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The Information Assessment Method: Over 15 years of research evaluating the value of health information

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ABSTRACT

The Information Assessment Method (IAM) is unique, theory-driven, and validated by and for different audiences. Based on a theoretical model of information outcomes, the IAM questionnaire is organized in four levels: situational relevance, cognitive impact, use, and health outcomes of information. To evaluate health information, the IAM questionnaire has been used as an outcome measure providing feedback from the viewpoint of information users, who are clinicians, managers, patients or the public. The IAM stimulates the user to rate specific health information content online (e.g., on a webpage), thereby capturing their reflection (e.g., reflective learning) and feedback. Subsequently, ratings and comments can be used by information providers to improve their content.

Keywords: Information seeking, information outcomes, impact assessment, mixed methods, participatory research, primary health care, evidence-based clinical practice, consumer health information

1. INTRODUCTION

In 1986, a commentator on medical information stated “many [medical professionals] have abandoned ‘keeping up with the literature’. They are paralyzed by the sheer enormity of the task: more than 20,000 journals in biomedicine are published each year” (Bawden & Robinson, 2009, p. 183). A study of Google Scholar and Microsoft Academic Search engines, estimated the number of scholarly documents in English, which are accessible online, to be at least 114 million (Khabsa & Giles, 2014). According to the STM Report of scientific and scholarly journal publishing, “there were about 28,100 active peer-reviewed English-language journals in late 2014 (plus a further 6450 non-English-language journals), collectively publishing about 2.5 million articles a year” (Ware & Mabe, 2015, p. 6). The number of published articles per year and journals has been growing steadily, and at a faster rate in recent years (Ware & Mabe, 2015). By mid-2018, those numbers have reached 33,100 active peer-reviewed journals in English, collectively publishing over 3 million articles per year (Johnson et al., 2018).

At the same time, health professionals are expected to make clinical decisions informed by the ‘best’ research evidence, in what is known as Evidence Based Medicine (EBM) (Greenhalgh et al., 2014; Sackett & Straus, 1998). To access and apply evidence at the point of care, health professionals use EBM summaries and decision support tools (Craig et al., 2001). However, even with tools and resources, the implementation of evidence in daily practice and related behaviour change remain challenging (Cabana et al., 1999; Grol & Grimshaw, 2003).

The aim of this short paper is to introduce the Information Assessment Method (IAM), which sheds light on the use of information and its outcomes. The IAM is unique, theory-driven, and used to evaluate health information outcomes from the viewpoint of information users (clinicians, managers, patients or the public). The different versions of the IAM questionnaire are available on a website (www.mcgill.ca/iam). The IAM allows information users to document how they use health information in their daily work and life, for example to change the management of a specific patient. In addition, two theoretical models of health information outcomes will be introduced, which may enrich future research and practice in the fields of library, information, and communication science.

2. WHAT IS THE IAM?

It all began with two family doctors, one in Montreal, Canada, and another in rural France. Both were searching for and accessing clinical information in the context of their practice. Both shared the feeling of being torn between the growing volume of information and the need to use it in clinical practice. As described above, this situation is not easier today when there is even more information. In addition, given the growing number of patients with complex care needs, there is also more risk of doing harm by doing the wrong thing (Bujold et al., 2017).

In 2001, in Montreal, they began collaborating as researcher partners. At the time, most research focused on how frequently clinicians looked for information or on what resources they were using (Pluye et al., 2005). In contrast, Grad and Pluye were both interested in knowing more about how clinicians used the information in their practice, and what were the benefits for their patients. Thus, they embarked on studying the impact of searches for information conducted by family doctors at the point-of-care. This research focus on information use and related outcomes re- mains innovative and rare to this day. Recent literature reviews identified few studies focussing on information outcomes, while the majority assessed internet access, in- formation needs, and retrieval (Case & O'Connor, 2016; Urquhart & Turner, 2016). In other words, while the role of information and evidence is fundamental, little is known about how patients benefit from that information. Thus, the work to develop and implement the IAM addressed important gaps in our knowledge.

The IAM is an online questionnaire, conceived as a systematic way to evaluate and document reflection on health information, its potential use, and outcomes. It is used by clinicians, consumers, and managers in both 'push' and 'pull' contexts, when in- formation is pushed as email alerts or retrieved from electronic knowledge resources. In addition, the IAM enhances reflective learning, evaluation, and two-way knowledge exchange between information users and information providers (Tang et al., 2015).

3. RESEARCH APPROACH AND METHODS

What makes the IAM unique is the participatory approach taken in its development, specifically that of organizational participatory research (OPR). The main goal of OPR is to improve practice with and for members of an organization (Bush et al., 2018). In contrast to community-based participatory research, in OPR it is an organization that functions as a research partner, rather than a community. Despite being time-consuming, OPR often leads to extra benefits for the organization and its members, beyond the initial research aims (Bush et al., 2017). Over the years, our major research partnerships have been with the Canadian Medical Association, the Canadian Pharmacists Association, and the Chagnon Foundation. These partnerships have allowed us to implement and continuously improve the various versions of the IAM questionnaire.

The majority of IAM studies and reviews have followed a mixed methods research approach, combining qualitative and quantitative methods (Creswell et al., 2018; Pluye & Hong, 2014). This approach allows the researcher to enhance the breadth and depth of understanding of a phenomenon and corroboration of knowledge (Johnson et al., 2007) and is recommended for the assessment of value or impact of information (Urquhart & Turner, 2016). Mixed methods studies involve combining quantitative and qualitative methods, and integrating their findings (Pluye et al., 2018).

4. IAM IMPLEMNTATION AND VERSIONS

The IAM has been implemented with 19 partners and linked to a variety of information products such as summaries of primary research, summaries of new genetic tests, guideline recommendations delivered through a mobile app, information on child health and development, and others (Table 4). IAM users have included doc- tors, pharmacists, nurses, residents, rehabilitation professionals, parents and health information consumers, cancer and stroke survivors, and managers.

4.1. The IAM for clinicians

Six audience-specific IAM versions are currently used. For example, IAM-clinician has been implemented by the Canadian Medical Association (CMA). About 25,000 physician-members of the CMA can use the IAM to rate daily InfoPOEMs (Patient-Oriented Evidence that Matters) for their continuing education. Other versions include IAM-survivor, IAM-parent, IAM-heart, IAM-consumer, IAM-caregiver, and IAM-manager. In this article, we will focus on the following two versions: IAM for clinicians and IAM for parents.

IAM for clinicians is based on the 'Value of Information' construct and the conceptual model of 'Acquisition – Cognition – Application' (Saracevic & Kantor, 1997). We extended this model by proposing four levels of outcomes of information: situational relevance, cognitive/affective impact, use, and the subsequent health outcomes from the use of information (Pluye et al., 2013) (Fig. 1). These four levels conceptualise the value of information (i.e., how information is valuable) from the viewpoint of information users and are derived from an iterative three-stage pro- cess: information is received or retrieved (acquisition), it may be understood and integrated (cognition), and potentially used (application).

The IAM for clinicians questionnaire has good content, logical and ecological validity (Badran et al., 2017; Hogan et al., 2012). While content validation refers to "the degree to which elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose" (Haynes et al., 1995, p. 239), logical validation is determined by experts, and ecological validation is determined by users in natural settings (Hogan et al., 2012; Vogt et al., 2004).

In the context of the POEMs program supported by the CMA, the IAM questionnaire is used not only to stimulate reflection on POEMs, but to identify which re- search studies are most closely aligned with the international Choosing Wisely campaign (Grad & Ebell, 2017; Grad et al., 2015). Annually, several hundred-thousand completed IAM questionnaires are used to identify the top 'POEMs' consistent with the principles of Choosing Wisely. This process provides the data for an article series in the journal of the American Academy of Family Physicians.

4.2. The IAM for health information consumers

Nearly everyone accesses health information online. In fact, the second most popular activity on the Internet, after email, is searching for health information (Jacobs et al., 2017; Prestin et al., 2015). Similar to the situation with health information for clinicians, there are more empirical studies and literature reviews on the quality of information sources, patients' information needs and information-seeking behaviour, than on the outcomes of online consumer health information use (Pluye et al., 2017). The IAM for consumers and parents addresses this gap.

To that end, we explored the outcomes of online consumer health information from the perspective of consumers/patients in a mixed studies systematic review (Pluye et al., 2019). Our review included 65 studies of diverse research designs (qualitative, quantitative and mixed methods) conducted in a primary health care setting. We used a framework synthesis, which consisted of coding evidence against an a priori framework (Carroll et al., 2013). We then produced a revised framework of factors and outcomes of online health information (Fig. 2). The revised conceptual framework specifies four individual and one organizational level of outcomes and includes factors such as consumers' information needs and four interdependent contextual factors.

Since 2014, IAM-parent has been implemented with an online parenting information resource (www.naitreetgrandir.com). Thus far, over 60,000 completed IAM questionnaires have been collected. Naitre et Grandir (N&G) is a magazine, website and newsletter that is free and independent of industry funding, providing parenting information with text, audio and video material for all, including parents with low literacy levels. N&G is funded by the Lucie and André Chagnon Foundation, a phil- anthropic organization that seeks to contribute to the prevention of poverty through the creation of conditions and environments favourable to the educational success of children, specifically from socially vulnerable families and communities. We have worked in partnership with N&G to implement the IAM for assessing and improving the N&G website and newsletter (Pluye et al., 2017).

The ecological content validation of IAM-parent was done using a convergent mixed methods design (Bujold et al., 2018). The quantitative component focused on measuring the relevance of each item and involved analysis of 22,000 completed IAM questionnaires. The qualitative component focused on representativeness and involved interviews with 20 parents using the IAM linked to the Naitre et Grandir website. The quantitative and qualitative results were integrated in a matrix. The qualitative results helped interpret low relevance ratios and identify problematic wording.

Since 2015, bi-annual reports on the IAM responses have been prepared for N&G, allowing them to evaluate the outcomes of their information. Overall, the IAM ratings suggest that N&G information is valuable in terms of situational relevance, positive cognitive impact, intention to use and expectation of benefits for child health and well-being. Moreover, when comparing the benefits reported by parents with a combined low income and low education, there were no differences regarding parental worries, problem prevention, problem management, information exchange (e.g., with professionals) and confidence in decision-making associated with information use (Pluye et al., 2017). These results suggest that trustworthy online parenting information accessible for everyone, including parents with low levels of literacy, can contribute to overcoming the digital divide.

In addition to allowing Naître et Grandir to evaluate the information they provide using a validated questionnaire, the IAM contributed to improving the informational content. For example, 4,950 feedback comments on 934 unique webpages were collected. Using an online system and a previously developed codebook, two editors coded all collected comments, resulting in more than 250 revised pages. In other words, the information provider was able to improve their content based on the comments provided by IAM users, in what is referred to as two-way knowledge translation (El Sherif et al., 2017).

5. CONCLUSION AND A LOOK INTO THE FUTURE

The IAM stimulates reflective learning and collects user-generated and content- specific feedback. As a method, it is useful to both information users and providers as it facilitates two-way knowledge translation. Moreover, IAM ratings can identify POEMs of clinical research about medical tests or treatments considered to be unnecessary, in line with the principles of the ‘Choosing Wisely’ campaign.

In the future, our research will focus on exploring ways to leverage collective intelligence from comments submitted by physicians evaluating summaries of clinical research (POEMs). By sharing the feedback of physicians who rate POEMs, we can stimulate a second wave of learning and thereby build collective intelligence: shared or group intelligence that emerges from collaborative effort. As for IAM-parent, we are doing further research aimed at evaluating and improving information resources for consumers with lower socioeconomic status, as well as exploring the role of social support in information outcomes.

For clinicians and patients, the role of health information and best evidence is invaluable. Over a decade of IAM-related research has demonstrated that information use can lead to health benefits for patients in primary care. We invite information researchers and professionals interested in health information to consult the book titled ‘Look it up!’ that describes integrating evidence in practice by drawing on research, numerous case files, and extensive interviews with clinicians and patients (Pluye, Grad, et al., 2017).

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TABLES AND FIGURES

Table 1 Information assessment method: Implementation matrix

Partners/ information providers	IAM types	Information product	Information content	Information users	Main location	Implementation period
Canadian Medical Association (CMA)	IAM-clinician	InfoPOEMs and DynaMed	Clinical information regarding diagnosis, preventive interventions, treatment or prognosis	CMA members (Physicians)	Canada	2006-ongoing
Canadian Medical Association (CMA)	IAM-clinician	Courriels Cochrane	French translations of P.E.A.R.L.S., brief summaries of abstracts of Cochrane reviews disseminated by email to primary care physicians	Family physicians	World-wide	2009– 2010
Canadian Pharmacists Association	IAM-clinician	Highlights	Therapeutic recommenda- tions	Physicians	Canada	2010– 2017

(CPhA) and the College of Family Physicians of Canada						
Cleveland Clinic	IAM-clinician	Searches of DynaMed or UptoDate linked to patient-specific files in an electronic medical record	Clinical information to address questions regarding diagnosis, preventive interventions, treatment or prognosis	General internists, family physicians, and clinical nurse practitioners	USA	2010– 2012
McMaster University, Health Information Research Unit	IAM-clinician	MacPlus	Email alerts about new evidence, tailored to the user's interest profile	Physicians in general practice or primary care, internal medicine or subspecialties	Canada	2012
Department of Family and Community Medicine, University of Toronto	IAM-clinician	Gene Messengers	Email alerts of summaries of new genetic tests with recommend-ations	Family physicians	Canada	2012
Information	IAM-	Information	Alerts on a	Family	Canada	2015– 2017

Technology Primary Care Research Group (ITPCRG)	clinician	Assessment Method (IAM) mobile app	mobile app to encourage reading of 99 topics, in a manner inspired by the concept of spaced education	medicine residents		
Laval University	IAM-clinician	Infopratique	Critical analyses of research articles published by Laval University and the Canadian Medical Association	Physicians	Québec	2015- ongoing
Naître & Grandir	IAM-parent	Naître & Grandir website and newsletters Patient Education Network database	Information on child health and development	Parents and caregivers	Québec	2014- ongoing
Patient Education Network (PEN),	IAM-consumer-PEN	“Fiches santé” website (https://	Consumer health information resources	General public (patients and consumers)	Québec	2014- ongoing

Jewish General Hospital (JGH)		www. chumontreal.qc.ca/ fiches-sante)				
Centre hospitalier de l'Université de Montréal (CHUM)	IAM-consumer	Gene Messengers	Patient information sheets	General public (patients and consumers)	Québec	2015- ongoing

Fig. 1. ACA-LO Theoretical Model (Grad et al., 2015). Reproduced by permission of the American Board of Family Medicine.

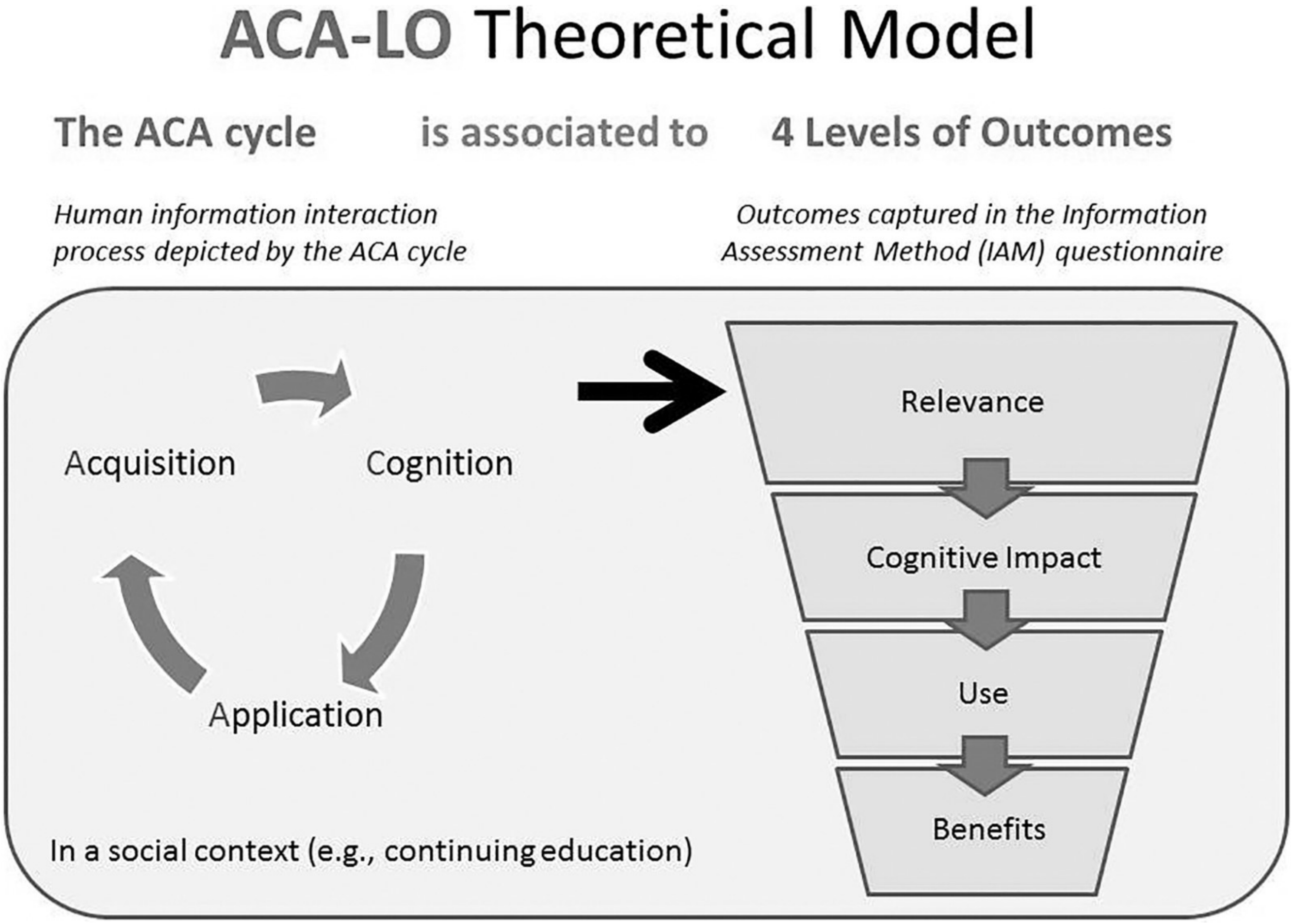

Fig. 2. Revised model context-ACA-LO: Context, Health Information Needs and Behaviour, and Five Levels of Outcomes of Information (Pluye et al., 2019).