Evidence scan:

High reliability organisations

November 2011

Contents

Health Foundation research scans provide information to help those involved in improving the quality of healthcare understand what research is available on particular topics.

Research scans provide a rapid collation of empirical research about a topic relevant to the Health Foundation's work. Although all of the evidence is sourced and compiled systematically, they are not systematic reviews and they have not been formally peer reviewed.

This research scan was prepared by The Evidence Centre on behalf of the Health Foundation

Key messages

High reliability organisations are organisations that work in situations that have the potential for large-scale risk and harm, but which manage to balance effectiveness, efficiency and safety. They also minimise errors through teamwork, awareness of potential risk and constant improvement.

Characteristics

This research scan collates empirical evidence about the characteristics of high reliability organisations and how these organisations develop within and outside healthcare.

Case studies and qualitative research suggests that the key characteristics of high reliability organisations include:

– complex high risk environments

– consequences of error would be serious

– collective mindfulness across organisation

– positive safety culture

– continuous improvement

– learning culture

– highly trained and well-rewarded staff

– creative ways to cope with errors

– regular checks

– redundancy of processes

– flexibility to deal with change.

Development process

While descriptive articles about the theory and characteristics of high reliability organisations are plentiful, less research has been published about how groups or institutions develop into high reliability organisations. There are some narrative accounts of development initiatives, but few rigorous studies track how organisations evolve in this way or the key ingredients needed to support such growth.

Healthcare

Much more research is available about the application of high reliability principles in healthcare. Studies have examined:

– creating team skills and mindfulness

– safety culture and climate

– safety briefings and checklists

– the impact of human factors

– crew resource management

– high performing teams.

Ongoing research

There appears to be a great deal of focus and ongoing research about the concept of high reliability organisations or reliability seeking organisations. In the USA there are annual conferences about this topic and government departments have set up networking sites and learning collaboratives to share lessons learned in this field.

Studies are underway in healthcare regarding practical ways to enhance some of the characteristics of high reliability organisations such as mindfulness development, team training, crew resource management, safety briefings and human factors concepts. In the UK, research and development programmes are testing some of these concepts without necessarily using the term 'high reliability organisations'. No large ongoing research programmes were identified in the UK.

1   Scope

1.1 Purpose

This research scan summarises readily available studies about high reliability organisations in healthcare and other sectors. High reliability organisations are those which consistently or reliably seek to balance both safety and effectiveness, while operating in high risk contexts.

This is an excerpt from a 'quick research scan', which means that the material is not synthesised in any depth. The full quick scan contains copyright material for use only by internal members of the Health Foundation team. This excerpt contains descriptive text extracted from a longer document.

1.2 Approach

The main focus of the research scan is 'What research is available about the characteristics of high reliability organisations (HRO) and how do these organisations develop in healthcare and other industries?'

This was broken down into the following topic areas of interest:

–   How have HROs been defined and are these well recognised and agreed across the field/ literature?

–   What is the link between HROs and safety culture?

–   How did these organisations become HROs and what were their development journeys and key drivers?

–   Are there any studies of healthcare HROs?

–   Are there any studies of the relevance and application of these principles/characteristics in healthcare organisations?

–   What lessons can be learned for healthcare?

–   What are the practical considerations for leaders in healthcare?

The aim was not to answer each of these questions, but rather to collate studies which may have some relevance to these topic areas for review by the Health Foundation team.

The scan does not summarise all research on these topics, but rather rapidly collates information to provide a flavour of the range of material available.

To collate material, one reviewer searched 27 bibliographic databases, reference lists of identified articles and reviews and the websites of relevant agencies for information available in August 2011.

The databases included Cochrane Library, DARE, ERIC, Embase, Academic Publications eJournal, AGRIS, Analytical Sciences Digital Library, Directory of Open Access Journals, Google Scholar, Information Bridge, Infotopia, IngentaConnect, InTechOpen, Mendeley, OAJSE, OpenGrey, Pubmed, SafetyLit, Science.gov, ScienceDirect, Scopus, Scirus, Social Science Research Network, SpringerLink, Web of Knowledge, Wiley Online Library and WorldWideScience.

News archives such as the following were also searched: A-Znewsfile, Alternative Press Center, CNN Search, Drudge Report, ELibrary Research, Ithaki News Metasearch, Magazines.com, MagPortal.com, News Directory, Newspapers.com, Google news archive, PenguinRadio, Reuters, Search Washington Post and AP and Total News.

Thirty universities, foundations, UK health departments and research groups were asked about ongoing studies.

All databases were searched from 1990 until early August 2011 using combinations of search terms such as high reliability organisations (s and z spelling used), reliability seeking organisation, safety culture, high performing teams, high performance team, human factors, crew resource management, high reliability theory, mindfulness, mindful organising and similes.

To be eligible for inclusion, studies had to:

– be primary research or reviews

– be readily available online, in print or from relevant organisations

– be available in abstract, journal article, or full report form

– be relevant to one or more of the core questions outlined above

– be available in the English language or with a translated abstract.

We scanned more than 25,000 pieces of potentially relevant research, but most articles did not meet the inclusion criteria. There is a great deal of theoretical, narrative and descriptive material available, but most is not empirical research. 135 abstracts of empirical material were included in the full scan. Most involve case studies, reviews of selected literature or small observational studies.

Both published and unpublished research was eligible for inclusion. Unpublished research is summarised alongside published research in the following sections.

2 Characteristics

2.1 Conceptual development

The most commonly used definition of a 'high reliability organisation' is a consistently reliable organisation that operates in a complex environment where accidents might be expected to occur frequently, but which manages to avoid or seeks to minimise catastrophes.[1–4]

Originally, high reliability organisations were inextricably linked to their safety record, with some authors suggesting that high reliability organisations are a subset of hazardous organisations that have achieved a record of high safety over long periods of time. The focus was on how many times an organisation could have failed, resulting in catastrophic consequences, but did not.[5,6]

However, more recent definitions have focused on the extent to which organisations constantly seek to improve reliability. This involves not only preventing errors or failures, but also recovering quickly if they occur.[7]

There has been an increased emphasis on thinking about 'reliability seeking' rather than 'reliability achieving' organisations.[8] Reliability seeking organisations are not defined by the absolute number of errors or their accident rate, but rather by the extent to which they effectively manage 'innately risky' technologies.[9] Weight is placed on the social and organisational underpinnings of safety.[10,11]

Work on this topic comes predominantly from studies of:[12,13]

– energy[14–18]
– aviation and transport[19,20]
– military and space[21–23]
– fires and disasters[24–27]
– healthcare[28–33]
– education.[34,35]

Researchers at the University of California Berkeley such as LaPorte, Rochlin and Roberts undertook seminal work in this field in the late 1980s and early 1990s.[36–39] Further important research was undertaken by Weick and Schulman.[40–43]

Over the past 20 years a great deal of other research has been conducted using 'high reliability theory' or seeking to examine the extent to which various entities fulfil the criteria of high reliability organisations.

High reliability theory is sometimes contrasted with 'normal accident theory', which takes a more pessimistic view and suggests that regardless of the effectiveness of management and operations, accidents in complex systems are inevitable.[44–46] High reliability theory, in contrast, suggests that high risk organisations can function safely despite the hazards of complex systems.[47]

2.2 Key features

While individual authors have slightly differing views about the characteristics of high reliability organisations, there is consensus about many key principles such as:[48–50]

– High reliability organisations operate in complex environments. This may include complex physical environments as well as unforgiving social and political environments.

– High reliability organisations use processes and technologies that have the potential for risk and error.

– The consequences of errors would be serious and significant. This means that it is not possible for high reliability organisations to use learning through experimentation as a core strategy. The consequences of experimentation may be devastating.

– To minimise errors, high reliability organisations use complex processes to manage technologies and work.[51]

– There is a focus on continuous improvement.

– There is a good safety culture, with leadership and frontline staff taking shared responsibility.[52]

– Teams are adept at quickly building creative responses to failure.

– High reliability organisations share features with high performing organisations and these terms are used interchangeably by some researchers. However, others differentiate high reliability organisations as always having high potential risk. The characteristics shared with high performing organisations include well-trained personnel, teamwork, ongoing training, reward systems, regular audits of processes and continuous improvement initiatives.[53–56]

– Such organisations often include a variety of checks, counter checks and redundancy as a precaution against potential mistakes.[57,58]

– There is a focus on change and flexibility to meet varying circumstances.

– High reliability organisations have a 'group mindfulness', which includes an organisation-wide sense of vulnerability and pessimism about possible failures. Responsibility and accountability for reliability is distributed throughout the organisation. Such organisations aim to increase the quality of attention and alertness across all departments and teams.[59]

Collective mindfulness is an important characteristic of high reliability organisations.[60] Various studies and reviews suggest that collective mindfulness is indicated by:[61,62]

– a preoccupation with failure

– sensitivity to operations

– commitment to resilience

– deference to expertise

– reluctance to simplify interpretations of issues or risks.

These five features are thought to help high reliability organisations work well when facing unexpected situations.[63]

3   Development

Few robust empirical studies are available about how organisations develop into highly reliable entities. There are descriptive accounts and some case studies, but most do not focus in any depth on the development journey or key triggers and drivers. Stories about the development of high reliability organisations tend to be unpublished. For instance, blogs and website posts have described the processes used as organisations seek to become 'highly reliable.'[64]

Descriptive accounts of successes and failures are available in the fields of transport,[65,66] the military,[67] education,[68,69] energy,[70–72] fire[73–75] and other sectors.[76] Some research also examines how organisations have implemented specific initiatives to develop greater collective mindfulness or improve teamwork. This includes education[77] and healthcare.

Human factors engineering, crew resource management, briefing and debriefing, high performing teams concepts and root cause analysis are examples of tools that have been implemented to help organisations develop greater reliability and consistency. These approaches are not necessarily synonymous with high reliability organisations and not all studies of these approaches are aiming to achieve high reliability status. However, they are techniques that have been tested for enhancing some of the characteristics routinely associated with high reliability organisations.

Most developmental descriptions agree that entities do not just 'become' high reliability organisations. Instead, this is something to be worked at continuously.[78] These studies also suggest that proactive leadership and shared vision throughout the organisation are essential in the development journey.

'Organisational learning is therefore likely to be heavily influenced by the behaviour of leaders. If leaders prompt dialogue and debate through active questioning and listening, learning is likely to be encouraged. If they signal the importance of spending time on problem identification, knowledge transfer, and reflective post-audits, these activities are likely to flourish. If they behave in ways that acknowledge their own openness and willingness to entertain alternative points of view, options are likely to multiply and diverse alternatives are likely to be voiced.'[79]

In addition to strong leadership, a supportive learning environment and collaborative learning processes have been found to be essential.[80–83]

A number of agencies are including plans to become high reliability organisations in their strategic plans[84] and resources are available to prompt organisations with questions to ask themselves as part of their development journey.[85]

4   Healthcare research

Application of the theory and concepts of high reliability organisations is growing in the field of healthcare. In fact, there is potentially as much empirical work about this in healthcare as in other fields. However, much of this 'empirical' work consists of case studies or literature analyses based on very selective reviews.

There are a small number of case studies outlining how specific healthcare services might fit the definition of high reliability organisations.[86–90] However, the main focus of this type of research in healthcare has included:

– examining the relevance of high reliability theory or concepts to healthcare[91–100]

– testing the value of tools to enhance reliability[101,102] such as human factors approaches,[103–114] root cause analysis,[115] checklists,[116] safety culture and climate surveys,[117,118] high performing teams[119–121] and crew resource

– management.[122–163]

The US Institute for Healthcare Improvement (IHI) has identified four themes that may explain some of the gaps in process reliability between healthcare and other industries. These include extreme dependence on hard work and personal vigilance in healthcare, a focus on 'mediocre' benchmark outcomes rather than processes, tolerance of provider autonomy, and failure to create systems designed to reach reliability goals.[164]

As in other fields, research in healthcare suggests that learning and trusting other roles, sharing responsibilities, team awareness, a learning culture and being adaptive are all important components of reliability seeking organisations.[165–167]

The bulk of this type of research in healthcare has focused on the 'team' and leadership aspects of high reliability organisations rather than other characteristics.[168,169]

However recent studies have also begun to examine the cost-effectiveness of specific characteristics of high reliability organisations such as mindfulness,[170] and, in some instances, to question the value of high reliability theory for healthcare.[171]

Some suggest that high reliability theory has difficulty explaining aspects of organisational culture and that the application of this approach in healthcare has involved an over-reliance on numerical indicators.[172]

5 Ongoing research and media coverage

5.1 Ongoing research

An examination of websites, ongoing trials registers and study protocols suggests that there is a great deal of ongoing research about the concept of high reliability organisations or reliability seeking organisations. In the USA there are annual conferences about this topic and organisations such as the US Department of Energy have set up networking sites and learning collaboratives to share lessons learned in this field.[173] The US military also has ongoing work programmes in this field as do a number of universities and the Institute for Healthcare Improvement.

Studies are underway in healthcare regarding practical ways to enhance some of the characteristics of high reliability organisations such as mindfulness development, team training, crew resource management, safety briefings and human factors concepts.

In the UK and Western Europe, research and development programmes are testing some of these concepts without necessarily using the term 'high reliability organisations'. In other words, most research focuses on applying specific components rather than examining the broader theory in any depth. The NHS Institute for Innovation and Improvement planned specific tests of reliability theory but the future of these plans is currently uncertain.

5.2 Media stories

Various websites are available outlining the characteristics of high reliability organisations.[174–179] Various blogs are also available and conferences are regularly organised about this topic, especially in the USA.[180]

The term 'high reliability organisation' is not particularly common in the print press, and is most often used in US newspapers and the trade press.[181] The health press is beginning to use this term more frequently.[182–185]

News articles using these terms most commonly describe organisations as 'high reliability' or 'highly reliable' when they are reporting on safety or leadership issues.[186–189]

A small number of articles have interviewed business leaders to describe the characteristics of high reliability organisations or the development path of these organisations.[190–193]

There has also been press attention for conferences related to high reliability organisations.[194]

Most media attention comes from the US press.

6 Summary

How have high reliability organisations been defined and are these characteristics well recognised and agreed across the literature?

In empirical research, key characteristics of high reliability organisations include:

– complex high risk environments

– serious consequences of error

– collective mindfulness

– positive and proactive safety culture

– continuous improvement

– learning culture

– highly trained and rewarded staff

– creative ways to cope with errors

– regular checks

– redundancy of processes

– flexibility to deal with change.

Although individual authors and studies sometimes debate the extent to which various characteristics apply, there is a reasonable level of consensus across the literature. The literature spans many fields, including energy, aviation, transport, military, fires, disasters and healthcare.

There is a growing literature about high reliability organisations in healthcare and much of the most recent empirical knowledge comes from healthcare.

What is the link between high reliability organisations and safety culture?

There is little empirical evidence exploring links between high reliability and safety culture – or whether developing specific characteristics of high reliability organisations also leads to improved safety culture. The literature tends to assume that high reliability organisations have a positive safety culture and this is often deemed to be one of the characteristics of such organisations.

Seminal writers in this field suggest that a distinguishing characteristic of high reliability organisations is a lack of complacency and a constant concern about safety that is built into the organisational culture.

'When an organisation succeeds, its managers usually attribute success to themselves... Success narrows perceptions, changes attitudes, feeds confidence into a single way of doing business, breeds over-confidence in the efficacy of current abilities and practices, and makes leaders and others intolerant of opposing points of view. The problem is that if people assume that success demonstrates competence, they are more likely to drift into complacency, inattention, and predictable routines. What they don't realise is that complacency increases the likelihood that unexpected events will go undetected and accumulate into bigger problems.'[195]

How do organisations become high reliability organisations?

There are very few robust empirical studies of how high reliability organisations develop and their key drivers. Some descriptive narratives are available, but the methods used to collect and analyse information are usually not outlined in any detail and the quality or extent of bias in such accounts remains uncertain.

Most studies suggest that building strong leadership and good teamwork are essential, but the exact strategies for doing this vary or are not described in depth.[196]

In recent years there has been an increasing amount of research outlining how organisations have sought to implement various processes or tools in order to increase mindfulness or improve safety culture. Examples include developing team training, implementing the principles of crew resource management and using a human factors approach.

Are there any examples of high reliability organisations in healthcare?

A small number of studies have explicitly examined high reliability organisations within healthcare or explored ways that healthcare services have sought to develop high reliability characteristics.[197–201]

Are there any studies of the application of these principles in healthcare organisations?

A larger number of studies have applied the principles or theories of high reliability organisations to a healthcare context. The most commonly applied principles include attempts to improve safety culture (the subject of a previous research scan), standardise processes using care bundles, checklists and other tools, and initiatives to build teamwork using crew resource management and human factors approaches.

What lessons can be learned for healthcare and what are the practical considerations for leaders in healthcare?

Few studies have explicitly examined practical considerations for leaders, but the findings of a number of studies suggest the importance of leadership in enhancing safety culture and standardising processes.[202]

Research suggests that the principles of high reliability organisations can be applied in healthcare and this has practical implications regarding team building, infrastructure and leadership commitment.

For example, the US Department of Energy suggests that entities wishing to become high reliability organisations need to pay attention to developing systems, culture and cognition.[203]

Regarding systems, they suggest that processes need to be in place to support reporting of near misses and small and localised failures, risk-profiling to understand what is important, lessons learned, investigation and causal analysis, and reward and recognition.

In terms of culture, the research suggests that organisations should set up strategies to ensure a just culture, a reporting culture and a learning culture by emphasising leadership, organisational learning and engagement.

In terms of cognition, mental models influence reasoning and decision making and encourage systems thinking. Therefore, it is important to foster increased situational awareness and mindfulness.

Collective mindfulness is a key characteristic of high reliability organisations and researchers argue that 'mindful organising' requires leaders and workers to pay close attention to shaping the social and relational infrastructure of the organisation and to developing processes, infrastructure and relationships that contribute to team and organisational safety culture.[204]

Partnerships within sectors and between sectors and academia, as well as learning collaboratives and other networks, have been found to be useful for developing and integrating the concept of high reliability.[205]

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