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An empirical exploration of the presence of HRO safety principles across the health care sector and construction industry in Norway

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ABSTRACT

Adverse events occur in one-third of all hospital admissions, and the construction industry has one of the highest accident rates across all industries. This background highlights the criticality of researching principles that can enhance current safety organization and practices in both sectors. Accordingly, this article explores whether, and to what degree, different HRO safety principles can be found in the health care sector and the construction industry in Norway. To assist in this exploration, HRO concepts and associated safety principles are operationalized and applied in a systematic content analysis of qualitative interview data from two Norwegian research projects. The presence of the explored HRO safety principles is found in both sectors, where they appear strongly tied to unwritten and informal safety mindsets and practices. The article also finds that safety principles may be subordinate to other day-to-day operational priorities and disruptions that can negatively affect the frequency of adverse events and accidents across the sectors. This situation could be related to the presence of some safety principles over others and an associated untapped potential for strengthening principles across sectors. The article suggests that this potential could be tapped through an organization's expressed adoption of safety principles, with manager support, follow-up practical courses, and regular meetings. A practical recommendation is for organizations across sectors to conduct surveys and quantitative assessments to map the presence of the nine safety principles investigated in this article. Further research across sectors to map and understand the informal nature of safety mindsets and practices is recommended.

1. Introduction

Safety literature to date has identified a number of principles for achieving and maintaining safety at an organizational level. These principles are often associated with high-reliability organizations (HROs); that is, organizations that have low accident rates despite working under high pressure and trying conditions. The main principles behind these organizations' success can be classified as standard operation procedures in normal operations, sensitivity to operations, and resilient design, as demonstrated in their ability to pre-program operational procedures, to sense the need for local operational adaptions, and to treat signals of failure as having the potential to result in catastrophic system events (Almklov and Antonsen, 2010). Research efforts reflecting variants of these core principles include the concepts of latent errors (Reason, 1997; Ramanujam and Goodman, 2003; Putz et al., 2013), mindfulness (Weick and Sutcliffe, 2001; Weick and Putnam, 2006; Vogus and Sutcliffe, 2012), and organizational resilience (Kantur and İşeri-Say, 2012; Sahebjamnia et al., 2015; Aleksić et al., 2013).

Within the health care sector, the importance of exploring and identifying principles that can improve safety at an organizational level is reflected in the fact that 3–17% of hospitalized patients worldwide suffer adverse events, and that 3–21% of adverse events in turn lead to patient death (Baker et al., 2004; Brennan et al., 1991; Davis et al., 2002; de Vries et al., 2008; Schioler et al., 2001; Soop et al., 2009; Thomas et al., 2000; Vincent et al., 2001; Wilson et al., 1995). Recent numbers suggest an even more dire situation; for instance, Classen et al. (2011) found that adverse events occurred in one-third of hospital admissions, while Kennerly et al. (2014) identified 32.1 percent of admitted hospital patients with one or more adverse events. Similarly dramatic numbers can be found in the construction industry. Specifically, construction is one of the industries with the highest accident rates, including fatalities, and where the leading cause of death is falls (Kines et al., 2010; Haslam et al., 2005; Janicak, 1998; Camino López et al., 2008). The risk of work-related injuries in the first months of a new job is particularly high in this industry (Breslin and Smith, 2006; Smith and Mustard, 2007). In short, safety remains

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a significant challenge for both the health care sector and the construction industry, understating the criticality of researching principles that can enhance current organizational practices in both sectors.

According to Reason (1997), there are two kinds of accidents – those that happen to individuals and those that happen to organizations. Compared to individual accidents, organizational (or system) accidents are rare, but they are often catastrophic events that occur within the context of modern technologies, such as nuclear power plants, commercial aviation, the petrochemical industry, or chemical processing plants. High-reliability theory has often focused on system-level and organizational accidents. However, it is possible to expand beyond the original system-level focus to include processes and interactions among units and individuals (Tamuz and Harrison, 2006). High-reliability theory argues that the features of HROs can be identified and adopted by most organizations seeking to attain high reliability (Roberts, 1990). For example, high-reliability theory has been applied to study major failures, uncertainties, and reliability issues in construction projects and construction management (Saunders et al., 2016; Saunders, 2015; olde Scholtenhuis and Dorée, 2014; Brady and Davies, 2010). The theory has also been applied to explore and understand incidents and component failures, as well as potential means to reach high reliability in health care organizations and systems (Shabot, 2015; Chassin and Loeb, 2013; Thomassen et al., 2011; Christianson et al., 2011; Pronovost et al., 2006). A common characteristic of most of the HRO research efforts in both sectors is the lack of studies at the sharp end of an organization; that is, the workers' everyday safety practices. Furthermore, an emphasis on system accidents in high-reliability theory does not degrade the importance of safety at the individual level; on the contrary, individual safety is a prerequisite of an HRO. The HRO perspective is founded on an empirical research base that shows how safety originates in large part in the managerial and operational activities of people at all levels of an organization (Dekker and Woods, 2010).

Based on the identified need for further research into safety principles, including workers' sharp-end safety practices, and the broader applicability of the HRO perspective, this article explores whether, and to what degree, different HRO safety principles can be found in the health care sector and the construction industry in Norway (the stated aim of this article). In terms of the appropriateness of exploring HRO safety principles across these sectors, construction and health care both experience adverse events that can affect oneself, one's colleagues, or a third party such as the patient being treated or undergoing surgery or a bystander to work activities at a construction site (Safe Work Australia, 2015; Zhao et al., 2010; IOM, 1996). Both sectors are also characterized by unpredictability, such as a hospital organization receiving acute patients requiring immediate rather than planned treatment and a construction site that changes to varying degrees from project to project. Furthermore, a hospital organization and a construction site both experience incidents that are individual and unique and accumulate to a larger number of injuries or fatalities over time.

Given their contextual similarities, the choice to explore HRO safety principles across the health care sector and the construction industry in Norway could be justified. The next section describes the concepts of latent errors, mindfulness, and organizational resilience, together with their associated safety principles.

2. Theory

The theory section is organized according to Fig. 1, along with presentation of each safety concept and identification of associated safety principles, including across concepts.

2.1. Latent errors

Ramanujam and Goodman (2003) conceptualized latent errors as events, activities, or conditions that deviate from expectations (expressed through rules, regulations, procedures, and so forth) in ways that may or may not cause adverse consequences of organizational significance (p. 817). Latent errors and adverse consequences are made less likely through the following approaches: (1) through positive organizational antecedents (such as primacy of safety goals and incentive systems that reward safety rather than revenues) and (2) through vigilance, monitoring, and corrective action mechanisms. These mechanisms reflect the mindfulness concept in HRO literature, and hereunder specifically the principles of "sensitivity to operations," "reluctance to simplify," "preoccupation with failure," "commitment to resilience," and "deference to expertise" (Weick and Sutcliffe, 2001; Sellnow et al., 2009; Hales and Chakravorty, 2016). The dashed arrows in Fig. 1 indicate this indirect connection between the concepts of latent errors and mindfulness.

2.2. Mindfulness

The sensitivity to operations principle is understood as an awareness of the situation surrounding a particular operation or process that enables abnormalities to be recognized and addressed. Reluctance to simplify implies a careful and limited use of categories to ensure that details about events, experiences, and opinions of organizational members are preserved, and simplifications are kept to a minimum. The preoccupation with failure principle states that every signal or symptom of failure is treated as having potentially severe or catastrophic (worst-case scenario) consequences for the system as a whole, such as when occurring simultaneously with other failures. Through commitment to resilience, the organization seeks to absorb, recover, and learn from errors in order to maintain operations. Resilience can be achieved through safety-enhancing practices (such as checklists), training and drills, and the constant updating of crisis-management plans. Finally, deference to expertise involves deferring decisions downwards or around the organization to the individual who works most closely with the procedure or problem in question, and therefore possesses the most relevant expertise and experience. Overall, the mindfulness concept and associated principles imply ways of thinking and organizing that have a higher likelihood of revealing unexpected events. Furthermore, all described principles imply vigilance, monitoring and corrective actions as described in connection with the latent error concept, which highlights the connection between the concepts of latent errors and mindfulness.

2.3. Organizational resilience

The third concept, organizational resilience, is about developing short-term business continuity and long-term disaster recovery planning, in order to strengthen the organization's ability to cope with disruptive events (Sahebjamnia et al., 2015; Riolli and Savicki, 2003; Kantur and İşeri-Say, 2012). Key to this planning are principles such as robustness, redundancy, resourcefulness, and rapidity (Tierney, 2003). Tierney referred to robustness as "the ability of elements, systems, and other units of analysis to withstand stresses and demands without suffering damage, degradation or loss of functions" (p. 2). Redundancy concerns the organization's ability to establish "elements, systems, or other units of analysis [...] that meet functional requirements in the event of disruption, degradation, or loss of functionality of primary systems" (p. 2). Resourcefulness refers to the organization's ability

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