ANNALS OF FAMILY MEDICINE

Online Supplementary Material

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Supplemental Appendix 1. Definitions and Examples of Concepts and Technical Terms

Clinical information: Any information designed for clinicians to use in a patient encounter specifically for answering clinical questions, eg, 'what is the utility of diagnostic testing for someone whose first degree relative has celiac disease, but who does not herself have symptoms?' (Table 1). Clinical information includes text, images, sound and multimedia documents. It refers to research-based articles or summaries or synopses, and treatment recommendations or knowledge syntheses for clinical practice, eg, guidelines. It is stored in and retrieved from electronic resources such as journals, textbooks, and databases with drug information, treatment recommendations, or drug interactions. What clinical information does not refer to is patient-specific data, such as their blood pressure.

Information object: A discrete item or piece of information with a unique identifier such as a Web page.

Information Assessment Method (IAM): The IAM links a questionnaire for assessment of one object of information retrieved from (pull) or delivered by (push) an electronic resource. The content validated *2011 IAM-pull* questionnaire for health professionals documents the value of one clinical information object in relation to: (a) its relevance for at least one patient (7 items), (b) its cognitive impact on the health professional (9 items), (c) its use for a specific patient (7 items), and (d) expected patient health benefits (5 items) (www.mcgill.ca.iam).

Multiple Case Study: A design frequently used in qualitative research. Cases can be anything from a country (eg, for international comparisons) to an organization (eg, a clinical setting), a person (eg, a physician), or an event (eg, a search for information). This design is based on two principles: the logic of replication and pattern-analysis. On the one hand, a conceptual or theoretical proposition (eg, the ACA-LO model) is considered more robust when supported by more than one case. On the other hand, results are based on patterns observed within and between cases (eg, types of health benefits associated with the use of clinical information).

Convergence design: A key characteristic of mixed methods research is the integration of qualitative and quantitative methods. A common classification of mixed methods is based on three types of research design, each corresponding to a type of integration.[1] First, in a convergence design, quantitative and qualitative methods are concomitant. The integration occurs at the time of data collection and analysis. Second, in a sequential exploratory design, a qualitative method is followed by a quantitative method. In terms of integration, the quantitative results are mobilized to confirm or generalize the qualitative results. Finally, in a sequential explanatory design, a quantitative method is followed by a qualitative method. Concerning integration, the qualitative results are mobilized to interpret or explain quantitative results.

Convergence coding matrix: This analysis technique has been proposed for mixed methods convergence designs. A 'convergence coding matrix' displays results emerging from qualitative and quantitative components of a study on the same page: "This is followed by consideration of where there is agreement, partial agreement, silence, or dissonance between findings from different components".[2(p1148)]

Critical incident technique: This technique has been widely used since World War II, when American psychologists recorded stories of how aviators survived critical incidents. Stories were introduced into training, which was associated with an important decrease in aviator mortality. This technique then suggested standard educational practice called problem-based and case-based learning. In research, this technique is known to provide detailed and reliable data.

Critical search: In line with the *Critical Incident Technique*, critical searches were defined as clearly described searches where clinical information was used for a specific patient.

Clear search: We included searches when interviewees successfully answered five 'W' screening questions (see below), had a good memory of the search (eg, no "I don't remember"), and provided a clear story about the use of information for a given patient. Other searches were excluded (because of poor memory, or no use of information for a patient, or a major contradiction). For example, we excluded a search where the clinical story (using information on adverse effects of a drug) was contradicted by the content of found information (no mention of adverse effect).

Our five 'W' screening questions were as follows: (a) Why: "According to my report, you searched for the following reason(s) (read log-report). Also, you said that this search succeeded in meeting your objective(s) (read log-report). In what specific ways did this search succeed in meeting your objective(s)?"; (b) With whom: "Did you do this search by yourself or in the presence of someone else?"; (c) Where: "Do you remember where you were when you did this search?"; (d) When: "Did you search before, after, or during an encounter with a patient?"; (e) How: "Did you search in another source of information? For example did you seek information from colleagues, Internet, journals, textbooks, personal notes or library services?"

Information use: The five types of information use were: (a) The interviewee used this information to persuade the patient, or to persuade other health professionals to change; (b) As a result of this information, the interviewee managed the patient differently; (c) The interviewee had several options or did not know what to do, and used this information to justify a choice; (d) The interviewee felt they knew what to do, and used this information to be more certain about patient management; and (e) The interviewee used this information to better understand a particular issue related to the patient. In type (b), information changed the physicians' original management plan, but the original plan (before the search for information) was not recorded. Information use was based on IAM ratings, then confirmed and explained by physicians during interviews (self-report).

The inclusion/exclusion of critical searches followed three steps: (a) a researcher synthesized the data into a brief clinical vignette, which integrated quantitative and qualitative data to provide a comprehensive picture; (b) another researcher reviewed all data (all searches), and initial vignettes; and (c) disagreements between these two researchers regarding the interpretation of the data (summarized in the vignettes) were resolved by discussion and consensus. To ensure rigor in mixing data, these researchers specifically discussed divergences between qualitative and quantitative data, and systematically documented the strategies they applied for resolving these issues: 'reconciliation' (minor divergence such as reporting that an item was checked "in error") or 'exclusion' (major contradiction: see above example). Our methodological strategies for analyzing divergence between qualitative and quantitative data or results have been published elsewhere.[3]

Searches whose objective was directly linked to a patient: These searches were identified by participants who used IAM to report that their search was done: 'to address a clinical question', or 'to share information with a patient', or 'to plan/manage aspects of patient care with other health professionals'. The 188 clinical vignettes merged IAM ratings and interview data corresponding to two situations. Participants sought an answer to a specific management question (eg, a physician's question concerned *"the utility of doing the test [for celiac disease] in someone who did not have symptoms"* —see Table 1), or a general question related to a need to update knowledge on a topic (eg, another physician stated, *"I just wanted to know what else I should be looking at"* on vertigo, learned *"how effective exercise therapy was,"* and called the patient to recommend it). Where none of the above items were checked, searches were considered as not directly linked to a patient. IAM items not directly associated with a patient were: 'To fulfill a personal educational objective', or 'To satisfy curiosity or for personal interest', or 'To look up something I had forgotten', or 'To exchange information with other health professionals (eg, a colleague)'.

Patient health benefit: Rare are comprehensive models of patient health outcome that apply in all health situations, such as those encountered in primary care. The 'Logic model for primary health care' provides concepts that describe effects of knowledge utilization on patient health.[4] In line with this model, the use of information in clinical decision-making may lead to five types of patient health benefit: (a) this information helped to improve the patient's health status, functioning or resilience, (b) this information helped to prevent a disease or worsening of disease for this patient, (c) this information helped to avoid unnecessary or inappropriate treatment, diagnostic procedures, preventive interventions or a referral, (d) this information helped to increase patient satisfaction about a treatment, diagnostic procedure or preventive intervention, and (e) this information helped to increase patient knowledge. The outcome (c) refers to quality of health care and patient safety. The other outcomes correspond to changes that are usually attributed to health care: (a) change in health status, (b) change in the behavior of patients or family members that may influence future health, (d) satisfaction of patients and family members with the care they received, and (e) change in knowledge acquired by patients and family members that may influence future care.[5]

Patient health outcome: This includes positive (benefit) and negative outcomes. While no participant reported that found information misled them in their clinical decision-making, research conducted in computer-lab settings suggests this can happen.[6 7] Thus, clinical information may be associated with negative patient health outcomes in routine clinical practice.

References

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