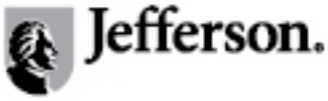

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Solutions to Reduce Unnecessary Imaging.

David C. Levin
Thomas Jefferson University, David.Levin@jefferson.edu

Vijay M. Rao
Thomas Jefferson University, Vijay.Rao@jefferson.edu

an investigator-led trial with limited access to a single anaerobic chamber at only 1 center, making it impossible to process autologous FMT stool anaerobically at each trial site. We believe, however, that the risk of bias from this is minimal.

Autologous stool samples were processed at room temperature and frozen within minutes of laboratory delivery. Therefore, there was not sufficient time, nor optimized growth conditions, for significant proliferation of oxygen-tolerant organisms, such as Enterobacteriaceae, during processing. While the relative proportion of oxygen-tolerant, potentially pathogenic bacteria was likely to be higher following aerobic processing, the overall number of such organisms would not likely have been increased. Although the autologous stool may have been devoid of some beneficial organisms due to aerobic processing, this would not have introduced significantly increased numbers of pathogens and thus should not have significantly reduced the placebo response.

Of course, much of this explanation is supposition based on best evidence available, and the answer can only be clarified with a randomized clinical trial comparing anaerobic and aerobic donor FMT groups.

It is not clear that steroids potentiate the effect of donor FMT because there are no human trials powered to assess this. Benech and colleagues cite data from a murine model in support of this notion.[3] Post hoc analyses from 2 previous randomized FMT studies in humans with ulcerative colitis demonstrated no effect of steroid therapy on remission.[4,5] Paramsothy et al[4] reported that 0 of 9 patients in the donor FMT group who entered the trial while taking steroids achieved remission. Conversely, in the post hoc logistical regression analysis in our study, oral steroids were associated with a greater reduction in total Mayo score following donor FMT. Therefore, the data from human trials are inconsistent on this question.

It is also unclear whether the length of time receiving steroid therapy prior to enrollment would influence any putative effect. The patients entering our trial taking steroid therapy underwent a mandatory steroid taper, which would have diminished any late steroid effect as steroid therapy ongoing at week 8 was considered therapeutic failure. In addition, only a minority of patients entered the study receiving steroid therapy, and there was no statistical difference between the number of patients taking steroids in the donor FMT and autologous FMT groups (8/38 [21%] vs 11/35 [31%]; odds ratio, 0.67 [95% CI, 0.23-1.80]; $P = .61$). Therefore, any differences in steroid therapy duration prior to enrollment are unlikely to have significantly influenced the rate of remission overall.

Samuel P. Costello, MBBS
Michael A. Conlon, PhD
Jane M. Andrews, PhD

Author Affiliations: Department of Gastroenterology, The Queen Elizabeth Hospital, Adelaide, Australia (Costello); CSIRO Health & Biosecurity, Adelaide, Australia (Conlon); Department of Gastroenterology and Hepatology, Royal Adelaide Hospital, Adelaide, Australia (Andrews).

Corresponding Author: Samuel P. Costello, MBBS, Inflammatory Bowel Disease Service, Department of Gastroenterology, The Queen Elizabeth Hospital, 30 Woodville Rd, Woodville, SA 5000, Australia (sam.costello@sa.gov.au).

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Solutions to Reduce Unnecessary Imaging

To the Editor Dr Oren and colleagues[1] provided suggestions for curbing unnecessary and wasted diagnostic imaging. They implied that physicians need more education about ordering tests, should learn about diagnostic waste, and are often unprepared to handle incidental findings discovered during unnecessary diagnostic imaging. Such reeducation may be difficult and may have variable results. There is an easier way to make a difference.

The authors have ignored a principal and more easily correctable problem: the cost of defensive medicine. In a survey of 824 physicians, 93% reported practicing defensive medicine and "43% reported using imaging technology in clinically unnecessary circumstances" as a form of "assurance behavior."[2] The authors cited the reduced rate of diagnostic imaging in Finland, but that may not be an appropriate comparison given that the Finnish Patient Insurance Centre handles all claims in the country and that the personnel involved in treatment are not accused or sued whenever patient injury is recognized. This no-guilt principle has been successful.

Among the most common causes of legal complaints in the United States is delayed or failed diagnosis, including failure to order a diagnostic study. Ordering an unnecessary study often is forgiven as due diligence.

Reducing reimbursement for certain diagnostic procedures, training radiologists to read less and gatekeep more, and educating physicians on how to handle too much information are all good suggestions. However, in the absence of uniform legislation that will mitigate the fear of a devastating lawsuit, these approaches will be overshadowed by physicians' self-protective instincts.

Frederick A. Simeone, MD

Author Affiliation: Pennsylvania Hospital, Philadelphia.

Corresponding Author: Frederick A. Simeone, MD, 6825 Norwitch Dr, Philadelphia, PA 19153 (fasimeone@comcast.net).

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To the Editor Imaging examinations carry risks and are the fourth largest contributor to patient care debt.[1] At the same time, appropriate imaging can reduce both emergency department (ED) length of stay and hospitalization rate, the 2 largest contributors to bills that burden patients.[1] In a Viewpoint on reducing unnecessary diagnostic imaging, Dr Oren and colleagues[2] reported a paucity of randomized clinical trials (RCTs) related to improving ordering appropriateness. We highlight 3 RCTs related to imaging value.

An RCT by Zafar et al[3] evaluated the effects of performance feedback reports on high-cost imaging utilization. Through capture of data during order entry, these reports compared each ordering physician with their peers. A significant reduction in primary care physician ordering of magnetic resonance imaging of the lumbar spine for low back pain was found. Performance feedback reports alone (37% reduction in orders) were more effective than a combination of clinical decision support alerts and performance feedback reports (27% reduction) or clinical decision support alerts alone (no change).

Regarding imaging value, coronary computed tomography angiography (CCTA) for chest pain has been studied in multiple RCTs. For example, the ROMICAT-II trial[4] randomized 1000 ED patients with chest pain and intermediate likelihood of acute coronary syndrome to standard care vs CCTA. Use of CCTA significantly reduced ED length of stay and increased rate of ED discharge (47% vs 12%; $P < .001$). At 28 days, having had CCTA was associated with more testing and radiation exposure, but no difference in cost. The SCOT-HEART trial[5] randomized 4146 patients with stable angina to standard care with or without CCTA. Follow-up over a median of 4.8 years revealed a significant decrease in coronary-related death and nonfatal myocardial infarction with use of CCTA.

As improvements in health care quality, safety, and affordability are sought by reducing the unnecessary use of tests and treatments, the total cost of care for patients and patient outcomes also must be considered. Appropriate imaging examinations protect patients from more costly elements of care and translate to reduced morbidity and mortality and, as such, are equally important to high-value care.

Pamela T. Johnson, MD
Ali Raja, MD, MBA, MPH
Ramin Khorasani, MD, MPH

Author Affiliations: Department of Radiology, Johns Hopkins University School of Medicine, Baltimore, Maryland (Johnson); Department of Emergency Medicine, Harvard Medical School, Boston, Massachusetts (Raja); Department of Radiology, Harvard Medical School, Boston, Massachusetts (Khorasani).

Corresponding Author: Pamela T. Johnson, MD, Johns Hopkins University School of Medicine, 601 N Caroline St, Johns Hopkins Outpatient Center, Room 3140D, Baltimore, MD 21287 (PamelaJohnson@jhmi.edu).

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To the Editor Dr Oren and colleagues stated that unnecessary diagnostic imaging is a problem and that the detection of harmless incidentalomas can lead to a cascade of follow-up studies that increase patient anxiety and risk and costs to the system.[1] However, their proposed solutions are impractical.

The authors suggested that clinicians engage in a shared decision-making process with patients before ordering examinations such as computed tomographic scans. In an ideal world, this would be helpful, but unfortunately, clinicians are under pressure to move patients in and out of the office quickly. There is no time for a leisurely discussion of whether a patient would like to undergo a computed tomographic scan. Moreover, no insurer is likely to pay for such discussions.

They also suggested reducing the sensitivity or shadowing nontarget organs in imaging studies. This may incur malpractice liability if a scan was done but a possible early cancer was missed because its location was shadowed.

They further suggested that automated reading (presumably through artificial intelligence algorithms) could reduce the amount of time radiologists need to read scans, thereby freeing them to spend more time acting as gatekeepers. Artificial intelligence is not ready for clinical use in image interpretation and may never be.

The radiology community is aware of the problem of unnecessary imaging, and efforts are being made on multiple fronts to address it. The Choosing Wisely initiative[2,3] is an attempt to reduce inappropriate and unnecessary testing of all kinds (not just imaging). As of late 2016, 77 national medical societies had each created lists of 5 or more such tests. However, trying to find a specific imaging test among more than 400 recommendations is cumbersome and time consuming for clinicians. We scrutinized the entire Choosing Wisely website and selected the 103 imaging tests that at least 1 society

labeled as inappropriate or often unnecessary[4] and organized them into 11 tables by body area or type of imaging (eg, neuroradiology, abdomen/pelvis). These quick and simple-to-use tables may enable both primary care physicians and specialists to substantially reduce unnecessary and wasted imaging.

David C. Levin, MD
Vijay M. Rao, MD

Author Affiliations: Department of Radiology, Thomas Jefferson University Hospital, Philadelphia, Pennsylvania.

Corresponding Author: David C. Levin, MD, Department of Radiology, Thomas Jefferson University Hospital, 132 S 10th St, Philadelphia, PA 19107 (david.levin@jefferson.edu).

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In Reply Dr Simeone argues that the litigious medical milieu in the United States is a key driver of overutilization of diagnostic imaging compared with a litigation-free environment like Finland. We agree that defensive medicine may contribute to the rise in the use of diagnostic imaging, including nonindicated testing. However, liability fear may not explain most of the excess medical tests. An economic analysis suggested that, in the no-liability model of the military in which patients can seek treatment from medical institutions but are barred from suing for negligent care, health care spending decreased by only 5% in active-duty compared with non-active-duty patients and the clinical outcomes (mortality and readmission rates) were similar.[1] Nevertheless, systemic efforts to reduce litigation are worth exploring, even if a legislative landscape similar to Finland is unlikely to happen in the United States any time soon.

Dr Johnson and colleagues suggest that advanced imaging can translate into better patient outcomes, using the ROMICAT-II and SCOT-HEART trials as examples.[2,3] These trials were not designed to assess the detection of incidentalomas, a major problem with unnecessary imaging, as discussed in our Viewpoint.[4] In the ROMICAT-II trial, the 28-day health care costs were similar in both groups, yet the number of patients with a new diagnosis other than acute coronary syndrome was 10 points higher in the CCTA group compared with the control group. No data were provided about the nature of the noncardiac diagnoses, and the long-term clinical, financial, and emotional implications of such diagnoses are unknown. A valuable addition to clinical trials could be long-term follow-up of incidentally detected abnormalities and quantification of their individual effect on a patient's survival and quality of life.

Drs Levin and Rao do not think that preimaging-informed decision making is practical in the current time-compressed health care system. We argue that time has to be created for such discussions, which eventually may save resources and time as fewer tests would be performed. Such a step would be similar to obtaining informed consent for a patient undergoing any invasive intervention. Subjecting a patient to a nonurgent imaging test without providing information on its potential long-term consequences does not represent good care in our opinion. Informed consent and shared decision making need to be adapted to current challenges. Levin and Rao also maintain that reducing off-target image sensitivity is not feasible because of the litigation risk it would create. However, it may be feasible with proper shared decision making. For clinical scenarios of noncritically ill patients who do not have multiorgan systemic conditions, the patient and physician can decide whether to proceed with a resolution-adjusted image after weighing the risks of finding an incidentaloma and those of missing a clinically important lesion due to the lower resolution. As for automatic reading of imaging tests by artificial intelligence rather than radiologists, this is something that is not just defendable, but also ethically advisable and possibly preferable. In some areas, artificial intelligence reading is being shown to be noninferior to reading of the same images by radiologists.[5]

Ohad Oren, MD
Electron Kebebew, MD
John P. A. Ioannidis, MD, DSc

Author Affiliations: Division of Hematology and Oncology, Mayo Clinic, Rochester, Minnesota (Oren); Department of Surgery, Stanford University School of Medicine, Stanford, California (Kebebew); Meta-Research Innovation Center at Stanford (METRICS), Stanford University, Stanford, California (Ioannidis).

Corresponding Author: Ohad Oren, MD, Division of Hematology and Oncology, Mayo Clinic, 200 First St, Rochester, MN 55901 (ohadoren@gmail.com).

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Meta-analysis of Aspirin for Primary Prevention of Cardiovascular Events

To the Editor Dr Zheng and Mr Roddick[1] reported frequentist and Bayesian meta-analyses examining the association between aspirin use and cardiovascular events and bleeding risk in individuals without cardiovascular disease. The investigators required randomized trials to enroll at least 1000 participants to be eligible for inclusion in the analyses. The basis for imposing such a study eligibility criteria was not explicitly justified, but a plausible motivation could be related to the