



Review

Methodological strategies in resilient health care studies: An integrative review



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ABSTRACT

Resilient healthcare research focuses on everyday clinical work and a system's abilities to adopt or absorb disturbing conditions as opposed to risk management approaches, which are based on retrospective analyses of errors. After more than a decade of theoretical development and a large quantity of empirical work, the field of resilience is beginning to recognize the methodological challenges related to operationalizing and designing studies of complexity. This paper reviews a sample of empirical articles on studies of resilient healthcare to describe and synthesize their methodological strategies. The review found that data collection by resilient healthcare studies has predominantly been conducted at the micro level (e.g. frontline clinical staff). Data sources at the meso level (i.e. hospital/institution) have been limited, and no studies were found that collected macro-level data. We argue that the methodological focus in the field should increase its embrace of complexity and the adaptive capacities of the system as a whole by integrating data sources at the micro, meso, and macro levels. To improve the methodological designs, we argue that the resilience construct, in which the complexity of multiple levels is integrated, must be developed. Improving the transparency and quality of future resilient healthcare research might be accomplished by reporting thorough descriptions of analytical strategies, in-depth descriptions of research design and sampling strategies, and discussing internal and external validity and reflexivity.

1. Resilient healthcare

This integrative review focuses on the methodological strategies employed by studies on resilient healthcare. Resilience engineering (RE), which involves the study of coping with complexity (Woods and Hollnagel, 2006) in modern socio-technical systems (Bergström et al., 2015); emerged in about 2000. The RE discipline is quickly developing, and it has been applied to healthcare, aviation, the petrochemical industry, nuclear power plants, railways, manufacturing, natural disasters and other fields (Righi et al., 2015). The term 'resilient healthcare' (RHC) refers to the application of the concepts and methods of RE in the healthcare field, specifically regarding patient safety (Hollnagel et al., 2013a). Instead of the traditional risk management approach based on retrospective analyses of errors, RHC focuses on 'everyday clinical work', specifically on the ways it unfolds in practice (Braithwaite et al., 2017). Wears et al. (2015) defined RHC as follows.

The ability of the health care system (a clinic, a ward, a hospital, a

county) to adjust its functioning prior to, during, or following events (changes, disturbances or opportunities), and thereby sustain required operations under both expected and unexpected conditions. (p. xxvii)

After more than a decade of theoretical development in the field of resilience, scholars are beginning to identify its methodological challenges (Woods, 2015; Nemeth and Herrera, 2015). The lack of well-defined constructs to conceptualize resilience challenges the ability to operationalize those constructs in empirical research (Righi et al., 2015; Wiig and Fahlbruch, forthcoming). Further, studying complexity requires challenging methodological designs to obtain evidence about the tested constructs to inform and further develop theory (Bergström and Dekker, 2014). It is imperative to gather emerging knowledge on applied methodology in empirical RHC research to map and discuss the methodological strategies in the healthcare domain. The insights gained might create and refine methodological designs to enable further development of RHC concepts and theory. This study aimed to describe and synthesize the methodological strategies currently applied in

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empirical RHC research in terms of the empirical fields, applied research designs, methods, analytical strategies, main topics and data collection sources at different systemic levels, and to assess the quality of those studies. We argue that one implication of studying socio-technical systems is that multiple levels in a given system must be addressed, as proposed by, for example, Rasmussen (1997). As such, this study synthesized the ways that RHC studies have approached empirical data at various systemic levels.

2. Methodology in resilient healthcare research

‘Research methodology’ is a strategy or plan of action that shapes the choices and uses of various methods and links them to desired outcomes (Crotty, 1998). This study broadly used the term ‘methodological strategy’ to denote an observed study’s overall research design, data collection sources, data collection methods and analytical methods at different systemic levels. The methodological issues discussed in the RHC literature to date have concerned the methods used to study everyday clinical practice, healthcare complexity and the operationalization of the constructs measuring resilience.

2.1. Methods of studying healthcare complexity

RE research is characterized by its study of complexities. In a review of the rationale behind resilience research, Bergström et al. (2015) found that RE researchers typically justified their research by referring to the complexity of modern socio-technical systems that makes them inherently risky. Additionally, in the healthcare field, references are made to the complex adaptive system (CAS) perspective (Braithwaite et al., 2013). CAS emerged from complexity theory, and it takes a dynamic approach to human and nonhuman agents (Urry, 2003). Healthcare is part of a complex socio-technical system and an example of a CAS comprising professionals, patients, managers, policymakers and technologies, all of which interact with and rely on trade-offs and adjustments to succeed in everyday clinical work (Braithwaite et al., 2013).

Under complexity theory, complex systems are viewed as open systems that interact with their environments, implying a need to understand the systems’ environments before understanding the systems. Because these environments are complex, no standard methodology can provide a complete understanding (Bergström and Dekker, 2014), and the opportunities for experimental research are limited. Controlled studies might not be able to identify the complex interconnections and multiple variables that influence care; thus, non-linear methods are necessary to describe and understand those systems. Consequently, research on complexity imposes methodological challenges related to the development of valid evidence (Braithwaite et al., 2013).

It has been argued that triangulation is necessary to study complex work settings in order to reveal actual phenomena and minimize bias leading to misinterpretation (Nemeth et al., 2011). Methodological triangulation has been suggested, as well as data triangulation, as a strategic way to increase the internal and external validity of RE/RHC research (Nemeth et al., 2011; Mendonca, 2008). Data triangulation involves collecting data from various sources, such as reports, policy documents, multiple professional groups and patient feedback, whereas methodological triangulation involves combining different qualitative methods or mixing qualitative and quantitative methods.

Multiple methods have been suggested for research on everyday clinical practice and healthcare complexity. Hollnagel (2014) suggested qualitative methods, such as qualitative interviews, field observations and organizational development techniques (e.g. appreciative inquiry and cooperative inquiry). Nemeth and Herrera (2015) proposed observation in actual settings as a core value of the RE field of practice. Drawing on the methods of cognitive system engineering, Nemeth et al. (2011) described the uses of cognitive task analysis (CTA) to study resilience. CTA comprises numerous methods, one of which is the

critical decision method (CDM). CDM is a retrospective interview in which subjects are asked about critical events and decisions. Other proposed methods for studying complex work settings were work domain analysis (WDA), process tracing, artefact analysis and rapid prototyping.

System modelling, using methods such as trend analysis, cluster analysis, social network analysis and log linear modelling, has been proposed as a way to study resilience from a socio-technical/CAS perspective (Braithwaite et al., 2013; Anderson et al., 2013). The functional resonance analysis method (FRAM) has been employed to study interactions and dependencies as they develop in specific situations. FRAM is presented as a way to study how complex and dynamic socio-technical systems work (Hollnagel, 2012). In addition, Leveson et al. (2006) suggested STAMP, a model of accident causation based on systems theory, as a method to analyse resilience.

2.2. Operationalization of resilience

A vast amount of the RE literature has been devoted to developing theories on resilience, emphasizing that the domain is in a theory development stage (Righi et al., 2015). This process of theory development is reflected in the diverse definitions and indicators of resilience proposed over the past decade e.g. 3, (Woods, 2006, 2011; Wreathall, 2006). Numerous constructs have been developed, such as resilient abilities (Woods, 2011; Hollnagel, 2008, 2010; Nemeth et al., 2008; Hollnagel et al., 2013b), Safety-II (Hollnagel, 2014), Work-as-done (WAD) and Work-as-imagined (WAI) (Hollnagel et al., 2015), and performance variability (Hollnagel, 2014). The operationalization of these constructs has been a topic of discussion. According to Westrum (2013), one challenge to determining measures of resilience in healthcare relates to the characteristics of resilience as a family of related ideas rather than as a single construct.

The applied definitions of ‘resilience’ in RE research have focused on a given system’s adaptive capacities and its abilities to adopt or absorb disturbing conditions. This conceptual understanding of resilience has been applied to RHC [6, p. xxvii]. By understanding resilience as a ‘system’s ability’, the healthcare system is perceived as a separate ontological category. The system is regarded as a unit that might have individual goals, actions or abilities not necessarily shared by its members. Therefore, RHC is greater than the sum of its members’ individual actions, which is a perspective found in methodological holism (Ylikoski, 2012). The challenge is to operationalize the study of ‘the system as a whole’.

Some scholars have advocated on behalf of locating the empirical basis of resilience by studying individual performances and aggregating those data to develop a theory of resilience (Mendonca, 2008; Furniss et al., 2011). This approach uses the strategy of finding the properties of the whole (the healthcare system) within the parts at the micro level, which is found in methodological individualism. The WAD and performance variability constructs bring resilience closer to an empirical ground by framing the concepts as observable things that could be operationalized and (possibly) managed by studying the individuals in a given healthcare system at the micro level (Hollnagel, 2014).

Research on operationalizing resilience in RHC is exemplified by two main theoretical models: ‘four cornerstones of resilience’, as introduced by Hollnagel et al. (2013b), and the more recent ‘organizational resilience’, put forth by Anderson et al. (2017). The four cornerstones model describes a system’s resilience in terms of how well it can respond, monitor, anticipate and learn (Hollnagel et al., 2013). A Resilience Analysis Grid (RAG) comprises operationalized questions related to the four systemic abilities to measure how well an organization performs on each of the four potentials (Hollnagel, 2011). The organizational resilience model conceptualizes WAD as interplay and alignment between demand and capacity. Its focus is on the organization, teams and units. Operationalized measures are suggested for each of the model’s constructs (Anderson et al., 2017); however, a unified

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