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How Important is Theory in Health Informatics? A Survey of UK Academics

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Abstract. The disciplinary status of health informatics remains unclear. Is it an art or a science? Does it have a body of theory? A survey was devised for UK academics that teach or research health informatics. Forty-six responses were received, twenty-five from the target group (representing between a quarter and a third of the population of interest). Health informatics is not perceived to have a well-known and clearly definable body of theory, but there is a clear demand for a more theoretical basis for the discipline. Journals and conferences were rated as the best sources of theory and seven key textbooks were identified.

Keywords. Medical informatics; health informatics; theoretical models; review

Introduction

The purpose of this paper is to report a survey of UK academic opinion about theory in health informatics. We first consider the status of the field and the nature of theory.

Is health informatics truly a scientific discipline in which it is right to expect theory to exist? One argument is that it is both art and science: its applied features are the art and its more fundamental characteristics are the science of medical informatics [1]. Another view is that health informatics should be viewed as a scientific discipline only if it has specific principles that are enduring, evidence-based, easily applied and original. That would imply that if health informatics solely shows how to use principles from other fields then it must be accepted as an application area, not a scientific discipline [2]. This uncertainty is not surprising given that the name and definition of the field of health informatics remains unresolved [3-4].

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The nature and significance of theory and its relevance in health informatics

What is theory? One dictionary definition is that theory is either a conjecture or “an explanation or system of anything; an exposition of the abstract principles of a science or art” [5]. It may comprise synthesis, abstraction and interpretation of research findings or a purely hypothetical explanation of observed phenomena. It may take the form of a predictive model, a proposed causal relationship or a conceptual framework. Theory may be derived either philosophically or empirically and its application may be either explicit or tacit [6]. A theory is capable of application in multiple scenarios.

Why does theory matter? Firstly, formulating a proposed general principle allows it to be empirically tested, then accepted, qualified or rejected. Secondly, Kuhn [7] proposed that a sign of maturity of a scientific field is its acquisition of a “paradigm”, defined as the theory, methods and standards of the given domain of knowledge.

Does theory matter in health informatics? Theory in health informatics might be expected to provide helpful frameworks for evaluation, design or implementation. The absence or presence of theory in health informatics, and its relative maturity, is arguably significant to an assessment of the disciplinary maturity and professional credibility of the field. Health informatics authors have called for more explicit epistemology and theory in the design and reporting of its research [8-10].

The authors wanted to determine how theory and disciplinary maturity are perceived within the health informatics academic community, assess the level of interest in this topic and sample informed opinion about relevant sources, to guide the design of some form of systematic review. A survey instrument was devised to answer the questions: Is the planned review worth doing? If so, where should it look?

1. Methods

1.1. Survey instrument

As the aim of the survey was specific, a new twenty-item instrument was devised for the purpose. The instrument was developed and tested for usability and face validity within the research group of PS and JB. The first ten questions asked about the nature and importance of theory in health informatics and the professional maturity of the discipline. The remaining questions asked participants to rate the relative value of particular sources for the proposed review, to identify the main textbooks in health informatics and comment whether theory is given enough attention in the literature.

Questions 1-17 offered a five-point Likert-type scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) with a “No opinion” option and a free-text box to allow qualifying comments to be made. Questions 18 and 19 asked for free-text lists. Question 20 offered a dichotomous yes/no choice with the option of qualifying comments. The demographics requested were sector (academic institution type, NHS, private healthcare or information technology), job role, gender and whether UK-based.

Standard systematic review methods are designed to examine the body of evidence on *particular* interventions [11]. The review contemplated here has a rather different purpose: to identify certain *types* of conclusion (theoretical inferences) within a general field, not substantive conclusions about specific interventions. As this aim might require adaptation of the standard review approach, the survey offered participants repeated opportunities to make qualifying comments to elucidate this.

1.2. Target population

The population of primary interest was the UK health informatics academic community, defined as professional teachers or researchers in the field and their research students. This population was selected to offer a well-informed community of interest on the subject. The UK focus was chosen merely to circumscribe a definite sampling frame and facilitate survey administration. There were understood to be 20-25 UK academic institutions that teach or research health informatics. Given that the research groups are relatively small, 75-100 seems a plausible estimate of the target population. This is consistent with the figure of approximately 70 academically affiliated members voluntarily enrolled in the UK Faculty of Health Informatics (Bruce Elliott, Faculty coordinator, personal communication, 25 August 2009).

1.3. Administration

The survey was constructed as a web site and advertised to selected UK email lists and web sites relevant to health informatics educators and practitioners. The survey was open during August–September 2009. Given its public nature, participation was not restricted to the target population but was open to anyone with an opinion to offer.

1.4. Analysis

Answers were scored as ‘Strongly Agree’=1, ‘Agree’=2, ‘Neutral’=3, ‘Disagree’=4, ‘Strongly Disagree’=5. Although data from Likert scales is commonly treated as interval rather than ordinal, it has long been debated whether this is statistically correct [12]. For the purposes of this paper, the data is treated as interval given that the semantic ranges of the questions intuitively offer a symmetrical continuum and the very broad nature of the overall study question does not demand more of the data than it legitimately offers. This approach allows summary statistics and confidence intervals to be computed, though with the caution that applies to small samples.

The mean score, standard deviation and 95% confidence interval were calculated for each question. The free text comments were qualitatively analyzed by grouping them into common themes and noting particular extremes of opinion.

The sample size was anticipated to be too small to use factor analysis to test construct validity, so this was assessed subjectively from the summary statistics and the pattern of scores. Formal calculations of reliability and sample size were not judged to be necessary given the modest precision level required for the purposes of the study.

2. Results

Forty-six responses were received: 33 male and 13 female; 39 UK-based and 7 not. In total, 25 participants were from the target UK academic population, suggesting a response rate in the order of 25-33%. Of the others, 12 were NHS staff, mostly in management roles, 4 were in IT roles and 4 were non-UK academics (plus one “other”).

As the population of interest was the academic community, the subgroups used for data analysis are academics and practitioners. The supplementary tables [13] present a summary of the responses. We found *agreement* that theory is important in health

informatics teaching and research, *uncertainty* as to whether a distinct body of theory exists or if health informatics is usually evidence-based and mild *disagreement* that health informatics is a mature academic discipline or that theory is irrelevant.

The emergent themes derived from the free text comments in the first section were: the ambiguity of the term “theory”; the need for a multi-disciplinary approach; the foundational importance of theory both in education and research; a repeated failure to learn from experience in healthcare IT implementation; and the need for theory about actual clinical usage of informatics. Some participants stressed that the field is almost entirely about application of knowledge from more fundamental disciplines. Several commented that social and organizational theory has a longer history and a more extensive body of published research than health informatics, whereas others were sceptical about the validity of theory in those areas. The recurring themes in the section on sources for theory were: an unsatisfactory lack of theoretical content in evaluation studies and textbooks; a view that governmental strategy is a dubious source of theory; and minimal support for professional standards as a relevant source. The other sources for theory suggested were: community mailing lists/forums, blogs and social networking sites and unpublished views of experts.

Seven sources were cited more than once; ten other textbooks were only cited once. Citations [13] have been consolidated to the most recent known edition where older versions were listed. A surprising omission from the responses to question 18 was the IMIA Yearbook, which selects some of the “best” literature of the preceding year [14].

In answer to question 20, whether theory is given sufficient attention in health informatics literature, 77% of academics thought not, as against 60% of practitioners. Several participants said that they would have liked a “not sure” option on this question.

3. Discussion

This survey has satisfied its aims and shown clear evidence of the demand from an informed group of practitioners and academics for a more theoretical basis for health informatics as a discipline. It has also given useful indications of the likely sources of such theories and suggested their relative relevance.

The survey has several important limitations. The sample was subject to self-selection bias in that those uninterested in health informatics theory were less likely to participate. The data is subject to UK realm bias (though in fact open to anyone) and was conducted within a fairly short time frame. The instrument failed to make allowance for staff with more than one role, for example dual clinical and academic posts, so may have somewhat misstated the subgroup allocation.

Academics showed an unsurprisingly stronger agreement with the importance of theory in both teaching and research. However, both groups disagreed that theory was irrelevant for practitioners or that theories from other domains were sufficient, with academics disagreeing more strongly.

None of the sources suggested by the survey was strongly supported as a key source of health informatics theory. The best rated sources were journals and conference proceedings, but even they did not attain strong agreement as a key source. Most of the confidence intervals included or were close to a neutral rating. This is consistent with the view that theory receives insufficient attention in the literature.

3.1. Theory, maxim or speculation?

Health informatics is arguably more likely to produce theories offering qualitative credibility (like reconstructions of literary texts [15] or historical events [16], rather than the precise formulae of the physical sciences). Health informatics today is perhaps susceptible to the same criticism that Francis Bacon made of medicine in 1603. Bacon criticized both the untheoretical empiricists who (like Hippocrates) only produced “a few maxims” and speculative rationalists (like Galen) who “spin webs out of themselves”. Bacon commended the synthesis: empirically based theory [17]. The proposed review will seek to determine whether, in Bacon’s terms, health informatics theory comprises any more than empirical maxims and rationalist speculations.

4. Conclusion

Health informatics is not perceived to have a well-known and clearly definable body of theory but there is a clear demand for this. The authors are designing a review of health informatics theory, drawing upon a recent meta-narrative framework [18], that aims to provide both quantitative and qualitative analysis and develop a comparative typology.

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