Testing 1, 2, 3

Is overtesting undermining patient and system health?

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Health care costs are rising in Canada, and not mainly because of population aging. One of the fastest growing areas of health services spending is laboratory testing. Laboratory tests are not free. McGrail and colleagues recently demonstrated that in British Columbia (BC), $174 million more was spent on laboratory testing and imaging in 2005 and 2006 compared with 1996 and 1997.[1] Research further reports a 37.4% increase in laboratory testing over this time (S. Sivananthan and colleagues, unpublished data, 2012). These increases are even after accounting for population aging and inflation.

Overtesting is a relatively understudied topic, and overuse rates vary by test and by study.[2,3] However, as physicians we know that many of the decisions to order tests start in the family doctor's office.[4] Van Walraven and colleagues found that family physicians in Ontario were more than 7 times more likely than specialists to order potentially redundant repeat tests for hemoglobin, sodium, creatinine, thyrotropin, total cholesterol, ferritin, and hemoglobin A_{1c} levels.[5]

Drivers behind increased testing

Preventive screening "creep." Clinical practice guidelines have been advising us to screen earlier to detect occult disease. For example, in the 1990s the BC guideline for measuring lipid profiles in otherwise healthy people was 45 years of age for men and 55 for women. In 2008, the guideline was revised to start screening in men older than 40 years and women older than 50 years.[6] Applied to the population of BC,[7] this simple change potentially adds an additional 343400 cholesterol screening tests. Among the individuals screened with these tests, there will be an estimated 17% of healthy men and 13% of healthy women[8] whose results will be reported as elevated,* leading to multiple follow-up cholesterol tests to track progression or resolution over time.

Unfortunately, it is difficult to estimate how much good this will achieve. Three US internists, in a recently published book on the topic, note that "we are working hard to find something wrong because of the belief that early diagnosis—and subsequent intervention—improves health."[9] The authors point out that in many cases the studies we rely on to answer questions about whether early diagnosis and intervention do improve health use surrogate end points, such as an improvement in the same test that "diagnosed" the disease in the first place. They further note that detecting subclinical disease in some cases might also "do harm" by leading to false labeling, causing inappropriate treatment, and making people who are otherwise well "feel sick."[9]

Perhaps more important, the guideline committees that make recommendations do not appear to consider cost-effectiveness, opportunity costs, and the potential harms of decisions to broaden screening guidelines. For example, in the same guideline recommending an earlier age of screening for cardiovascular disease, there were no references to the cost-effectiveness of screening at an earlier age.[6]

Diagnostic "creep." Not only are we screening with widespread laboratory testing at younger ages, but our definition of disease is also shifting. Ten years ago, to be diagnosed with diabetes someone had to have a fasting blood glucose level higher than 7.8 mmol/L.[10] Today the same person is deemed to have diabetes with a fasting blood glucose level of higher than 7.0 mmol/L,[11] creating an "epidemic" of new patients with diabetes. Guidelines recommend that all patients with diabetes undergo twice-yearly measurement of hemoglobin A_{1c} levels, and annual measurements of urine protein or albumin-creatinine ratio, creatinine levels, and lipid profile.[11] It is easy to see how expanding the scope of who gets diagnosed with diabetes might result in considerable increases in laboratory testing.

Further, guidelines tell us that those with diabetes have a different cutoff for "high" cholesterol.[12] Five years ago the guideline said that patients with diabetes should aim for low-density lipoprotein levels of less than 2.5 mmol/L. Today the recommended target for those with type 2 diabetes has decreased to less than 2.0 mmol/L.[11] This inevitably leads to more patients taking medication to reach this goal. Once a lipid-lowering agent has been started, the guidelines advise us

*Our estimates were based on prevalence rates from the Canadian Heart Health Survey among men and women aged 35 to 54, who did not have cardiovascular disease or hypertension, but who had high total cholesterol to high-density lipoprotein cholesterol ratios.[8]

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to measure lipids within 6 to 8 weeks of initiation (or of any change in pharmacotherapy) and every 6 to 8 months thereafter.[11] Tests to measure creatine kinase and alanine aminotransferase are also recommended as part of ongoing monitoring for those taking "statins." Thus, often decades before an individual is likely to show symptoms of disease, we give them diagnoses for which they require further testing 2 to 4 times per year.

In BC, there has been a 13.9% increase per year in treatment rates for 8 chronic diseases, beyond what would be expected for the changing demographic characteristics of the population (S. Sivananthan and colleagues, unpublished data, 2012). Either British Columbians are rapidly becoming much sicker, or this increase in prevalence is a reflection of what Welch and colleagues describe as "looking harder" and "changing the rules."[9] They calculate that simply expanding the diagnosis of "high" cholesterol from 6.2 mmol/L to 5.2 mmol/L results in an 82% increase in individuals with a "diagnosis" of dyslipidemia, which represents more than 4.3 million people in the United States.[9]

To complicate matters further, through primary care reform initiatives, family doctors in many jurisdictions are now paid to do a "better" job of managing chronic disease, which includes ordering more tests. From 2009 to 2010, BC spent approximately $38.5 million on financial incentives for family physicians to improve their management of 4 chronic diseases (diabetes, congestive heart failure, hypertension, and chronic obstructive pulmonary disease).[13] Such programs inevitably encourage our enthusiasm for testing, diagnosing, and treating more people with these conditions. Sivananthan and colleagues estimate that about one-third of the increasing cost of testing is related to physician adherence to guidelines for 8 chronic diseases, much of it relating to increased monitoring with tests (S. Sivananthan and colleagues, unpublished data, 2012).

Patient demand. To compound the issue, patients now often request particular tests. This is especially difficult in the era of "Google diagnosis" or when other health care providers have recommended the tests (eg, a naturopath, a physiotherapist, or a cardiologist). Research on Internet use suggests there is a positive association in some patient groups between Internet searching and more frequent[14,15] and longer physician visits.[16] Our time is limited, the next patient is waiting, and arguing is time-consuming and uncomfortable. In our own practices we often say yes to patient requests for tests whether we think they are appropriate or not, and we suspect many of our colleagues do the same. Patients who come in requesting tests commonly want them "just to be sure."

What is the price of such reassurance, over and over, multiplied over the years and by 33 million Canadian patients? Kale and colleagues recently reported that one of the most frequent unnecessary activities in the United States was ordering complete blood cell counts for general medical examinations—at an estimated annual cost of $32.7 million (95% CI $23.9 million to $40.8 million).[17]

Physician psychology. As physicians we are trained to fix things, and we fear the consequences of not doing so. Earlier diagnoses and more aggressive treatments appeal to our self-definition as fighters of illness—and we all shudder at the successful lawsuit against the physician who did not screen for prostate cancer with a prostate-specific antigen test.[9]

The advent of more and fancier tests also helps us avoid what is often the most important and difficult part of family medicine: helping our patients live with uncertainty. In patients with chronic pain, for example, or with inexplicable symptoms that are likely benign but nonetheless bothersome, tests buy us time while we wait for the body to heal on its own or declare a serious pathology. Because tests are available, we use them as therapy of a sort, giving hope to the patient that we will find an explanation for the symptoms instead of admitting that we do not know and might never know the exact cause of the problem. The tests might not contribute to diagnosis or treatment, but they make us (and the patient) believe we are "doing something." Moreover, there is some evidence that higher levels of patient satisfaction are associated with more health expenditure,[18] confirming our impression that patients are happier if we do "stuff" when they come to see us.

Putting the brakes on

One of the greatest challenges for us as family doctors is to understand when and how not to test.

At the highest level, there needs to be a broader evaluation of guidelines. Such evaluation needs to have representation from policy thinkers and health economists in addition to family doctors, other specialists, patients, and the public. There needs to be a discussion of the evidence for meaningful outcome measures (eg, admissions, readmissions, deaths, patient quality of life) and not simply examination of surrogate tests or process measures. There also needs to be a full economic evaluation of guideline recommendations and consideration of the potential harms to individuals and to the system as a whole.

Perhaps more important, the opportunity costs of deciding to implement widespread laboratory testing for healthy people, compared with adopting population-based policies, such as 24-hours-a-day, 7-days-a-week access to community recreation facilities and social housing, or free access to smoking cessation supports, should be debated.

Clinical practice guidelines should not be adopted until these things have been considered.

Tests and repeat tests that are deemed to be of less benefit or not worth the opportunity-cost trade-off should be delisted. A recent article in the *New England Journal of Medicine* called for physicians to "go back to the basics" of making a clinical diagnosis based on history and physical examination.[19] This would require courage on the part of both doctors and patients—but the need is clear.

Engaging our specialist colleagues in discussions about variation in and appropriateness of testing is also important. In the same way that patients often come to their family physicians for reassurance about given symptoms, we often refer patients to other specialists for reassurance. Many specialists, however, see themselves as having to "find the zebra"—to leave no stone unturned in the differential diagnosis.

Finally, some have called for building the costs of health services into our electronic records, allowing us to track the costs we generate in real time for each encounter.[20] It might be time to pilot this "shopping cart" approach.

It is possible, and even highly likely, that some tests sufficiently improve the health of people to be worth the broader societal costs. However, unless there is an honest discussion about the costs of decisions to "up-diagnose" and overtest our communities, we do so at our patients' and our health system's peril.

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References

1. McGrail KM, Evans RG, Barer ML, Kerluke KJ, McKendry R. Diagnosing senescence: contributions to physician expenditure increases in British Columbia, 1996/97 to 2005/06. *Healthc Policy* 2011;7(1):41-54.
2. Korenstein D, Falk R, Howell EA, Bishop T, Keyhani S. Overuse of health care services in the United States: an understudied problem. *Arch Intern Med* 2012;172(2):171-8.
3. Van Walraven C, Raymond M; Network of Eastern Ontario Medical Laboratories. Population-based study of repeat laboratory testing. *Clin Chem* 2003;49(12):1997-2005.
4. Health Council of Canada. *Decisions, decisions: family doctors as gatekeepers to prescription drugs and diagnostic imaging in Canada*. Toronto, ON: Health Council of Canada; 2010.
5. Van Walraven C, Cernat G, Austin PC. Effect of provider continuity on test repetition. *Clin Chem* 2006;52(12):2219-28.
6. Guidelines BC; Protocols Advisory Committee. *Cardiovascular disease—primary prevention.* Victoria, BC: BC Ministry of Health Services; 2008. Available from: **www.bcguidelines.ca/pdf/cvd.pdf.** Accessed 2012 Mar 10.
7. BC Stats [website]. *Population projections. British Columbia–level population projections (May 2011).* Victoria, BC: BC Stats; 2011. Available from: **www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/PopulationProjections.aspx**. Accessed 2012 Oct 9.
8. Perreault S, Dorais M, Coupal L, Paradis G, Joffres MR, Grover SA. Impact of treating hyperlipidemia or hypertension to reduce the risk of death from coronary artery disease. *CMAJ* 1999;160(10):1449-55.
9. Welch HG, Schwartz I, Woloshin S. *Overdiagnosed—making people sick in the pursuit of health*. Boston, MA: Beacon Press; 2011.
10. World Health Organization. *Definition, diagnosis and classification of diabetes mellitus and its complications*. Geneva, Switz: World Health Organization; 1999. Available from: **www.staff.ncl.ac.uk/philip.home/who_dmg.pdf.** Accessed 2012 Mar 10.
11. Guidelines BC; Protocols Advisory Committee. *Diabetes care*. Victoria, BC: BC Ministry of Health Services; 2010. Available from: **www.bcguidelines.ca/pdf/diabetes.pdf**. Accessed 2012 Mar 10.
12. Guidelines BC; Protocols Advisory Committee. *Hypertension—detection, diagnosis and management.* Victoria, BC: BC Ministry of Health Services; 2008. Available from: **www.bcguidelines.ca/pdf/hypertension.pdf.** Accessed 2012 Mar 10.
13. General Practice Services Committee. *Improving primary care in British Columbia.* Vancouver, BC: General Practice Services Committee; 2010. Available from: **www.health.gov.bc.ca/library/publications/year/2010/gpsc-ar-2010.pdf.** Accessed 2012 Feb.
14. Constant A, Peterson S, Mallory CD, Major J. *Research synthesis on cost drivers in the health sectors and proposed policy options*. Ottawa, ON: Canadian Health Service Research Foundation; 2011.
15. Fox S, Fallows D. *Internet health resources.* Washington, DC: Pew Internet & American Life Project; 2003.
16. Helft PR. American oncologists' views of Internet use by cancer patients: a mail survey of American Society of Clinical Oncology members. *J Clin Onc* 2003;21(4):942-47.
17. Kale MS, Bishop TF, Federman AD, Keyhani S. "Top 5" lists top $5 billion in potential savings. *Arch Intern Med* 2011;171(20):1856-8.
18. Fenton JJ, Jerant AF, Bertakis KD, Franks P. The cost of satisfaction: a national study of patient satisfaction, health care utilization, expenditures, and mortality. *Arch Intern Med* 2012;172(5):405-11. Epub 2012 Feb 13.
19. Palfrey S. Daring to practice low-cost medicine in a high-tech era. *N Engl J Med* 2011;364(11):e21.
20. Brook RH. Do physicians need a shopping cart for health care services? *JAMA* 2012;307(8):791-2.