

Contingent or Universal Approaches to Patient Deficiencies in Health Numeracy

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Medical decision-related numeracy includes aptitude with numbers, fractions, and ratios.¹ It is an aptitude assumed necessary for complete understanding of the risks of health behaviors and medical treatments, for communicating one's utilities when the patient's individual preferences can swing the decision, and for considering costs and cost-effectiveness of alternative treatments. The ability to perform basic arithmetic operations is part, but not all, of health numeracy.

It has been established that patients' health literacy (the ability to read information relevant to health) is related to their health behaviors² and health outcomes.³ We would also expect numeracy to be associated with health outcomes, although there is little evidence yet of its connection to health outcomes that could not be explained as an expression of the effects of health literacy or of general intelligence.⁴ It seems reasonable to figure out how physicians and health communicators may compensate for patients' numeracy deficits by communicating in a way so that they may understand quantitative concepts.

In this endeavor, should physicians and health educators routinely assess patients' health literacy and numeracy and adjust their communication contingent on their patients' ability to understand? Or should they develop a message that all patients can grasp and use it universally? Articles in this issue of *Medical Decision Making* provide support for each of these competing approaches. Fagerlin, Zikmund-Fisher, and colleagues^{1,5} report on the development of a subjective measure of numeracy intended to facilitate its measurement for research. Presumably,

an instrument such as this could serve as a basis for sorting patients into groups to receive messages appropriate for different levels of health literacy and numeracy. Schwartz, Woloshin, and Welch,⁶ on the other hand, describe a communication tool, a "Drug Facts Box," that tabulates the efficacy and side effect rates of a treatment. This tool successfully conveyed its key concepts not only to the well educated (health lecture attendees in a university town) but also to the poorly educated (patients and family members in a Veterans Affairs medical center waiting room). Although the tool is proposed as a required component of direct-to-consumer advertisements rather than for patient education, it represents an ideal of communication, accessible for all, that does not oversimplify but rather expresses the concepts essential for evaluating a treatment decision, including the numerical aspects of risk, efficacy, and quality of life.

THE CONTINGENT APPROACH: TAILORING FOR NUMERACY

A clinician might tailor patient communication to the individual patient's level of health literacy and medical decision numeracy. The prototypical example of tailoring is conversing in the patient's language: Obviously, this improves the outcome for the patient, although there can be subtle pitfalls.⁷ On the other hand, a meta-analytic review of tailoring for health behavioral change,⁸ comparing the effects of tailored and general communications, showed that the overall effect of tailored messages was only $r=0.074$ or at best $r=0.122$ if the tailoring was thorough, based on theoretical, behavioral, and demographic factors. This corresponds to tailored health communications producing an improvement of only 0.5% or 1.5% of the variance in patient outcomes. Although the impact of tailoring for numeracy is unknown, let us assume it would offer greater benefits than this.

The expectation that tailoring communications for patient numeracy will help patients depends on

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2 assumptions: 1) that an accurate distinction can be made between 2 or more levels of patient numeracy and 2) that better patient outcomes happen if different types of communication are used for each numeracy level—that it is better when patients are offered explanations, brochures, Web page referrals, or decision aids designed for their level of numeracy than if they were to be communicated with in a style that couches the quantitative concepts in terms that are too hard or too easy.

Addressing assumption 1, how accurately could a numeracy measure identify patients with deficiencies? Fagerlin and colleagues^{1,5} noted their research participants' reluctance to complete tests of the arithmetic of fractions and proportions, presumed to be accurate measures of numeracy. Their subjective numeracy measure, generally acceptable to participants, correlated 0.63 to 0.68 with a test of basic arithmetic skills⁹ in different studies and hence could lead to inaccurate categorization. For example, if 25% of the population had numeracy problems and the correlation between a numeracy measure and their true state were 0.68, explaining 46% of the variance, we can use Rosenthal's binary effect size display¹⁰ to show that (with an optimal decision threshold) 6 of 25 patients (24%) with literacy problems would be given the high literacy brochure and 6 of 75 patients (8%) with no deficit would nonetheless be given the brochure written for the low literacy patient.

Meeting assumption 2 presents the 2nd challenge to tailoring communication contingent on patient numeracy. There is no repository or library of patient education materials that has been proven adequate for explaining decision-relevant quantities for readers with different levels of numeracy. In fact, many patient brochures lack essential numerical content,¹¹ and even many decision aids do not present the probabilities needed to appreciate the uncertainties of the decision.¹²

THE UNIVERSAL APPROACH: ONE MESSAGE FOR ALL LEVELS OF PATIENT NUMERACY

In the face of uncertainty about the 2 key assumptions necessary for tailoring communications based on patient numeracy, it is natural to consider the alternative, designing communications that are effective for patients at all levels of numeracy. Such a universal approach would use a single explanation for all patients, carefully crafted to convey the quantitative concepts necessary to support the decision. A rising tide lifts all boats; this approach assumes

more good is delivered by ensuring the availability of at least 1 generally accessible message than by producing multiple messages, each refined for a subgroup of different numeracy.

A possible problem with relying on a universal message is that although patients with all levels of numeracy might be able to understand it, possibly it will serve no one well. However, the demonstration by Schwartz and colleagues⁶ shows it is feasible to develop materials that are universally accessible. With no instructions other than to read the materials, the college-educated patients could answer more than 80% of the questions assessing comprehension of the treatment efficacy information; the high school-educated patients answered just less than 70% right. However, that communication tool is the product of several years of effort, and similar projects would be needed for every disease to provide physicians with an adequate library of universal messages.

Conveying quantitative concepts to patients with numeracy difficulties—or simultaneously to patients with high and low numerical abilities—is quite different from writing at a fifth- or sixth-grade level, as is done with so many patient education materials. The latter goal is achieved by using short words and short sentences as well as eliminating difficult passages. Often, the passages with numerical content are left out in the effort to be easily understood, casualties of the lack of recognition that numbers are needed health information, and that numeracy is an essential component of health literacy.

It may be difficult to produce messages about quantitative aspects of health that are universally effective for all levels of numeracy. Research and theory may be needed to identify the key concepts for each disease's decisions as well as effective ways to present quantitative concepts accessibly. The workload may exceed the capacity of academic researchers who specialize in knowing how to produce such materials. Even if there were a federal initiative to train health communication professionals to write clearly and universally accessibly about the quantitative aspects of risks and medical decisions, it may be easier for such a workforce to produce multiple messages, each aimed at patients with specific numeracy levels, than to produce a smaller number of messages, each effective for all patients.

In conclusion, these distinct positions, although oversimplified, are important reference points for those developing materials for educating patients about the essential quantitative concepts of medical decision making.

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