

# Assumption-Based Leading Indicators to Monitor Healthcare System Drift Towards Failures

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## SUMMARY

This study explores how the assumption-based leading indicator approach can be applied to monitor organisational drift of healthcare systems towards failures based on the Mid Staffordshire NHS hospital failure case.

## KEYWORDS

Assumption, leading indicators, healthcare and practical drift

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## Introduction

Today, healthcare systems are becoming increasingly more complex due to highly interconnected elements including institutions, people, processes, and resources (Bashford, et., 2018). Adverse

events in healthcare are the fourteenth leading cause of the global disease burden (Slawomirski et al, 2017). These healthcare adverse events significantly represent the safety management of an organisation, values, attitudes, and behaviour patterns. Organisations tend to gradually erode without the organisation being aware of this drift, which is often an important precursor to organisational accidents. Leveson (2017) argues that most adverse incidents can be controlled and detected through risk monitoring systems such as leading indicator monitoring programs. Zwetsloot et al., (2020) found that proactive leading indicators are intended not only to better direct and control the safety, health, and wellbeing of the system, but also to support the development of prevention culture. Wormaes (2015) claimed that highly complex socio-technical systems like healthcare which are dominated by human actions and interaction, will require a new leading indicator framework. The concept of assumption-based leading indicators implies that a warning sign can be used in monitoring a process to detect when an assumption is broken or dangerously weak or when the validity of an assumption is changing (Leveson, 2014). Assumptions are defined as a ‘belief or feeling that something will happen, although there is no tested proof.’ Assumptions play an important role in developing a safety control structure and assigns responsibilities for the system. In order to avoid any system failures, it is important to make sure that the assumption-based plans are not vulnerable to violations or unplanned changes throughout the organisational operations. In addition, operational systems should always be monitored to ensure that the system is operated and maintained in a manner assumed by the designers. The aim of this study is to explore how the assumption-based leading indicator approach can be applied to healthcare system safety management.

## **Method**

We used the Mid Staffordshire NHS hospital failure case (Francis 2013 public inquiry report) which is an example of a large-scale healthcare system failure in the UK (400 and 1,200 patients died



because of poor care over the 50 months between Jan 2005 and March 2009). We created a hierarchical control structure model (STAMP-based) of the healthcare system relevant to the failure; STAMP explains that accidents are a result from inadequate enforcement of system safety constraints in design, development, and operations (Leveson et al., 2015). A documentary analysis of the Mid Staffordshire public inquiry report (executive summary) was conducted using NVivo software to identify incorrect assumptions that existed or became incorrect over time in terms of feedback and control actions. Furthermore, an ultimate question put forward was what assumption-based leading indicators can be put in place to monitor healthcare system drift towards failures.

## **Results and Conclusions**

Table 1 shows the results of the analysis. The findings show that various inadequate visible behaviours or actions of stakeholders at the multiple levels are based on broken or invalid assumptions about feedback they are receiving or control actions they assume that other actors might take. In general, actors naively believed that limited feedback they get are accurate indicators of what is going on or sometimes selectively accepted certain assuring feedback while ignoring more concerning feedback. It seems that various cognitive bias, e.g. belief bias, availability heuristics, confirmation bias, influenced the broken or invalid assumptions people made behind their inadequate behaviours and actions. The findings have important implications for developing assumption-based planning to ensure that the assumption-based plans are not vulnerable to violations or unplanned changes throughout the organisational operations (Leveson, 2014). The assumption-based planning can complement traditional risk/hazard assessment approaches by ensuring that the models and assumptions used during the initial decision making and planning were appropriate and support the organisation to be resilient towards vulnerable assumptions.

Table 1: Leading indicators and underlying assumptions – Mid Staffordshire NHS Failures

System levels	Leading indicators (behaviour/actions)	Broken or invalid assumptions behind leading indicators (Feedback/Control actions)
NHS regional oversight	Relaxation of safeguards & controls	<p><b>Feedback</b></p> <ul style="list-style-type: none"> <li>▪ Intelligence from others would be accurate</li> <li>▪ Adequate patient safety monitoring systems would be in place</li> <li>▪ Transfer of operational information would be clear/adequate</li> </ul> <p><b>Control action</b></p> <ul style="list-style-type: none"> <li>▪ Other actors would be proactive in managing high risks</li> </ul>
Health Board Trust	Too much emphasis on the Foundation Trust application	<p><b>Feedback</b></p> <ul style="list-style-type: none"> <li>▪ It would be okay to accept the reported false assurances, (e.g., relying on mortality ratios rather than the reported system violations)</li> </ul> <p><b>Control action</b></p> <ul style="list-style-type: none"> <li>▪ Releasing the financial pressure by becoming the Foundation Trust would be most important</li> </ul>
	Allocation of mismatched tasks to healthcare workers who were not adequately trained or qualified	<p><b>Control action</b></p> <ul style="list-style-type: none"> <li>▪ It would be okay not to plan for future uncertainties</li> <li>▪ Staff would be able to cope with unplanned changes, unintended goals, &amp; inadequate system designs</li> <li>▪ Reported complaints from patients, families, and community would be adequately addressed or resolved in a timely manner</li> </ul>
Divisional Management	Bullying care team members to keep their heads down	<p><b>Feedback</b></p> <ul style="list-style-type: none"> <li>▪ There would be continuously managed adequate risk planning &amp; monitoring framework in place</li> </ul> <p><b>Control action</b></p> <ul style="list-style-type: none"> <li>▪ Relying on past experiences while not accepting or being prepared for evolving system changes &amp; patient needs</li> </ul>



Hospital Care Team	Failed attempt to report patient safety concerns	<p><b>Feedback</b></p> <ul style="list-style-type: none"> <li>There would be accurate feedback channels of pertinent information during unplanned changes that would be timely, communicated, and transferred between all operational levels both internal &amp; external</li> </ul>
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