Chapter 7: High Reliability Organisations: Making Care Safer through Reliability and Resilience

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Chapter 7 High Reliability Organisations

Making care safer through reliability and resilience

Introduction

This chapter provides an overview of some of the key lessons from the theory of industrial High Reliability Organisations (HRO) that might be applied in healthcare in order to improve the safety of care delivered to patients. HROs have been described as organisations that manage to have few or no significant accidents even though they operate complex technology in highly hazardous environments, such as aircraft carriers and nuclear power plants [1].

Patient safety is an area of significant public concern. In the UK, there has been much media coverage of the findings of the Public Inquiry into the failings at Mid Staffordshire NHS Foundation Trust. The report suggests that between 2005 – 2009 as many as 1,200 patients died needlessly as a result of inadequate and often appalling standards of care [2]. Research undertaken in different countries and different health systems has provided ample evidence that patients around the world are suffering preventable adverse events [3-8]. Adverse events cause unnecessary suffering, and they also have significant financial implications resulting from additional bed days and extended care requirements of patients, as well as from increased insurance and litigation costs [3, 9].

In order to improve patient safety, and to reduce the number of adverse events, healthcare organisations have been encouraged to consider lessons about safety management practices in safety-critical industries [10, 11]. For example, commercial aviation is considered an ultra-safe industry, and there have been frequent attempts to transfer some of

the tools, methods and approaches from this industry to healthcare. Examples include the introduction of incident reporting systems [12] and the adoption of aviation-style checklists to manage safety-critical tasks, such as the WHO surgical safety checklist [13]. Learning from industry is a reasonable suggestion [14], but the successful transfer of lessons from industry to health care often proves to be challenging in practice [15, 16]. When transferring and applying lessons from industry to healthcare it is important to understand the underlying theory, the benefits and the limitations of tools and methods within their original industrial context [17].

The aim of this chapter is to provide a brief overview of the theory of HROs as developed in industrial contexts, and based on this, to identify some lessons that might be helpful in healthcare contexts to make the delivery of care both more reliable and safer. The next section describes the key characteristics of industrial HROs. The following three sections then discuss in turn lessons from the theory of HROs for enhancing the reliability of care, for making the delivery of care more resilient, and for organisational learning. A summary of the key points concludes the chapter.

Chapter Objectives

- Provide an overview of the theory High Reliability Organisations
- Introduce principles of risk analysis and risk control for enhancing reliability
- Highlight the importance of performance variability for enhancing resilience
- Discuss the role of organisational learning for sustaining progress with patient safety

Theory of High Reliability Organisations

The importance of studying what goes well

Traditionally, organisations and systems aim to learn from what goes wrong [18], for example by analysing aviation accidents or by investigating the accidental release of toxic

materials from chemical processing plants. The aim of learning from such extraordinary catastrophes is to prevent similar events from recurring [19]. In the 1980s a group of researchers at the University of California, Berkeley suggested that novel insights into safety management and improved safety performance might be developed by studying organisations that had successfully avoided disaster despite operating with complex technology in hazardous situations. The group studied in depth the safety management activities and safety behaviours of three types of organisations with an outstanding safety record – the US air traffic control system, a company operating a nuclear power plant and an electricity distribution system, and the US Navy's operation of aircraft carriers [20-22]. The basic premise of the resulting theory of HROs is that there are processes, systems and behaviours that can be put in place that enable organisations operating complex technology in hazardous conditions to prevent and recover from errors in order to maintain an exceptional safety record over long periods of time. In order to understand what these processes, systems and behaviours are, and how they can be sustained in practice, it is necessary to study not only how organisations fail, but also how they succeed to avert disaster on a daily basis, i.e. to study their ordinary, everyday performance [23, 24].

A model of HROs – mindful organising

The original empirical research did not set out explicitly to study HROs. This term was coined during the research, and there have been numerous definitions of what an HRO might look like. This has not been without controversy, and it has been suggested that it is actually not possible to identify objectively whether an organisation is, or is not, an HRO [25, 26]. Based on the HRO research, Carl Weick and colleagues developed a model of what they then referred to as "mindful organisation" [27]. This model describes a number of characteristics and behaviours that organisations should aspire to in order to manage safety. The model can be thought of as an ideal rather than as something concrete against which organisations can be measured [25]. The five organisational characteristics and behaviours

are [27]: (1) preoccupation with failures, (2) reluctance to simplify, (3) sensitivity to operations, (4) commitment to resilience, and (5) deference to expertise. These are discussed in turn below, and then put into a healthcare context in the subsequent sections.

Preoccupation with failure

A good past safety track record might lead to complacency, the diversion of resources for reasons of efficiency, and a reluctance to report and to acknowledge evidence that might call the good performance into question. HROs are preoccupied with failure because they seek out evidence of even small errors, and they treat these as potential precursors to larger failures and disaster. They encourage active reporting and speaking up by front line staff, and they ensure that as an organisation they have the capacity to listen and to act on such concerns. Often, these errors and early warning signs are, in fact, innocent and without further consequence, but staff are congratulated for reporting these rather than reprimanded for wasting time or causing unnecessary problems.

Reluctance to simplify

In order to manage an organisation in a complex environment one has to simplify and get on with things. However, simplification means discarding some information as noise in favour of other more salient aspects, and this bears the risk of discarding the wrong information. HROs breed a reluctance to simplify explanations by fostering a culture of diverse viewpoints and of constructive criticism. They avoid simplistic interpretations of failures such as labelling them human errors. HROs invest in diversity, and they create an infrastructure that provides resource to investigate and pursue potential problems proactively and more widely.

Sensitivity to operations

HROs are sensitive to operations by being attentive to the experience of front line staff. They recognise that in their complex operating environment, front line staff have to adapt to the situations on the ground. Managers in HROs encourage staff to report their concerns

and to speak up about any errors, safety problems or other potential sources of failure. HROs recognise that a culture of fear might disable the necessary flow of information, and prevent the organisation from functioning and adapting effectively.

Commitment to resilience

HROs are not error free, but they are able to deal with errors and contain their consequences before they can lead to actual failures. This is achieved through a commitment to resilience, which, in practice, requires investment in systems, processes, and people to provide redundancy and overlap in order to recover from errors. Critical infrastructure might be duplicated, alternative ways of achieving goals are planned and designed, and staff are trained to deal with failures and to improvise novel ways of working and workarounds to existing problems.

Deference to expertise

In time-critical situations, decisions are delegated to the people with the greatest level of relevant expertise, rather than to the member of staff with the highest level of formal authority. This enables HROs to act quickly in changing and challenging environments. HROs also cultivate a culture of listening to expertise, for example in situations that are not time-critical, but where technical experts might raise concerns. In these situations, staff can abort missions or escalate their concerns irrespective of their ranking in the organisational hierarchy.

Steps towards becoming an HRO

The model of mindful organising presented above sets out an ideal set of characteristics and behaviours to which organisations can aspire. It is unlikely, or even unrealistic, that an organisation can simply adopt these principles from one moment to another across all of its operations in a uniform manner. The more likely scenario is that organisations will have to

go through a journey towards becoming an HRO, and this journey might be faster in some areas, and slower and more cumbersome in other areas of an organisation [28]. Certain aspects might be more developed in one area, while other aspects are better implemented elsewhere.

The model of mindful organising is closely linked to issues of reliability and managing known risks on the one hand, and to resilience and adaptive capacity to deal with changes and surprises on the other hand. These two abilities – to control known risks and to adapt to changes – are underpinned by a third ability, which is the ability to continuously learn and evolve as an organisation.

Enhancing Reliability – Risk Analysis and Risk Control

The need for reliable care processes

There is plenty of evidence to suggest that care processes are generally not delivered reliably. In the area of medicines management and prescribing, studies have suggested that prescribing errors occur in 1.5-9.2% of hospital medication orders [29]. This wide range of figures is due to differences in settings, definitions and data collection methods. A median error rate of 7% was reported in an international systematic review of prescribing errors in hand-written medication orders for hospital inpatients [30]. A major study in the US found that patients received scientifically recommended care in only 55% of the cases [31]. However there were significant differences depending on the condition considered. For example, patients received 78.7% of recommended care for senile cataract where as only as little as 10.5% for alcohol dependence. This evidence suggests that there is large variation in the reliability of different care processes, and that, overall, care process have a significant failure rate that can be improved upon.

Identifying and controlling risks

In order to improve the reliability of processes organisations usually attempt to exert greater managerial control over how care is delivered [28]. This can often be in the form of simplification and standardisation of processes, for example through the use of process mapping [32], Lean methodologies [33, 34], and the introduction of care bundles [35].

Another frequently recommended approach is the use of a method called Failure Mode & Effects Analysis (FMEA) [36]. FMEA is a proactive, inductive, bottom-up approach for analysing processes in order to identify and to evaluate the main vulnerabilities and the potential for failures. Like process mapping, FMEA is carried out in a multi-disciplinary group setting in order to ensure that different perspectives are considered. FMEA often starts with a process map, and then asks a number of questions for each step in the process: (1) How could this process step fail? (2) What are potential causes for the failure? (3) What might be the consequences of the failure? (4) How likely is such a scenario? A risk priority number is then assigned to each failure based on the likelihood of occurrence and the severity of the consequences. In this way, the failures can be prioritised in terms of the risk they pose.

FMEA is a useful tool in order to understand key vulnerabilities of care processes, so that these can be addressed and controlled before small errors aggregate and cause larger failures or adverse events and patient harm. FMEA has been used in a number of different care settings including intravenous drug infusion [37], blood transfusion [38] and emergency care handover [39]. However, there has also been criticism of the approach in healthcare, suggesting that it was time consuming [40], demonstrated low reliability when used by different teams [41], and that the focus on single errors might not be adequate to capture the complexity of real failure scenarios in healthcare [42]. It is worth bearing these criticisms in mind, but arguably the benefit of adopting an approach such as FMEA comes from the proactive discussion around potential failure opportunities within a multi-disciplinary team in a systematic and structured fashion. Investing in such activities is a prerequisite for

enhancing the reliability of care processes to higher levels, and it is a key component of mindful organising.

Enhancing Resilience – Performance Variability

Reliability and safety

Improving the reliability of care processes by exerting greater managerial control over processes and behaviours is a useful start. However, in order to achieve higher levels of safety, and to aspire to the performance of ultra-safe industries such as commercial aviation, this is not enough. Reliability is not the same as safety, and being more reliable does not necessarily mean being safer. For example, once a patient's waiting time in the emergency department approaches the breach threshold, staff and managers might be tempted to revert to practices and shortcuts aimed at meeting the target (i.e. performing reliably), but which might pose additional risks to the patient's safety.

The reason why reliable performance does not by itself guarantee safe performance lies with the complexity of many modern systems, including healthcare [24]. Healthcare systems are characterised by changing demands and finite resources giving rise to competing organisational priorities, such as the management of patient flows and time-related performance targets [43]. Healthcare systems might be regarded more appropriately as Systems of Systems [44] or Complex Adaptive Systems [45]. For such systems, it is not possible to specify upfront every possible scenario and required form of response and behaviour.

In order to succeed, such systems require a certain degree of flexibility and adaptability to deal with changes, surprises, and the unknown. As a result, HROs need to do the opposite of the previous step – they need to be able to relinquish excessive managerial control and embrace performance variability. Successful organisations operating in complex

environments are those that are able to manage effectively this trade-off between managerial control through simplification, standardisation and anticipation of known risks on the one hand, and flexibility and adaptability through performance variability on the other hand [46].

Resilience

Recent literature in the area of Resilient Health Care provides many examples that the way everyday clinical work is unfolding – referred to as work-as-done (WAD) – is necessarily different from what those who design and manage health care systems assume – referred to as work-as-imagined (WAI) [47-49]. This is because healthcare professionals are able to make dynamic trade-offs and to adjust their performance in order to meet changing demands and deal with disturbances and surprises [18, 24, 43, 46, 50]. Empirical studies of everyday clinical work provide a diverse range of examples of such performance adjustments in practice [51-53].

One specific example comes from the study of handover in emergency care, where clinicians need to make many different trade-offs [39, 43]. For example, when ambulances are queuing at the emergency department, ambulance crews might hand over their patient to another crew waiting in line in order to save time. The second crew will then be less familiar with the patient when they eventually hand over the patient to the emergency department staff. Ambulance crews in this instance are trading the risk of not meeting clinical need in the community due to queuing with the risk of having a poor quality handover from a crew who are not familiar with the patient. The empirical work demonstrated that clinicians resolve such tensions dynamically, and sometimes in violation of the formal time-related performance target, based on the specifics of the situation and on their sense of “being worried” about the patient in their care [46, 52].

Such necessary performance adjustments contribute to organisational resilience [50] by adding the adaptive capacity that is required to operate successfully in complex environments. From a WAI perspective, on the other hand, performance variability is often regarded as detrimental deviations or violations [54]. The challenge for organisations is to manage this seeming contradiction mindfully.

Organisational Learning – Sustaining Progress

HROs are learning organisations

The principles of mindful organising suggest that, first and foremost, HROs are learning organisations [25]. Encouraging active reporting by staff, demonstrating a commitment to listen, and providing the necessary resource and infrastructure for acting on concerns underpin mindful organising.

Organisational learning can be characterised as a continuous cycle of action and reflection [55]. Organisations might be more successful at learning from past experience if they create and foster the capacity for deep reflection on whole system dynamics, which can lead to fundamental change [56]. On the other hand, insistence on past traditions, and quick fixes to existing strategies and procedures might inhibit more powerful forms of organisational learning. Organisations have a range of learning processes at their disposal, which might be internal (for example audits and adverse event reviews) as well as external (for example feedback from the regulator) [57].

Many organisations are relying on incident reporting systems as a key process for reporting and organisational learning [58-60]. Ideally, effective learning from incidents triggers improvements in practice that enhance safety and productivity [61]. The analysis of incidents seeks to reveal contributory factors and underlying causes [58], which can then be addressed in order to reduce the likelihood of incidents recurring. Learning from past

experiences does not have to be limited to the consideration of incidents, but can also include monitoring and analysis of leading indicators, or even weak signals [62]. However, there is increasing evidence in the literature that suggests that effective learning from past experiences in order to improve safety performance remains challenging even in traditional safety-critical industries [59, 61, 63].

The challenges of organisational learning in healthcare

Following the public inquiry into the failings at Mid Staffordshire NHS Foundation Trust, the subsequent Berwick report generated lessons and suggestions for change for the UK government and the National Health Service (NHS) in England [64]. The report recommends that the NHS should aim to become a system devoted to continuous learning and improvement of patient care. This is clearly a fundamental requirement for any healthcare organisation aspiring to improve the safety of care to higher levels.

Incident reporting as an instrument for organisational learning was introduced into the NHS about thirteen years ago, following a publication by the Department of Health [10]. This report recommended the development of a reporting system based on the model of incident reporting used in commercial aviation. Incident reporting is well established in the NHS, and it is regarded as a key instrument for improving patient safety and the quality of services [12, 65].

In one respect, incident reporting in the NHS has been very successful. There are a staggering number of incidents reported every year. However, despite the large number of potential learning opportunities, questions have been raised about the effectiveness of incident reporting systems to contribute to improvements in patient safety [19, 66-69]. There are now many studies that document barriers to effective incident reporting in health care. Such barriers include, for example, fear of blame and repercussions, poor usability of

incident reporting systems, perceptions among doctors that incident reporting is a nursing process, lack of feedback to staff who report incidents, and lack of visible improvements to the local work environment as a result of reported incidents [67, 68, 70-73]. Among management staff in particular, there continues to be widespread misperception that incident reporting systems might be useful for monitoring incident frequencies, despite evidence that suggests that incident reporting data are poor indicators of actual incident frequencies [74]. It has been suggested that the focus of learning from incidents in health care has been too much on collecting and categorising data [68, 75], whereas successful learning from experience should inherently be a social and participative process [61, 68].

Learning from the ordinary

How can health care organisations enhance their ability to learn from past experience in order to set them on the path towards becoming an HRO given the obstacles and practical difficulties with learning from incidents outlined above? One way might be to shift the focus from formal learning about extraordinary failures and incidents towards more de-centralised, local forms of learning about everyday clinical work [76].

An example of such a local form of learning is the Proactive Risk Monitoring in Healthcare (PRIMO) approach. This approach to organisational learning was developed in order to elicit a rich contextual picture of the local work environment, to move away from negative and threatening notions of errors and mistakes, and to encourage active participation and ownership with clear feedback for local work practices [72, 73]. The distinguishing feature of the PRIMO approach is that it focuses on learning from the ordinary, in this case the various hassles that practitioners experience in their everyday clinical work.

Hassle in this instance can be defined loosely as anything that causes people problems during their daily work. Examples of hassle include, for instance, unavailable equipment

such as drip stands on a ward or supporting equipment for undertaking radiographic procedures. There are a number of important benefits of learning from everyday hassle. Among these the most important benefit is arguably that the focus on hassle supports building an understanding of the system dynamics, i.e., of the way performance adjustments are made, and the way work ordinarily unfolds. Reports of hassle typically contain not only descriptions of how the hassle manifested itself, but also how people coped – how they adapted their behaviour in order to continue to provide safe and good quality care [46]. Examples of typical adaptations made by health care professionals include the sharing of information and personal negotiation to create a shared awareness, prioritisation of goals and of activities, and offering and seeking help.

Other local and informal processes that organisations might consider supporting include regular staff meetings aimed at identifying ways to improve the delivery of care, informal discussions between staff and their managers, and discussions among peers, and informal lunchtime improvement groups. Such processes are perceived as locally owned, and they might be better suited to provide shared awareness, to make staff feel that they are being listened to and that they can make a contribution to improving patient safety, and for generating ownership for improvement interventions [76].

Research suggests that where organisational effort is invested to support and include such processes, these can have a positive effect on staff engagement in reporting and learning activities [72] and on patient safety [77]. Utilising a range of processes that draw upon and strengthen different aspects of an organisation's culture might enable healthcare organisations to deliver more sustainable improvements in patient safety [78].

Conclusion

Some industries and organisations have a remarkable safety track record despite operating complex technology in hazardous environments. The study of how such organisations manage safe operations over long periods of time has given rise to the theory of HROs and a corresponding model of mindful organising. A mindful organisation is characterised by a strong commitment to reliability, resilience and organisational learning.

The path towards becoming an HRO is challenging, and the journey requires vision, leadership, and an organisational culture of safety and improvement. Experiences from industry suggest that even in ultra-safe organisations this remains a challenge and a daily struggle.

Healthcare systems, such as the NHS in England, have made progress with patient safety, but much more needs to be done to reassure patients that the care they receive is safe. The reliability of processes can be improved using a number of established process improvement and risk management tools. The importance of resilience and the positive contribution of performance variability are only now starting to become recognised in healthcare. This might lead to greater authority and responsibility being given to front line staff for improving services. Similarly, organisational learning has been recognised as a priority, but it has been managed centrally through formal structures, such as incident reporting systems, and with limited success. Healthcare organisations need to explore how they can provide support to less formal, locally owned mechanisms for organisational learning.

Organisations do not become HROs overnight. Improvement can start locally, in any area of an organisation. Key to this are always individuals, local champions, with a strong desire to improve the safety and quality of care delivered to patients.

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