Improving the science of health informatics by using validated instruments and outcome measures.

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Abstract Health informatics does not have well-established instruments and outcome variables to measure efficacy and effectiveness. We report on a structured literature review of measurement practice in the evaluation of clinical decision support systems. A series of brief presentations introduces a workshop session about how to influence methodological practice in the field. We aim to elicit and elaborate suggestions for how to achieve the validation of at least a core set of health informatics measures.

Keywords. Health informatics, evaluation, methodology, outcomes, instruments

Introduction

Healthcare has well-established instruments and outcome variables to measure efficacy and effectiveness. Health informatics does not. The field "does not have a well-established tradition of 'variables worth measuring' or proven instruments for measuring them" [1]. Without a well-known and well-used catalogue of validated measurement outcomes and instruments, health informatics studies will re-invent methods, systematic reviews and meta-analyses will be highly problematic and the evidence base in the field will continue to be weak [2-4].

We have recently completed a structured literature review of measurement practice in the evaluation of clinical decision support systems (CDSS) [5], updating an earlier review [6]. We found minimal evidence of validated outcomes used in CDSS studies apart from existing clinical variables. We conclude that the science of health informatics remains immature, at least in the sector we examined. We propose that an initiative is required to motivate the validation of a range of health informatics measures so that findings can reliably inform policy and service planning.

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The EFMI Working Group on the Assessment of Health Information Systems and the IMIA Working Group on Technology Assessment and Quality Development have done much to progress Evidence-Based Health Informatics [7], in particular through the publication of guidelines for good evaluation practice [8] and good reporting practice [9]. Whereas these guidelines have addressed issues of overall study design, planning, execution and reporting, our narrower focus is on the scientific validity of the instruments and outcome variables used.

1. Aim of the discussion

The purpose of the workshop is to have a fruitful exchange of ideas about how to influence methodological practice in the field, determine the next steps in our research of this topic and build a collaborative network of interested parties.

We wish to engage with a mixed audience interested in advancing the scientific maturity of health informatics. We welcome the active participation of evaluators, methodologists, journal editors, clinicians, technology suppliers, policy makers and others in this workshop.

2. Contribution from each speaker

The opening two speakers (PS, AB) will introduce the aims, methods and conclusions of the structured literature review of measurement practice in CDSS evaluation. Audience discussion will be encouraged to offer critical assessment of the findings.

CF will discuss how educational programmes in informatics could be structured to better prepare future researchers to conduct studies using more rigorous measurement methods. JW will present the case for theory-based research in health informatics. AG and EE will offer their perspectives on progress in health informatics science, barriers to change, opportunities to improve and how to involve funders, industry and other stakeholder groups.

A facilitated workshop discussion will address limitations of our study, how to identify instruments and outcomes in other sectors of health informatics, how to raise awareness, how to widen active international collaboration and how to motivate significant change in practice.

3. Expected results

The desired outcome is a raised awareness of measurement issues in health informatics.

We aim to elicit and elaborate suggestions for how to achieve the validation of at least a core set of health informatics measures.

References

[1]   Friedman CP, Wyatt JC, Owens DK. Evaluation and technology assessment. In: Shortliffe EH, Cimino J, editors. Biomedical informatics Computer

applications in health care and biomedicine. 3rd ed. New York, NY: Springer; 2006.

[2] Clamp S, Keen J. Electronic health records: is the evidence base any use? In: Bryant J, editor. Proceedings of Healthcare Computing 2006. Harrogate: BCS Health Informatics Forum.

[3] Scott PJ, Briggs JS, Wyatt JC, Georgiou A. How Important is Theory in Health Informatics? A Survey of the UK Health Informatics Academic Community. Studies in Health Technology and Informatics. 2011;169:223-7.

[4] Ammenwerth E, Schnell-Inderst P, Siebert U. Vision and challenges of Evidence-Based Health Informatics: A case study of a CPOE meta-analysis. International Journal of Medical Informatics. 2010;79(4):e83-e88.

[5] Scott PJ, Brown AW, Friedman CP, Wyatt JC, Georgiou A, Eisenstein EL. A review of health informatics measurement variables and mature measurement practice used in clinical decision support system intervention studies. 2014. Unpublished manuscript.

[6] Friedman CP, Abbas UL. Is medical informatics a mature science? A review of measurement practice in outcome studies of clinical systems. Int J Med Inform. 2003;69(2-3):261-72.

[7] Rigby M, Ammenwerth E, Beuscart-Zephir MC, Brender J, Hyppönen H, Melia S, et al. Evidence Based Health Informatics: 10 Years of Efforts to Promote the Principle. IMIA Yearbook 2013: Evidence-based Health Informatics. 2013;8(1):34-46.

[8] Nykänen P, Brender J, Talmon J, de Keizer N, Rigby M, Beuscart-Zephir M-C, et al. Guideline for good evaluation practice in health informatics (GEP-HI). International Journal of Medical Informatics. 2011;80(12):815-827.

[9] Talmon J, Ammenwerth E, Brender J, de Keizer N, Nykänen P, Rigby M. STARE-HI—Statement on reporting of evaluation studies in Health Informatics. International Journal of Medical Informatics. 2009;78(1):1-9.