

[research profile] BY ANDREW CURRY

# It All Adds Up

## Poor math skills can endanger health



Rothman is interested in how doctors and patients communicate.

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### Focus

Health service research

### Research Funding

ADA Clinical  
Research Grant

For most people, being bad at math is an inconvenience. For those with diabetes, poor numeracy—the math equivalent of illiteracy—can have serious consequences. And for Russell Rothman, MD, MPP, a primary care physician at Vanderbilt University Medical Center in Nashville, improving education and self-management skills for

diabetes patients with poor numeracy can be just as important as prescribing new drugs or changing treatment regimens.

Rothman has spent the past five years studying the impact of literacy and numeracy on diabetes treatment. With a grant from the American Diabetes Association, he interviewed 400 diabetes patients in Nashville

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and Chapel Hill, N.C., to see how well they dealt with the math that is an essential part of diabetes care. “We talked to a diverse range of patients, with varied education, income, and other factors,” Rothman says. However, when tested, he found that more than two-thirds of the patients had less than ninth grade math skills, and almost all of the patients had some difficulties when trying to apply math to diabetes-related tasks. Preliminary results of the study were recently presented at the American Diabetes Association Scientific Sessions.

The study was no college-level calculus exam, or even a high-school algebra test. The 43 questions looked at basic arithmetic skills crucial to diabetes treatment. Some used real-world examples: reading a nutrition label, for instance, to see how many carbohydrates there are in half a bag of carrots. Others asked for simple multiplication: “Each cracker has 2 grams of carbohydrate. How many crackers should you eat to get 20 grams?”

**According to some estimates, 90 million American adults have trouble reading; 110 million have trouble with basic math.**

Yet the majority of people Rothman surveyed “couldn’t look at a bag of chips and tell us how many carbs they would eat if they ate the whole bag,” he says. In one question, patients were asked to read numbers from a glucose monitor and tell the researchers which numbers were between 60 and 120, the normal range for blood sugar. Unfortunately, some patients could not even perform

this fundamental skill required for blood glucose management.

The patients Rothman surveyed had a lot of trouble with fractions and decimals; any calculations involving more than one step threw them off. “[The study] confirmed that many people are struggling every day,” he says. Though this study only looked at people with diabetes, Rothman’s results fit into a larger picture of literacy and numeracy problems in America. According to some estimates, 90 million American adults have trouble reading; 110 million have trouble with basic math. “Patients find these skills challenging, and ... there’s a disconnect between what we’re asking them to do and what they’re prepared to do.”

Trained as a general internist and pediatrician at Duke

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University, Rothman also earned a master's in public policy from Duke and worked at the University of North Carolina before moving to Vanderbilt in 2002. Since then, he's studied the impact of literacy and numeracy on diabetes care while seeing patients at Vanderbilt's Medical Center. (His interest in diabetes has personal roots: Rothman's father, an engineer, has type 1 diabetes.)

A paper he wrote for the *Journal of the American Medical Association* in 2004 tied literacy to successful diabetes treatment, and he's also involved in research looking at how language and cultural barriers can complicate communication between doctors and patients.

One problem Rothman points to is the approach many doctors take toward disease. Attracted to the complexities of science and medicine and eager to fill patients in on the details of their condition, they may overwhelm people with information, or get caught up in detailed medical terms and jargon. "When we

teach people to drive, we tell them to push on the gas and use the brake. We don't sit there and tell them how pistons work and what the fuel injector does," Rothman says. "But with health, sometimes we focus on lengthy explanations that don't improve patients' care."

Changing the situation takes an effort on the part of doctors and diabetes educators to adjust the way they approach patients. "The safest thing is to assume all patients have poor literacy and numeracy skills," Rothman says. By slowing down and clearly communicating, doctors, nurses, and educators can help patients successfully treat themselves—and save time later by avoiding the complications that come up when instructions are ignored or poorly understood. "A lot of the onus is really on us as providers," he says, "to improve how we communicate."

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*Andrew Curry is a freelance writer who contributes to Science, Smithsonian Magazine, and U.S. News & World Report.*