Anderson, J. E., Ross, A. J., Back, J., Duncan, M., Snell, P., Hopper, A., & Jaye, P. (2020). Beyond 'find and fix': improving quality and safety through resilient healthcare systems. *International Journal for Quality in Health Care*, *32*(3), 204-211.

Beyond 'find and fix': Using resilience principles to improve quality and safety

Anderson JE, [1]* Ross AJ, [2] Back J, [3] Duncan M, [4] Snell P, [5] Hopper A, [6] & Jaye P. [7]

[1] Florence Nightingale Faculty of Nursing, Midwifery & Palliative Care, King's College London janet.anderson@kcl.ac.uk

[2] Dental School, School of Medicine, University of Glasgow alastair.ross@glasgow.ac.uk

[3] Florence Nightingale Faculty of Nursing, Midwifery & Palliative Care, King's College London jonathan.back@kcl.ac.uk

[4] Department of Psychology, IOPPN, King's College London myanna.duncan@kcl.ac.uk

[5] Patricia Snell Healthcare Consulting patriciasnell21@gmail.com

[6] Guy's and St. Thomas' NHS Foundation Trust, London, UK adrian.hopper@gstt.nhs.uk

[7] Simulation and Interactive Learning (SaIL) Centre, St Thomas' Hospital, King's Health Partners, London, UK Peter.jaye@gstt.nhs.uk

Correspondence to:

Dr. Janet Anderson
King's College London
Florence Nightingale Faculty of Nursing, Midwifery and Palliative Care
James Clerk Maxwell Building
57 Waterloo Road
London SE1 8WA
janet.anderson@kcl.ac.uk

Anderson, J. E., Ross, A. J., Back, J., Duncan, M., Snell, P., Hopper, A., & Jaye, P. (2020). Beyond 'find and fix': improving quality and safety through resilient healthcare systems. ***International Journal for Quality in Health Care*****, *32*(3), 204-211.**

ABSTRACT

Beyond 'find and fix': Improving quality and safety through resilient healthcare systems

Objective

The aim was to develop a method based on resilient healthcare principles to proactively identify system vulnerabilities and quality improvement interventions.

Design

Ethnographic methods to understand work as it is done in practice using concepts from resilient healthcare, the CARE model, and the four key activities that are proposed to underpin resilient performance – anticipating, monitoring, responding and learning.

Setting

Accident and Emergency Department (ED) and the Older People's Unit (OPU) of a large teaching hospital in central London

Participants

ED - observations 104 hours, and 14 staff interviews. OPU - observations 60 hours, and 15 staff interviews.

Results

Data were analysed to identify targets for quality improvement. In the OPU discharge was a complex and variable process that was difficult to monitor. A system to integrate information and clearly show progress towards discharge was needed. In the ED patient flow was identified as a complex high intensity activity that was not supported by the existing data systems. The need for a system to integrate and display information about both patient and organisational

factors was identified. In both settings adaptive capacity was limited by the absence of systems to monitor the work environment.

Conclusions

The study showed that using resilient healthcare principles to inform quality improvement was feasible and focused attention on challenges that had not been addressed by traditional quality improvement practices. Monitoring patient and workflow in both the ED and the OPU were identified as priorities for supporting staff to manage the complexity of the work.

Keywords – Resilient Health Care, Complex systems, Elderly care, Emergency care, Discharge, Patient Flow

INTRODUCTION

Although there is increasing recognition that healthcare organisations are complex sociotechnical systems [for example, 1, 2] there has been little exploration of what this means for improving the safety and quality of care [3]. Complex systems are open systems that are exposed to variability in the environment in which they operate. In healthcare, this means for example that patient flow and the demands of providing care cannot be fully predicted or fully specified in advance [4]. The system thus relies for safety and quality on its ability to respond to these demands appropriately and adapt to situational pressures. Complex systems also comprise multiple interacting components including individuals, teams, organisational units, managerial structures, equipment and devices, physical infrastructure and processes for delivering care. Outcomes emerge from interactions between these aspects of the care system which are often nonlinear, making it difficult to predict the effect of inputs such as quality improvement initiatives [4].

Despite increasing recognition of complexity as a hallmark of healthcare systems, quality improvement efforts in hospitals continue to focus on isolating discrete problems, identifying their antecedents and implementing interventions designed to remove the antecedent and thus solve the problems in a linear fashion. This 'find and fix' model seems increasingly incongruent with new understanding of complexity, non-linearity and emergence in healthcare systems [5]. New quality improvement methods designed to work with complexity and aiming to support adaptive responses are needed to increase the pace of change and the success of interventions.

In this paper we present a study based on the growing literature and evidence base arguing for a paradigmatic shift in quality improvement. The results add evidence of the value of the approach and its potential to increase the effectiveness of quality improvement efforts. The resilient systems approach to quality improvement which we propose, incorporates insights from systems theory and resilient healthcare theory, and moves beyond finding and fixing existing problems, or retrospectively focusing on antecedents of events that have already occurred. We will show how

studying systems in this way can lead to new interventions for improvement that have the potential to strengthen organisational processes prospectively. In the rest of the introduction we briefly review the shortcomings of current approaches to quality improvement before discussing the philosophical basis of resilient systems.

Problems with current quality and safety methods

Despite the success of some focused initiatives such as the WHO surgical checklist, and concerted efforts to improve, safety remains a problem for healthcare systems and approximately 10% of patients experience harm during their hospital treatment, [6,7]. We argue that new methods and approaches are needed if further gains are to be made. Critiques of current quality and safety methods have identified several linked underlying assumptions, namely: that care can be decomposed into a series of discrete tasks; that reduction of variation in each task will lead to a cumulatively safe system; and that adverse events are primarily caused by noncompliance with policies and procedures, including errors, violations, and failures [4,8]. These assumptions have led to reliance on incident reporting and other methods to identify events where outcomes are suboptimal with the aim of fixing their causes.

One effect of basing quality and safety interventions on previous incidents, or identified problems, is that the aim of the intervention is clear- to stop recurrence – and this provides reassurance about the value of the activity, even if this reassurance is misplaced. Other formal quality improvement methodologies not based on responding to an incident often focus on reducing problematic variation (e.g. in outcomes) and/or inefficiency in processes. For example, clinical audits focus on identifying compliance with best practice, but effectiveness is often limited by organisational barriers [9]. Lean Six Sigma targets interventions by identifying how to reduce inefficiencies and waste of resources and increasing the value and reliability of processes [10,11,12], but there is doubt over the suitability of this approach to healthcare [13]. Thus, to date it has been assumed that quality and safety can only be approached by first identifying pre-defined problems (events, errors,

waste, variation) and subsequently setting targets for their reduction. These different activities are often collectively described as the "find and fix" approach to quality and safety [6] as a contrast to developing solutions based on an understanding of the flexible, adaptive nature of healthcare work.

Resilient systems

Resilient healthcare is a theoretically coherent set of principles for understanding safety and quality in complex systems. A set of foundational concepts can be identified from a series of monographs [14,15,16]. First, the approach is proactive and aims to increase the capacity of workers to anticipate disturbances and challenges and prevent problems before they occur. Second, safety and harm are viewed as emergent properties of system complexity and therefore, third, it is crucial to understand the skilled performance of work in a complex system as the reality is likely to differ from how work is imagined in policies and procedures. Fourth, safety should not be defined solely as the absence of errors or unwanted events. Event frequencies are a highly unreliable way of measuring system performance, and a poor indicator of whether a unit, department or organisation is operating well under pressure, or in a risky way where adverse events are more likely occur [3].

The philosophical basis of resilient healthcare is thus well articulated but untested and there is little evidence about its efficacy for quality improvement. We contend that the power of these ideas lies in moving beyond descriptions of resilient performance to directly informing quality improvement efforts and this is now being echoed by others [17]. In this paper we provide an overview of how resilient principles can inform quality improvement and show how they move the focus of improvement efforts from 'finding and fixing problems' to strengthening system performance.

Resilience concepts

Theory and concepts from the Concepts for Applying Resilience Engineering (CARE) model and resilient healthcare provided the foundation of the study. The design and methods were guided by the CARE resilience model [3], which focused attention on misalignments between demand and

capacity (such as staff shortages, equipment breakdown); staff adaptations in response to misalignments; and emergent outcomes. The model is described in more detail in the published study protocol [3]. We also employed theoretical concepts from resilient healthcare theory, namely goal trade-offs and the four activities which are proposed as having the potential to increase system resilience. (see below).

Resilient systems are proposed to carry out four activities that underpin adaptive capacity – **anticipating** future demands such as increased need for specific services, **responding** to demands such as the needs of patients, **monitoring** the system for emergent problems such as a sudden influx of patients or sudden patient deterioration, and **learning** from results, both good and bad [18]. Although these activities have been proposed as key for resilient performance there has been little research examining whether and how they are related to improving quality and safety. We drew on these concepts to analyse our qualitative data and to identify and conceptualise interventions, reasoning that if these four activities are fundamental to resilience, interventions should aim to increase capacity in the work system by enhancing and supporting them.

Aim

The aim of the study was to test and develop the application of resilient healthcare principles as a basis for identifying quality improvement interventions. The goal was to proactively identify system vulnerabilities that could be targeted with quality improvement interventions. The study used qualitative ethnographic methods to understand work as it is done in practice and identify how work systems could be strengthened.

METHOD

Settings

The research was conducted in the Accident and Emergency Department (ED) and the Older People's Unit (OPU) of a large teaching hospital in central London. These sites were chosen because they are

acute medicine subsystems that are dissimilar in: the types of clinical problems that are dealt with; the predictability of demand over short time spans; whether there is a multi-disciplinary co-located team to provide care; and the timescale over which care, and treatment are delivered. These contrasts allowed us to test the usefulness and applicability of resilience principles in different environments.

Ethical Approval

The study was approved by King's College London Psychiatry, Nursing & Midwifery Research Ethics Committee (PNM/13/14-67) and by Guy's & St. Thomas' NHS Trust R&D Department.

Data Collection

Data were collected in iterative cycles of non-participant observation and ethnographic interviews, followed by semi structured interviews. There were 30 observation sessions in the ED totalling 104 hours and 14 interviews lasting between 45 and 90 minutes. In the OPU there were 23 observation sessions lasting 60 hours in total and 15 interviews lasting between 45 and 90 minutes.

Data Analysis

All data were handled in QSR NVivo 10 software. Initial coding was done by MD and JB under the supervision of experienced qualitative researchers JA and AR. Further iterative cycles of coding and refinement involved the whole research team to increase the rigour and reliability of the analysis.

The first step was a coarse-grained thematic analysis to inductively identify relevant data and classify it into broad themes capturing the main domains of activity in each setting. The final activity themes for each department are shown in Figure 1, which contains a map of the inductive themes identified and provides an overview of the context of each unit. Extended resilience narratives were then written for each theme. Data were integrated from different sources to describe in detail how work was accomplished in each department.

The narratives were reviewed by clinical members of the research team for accuracy, omissions and alternative interpretations of the data and revised based on their feedback. The resilience narratives were then coded deductively using concepts from resilient healthcare theory, the CARE model [3] and the four key activities that are proposed to underpin resilient performance. These were;

a. Misalignments between demand/pressure and capacity
b. Variability – what varies and why?
c. Adaptations – response to misalignments, variability, opportunity
d. Goal trade-offs and prioritising decisions
e. Anticipation – how are future developments planned for?
f. Monitoring – how is the system status monitored and linked to anticipation and/or response?
g. Responding – what are the responses to variability, misalignment, monitoring data?
h. Learning – how is previous experience captured, analysed and used for learning?

The final coded narratives comprised descriptions of the work system using the interpretive lens of resilient healthcare theory.

Opportunities for quality improvement interventions were then identified through a systematic, interpretive process involving the whole research team. The process involved analysing the coded narratives to identify sources of pressure, responses and the effectiveness of those responses. Where there was evidence of chronic pressures or inadequate responses, the potential for strengthening the four activities that underpin resilient performance was explored and the effect such strengthening might have on the trajectory of the narrative was considered.

RESULTS

In the following sections we describe one narrative theme from each setting and show how the data were used to identify how to strengthen organisational processes to support resilience. Tables 1 and 2 summarise the findings in the Older Persons' Unit and the Emergency Department respectively.

OPU Discharge planning

Discharge planning was a complex process involving multiple members of the multi-disciplinary team co-ordinating their work. Although a patient's anticipated discharge date was established at admission, it was often revised and updated based on the patient's progress. Although discharge was a clear priority, data showed that it was difficult for staff to monitor the status of ongoing activities and/or completion of tasks necessary for timely discharge. There was not a protocol for the complex process of delivering treatment, monitoring progress on clinical goals, preserving patients' current level of functioning, co-ordinating an array of home and social care services in time for discharge, and liaising with family.

Implications for improvement

Successful discharge relied on the ability of staff to respond appropriately to constantly changing contextual factors. Considering this, it would not be feasible and could be counter-productive to attempt to fully standardize the process, for example via a new protocol. It would be almost impossible to design protocols to match all the situational variability that we observed. Resilient healthcare theory proposes that adaptive capacity is reliant on being able to monitor the work system; without the ability to see and understand the state of the system being controlled it is difficult to know what needs to be done and to respond in time.

The consensus achieved through the staff engagement process was that resilience would best be enhanced in the first instance by an intervention to support monitoring of progress towards discharge, the aim being to reduce variability in outcomes (delay) by allowing more efficient anticipation and response during the process. An information artefact, available to all team members, could be designed to support their ability to monitor each patient's progress towards discharge and to facilitate team communication and co-ordination. Further empirical work is now needed to ascertain the best content and layout of information for the display and to evaluate the effect on adaptive capacity and discharge timeliness.

Emergency Department Patient flow management

The ED is a different but similarly complex subsystem to the OPU with multiple locations for streaming patients with particular needs, multiple waiting areas for different tests and interventions, multiple enclosed treatment cubicles and difficult performance targets for patient throughput (currently 4 hours for 90% of patients). It was therefore challenging to monitor the state of the system and maintain awareness of the current load on the system and capacity to meet that demand. Typically, stress on the system was perceived when patient numbers at designated points in the department (for example, triage) began to exceed capacity to treat them. By the time individual clinicians perceived this pressure, it was often too late to act to prevent delays. Early response was vital to avoid lengthened waits and increased numbers of target breaches.

Implications for improvement

Our data showed that managing patient flow is not a trivial task given the complexity of the environment and the unpredictability of patient numbers and acuity. A real-time digital system to monitor flow via an integrated set of core indicators (including patient and organisational factors such as numbers of patients already in the system and staffing levels) would support adaptive capacity in the ED by visualising variable demands and enabling staff to anticipate problems and respond in a more targeted and effective way when required.

Healthcare technology has been primarily focused on individual patient records, or single variable run charts, neglecting the importance of monitoring system performance. Without an accurate view of demands and risks to quality staff cannot respond to problems in a timely or effective way.

DISCUSSION

This study has shown that it is feasible to use resilient healthcare theory to understand work as it is done in practice, identify weak processes, and propose interventions designed to strengthen adaptive capacity. In-depth ethnographic observations and interviews showed that difficulties with

discharge planning and planning the delivery of care, emerge in part from a lack of systems to monitor and track the progress of the many components of clinical work. This hampers the ability to manage care, which is characterised by uncertainty, dynamism and non-linearity.

In this study we found that the lack of a shared artefact to manage tasks impeded timely discharge. The need for artefacts to support shared team understanding and communication has been highlighted by researchers in different fields [19,20,21] but continues to be a neglected aspect of technology development and quality improvement in healthcare that deserves more attention. The use of resilience concepts has highlighted the complexity and emergence involved, and focused attention on the need to support staff co-ordinating their work and adapting to this complexity.

Many studies have identified factors that impede successful discharge, such as communication problems and unhelpful structures [e.g. 22,23]. Although there have been many investigations of discharge planning, some using qualitative methods to understand staff and patient perspectives [24,25,26], these have largely focused on standardised tools and processes to address problems [27]. The approach described here differs, in that the aim is to study how to engage with the complexity and dynamism involved in discharge planning, rather than assume this can always be 'ironed out' by fully streamlining the process.

The mandated patient flow target in EDs nationally and in many other countries underestimates the complexity involved in maintaining efficient and safe patient throughput in response to input demand variability and limited and variable organisational resources. Previous studies of patient flow in emergency departments have focused on solutions such as reducing admissions of unsuitable patients, reducing inefficiencies in processes such as triage, and receiving test results, and increasing output by using discharge lounges and identifying bed availability early in the patient journey [28,29]. Our results focused on the need to visualise the load on the system so that experts could

detect and solve problems efficiently. This would better support human decision making than current systems that yield only a partial view of the system to be controlled.

The resilient healthcare approach described in this paper can be summarised as follows:

1. Focus on understanding work as it is done in practice
2. Maintain a neutral stance about what the problems and difficulties are
3. Study how goals are achieved despite difficulties and understand in depth the contextual factors that challenge workers
4. Use resilient healthcare concepts to look for aspects of the work system that do not support workers as they grapple with the complexity and dynamism of the work
5. Identify potential solutions that would better support worker adaptation to challenges

This approach contrasts with current improvement practices that focus on first finding problems (incidents, or unwanted variances) then fixing the causal processes. Although some problems must of course be studied, and actions taken, we argue that there is now a need for a step change and significant rebalancing of how healthcare organisations, supported by regulatory frameworks, approach improvement. Because resilient healthcare emphasises the capacity of a system to self-correct and cope with disturbances the focus moves beyond reliability and compliance towards improving the adaptive capacity of the system and supporting people in dealing with organisational complexity and demands. Safety and quality are strengthened by enabling workers to adapt safely to changing conditions, through a deep understanding of the whole system, rather than by fixing piecemeal one isolated issue at a time. The goal is to create robust and flexible organisational processes.

Strengths and Limitations

The strengths of this study were the in-depth data collection, the conceptual basis and theory driven analysis, and the existence of a pre-published protocol. It was a single site study, which could be

viewed as limiting generalisability, but which was deemed appropriate given the in-depth data collection, systems focused analysis and the exploratory nature of the study. The methods are being tested further in different settings and organisations, including dental primary care, residential nursing homes and mental healthcare.

ACKNOWLEDGEMENTS

We acknowledge the assistance of the healthcare professionals who participated in the study.

FUNDING

This work was supported by Guy's and St. Thomas's Charity [grant number MAJ120811]

COMPETING INTERESTS

None

REFERENCES

1. Holden RJ, Carayon P, Gurses AP, Hoonakker P, Hundt AS, Ozok AA, Rivera-Rodriguez AJ. SEIPS 2.0: a human factors framework for studying and improving the work of healthcare professionals and patients. Ergonomics. 2013; 56a: 1669-86.
2. Braithwaite J, Runciman WB, Merry AF. Towards safer, better healthcare: harnessing the natural properties of complex sociotechnical systems. BMJ Qual Saf 2009; 18: 37-41.
3. Anderson JE, Ross AJ, Back J, Duncan M, Snell P, Walsh K, Jaye P. Implementing resilience engineering for healthcare quality improvement using the CARE model: a feasibility study protocol. Pilot and feasibility studies. 2016; 2: 61.
4. Hollnagel E. Safety-I and safety-II. Farnham. UK: Asghate, 2014.
5. Braithwaite, J. Clay-Williams, R., Nugus, P., & Plumb, J. (2013). Health care as a complex adaptive system. In Hollnagel, E., Braithwaite, J., & Wears, R. (Eds) Resilient Health Care. Ashgate, Aldershot. 57-76
6. Braithwaite, J., Wears, R.L. and Hollnagel, E., 2015. Resilient health care: turning patient safety on its head. *International Journal for Quality in Health Care*, *27*(5), pp.418-420.
7. Vincent, C. and Amalberti, R., 2016. Safer healthcare. *Cham: Springer International Publishing*
8. Hollnagel E, Wears RL, Braithwaite J. From Safety-I to Safety-II: a white paper. The resilient health care net: published simultaneously by the University of Southern Denmark, University of Florida, USA, and Macquarie University, Australia, 2015
9. Bowie P, Bradley NA, Rushmer R. Clinical audit and quality improvement–time for a rethink? Journal of evaluation in clinical practice. 2012; 18: 42-8
10. Radnor ZJ, Holweg M, Waring J. Lean in healthcare: the unfilled promise? Soc Sci Med 2012; 74: 364-71
11. Tolga Taner M, Sezen B, Antony J. An overview of six sigma applications in healthcare industry. International Journal of health care quality assurance 2007; 20: 329-40

12. Proudlove N, Moxham C, Boaden R. Lessons for lean in healthcare from using six sigma in the NHS. Public Money and Management 2008; 28: 27-34
13. Kaplan GS, Patterson SH, Ching JM, Blackmore CC. Why Lean doesn't work for everyone. BMJ Qual Saf 2014; 22: bmjqs-2014
14. Hollnagel E, Braithwaite J, Wears RL. editors. Resilient health care. Farnham, UK: Ashgate, 2013
15. Wears RL, Hollnagel E, Braithwaite J. editors. Resilient Health Care Volume 2: The Resilience of Everyday Clinical Work. Farnham, UK: Ashgate Publishing, 2015
16. Braithwaite J, Wears RL, Hollnagel E editors. Resilient healthcare. Volume 3: Reconciling work-as-imagined and work-as-done. Boca Raton, Fl: CRC Press, 2017
17. Righi AW, Saurin TA, Wachs P. A systematic literature review of resilience engineering: Research areas and a research agenda proposal. Reliability Engineering & System Safety. 2015; 141: 142-52
18. Hollnagel E. Safety-II in practice: developing the resilience potentials. Abingdon, Oxon: Routledge, 2018
19. Broome C, Adams A. What gets missed when deploying new technologies in A&E? Medical Informatics and the Internet in Medicine 2005; 30: 83-7
20. Artman H, Wærn Y. Distributed cognition in an emergency co-ordination center. Cognition, Technology & Work. 1999; 1: 237-46
21. Miller A, Weinger MB, Buerhaus P, Dietrich MS. Care coordination in intensive care units: communicating across information spaces. Human factors 2010; 52: 147-161
22. Victor CR, Healy J, Thomas A, Seargeant J. Older patients and delayed discharge from hospital. Health & social care in the community. 2000; 8: 443-52
23. Challis D, Hughes J, Xie C, Jolley D. An examination of factors influencing delayed discharge of older people from hospital. International journal of geriatric psychiatry. 2014; 29: 160-8

24. Kydd A. The patient experience of being a delayed discharge. Journal of nursing management. 2008; 16: 121-6
25. Nosbusch JM, Weiss ME, Bobay KL. An integrated review of the literature on challenges confronting the acute care staff nurse in discharge planning. Journal of clinical nursing. 2011; 20: 754-74
26. Hesselink G, Flink M, Olsson M, Barach P, Dudzik-Urbaniak E, Orrego C, Toccafondi G, Kalkman C, Johnson JK, Schoonhoven L, Vernooij-Dassen M. Are patients discharged with care? A qualitative study of perceptions and experiences of patients, family members and care providers. BMJ Qual Saf 2012; 21(Suppl 1): i39-49
27. White CM, Statile AM, White DL, Elkeeb D, Tucker K, Herzog D, Warrick SD, Warrick DM, Hausfeld J, Schondelmeyer A, Schoettker PJ. Using quality improvement to optimise paediatric discharge efficiency. BMJ Qual Saf 2014; 23: 428-36
28. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Annals of emergency medicine 2008; 52: 126-36
29. Oredsson S, Jonsson H, Rognes J, Lind L, Göransson KE, Ehrenberg A, Asplund K, Castrén M, Farrohknia N. A systematic review of triage-related interventions to improve patient flow in emergency departments. Scandinavian journal of trauma, resuscitation and emergency medicine 2011; 19: 43

TABLES

TABLE 1 SUMMARY OF FINDINGS – DISCHARGE PLANNING IN THE OLDER PERSONS' UNIT

Themes	**Summary of findings**
Misalignments between demand/pressure and capacity	Misalignments included • Lack of social services availability • Asynchronous communication with external agencies • Family requests and concerns • Equipment missing • Home environment not suitable for patient • Safeguarding issues
Variability	Efficiency of the discharge process varied greatly • Discharge dates are estimated and are updated frequently based on patient progress • Delays often occur because unavailability of support from social services, lack of specialist equipment, unavailability of care home places, lack of transport, patient deterioration
Adaptations	Frequent adjustments to • planned discharge dates • patient treatment • care plans Frequent staff adaptations • repeating work that was thought to have not been completed but was not documented or completed • constantly re-reading patient notes to ascertain actions planned, undertaken and incomplete • constant queries to other staff about patient progress towards discharge and outstanding tasks Initiatives trialled to improve discharge process • dedicated discharge nurses • inclusion of social care staff in multi-disciplinary meetings

Goal trade offs	Discharge planning must balance competing goals • Minimising length of stay • Ensuring patient treatment is effective • Minimising exposure to risks while in hospital such as infection and immobility • Minimising risk of re-admission • Ensuring safety at home • Appropriate care available in community • Addressing family and relatives' concerns
Anticipation	Anticipation was often difficult when external factors were not known • Many last-minute adjustments to discharge plans occurred
Monitoring	Need to monitor progress towards discharge, initiated tasks requiring follow-up, milestones towards completion of tasks, completion of tasks, outstanding tasks • Difficult to monitor the changing priorities and progress towards discharge as information was held by different professionals • Information documented in different systems and places • Chronological format of patient records meant information was difficult to find and integrate. • Building a shared understanding of a patient's progress in the multi-disciplinary team was difficult and time consuming
Responding	Responding to emerging problems is difficult when communication is asynchronous and documentation is not shared • Concerns of family and relatives • Patient deterioration • Unavailability of social services • Transport problems • Equipment problems
Learning	Learning limited by • Focus on reporting of metrics for assurance purposes • Focus on reporting incidents but little feedback received by staff about learning and improvements • Lack of evaluation of improvement initiatives

TABLE 2. SUMMARY OF FINDINGS – PATIENT FLOW IN THE EMERGENCY DEPARTMENT

Themes	**Summary of findings**
Misalignments between demand/pressure and capacity	Misalignments included • Higher than expected patient numbers • Higher than expected numbers of ambulance arrivals • Staff numbers • Staff skill mix • Information availability • Diagnostic test availability
Variability	Variability occurred in • Patient numbers, which fluctuated unpredictably • Patient acuity • Length of stay – patient numbers did not fully predict length of stay • Processes varied according to available time and resources, clinician preference • Treatment varied according to patient preferences, time and resources available • Staffing levels • Skill mix • Equipment availability • Availability of services such as imaging, blood testing, specialty input • Availability of inpatient beds
Adaptations	Responding to misalignments resulted in a set of common adaptations and included • Escalation processes designed to increase staff resources when pre-defined patient flow triggers were met • Relocation of patients to free up space • Expediting patient care to free up space • Flexing staff members to areas experiencing bottlenecks • Creation of Flow Co-ordinator role filled by a senior and highly experienced nurse to expedite patient flow • Two hourly patient flow meetings to review load on the system and whether action was needed
Goal trade offs	The most common trade-offs observed involved • balancing patient safety and waiting time targets • balancing efficiency and thoroughness in patient care

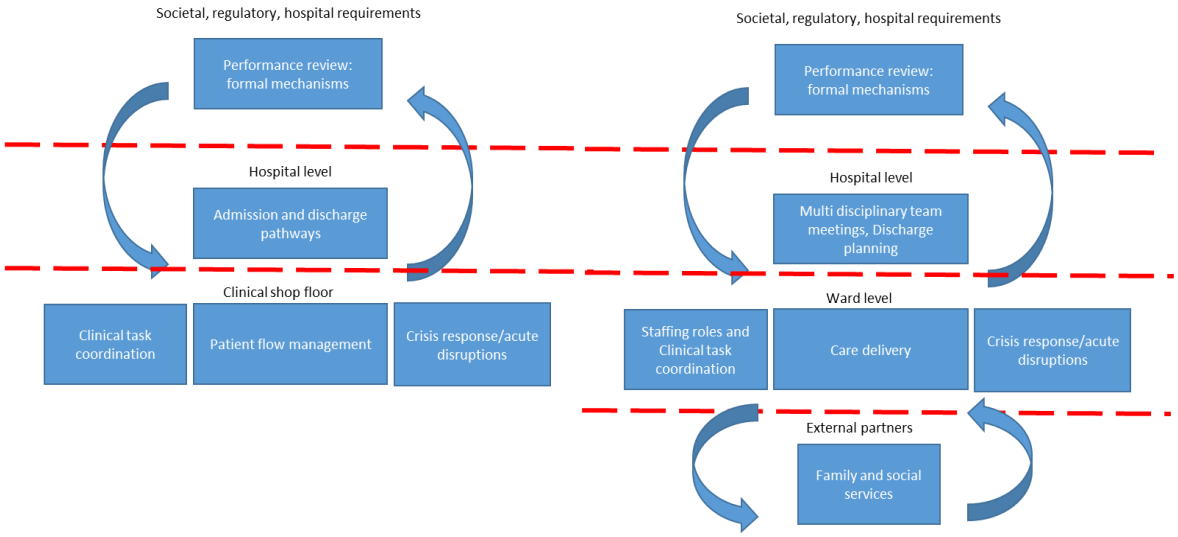
	• balancing efficiency and thoroughness in supporting junior staff • balancing efficiency and responding to patient concerns
Anticipation	Anticipation was difficult • flow of patients into the department was not predictable • no control over the availability of beds in the hospital • waiting times for diagnostic test results and specialist input unpredictable
Monitoring	Monitoring patient flow was challenging and achieved by a combination of • Walk circuits of the department • Observing numbers of patients waiting or being treated • Board rounds to identify blockages • Personal approach to doctors to gain a summary of their patients' status • Identifying how many patients will be imminently discharged • Review of test results pending • Identification of long patient waiting times on the patient record system • Ascertaining staffing levels and waiting times for imaging, blood testing and specialty input • Requesting updated data on inpatient bed availability Monitoring required the integration of data from multiple sources to construct an overview of patient flow Demand on the system could not be easily or accurately ascertained, creating difficulties in resource planning, failure to anticipate and delayed responses
Responding	• Responding to clinical needs was a priority for clinicians • Responding to patient flow problems was role of the flow-co-ordinator. • Efficiently managing clinical tasks and patient flow required teamwork • When incomplete clinical tasks were causing delays, the flow-co-ordinator often assisted to ensure delays did not lead to a target breach
Learning	Learning • Clinical skills learning for junior doctors required exposure to a range of clinical problems and support from senior doctors for learning • Learning about the effect of improvement initiatives limited by lack of evaluation • Extensive reporting of metrics for assurance purposes but limited learning • Learning about patient flow problems not supported by current IT systems that currently report length of stay but this is not linked to other system information

FIGURE LEGENDS

Figure 1. Inductive theme map for Emergency Department (A) and Older Persons' Unit (B)

Anderson, J. E., Ross, A. J., Back, J., Duncan, M., Snell, P., Hopper, A., & Jaye, P. (2020). Beyond 'find and fix': improving quality and safety through resilient healthcare systems. *International Journal for Quality in Health Care*, *32*(3), 204-211.

FIGURES



A B

Appendix

Semi Structured Interview Topic Guide

1. Can you briefly describe your role and your main responsibilities? How long have you been in this role? How many patients are you normally responsible for?
2. On a day-to-day basis, what are the main difficulties and pressures on the Older Person's Unit/Emergency Department? What creates difficulties for staff? Probe admissions, discharges, ambulances, challenging patient care, relatives, communication, staff shortages, MDT co-ordination
3. How do you know that the Unit/Department is under pressure? Do you have 'warnings'? If so, what do these look like/how would you describe them?
4. What do you personally do in response to pressures? For example, are you able to make adjustments to your workload/the workloads of your colleagues or take other action to reduce pressure? Prompts – ask for assistance, change the way tasks are done to get them done more quickly, ask senior nurse what to do
5. Are there instances where a number of staff are required to manage a difficult situation? Eg patient deterioration, aggression, mental health problems. What happens then?
6. What actions do managers take to deal with pressure? Eg staffing changes, escalation, goal adjustment, is everyone informed?
7. Could more be done to anticipate pressures on the Unit/Department?
8. What would you define as a 'successful day' and why?
9. What would you define as an 'unsuccessful day' and why?
10. Do you know whether the unit/department is performing well at any particular time? How do you find out? What indicates that it is performing well?
11. Do you generally know about the status of all patients? How do you find out? Probe whiteboard, verbal communication, ward rounds, MDT, two hourly meeting, board rounds. Do these ways of communicating work well or are there times when they don't? How can it be improved?
12. How do you interact with the multi-disciplinary team?
13. How do you learn about what is happening on the unit/department, new ways of working, risks and problems that may occur during clinical work? Are there meetings where these things are discussed? Or is it more informal and you share experiences with colleagues and learn from each other? Which colleagues?
14. What initiatives have been taken recently to improve the working of the unit/department? How have they worked out? Do you receive information about initiatives and outcomes? What is planned for the near future in terms of improvements? What would you like to see happen?
15. Do you have any additional comments you would like to add or questions for us?

Anderson, J. E., Ross, A. J., Back, J., Duncan, M., Snell, P., Hopper, A., & Jaye, P. (2020). Beyond 'find and fix': improving quality and safety through resilient healthcare systems. ***International Journal for Quality in Health Care*****,** ***32*****(3), 204-211.**