REVIEW ARTICLE

Translating evidence-based information into effective risk communication: Current challenges and opportunities

AMIT KUMAR GHOSH and KARTHIK GHOSH

ROCHESTER, MINNESOTA

Recent medical advances and the easy availability of evidence-based information at the point of care are believed to provide physicians with improved tools for risk communication. However, evidence indicates that physicians still display marked variability in ordering tests. Factors that determine a physician's test-ordering tendencies vary by specialization, practice, geographical location, defensive practice, and tolerance of uncertainty and are also modified by patient requests. Understanding of statistical terms on the part of both physicians and patients remains limited. Physicians may display limited ability to assess pretest and posttest probabilities, especially in low- and intermediate-risk patients, even after attending short courses in epidemiology, or may find the process impractical. Presentation of diagnostic-test results in a natural-frequency format might improve understanding. Both physicians and patients have difficulty grasping the term "number needed to treat" compared with "relative risk reduction" when comparing therapeutic options. Other patient-related factors that limit understanding include low literacy, individual risk tolerance, and framing patterns of the problem (potential gains vs losses). Despite numerous available modalities (quantitative and qualitative) of risk communication, consensus over the advantage of any single modality in translating evidence into risk communication is limited. It is essential that physicians remain patient-centered, generate trust, and build a partnership with the patient to achieve consensus for medical decision-making. Future studies are indicated to assess the effectiveness of novel risk-communication modalities based on patients' and physicians' characteristics and identify appropriate modality of translating evidence (quantitative or qualitative information). (J Lab Clin Med 2005;145:171–80)

Abbreviations: AR = absolute risk; ARR = absolute risk reduction; EBM = evidence-based medicine; GP = general practitioner; LR = likelihood ratio; NNT = number needed to treat; PPV = positive predictive value; ROC = receiver-operator characteristic; RR = relative risk; RRR = relative risk reduction

I n an effort to provide the most appropriate health information to patients, physicians are faced with a dilemma. Given the time constraints, physicians must focus on critical information while avoiding

irrelevant information during the physician-patient encounter.[1] Physicians often find themselves in the role of risk communicators and must determine and describe the content of their message in a manner that will be understood by their patients. The final message should incorporate the patient's values and opinions and should be tailored by the best existing evidence. The 2001 Institute of Medicine report emphasizes patient-centeredness as an essential component of patient-physician relationship.[2] There is an increasing emphasis on providing patients with quantitative information about the risks and benefits of diagnostic tests and treatment that they can use to make the best decisions for themselves. Not transparent in this assumption are the factors that can affect the patient's and physician's understanding of the tests and their role in the decision-making process.

The current emphasis on a curriculum in evidence-based medicine is based on the assumption that increased ability to appraise current evidence and awareness of best evidence transforms medical students and practitioners into expert risk communicators.[3] Commonly stressed statistical terms include such diagnostic terms as "pretest probability," "sensitivity," "specificity," and "likelihood ratio," as well as terms used to express therapeutic efficacy, including "absolute risk reduction," "relative risk reduction," and "number needed to treat." This last term has been stressed as the most important indicator of clinical significance of a therapeutic intervention.[4] The authors of a recent article expressed great alarm at the infrequency of reporting of NNT in articles published in prestigious journals (only 8 of 356 eligible pieces).[5]

The translation of current evidence into clinical practice presents challenges, both in cases in which the diagnosis is known with certainty and in those in which it remains uncertain.[6,7] It has been presumed that physicians with adequate training develop the ability to assimilate current information and thereby decrease practice variability. The final assumption is that patients are able to understand quantitative information reported in the medical literature and assume equal partnership in their health care.

In this review, we will present an account of current evidence regarding physician variability in test-ordering characteristics; physicians' understanding of probability statistics and terms describing therapeutic efficacy, including NNT, ARR, and RRR; and factors that may impair a patient's understanding of evidence-based information. We will also suggest strategies for effective risk communication.
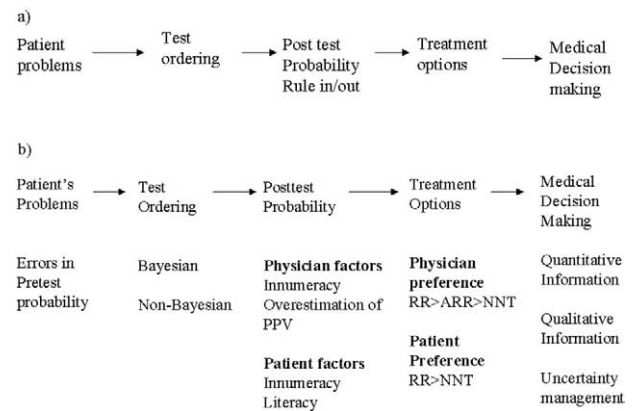
Fig 1. A, Linear process of medical decision-making; **B**, actual steps of the decision-making process.

DETERMINANTS OF PHYSICIANS' TEST-ORDERING CHARACTERISTICS

At first glance, ordering a test appears a rather straightforward exercise in clinical decision-making (Fig 1, A). One must take a thorough history and perform a meticulous examination of the patient to determine the pretest probability of the differential diagnosis, choose a test with favorable characteristics (high sensitivity and specificity), and thereby refine the posttest probability of the likely cause of patient's problem while relegating the other causes to insignificance.

In reality, the process of choosing a test is more complicated and frequently non-Bayesian. After other variables are controlled, factors that affect physicians' test-ordering characteristics vary with their geographic location (American neurologists order more tests than do neurologists in the United Kingdom),[8] specialization (specialists order more tests than do primary-care physicians),[9] practice settings (solo practitioners order more tests than do physicians in group practices),[10] financial incentives (physicians who own imaging facilities order more radiographs than do those who do not own such facilities),[11] defensive practice (malpractice fears),[12] and perception of official guidelines.[13] Recent studies have also revealed that physicians' personal intolerance of uncertainty may account for 17% of excessive cost in medical management.[14] In fact, in 1 study, most physicians did not use a Bayesian approach in their practices because they found it impractical or too unfamiliar.[15]

A physician's test-ordering behavior is often guided by patient-related factors. It has been shown that physicians are inclined to order more tests if a patient demands them,[16] if a patient has private insurance,[17] if a patient is of higher socioeconomic status,[18] if a pa-