



Editorial

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We are delighted to introduce the very first issue of *Health Systems*. This is a brand new interdisciplinary journal promoting a holistic systems approach to solving problems in health and health care delivery.

In this inaugural editorial, we explore the diverse definitions of systems across health care research and demonstrate why a new publication venue is needed to support and encourage research at the fertile intersections of health care disciplines. We underline the ethos of *Health Systems* and describe the types of submissions that we hope to receive. Finally, we review the content of this first issue – a collection of papers, which exemplifies the interdisciplinary practices and systems emphasis which are central to our vision for *Health Systems*.

What is a system?

Health Systems sets out its stall as ‘an interdisciplinary journal promoting the idea that all aspects of health and health care delivery can be viewed from a systems perspective’. But what do we mean by a systems perspective? Specifically, what is a system? The dictionary tells us that a system is *a set of interacting or interdependent components forming an integrated whole*. Everyday examples of systems are all comprehensible to the lay person and academics alike. However, like the word model, system is one of those common place terms that takes on new depths in research and is used widely across many academic disciplines. Although each discipline may see their definition of system as a universal one, there may be subtle differences among disciplines. These differences can lead to misunderstanding or create a fertile ground for exploration. *Health Systems* can provide this fertile ground.

Subtle differences may exist in academic disciplines and technological fields that qualify the word ‘system’ to designate a more precise or specialized meaning, for example, computer, information, or communications systems. We do not see these as mutually exclusive concepts and, in fact, assert that health care often blurs and overlaps any existing lines of demarcation. Therefore, our journal welcomes research from various system interpretations that connect with health care. While the journal’s ‘home’ is within the U.K. Operational Research Society, its remit is much broader than merely operational research, management science or information systems. A brief history of systems thinking will help to convey the broader perspective of the word, ‘system’.

Although the origins of the term system in the natural and social sciences date back to the 19th century, it was the biologist Ludwig von Bertalanffy (1950, 1968), who introduced the concept of General Systems Theory and who is known as the founding father of systems theory. Systems Theory was taken up within the operational research and management science community as Stafford Beer’s management cybernetics (Beer, 1959a, b) and Viable Systems Model (Beer, 1972); Jay Forrester’s system dynamics (SD) (Forrester, 1961), systems engineering (Hall, 1962) and what is now generally known as the systems approach (Churchman, 1968; Weinberg, 1975). The way that this ‘systems approach’ is generally understood within this community was nicely summarized by Mingers & White (2010):

- viewing the situation holistically, as opposed to reductionistically, as a set of diverse interacting elements within an environment;

- recognizing that the relationships or interactions between elements are more important than the elements themselves in determining the behaviour of the system;
- recognizing a hierarchy of levels of systems and the consequent ideas of properties emerging at different levels, and mutual causality both within and between levels;
- accepting, especially in social systems that people will act in accordance with differing purposes or rationalities.

System dynamics (SD) is a modelling methodology (or a philosophical paradigm), which exemplifies the systems approach. The basic principle underlying SD is that the structure of a system determines its behaviour over time (Forrester, 1961; Sterman, 2000). In other words, the way that the separate components of any system relate to and affect each other determines the emergent behaviour of the system as a whole. While SD was initially successful, it somewhat fell out of favour in the 1980s, possibly as a result of being associated with extremely ambitious models such as the Club of Rome sponsored model of the world economy (Meadows *et al*, 1972). Since the mid 1990s it has been enjoying a resurgence in popularity, particularly although not exclusively in health care (Brailsford, 2008; Brailsford *et al*, 2009), arguably because of its ability to capture the complexity and complicatedness of systems involving human beings, technology, and resources. One of the key challenges in developing any model is where one draws the boundaries: what is included in the model and what is not. Too often in many published models, factors are left out because they are impossible to quantify, difficult to model, or people disagree about whether they matter.

In *Health Systems* we are hoping to celebrate a 'whole systems' approach that recognizes the various factors and facets in the health care landscape. The journal's underpinning philosophy is that health and health care systems are characterized by complexity and interconnectedness, where 'everything affects everything else'. Thus, problems in health care need to be viewed holistically as an integrated system of multiple components (people, organizations, technology, and resources) and perspectives.

What is a health system?

A wide lens is needed in defining a health system in order to retain the full breadth of scope in our definition of health care systems. We approach this journal from this expansive vantage point. The components of a health system include all the organizations, institutions, resources, and people who contribute to maintaining and improving health. This perspective of actors includes not only the pyramid of public and privately owned health facilities that deliver personal health services, but a gamut of health contributing actors such as mothers caring for their sick children, health insurance organizations, and

occupational health and safety legislation (Everybody's business: strengthening health systems to improve health outcomes: WHO's framework for action, World Health Organization, 2007). Actors and institutions within the health system may influence determinants of health as well as deliver preventive, promotive, curative, and rehabilitative interventions through a combination of public health actions and the pyramid of health care facilities that deliver personal health care (Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and Their Measurement Strategies, World Health Organization, 2010). Consequently, the broad perspective of health systems also includes inter-sectoral action by health staff to promote determinants of better health, such as female education, to policymakers. According to Frenk & Murray (2000), the following dimensions must be considered to provide comprehensive portrayal of the health systems concept. Health systems:

- should not be expressed in terms of their components only, but also of their interrelationships;
- should include not only the institutional or supply side of the health system, but also the population;
- must be seen in terms of their goals, which include not only health improvement, but also equity, responsiveness to legitimate expectations, respect of dignity, and fair financing, among others;
- must also be defined in terms of their functions, including the direct provision of services, whether they are medical or public health services, and also 'other enabling functions, such as stewardship, financing, and resource generation, including what is probably the most complex of all challenges, the health workforce'.

Indeed, health systems are interdisciplinary ecologies of interrelated actors and institutions.

The global health system is comprised of the network of national health systems that vary from country to country. Health systems in different countries (even in those with similar levels of income, education, and health expenditure) vary widely in performance and in their ability to attain key health goals (El Taguri, 2008). Policies differ widely across country settings. There is no simple stereotyped formula for the organization of health services, and no country has discovered an ideal model. In recognition of the diversity and richness of the global health landscape, *Health Systems* welcomes multi-national views as well as a more collective global health perspective in the articles it publishes.

The World Health Organization asserts the following six building blocks of health systems: (a) good health services, (b) well-performing health workforce, (c) well-functioning health information systems, (d) equitable access to medical products, (e) vaccines and technologies, (f) good health financing, and (g) leadership and governance (World Health Organization, 2007). Therefore, strengthening health systems means addressing key

constraints related to staff, funds, information, supplies, transport, communications, and overall guidance and direction (World Health Organization, 2010). Much attention is being directed towards technology and decision science tools as means by which to navigate key constraints and seize opportunities to strengthen health systems. This attention is reflected in the scope of coverage and mission of this journal.

The strength of a health system or improvement initiative can only be assessed by evaluation. When evaluating a health system, performance is measured against three fundamental goals: improving health, enhancing responsiveness to the expectations of the population, and assuring fairness of financial contributions (Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and Their Measurement Strategies, World Health Organization, 2010). We welcome all three aspects of health system evaluation within the scope of coverage of health system evaluation papers for the journal.

Why interdisciplinary approaches to health care research?

While Checkland (1999) offered the field a 30-year retrospective of *Systems Thinking, Systems Practice*, he defined the four-activity model (SSMA, Soft Systems Methodology in Action) in an iconic rather than descriptive manner that set the stage for an interdisciplinary approach to systems thinking. The four activities offered by precise definitions include (Checkland, 1999, p. A15):

- (1) Finding out about a problem situation, including culturally/politically.
- (2) Formulating some relevant purposeful activity models.
- (3) Debating the situation, using the models, seeking from that debate both
 - (a) changes which would improve the situation and are regarded as both desirable and (culturally) feasible, and
 - (b) the accommodations between conflicting interests, which will enable action-to-improve to be taken.
- (4) Taking action in the situation to bring about improvement.

These activities offer the field the benefits and challenges associated with using interdisciplinary theories, research methodologies and engagement to address the myriad of exigent problems confronting the health care domain. This is precisely the aim of *Health Systems*; that is, to provide a holistic, interdisciplinary, yet rigorous publication outlet for those scholars seeking to advance research in the health care domain. In Payton *et al* (2011), the authors detailed the need for an interdisciplinary approach health care research and management in a discussion aligning three perspectives: Process, People, and Patients. Similar to Checkland (1999), Payton *et al*

(2011) depicts health care IT as a system of technologies, processes, people (or providers), and patients, and implies that the omission of any one perspective prohibits advancement in model formulation and problem definition, in general, and actions for improvement and innovation, in particular. Hence, silos of field knowledge, research results and frameworks can often hinder innovation and the emergence of new schools of thought and holistic results, which are needed to foster novel fields of study. Via the synthesis of knowledge, results and theories, interdisciplinary research (IDR) can offer health care evidence of a coordinated approach to addressing its tribulations as well as utilizing its best practices.

Furthermore, the ethics of health systems acknowledges that in providing an interdisciplinary perspective, the actions of the health system should be responsive and financially fair while treating people respectfully. In addition, research is a necessary part of the ecology of health systems to provide new insights and innovative solutions to health problems. In particular, we assert that research that embraces a true systems approach with an interdisciplinary perspective provides the most promise and is underrepresented in the literature.

Adopting The National Academies (2004) conceptual definition of IDR, we seek research that is characteristic of bridging gaps in fields and/or knowledge to address problems (i.e., what is the systems context) and demonstrates interaction among scholars seeking to address the problem. On the basis of usage statistics from the AIS Electronic Library, the Payton *et al* (2011) manuscript has been downloaded 315 times since its original publication date, 25 February 2011. This is one metric to demonstrate interest in the topic of health care interdisciplinary approaches. Further, our sister journal, *European Journal of Information Systems*, has witnessed a 160% increase in health care manuscripts over the past 10 years.

Global entities, such as the World Health Organization and the Bill and Melinda Gates Foundation, have given the field a litany of reasons to embrace interdisciplinary approaches to health care problems. The World Health Organization (2011) statistics focus on global dimensions of health care that can be embraced by interdisciplinary approaches. In fact, as reported in Payton *et al* (2011), the National Academy of Sciences (2004) concluded that a singular discipline approach to health care is limited in its ability to advance the field or promote innovation to address the challenging issues confronting use. WHO outlines several foci in its 2011 statistics, which can be used as health domains warranting interdisciplinary, systems thinking and practice. These dimensions include (p. 8):

- life expectancy and mortality;
- cause-specific mortality and morbidity;
- selected infectious diseases;
- health service coverage;

- risk factors;
- health workforce, infrastructure, and essential medicines;
- health expenditure;
- health inequities; and
- demographic and socio-economic statistics.

Further, the Bill and Melinda Gates Foundation focuses on three cross-cutting programmes including (<http://www.gatesfoundation.org/global-health/Pages/overview.aspx>):

- **Discovery:** Closing gaps in knowledge and science and creating critical platform technologies in areas where current tools are lacking.
- **Delivery:** implementing and scaling up proven approaches by identifying and proactively addressing the obstacles that typically lie in the path of adoption and uptake.
- **Policy and Advocacy:** Promoting more and better resources, effective policies, and greater visibility of global health so that we may effectively address the foundation's priority health targets.

Cross-cutting can suggest the continual need for broader impacts of the research, holistic problem-solving, and the implementation of diverse knowledge to improve the problems/scenarios under investigation (Checkland, 1999).

In *Health Professions Education: A Bridge to Quality* (2003), the Board of Health Care Services and Institute of Medicine calls for interdisciplinary teams to support evidence-based practice, quality improvement approaches and informatics (p. 45). Figure 1 was adopted from *Health Professions Education* to illustrate the syntheses necessitated in an emerging health care environment. From patient-centered care, informatics, quality improvement, and evidence-based practice, these competencies are viewed as rules governing emerging 21st-century health care systems.

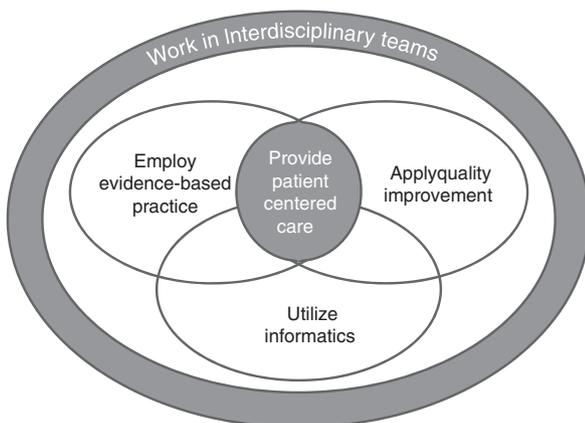


Figure 1 Relationship among core competencies for health professionals (National Research Council, 2003).

Lastly, interdisciplinary approaches in health care were embraced by the newly formed Commission on Education of Health Professionals for the 21st Century which was launched in January (Bhutta *et al*, 2010). With representation spanning the global health care community, the commission will develop 'a vision and recommend specific actions for catalysing the transformation of health professional education'. The group will address issues of workforce development, logistics of population movement, telecommunication and technological advances, all of which are viewed as interdisciplinary 'systems' needed to address emerging challenges facing researchers and practitioners in the 21st century.

Journal ethos

The underpinning ethos of *Health Systems* is that all aspects of health and health care delivery can be viewed from a systems perspective, which benefits from interdisciplinary collaborations to help meet the challenges as discussed above. The journal recognizes that often the most interesting problems occur at disciplinary boundaries and would, therefore, particularly like to receive papers that span several disciplines. To facilitate wider recognition and understanding of the different domains, and associated research methods and applications, *Health Systems* covers a wide range of academic disciplines and sub-disciplines that contribute to a multi-perspective approach towards health care delivery. These include (but are not limited to) operational research, information systems, design science, knowledge management, decision analysis, data mining and data analytics, health economics, industrial and systems engineering, human computer interaction, management science, mathematical modelling, organizational behaviour, nursing informatics, communications, and public health. To promote the range of topics and disciplines served, the journal is initially supported by 21 Area Editors and 37 Editorial Board members, all being influential researchers in their own fields. Full details can be found on the journal's webpages at <http://www.palgrave-journals.com/hs/index.html>.

We welcome submissions of the following article types:

- **Research Article:** Both theoretical and applied papers are welcome. Authors should bear in mind the interdisciplinary ethos of the journal. Therefore, all papers should commence with an introduction, which is comprehensible to non-specialist readers, and where appropriate worked examples should be included in theoretical papers to assist the understanding of non-specialist readers. The relevance of the paper to practice should be made evident within in all papers. All papers should end with a conclusion, which summarizes the value of the work and, where appropriate, indicates possible directions for future developments. Guide for length: 4000–8000 words.

- *Review Article*: We welcome review papers from domain specialists, which provide an authoritative, up-to-date and comprehensive overview of a specific area within the Journal's remit for the non-specialist. The Editors may, from time to time, commission Invited Reviews on key topics. Guide for length: 5000–10,000 words (plus references).
- *Position Paper*: This is a short article presenting the author's opinion on any topic within the remit of the Journal. A position paper is generally intended to stimulate debate, set out an agenda or challenge accepted thinking. It need not contain original research, but all statements and assumptions must be substantiated with evidence from an objective discussion of the topic and by referencing in the normal way. Guide for length: 2000–3000 words.
- *Case Study*: All case-oriented papers should commence with an introduction, which indicates clearly that this is an account of an actual project. We especially welcome case studies by health care practitioners or by academics where there is evidence of collaboration with a health care organization and/or implementation of the research findings or policy recommendations. Guide for length: 4000–8000 words.
- *Response*: Comments on published articles are welcome, as are responses from the original author(s), and may be published at the Editors' discretion.

Furthermore, we welcome suggestions on special issues, especially those which are designed to capture contributions from different disciplines, united for example by a common theme or focus of global importance. The collection of articles in this first issue exemplify the ethos of the journal.

In this issue

Jim Burgess, Area Editor for Health IT and Economics is the author of a position paper that focuses on health economics and encourages the health care community to rethink definitions of innovation and efficiency in the field. These definitions can provide improved outcomes for patients with better allocations of scarce resources.

In 'A New Era for the Consumer Health Informatics Research Agenda', George Demiris, Area Editor for Consumer Health Informatics, crafts a conceptual presentation of the current landscape, opportunities, and challenges for the consumer health informatics sub-domain to set the stage for Health Systems to play an important role in advancing this area.

Murat Gunal, Area Editor for Simulation and Logistics, presents a guide to building hospital simulation models. This insightful guide discusses both conceptual issues (such as framing and specification) and technical issues (including descriptions and examples drawn from different simulation paradigms).

Woodrow Winchester, Area Editor for Human Computer Interaction, and his colleagues, Troy Abel

and Jose Bauermeister, use activity theory to articulate the opportunities for design of HIV prevention applications. In their paper, 'The Use of Partner-Seeking Computer-Mediated Communication Applications by Young Men that have Sex with Men (YMSM)', they detail how behaviours can impact social networking application design and use.

Are families more likely to miss a clinic appointment, compared with individuals? Davis and Abdus-Salaam study the interesting and little-researched problem of group no-shows, in the context of a public and a private paediatric clinic. In both clinics, appointment size is found to be a significant predictor in determining no-show rates, and the authors argue that clinic coordinators should bear this in mind when booking family appointments.

Neubauer, Heurix, and Karlinger introduce PERiMETER, a security protocol for data privacy that is strictly controlled by the data owner in response to the rising costs of data leakage in the health care context and the common situation of electronic health records centrally controlled by administrators, which introduce a major threat to the patients' privacy. This research article is a contribution to our Technical Architecture of Health IT area.

In their paper 'Modelling emergency medical services with phase-type distributions', Vincent Knight (Area Editor for Mathematical Modelling) and Paul Harper (one of the journal Editors) describe research to examine ambulance service times and provide guidance on ambulance needs to meet response time targets. Fitted Coxian phase-type distributions are combined with priority queueing models permitting scenario evaluations such as the impact of reducing hospital turnaround times on the overall response times in the ambulance system.

The field of perishable inventory control owes a great deal to the health care domain, mainly through models of the supply chain of blood products. In the final paper in this first issue, Vila-Parish, Simmons Ivy (Area Editor for Health Disparities & Modelling), King, and Abel develop a Markov decision process model for pharmaceutical supply chain management. Their model uses a stochastic 'demand state' as a surrogate for patient condition to determine optimal, state-dependent two-stage inventory and production policies.

Collectively, the papers in this issue speak to the complexity and many components of health systems and the need for an interdisciplinary outlet. Problems, issues, and possibilities addressed in this body of work range from the design of new health technology to needed improvements in operations to the role of health consumers and also acknowledge economic realities. This issue converges researchers from human factors, operational science, computer science, and economics domains.

In the spirit of a systems approach, we hope that our readers: (a) view each issue holistically as a set of diverse interacting issues and ideas; (b) recognize and

identify relationships and interactions within and across papers; (c) notice the varying levels (organizational and individual) at work; and (d) acknowledge the implications of varying social systems on issues and insights. Overall, we hope that this convergence of different perspectives and elements of health systems stimulate awareness and advance scientific pursuit and innovation.

Finally, as Editors-in-Chief, we are truly excited by the opportunities that *Health Systems* presents and the unique

position that this journal can establish within the published body of knowledge. We trust the journal will become to be recognized and acknowledged across the different represented communities as one of the leading journals internationally. As we set off on this endeavour, we are especially grateful to our Area Editors, to the U.K. Operational Research Society who commissioned this journal, and to the publishers, Palgrave Macmillan, for making this a reality.

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