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## Multi-level Influences on Resilient Healthcare in Six Countries – An International Comparative Study Protocol

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# Multi-level Influences on Resilient Healthcare in Six Countries – An International Comparative Study Protocol

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## 20 21 22 23 24 Abstract

### 25 26 Introduction

27  
28 Resilient healthcare (RHC) is an emerging area of theory and applied research to understand how  
29 healthcare organisations cope with the dynamic, variable, and demanding environments in which they  
30 operate, based on insights from complexity and systems theory. Understanding adaptive capacity has  
31 been a focus of RHC studies. Previous studies clearly show why adaptations are necessary and  
32 document the successful adaptive actions taken by clinicians. To our knowledge, however, no studies  
33 have thus far compared RHC across different teams and countries. There are gaps in the research  
34 knowledge related to the multilevel nature of resilience across healthcare systems, and the team-  
35 based nature of adaptive capacity.  
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39 This cross-country comparative study therefore aims to add knowledge of how resilience is enabled  
40 in diverse healthcare systems by examining adaptive capacity in hospital teams in six countries. The  
41 study will identify how team, organisational and national healthcare system factors support or hinder  
42 the ability of teams to adapt to variability and change. Findings from this study are anticipated to  
43 provide insights to inform the design of resilient healthcare systems by considering how macro and  
44 meso level structures support adaptive capacity at the micro level, and to develop guidance for  
45 organisations and policy makers.  
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### 48 49 Methods and analysis

50  
51 The study will employ a multiple comparative case study design of teams nested within hospitals, in  
52 turn nested within six countries: Australia, Japan, the Netherlands, Norway, Switzerland and the  
53 United Kingdom. The design will be based on the Adaptive Teams Framework placing adaptive teams  
54 at the centre of the healthcare system with layers of environmental, organisational and system level  
55 factors shaping adaptive capacity. In each of the six countries, a focused mapping of the macro level  
56 features of the healthcare system will be undertaken by using documentary sources and interviews  
57 with key informants operating at the macro level.  
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3 A sampling framework will be developed to select two hospitals in each country to ensure variability  
4 based on size, location and teaching status. Four teams will be selected in each hospital – one each of  
5 a structural, hybrid, responsive and co-ordinating team. A total of eight teams will be studied in each  
6 country, creating a total sample of 48 teams. Data collection methods will be observations, interviews,  
7 and document analysis. Within-case analysis will be conducted according to a standardised template  
8 using a combination of deductive and inductive qualitative coding, and cross-case analysis will be  
9 conducted drawing on the Qualitative Comparative Analysis (QCA) framework.  
10  
11

## 12 13 Ethics and dissemination

14 The overall Resilience in Healthcare (RiH) research programme of which this study is a part has been  
15 granted ethical approval by the Norwegian Centre for Research Data (Ref.No. 8643334). Ethical  
16 approval will also be sought in each country involved in the study according to their respective  
17 regulatory procedures. Country specific reports of study outcomes will be produced for dissemination  
18 online. A collection of case study summaries will be made freely available, translated into multiple  
19 languages. Brief policy communications will be produced to inform policy makers and regulators about  
20 the study results and to facilitate translation into practice. Academic dissemination will occur through  
21 publication in journals specialising in health services research. Findings will be presented at academic,  
22 policy and practitioner conferences, including the annual Resilient Healthcare Network meeting and  
23 other healthcare quality and safety conferences. Presentations at practitioner and academic  
24 conferences will include workshops to translate the findings into practice and influence quality and  
25 safety programs internationally.  
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## 32 33 Article Summary

### 34 35 Strengths and limitations of this study

- 36 • First international cross-country, multilevel comparative study of resilience in healthcare
- 37 • An in-depth exploration of adaptive capacity in 48 hospital teams in six countries
- 38 • Development of team adaptive capacity theory grounded in rich data
- 39 • Limited number of hospitals included in each country could reduce generalizability
- 40 • Language differences and health system variations may challenge cross-country comparison
- 41
- 42
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- 45

### 46 47 Keywords:

48 Resilience, adaptive capacity, healthcare, teamwork, cross-cultural research  
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53 Word count: 3823  
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## Introduction

Resilient healthcare (RHC) is an emerging area of theory and (applied) research to understand how healthcare organisations cope with the dynamic, variable, and demanding environments in which they operate based on insights from complexity and systems theory. RHC can be defined as “the capacity to adapt to challenges and changes at different system levels, to maintain high quality care”. [1] Over approximately a decade, multi-disciplinary researchers interested in studying how performance emerges in non-linear complex systems such as healthcare have advanced theory and identified the key features of resilient healthcare systems. The evolution of this thinking can be traced in a series of edited books [2-4] from which the following four key concepts can be distilled.

First, resilience is conceptualised as a characteristic of systems and processes rather than individuals. [5] This perspective is not focused on individual psychological resilience to stressful events, but on how organisational processes can support adaptation to deal with problems and challenges. Second, complex and open systems in healthcare experience variability in the conditions under which clinical work occurs. [6] For example, patient flow and workload fluctuate, staff shortages and equipment breakdowns occur, patients vary in their understanding of, and willingness to consent to procedures, and clinical complexity is usually not predictable. Third, as a result of variable demands, clinical processes must adapt to unforeseen challenges so that high quality care can still be delivered. [7] Fourth, resilience is proposed to rely on the ability to anticipate developments, respond to problems, monitor processes, and learn from experience. [8]

Many resilient healthcare studies contain detailed descriptions of healthcare work which clearly show why adaptations are necessary, and document successful adaptive actions taken by clinicians. [9-12] Recently however, researchers have begun to apply these ideas to improving quality, by asking how insights into complexity and the need for adaptive capacity can inform quality improvement processes [13]. Further examples can be found in a recent book on delivering resilient healthcare [14]. However, the evidence base is still developing and there are gaps in the research knowledge [15-18]. Although adaptive capacity is thought to be provided by the activities of anticipating, responding, monitoring and learning, [8] we still do not know how these activities can be strengthened, whether there are other components of adaptive capacity, how resilience is enabled, and how adaptive capacity can be nurtured and supported in organisations.

Furthermore, there have been no studies to our knowledge that have compared resilient healthcare in different countries and so the influence of domestic healthcare structures and regulatory regimes on adaptive capacity is not known. Although cross country comparative studies are generally not common in health services research, those that exist have added to our understanding of how macro contextual factors shape, constrain and facilitate clinical work. [19-22] These studies have also illuminated different ways to organise clinical work and how these relate to outcomes. Such multi-level investigations often aim to tease out how the national organisation of healthcare systems, organisational and team factors interact to influence performance. They thus enlarge our knowledge of the possibilities regarding the organisation of healthcare. For resilient healthcare, such studies are especially important given the early stage of development of the field. For adaptive capacity to be enabled and supported, team structures and processes, organisational factors, and a country's healthcare policy and regulatory system need to allow resilience to emerge when it is required in response to a challenge or change in the environment [23,24]. However, we do not currently know enough about adaptive capacity at multiple system levels to really understand how to support resilience. [16]

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3 A second gap in our knowledge about resilient healthcare relates to teamwork. Most RHC studies have  
4 investigated adaptations made by individual clinicians, but most clinical and organisational work in  
5 hospitals is carried out by teams, which are the smallest functional units in hospitals. The few resilient  
6 healthcare studies that have examined teams and teamwork [25-27] are limited because they have  
7 not considered how teams are defined and structured, what their functions are, or the different types  
8 of teams that are found in healthcare. There have been studies of adaptive teams in other domains,  
9 [28] but healthcare teams have unique characteristics. Teams differ depending on their goals, tasks,  
10 structure, membership and location. Healthcare teamwork is complex and multi-layered and is  
11 characterised by a network of multiteam systems interacting to accomplish collective goals.[29,30]  
12 Teamwork in multiteam systems usually features interprofessional interaction, multiple handovers,  
13 professional hierarchies and the need to co-ordinate progress towards multiple goals across time and  
14 locations. These factors determine their need for adaptive capacity, the types of challenges that  
15 necessitate adaptation and flexibility, and the types of adaptations that are feasible. Hence,  
16 understanding adaptive capacity requires a more sophisticated analysis and understanding of teams  
17 than has been applied in most resilient healthcare studies.

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22 Teamwork research in healthcare has focused on areas with similar characteristics to teams studied  
23 in other domains such as aviation and disaster response. Consequently, most teamwork research in  
24 healthcare has studied areas such as surgery and emergency care [31] which have time limited well-  
25 defined tasks and stable team membership, even though these areas represent only a small  
26 proportion of healthcare work. Current theories are therefore not representative of many healthcare  
27 teams and are therefore not comprehensive. Recent research [32] has identified four main types of  
28 teams in hospitals. These are:

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31 1. Structural teams. These are usually ward-based teams whose members routinely work  
32 together and comprise different disciplines, such as medicine, nursing, physiotherapy, co-  
33 ordinating their actions to care for patients.
- 34  
35 2. Hybrid teams. Hybrid teams have some permanent members and some rotating members. An  
36 example is teams on short stay acute medical units, which commonly have a permanent  
37 nursing team and a rotating medical team.
- 38  
39 3. Responsive teams. These teams react to time limited emergencies such as cardiac arrests or  
40 incidents of aggression and violence or provide specialist expertise such as diabetes or pain  
41 management teams. Such teams are often experienced at working together and have well  
42 defined aims and methods of working.
- 43  
44 4. Co-ordinating teams. These teams facilitate decision-making and workflow. Their work can  
45 span organisational units, such as bed management teams who co-ordinate patient flow  
46 across a hospital, and multi-disciplinary teams who co-ordinate patient care within an  
47 organisational unit.

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49 Different types of teams experience different challenges requiring them to adapt in different ways to  
50 maintain effective performance [32]. It is therefore essential to conduct research that is sensitive to  
51 team type, structure and context. This study will build upon the already established evidence base on  
52 resilient healthcare in complex and dynamic hospital settings by expanding it with a team-based,  
53 multilevel perspective.

## 54 55 56 Aims and objectives

57  
58 This international comparative study is part of the Resilience in Healthcare (RiH) research programme  
59 of the Norwegian Centre for Resilience in Healthcare (SHARE), comprising five work packages to  
60 advance the theory and practice of resilient healthcare.[33] The aim of the cross-country comparative



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3 study described here is to investigate how adaptive capacity in hospital teams is influenced by team,  
4 organisational and healthcare system factors. It aims to answer the question of how multilevel system  
5 factors interact to support or hinder adaptive capacity in different types of hospital teams and how  
6 this leads to performance variability. The study will take place in hospitals in the following six  
7 countries: Australia, Japan, the Netherlands, Norway, Switzerland and the United Kingdom. The study  
8 objectives are to:  
9

- 10  
11 1) Conduct a macro level analysis of the healthcare systems in each country using  
12 documentary sources and interviews with key informants. The analysis will be based on  
13 mapping healthcare system contextual factors in each country such as funding and access,  
14 patient rights, regulatory framework, accreditation and monitoring, information  
15 availability, and resources available.  
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- 17  
18 2) Create a sampling framework based on team types in hospitals that can be used to select  
19 and recruit teams in each country.  
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- 21  
22 3) Collect in-depth qualitative data using an agreed template in each of the selected  
23 empirical settings in the six countries. This will involve interviews (micro, meso, macro)  
24 and observations of clinical work and managerial processes to identify how adaptive  
25 capacity is enabled or inhibited in each team and organisation.  
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- 27  
28 4) Conduct a within-case analysis in each country according to a joint protocol to determine  
29 adaptive capacities at micro, meso and macro levels in the selected empirical settings in  
30 each country. The within-case analysis will result in six country-specific reports in English  
31 to enable cross-country comparison.  
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- 33  
34 5) Conduct a comparative cross-case analysis to synthesize and compare findings across the  
35 six country reports using a common conceptual framework, aiming to identify a wider  
36 range of adaptive capacities than in previous research, as well as how adaptation is shaped  
37 by organisational, cultural, economic, and regulatory factors in different countries.  
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- 39  
40 6) Develop guidance for policy makers, managers and practitioners for operationalizing and  
41 implementing resilient healthcare in different countries and organisational contexts.  
42

## 43 Design

44 The study will have a multiple comparative case study design [34] of teams nested within hospitals,  
45 nested within countries. The design will be based on the Adaptive Teams Framework, which has been  
46 developed to guide data collection and analysis in this study and shown in Figure 1. This framework  
47 shows adaptive teams at the centre of the healthcare system with layers of environmental,  
48 organisational and system level factors shaping adaptive capacity. These layers of influence, which will  
49 be identified and articulated in the study, could support or hinder adaptive capacity. The new  
50 knowledge to be created by the study is highlighted by the research questions at each level of the  
51 framework. First, we want to understand the environmental pressures or challenges that require  
52 adaptation and delineate whether and how different teams are sensitive to these changes. Second,  
53 the teamwork skills that are required to perceive changes and respond appropriately by adapting will  
54 be identified. Third, we will explore how the organisational context supports or hinders adaptive  
55 capacity, and fourth, how the organisation of the healthcare system in each country supports or  
56 hinders adaptive capacity. The framework will be reviewed, modified and extended with the empirical  
57 findings of the study, thus contributing to the theoretical and practical advancement of resilient  
58 healthcare theory.  
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## Figure 1. Adaptive Teams Framework and research questions

### Methods and analysis

#### Phase 1 – Mapping of country characteristics and sampling

In each country, a focused mapping of the macro level features of the healthcare system will be undertaken to understand the broad organisational and regulatory structures of the hospitals. The mapping will be based on documentary sources and interviews with up to five key informants operating at the macro level. The framework for mapping the healthcare system characteristics will focus on the regulatory processes in each country since they set out the framework within which organisational decision-making and behaviour take place. Purposive interviews with informants such as regulatory inspectors, leaders of quality improvement organisations, or healthcare organisation directors will be undertaken to review the emergent mapping and verify its accuracy.

The six participating countries were selected because they are of contrasting sizes and geographical characteristics, and have differently structured healthcare systems, but share in common a high standard of living, as well as highly comparable levels of health expenditure as a percentage of gross domestic product (GDP). Table 1 shows preliminary data for each country, which will be developed and expanded during the study.

**Table 1 Overview of characteristics of participating countries**

Country	Organisation and structure	Funding system and healthcare expenditure	Regulation of quality and safety	Population and country size
<b>Australia</b>	<ul style="list-style-type: none"> <li>• Universal health coverage through Medicare.</li> <li>• Federated structure with agreements between the Commonwealth (Australian) government and the states and territories.<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Taxpayer funded for two-thirds of all care; one third is paid through private health insurance or out-of-pocket expenditure</li> <li>• Healthcare expenditure at 9.3% of GDP</li> <li>• Government/compulsory spending 69.3% of total health expenditure<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Regulation and agencies split across the Federal Government (e.g., the Australian Commission on Safety and Quality in Health Care) and the States and Territories (e.g., the Clinical Excellence Commission in New South Wales)<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population: 25.2 million</li> <li>• Land area: 7.69 million km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 3.3<sup>h</sup></li> </ul>
<b>Japan</b>	<ul style="list-style-type: none"> <li>• Universal health insurance scheme provided by two types of plans: Social Health Insurance (SHI) for those in employment, and National Health Insurance (NHI) for those not covered through SHI.</li> <li>• Free access to healthcare providers (hospitals and private practitioners).<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Insurance premiums subsidized by tax with 10-30% co-payment.</li> <li>• Healthcare expenditure at ~10.9% of GDP.</li> <li>• Government/compulsory spending 84.1% of total health expenditure<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Regulation on quality and safety in healthcare institutions is based on Medical Care Act setting standards.</li> <li>• Inspections are conducted by central and local government agencies (Regional Bureaus of Ministry of Health and Welfare; Prefectural Health Departments).<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population: 126.5 million</li> <li>• Land area: 377,975 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 336<sup>h</sup></li> </ul>
<b>Netherlands</b>	<ul style="list-style-type: none"> <li>• Universal health coverage through mandatory insurance. Decentralised, 'regulated competition' system with private insurers and providers<sup>c</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Mixed system of insurance and taxation-based financing.</li> <li>• Healthcare expenditure at ~9.9% of GDP.</li> <li>• Government/compulsory spending 82.1% of total health expenditure.<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• National Health Institute responsible for setting standards; quality and safety supervised by Health and youth care inspectorate.<sup>c</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population: 17.2 million</li> <li>• Land area: 41,873 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 411<sup>h</sup></li> </ul>

<p><b>Norway</b></p>	<ul style="list-style-type: none"> <li>• Semi-decentralized system, parliament as decision-making body. State ownership of hospitals administered by four Regional Health Authorities (RHAs).</li> <li>• The Norwegian Board of Health Supervision is a national regulatory body, organized under the Ministry of Health and Care Services. County governors at the regional level oversee services within primary and specialized healthcare. <sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Tax-based system, limited out of pocket payment</li> <li>• Healthcare expenditure at ~10.2% of GDP</li> <li>• Government/compulsory spending 85.5% of total health expenditure <sup>g</sup></li> </ul>	<p>Comprehensive legislation regarding child welfare, health and social services:</p> <ul style="list-style-type: none"> <li>• requirements for quality of services</li> <li>• regulations for authorized health care personnel</li> <li>• service user rights</li> </ul> <p>Supervision applies to all statutory services (municipalities, private businesses, publicly owned hospitals, etc.). <sup>d</sup></p>	<ul style="list-style-type: none"> <li>• Population: 5.3 million</li> <li>• Land area: 385,207 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 13.8 <sup>h</sup></li> </ul>
<p><b>Switzerland</b></p>	<ul style="list-style-type: none"> <li>• Universal, government regulated insurance system of around 60 private health insurance companies that offer mandatory basic coverage. <sup>e</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Full or partial government subsidies for insurance policies provided based on age and income.</li> <li>• Healthcare expenditure at ~12.2% of GDP.</li> <li>• Government/compulsory spending 63.7% of total health expenditure. <sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• LAMal (Swiss Federal Law on Health Insurance) provides structure for and governance of the current healthcare system. <sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population: 8.45 million</li> <li>• Land area: 41,285 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 204.7 <sup>h</sup></li> </ul>
<p><b>United Kingdom</b></p>	<ul style="list-style-type: none"> <li>• Universal public healthcare system through the National Health Service (NHS). <sup>f</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Free at the point of care delivery. Funded through general taxation.</li> <li>• Healthcare expenditure at 9.8% of GDP.</li> <li>• Government/compulsory spending 77.1% of total health expenditure. <sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Healthcare regulator (CQC) conducts inspections and rates quality</li> <li>• Complex layers of regulation and oversight, including independent investigator, improvement body and accreditation requirements. <sup>f</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population: 66.27 million</li> <li>• Land area: 242,495 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 273 <sup>h</sup></li> </ul>

Note: <sup>a</sup> [42], <sup>b</sup> [43-45], <sup>c</sup> [46], <sup>d</sup> [47], <sup>e</sup> [48,49], <sup>f</sup> [50], <sup>g</sup> [51], <sup>h</sup> [52]

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A sampling framework will be developed to select two hospitals in each country. Hospitals will be selected to ensure variability within each country based on size, location and teaching status. Within each hospital, four teams will be selected to represent each of the structural, hybrid, responsive and co-ordinating types of teams. Eight teams will therefore be studied in each country, creating a total sample of 48 teams. Table 2 details the team sampling. A detailed description of team types will be developed to assist selection in each country, based on in-depth discussion with the international research team. Differences in healthcare structures between countries may require in-depth discussion to understand and clearly define team types and the criteria for team selection.

**Table 2. Overview of proposed team sampling framework**

Team types	Example teams	Hospital A – Large teaching hospital	Hospital B – Small non-teaching hospital
Structural	Ward team caring for paediatric or elderly patients. Co-located, stable membership	1	1
Hybrid	Acute Admissions Unit (short stay unit) for patients referred from Emergency Department. Combination of stable and rotating membership	1	1
Responsive	Emergency response team for patients experiencing cardiac arrest. Diabetes team responding to inpatients with diabetes Membership may vary but the team responds to well defined needs	1	1
Co-ordinating	Multi-disciplinary team which meets regularly to discuss and plan the care of specific patients, as cancer patients or rehabilitation ward patients. Membership may vary but involves co-ordination across organisational units.	1	1

## Phase 2 – Within country case studies

The aim of the case studies is to understand in-depth how best adaptive teams can be designed and supported. To do this, the study will identify the environmental pressures that create the need for adaptation, how teamwork skills contribute to adaptive capacity in each type of team, and how it is supported or hindered by organisational and healthcare system factors. The types of teams studied include those operating at the micro level (structural and hybrid), and the meso level (responsive and co-ordinating), generating data about micro and meso level adaptation. In-depth qualitative data will be collected over a period of three months in each hospital using the following methods:

**General observations and documentary analysis.** Observations will initially be broad and aim to map the team context, including types of patients, key tasks, processes, demands, challenges, performance measures, team membership and management structures. Organisational documents will be content

1  
2  
3 analysed to identify the context of teamwork. Data will be thematically analysed to comprehensively  
4 describe the organisational context for teamwork.  
5

6 **Observations of adaptive teamwork.** Tasks requiring team communication and co-ordination such as  
7 ward rounds, briefings, meetings and handover, will be identified during step 1 (above), and observed  
8 multiple times to account for differences due to such factors as time of day, change of staff and patient  
9 numbers. The focus at this stage will be on understanding how work is structured and organised and  
10 how teams co-ordinate their activities. Researchers will then shadow different team members to  
11 observe their activities and discuss their work to clarify their aims, problems encountered, solutions  
12 found and any other contextual factors that require clarification. Data will be captured using detailed  
13 field notes, analysed thematically and described qualitatively to allow understanding of the subtleties  
14 and nuances of adaptive teamwork.  
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17 **Interviews.** A sample of 4-5 staff in each team and 4-5 staff at managerial levels will be interviewed.  
18 A sampling frame will be developed to ensure that a representative sample of professions and levels  
19 of seniority is interviewed. A topic guide will be used for semi-structured interviews to probe staff  
20 perceptions of teamwork capacities. Example topics include:  
21  
22

- 23 • perceptions of the quality of teamwork, including communication, collaboration, learning, and  
24 inclusion of the patient's perspective by the team;
- 25 • variability experienced in processes and performance;
- 26 • local adjustments of procedures to meet changing demands;
- 27 • individual and team adaptations;
- 28 • cognitive, behavioural, and procedural strategies for managing variability and change;
- 29 • interactions with external actors such as regulators, industry representatives, payers; and
- 30 • activities that enable teams to adapt, such as ability to anticipate, respond, monitor and learn.  
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34 Interviews will also be an opportunity to clarify observational data and ask further questions about  
35 individual perceptions and experiences. Interviews will be audio recorded, transcribed and analysed  
36 thematically to identify the key factors that influence team adaptation and their mechanisms.  
37

38 Data will be analysed in each country according to a standardised template. In previous work the CARE  
39 model [5] has been used for conceptualising adaptation as a response to changes encountered in the  
40 healthcare environment that originate in a mismatch between demand and capacity. The model has  
41 since been expanded to include factors that stimulate adaptation and processes through which  
42 adaptations occur.[35] The original and adapted CARE models will be used deductively to code  
43 concepts such as environmental changes, demand, capacity, and adaptation. The analysis process will  
44 also inductively identify new factors not accounted for by the models. All researchers will discuss and  
45 review emerging results from the analysis so that insights can be shared across countries and increase  
46 the reliability of the analysis process. This will ensure comparability between the case studies and  
47 increase the rigour of the process. Case study reports will be produced in each country, written in  
48 English and structured according to an agreed template.  
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### 52 Phase 3 – Cross-country comparative analysis and guidance

53 A cross case comparative analysis will be conducted to synthesize and compare findings across the six  
54 countries to identify how adaptation at the team level is shaped, constrained and facilitated by team,  
55 organisational and healthcare system factors. The qualitative analysis will be based on identifying  
56 explanatory mechanisms, comparing concepts across cases, refining concepts, and exploring  
57 relationships and patterns in cases and concepts will be used to generate an account of the multiple  
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3 influences enabling or hindering team adaptive capacity. The broad approach to analysis will be based  
4 on Qualitative Comparative Analysis (QCA),[36] which was developed specifically to facilitate  
5 comparison between case studies. QCA provides both an approach and suggested techniques for  
6 summarising data, building explanatory models and visualising results of the comparison. This  
7 approach is able to consider the roles and outcomes of multiple causal factors, which will be a feature  
8 of the data generated in this study. The cross-case comparison will also be used to identify guidance  
9 about how adaptive capacity in healthcare teams can be enabled based on in depth analysis of the  
10 multiple situational and structural influences on team adaptive capacity.  
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## 14 Research team co-ordination

15  
16 The study will involve a large international team of researchers. Regular opportunities for  
17 communication and co-ordination will be arranged, including regular online meetings with the whole  
18 team to discuss overall progress and solve problems, ad hoc meetings with selected members to  
19 discuss and clarify relevant concerns, and annual face-to-face meetings of the whole team in Norway  
20 to share progress, findings and plan activities. Other ad hoc meetings may also be possible at  
21 conferences such as the annual Resilient Healthcare Net meeting.  
22  
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## 25 Patient and Public Involvement statement

26  
27 Patient and Public Involvement (PPI) representatives were involved in the development of the  
28 proposal for the overall RiH research programme [33], of which this study protocol is a key component.  
29 The RiH research programme furthermore has an international expert advisory board with a senior  
30 PPI advisor as co-chair and a dedicated Patient and Stakeholder (PSI) work package, which aims to  
31 systematically involve patients and key stakeholders in multiple ways across the programme. For the  
32 international comparative study, local PPI representatives or PPI panels in each of the six countries  
33 will be consulted during the planning and conduct of the study. Patients and other stakeholders will  
34 also be involved in overall public engagement activities and in translating research into practice in  
35 several local languages and cultural contexts.  
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## 40 Ethics and dissemination

41  
42 The overall RiH research programme has been granted ethical approval by the Norwegian Centre for  
43 Research Data (Ref.No. 8643334). Approval for this international study will also be sought in each  
44 country in which data will be collected as required by each country's internal research regulatory  
45 procedures. Raw data will not be transferred internationally. Individual country case reports of the  
46 findings in each country will form the basis of the cross-case comparison and will contain only  
47 illustrative examples and anonymized quotations from the raw data. Anonymized data only will be  
48 reported in all outputs.  
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51 A detailed report of the study outcomes will be produced for dissemination on the international  
52 research partner websites. Examples of organisational and regulatory support for adaptive capacity  
53 will be identified to enable learning from success. A collection of case study summaries will be  
54 compiled and made freely available on the Centre for Resilience in Healthcare ([www.uis.no/share](http://www.uis.no/share))  
55 website. These outputs will also be translated into the language of each participating country, to be  
56 shared on research partners' websites. Brief policy communications will be produced to inform policy  
57 makers and regulators about the results of the study and to facilitate translation into practice.  
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3 Academic dissemination will occur through publication in journals specialising in health services  
4 research. Findings will be presented at healthcare conferences, including the annual Resilient  
5 Healthcare Net meeting and other quality and safety conferences. Presentations at practitioner and  
6 academic conferences will include workshops to translate the findings into practice and influence  
7 quality and safety programs internationally.  
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## 10 Discussion

11  
12 This cross-country comparative study aims to increase knowledge about how resilience is enabled in  
13 healthcare systems by examining the adaptive capacity of selected hospital teams in six countries. It  
14 will identify how team skills, organisational and national healthcare system factors support or hinder  
15 the ability of teams to adapt to variability and changes. The study's findings are anticipated to provide  
16 insights into how the design of resilient healthcare systems should consider the ways in which macro  
17 and meso level structures support team adaptive capacity at the micro level. The study will produce  
18 evidence about how this can be done and will develop guidance for organisations and policy makers.  
19

20  
21 A focus of much RHC research has been the identification of policies and procedures that are unhelpful  
22 to clinicians and staff as they seek to cope with the dynamic nature of healthcare work.[12] For  
23 example, Work-As-Imagined is a core RHC concept that focuses attention on how policies do not fit  
24 the reality of practice and so hinder clinicians.[37] However, governmental frameworks could also be  
25 enabling, and this study will investigate the question of whether and how such macro frameworks can  
26 be helpful in supporting adaptive capacity.[23,38,39] Moreover, there is an unresolved question about  
27 how much adaptation is beneficial. Badly designed systems may require constant adaptation as  
28 clinicians attempt to compensate for problems that could be prevented by good design,[5] and it may  
29 be possible that constant adaptation creates additional problems in clinical work.[40,41]  
30  
31

32  
33 The study is focused on teams as the key resilience mechanism in hospital organisations. Teamwork is  
34 known to be difficult in healthcare due to constantly changing team membership, interprofessional  
35 differences in education, culture, and expectations, perceived and actual power hierarchies and power  
36 differentials, and the episodic nature of teamwork.[31] Moreover, teams are varied and often not  
37 clearly defined. Individuals are likely to work in multiple different teams.[32] For example, ward nurses  
38 may belong to a nursing team, a multi-disciplinary team of doctors, nurses and allied health  
39 professionals, and a co-ordinating team such as a bed management team. In this study, we focus on  
40 four basic team types identified in previous research, thus ensuring consistency of team definitions  
41 across case study countries and providing a theoretical rationale for sampling. This will also expand  
42 the evidence base about teamwork in healthcare, which has focused mostly on stable teams with well-  
43 defined, time limited tasks, such as surgery and trauma medicine.  
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46  
47 The study will extend the theory of Resilient Healthcare. Most RHC studies have focused on the micro  
48 level and used a descriptive approach to understand how adaptation facilitates the delivery of  
49 care.[16] This study will pose causal questions about how adaptive capacity can be supported and  
50 aligned across multiple system levels. It is not possible to conduct an experimental trial to answer such  
51 causal questions, but multiple case study designs are commonly used to answer similar questions that  
52 are not suited for experimental designs. The multi case study design [34] will enable comparison  
53 between different types of teams, organisations and healthcare systems, the identification of  
54 relationships and patterns in the data, and lead to theory generation and greater understanding of  
55 how adaptive capacity can be supported in healthcare teams.  
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3 The study forms part of a larger research programme designed to advance the theory and practice of  
4 RHC by developing theory and methods, studying the role of patients, implementing and evaluating  
5 interventions to increase resilience and supporting collaborative learning about RHC.[33]  
6  
7

## 8 Author Contributions

9

10 JEA is the principal investigator of the work package featuring the international comparison, drafted  
11 the original manuscript, and contributed to revisions and additions to the manuscript. KA, SW and VG  
12 contributed with substantial intellectual content in the study design, drafted parts of the original  
13 manuscript, and contributed to the revision of the manuscript. RB, MB, JB and KN contributed to the  
14 study design, drafted parts of the original manuscript, and contributed to manuscript revisions. All  
15 authors approved the final version of the manuscript.  
16  
17

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19

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24  
25

## 26 Competing interests

27

28 None declared.  
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## 30 Patient consent for publication

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32 Not required  
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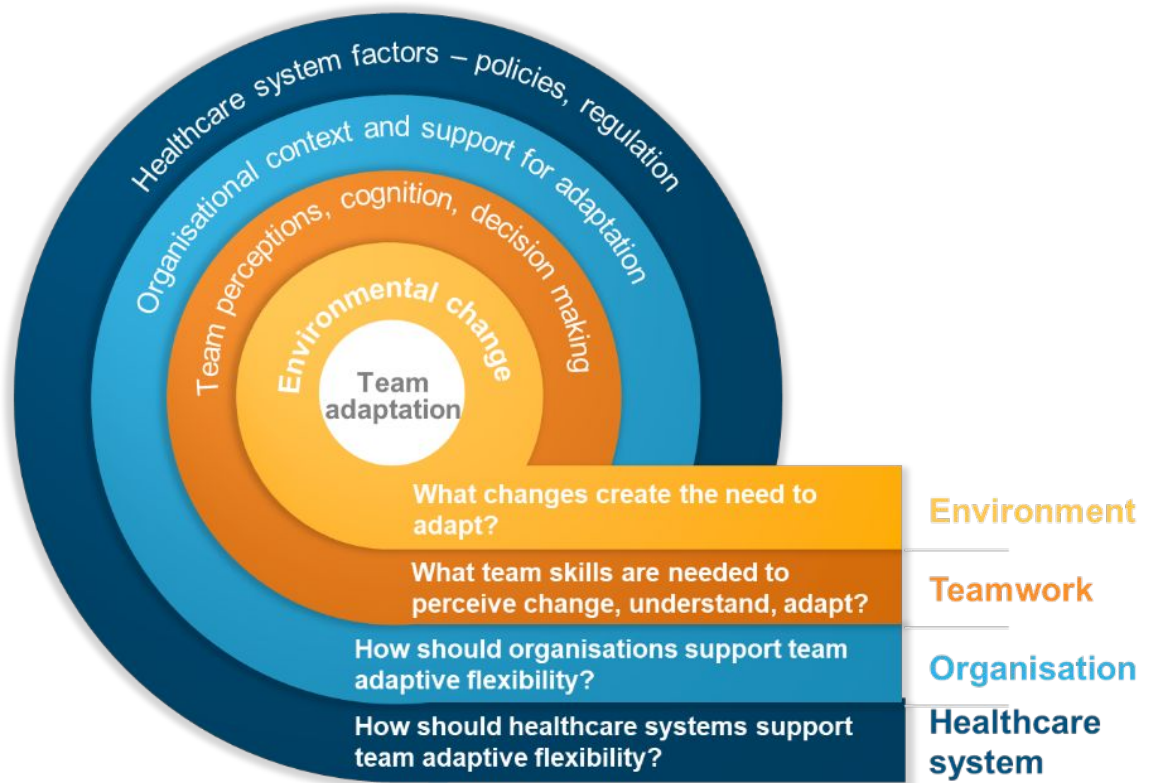


Figure 1. Adaptive Teams Framework and research questions

# BMJ Open

## Multi-level Influences on Resilient Healthcare in Six Countries – An International Comparative Study Protocol

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# Multi-level Influences on Resilient Healthcare in Six Countries – An International Comparative Study Protocol

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## 24 Abstract

### 25 Introduction

26  
27 Resilient healthcare (RHC) is an emerging area of theory and applied research to understand how  
28 healthcare organisations cope with the dynamic, variable, and demanding environments in which they  
29 operate, based on insights from complexity and systems theory. Understanding adaptive capacity has  
30 been a focus of RHC studies. Previous studies clearly show why adaptations are necessary and  
31 document the successful adaptive actions taken by clinicians. To our knowledge, however, no studies  
32 have thus far compared RHC across different teams and countries. There are gaps in the research  
33 knowledge related to the multilevel nature of resilience across healthcare systems, and the team-  
34 based nature of adaptive capacity.  
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39 This cross-country comparative study therefore aims to add knowledge of how resilience is enabled  
40 in diverse healthcare systems by examining adaptive capacity in hospital teams in six countries. The  
41 study will identify how team, organisational and national healthcare system factors support or hinder  
42 the ability of teams to adapt to variability and change. Findings from this study are anticipated to  
43 provide insights to inform the design of resilient healthcare systems by considering how macro and  
44 meso level structures support adaptive capacity at the micro level, and to develop guidance for  
45 organisations and policy makers.  
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### 48 Methods and analysis

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50 The study will employ a multiple comparative case study design of teams nested within hospitals, in  
51 turn embedded within six countries: Australia, Japan, the Netherlands, Norway, Switzerland and the  
52 United Kingdom. The design will be based on the Adaptive Teams Framework placing adaptive teams  
53 at the centre of the healthcare system with layers of environmental, organisational and system level  
54 factors shaping adaptive capacity. In each of the six countries, a focused mapping of the macro level  
55 features of the healthcare system will be undertaken by using documentary sources and interviews  
56 with key informants operating at the macro level.  
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3 A sampling framework will be developed to select two hospitals in each country to ensure variability  
4 based on size, location and teaching status. Four teams will be selected in each hospital – one each of  
5 a structural, hybrid, responsive and co-ordinating team. A total of eight teams will be studied in each  
6 country, creating a total sample of 48 teams. Data collection methods will be observations, interviews,  
7 and document analysis. Within-case analysis will be conducted according to a standardised template  
8 using a combination of deductive and inductive qualitative coding, and cross-case analysis will be  
9 conducted drawing on the Qualitative Comparative Analysis (QCA) framework.  
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## 12 Ethics and dissemination

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14 The overall Resilience in Healthcare (RiH) research programme of which this study is a part has been  
15 granted ethical approval by the Norwegian Centre for Research Data (Ref. No. 8643334). Ethical  
16 approval will also be sought in each country involved in the study according to their respective  
17 regulatory procedures. Country specific reports of study outcomes will be produced for dissemination  
18 online. A collection of case study summaries will be made freely available, translated into multiple  
19 languages. Brief policy communications will be produced to inform policy makers and regulators about  
20 the study results and to facilitate translation into practice. Academic dissemination will occur through  
21 publication in journals specialising in health services research. Findings will be presented at academic,  
22 policy and practitioner conferences, including the annual Resilient Healthcare Network meeting and  
23 other healthcare quality and safety conferences. Presentations at practitioner and academic  
24 conferences will include workshops to translate the findings into practice and influence quality and  
25 safety programs internationally.  
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## 32 Article Summary

### 33 Strengths and limitations of this study

- 34 • First international cross-country, multilevel comparative study of resilience in healthcare
  - 35 • An in-depth exploration of adaptive capacity in 48 hospital teams in six countries
  - 36 • Development of team adaptive capacity theory grounded in rich data
  - 37 • Limited number of hospitals included in each country could reduce generalizability
  - 38 • Language differences and health system variations may challenge cross-country comparison
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### 46 Keywords:

47 Resilience, adaptive capacity, healthcare, teamwork, cross-cultural research  
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52 Word count: 4507  
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## Introduction

Resilient healthcare (RHC) is an emerging area of theory and (applied) research to understand how healthcare organisations cope with the dynamic, variable, and demanding environments in which they operate based on insights from complexity and systems theory. RHC can be defined as “the capacity to adapt to challenges and changes at different system levels, to maintain high quality care”. [1] Over approximately a decade, multi-disciplinary researchers interested in studying how performance emerges in non-linear complex systems such as healthcare have advanced theory and identified the key features of resilient healthcare systems. The evolution of this thinking can be traced in a series of edited books [2-4] from which the following four key concepts can be distilled.

First, resilience is conceptualised as a characteristic of systems and processes rather than individuals. [5] This perspective is not focused on individual psychological resilience to stressful events, but on how organisational processes can support adaptation to deal with problems and challenges. Second, complex and open systems in healthcare experience variability in the conditions under which clinical work occurs. [6] For example, patient flow and workload fluctuate, staff shortages and equipment breakdowns occur, patients vary in their understanding of, and willingness to consent to procedures, and clinical complexity is usually not predictable. Third, as a result of variable demands, clinical processes must adapt to unforeseen challenges so that high quality care can still be delivered. [7] Fourth, resilience is proposed to rely on the ability to anticipate developments, respond to problems, monitor processes, and learn from experience. [8]

Many resilient healthcare studies contain detailed descriptions of healthcare work which clearly show why adaptations are necessary, and document successful adaptive actions taken by clinicians. [9-12] Recently however, researchers have begun to apply these ideas to improving quality, by asking how insights into complexity and the need for adaptive capacity can inform quality improvement processes [13]. Further examples can be found in a recent book on delivering resilient healthcare [14]. However, the evidence base is still developing and there are gaps in the research knowledge [15-18]. Although adaptive capacity is thought to be provided by the activities of anticipating, responding, monitoring and learning, [8] we still do not know how these activities can be strengthened, whether there are other components of adaptive capacity, how resilience is enabled, and how adaptive capacity can be nurtured and supported in organisations.

Furthermore, there have been no studies to our knowledge that have compared resilient healthcare in different countries and so the influence of domestic healthcare structures and regulatory regimes on adaptive capacity is not known. Although cross country comparative studies are generally not common in health services research, those that exist have added to our understanding of how macro contextual factors shape, constrain and facilitate clinical work. [19-22] These studies have also illuminated different ways to organise clinical work and how these relate to outcomes. Such multi-level investigations often aim to tease out how the national organisation of healthcare systems, organisational and team factors interact to influence performance. They thus enlarge our knowledge of the possibilities regarding the organisation of healthcare. For resilient healthcare, such studies are especially important given the early stage of development of the field. For adaptive capacity to be enabled and supported, team structures and processes, organisational factors, and a country's healthcare policy and regulatory system need to allow resilience to emerge when it is required in response to a challenge or change in the environment [23,24]. However, we do not currently know enough about adaptive capacity at multiple system levels to really understand how to support resilience. [16]

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3 A second gap in our knowledge about resilient healthcare relates to teamwork. Most RHC studies have  
4 investigated adaptations made by individual clinicians, but most clinical and organisational work in  
5 hospitals is carried out by teams, which are the smallest functional units in hospitals. The few resilient  
6 healthcare studies that have examined teams and teamwork [25-27] are limited because they have  
7 not considered how teams are defined and structured, what their functions are, or the different types  
8 of teams that are found in healthcare. There have been studies of adaptive teams in other domains,  
9 [28] but healthcare teams have unique characteristics. Teams differ depending on their goals, tasks,  
10 structure, membership and location. Healthcare teamwork is complex and multi-layered and is  
11 characterised by a network of multiteam systems interacting to accomplish collective goals.[29,30]  
12 Teamwork in multiteam systems usually features interprofessional interaction, multiple handovers,  
13 professional hierarchies and the need to co-ordinate progress towards multiple goals across time and  
14 locations. These factors determine their need for adaptive capacity, the types of challenges that  
15 necessitate adaptation and flexibility, and the types of adaptations that are feasible. Hence,  
16 understanding adaptive capacity requires a more sophisticated analysis and understanding of teams  
17 than has been applied in most resilient healthcare studies.

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22 Teamwork research in healthcare has focused on areas with similar characteristics to teams studied  
23 in other domains such as aviation and disaster response. Consequently, most teamwork research in  
24 healthcare has studied areas such as surgery and emergency care [31] which have time limited well-  
25 defined tasks and stable team membership, even though these areas represent only a small  
26 proportion of healthcare work. Current theories are therefore not representative of many healthcare  
27 teams and are not comprehensive. Recent research [32] has provided a schema of four main types of  
28 teams in hospitals. These are:

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31 1. Structural teams. These are usually ward-based teams whose members routinely work  
32 together and comprise different disciplines, such as medicine, nursing, physiotherapy, co-  
33 ordinating their actions to care for patients.
- 34  
35 2. Hybrid teams. Hybrid teams have some permanent members and some rotating members. An  
36 example is teams on short stay acute medical units, which commonly have a permanent  
37 nursing team and a rotating medical team.
- 38  
39 3. Responsive teams. These teams react to time limited emergencies such as cardiac arrests or  
40 incidents of aggression and violence or provide specialist expertise such as trauma,  
41 haemorrhage and other acute care teams. Such teams are often experienced at working  
42 together and have well defined aims and methods of working.
- 43  
44 4. Co-ordinating teams. These teams facilitate decision-making and workflow. Their work can  
45 span organisational units, such as bed management teams who co-ordinate patient flow  
46 across a hospital, and multi-disciplinary teams who co-ordinate patient care within an  
47 organisational unit.

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49 Different types of teams experience different challenges requiring them to adapt in different ways to  
50 maintain effective performance [32]. It is therefore essential to conduct research that is sensitive to  
51 team type, structure and context. This study will build upon the already established evidence base on  
52 resilient healthcare in complex and dynamic hospital settings by expanding it with a team-based,  
53 multilevel perspective.

## 54 55 56 Aims and objectives

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58 This international comparative study is part of the Resilience in Healthcare (RiH) research programme  
59 led by the Norwegian Centre for Resilience in Healthcare (SHARE), comprising five work packages to  
60 advance the theory and practice of resilient healthcare.[33] The aim of the cross-country comparative

study described here is to investigate how adaptive capacity in hospital teams is influenced by team, organisational and healthcare system factors. It aims to answer the question of how multilevel system factors interact to support or hinder adaptive capacity in different types of hospital teams and how this leads to performance variability. The study will take place in hospitals in the following six countries: Australia, Japan, the Netherlands, Norway, Switzerland and the United Kingdom. The study objectives are to:

- 1) Conduct a macro level analysis of the healthcare systems in each country using documentary sources and interviews with key informants. The analysis will be based on mapping healthcare system contextual factors in each country such as funding and access, patient rights, regulatory framework, accreditation and monitoring, information availability, and resources available.
- 2) Create a sampling framework based on team types in hospitals that can be used to select and recruit teams in each country.
- 3) Collect in-depth qualitative data using an agreed template in each of the selected empirical settings in the six countries. This will involve interviews (micro, meso, macro) and observations of clinical work and managerial processes to identify how adaptive capacity is enabled or inhibited in each team and organisation.
- 4) Conduct a within-case analysis in each country according to a joint protocol to determine adaptive capacities at micro, meso and macro levels in the selected empirical settings in each country. The within-case analysis will result in six country-specific reports in English to enable cross-country comparison.
- 5) Conduct a comparative cross-case analysis to synthesize and compare findings across the six country reports using a common conceptual framework, aiming to identify a wider range of adaptive capacities than in previous research, as well as how adaptation is shaped by organisational, cultural, economic, and regulatory factors in different countries.
- 6) Develop guidance for policy makers, managers and practitioners for operationalizing and implementing resilient healthcare in different countries and organisational contexts.

## Design

The study will have a multiple comparative case study design [34] of teams nested within hospitals, embedded within countries. The design will be based on the Adaptive Teams Framework, which has been developed to guide data collection and analysis in this study and shown in Figure 1. This framework shows adaptive teams at the centre of the healthcare system with layers of environmental, organisational and system level factors shaping adaptive capacity. These layers of influence, which will be identified and articulated in the study, could support or hinder adaptive capacity. The new knowledge to be created by the study is highlighted by the research questions at each level of the framework. First, we want to understand the environmental pressures or challenges that require adaptation and delineate whether and how different teams are sensitive to these changes. Second, the teamwork skills that are required to perceive changes and respond appropriately by adapting will be identified. Third, we will explore how the organisational context supports or hinders adaptive capacity, and fourth, how the organisation of the healthcare system in each country supports or hinders adaptive capacity. The framework will be reviewed, modified and extended with the empirical findings of the study, thus contributing to the theoretical and practical advancement of resilient healthcare theory. The study will be carried out between 2020 and 2023.

## Figure 1. Adaptive Teams Framework and research questions

### Methods and analysis

#### Phase 1 – Mapping of country characteristics and sampling

In each country, a focused mapping of the macro level features of the healthcare system will be undertaken to understand the broad organisational and regulatory structures of the hospitals. The mapping will be based on documentary sources and interviews with up to five key informants operating at the macro level of the system. The framework for mapping the healthcare system characteristics will focus on the regulatory processes in each country since they set out the framework within which organisational decision-making and behaviour take place. Purposive interviews with informants such as regulatory inspectors, leaders of quality improvement organisations, and healthcare organisation directors will be undertaken to review the emergent mapping and verify its accuracy.

Researchers from all the selected countries are active members of the Resilient Health Care Network (RHCN), an international community of practice for advancing the principles and practice of resilient healthcare. The study collaboration was founded on shared research interests and approaches to the study of healthcare systems. The six participating countries were selected because they are of contrasting sizes and geographical characteristics, and have differently structured healthcare systems, but share in common a high standard of living, as well as highly comparable levels of health expenditure as a percentage of gross domestic product (GDP). Table 1 shows preliminary data for each country, which will be developed and expanded during the study.



Table 1 Overview of characteristics of participating countries

Country	Organisation and structure	Funding system and healthcare expenditure	Regulation of quality and safety	Population and country size
<b>Australia</b>	<ul style="list-style-type: none"> <li>• Universal health coverage through Medicare.</li> <li>• Federated structure with agreements between the Commonwealth (Australian) government and the states and territories.<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Taxpayer funded for two-thirds of all care; one third is paid through private health insurance or out-of-pocket expenditure</li> <li>• Healthcare expenditure at 9.3% of GDP</li> <li>• Government/compulsory spending 69.3% of total health expenditure<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Regulation and agencies split across the Federal Government (e.g., the Australian Commission on Safety and Quality in Health Care) and the States and Territories (e.g., the Clinical Excellence Commission in New South Wales)<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population : 25.37 million</li> <li>• Land area: 7.69 million km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 3.3<sup>h</sup></li> </ul>
<b>Japan</b>	<ul style="list-style-type: none"> <li>• Universal health insurance scheme provided by two types of plans: Social Health Insurance (SHI) for those in employment, and National Health Insurance (NHI) for those not covered through SHI.</li> <li>• Free access to healthcare providers (hospitals and private practitioners).<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Insurance premiums subsidized by tax with 10-30% co-payment.</li> <li>• Healthcare expenditure at ~10.9% of GDP.</li> <li>• Government/compulsory spending 84.1% of total health expenditure<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Regulation on quality and safety in healthcare institutions is based on Medical Care Act setting standards.</li> <li>• Inspections are conducted by central and local government agencies (Regional Bureaus of Ministry of Health and Welfare; Prefectural Health Departments)<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population : 126.26 million</li> <li>• Land area: 377,975 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 334<sup>h</sup></li> </ul>
<b>Netherlands</b>	<ul style="list-style-type: none"> <li>• Universal health coverage through mandatory</li> </ul>	<ul style="list-style-type: none"> <li>• Mixed system of insurance and taxation-based financing.</li> <li>• Healthcare expenditure at ~9.9% of GDP.</li> </ul>	<ul style="list-style-type: none"> <li>• National Health Institute responsible for setting</li> </ul>	<ul style="list-style-type: none"> <li>• Population : 17.33 million</li> <li>• Land area: 41,873 km<sup>2</sup></li> </ul>



	<p>insurance. Decentralised, 'regulated competition' system with private insurers and providers <sup>c</sup></p>	<ul style="list-style-type: none"> <li>• Government/compulsory spending 82.1% of total health expenditure. <sup>g</sup></li> </ul>	<p>standards; quality and safety supervised by Health and youth care inspectorate. <sup>c</sup></p>	<ul style="list-style-type: none"> <li>• Inhabitants per km<sup>2</sup>: 414 <sup>h</sup></li> </ul>
<b>Norway</b>	<ul style="list-style-type: none"> <li>• Semi-decentralized system, parliament as decision-making body. State ownership of hospitals administered by four Regional Health Authorities (RHAs).</li> <li>• The Norwegian Board of Health Supervision is a national regulatory body, organized under the Ministry of Health and Care Services. County governors at the regional level oversee services within primary and specialized healthcare. <sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Tax-based system, limited out of pocket payment</li> <li>• Healthcare expenditure at ~10.2% of GDP</li> <li>• Government/compulsory spending 85.5% of total health expenditure <sup>g</sup></li> </ul>	<p>Comprehensive legislation regarding child welfare, health and social services:</p> <ul style="list-style-type: none"> <li>• requirements for quality of services</li> <li>• regulations for authorized healthcare personnel</li> <li>• service user rights</li> </ul> <p>Supervision applies to all statutory services (municipalities, private businesses, publicly owned hospitals, etc.). <sup>d</sup></p>	<ul style="list-style-type: none"> <li>• Population : 5.33 million</li> <li>• Land area: 385,207 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 13.8 <sup>h</sup></li> </ul>
<b>Switzerland</b>	<ul style="list-style-type: none"> <li>• Universal, government regulated insurance system of around 60 private health insurance companies that offer mandatory basic coverage. <sup>e</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Full or partial government subsidies for insurance policies provided based on age and income.</li> <li>• Healthcare expenditure at ~12.2% of GDP.</li> <li>• Government/compulsory spending 63.7% of total health expenditure. <sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• LAMal (Swiss Federal Law on Health Insurance) provides structure for and governance of the current healthcare system. <sup>e</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population : 8.51 million</li> <li>• Land area: 41,285 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 206 <sup>h</sup></li> </ul>

<b>United Kingdom</b>	<ul style="list-style-type: none"> <li>• Universal public healthcare system through the National Health Service (NHS).<sup>f</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Free at the point of care delivery. Funded through general taxation.</li> <li>• Healthcare expenditure at 9.8% of GDP.</li> <li>• Government/compulsory spending 77.1% of total health expenditure.<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Healthcare regulator (CQC) conducts inspections and rates quality</li> <li>• Complex layers of regulation and oversight, including independent investigator, improvement body and accreditation requirements.<sup>f</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Population : 66.27 million</li> <li>• Land area: 242,495 km<sup>2</sup></li> <li>• Inhabitants per km<sup>2</sup>: 273<sup>h</sup></li> </ul>
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Note: <sup>a</sup> [35], <sup>b</sup> [36-38], <sup>c</sup> [39], <sup>d</sup> [40], <sup>e</sup> [41,42], <sup>f</sup> [43], <sup>g</sup> [44], <sup>h</sup> [45]

A sampling framework will be developed to select two hospitals in each country, ensuring variability in size, location and teaching status. Within each hospital, four teams will be selected to represent each of the structural, hybrid, responsive and co-ordinating types of teams. Eight teams will therefore be studied in each country, creating a total sample of 48 teams. Table 2 details the team sampling. A detailed description of team types will be developed to assist selection in each country, based on in-depth discussion with the international research team. Differences in healthcare structures between countries will require in-depth discussion to understand and clearly define team types and the criteria for team selection.

**Table 2. Overview of proposed team sampling framework**

Team types	Example teams	Hospital A – Large teaching hospital	Hospital B – Small non-teaching hospital
Structural	Ward team caring for paediatric or elderly patients. Co-located, stable membership	1	1
Hybrid	Acute Admissions Unit (short stay unit) for patients referred from Emergency Department. Combination of stable and rotating membership	1	1
Responsive	Emergency response team for patients experiencing cardiac arrest. Diabetes team responding to inpatients with diabetes Membership may vary but the team responds to well defined needs	1	1
Co-ordinating	Multi-disciplinary team which meets regularly to discuss and plan the care of specific patients, as cancer patients or	1	1

	rehabilitation ward patients. Membership may vary but involves co-ordination across organisational units.		
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## Phase 2 – Within country case studies

The aim of the case studies is to understand in-depth how effective adaptive teams can be designed and supported. To do this, the study will identify the environmental pressures that create the need for adaptation, how teamwork skills contribute to adaptive capacity in each type of team, and how it is supported or hindered by organisational and healthcare system factors. The types of teams studied include those operating at the micro level (structural and hybrid), and the meso level (responsive and co-ordinating), generating data about micro and meso level adaptation. In-depth qualitative data will be collected over a period of three months in each hospital using the following methods:

**General observations and documentary analysis.** Observations will initially be broad and aim to map the team context, including types of patients, key tasks, processes, demands, challenges, performance measures, team membership and management structures. Organisational documents will be content analysed to identify the context of teamwork. Data will be thematically analysed to comprehensively describe the organisational context for teamwork.

**Observations of adaptive teamwork.** Tasks requiring team communication and co-ordination such as ward rounds, briefings, meetings and handover, will be identified during step 1 (above), and observed multiple times to account for differences due to such factors as time of day, change of staff and patient numbers. The focus at this stage will be on understanding how work is structured and organised and how teams co-ordinate their activities. Researchers will then shadow different team members to observe their activities and discuss their work to clarify their aims, problems encountered, solutions found and any other contextual factors that require clarification. Data will be captured using detailed field notes entered into a data collection template. The template will be structured to facilitate documentation of key theoretical and conceptual resilience components inspired by some of our recent work [1,5,18,23,46] and the system activities underpinning adaptive capacity. These include e.g. demand-capacity misalignments, adaptations, outcomes, anticipating, monitoring, co-ordinating, responding and learning. Observers will be trained in using this template and team discussions during the data collection process will assist with problem solving, interpretation and reliability across cases. The field notes will be analysed thematically and described qualitatively to allow understanding of the subtleties and nuances of adaptive teamwork.

**Interviews.** A sample of 4-5 staff in each team and 4-5 staff at managerial levels will be interviewed. A sampling frame will be developed to ensure that a representative sample of professions and levels of seniority is interviewed. A topic guide will be used for semi-structured interviews to probe staff perceptions of teamwork capacities. Topic guides will be tailored to the context of each team. Example topics, based on recent conceptual work in the RIH programme [1,46] and previous experience researching resilience in healthcare,[23,47] include:

- perceptions of the quality of teamwork, including communication, collaboration, learning, and inclusion of the patient's perspective by the team;
- variability experienced in processes and performance;
- local adjustments of procedures to meet changing demands;
- individual and team adaptations;
- cognitive, behavioural, and procedural strategies for managing variability and change;

- interactions with external actors such as regulators, industry representatives, insurers; and
- activities that enable teams to adapt, such as ability to anticipate, respond, monitor and learn.

Interviews will also be an opportunity to clarify observational data and ask further questions about individual perceptions and experiences. Interviews will be audio recorded, transcribed and analysed thematically to identify the key factors that influence team adaptation and their mechanisms.

Data will be analysed in each country according to a standardised template. In previous work the CARE model [5] has been used for conceptualising adaptation as a response to changes encountered in the healthcare environment that originate in a mismatch between demand and capacity. The model has since been expanded to include factors that stimulate adaptation and processes through which adaptations occur.[48] The original and adapted CARE models will be used deductively to code concepts such as environmental changes, demand, capacity, and adaptation. Additionally, a new framework for defining and operationalizing adaptive capacity will be used to guide data analysis in addition to other recent conceptual work [1,18,23]. The Integrated Resilience Attributes Framework [35] defines the types of activities that support adaptation at different scales of a system. For example, learning is required for system resilience, but different learning actions are required depending on whether adaptation is occurring by readjusting processes, reorganising resources, or reconfiguring how resources are produced in a system. Using this framework together with the previously described models will facilitate a fine-grained analysis of healthcare activities and ensure that the analysis is theoretically coherent. New factors not accounted for by the models and framework will also be identified inductively.

All researchers will discuss and review emerging results from the analysis so that insights can be shared across countries, increasing the reliability of the analysis. This will ensure comparability between the case studies and increase the rigour of the process. Case study reports will be produced in each country, written in English, and structured according to an agreed template.

### Phase 3 – Cross-country comparative analysis and guidance

A cross case comparative analysis will be conducted to synthesize and compare findings across the six countries to identify how adaptation at the team level is shaped, constrained and facilitated by team, organisational and healthcare system factors. The qualitative analysis will be based on identifying explanatory mechanisms, comparing concepts across cases, refining concepts, and exploring relationships and patterns. The analysis will generate an account of the multiple influences enabling or hindering team adaptive capacity. Although cross case analysis is challenging, we will use the Qualitative Comparative Analysis method (QCA),[49] which was developed specifically to facilitate comparison between case studies. QCA provides both an approach and suggested techniques for summarising data, building explanatory models and visualising results of the comparison. This approach can consider the roles and outcomes of multiple causal factors, which will be a feature of the data generated in this study. The cross-case comparison will also be used to identify guidance about how adaptive capacity in healthcare teams can be enabled based on in depth analysis of the multiple situational and structural influences on team adaptive capacity.

### Effect of the COVID-19 pandemic on data collection

The continuing effect of the pandemic on healthcare systems worldwide means that it is uncertain when researchers will be able to collect data in person in hospital settings. In many countries, activity that involves risk to researchers is restricted by universities, ethics committees and healthcare organisations, unless absolutely necessary. It is not clear when these restrictions might be lifted and so contingency plans for completing this study have been developed. If necessary, interviews will be

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3 carried out before observations, thereby postponing the observation phase to a time when clinical  
4 access might again be possible. In this case, interview findings will inform how the observations can  
5 be focused on areas requiring further exploration. If observations are still not possible at a later time,  
6 we will focus on conducting further individual interviews, alongside group interviews and focus group  
7 interviews, with a larger more heterogeneous sample to probe experiences and perceptions of  
8 teamwork in more depth. In this case, the results from the initial round of interviews will inform the  
9 development of topic guides for a second round of interviews.  
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12 The pandemic has required health services to respond quickly to an uncertain and fast developing  
13 crisis in the absence of knowledge and experience about the virus. Adaptive responses by frontline  
14 clinicians have been vitally important in the overall response and can inform our understanding of  
15 adaptation and how it emerged and was supported or hindered. This will be important in planning for  
16 and supporting resilient systems in the future. As more information emerges about how healthcare  
17 systems responded we will include questions about responses to COVID-19 in the interview topic  
18 guides.  
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## 22 Research team co-ordination

23 The study will involve a large international team of researchers. Regular opportunities for  
24 communication and co-ordination will be arranged, including regular online meetings with the whole  
25 team to discuss overall progress and solve problems, ad hoc meetings with selected members to  
26 discuss and clarify relevant concerns, and annual face-to-face meetings of the whole team in Norway  
27 to share progress, findings and plan activities. Other ad hoc meetings may also be possible at  
28 conferences such as the annual Resilient Healthcare Net meeting.  
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## 32 Patient and Public Involvement statement

33 Patient and Public Involvement (PPI) representatives were involved in the development of the  
34 proposal for the overall RiH research programme [33], of which this study protocol is a key component.  
35 The RiH research programme furthermore has a patient and citizen representative as co-chair of its  
36 international Expert Advisory Board, who has been involved in the project development and has  
37 contributed to key aspects of its design. The RiH research programme also has a dedicated Patient and  
38 Stakeholder Involvement (PSI) work package, which aims to systematically involve patients and key  
39 stakeholders in multiple ways across the programme. The key outcome for the PSI work package is to  
40 develop and test a conceptual model for how PSI in RiH can be understood and improved. For the  
41 international comparative study, local PPI representatives or PPI panels in each of the six countries  
42 will be consulted during the planning and conduct of the study. Patients and other stakeholders will  
43 also be involved in overall public engagement activities and in translating research into practice in  
44 several local languages and cultural contexts. The entire RiH research project is oriented around  
45 quality as the outcome of resilient healthcare [1]. Developing better methods for involving patients  
46 and stakeholders in RiH, while improving the overall quality of healthcare systems will benefit patients  
47 as recipients of healthcare services.  
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## 55 Ethics and dissemination

56 The overall RiH research programme has been granted ethical approval by the Norwegian Centre for  
57 Research Data (Ref. No. 8643334). Ethical approval for this international study will also be sought in  
58 due course in each country as required by each country's internal research regulatory procedures.  
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3 Raw data will not be transferred internationally. Individual country case reports of the findings in each  
4 country will form the basis of the cross-case comparison and will contain only illustrative examples  
5 and anonymized quotations from the raw data. Anonymized data only will be reported in all outputs.  
6

7 A detailed report of the study outcomes will be produced for dissemination on the international  
8 research partner websites. Examples of organisational and regulatory support for adaptive capacity  
9 will be identified to enable learning from success. A collection of case study summaries will be  
10 compiled and made freely available on the Centre for Resilience in Healthcare ([www.uis.no/share](http://www.uis.no/share))  
11 website. These outputs will also be translated into the language of each participating country, to be  
12 shared on research partners' websites. Brief policy communications will be produced to inform policy  
13 makers and regulators about the results of the study and to facilitate translation into practice.  
14

15 Academic dissemination will occur through publication in journals specialising in health services  
16 research. Findings will be presented at healthcare conferences, including the annual Resilient  
17 Healthcare Net meeting and other quality and safety conferences. Presentations at practitioner and  
18 academic conferences will include workshops to translate the findings into practice and influence  
19 quality and safety programs internationally.  
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## 23 Discussion

24 This cross-country comparative study aims to increase knowledge about how resilience is enabled in  
25 healthcare systems by examining the adaptive capacity of selected hospital teams in six countries. It  
26 will identify how team skills, organisational and national healthcare system factors support or hinder  
27 the ability of teams to adapt to variability and changes. The study's findings are anticipated to provide  
28 insights into how the design of resilient healthcare systems should consider the ways in which macro  
29 and meso level structures support team adaptive capacity at the micro level. The study will produce  
30 evidence about how this can be done and will develop guidance for organisations and policy makers.  
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34 A focus of much RHC research has been the identification of relatively static policies and procedures  
35 that can be unhelpful to clinicians and staff as they seek to cope with the dynamic nature of healthcare  
36 work.[12] For example, Work-As-Imagined is a core RHC concept that focuses attention on how  
37 policies do not fit the reality of practice and so act to hinder rather than support clinical work.[50]  
38 However, governmental frameworks can also be enabling, and this study will investigate the question  
39 of whether and how such macro frameworks can be helpful in supporting adaptive capacity.[23,51,52]  
40 Moreover, there is an unresolved question about how much adaptation is beneficial. Badly designed  
41 systems may require constant adaptation as clinicians attempt to compensate for problems that could  
42 be prevented by good design,[5] and it may be possible that constant adaptation creates additional  
43 problems in clinical work.[53,54]  
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48 The study is focused on teams as the key resilience mechanism in hospital organisations. Teamwork is  
49 known to be difficult in healthcare due to constantly changing team membership, interprofessional  
50 differences in education, culture, and expectations, perceived and actual power hierarchies and power  
51 differentials, and the episodic nature of teamwork.[31] Moreover, teams are varied and often not  
52 clearly defined. Individuals are likely to work in multiple different teams.[32] For example, ward nurses  
53 may belong to a nursing team, a multi-disciplinary team of doctors, nurses and allied health  
54 professionals, and a co-ordinating team such as a bed management team. In this study, we focus on  
55 four basic team types identified in previous research, thus ensuring consistency of team definitions  
56 across case study countries and providing a theoretical rationale for sampling. This will also expand  
57 the evidence base about teamwork in healthcare, which has focused mostly on stable teams with well-  
58 defined, time limited tasks, such as surgery and trauma medicine.  
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3 The study will extend the theory of Resilient Healthcare. Most RHC studies have focused on the micro  
4 level and used a descriptive approach to understand how adaptation facilitates the delivery of  
5 care.[16] This study will pose causal questions about how adaptive capacity can be supported and  
6 aligned across multiple system levels. It is not possible to conduct an experimental trial to answer such  
7 causal questions, but multiple case study designs are commonly used to answer similar questions that  
8 are not suited for experimental designs. The multi case study design [34] will enable comparison  
9 between different types of teams, organisations and healthcare systems, the identification of  
10 relationships and patterns in the data, and lead to theory generation and greater understanding of  
11 how adaptive capacity can be supported in healthcare teams.  
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15 The study forms part of a larger research programme designed to advance the theory and practice of  
16 RHC by developing theory and methods, studying the role of patients, implementing and evaluating  
17 interventions to increase resilience and supporting collaborative learning about RHC.[33] Although  
18 implementing interventions is not the purpose of the current study, intervention testing will be part  
19 of the overall work of the SHARE Centre and in the Norwegian part of the RiH programme. The results  
20 from this multinational study will inform this future work.  
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## 23 Data statement

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25 The datasets generated during and/or analysed during the study will be available from the  
26 corresponding author on reasonable request.  
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28

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30  
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33

## 34 Author Contributions

35  
36 JEA is the principal investigator of the work package featuring the international comparison, drafted  
37 the original manuscript, and contributed to revisions and additions to the manuscript. KA, SW and VG  
38 contributed with substantial intellectual content in the study design, drafted parts of the original  
39 manuscript, and contributed to the revision of the manuscript. RB, MB, JB and KN contributed to the  
40 study design, drafted parts of the original manuscript, and contributed to manuscript revisions. All  
41 authors approved the final version of the manuscript.  
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## 52 Competing interests

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54 None declared.  
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## 57 Patient consent for publication

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59 Not required  
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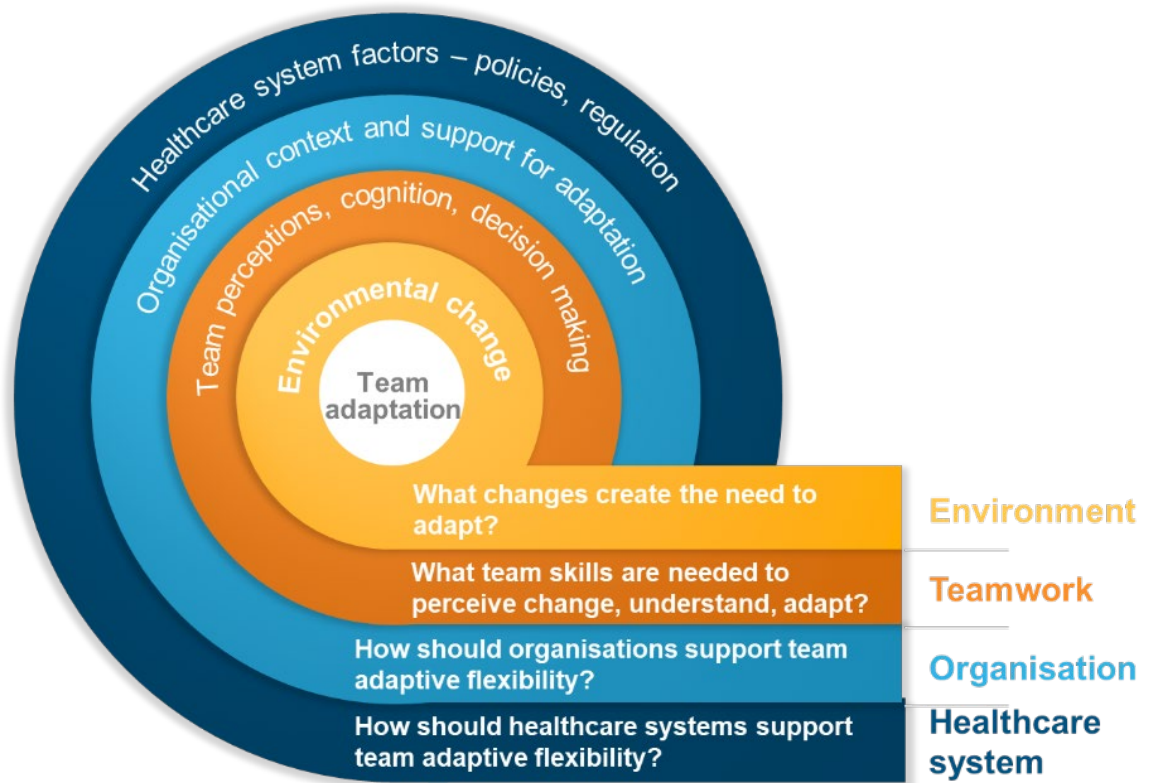


Figure 1. Adaptive Teams Framework and research questions