Editorial

Using Computer-Based Decision Support to Close the "Know–Do" Gap in Lipid-Lowering Therapy

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A strange paradox haunts our attempts to prevent ischemic heart disease. Medicine has addressed the relation between serum lipids and atherosclerosis through a series of scientific triumphs. First, epidemiology demonstrated the association between abnormal cholesterol levels and coronary artery disease. Then, physiology and biochemistry elucidated the pivotal role of 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase in the synthesis of lipoproteins. Next, pharmacology led to the development of new medications to target that enzyme without the often-unbearable side effects of earlier drugs. And finally, clinical researchers enrolled tens of thousands of patients at hundreds of centers worldwide to prove the efficacy of these treatments and help guide their use. Taken together, these steps represent one of the finest examples of the application of science to understand and ameliorate human disease.

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But shifting our focus from the successful laboratory or clinical trial site to the population reveals more disappointing data. We physicians fail to diagnose potentially dangerous lipid levels in up to a third of our patients with cardiovascular disease[1,2]; when the problem is identified, we often do not properly deploy the impressive arsenal of treatments that have been put in our hands. In the United States, fewer than half of those who would benefit from lipid-modifying treatment for coronary heart disease risk reduction are receiving it.[3] And of those on therapy, just half of patients actually achieve their cholesterol goals.[4] This results in part from poor persistence by physicians in monitoring lipid levels and adjusting therapy accordingly, as well as poor persistence by patients in staying with their prescribed regimens for both economic and noneconomic reasons.[5]

In summary, despite the wealth of tools available to diagnose and manage this common condition, only a fraction of people who have it are being adequately treated. The clinical and economic consequences of this front-line shortfall are as sobering as the more basic scientific accomplishments are impressive.

The problem has many causes: the difficulties many Americans have accessing adequate affordable physician services and medications; the rushed nature of primary care in many settings, reducing the time that can be spent on prevention and patient education; the gaps in core knowledge about appropriate strategies for cardiovascular risk reduction that some practitioners have; the absence of anything resembling quality control in most practice situations in our fragmented healthcare system; prescribers' inattention to the need for simple and affordable treatment regimens, especially for patients without adequate insurance coverage; and the lack of enthusiasm some patients feel for lifelong drug use to treat an asymptomatic condition. No single solution can deal with all of these components. However, in the current issue of *Circulation*, van Wyk et al[6] demonstrate the efficacy of a practical and easily scalable intervention.

Van Wyk et al developed a computer-based decision support system to help generalist physicians identify which of their patients require screening and/or treatment of lipid abnormalities and then randomized 38 primary care practices (including 80 physicians) into 3 groups. One group had the decision support software available on demand to provide guidance on screening and treatment; in a second group, the system provided those prompts automatically. A third group served as controls. The results were impressive. Control practices screened only 25% of patients who required it, whereas practices given the alerts screened 65% of such patients. The benefits extended to treatment as well. Practices given the alerts treated 66% of patients who needed treatment compared with just 36% of such patients treated in the control practices.

The practices in which the decision support was merely available if queried performed only slightly (and insignificantly) better than controls. It would have been good also to know how the intervention affected lipid levels and other clinically meaningful outcomes, but it does not require a great leap of faith to assume that a population better screened and more frequently treated will have improved health.

This study is a fine example of what might be called "1-level-up" healthcare interventions, which implement solutions (and ideally test them rigorously) at the level of the healthcare system rather than of the individual patient. Grounded in disciplines such as epidemiology, operations research, informatics, and behavioral science, this area of research and implementation attempts to address what is sometimes referred to as the "know-do" gap, the large chasm between the best that clinical science can accomplish and the realities of average care in typical practice settings.[7]

Knowing which patients require lipid screening and which require treatment is not as complex as molecular genetics. But although data-driven paper-based guidelines and algorithms with multicolor grids have existed for a long time, their visually striking appearance does not quite make up for their difficulty of

The opinions expressed in this article are not necessarily those of the editors or of the American Heart Association.

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(*Circulation.* 2008;117:336-337.)

***Circulation* is available at http://circ.ahajournals.org**
DOI: 10.1161/CIRCULATIONAHA.107.745042

use. The situation is a natural one for electronic decision support; general consensus exists about the clinical goal and the rationale for getting there, but the exact details of just who is at risk and what to do about it are not easy for a busy primary care doctor to commit to memory and even harder to implement in a busy generalist practice. The utility of computer prompts in this setting has been apparent for at least 3 decades.[8,9]

The Dutch investigators had 1 important factor helping to make their intervention a success. Fully 90% of primary care physicians in the Netherlands already use an electronic medical record,[10] so an enhancement such as this could be both feasible and readily generalizable. By contrast, the computerization of primary care records in the United States, believed by many to be imminent for decades, continues to plod along at a disappointing pace.[11] One recent nationwide survey found that in 2006 only 12% of American office-based physicians were using a comprehensive electronic medical record system, an insignificant increase over the prior year.[12] Another interesting contrast is that the authors developed their user-friendly software with foundation support and gave it out free to all participants; they do not plan to turn it into a commercial product. In these ways also, the origins and dissemination of this very effective decision support system offer instructive contrasts with the less robust, more fragmented, and privatized approach to medical informatics that has marked the American system.

Previous investigations of alerting systems in the United States[13] have found less impressive results than the 30% to 40% absolute improvements in screening and treatment rates observed by van Wyk and colleagues. For example, in a randomized study conducted at 2 Boston-based academic hospitals with sophisticated electronic health records, providing electronic alerts to physicians increased absolute rates of guideline-adherent care by only 5% in patients with diabetes mellitus or coronary artery disease.[14] It is unclear whether these differences are attributable to baseline differences, the tool being tested, the doctors who agreed to use them, the practice environments, or cultural differences between Americans and Europeans with respect to their willingness to accept information technology and guidelines. In any case, the study of van Wyk et al rigorously demonstrates just what is possible with computer decision support—and even more important, how such systems should be designed.

Much of medicine at both the generalist and specialist levels requires the consistent, evidence-based application of often-straightforward decision rules. This is a task at which computers often perform better than humans, which may help to explain why the penetration of electronic decision support has proceeded so slowly in many settings. As more and more applications such as this prove their worth in controlled trials, clinicians will need to embrace them rather than feel threatened by them, for several reasons. First, if such interventions can be shown to improve outcomes over usual care, they will eventually be implemented whether practitioners like them or not. Second, if we could "outsource" more secretarial-type functions such as lipid assessment to a computer, it could free up physician time so that we could do a better job of actually talking with patients about their condition and the regimens we prescribe. That could go a long way toward addressing the second major embarrassment of chronic disease treatment: patient nonadherence.

The evaluation of systems-level interventions such as that reported by van Wyk et al is likely to become an increasingly important component of medical research in coming years as evidence of the "know-do" gap becomes better documented across a host of chronic and acute illnesses and as patients, policy makers, and payers increasingly demand better outcomes and better value from medical care. But it is not enough to decide that a given systems-level intervention seems to make sense and then simply implement it on a large scale. Applied to therapeutics, that unscientific approach is what gave us centuries of purgatives, cathartics, and leeches as the mainstays of medicine. Instead, we can look forward to important gains in clinical effectiveness that will be made possible by studies such as this one that take a promising idea, subject it to rigorous evaluation in a randomized trial, and prove its worth, just as we do for smaller-scale clinical interventions.

Disclosures

None.

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KEY WORDS: Editorials ■ cholesterol ■ computers ■ drugs ■ prevention

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Circulation. 2008;117:336-337
doi: 10.1161/CIRCULATIONAHA.107.745042
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Print ISSN: 0009-7322. Online ISSN: 1524-4539