

Patient Safety Tip of the Week

May 18, 2021

Medical Overuse Is Not Just An Economic Problem

We often do presentations on what’s wrong with our current healthcare system. Two significant factors we highlight are unnecessary testing and low-value care. The economic consequences of the “diagnostic cascade” are well known and frequently reported on. But that diagnostic cascade can also result in patient harm, particularly when it ultimately leads to a low-value procedure or other intervention.

Fisher and Welch ([Fisher 1999](#)) developed a schematic showing the mechanisms by which more medical care can lead to harm. **More diagnosis** creates the potential for labeling and detection of pseudodisease—disease that would never become apparent to patients during their lifetime without testing. **More treatment** may lead to tampering, interventions to correct random rather than systematic variation, and lower treatment thresholds, where the risks outweigh the potential benefits. Because there are more diagnoses to treat and more treatments to provide, physicians may be more likely to make mistakes and to be distracted from the issues of greatest concern to their patients.

Korenstein et al. ([Korenstein 2018](#)) developed a conceptual map that documents that overused tests and treatments and resultant downstream services generate 6 domains of negative consequences for patients:

- Physical
- Psychological
- Social
- Financial
- Treatment burden
- Dissatisfaction with health care

They note that negative consequences can result from overused services or from downstream services. They can also trigger further downstream services that in turn can lead to more negative consequences, in an ongoing feedback loop. One example they provide is a screening colonoscopy in an 80-year-old man leading to a biopsy, hospitalization, and follow-up imaging tests and, perhaps, even a bowel perforation

during a colonoscopy which may, in turn, lead to chronic gastrointestinal symptoms. Another was an unnecessary screening low-dose computed tomography (LDCT) scan which revealed scattered nodules. This finding led to a 3-month follow-up scan, which then led to a positron emission tomography (PET) scan, a surgical evaluation, and ultimately another follow-up scan. Another was unnecessary CT angiography showing coronary artery disease, which led to coronary angiography and ultimate 3-vessel CABG, with heart failure as a complication of the CABG.

Their review of cases in the literature found 54 case descriptions with a total of 63 overused services. Nearly all case descriptions (91%) described the overuse cascade, with a mean of 4.2 downstream services identified per case and 227 downstream services mentioned in total. Physical harms predominated (69%), followed by psychological consequences (16%) and treatment burden (9%), financial consequences (3%), dissatisfaction with health care (2%), and social consequences (1%). The authors do acknowledge that the high frequency of cases reporting physical harm may result from publication bias.

Over the last decade, the [Choosing Wisely](#) campaign has compiled lists from national organizations representing medical specialists to identify tests or procedures commonly used in their field whose necessity should be questioned and discussed. Many examples of what is referred to as “low-value” care have come from such lists. In addition, the JAMA Internal Medicine “[Less is More](#)” series has provided multiple examples of low-value care leading to unwanted consequences.

There has been a spate of articles recently about low-value care and unnecessary testing.

One classic example deals with cataract surgery. One of the American Academy of Ophthalmology’s Choosing Wisely items is “Don’t perform preoperative medical tests for eye surgery unless there are specific medical indications.” That statement notes that, for many, preoperative tests are not necessary because eye surgeries are not lengthy and don’t pose serious risks. It further states that an EKG should be ordered if patients have heart disease and, in general, patients scheduled for surgery do not need medical tests unless the history or physical examination indicate the need for a test, e.g., the existence of conditions noted above. Institutional policies should consider these issues. Yet many patients undergoing cataract surgery still get some preoperative testing. Ganguli et al. ([Ganguli 2019a](#)) looked at preoperative electrocardiogram (EKG) for Medicare patients undergoing cataract surgery without known heart disease. They compared downstream testing and events in those who got a preoperative EKG versus those that did not. Those who received a preoperative EKG experienced between 5.11 and 10.92 additional events per 100 beneficiaries relative to the comparison group. This included between 2.18 and 7.98 tests, 0.33 treatments, 1.40 new patient cardiology visits, and 1.21 new cardiac diagnoses. Spending for the additional services was up to \$565 per Medicare beneficiary, or an estimated \$35,025,923 annually across all Medicare beneficiaries in addition to the \$3,275,712 paid for the preoperative EKG’s. They estimated that 14.7% of preoperative EKG recipients had a potential cascade event.

Though Ganguli et al. were not able to determine how many of those patients suffered harm as a result of having a preop EKG, they cited the US Preventive Services Task Force statement ([Curry 2018](#)) that screening EKG in low-risk, asymptomatic patients can lead to harms including “unnecessary invasive procedures, overtreatment, and labeling”. Ganguli et al. do acknowledge that, lacking clinical details on all patients, some may also have benefitted from the diagnostic cascade.

Ganguli et al. ([Ganguli 2020](#)) also assessed the prevalence of several low-value tests (routine electrocardiograms, urinalyses, and thyrotropin tests) during Medicare Annual Wellness Visits and how these related to cascades of further tests or care. They found that 18.6% of patients received at least 1 low-value test including an ECG (7.2%), urinalysis (10.0%), or thyrotropin test (8.7%) during such visits. A total of 6.1 cascade-attributable events per 100 beneficiaries occurred in the 90 days following routine ECGs and 5.4 following urinalyses. Cascade-attributable cost per beneficiary were \$9.62 for ECG’s and \$7.46 for urinalyses. No cascade-attributable events or costs were found to be associated with thyrotropin tests.

Among patients who received any routine test, 13.5% had a potential cascade laboratory test, 6.6% had a potential cascade imaging test, 3.9% had a potential cascade procedure, 8.6% had a potential cascade visit, 2.0% had a potential cascade new diagnosis, and 0.3% had a potential cascade hospitalization. Again, lacking clinical details, it is unknown whether some patients were harmed as a result of these and it is very conceivable that some patients benefitted.

Similarly, Bouck et al. ([Bouck 2020](#)) looked at low-value testing with subsequent care among low-risk primary care outpatients undergoing an annual health examination (AHE) in Ontario, Canada. Specifically, they identified patients who received 1 of 3 tests identified by Choosing Wisely Canada as low value in low-risk populations: chest radiographs, electrocardiograms (ECG’s), and Papanicolaou tests. At 90 days, patients receiving any of these tests were more likely to see specialists and more likely to undergo both additional noninvasive and invasive testing or procedures compared to patients who did and did not receive an initial low-value test.

We discussed the issue of **incidental findings** in our April 13, 2021 Patient Safety Tip of the Week “[Incidental Findings – What’s Your Strategy?](#)”. While our focus was on avoiding “falling through the cracks”, it is important to recognize the cascade effect that results from incidental findings on lab or imaging studies. Once again, Ganguli and colleagues ([Ganguli 2019b](#)) have assessed the cascade effect that follows incidental findings on screening and diagnostic tests. In a nationally representative survey of physicians, almost all respondents reported experiencing cascades, including cascades with clinically important and intervenable outcomes and cascades with no such outcome. Physicians reported cascades caused their patients psychological harm (68.4%), physical harm (15.6%), and financial burden (57.5%) and personally caused the physicians wasted time and effort (69.1%), frustration (52.5%), and anxiety (45.4%).

When asked about their most recent cascade, 33.7% reported the test revealing the incidental finding may not have been clinically appropriate. During that most recent cascade, physicians reported that guidelines for follow-up testing were not followed (8.1%) or did not exist to their knowledge (53.2%). To lessen the negative consequences of cascades, 62.8% of respondents chose accessible guidelines and 44.6% chose decision aids as potential solutions. We discussed implementation of such solutions in our April 13, 2021 Patient Safety Tip of the Week “[Incidental Findings – What’s Your Strategy?](#)”.

Chalmers et al. ([Chalmers 2021](#)) looked at low-value services provided to Medicare patients. Head imaging for syncope was the highest-volume low-value service (29.9%), followed by coronary artery stenting for stable coronary disease (15.8%). They developed a composite overuse score ranging from 0 (no overuse of services) to 1 (relatively high overuse of services) to compare hospital performance. They found the highest scores were associated with nonteaching and for-profit hospitals, particularly in the South. This work was related to the Lown Institute, which publishes a [Hospital Index](#) that compares hospital performance on twelve low-value services, such as hysterectomy for benign disease, coronary stents for stable heart disease, and head imaging for syncope.

The recent trend toward more employment of physicians by hospitals may have had a negative impact on overuse of some services. Young et al. ([Young 2021](#)) investigated inappropriate ordering of MRI scans in Massachusetts for three common medical conditions: lower back pain, knee pain, and shoulder pain. They found that the odds of a patient receiving an inappropriate MRI referral increased by more than 20 percent after a physician transitioned to hospital employment. Most patients who received an MRI referral by an employed physician obtained the procedure at the hospital where the referring physician was employed. These results point to hospital-physician integration as a potential driver of low-value care.

Müskens et al. ([Müskens 2021](#)) reviewed the literature on diagnostic testing overuse. They concluded that substantial overuse of diagnostic testing is present with wide variation in overuse. The highest prevalence of overuse was reported for: use of electrocardiograms, chest X-rays or pulmonary function tests in low-risk patients having low-risk surgery (97.5%); imaging for low back pain within the first 6 weeks of symptom onset in the absence of red flags (86.2%); knee arthroscopy for meniscal derangements (81.7%); baseline lab tests for low-risk patients receiving low risk surgery (78.6%); and knee arthroscopy for osteoarthritis (71.7%). Overall, imaging in case of nonspecific low back pain and preoperative tests, such as preoperative baseline lab tests, echocardiography or exercise stress tests, were the most often assessed diagnostic practices identified in this study.

Low-value care includes not only examples from diagnostic testing but also **procedures** and other interventions. As above, low-value procedures often result from low-value diagnostic testing. For example, screening an asymptomatic high-risk patient for carotid stenosis may lead to a carotid endarterectomy. Procedures are the most likely to be associated with patient harm or other patient safety issues. Attempts have been made to measure harms from low-value care indirectly by measuring rates of both low value care

and hospital complications ([Brownlee 2017](#)). But Badgery-Parker et al. ([Badgery-Parker 2019](#)) sought a more direct measurement. They looked at the following low-value procedures (chosen from Choosing Wisely and other sources) in a large patient database in Australia:

- endoscopy for dyspepsia in people younger than 55
- knee arthroscopy for osteoarthritis or meniscal tears
- colonoscopy for constipation in people younger than 50 years
- endovascular repair of abdominal aortic aneurysm in asymptomatic, high-risk patients (EVAR)
- carotid endarterectomy in asymptomatic, high-risk patients
- renal artery angioplasty
- spinal fusion for uncomplicated low back pain

They used 16 hospital-acquired complications (HAC's) as a measure of harm associated with low-value care.

The percentage of low-value episodes with any HAC ranged from 0.1% for endoscopy to 15.0% for EVAR. Predictably, HAC rates were higher for those procedures done in high-risk patients, such as carotid endarterectomy and EVAR, but high rates were also seen for renal artery angioplasty and spinal fusion. Moreover, the occurrence of a HAC at least doubled the hospital length of stay for each of the 7 procedures studied.

For most procedures, the most common HAC was healthcare-associated infection, which accounted for 26.3% of all HAC;s observed. But cardiac complications occurred relatively frequently for carotid endarterectomy, EVAR, and renal artery angioplasty (9.7%, 5.7%, and 4.6% respectively).

And, of course, the other major area of more medical care leading to harm has to do with **medications**. Sometimes it's hard to distinguish "overuse" from "misuse" but both can give rise to patient harm. Overuse would include inappropriate prescribing of antibiotics for conditions not likely to require antibiotics. Misuse would include examples like polypharmacy or prescription of potentially inappropriate medications (PIM's) in the elderly. Discussion of these medication-related harms is beyond the scope of today's column but can be found in our many columns on medication safety.

All this has led to calls for "**deimplementation science**". Anderson and Lin ([Anderson 2020](#)), in a commentary on the Bouck study, called for more focused research on testing cascades and their outcomes. They note that most studies have utilized administrative data, which lacks the clinical details we need to better understand cause and effect, rationales, and factors contributing to low-value testing.

So, how do we cut down on low-value care? One study showed that Choosing Wisely had minimal impact on one example, whereas stopping payment for the low-value service had a dramatic impact. Henderson et al. ([Henderson 2020](#)) looked at the impact of Choosing Wisely recommendations regarding 2 low-value tests (vitamin D screening and

triiodothyronine tests). Choosing Wisely recommendations were associated with reductions 13.8% for US Veterans Health Administration, and 14.0% for US employer-sponsored insurance. They compared that to the impact of an Ontario, Canada payment policy change that eliminated reimbursement of vitamin D screening. That was associated with a 92.7% relative reduction in such screening. (There was no significant difference in the frequency of triiodothyronine testing.)

Wolf et al. ([Wolf 2021](#)), in a viewpoint on deimplementation in pediatrics, offer insights into the problem of low-value care in general. They note that, despite significant progress in the identification of low-value services, overuse continues. And, as we've noted, guidelines alone seem insufficient to change clinical practice. They describe factors at the level of the patient (parental pressures, direct-to-consumer advertising), clinician (fear of missing a diagnosis, malpractice suits), and health care system (fee-for-service reimbursement, short visit times) that continue to drive overuse. Cognitive biases such as the "endowment effect" also make clinicians less likely to end historical practices.

One additional factor contributing to overdiagnosis and medical overuse was recently emphasized: we regularly overestimate the probability of disease. Morgan et al. ([Morgan 2021](#)) surveyed practitioners and presented them with clinical scenarios and asked them to estimate pretest probability of disease and posttest probabilities after both positive and negative test results. Individual testing questions pertained to mammograms for breast cancer, stress testing for cardiac ischemia, chest radiography for pneumonia, and urine cultures for urinary tract infection (UTI). They found that, for common diseases and tests, practitioners overestimate the probability of disease before and after testing. Pretest probability was overestimated in all scenarios, whereas adjustment in probability after a positive or negative result varied by test. They conclude that widespread overestimates of the probability of disease likely contribute to overdiagnosis and overuse.

Wolf et al. ([Wolf 2021](#)) note many different approaches to reduce low-value care in adults have been used, including reimbursement restriction, risk sharing, patient and clinician education, audit and feedback of clinician performance, and clinical decision support tools. They note that that multicomponent interventions may be most successful.

Focusing on the fiscal costs of low-value care and medical overuse can stay in the realm of administrators and health policy wonks. But it has done little to solve the problem. **Focusing on the human costs** of low-value care and medical overuse is what is needed to get the attention of clinicians, who are key to solving the problem. You've heard us extol over and over the power of stories over statistics. One example we often note in our presentations and webinars was from Richard Shannon, MD back in 2007 at a conference on patient safety sponsored by the NY State Department of Health. He spoke about how for years data would be presented on rates of CLABSI's and likely costs due to CLABSI's and how this generated little interest in action. Then something caught his attention: over half his ICU patient who got a CLABSI died! That's what spurred him and his colleagues to action, resulting in a dramatic reduction in CLABSI's in his ICU. It's that focus on the impact on our patients, rather than the pocketbook, that gets clinicians to act.

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