

Why evidence-based health informatics should have theoretical foundations: Exploring the implications for policy and evaluation

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Abstract

There is growing recognition that health informatics should be an evidence-based discipline. We propose that a truly evidence-based field should also have sound theoretical foundations. In this workshop, jointly organized by the EFMI Working Group on Health IT Evaluation and the IMIA Working Group on Technology Assessment and Quality Development, we will explore the implications for policy makers and evaluators. Speakers will illustrate potential theoretical approaches in policy design and programme evaluation. Participants will work in groups to debate the areas where theoretical work is most useful. We aim to identify priority areas for further work to strengthen the theoretical foundations of health informatics.

Keywords:

Theory; Evidence; Health informatics; policy; evaluation.

Introduction

Medicine is a mature discipline with a strong scientific basis. Health informatics (HI) is not yet. The EFMI/IMIA campaign for evidence-based HI has led the way in promoting the scientific maturity of the field [1]. This workshop forms part of that approach, arguing that HI should not only be evidence-based but also needs theoretical foundations.

Evidence and theory in healthcare

Evidence-based medicine (EBM) is defined as “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients” [2]. EBM entails formal judgments about the quality of evidence for a particular therapy or technique, but only a minority of care guidelines are based on ‘strong’ evidence [3, 4]. There has been some resistance to evidence-based care protocols that can be perceived as insufficiently patient-centric [5], undermining clinical autonomy and expert diagnostic skill [6] or not keeping up with current clinical experience [7]. Concerns have also been expressed that the research data and the way it is packaged into guidelines are tainted by incomplete reporting, commercial conflicts of interest and publication bias [8]. However, the fundamental idea that healthcare should be scientific rather than ‘magical’ seems to be uncontroversial. Re-

liable evidence in medicine is implicitly based on theory, whether in the natural sciences, statistics or psychology.

Evidence and theory in health policy

Health policy is a broad field that can encompass areas such as population health improvement, regulation and payment models. It has been argued by analogy from EBM that health policy should be evidence-based [9-11]. Efforts to inform policy with evidence include impact assessment, constructive technology assessment and monitoring implementation. Of course, policy by its nature is an expression of ideology. Policy is intrinsically about changing the world, not describing it. It is therefore subject to confirmation bias [12] and selective and tendentious use of data in support of a political aspiration [13].

Evidence and theory in health informatics

A similar tension exists in HI. The aim is to change healthcare for the better by improving the use of information. Although numerous reports have demonstrated benefits to clinicians, patients and management in a wide variety of settings, systematic reviews have questioned the strength and sufficiency of the evidence base [14-16]. New information systems are sometimes proclaimed as ‘obviously better’ (the ‘you don’t need RCTs to tell you parachutes are a good idea’ argument [17]) or explicitly as performance of a political manifesto (the ‘patients will be given a choice of hospital, whether they want it or not’ approach [18, 19]). Projects are naturally subject to optimism bias [12], but HI implementations have not been uniformly beneficial. Sadly, the record of HI is stained with programme failure, negative impacts on care and service delivery and (rarely) even increased mortality [20-22]. Parachutes are only a good idea if the most proven best design is used. There is also a lack of mature measurement science in HI [23]. This situation of real risks as well as putative benefits has led to calls for HI to become an evidence-based discipline, which has had sustained leadership from EFMI and IMIA working groups [1]. There is evidence of latent practitioner demand for theory in HI, but minimal current use [24].

The importance of theory in mature science

Kuhn argued that the acquisition of theory was one of the markers of the maturity of a field of knowledge [25], as it shows that the given domain has moved beyond initial exploration and has formed a solid understanding of its concepts, principles and relations. Theory is defined as “A scheme or system of ideas or statements held as an explanation or account of a group of facts or phenomena; a hypothesis that has been confirmed or established by observation or experiment, and is propounded or accepted as accounting for the known facts; a statement of what are held to be the general laws, principles, or causes of something known or observed.” [26]. This definition shows that theory can be explanatory or predictive and can be anywhere on the continuum from tentative hypothesis to reliable knowledge. “Theory” can incorporate both precise mathematical models and softer conceptual models or sense-making frameworks. Even when a theory has rigorous empirical support it is often still called “theory”, as it is not simply an unmediated observation of the world but is a construct, an abstract model that explains or predicts. Well-known examples are ‘probability theory’ in statistics, ‘quantum theory’ in physics and ‘rational choice theory’ in economics.

What kind of theory is relevant in health informatics?

Suitable theoretical approaches are not axiomatic but must be purposively selected by policy makers and evaluators. The fundamental question is one of framing: What is the policy goal? Whose worldview is being considered? (Government, payer/commissioner, industry, patient/citizen, carer, clinician, researcher, service manager). Therefore, what conceptual framework of ideas and principles is helpful? What are the theoretical mechanisms by which the proposed intervention will achieve the desired outcomes? [27]

Theories operate at different levels of scale or abstraction. At the micro-level, the Theory of Planned Behavior [28] (for individual actions) has been used where the intervention is focused on behavioural choices. Mid-level normalization process theory has been used to study team interventions [29]. HI studies have also employed macro-level theories, which operate at organizational or even societal level, including Diffusion of Innovations [30] and Activity Theory [31]. Various other social science theories have been used in HI.

Another contribution of theory is as an overarching conceptual framework for a evaluation design, such as the Theory of Change [32], or to explore phenomena and generate theory, as in the case of Grounded Theory [33].

Workshop

To lead the group discussions, the following panel of HI policy and evaluation experts will facilitate the workshop:

- Dr Philip Scott, Centre for Healthcare Modelling and Informatics, University of Portsmouth, UK
- Assoc. Prof. Nicolet de Keizer, Academic Medical Center, University of Amsterdam, the Netherlands
- Assoc. Prof. Andrew Georgiou, Australian Institute of Health Innovation, Macquarie University, NSW, Australia
- Assoc. Prof Catherine Craven, MU Informatics Institute, University of Missouri, United States

General Organization of the Workshop Proposal

Aim of the workshop

The aim of the workshop is inform participants about existing theoretically-based work in HI and debate where theoretically-informed approaches can add most value in HI. The panel speakers will seek to stimulate the group discussions.

Workshop structure

The planned duration of the workshop is 90 minutes:

- 0-10 min. PS will introduce the objectives and structure of the workshop and introduce the panel speakers.
- 10-30 min. Speakers will briefly present on the topics:
 - Using the the Friedman & Wyatt typology [34]
 - Theory-based assessment of eHealth policies
 - Application of Control Theory
 - Explanation of group tasks
 - Group organization
- 30-60 min. Work in groups (4 – 5 participants each)
 - Each group will be asked to nominate a group moderator (moderating the discussion, presenting the group results) and a secretary (documenting the key ideas of the discussion).
 - Groups will work on the following questions:
 1. What theoretical foundations does HI have?
 2. Which areas of HI policy and evaluation have greatest need of theoretical foundations?
 3. What kinds of theory are likely to be useful in these priority areas?
- 60-80 min. Group moderators summarize group discussions. Discussion and conclusions on recommended priority areas for further work.
- 80-90 min. Moderators will conclude on next steps for developing recommendations and will collect written documentation of all groups.

Expected attendees

- Academic researchers interested in evidence-based health informatics.
- Policy makers responsible for health informatics programme planning and evaluation.
- Practitioners who want to add to the evidence base for health informatics interventions.

Conclusion

It is hoped that this workshop will result in fruitful discussion that suggests priority areas for further work to strengthen the theoretical foundations of HI and informs future EFMI/IMIA activities in this area. We anticipate producing recommendations to be presented in a journal paper.

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