Reviewer’s report

Title: Adopting clinical genomics: a systematic review of genomic literacy among physicians in cancer care

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Reviewer: Kurt Christensen

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Overview

This review article summarizes the literature about genetic literacy among health care providers published within the past 25 years. The topic is unquestionably an important one, given the increasing integration of genomics into clinical practice; and I particularly like the focus on potential strategies to improve genetic literacy. However, the value of this article would be greatly improved with a tighter focus and more nuanced analysis. Genetic literacy and the importance of genetic testing, for instance, vary by provider specialty, and professional societies often develop specialty-specific competencies and genomics education programs. Another approach I would suggest is to use a knowledge framework such as the one proposed by Chris Smerecnik, based on Diffusion of Innovation Theory, that distinguishes awareness knowledge, how-to knowledge, and principles knowledge.

Major Concerns

The objectives of this review are too broad. The authors list the objectives as to (1) examine the level of (a) genomic knowledge, (b) education, or (c) practices amongst physicians, (2) assess the attitudes towards genomics, (3) evaluate the current status of genomic materials in medical school curricular, and (4) identify potential strategies for development of genomic education among physicians. I applaud the ambitiousness of the review and agree that the outcomes of interest are interrelated, but the net result is that the authors don't provide a nuanced or deep analysis of any of these important objectives. Of additional note, it would be helpful if the authors defined what is meant by "practices."

Regarding objective (3), much of the emphasis on improving genetic literacy among physicians is aimed at continuing education and standalone programs. Medical school curricula are important, but not the only important determinant of genetic literacy.

The empirical bases for many statements about low genomic literacy are unclear. For instance, the authors write, "the general level of genomic literacy identified in the reviewed studies…remains stagnant." How did the authors reach this conclusion? The authors later contradict their
own assertion by writing, "physicians who graduated later from medical tend to have higher knowledge," and "it is reasonable to expect level of genomic literacy to change over the last ten years."

Objective and subjective genetic literacy are distinct constructs. We typically see high objective scores of genetic literacy (i.e., on scales measuring correct answers to knowledge questions), but low subjective scores (low confidence, low self-efficacy). Distinguishing these two constructs would help the authors be more nuanced about how physicians should be educated and how they should be supported in practice. GeneInsight, for instance, is not a genetics education tool; but supports genomic medicine in a way that can boost providers’ confidence.

There are already many, many programs devoted to increasing genetic literacy among physicians, most of which have identified competencies and prioritized areas of improvement. These include NCHPEG, G3C, and ISCC-PEG, to name just a few. Given how few of these efforts have been formally evaluated, I liked how the authors summarized the CPD module and GIC in the section on "potential strategies for better development of genomic education." Rather than the brief identification of some issues that educational efforts should cover, the authors could summarize the evidence on what programs achieved their goals and which ones didn't.

Minor Comments

Introduction: I'm uncertain what the authors mean by, "action-oriented engagement." It would also be helpful if the authors substituted more familiar terms for "affordances," and "constraints" in their definition of genetic literacy. From my understanding, affordances and constraints influence the importance of genetic literacy rather than being dimensions of it.

Methods: Per the PRISMA Statement, the authors should include the actual search terms they used.

Discussion: Genomic technologies are already part of oncology care, as well as many other specialty settings.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
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Are the conclusions drawn adequately supported by the data shown?  
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