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EDITORIAL

Using participatory systems approaches to improve healthcare delivery

The planning of Health Systems needs to be understood holistically, looking at the interconnectedness between providers and processes, and the expectations and values of all stakeholders. Yet, in the context of ageing population and increasingly high prevalence of chronic diseases, the provision of healthcare services remains often very fragmented, while at the same time, more and more patients present multiple comorbidities that require coordination between specialities and providers. Tackling these issues is a fundamental social and political challenge that regularly generates public debate.

In this context, there is a need to develop and use tools, concepts, and principles that can help make sense of complex and fragmented healthcare structures. Healthcare problems need to be viewed holistically and as an integrated system with multiple interacting components (Braithwaite, 2018). To achieve this, we need to bridge across ecosystems, areas, communities, disciplines, and specialities by engaging with a variety of stakeholders to explore and analyse the issues faced and to identify feasible and desirable solutions. The effective management of healthcare problems impacts on patient care and deserves attention. It requires clinical evidence and ways of capturing the views of multiple stakeholders with different points of view, values, and priorities. The integration of diverse perspectives also requires the use of methods that facilitate dialogue and debate between care providers, care commissioners, healthcare professionals, patients, and carers. This integrative view on healthcare systems allows for the design of collectively agreed (models of) healthcare delivery services.

The past two decades have seen calls for better uptake of complexity science (e.g., Braithwaite, 2018; Greenhalgh & Papoutsi, 2018), better integration of human factors (NHS England National Quality Board, 2013), and calls for systems orientation by national and international bodies (e.g., Clarkson et al., 2017; De Savigny & Adam, 2009). In parallel, systems approaches in healthcare delivery science have flourished in different disciplines, including human factors/ergonomics (Carayon et al., 2014; Hignett et al., 2013), design (Huynh-Dagher et al., 2022; Pannunzio et al., 2019) and operational research (including Soft OR) (Kotiadis & Mingers, 2006; Kotiadis & Tako, 2018; Kotiadis et al., 2013; Lamé et al., 2020; Pitt et al., 2016). Yet, all these disciplines have also noted the specificities of healthcare compared to other sectors (Morales Ornelas et al., 2023; Tako & Robinson, 2014; Waterson & Catchpole, 2016). It is now time to think about how we can best integrate these disciplines, in a true systems spirit (Lamé et al., 2023). In response to these emerging needs, the *Health Systems Journal's* new focus areas in facilitated modelling, problem structuring, Soft OR, and systems thinking are well suited to fit within the wider health systems research agenda.

The present special issue was first discussed during collaborative transdisciplinary meetings (Ciccone et al., 2020; Komashie et al., 2019). Noting that there is much more bringing us together than setting us apart and that our approaches are complementary in tackling the "hypercomplexity" of healthcare (Klein & Young, 2015), this special issue presents articles from different disciplines, which have in common the core principles of being systems-informed, interdisciplinary, and participative. By systems-informed, we mean that they are mindful of boundaries, interdependencies, and embeddedness into broader systems, and aware of multiple coexisting perspectives on a situation. By interdisciplinary, we mean that these methods help bridge across groups and communities, whether they are academic or professional. By participative, we mean that these approaches use systems models as a basis for dialogue and engagement with stakeholders, and often rely on facilitated conversations to enable a shared framing and tackling of issues in healthcare planning and delivery (Kotiadis & Tako, 2018; Tako & Kotiadis, 2015).

This special issue attracted 25 submissions, of which nine articles were accepted. The articles included represent different disciplines: human factors, design, engineering, operational research, and behavioural operational research. These studies illustrate the variety of healthcare system design approaches and cover a broad range of application areas. The SI has been structured into three sections: health system improvement and quality of care, education and training in healthcare, and information and data systems in health services. Next, the articles included in each section are briefly introduced.

The first five articles deal with health systems improvement. In the first article of this issue, titled "Towards a better understanding of mental health care delivery systems: From stories to system components", Komashie et al. (2023) illustrates and focuses on how

an interactive and participatory method using storytelling can be used to understand the key components of health delivery systems from different stakeholders' perspective. The authors apply this method to a mental health delivery service focusing on the stories of two system stakeholders, service users and staff (clinical staff and managers). Qualitative data collected in interviews and focus groups are coded to identify key system components, People, Goals, Conditions, Interventions, Processes, Resources, Staff/Carers, Data/Information, Family/Friends, and Environment. Narratives have been highlighted as a key form of evidence to inform health systems improvement (Oluoch et al., 2023). This method combines the distinctive strength of narratives with the value of systems modelling efforts.

Next, the article "Participatory Design Research for the Development of Real-time Simulation Models in Healthcare" by Harper and Mustafee (2023) provides an example of cross-fertilisation between systems disciplines that combines a design research framework, the Design Research Methodology (Blessing & Chakrabarti, 2009), with a facilitated modelling and simulation approach adapted from the PartiSim framework (Kotiadis & Tako, 2018; Tako & Kotiadis, 2015). The result is a staged participative modelling approach that enables staff and patients to input into the model. The authors illustrate this approach through a case study of developing a real-time simulation of an emergency department. This study highlights the potential of design research as a participative methodology within which OR modelling can be embedded, in complement to previous studies that combined OR modelling with, e.g., Soft Systems Methodology (Holm et al., 2013; Tako & Kotiadis, 2015).

In the article titled "The bio-psycho-socio-technical model: A systems-based framework for human-centred health improvement", Card (2023) extends the biopsychosocial model, a classic layered model of how nested, multilevel interactions affect individual health. The author combines this model with socio-technical theory, and more specifically builds on the Systems Engineering Initiative for Patient Safety (SEIPS) framework, a key framework for human factors engineering in healthcare, to develop a new and extended model that offers a broader and systemic approach to improving healthcare systems. This model suggests that to improve health systems one needs to act based on biological, psychological, social, and technological factors, and adapt through feedback loops.

The next article "Balancing the Satisfaction of Stakeholders in Home Health Care Coordination: A Novel OptaPlanner CSP Model", Zhang et al. (2023) consider the integration of human behaviour and preferences *in* models (Kunc et al., 2018). They consider the problem of home health care routing and scheduling, using constraint-satisfaction programming, which also includes constraints that represent stakeholders' satisfaction criteria. With staff shortages and turnover increasingly pressing issues in health services, accounting for stakeholders' preferences is important.

With the aim to achieving a better integration of human factors in health services improvement, the article "The Better Work, Better Care Framework: 7 Strategies for Sustainable Healthcare System Process Improvement", by Neumann and Purdy (2023) proposes the "Better Work, Better Care" framework. This framework consists of seven human factors/ergonomics tenets targeted at health services' current woes, which adopts the view that better working conditions can lead to achieving better quality of care. The seven tenets include, among others, the integration of work environment quality into goalsetting and key performance indicators and the use of a human-centred design thinking approach. As healthcare increasingly recognises that little can be achieved without engaged staff and meaningful healthcare work (Sikka et al., 2015), frameworks that help integrate this concern are welcome.

The next two articles are concerned with education and training in healthcare. In the article titled "Applying a participatory systems and value approach in a transdisciplinary exercise: on assessing the impact of training and education initiatives", Akinluyi et al. (2023) apply the System Impact Model to assess the impact of education and training programmes on a wide range of stakeholders in health services. The System Impact Model consists of a causal map that connects the influencing factors with target outcomes, as seen from different stakeholders' perspectives, reminding us of both system dynamics and causal loop diagramming (Forrester, 1961; Sterman, 2009), and Peter Checkland's key systemic insight on how different worldviews coexist in any situation (Checkland, 1981). The authors report how the System Impact Model was used to understand and assess the impact of the training and education offered by the Education Academy of King's Health Partners (KHP), an Academic Health Science Centre made up of three NHS Foundation Trusts and a University, to a wide range of students and healthcare professionals, administrative and support staff.

The next article by Schoepen et al. (2023) titled "Systems thinking and designerly tools for medical device design in engineering curricula" assesses medical device development curricula and use of systems design tools by Belgian industrial design engineering students. A key insight is that students use participatory techniques and systems tools in early phases of medical device development, but often fail to translate the insights into requirements, and pay insufficient

attention to regulatory and clinical testing imperatives. This type of study is important for improving engineering curricula as we prepare the next generation of health designers.

Finally, the next two articles focus on information and data systems in health services. In their article "Automating data collection in Electronic Health Record Systems: A Social Determinant of Health (SDOH) viewpoint", Berg et al. (2023) discuss the importance of taking into account social determinants of population health in researching health information systems. An individual's health is influenced by a number of factors such as culture, gender, affluence, upbringing that can help explain outcomes and adapt clinical management of health conditions. The authors suggest that to improve the equity of future health information systems, it is necessary to include the voices of a variety of stakeholders, including end-users, care-providers, researchers, technicians, and administrators. The article offers recommendations for research directions aimed at improving the participative nature of data collection and analysis of SDOH in healthcare data systems.

Last but not least, in the article "From digital health to Learning Health Systems: four approaches to using data for digital health design", Pannunzio, Kleinsmann, Snelders, and Raijmakers (2023) build on existing distinctions in design studies (Gorb & Dumas, 1987) and on recent evolutions in data-enabled design (Noortman et al., 2022) to define Silent, Overt, Data-Enabled, and Convergent approaches to the use of data for digital health design. Depending on how data is collected, managed, and fed-back into design and care processes, projects can fall into one of the four categories. This typology is timely, as health data is increasingly prevalent with the pervasive deployment of connected devices and the increasing integration of health information systems. More importantly, the exploitation of these data is considered a key lever to develop Predictive, Preventive, Personalised, and Participative (or "P4") medicine (Patou et al., 2020).

The collection of studies included in this special issue provides evidence that an appreciation for diverse worldviews, objectives and expectations, a participative ethos, and a model-informed exploration of experiences and processes can drive improvement in healthcare delivery, education of healthcare industrial designers, and health information systems. Our aim through this special issue has been to initiate conversations between the different systems disciplines, which can lead to new insights. By combining methods from different streams and tackling issues we had not addressed before, the articles extend both the scope and the toolkit available to health researchers and practitioners in their quest for improving health systems. We hope these conversations continue beyond this special issue and pave the way for more interdisciplinary collaborations. Participative systems approaches are not the easiest path when intervening in health organisations (Groeneveld et al., 2018; Perry et al., 2021). Yet, reading the contributions in this special issue reinforces our conviction that participatory systems approaches can make a unique contribution to unify and improve our fragmented systems – or reimagine them altogether – and help us achieve improved population health, enhanced patient experience, reduced costs, and improved work life for those who deliver care (Bodenheimer & Sinsky, 2014).

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