seeks to find a balance between a system of excessive punishment and one of blamelessness, i.e., no accountability (Daniels, 2020). Healthcare organisations and their employees should therefore be held accountable for their actions and decisions, however, monitoring of risks, system design, human behaviour and patient safety must be a factor in considering culpability (Daniels, 2020). Thus, a just culture is essential for effective patient safety and PSI management as it enables a balance between two ends of the justice spectrum. However evidence from the AcciMap and Health Ombuds reports suggests that the system lacked a just culture.

The lack of a just sub-culture was evident in the 'voices' section of the Health Ombud's report. Comments such as…

1. "Even some NGOs were fearful of someone above." (Makgoba, 2017, pg. 29);
2. "Members of the GDoH stated that they felt 'powerless' and felt that they could not exercise their fiduciary responsibility out of 'fear' and 'disempowerment'." (Makgoba, 27, pg. 28-29);
3. "Staff and many stakeholders felt 'not being listened to' and 'being left out' during the process; authority had spoken and 'ours not to reason why, ours but to do and die' (Makgoba, 2017, pg. 18); **and**
4. "The GDoH is gripped with 'fear and disempowerment' of its staff and 'mental health champions'; fearful to name seniors or to question authority" (Makgoba, 2017, pg. 29).

…were cited by stakeholders and staff. It is evident from these comments that there was a critical fault in the just sub-culture of the healthcare system. It is apparent that there was a fear of excessive punishment lauded over professional staff at various levels of the system. The implication of fear destroyed the willingness of the NGOs and GDoH staff to willingly speak up about how they felt and the patient safety issues concerning the deinstitutionalisation project as well as about the circumstances the NGOs were facing, which works against patient safety.

As depicted in Figure 5.1, this is problematic because the upper levels of the system rely on feedback from the lower levels of the system to make informed and appropriate decisions. In the case of Life Esidimeni some of the decisions made by the upper levels were not informed and thus not appropriate which ultimately effected the care provided at the sharp end of the system. According to Reason, (2000), a culture of fear is a non- effective way to manage or mitigate risk to patient safety.

Such a state of affairs indicates that a just sub-culture was not present at the institutional levels involved in the Life Esidimeni incident. Instead, a sub-culture of fear existed in both the ‘government’ and ‘organisational’ levels of the system (AcciMap). This culture of fear prevented the vertical integration of information which was fundamental to communication and evidence-based approaches previously discussed (Reason, 2000).

Safeguard: Leadership

Leadership refers to the individuals that held various positions of power and decision making within the public healthcare system (Stavrianopoulos, 2012). In an ideal setting, these leaders are expected to align structure, processes, and outputs from the blunt end to the sharp end (Stavrianopoulos, 2012). The culture of patient safety should begin with stakeholders and leaders from the top of the system and permeate throughout every level of the public healthcare system. Evidence of poor leadership decisions and actions, from the AcciMap diagram (Figure 3.2) and Health Ombud’s report, specifically at the ‘government level’ is presented below:

1. **Poor stakeholder decisions**: the stakeholders of the GDoH that were responsible for the Life Esidimeni project, made decisions to terminate the

contract with Life Esidimeni and transfer MHCU, against widespread professional, expert, and civil society warnings and advice (Makgoba, 2017);

2. **False promises**: stakeholders of the GDoH promised to provide training for staff working in the NGOs to provide appropriate mental healthcare (Makgoba, 2017). The provision of appropriate training was mandated in the mental healthcare policy (Department of Health, 2013). The GDoH did not deliver on these promises, and no training was provided (Makgoba, 2017);
3. **Irregular licencing process**: unauthorised officials of the GDoH signed licence documents without appropriate authority, NGOs were issued licences without being inspected for compliance and some NGOs were granted to operate with no licence (Makgoba, 2017). The lack of oversight and guidance by leaders in this regard directly contributed to the eventual Life Esidimeni incident; and
4. **Lack of unity**: aligning the structure, processes, and outcomes of a system is not simple and requires the unification of various institutions within the system. It is evident in the Life Esidimeni incident that there was a lack of unity among the top-level leaders and that this divide propagated a system of poor leadership.
5. **Management structures**: the NGOs also demonstrated insufficient leadership as they lacked good corporate governance and management structures to effectively execute on their functions, however, they were also silenced by the fear of speaking up (Makgoba, 2017).

The SHR emphasised how decisions made at the top of the system propagate down the system (Reason, 1997). These decisions in turn affect the decisions and actions at the sharp end of the system. Thus, the effect of poor leadership decisions has a ‘domino’ effect on the rest of the system. This is reflected in a stakeholders account which details, “The MEC is alleged by many to have said her ‘decision was final and non-negotiable, and the project had to be done’, she left no room for ‘engagement’.” (Makgoba, 2017, pg. 17).

Safeguard: Learning

A sub-culture of learning implies a system that seeks to learn both from mistakes and successes (Sammer *et al.,* 2010). However, for learning to occur there needs to be structures in place to facilitate learning, i.e., a sub-culture of learning must be adopted.

Such a cub-culture is often reflected in reporting systems and active response to this reporting (Daniels, 2020).

During the timeframe of Life Esidimeni, it was evident that there was a lack of structures to facilitate learning as well as active responses to reports. Examples include informal reports in the form of emails were frequently made, but these were not provided a response (Makgoba, 2017). A particularly concerning indication is that even when formalised communications were sent to the various institutions engaged in the process of deinstitutionalisation by healthcare professionals, this information was not incorporated into the project implementation (Makgoba, 2017). Furthermore, there were also no handovers between NGO staff during shift changes (Makgoba, 2017). Handovers of MHCU information is of great importance to continuity and safety of care (Poh *et al.,* 2013). If MHCU relevant information is not shared and in a timely manner it may lead to PSI, delay in treatment, inappropriate treatment, and omission of care (Poh *et al.,* 2013).

The SEIPS model highlight the importance of reporting structures in the form of feedback loops that feed important information from the processes and outcome of the system into the work system (Carayon *et al.,* 2020). These feedback loops represent learning, improvement, and adaption mechanisms (Carayon *et al.,* 2020). Thus reporting structures are an important aspect of patient safety. However, the lack of a learning sub-culture in the public healthcare system is reflected throughout the Life Esidimeni incident. This lack of learning is a further indication that an important sub-culture, patient-centred healthcare systems, was equally as absent.

Safeguard: Patient-centred

Patient centred care refers to healthcare that is centred around the patient and family (Stavrianopoulos, 2012). Such a sub-culture prioritises the patient and promotes health and well-being as a continuum of care (Holden & Carayon, 2021). The SEIPS 3.0 model, focused on the importance of the patient, recognising that understanding the complexity of the patient which includes their needs, preferences, economic and social context in which they live, language and communication barriers is as well as their journey through the public healthcare system. In the case of Life Esidimeni, these considerations would have been particularly important during the

planning phase of the transfer of MHCU from Life Esidimeni to NGOs to ensure the most appropriate fit.

The primary outcome of the healthcare system is the resolution of a patient's ailment (World Health Organisation, 2012). As such, a patient centred healthcare system is prioritised according to the outcome of the system. This implies that such a healthcare system starts "with the end in mind". Given this priority, the structure and processes of a patient safety centred healthcare system can be aligned with the outcome of the system as opposed to some other metric or focus (Carayon *et al.,* 2012). For these reasons, a patient centred healthcare system is better for patient safety than one with an alternate focus.

It was evident in the Life Esidimeni incident that the decision to deinstitutionalise Life Esidimeni, the transfer of MHCU from Life Esidimeni to the NGOs and the care provided at the NGOs, was not patient-centred or catered the needs of the MHCU. Instead, there were multiple human rights violations of the MHCU from the start of the incident.

The AcciMap revealed that the most evident examples of the lack of a patient centred approach were:

1. **Physical condition of MHCU**: the MHCU were found dehydrated, emaciated, and unwashed (Makgoba, 2017). Furthermore, they faced numerous viral infections and were irregularly monitored (Makgoba, 2017). The lack of attention paid to the MHCU in these instances, which were widespread, is a clear indication that the focus was not on MHCU, i.e., was not patient centred;
2. **Knowledge of MHCU**: NGOs were mostly unaware of the health history, mental diagnosis, or health needs of MHCU (Makgoba, 2017). Such a lack of awareness or regard for the patients in their care, both from the staff handing the MHCU you over and those receiving them, is a clear indication of a lack of patient centeredness; and
3. **Lack of medication**: the MHCU frequently went without medication (Makgoba, 2017). Given the nature of the ailments these patients faced, such as cerebral palsy, dementia, epilepsy, schizophrenia, and severe intellectual impairment,

medication is vital to the daily functioning of MHCU (Makgoba, 2017, pg. 27). Failure to ensure that appropriate and regular administration of medication occurred is indicative of a lack of patient centredness.

4. **Placement of MHCU**: there was no evidence that MHCU were selected according to the skills and experience of the NGO staff with respect to diagnostic categories and severity of disabilities (Makgoba, 2017). Such mismatch between NGO staff capabilities and MHCU needs played a role in the failure to provide appropriate care.

There was also a lack of family involvement during the planning and implementation process (Makgoba, 2017). The SEIPS 2.0 emphasises the need to consider the role of 'non-professionals' (i.e. family members and MHCU responsible for MHCU) during the design and implementation of solutions and guidelines as they possess vital information such as values, needs, preferences, economic and social context, language, and communication medium pertaining to the MHCU as well as to the family member involved (Carayon *et al.,* 2020). Taking this information into consideration during the planning process and implementation process would have provided a patient-centred approach. Furthermore, such a lack of planning is evidently counter intuitive to the principle that underlies deinstitutionalisation – i.e., to have communities and families play a larger role in the care of a MHCU (Department of Health, 2013).

Thus, it is evident that the lack of a patient centred system led to several events that lowered the patient safety of the public healthcare system. This lowered patient safety resulted in the death of patients which is the worst possible outcome in the healthcare system when it can be avoided. In the case of the Life Esidimeni incident, the deaths of MHCU could certainly have been averted had a patient centred approach been instituted. A patient centred approach requires input and collaboration across several groups. Such input and collaboration are better referred to as teamwork.

Safeguard: Teamwork

Teamwork within the public healthcare system refers to a spirit of collegiality, collaboration, and cooperation that exists among stakeholders, staff, independent practitioners, and non-professionals (Stavrianopoulos, 2012). Teamwork is an essential part of the public healthcare system. Many of the care processes depend on

collaboration between multiple professionals, and non-professionals (Holden *et al.,* 2013). This collaboration could be span different units or geographical spaces (Carayon *et al.,* 2021)

A large-scale project, such as deinstitutionalisation of Life Esidimeni, required collaboration between the GDoH, multiple organizations, families, and civil society etc. to ensure planning and implementation was followed appropriately. Furthermore, according to the National Mental Health Policy, it is mandated that Provincial Departments of health, e.g., GDoH, work closely with district health managers and a range of stakeholders are consulted during the planning and delivery of mental healthcare services (Department of Health, 2013).

However, it is evident from the AcciMap results that the necessary collaborations, meetings, and consultations did not take place. Given that teamwork is deemed to be "collegiality, collaboration, and cooperation" each of the levels of the healthcare system are reflected upon below and their level of teamwork judged by the presence or absence of such character (Stavrianopoulos, 2012):

1. **Teamwork: top-level institutions:**
    1.1 **NDoH**: attempted to engage with the GDoH and collaborate on an implementation plan for the process of deinstitutionalisation. The requested implementation plan was never received but efforts were made by the NDoH to engage in teamwork (Makgoba, 2017).
    1.2 **Court**: the Court failed to exhibit teamwork by failing to work closely with professional bodies, civil society experts (such as SADAG) and family members who voiced concerns over the Life Esidimeni case (Makgoba, 2017)
2. **Teamwork: top-middle level institutions:**
    2.1 GDoH: there are multiple examples of instances where the GDoH was engaged by different organisations to assist in the process of deinstitutionalisation (Makgoba, 2017, pg. 29). These efforts were not reciprocated by the GDoH. It is evident that the GDoH did not exhibit a spirit of teamwork.
3. **Teamwork: bottom-middle level institutions:**

3.1 **Life Esidimeni**: there was a need for collaboration between Life Esidimeni and the NGOs. Life Esidimeni held important information about each MHCU. This would have been beneficial to share with the NGOs to provide an appropriate care plan for the MHCU and ensure that the MHCU received the same continuation of care provided by Life Esidimeni. However, there was no collaboration between Life Esidimeni and the NGOs.

4. **Teamwork: bottom level institutions:**

4.1 **NGOs**: in turn, NGOs failed to reach out to Life Esidimeni, requesting additional MHCU information and guidance to provide appropriate care. Once the MHCU were transferred to the NGOs, it was the responsibility of the NGOs to provide appropriate care. Thus, the NGOs also played a role in not facilitating teamwork.

The structure and processes of the public healthcare system require teamwork to achieve the desired outcomes. Lack of this teamwork leads to PSI. Furthermore, this teamwork must occur within and between institutions. It is a sub-culture of safeguards that must be fostered and promoted. A strong patient safety culture safeguards the healthcare system by supporting patient safety practice, reducing the likelihood of PSI, and fostering a resilient system. A system that can adapt and produce good outcomes both when conditions are favourable and when they are not.

The results of the AcciMap analysis indicate that there is a deficiency of patient safety culture. Patient safety culture is considered a system safeguard. All sub-cultures that together create a culture of safety were shown to be deficient. Thus, a reduction of system safeguards. The reduction of system safeguards results in healthcare system that is more susceptible to PSI. In the case of Life Esidimeni, the lack of system safeguards failed to prevent the migration from A to B (boundary of performance failure) in Figure 4.1. Within safeguards several recommendations have been made to address each sub-culture of patient safety culture.

The safeguards in a system are heavily reliant on the communication that occurs within that system. A lack of communication can render safeguards obsolete. The concept of communication within the public healthcare system can be described by theme of

vertical integration.

5.1.5. Vertical Integration

Vertical integration refers to the communication and feedback pathways present within a system. These communication and feedback pathways run both between institutions and within them. Vertical integration ensures that the levels of the system are connected by a flow of information which facilitates the operation of the system (Rasmussen, 1997). These communication and feedback pathways are illustrated as arrows running up and down the structural hierarchy on the right-hand side of Figure 5.1. In Figure 5.1. Vertical integration is closely associated with the sub-culture of communication in the theme safeguards.

In the case of the deinstitutionalisation of Life Esidimeni, the project required collaboration between multiple levels of the system, including family members of the MHCU. To facilitate collaboration, it was pertinent that there was vertical integration. However, it was evident that this vertical integration was not forthcoming.

Vertical integration in the case of the Life Esidimeni incident can be referred to as either top-down or bottom-up. These two forms of vertical integration are based on the different direction of information flow within and between the institutions of the system. They are discussed separately below.

Vertical integration: top-down

The AcciMap revealed a lack of vertical integration in terms of top-down information flow. Vertical integration of a top-down nature refers to the communication from the ‘blunt end’ to the ‘sharp end’ of the system, i.e., from the GDoH to the NGOs, or within an institution, i.e., from a doctor to a nurse both of whom work at Life Esidimeni. This lack of vertical integration between the levels of the system is depicted in Figure 4.1 as broken feedback pathways (broken arrows) that run up and down the system levels.

Evidence for this lack of vertical integration is evident in several of the commentaries provided by the Health Ombud’s report:

1. The GDoH failed to respond to emails and concerns raised about

deinstitutionalisation and transfer of MHCU." (Makgoba, 2017, pg. 29);
2. "There was general lack of information provided to families"; (Makgoba, 2017, pg. 8)
3. "The process of LE closure and transfers unfolded in a 'chaotic manner and with little information provided to relatives', some relatives were not informed at all, others were informed at short notice"; (Makgoba, 2017, pg. 19) and
4. "It took 2-3 weeks to be informed of deaths despite 2 or 3 contact details being available in the files" (Makgoba, 2017, pg. 19).

There was not only a lack of communication from the top levels to the lower levels, e.g., with a lack of top-down information from the GDoH to the lower institutions in Figure 5.1. There was also a lack of top-down vertical integration within institutions, e.g., from the MEC of GDoH to the GDoH Mental Health Directorate team (Makgoba, 2017). The top-down approach of the GDoH has been made clear, in which it demonstrated a culture/process of commanding the lower-level stakeholders what to do without listening to feedback provided by these stakeholders.

Top-down communication is vital as it sets the direction and strategic focus of institutions within a system (Rasmussen, 1997). The lack of effective top-down communication was a critical fault in the mental healthcare system that resulted in the Life Esidimeni incident. Equally important is an information flow from bottom levels to top levels. Encouragement delicious

Vertical integration: bottom-up

In contrast to top-down communication and feedback pathways, bottom-up communication and feedback pathways run up a system. They run from the sharp end of a system to the blunt end. This bottom-up flow occurs both within and between institutions. It occurs from a lower institution to a higher institution, i.e., from the NGOs to Life Esidimeni to the GDoH. This bottom-up flow can also occur within an institution i.e., from a nurse to a doctor both of whom work at Life Esidimeni.

Bottom-up information flow is vital to the operation of a system (Rasmussen, 1997). valuable information is gained from the sharp end, for it is at the sharp end where critical care processes and direct interactions with patients occur. Given that these

critical processes and interactions often influence the outcome of the system it is imperative that information pertaining to these critical processes and interactions occurring at the sharp end is propagated up the system to the blunt end. Such information can then be incorporated by decision makers and leaders at the blunt end to ensure strategic alignment of the system with mandated outcomes.

Evidence for this lack of vertical integration is evident in several of the commentaries provided by the Health Ombud's report:

1. "Assistance, support, and advice offered by the South African Depression and Anxiety Group (SADAG) was not taken by the GDoH. SADAG is Africa's largest mental health support and advocacy group and help from this organization could have been beneficial." (Makgoba, 2017, pg 29);
2. "No project plan received despite several; email requests to the Director of Mental Health Dr Manamela" (Makgoba, 2017, pg. 9)
3. "The government executive officer 'would not listen' and 'left no room for engagement'." (Ujewe & Van Staden, 2021);
4. "They communicated their concerns in writing with dignity and respect; again, they were not 'listened to." (Makgoba, 2017, pg. 17); **and**
5. Within the GDoH "voices of reason and advice from the GDoH Mental Health Directorate (MHD) team were not listened to" (Makgoba, 2017, pg. 29).

The integration of various causal factors is clearly demonstrated at this point. The lack of a patient safety culture (i.e. appropriate safeguards) meant that the GDoH was both highly top-down in approach and unwilling to listen to feedback and concerns from the other stakeholders. Consequently, there was a lack of vertical integration within the system and key information pertaining to the health of patients at the NGOs never reached relevant stakeholders in the system and resulted in multiple deaths before something was done. From the AcciMap it is evident that the GDoH was the most notable offender in terms of disabling bottom-up communication. The unwillingness of the GDoH to engage or listen to those in the lower levels of the system demonstrates a lack of vertical integration bottoms-up.

To conclude, this discussion was directed at understanding what constituted the

patient safety quality of the public healthcare system through the AcciMap results. It is clear that there were multiple, complex interactions that resulted in the emergence of the Life Esidimeni PSI. The four main themes that were established in the AcciMap results were discussed accordingly to their constituent elements or according to the structure of the public healthcare system as provided by Figure 4.1. The discussion expanded on the themes, justified various conclusions shown by the AcciMap results, derived the importance of the theme or sub-culture of that theme to patient safety, and identified the critical faults and gaps in the public healthcare system, that of which are encapsulated in the themes and sub-cultures.

Based on the AcciMap, the key themes derived from the causal factors identified in the AcciMap, and on the models used to expand on the AcciMap (SHR, DSM, SWM, and SEIPS) recommendations were made. These recommendations are discussed below.

5.2. Recommendations

The purpose of providing recommendations is to provide remedial solutions that aid in the prevention of future PSI, thus improving the public healthcare system. However, developing recommendations in the context Life Esidimeni proved challenging. The AcciMap for the Life Esidimeni case illustrated the complexity of the case study, including numerous systemic failures relating to multiple stakeholders across various system levels. In such cases it is clear that there are likely to be no “quick fixes” but rather an approach that is focused on building a strong understanding of why these systemic barriers to patient safety exist within the South African public healthcare system needs to be undertaken. Therefore, the recommendations that follow are twofold in nature; firstly they attempt to tackling the Life Esidimeni case specifically and secondly try to provide recommendations for consideration within the South African healthcare system more generally.

Firstly, for the Life Esidimeni case study itself, the AcciMap of Life Esidimeni highlighted that there were multiple stakeholders involved. These stakeholders included the Judiciary (Court), the NDoH, the GDoH, Life Esidimeni and the NGOs who for various reasons failed in their duty of care. Furthermore there were multiple causal factors, and multiple causal links between these causal factors throughout the

levels of the system. It is clear from this that the LE case emerged out of a ‘messy reality’. Cook, (1988), argued that complex systems are by nature hazardous systems and therefore require multiple layers of protection against these hazards. In particular these defences should include both technical and human components but also various organisational institutional and regulatory defences (including but not limited to policies, procedures, certification, team training, etc). It is clear that a socio-technical systems approach would be a useful approach to employ in integrating these into defences into the South African public healthcare system.

In particular it is a recommendation of the current study that HFE specialists with knowledge of HFE systems tools be embedded within the South African healthcare system. For example the use of the various SEIPS models (1.0, 2.0 and 3.0) which emphasise that outcomes (performance) of a system are partially due to system processes would be a salient approach. SEIPS recognises the interactions between the various elements of the system (humans, tasks, tools, environment, and organisations) and how these through appropriate procedures lead to the outcomes of human well-being (in this case of patients and healthcare workers) and system performance (here of the healthcare system). Using such a model within the South African public healthcare system would help to ensure that there are better safeguards put in place to act as a counter gradient increasing the number of defences in place and reducing the risk of drifting to failure.

For example, within the healthcare work system, one of the components of the system, as depicted in the SEIPS model, is the organisation. The organisation is governed by policies and mandates of which they are expected to be followed, implemented, and adhered to. These policies are developed to provide a constant standard across all healthcare institutions to provide appropriate and safe healthcare. Of these mandates and policies the Reporting and Learning Policy and the Deinstitutionalisation Policy were two policies of interest in this study. For these policies to be implemented active processes and procedures need to be in place that supports the implementation of the policies and mandates and for an intended outcome of patient safety to occur. This should be seen as an urgent matter within the healthcare sector if future incidents like Life Esidimeni are to be avoided.

A key finding of the AcciMap analysis was the lack of a patient safety culture, which was broken down into 7 sub-cultures, across the system. The culture of a system is the emergence of deeply rooted behaviour within the system. HFE concepts and systematic tools have proven useful in identifying the systemic failures in the complex system of healthcare and how these causal factors interact with each other across the system. However, changing the culture of a system is not a small task and would likely require a multi-transdisciplinary approach. An HFE approach could form part of this approach but on its own cannot solve all the problems of the public healthcare system. An emphasis here should be placed on the implementation of participatory HFE approaches to cultural change within organisations.

Although the Health Ombud's report highlighted the causal factors, they don't interrogate why these causal factors came about or question the culture present. It was clear from the report and the AcciMap that the culture within the GDoH was a top-down one in which there was no feedback from other stakeholders within the system (or the feedback was simply ignored). Thus, the recommendation of this study is to further investigate why the culture of the GDoH is the way it is and if there is to be change in the culture how is this change effectively implemented in the GDoH. In particular a deeper understanding of local rationality (i.e. why the GDoH felt that their actions were merited at the time) is essential in unravelling further systemic factors within the GDoH itself beyond just those involved directly with the Life Esidimeni case study.

There is a need for recognition of the dynamic nature of safety as well as the implementation of a healthcare system that recognises that safety is an emergent property of a system. This sentiment is embodied in Richard Cook (1998):

"Safety is an emergent property of systems; it does not reside in a person, device or department of an organization or system. Safety cannot be purchased or manufactured; it is not a feature that is separate from the other components of the system. This means that safety cannot be manipulated like a feedstock or raw material. The state of safety in any system is always dynamic; continuous systemic change ensures that hazard and its management are constantly changing."

Acknowledgement of the dynamic nature of safety (and consequently hazards) is the need to take a Safety II approach rather than Safety I. Holnagel *et al.,* (2015), placed an emphasis on recognising that correct system performance is not the result of people's behaviour but rather the result of people is able to adjust their performance to match the varying conditions, limitations, and demands of work. However for this adjustment in performance to take place it is crucial that reporting and learning structures are in place to provide information to facilitate this adaption. In complex systems such as healthcare, these adjustments (dynamic systemic changes) are crucial to maintain acceptable patient safety. Furthermore, reporting and learning systems enables the healthcare system to adapt before PSI such as the Life Esidimeni incident occurs. In this way the healthcare system will be one that encourages proactive safety management rather than having to react when it is too late. Therefore it is recommended that the GDoH ensures uses such an approach to support the effective implementation of the reporting and learning system.

It hoped that these recommendations will provide a way forward for the prevention of future PSI and the overall performance of the public healthcare system in South Africa. These recommendations only play a small role in the pursuit of patient safety. There needs to be a focus on how to implement and sustain the recommendations provided as well as to create greater awareness of patient safety practice. Following the recommendations the limitations of the study faced will be outlined below.

5.3. Limitations

While this study provides recommendations aimed at preventing future PSI and improving patient safety in the South African public healthcare system, this study is also attuned to the limitations of this research.

The inclusion of limitations is an important part to any research as it highlights potential aspects that could limit the quality of the findings of the research as well as provides areas of improvement for future research. In the case of this study, the limitations faced were:

1. **Subjective bias**: identified as the main limitation of this study, the aspect of

subjectivity must be taken into consideration given the nature of the AcciMap method. Although steps to eliminate subjective bias were taken, there is still an element of subjectivity that must be acknowledged;

2. **Expertise**: The AcciMap method was self-taught by the researcher. An identified strength of the application of the AcciMap is the non-necessity of training or expert guidance. However, attending an AcciMap workshop or guidance from an AcciMap expert many have been beneficial. This was not permissible under the COVID-19 conditions and because of no experts in any immediate academic institutions;
3. **Data collection**: At the time of data collection, the Covid-19 pandemic made interviews or access to SME difficult. Thus, the main source of data used to support the construction of this AcciMap was the official Health Ombud's report of the Life Esidimeni incident. Thus, not having access to SME or interviews is considered a limitation of this study; and
4. **Single PSI**: one PSI case study was used to reflect PSIs in South Africa. It may have been beneficial to compare two or more PSI case studies to support the conclusions regarding the public healthcare system as it pertains to the mental aspect. However, given the circumstances surrounding Life Esidimeni, this is a permissible limitation.

Any research will face limitations. An aspect of research is the ability to know the limitations faced by a study and ensure that the interpretation of results, and subsequent recommendations are tempered with this understanding.

CHAPTER 6: FUTURE RESEARCH APPOINTMENTS

This study was the first attempt to apply an HFE systems-based approach to a South African PSI. The objectives of this study were to:

1. Systematically uncover the causal factors that led to the outcome of the of the Life Esidimeni incident;
2. Identify critical faults and gaps within the public healthcare system that led to the Life Esidimeni incident; **and**
3. Provide proactive recommendations for future prevention of PSI in the public healthcare system.

The first objective was achieved through the utilisation of AcciMap. The AcciMap allowed for the construction of an in-depth description of the public healthcare system, the multiple stakeholders involved, the multiple causal factors involved in the Life Esidimeni incident and the causal links/relationships between these causal factors. These causal factors reflected the critical faults and gaps within the broader South African public healthcare system which fulfilled the second objective. From these causal factors, 4 over-arching themes were identified namely: time pressure, competence, safeguards, and vertical integration that broadly categorized the causal factors into problem areas.

Having derived the causal factors and identified key categorical themes for those factors, the third objective was achieved, and recommendations could be made with regards to improving patient safety within South African public healthcare system. The provision of recommendations was aimed at addressing the critical faults and gaps in the South African public healthcare system. It is hoped these recommendations will assist in patient safety becoming a priority in the South African public healthcare system and, as a result, future PSI such as Life Esidimeni will be averted.

Thereafter, the conclusion discusses the relevance of a patient centred healthcare

system, the application of AcciMap to a PSI, and the lessons to be learnt from the Life Esidimeni incident. Final recommendations are provided and areas for further research are suggested. The thesis is then concluded.

6.1. HFE and the Public Healthcare System

The fundamental objective of HFE, as a discipline, is to improve human wellbeing and system performance. Similarly, the fundamental objective of a healthcare system is to promote better health and wellbeing in a sustainable way. Thus, it becomes evident that healthcare is a system designed to achieve positive outcomes for society whilst HFE is a discipline designed to facilitate a system in achieving its outcomes in the most optimal way while considering the well-being of the individuals involved in the system. In this manner, HFE serves as a supporting discipline to the healthcare system.

The marriage of HFE and the healthcare system is not novel idea. There have been multiple HFE models aimed at understanding and improving various fields of human endeavour. It is important to understand complex socio-technical systems in the modern era where the vast interplay of factors and system elements all contribute to the end outcome of a system.

HFE has been used to understand and improve the domain of healthcare. Application of HFE methods, such as AcciMap, provides the intellectual tool to gain said understanding. The models underlying various tools of HFE methods include Reason's SCM, Carayon's SEIPS models and Rasmussen's SHR model and DSM. Importantly is the systems approach that underpins these models and the theories they contain provide the intellectual backbone of this work.

The various iterations of these models that have been applied to the public healthcare system identified patient safety as the key quality of the healthcare system when seeking to improve the functioning of said system. The focus on patient safety by these models reflects the view that patient safety lies at the heart of mitigating PSI.

6.2. Patient Safety Focused Healthcare System

Patient safety is an emergent property of a system. This implies that it is a quality that

is derived as a result of the operation of a system. As such, it is the sum of the parts of a system and is influenced by multiple inputs that of which are present within the system. Patient safety is a core focus of improving the healthcare system as previous HFE systems-based methods have identified that it is this emergent property that has the most pertinent impact of the wellbeing and operation of the system.

The public healthcare system, when described from the viewpoint of the SHR, is a hierarchical system that has various levels of decision making. These levels inform one another and influence the interactions and outcomes of each other. Within the SPO model, there can be instances where various institutions across the system levels places strategic focus on a mislead outcome, such as speed of deinstitutionalisation, or on structure, such as the maintaining of status quo institutions or positions of power, or processes. A misaligned strategic focus by institutions has ramifications on that institution outcome as well as the subsequent institutions that are subordinate to it.

Thus, a patient safety focused public healthcare system is one that understands that safety is an emergent property of a system and thus efforts are driven towards creating a safer system. By applying the AcciMap methodology, multiple causal factors that contributed to the erosion of safety and a PSI, can be identified and efforts made to correct these

6.3. AcciMap Application to PSI

AcciMap is an HFE method that enables the mapping of causal factors that contributed to a PSI. This mapping is conducted on an institutional level basis and reflects the hierarchy involved in the end outcome as well as the timeline of events, causal factors, and the causality links between these various factors.

The AcciMap technique is beneficial for:

1. Organising and communicating information concerning the events and conditions contributing to a PSI;
2. Promoting a systemic view of PSI causation; **and**
3. Assisting researchers to shed light on problem areas within the system.

It is for these reasons an AcciMap was developed to model the findings from the Health Ombud's report of the Life Esidimeni incident. The AcciMap diagram illustrates the public healthcare socio-technical system deconstructed into levels. These levels included: external, government, organizational, and individual. The last level of the AcciMap represented the outcome(s) of the PSI.

To create the AcciMap, 9 steps developed by Branford *et al.,* (2009), were followed. These 9 steps were:

Step1: Create a blank AcciMap format on which to arrange the causes;
Step 2: Identify the outcome(s);
Step 3: Identify the causal factors;
Step 4: Identify the appropriate AcciMap level for each cause;
Step 5: Prepare the causes;
Step 6: Insert the causal links;
Step 7: Fill in the gaps;
Step 8: Check the causal logic; **and**
Step 9: Formulate safety recommendations.

The end results, being the AcciMap diagram, see Figure 3.2, indicated that several systemic causal factors from all levels of the system contributed to the deaths and neglect of multiple MHCU. Frome these causal factors, key themes were identified from the AcciMap application, to reflect the critical faults and gaps in the broader South African public healthcare system. Thus, to improve patient safety, these key themes need to be the focus of patient safety resolution.

6.4. Life Esidimeni: What to Learn?

The key themes identified from the causal factors presented in the AcciMap diagram highlighted 4 main areas of concern that jeopardise patient safety. These 4 main areas are:

1. Competence;
2. Time pressure;
3. Safeguards; **and**

4. Vertical integration.

The general precept and pertinent factors of these theme are briefly outlined below.

6.4.1. Competent Decision Making

The key theme competence highlighted the systemic causal factors that led to incompetent decisions and actions made by individual(s) and institutions involved in the Life Esidimeni incident. These systemic causal factors were reflected by the top levels of the system failing to meet the required mandates outlined in the National Mental Healthcare Act as well as stipulations in mental policy. This failure to meet required mandates had further competence ramifications for the lower levels of the system, particularly the NGOs, which was reflected by the lack of competence to provide appropriate mental healthcare across these institutions. Creating and compounding these issues of competence was the theme of time pressure.

A key finding of the current study was that the GDoH failed to meet its mandates for the safe transfer of MHCU from Life Esidimeni to the various NGOs. The Life Esidimeni report clearly highlights the multiple failures at this level of the system, which the AcciMap shows were causal factors that lead to numerous of the lower-level causal factors. The report does not include the details of why this was the case or investigate the systemic failures within the GDoH itself that lead to the incident. this is an important recommendation stemming from this study, the structure and state of the GDoH and the culture within the department needs to be investigated for us to allow for an in depth understanding of what is happening there and how the culture can be changed.

6.4.2. Time Pressures

The key theme time pressure reflected the ‘hurried’ and ‘chaotic’ nature in which the Life Esidimeni transfer project was carried out. This time pressure was the result of a series of immediate and rushed actions aimed at deinstitutionalising the MHCU at Life Esidimeni. The short timeframe meant that the process of deinstitutionalisation was rushed and poorly planned. This led to decisions that were irrational and promoted taking shortcuts which gave rise to many critical errors. Time pressure resulted in the erosion of system safeguards by forcing these safeguards to be bypassed or ignored.

6.4.3. Safeguards

A strong patient safety culture safeguards the healthcare system by supporting patient safety practice, reducing the likelihood of PSI, and fostering a resilient system. However, the key theme safeguards reflected the deficiencies in the sub-cultures of patient safety culture. These sub-cultures are communication, evidence-based, just culture, leadership, learning, teamwork, and patient centred.

The deficiencies in in these sub-cultures of patient safety result in the reduction of system resilience and increase the likelihood of the occurrence of PSI. An adapted version of Reason's SCM was used to illustrate how these deficiencies in patient safety culture resulted in the Life Esidimeni incident.

6.4.4. Vertical Integration

The key theme vertical integration was reflected by the lack of communication and feedback channels that run from the blunt end of the system to the sharp end of the system and vice versa. Vertical integration ensures that the levels of the system are connected by a flow of information which facilitates the operation of the system, thus vertical integration is an integral part of the system. The lack of vertical integration critical fault in the public healthcare system that resulted in the Life Esidimeni incident. These key themes provided the basis for recommendations of future prevention of PSI.

6.5. Further Research

This research has demonstrated the value of applying a HFE systems-based lens to healthcare to provide recommendations aimed at improving patient safety from a systems perspective. To further improve patient safety future research should be directed at:

1. **Embedding HFE within a South African context**: it may be beneficial for future research to develop educational material based on the key themes identified in the AcciMap. To create South African context specific PSI awareness.
2. **Implementation**: recommendations will only be proven beneficial, in the prevention of future PSI, if they are actively implemented. Thus, it is

recommended that future research should explore how to effectively implement these recommendations;

3. **Implementation power**: further research should look at the benefit of giving the Health Ombuds implementation power within reason. Currently, the Health Ombuds power is to a large extent recommendatory. Their recommendations are reported to the chief executive officer of the OHSC. The challenge with this procedure is that the Ombud's corrective powers are dependent on an external source which could be problematic if the recommendations are not prioritized or stalled by people in positions of power (Durojave & Agaba, 2018). In Australia for example the Health Ombud's has enforcement powers in certain cases. In doing so, these countries have strengthened the Ombudsman's accountability role by enabling them to enforce their remedies (Durojave & Agaba, 2018).
4. **Broader scope of AcciMap analysis**: context plays an important role in understanding and preventing PSI. Thus more AcciMap analysis should be conducted across
    a. Urban;
    b. Peri-urban; **and**
    c. Rural healthcare settings.
    d. This would create a more holistic picture of the status quo of South Africa's public healthcare system; **and**
5. **Explore alternative PSI prevention strategies**: it would be useful for future work to explore whether the findings identified in this research are similar to other healthcare systems in developing countries across the different continents and what PSI prevention strategies they have adopted.

This study has sought to apply an HFE systems-based approach to a PSI in the South African public healthcare system. The intention of this application being the derivation of the critical faults, gaps, latent failures, and preconditions present within the public healthcare system that enabled the PSI to occur. AcciMap was applied to the Life Esidimeni incident, which was used as representative of the public healthcare system. This enabled the identification of multiple causal factors that were categorised into four broad themes. These themes form the basis of the recommendations which are aimed at addressing the critical faults, gaps, latent failures, and preconditions as well as focusing the South African healthcare system on patient safety as a core strategic

focus. This study is a first step towards a better and more optimal public healthcare system in South Africa.

REFERENCES

Aceves-Gonzalez, C., Rodriguez, Y., Escobar-Galindo, C.M., Perez, E., Gutierrez Moreno, B., Hignett, S., & Lang, A.R. (2021). Frontiers in human factors: integrating human factors and ergonomics to improve safety and quality in Latin American healthcare systems. International Journal for Quality in Health Care, 33(1), 45-50.

Anfield, J. (2007). People and Error: "Human Factors" Principles in Safety Critical Industries. Organizational and Development Journal, 25(4), 39-47.

Baxter, G., & Sommerville, I. (2011). Socio-technical systems: From design methods to systems engineering. Interacting with computers, 23(1), 4-17.

Beleffi, E., Mosconi, P., & Sheridan, S. (2020). The patient journey. In L. Donaldson, W. Ricciardi, S. Sheridan, & R. Tartaglia (Eds), Textbook of Patient Safety and Clinical Risk (PP. 117-127). Cham: Springer.

Bonsu, J., van Dyk, W., Franzidis, J-P., Petersen, F., & Isafiade. (2016). A systems approach to mining safety: an application of the Swiss Cheese Model. Journal of the Southern African Institute of Mining and Metallurgy, 116(8), 776-784.

Boysen, P. G. (2013). Just Culture: A Foundation for Balanced Accountability and Patient Safety. The Ochsner Journal, 13(3), 400-406.

Branford, K. (2007). An investigation into the validity of the AcciMap approach. Unpublished doctoral dissertation, Australian National University, Canberra, Australia.

Branford, K. (2011). Seeing the Big Picture of Mishaps. Aviation Psychology and Aoplied Human Factors, 1(1), 31-37.

Branford, K., Naikar, N., & Hopkins, A. (2009). Guidelines for AcciMap analysis. In A, Hopkins (Eds), Learning for High Reliability Organisations (pp. 193-212). Sydney: CCH.

Carayon, P., Bass, E. J., Bellandi, T., Gurses, A. P., Hallbeck, M. S., & Mollo, V. (2011). Sociotechnical systems analysis in health care: a research agenda. IIE transactions on healthcare systems engineering, 1(3), 145-160.

Carayon, C., Hundt, A.S., Karsh, B.T., Gurses, A.P., Alvarado, C.J., Smith, M., & Brennan, P.F. (2006). Work system design for patient safety: the SEIPS model. BMJ Quality and Safety, 15(1), 50-58.

Carayon, C., & Wood, K. E. (2009). Engineering the System of Healthcare Delivery. Information Knoweledge Systems Management , 8(1-4), 23-46.

Carayon, P. (2006). Human Factors of complex sociotechnical systems. Applied Ergonomics, 37(4), 525-535.

Carayon, P. (2012). Emerging role of human factors and ergonomics in healthcare delivery – A new field of application and influence for the IEA. Work, 41(1), 5037- 5040.

Carayon, P., Wetterneck, T.B., Rivera-Rodriguez., Hundt, A.S., Hoonakker, P., Holden, R., &Gurses. (2014). Human factors systems approach to healthcare quality and patient safety. Applied Ergonomics, 45(1), 14-25.

Carayon, P., Wooldridge, A., Hoonakker, P., Hundt, A.S., & Kelly, M.M. (2020). SEIPS 3.0: Human-centered design of the patient journey for patient safety. Applied Ergonomics, 84, 1-23.

Carayon, P., Xie, A., & Kianfar, S. (2014). Human factors and ergonomics as a patient safety practice. BMJ quality & safety, 23(3), 196–205.

Carthey, J. (2013). Understanding safety in healthcare: the system evolution, erosion and enhancement model. Journal of public health research, 2(3), 144-149.

Cassano-Piche, A., Vicente, K. J., & Jamieson, G. A. (2006). A Sociotechnical Systems Analysis of the Bse Epidemic in the Uk Through Case Study. Proceedings of the Human Factors and Ergonomics Society, 50(3), 386-390.

Chaskalson, J. (2021). Life Esidimeni Inquest: A recap on its progress and what to expect. News24. URL: https://www.news24.com/health24/news/public-health/life-esidimeni-inquest-a-recap-on-its-progress-and-what-to-expect-20211007. Last accessed 08 February 2022.

Chen, L., Zhoa, Y., & Zhao, T. (2014). An AcciMap analysis on the China-Yongwen railway accident. In: P. W. Tse, J. Mathew, K. Wong (Eds). Engineering Asset Management - Systems, Professional Practices and Certification (pp. 1247-1253). Hong-Kong: Springer International Publishing.

Clegg, C.W. (2000). Sociotechnical principles for system design. Applied Ergonomics, 31(5), 463-77.

Coles, E., Anderson, J., Maxwell, M., Harris, F.M., Gray, N.M., Milner, G., & MacGilivray. (2020). The influence of contextual factors on healthcare quality improvement initiatives: a realist review. Systematic Reviews, 9(94), 1-10.

Collins, S. J., Newhouse, R., Porter, J., & Talsma, A. (2014). Effectiveness of the surgical safety checklist in correcting errors: a literature review applying Reason's Swiss cheese model. AORN journal, 100(1), 65-79.

Colombo, F., & Clark, H. E. (2020). Global Future Council on Health and Healthcare. URL: https://www.weforum.org/agenda/2020/10/how-to-build-a-better-health-system/ [Accessed 5 December 2021].

Cook, R. I. (1998). How complex systems fail. Cognitive Technologies Laboratory, University of Chicago. Chicago IL.

Cook, R., & Rasmussen, R. (2005). ‘‘Going solid’’: a model of system dynamics and consequences for patient safety. Quality Safety Health Care, 14(1), 130-134.

Conmy, A. (2018). South African health care system analysis. Public Health Review, 1(1), 1-8.

Daniels, R. C. (2020). Factors influencing safe patient care provided by professional nurses in a healthcare organisation in the Western Cape. Unpubliushed Master's thesis, Stellenbosch University, Cape Town, South Africa.

Dekker, S., Cilliers, P., & Hofmeyr, J-H. (2011). The complexity of failure: Implications of complexity theory. Safety Science, 49, 1-7.
Dekker, S. W. A. (2001). The re-invention of human error. Human Factors and aerospace safety, 1(3), 247-265.

Dhai, A. (2018). The Life Esidimeni tragedy: Moral pathology and an ethical crisis. South African Medical Journal, 108(5), 382-385.

Dul, J., Bruder, R., Buckle, P., Carayon, P., Falzon, P., Marras, W.S., Wilson, J., & van der Doelen, B. (2012). A strategy for human factors/ergonomics: developing the discipline and profession. Ergonomics, 55(4), 337-395.

Durojave, E., & Agaba, D. K. (2018). Contribution of the Health Ombud to Accountability: The Life Esidimeni Tragedy in South Africa. Health and Human Rights Journal, 20(2), 161-168.

Edozien, L., & Clements, R., (2006). An interview with Sir Liam Sonaldson. Journal of Safety Science and Risk Management , 12(3), 87-89.

Emergency Care Research Institute. (2019). Culture of safety: an overview. Health System Risk Management, 1-19.

Ferlito, B. A., & Dhai, A. (2018). The Life Esidimeni tragedy: The courts are also to

blame. South African Medical, 108(3), 155-156. Filho, A., Jun, G., & Waterson, P. (2019). Four studies, two methods, one accident- An AcciMap and STAMP for accident analysis. Safety Science, 113, 310-217.

Gelo, O., Braakmann, D., & Benetka, G. (2008). Quantitative and qualitative research: Beyond the debate. Integrative psychological and behavioral science, 42(3), 266-290.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. The qualitative report, 8(4), 597-607.

Goode, N., Shaw, L., Finch, C. F., & Salmon, P. M. (2019). Challenges of translating Rasmussen's Accimap into a usable, sustainable, and useful incident reporting system: end-user attitudes following 12-month implementation. Cognition, Technology & Work, 23, 39-49.

Gqaleni, T. M., & Bhengu, B. (2020). Analysis of Patient Safety Incident reporting system as an indicator of quality nursing in critical care units in KwaZulu-Natal, South Africa. Journal of Interdiciplinary Sciences, 25(1263), 1-8.

Hickey, J., & Van Eikema Hommes, Q. (2013). Effectiveness of accident models: System theoretic model vs. the Swiss Cheese model: A case study of a US Coast Guard aviation mishap. International Journal of Risk Assessment and Management, 17(1), 46-68.

Hignett, S., Carayon, P., Buckle, P., & Catchpole, K. (2013). State of science: human factors and ergonomics inhealthcare. Ergonomics, 56(10), 1491-1503.
Holden, R. J., & Carayon, P. (2021). SEIPS 101 and seven simple SEIPS tools. BMJ Quality and Safety, 30(11), 1-10.

Holden, R. J., Carayon, C., Gurses, A.P., Hoonakker, P., Hundt, A.S., Ozok, A.A., & Rivera-Rodriguez, A.J. (2013). SEIPS 2.0: a human factors framework for studying and improving the work of healthcare professionals and patients. Ergonomics, 56(11), 1669–1686.
Hollnagel, E. (2004). Barriers and Accident Prevention. Hampshire: Ashgate.

Hollnagel, E. (2012). FRAM: The Functional Resonance Analysis Method: Modelling Complex Socio-technical Systems (1st ed). London: CRS Press.

Hollywell, P. (2014). A systems approach to enhancing railway safety assurance. Melbourne, AusRAIL PLUS 2014, Doing it Smarter. People, Power, Performance, 24-26 November 2014, Melbourne, Vic, Australia.

Hopkins, A. (2003). Fault Trees, ICAM & Accimaps: A Methodological Analysis. Safety in Australia, 25(2), 12-23.

Hopper, H. (2021). Case study: The public health medical negligent claims conundrum. URL: https://www.lexisnexis.co.za/ data/assets/pdf_file/0011/898067/Public-Health-Medical-Negligence-Claims-Conundrum-V2.pdf. Last accessed 13 February 2022.

Hutchings, J. (2017). Systemic factors in the investigation of South African railway occurrences. Unpublished doctoral dissertation, University of Witwatersrand, Johannesberg, South Africa.

Igene, O. O. (2021). Development and assessment of the reliability and validity of a proposed Medi-Socio AcciMap Taxonomy approach for analysing IT-related incidents in healthcare. Unpublished doctoral dissertation, University of Glasgow, Scotland, United Kingdom.

International Ergonomics Association. (2003). What is Ergonomics?. URL: https://iea.cc/what-is-ergonomics/. Last accessed: 08 January 2022.

Ishwerwood, P., & Waterson, P. (2021). To err is system: a comparison of methodologies for the investigation of adverse outcomes in healthcare. Patient Safety and Risk Management, 26(2), 64-73.

Jiang, Y. (2016). An application of AcciMap to identify and analyse the causes of the Eastern Star and Sewol casualties. Unpublished Master thesis, University of World Maritime, Malmo, Sweden.

Kabagame, A. D. (2019). Life Esidimeni: Applying a Human Rights Lens. ESR Review, 20(3), 4-8.

Karimi, A., Abbasi, M., Zokaei, M., & Falahati, M. (2021). Development of leading indicators for the assessment of occupational health performance using Reason's Swiss cheese model. Journal of education and health promotion, 10(158), 1-9.

Karanikas, N., & Roelen, A. (2019). The concept towards a Standard Safety Model (STASAM v. 0). In MATEC Web of Conferences (Vol. 273, p. 02001). EDP Sciences Katuu, S. (2017). Health Information Systems, eHealth Strategy, and the Management of Health Records: The Quest to Transform South Africa's Public Health Sector. In: K. H. Moahi, K. J. Bwalya, & P. M. I. Sebina (Eds), Health Information Systems and the Advancement of Medical Practice in Developing Countries (pp. 237-261). Hershey: IGI Global.

Kilonzo, E. M., & Ikamari, L. (2015). Impact of affirmative action on quality of service delivery in the public service sector of Kenya: A comparative case study of the Ministry of State in the Office of the President and Ministry of Higher Education.
Journal of Education and Practice, 6(3), 113-125.

Larouzee, J., & Le Coze, J-C. (2020). Good and bad reasons: The Swiss cheese model and its critics. Safety Science, (126), 1-11.

Leveson, N. G. (2004). A new accident model for engineering safer systems. Safety, (42), 237-270.

Macrae, C. (2016). The problem with incident reporting. BMJ Quality Safety , 25(2), 71-75.

Mahajan, R. P. (2010). Critical Incident Reporting and Learning. British Journal of Anaesthesi, 105(1), 69-75.

Mahlathi, P., & Dlamini, J. (2015). Minimum data sets for human resources for health and the surgical workforce in South Africa's health system: a rapid analysis of stock and migration. African Institute of Health and Leadership Development.

Makgoba, M. W. (2017). The report into the 'circumstances' surrounding the deaths of mentally ill patients. Pretoria: Health Ombud Republic of South Africa.URL: https://www.sahrc.org.za/home/21/files/Esidimeni%20full%20report.pdf. Last Accessed: 13 Feburary 2022.

Maphanga, C. (2021). 8 Life Esidimeni patients still missing after 4 years, Gauteng legislature hears. News24. URL: https://www.news24.com/news24/southafrica/news/8-life-esidimeni-patients-still-missing-after-4-years-gauteng-legislature-hears-2020031. Last accessed: 08 February 2022

Maphumulo, W. T. & Bhengu, B. R. (2019). Challenges of quality improvement in the healthcare of South Africa post-apartheid: A critical review. Curationis, 42(1), 1-9.

Manyisa, Z.M., & van Aswegen. (2017). Factors affecting working conditions in public hospitals: A literature review. International Journal of Africa Nursing Sciences, 6, 28-38.

McDonald, T., Helmchen, L.A., Smith, K.M., Centomani, N., Gunderson, A., Mayer, D., & Chamberlin, W.H. (2010). Responding to patient safety incidents: The "seven pillars". Quality and Safety in Health Care, 19(6), 1-4.

Medvedev, G. (1991). The truth about Chernobyl. New York: Basic Books Inc.

Mgobozi, P., & Mahomed, O. H. (2021). Epidemiology of patient safety incidents in a long-term rehabilitative hospital in KwaZulu-Natal, South Africa (April 2011 to March 2016). Curations, 44(1), 1-6.

Mirra, L. (2020). If You Want to Hold the Errors, Hold the Swiss.URL: https://www.jems.com/commentary/if-you-want-to-hold-the-errors-hold-the-swiss/.

Last accessed: 08 January 2022.

Moseneke, J. D. (2017). In The Arbitration Between: - SAFLII. URL: http://www.saflii.org/images/LifeEsidimeniArbitrationAward.pdf [Accessed 08 12 2021].

Manyazewal, T. (2017). Using the World Health Organization health system building blocks through survey of healthcare professionals to determine the performance of public healthcare facilities. Archives of Public Health, 75(1), 1-8.

Naranjo, L. L. S., & Kaimal, V. P. (2011). Applying Donabedian's theory as a framework for bariatric surgery accreditation. Bariatric Nursing and Surgical Patient Care, 6(1), 33-37.

Nayak, R., & Waterson, P. (2016). 'When Food Kills': A socio-technical systems analysis of the UK Pennington 1996 and 2005 E. coli O157 Outbreak reports. Safety Science, 86(1), 36-47.

Nemeth, C. P., Cook, R., Patterson, E., Donchin, Y., Rogers, M., & Ebright, P. (2004). Afterwords: The Quality of Medical Accident Investigations and Analyses. Proceedings of the Human Factors and Ergonomics Society Annual Meeting., 48(17), 2084-2088.

Nieva, V. F., & Sorra, J. (2003). Safety culture assessment: a tool for improving patient safety in healthcare organizations. Quality Safety Health Care, 12(2), 17-23.

Nyasulu, J., & Pandya, H. (2020). The effects of coronavirus disease 2019 pandemic on the South African health system: A call to maintain essential health services. African journal of primary health care & family medicine, 12(1), 1–5.
Office of the Health Ombud. (2016). URL: https://healthombud.org.za/about-us/#who-we-are. Last accessed: 16 January 2022.

Ogrinc, G., Goodman, D., Davies, L., Baker, G. R., Barnsteiner, J., Foster, T. C., Gali, K., Hilden, J., Horwitz, L., Kaplan, H. C., Lies, J., Matulis, J. C., Michie, S., Miltner, J., Neily, J., Nelson, W. A., Niedner, M., Oliver, B., Rutman, L., Thompson, R., & Thor, J. (2016). Explanation and elaboration of the SQUIRE (Standards for Quality Improvement Reporting Excellence) Guidelines, V. 2.0: examples of SQUIRE elements in the healthcare improvement literature. BMJ quality & safety, 25(12), 986-992.

Oleribe, O. O., Momoh, J., Uzochukwu, B. S., Mbofana, F., Adebiyi, A., Barbera, T., Williams, R., & Taylor-Robinson, S. D. (2019). Identifying key challenges facing healthcare systems in Africa and potential solutions. International journal of general medicine, 12, 395-403.

Pasman, H. J., Fouchier, C., Park, S., Quddus, N., & Laboureur, D.(2020). Beirut ammonium nitrate explosion: Are not we really learninganything?. Process Safety Progress, 39(4), pp. 1-18.

Perneger, T. V. (2005). The Swiss cheese model of safety incidents: are there holes in the metaphor?. BMC Health Services Research, 5(71), 1-7.

Perry, S. J., Catchpole, K., Rivera, A. J., Parker, S.H., & Gosbee, J., (2021). 'Strangers in a strange land': Understanding professional challenges for human factors/ergonomics and healthcare. Applied Ergonomics, 94, 1-4.

Piper, D., Lea, J., Woods, C., & Parker, V. (2018). The impact of patient safety culture on handover in rural health facilities. BMC Health Services Research, 1-13.

Rasmussen, J. (1997). Risk Management in a Dynamic Society: A Modelling Problem. Safety Science, 27(2), 183-213.
Poh, C. L., Parasuram, R., & Kannusamy, P. (2013). Nursing inter-shift handover process in mental health settings: a best practice implementation
project. International Journal of Evidence-Based Healthcare, 11(1), 26-32.

Rasmussen, J., & Svedung, I. (2000). Proactive Risk Management. First ed. Karlstad: Swedish Rescue Services Agency.

Reason, J. (2016). Managing the risks of organizational accidents. Routledge Reason, J. (2000). Human error: models and management. BMJ Clinical Research, 320(7237), 768-770.

Reid, P. P., Compton, W. D., Grossman, J. H., & Fanjiang, G. A. (2005). A framework for a systems approach to health care delivery. Building a better delivery system: A new engineering/health care partnership. Washington, DC: National Academies Press.

Rodriguez, Y., & Hignett, S. (2021). Integration of human factors/ergonomics in healthcaresystems: A giant leap in safety as a key strategy duringCovid-19. Human Factors and Ergonomics in Manufacturing, 31(5), 570-576.

Rydenfalt, C., Ek, A., & Larsson, P. A. (2013). Safety checklist compliance and a false sense of safety:new directions for research. BMJ Quality Safety, Volume 23, 183-186.

Salmon, P. M., Cornelissen, M., & Trotter, M. (2012). Systems-based accident analysis methods: A comparison of Accimap, HFACS, and STAMP. Safety Science, 50(4), 1158-1170.

Salmon, P. M., Hulme, A., Walker, G. H., Waterson, P., Berber, E., & Stanton, N. A.

(2020). The big picture on accident causation: A review, synthesis, and meta- analysis of AcciMap studies. Safety science, 126, 1-14.

Salmon, P. M., Walker, H. H., & Stanton, N. A. (2015). Broken components versus broken systems: why it is systems not people that lose situation awareness. Cognition, Technology and Work, (17), 179-183.
Sammer, C. E., Lykens, K., Singh, K.P., Douglas, A.M., & Lacken, N.A. (2010). What is patient safety culture? A review of the literature. Journal of Nursing Scholarship, 42(2), 156-165.

Sampson, P., Back, J., & Drage, S. (2021). Systems-based models for investigating patient safety incidents. BJA Education, 21(8),307-313.

Seleka, N. (2021). Life Esidimeni: Gauteng govt continues search for 8 missing patients. News24. URL. https://www.news24.com/news24/southafrica/news/life-esidimeni-gauteng-govt-continues-search-for-8-missing-patients-20210824#:~:text=The%20painful%20Life%20Esidimeni%20saga,to%20haunt%20the%20provincial%20government. Last accessed: 08 February 2022.

Smith, A. F., & Plunkett, E. (2019). People, systems and safety: resilience and excellence in healthcare practice. Anaethesia , 508-517.

Stein, J. E., & Heiss, K. (2015). The Swiss cheese model of adverse event occurrence—closing the holes. In Seminars in paediatric surgery, 24(6), 278-282. Stavrianopoulos, T. (2012). The development of patient safety culture. Health Science Journal, 6(2), 201-211.

Thatcher, A., Nayak, R., & Waterson, P. (2020). Human factors and ergonomics systems-based tools for understanding and addressing global problems of the twenty-first century. Ergonomics, 63(3), 367-387.

Underwood, P., & Waterson, P. (2012). A critical review of the STAMP, FRAM and Accimap systemic accident analysis models. In: N. Stanton (Eds). Advances in Human Aspects of Road and Rail Transportation (pp. 1709-1718). Brooklyn: CRC Press.

Underwood, P., & Waterson, P. (2013). Systems thinking, the Swiss Cheese Model and accident analysis: A comparative systemic analysis of the Grayrigg train derailmentusing the ATSB, AcciMap and STAMP models. Accident Analysis and Prevention, (68), 75-94.

Ujewe, S., & Van Staden, W. (2021). Policy-Making Indabas to Prevent “Not Listening”: An Added Recommendation from the Life Esidimeni Tragedy.
In International Perspectives in Values-Based Mental Health Practice (pp. 257-262). Switzerland: Springer Publishers.

van den Heever, A. (2019). Country report: South Africa. In: W. Sauter, J. Boertjens, J. van Manen & M. Mikkers, (Eds). The Law and Policy of Healthcare Financing (pp. 413-433). Cheltenham: Edward Elgar.

Van Ryneveld, M., Schneider, H., & Lehmann, U. (2020). Looking back to look forward: a review of human resources for health governance in South Africa from 1994 to 2018. Human Resources for Health, 18(1), 1-10.

Vicente, K. J., & Christofferson, K. (2006). The Walkerton E. Coli outbreak: a test of Rasmussen's framework for risk management in a dynamic society. Ergonomics, 7(2), 93–112.

Waterson, P. (2009). A systems ergonomics analysis of the Maidstone and Tunbridge wells infection outbreaks. Journal of Ergonomics, 52(10),1196– 1205.

Waterson, P., Jenkins, D. P., Salmon, P.M., & Underwood, P. (2017). 'Remixing Rasmussen': The evolution of Accimaps within systemic accident analysis. Applied Ergonomics, (59), 483-503.

Werner, N. E., Rutkowski, R., Graske, A., Finta, M.K., Sellers, G.R., Seshadri, S., & Shah, M.N. (2020). Exploring SEIPS 2.0 as a model for analyzing care transitions across work systems. Applied Ergonomics, (88), 1-7.

Wheway, J., & Jun, G. T. (2021). Adopting system models for multiple incident analysis: Utility and usability. International Journal for Quality in Health Care, (33)4, mzab135.

Whittaker, G. A. (2021). Medical Malpractice in the South African Public Sector. Cape Town: Actuarial Society of South Africa.

Wiig, S., Aase, K., Billet, S., Canfield, C., Roise, O., Nja, O., Guise, V., Haraldseid-Driftland, C., Ree, E., Anderson, J.E., & Macrae, C. (2020). Defining the boundaries and operational concepts of resilience in the resilience in healthcare research program. BMC Health Services Research, 1-9.

Wilson, J. R. (2012). Fundamentals of systems ergonomics. Applied ergonomics, (41)1, 3861-3868.

Woo, D. M., & Vincente, K. J. (2003). Sociotechnical systems, risk management, and public health: comparing the North Battleford and Walkerton outbreaks. Reliability Engineering and System Safety, (80), 253-269.

Woods, D., Hollnagel, E., & Leveson, N. (2006). Resilience Engineering: Concepts and Precepts (1st ed). Hampshire: Ashgate Publishing Limited.

World Health Organisation. (2007). Everybody's business: strengthening health systems to improve health outcomes; WHO's framework for action, Geneva: World Health Organisation.

World Health Organization. (2010). Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva: World Health Organization.

World Health Organization. (2012). World Health Organization: Regional Office for Europe.URL: https://www.euro.who.int/en/health-topics/Health-systems/public-health-services/public-health-services. Last accessed 06 December 2021.

World Health Organization. (2017). Patient Safety: making healthcare safer. Geneva: World Health Organization.

World Health Organization. (2021). Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach. Geneva: World Health Organization.

Xie, A., & Carayon, P. (2015). A systematic review of human factors and ergonomics (HFE)-based healthcare system redesign. Ergonomics, (58)1, 33-49.

APPENDIXES

Appendix A: Life Esidimeni Incident: AcciMap Worksheet

Life Esidimeni incident – AcciMap worksheet

To ensure reliability and validity of this research and AcciMap Methodology it has been recommended by Branford, (2011), that the AcciMap process is independently executed by more than one person and the causal factors, outcome, and their positioning (which level they belong to) is independently identified and then reviewed and compared in a group setting until consensus is reached. This step is done to mitigate subjective bias during the AcciMap process as well as to identify irrelevant or missed causal factors.

This worksheet is based on the guidelines/steps outlined by Branford *et al.,* (2015, chap 10).

Step 2. Identify the outcome(s}: (1) from the accident data, identify the negative outcome(s) to be analysed; and (2) insert the outcome(s) into the "Outcomes" level of the AcciMap.

Step 3. Identify the causal factors: on a separate page, make a list of all causes in the accident data, that is, all factors for which you can say "had this been otherwise, the accident would (probably) not have occurred". If you are unsure as to whether a factor is a cause, include it in the list - it can always be eliminated at a later stage.

Step 4. Identify the appropriate AcciMap level for each cause: next to each cause, write down the name of the AcciMap level in which it belongs. Refer to Table 1 to determine the correct level. The first column in Table 1 defines the levels of an AcciMap and the second provides examples of the types of cause that may be found at each level.

Life Esidimeni incident summary

Between October 2015 and June 2016, 1,711 people were relocated from mental health facilities operated by long-term provider Life Esidimeni in the South African province of Gauteng to alternative facilities managed by multiple nongovernmental organizations (NGOs). The result of the change in providers, and the way the transfers were managed, became a tragic incident that culminated in the death of 144 mental health care patients and the exposure of 1,418 others to torture, trauma, and poor health outcomes. The incident began in October 2015, when the then member of the Executive Council for health in the populous Gauteng province, which includes Johannesburg and Pretoria, announced the termination of a 40-year contract between the Department of Health and Life Esidimeni for the provision of mental health services. The NGO facilities to which the patients were transferred were ill prepared and ill equipped for the influx of patients. The Incident drew further public attention in September 2016, when, responding to a question raised in Parliament, the member of the Executive Council for health said that about 36 former residents of Life Esidimeni had died under mysterious circumstances following their transfers. South Africa's minister of health then requested that the newly established Office of the Health Ombud investigate the circumstances surrounding the deaths of mentally ill patients and advise on the way forward. – (Durojaye & Agaba, 2018).

Please list the causal factors that contributed to the Life Esidimeni incident using the Health Ombud official report (attached to the email). Additional articles have been attached for further understanding. Next to each causal factor in a different colour, please write E (External), Or (Organizational), P (physical/individual events, processes, and conditions) or Out (outcome) – this will represent the level in which your causal factor falls into.

e.g.: causal factor: inadequate number of staff (Or)

Causal factor clarity

According to Branford *et al.,* (2015), a causal factor are factors that were necessary for the accident to occur. To prevent the list from expanding unnecessarily, boundaries

were set. These boundaries are defined as; causes are only included if they are of "practical significance" (that is, if something could conceivably be done about them) or if they are necessary for making sense of how and why the accident occurred (that is, if the sequence of events does not make sense without them) (Branford *et al.,* 2015) Level definitions and examples.

The EXTERNAL:

level includes causes that are beyond the control of the organisation(s). This level includes factors relating to:

GOVERNMENT, for example: • budgeting issues, government cost cutting • inadequate legislation • privatisation, outsourcing • inadequate provision of service REGULATORY BODIES, for example, inadequate: • regulations, communication of regulations • certification, permits • safety standards • enforcement of regulations • auditing

SOCIETY, for example: • market forces • societal values, priorities (such as the public's requirement for quality, efficiency, comfort, affordability) historical events • global politic

The ORGANISATIONAL:

level incorporates causes relating to organisational processes. Factors are placed in this level if they are within the control of the organisation(s) involved, for example: FINANCIAL ISSUES, for example: • organisational budgeting, cost cutting • resource allocation problems

EQUIPMENT AND DESIGN, for example: • design problems (such as ergonomic issues, inaccessibility) • equipment problems (such as poor quality, defective, ageing, untidy, missing or poorly maintained equipment or tools) • equipment not used as designed

DEFENCES, for example, inadequate, insufficient, or missing: • proactive system defences (such as alarms, warnings, barriers, personal protective equipment) • reactive system defences (such as hazard containment, protection, escape, and rescue systems)

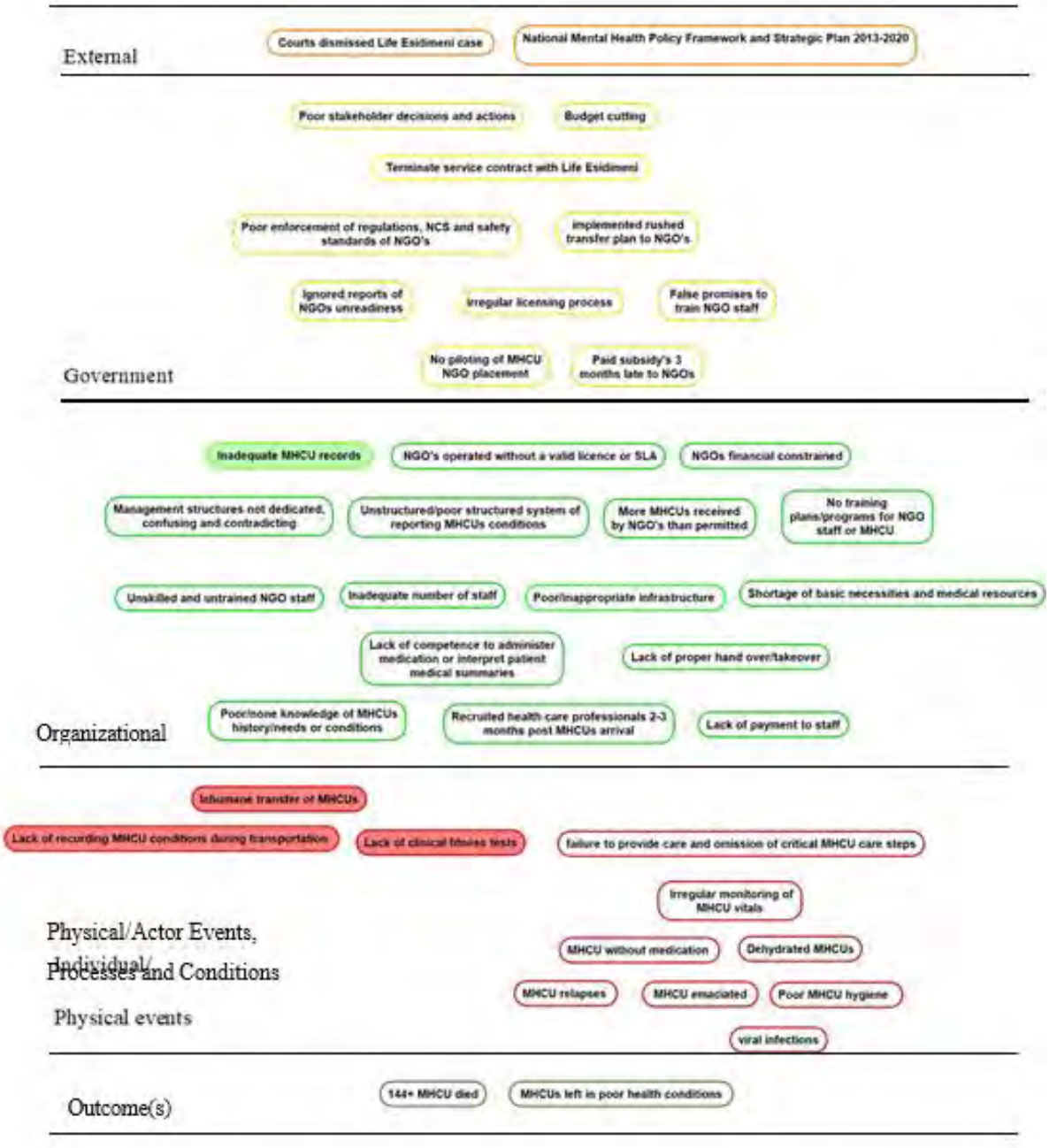
COMMUNICATION AND INFORMATION, for example, inadequate: • information or knowledge • flow or organisation of information • communication of instructions, hazards, priorities, objectives, etc
AUDITING AND RULE ENFORCEMENT, for example, inadequate: • implementation and enforcement of rules, regulations, or procedures • internal auditing, inspection

ORGANISATIONAL:
CULTURE, for example: • incompatible goals (between safety and production or safety and budget, etc) • organisational acceptance or encouragement of short cuts, non-compliance, etc
RISK MANAGEMENT, for example, inadequate: • hazard identification or risk assessment hazard or defects reporting processes for learning from past mistakes • awareness of risks • security (such as protection from unauthorised access)
MANUALS AND PROCEDURES, for example: • inadequate, ambiguous, conflicting, outdated, absent or difficult to follow procedures, rules, regulations, or manuals
HUMAN RESOURCES, for example, inadequate or insufficient: • supervision, management, coordination, staff numbers • delegation, accountability • staff selection procedures or criteria
TRAINING, for example. inadequate or insufficient: • training. training equipment, training exercises • training needs analysis

PHYSICAL/ACTOR EVENTS, PROCESSES AND CONDITIONS:
are the immediate precursors to the outcome(s) and should include factors relating to PHYSICAL EVENTS, PROCESSES AND CONDITIONS, for example: • physical sequence of events (including technical failures) • environmental conditions and factors relating to physical surroundings which are necessary for making sense of the sequence of events

ACTOR ACTIVITIES AND CONDITIONS, for example: • human errors, mistakes, violations, actions, activities, etc • false perceptions, misinterpretations, misunderstandings, Loss of situational awareness, etc • physical and mental status of actors (such as fatigue, ill health, inattention, unconsciousness, intoxication)

Appendix B: Second Version of AcciMap



Appendix C: Rough Work Recommendations

Stipulate a required legal minimum of time of which deinstitutionalisation may take place. Thus, the policy mandate must indicate that the process of deinstitutionalisation will not be permitted to take less than a stipulated period. This provides a 'floor' to the implementation of policy and ensures that rushed transfers cannot happen. This timeframe is best stipulated in accordance with the size of the institution being deinstitutionalised, i.e., X days per patient.

Safeguards	
Sub-culture of Patient Safety	Recommendation
Communication	The blunt end should model positive communication behaviour. A two-way communication dialog should be made a core part of workplace culture. NGO workers and health professionals should be encouraged to communicate. Communication should be incorporated into employee feedback and evaluations, and those who engage in good communications should be rewarded.
Evidence-based	To ensure evidence-based practice the SEIPS 3.0 and SEIPS 2.0 model should be incorporated into the deinstitutionalisation planning process. The SEIPS 2.0 and 3.0 focuses on the role of the patient, family member and the healthcare professional taking into consideration their capabilities and limitations to providing care so that the provision of care is appropriate.
Just	To empower employees at all levels of the system to proactively monitor the workplace and participate in patient safety efforts and to speak up if they see otherwise.
Leadership	Review leadership appointment criteria and ensure that these criteria are designed to appoint individuals with an appreciation of the sub-cultures of patient safety. Create leadership incentives to keep up to date with patient safety education that are aimed at upskilling leaders.
Patient-centred	Facilitate patient safety education and promote the sub-culture learning opportunities, e.g., to enhance the ~~Health~~ Ombuds educational role. This can be done by utilising the ~~Health~~ Ombuds reports for educational purposes and not only to solve individual claims. Summaries of the Health Ombuds PSI reports

Competence	
Institutional level	Recommendation
Top	To review the Court's decision to rule in favour of the GDoH from a legal perspective with the intention of ascertaining legal precedence for future legal challenges of a similar nature, i.e., healthcare related interdicts against deinstitutionalisation.
Top-middle	To increase oversight of mental healthcare policy mandates by an independent organization such as the ~~Health~~ Ombud. This oversight particularly directed at ensuring the mandates are being met and are actively being implemented.
Bottom-middle	To create a series of protocols for the process of deinstitutionalisation. Particularly aimed at the MHCU discharge and transfer phase of deinstitutionalisation. Tis must create specific criteria regarding the competence of NGOs to provide appropriate mental healthcare in an appropriate environment.
Bottom	NGOs should need to meet specific criteria regarding the capacity to provide appropriate mental healthcare in an appropriate environment prior to licencing and functioning as an NGO. An inspection should be done annually thereafter to ensure continuation of an appropriate standard of mental healthcare.
System recommendation: To implement workshops that must be attended by representatives of all institutions of the public healthcare system. These workshops should be aimed at explaining the functions of the mental healthcare policy mandates and how to achieve them. These workshops are to ensure a common understanding between the different system level organizations of the mental healthcare policy mandate.	

Time pressure
System recommendation: