Everyone's a winner if we test less: the *CODA* action plan

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ABSTRACT

In this era of 'Choosing Wisely,' we present a four-step action plan to reduce unnecessary pathology testing and the associated patient harm (blood loss through repeated phlebotomy), economic cost and environmental impact. The authors are experts from the *CODA* group; a medical education and health-promotion charity that aims to build on the Choosing Wisely initiative to provide meaningful and sustainable actions to reduce the carbon footprint of healthcare, globally. Pathology testing is expensive and carbon-intensive, with as many as half of all tests being not clinically indicated. Reducing unnecessary testing is the only effective way to decrease the carbon footprint and other associated costs, as opportunities to reuse and recycle pathology specimens are limited. The four key steps for action are (i) auditing local practice; (ii) defining unnecessary testing including developing a clinical guideline for rational ordering; (iii) educating stakeholders; and (iv) measuring the impact of the intervention through re-audit. This proven method is designed to be used in any healthcare setting around the world; having a small group of passionate 'champions' is thought to be as important as strong clinical governance and more important than access to sophisticated equipment. Electronic medical record systems and other technological solutions offer new ways to help establish a sustainability mindset and reduce unnecessary testing. The Codachange.org/coda-earth/ website provides a dynamic crowdsourcing platform through which we can collectively learn to meet the diverse needs of our international medical community. Self-reported outcomes are gamified through collaborative feedback, amplification via social media and the ability to earn rewards, be uploaded to the *CODA* website, or added to the template as a success story. By combining our existing local networks with the emerging international *CODA* community, we can initiate meaningful change now and enter the era of environmental stewardship.

Keywords: carbon cost, *CODA*, environment, environmental, greenhouse gas, over-testing, pathology, sustainability, sustainable, test, testing, unnecessary.

In this era of 'Choosing Wisely,'[1] we present an action plan to reduce unnecessary pathology testing and the associated patient harm (blood loss through repeated phlebotomy), economic cost and environmental impact. The philosophy behind Choosing Wisely is that of resource stewardship, whereby clinicians are the best placed to understand ways to reduce unnecessary testing, prescribing or procedures. Sustainable healthcare extends this concept so that actions are not only clinically appropriate, but also have a meaningful environmental impact. The authors of this action plan are experts from the *CODA* group;[2] a medical education and health-promotion charity that aims to build on the Choosing Wisely initiative to provide meaningful, achievable and sustainable actions to reduce the carbon footprint of healthcare globally. As one of several practice change documents for the *CODA* clinical community, we have compiled this action plan with supporting evidence and helpful links to highlight the intersection between clinical stewardship and environmental sustainability.

Healthcare is an expensive and carbon-intensive sector, comprising 10% of Australia's gross domestic product[3] and generating 7% of Australia's carbon emissions.[4] Pathology tests are a significant contributor; accounting for 12% of the overall Medicare

expenditure.[5] As many as half of all tests may not be clinically indicated,[6,7] and some are harmful due to their contribution to the development of anaemia.[8] In addition, considerable time is spent performing, processing and interpreting tests.

As the opportunities to reuse and recycle pathology specimens which have contained bodily fluids are limited due to infection prevention concerns, reducing unnecessary testing is the only effective method to decrease the carbon footprint and other associated costs of such pathology testing.[9]

We propose four steps for action to reduce pathology's environmental footprint: (i) auditing local practice, including quantifying the financial and environmental costs of each test; (ii) defining unnecessary testing along with developing a clinical guideline for rational ordering; (iii) educating stakeholders about such facts using a multidisciplinary team of champions; and (iv) measuring the impact of the intervention through re-audit and feedback to stakeholders.

Walsh *et al.* describe a success story using this four-step template to reduce unnecessary arterial blood gas (ABG) testing in a 58-bed Level III Sydney Intensive Care Unit (ICU).[10] A multifaceted educational intervention including the implementation of a clinical guideline significantly altered ABG ordering patterns, which had been primarily driven by cultural factors such as testing a certain number of times per ICU nursing shift, at arbitrary time intervals, and before or after *any* changes in patient care. A total of 66 000 ABGs were ordered annually prior to the intervention, with more than half of these deemed inappropriate. In the 6 months post-intervention, there was a 31% bed-day adjusted decrease in ABGs (4.6 vs 3.1 per bed-day) and a 70% decrease in the proportion of inappropriate ABGs per bed-day (2.8 vs 0.8) without a demonstrable difference in patient outcomes. This corresponded to annual savings of: more than 100 L of blood, AUD$770 000, one full-time equivalent staff member in labour costs, and a reduction in carbon dioxide equivalent emissions of 1038 kg CO_2e; the equivalent of driving 6782 km in an average Australian car.[11]

Thiele *et al.* found similar success with this approach; they reduced the amount of unnecessary pathology tests in their perioperative unit by 41% and increased the compliance with evidence-based guidelines from 23 to 69%, with no reported adverse effects. In their analysis, more than 60% of coagulation studies and 80% of group and hold and full blood count examinations were performed unnecessarily, according to state guidelines.[12] There are many additional examples that demonstrate the effectiveness of these relatively straightforward and achievable actions.[6,13]

This plan is designed to be used in any healthcare setting around the world, regardless of local factors such as accessibility, economics and organisational systems. It is believed that having a small group of passionate 'champions' (e.g. nursing educators) is key to success; as important as strong clinical governance and more important than having sophisticated equipment. Walsh *et al.* found that the majority of

ICU staff enthusiastically changed their previously ingrained behaviour, with the shared goal of minimising unnecessary costs to their patients and their healthcare system as a whole.[10] Regular updates at departmental meetings and case-based in-services in small groups were utilised in conjunction with laminated posters to maintain momentum. The increasingly common use of electronic medical record systems offers another tool to help establish a sustainability mindset. In addition, technological solutions such as these may reduce duplication of testing at the interface between primary and tertiary care, and lead to new strategies to decrease unnecessary testing in the community.

The Codachange.org/coda-earth/ website provides a dynamic platform for crowdsourcing global solutions. This allows us to collectively learn to meet the diverse needs of our international medical community. Self-reported outcomes are gamified through the use of collaborative feedback, amplification via social media and the ability to earn rewards, be uploaded to the *CODA* website, or added to the template as a success story. By combining our existing local networks with this emerging international *CODA* community, we can initiate meaningful change now and enter the era of environmental stewardship.

References

1 Choosing Wisely Australia. More is not always better when it comes to healthcare. 2022. Available at https://www.choosingwisely.org.au/

2 CODA. About CODA. 2022. Available at https://codachange.org/#about

3 Australian Institute of Health and Welfare (AIHW). Health Expenditure Australia 2019-20. Canberra: AIHW; 2021.

4 Malik A, Lenzen M, McAlister S, McGain F. The carbon footprint of Australian health care. *Lancet Planet Health* 2018; 2: e27–35. doi:10.1016/S2542-5196(17)30180-8

5 Services Australia. Medicare Group Reports by MBS category processed from July 2018 to June 2019. 2022. Available at http://medicarestatistics.humanservices.gov.au/statistics/mbs_group.jsp

6 National Coalition of Public Pathology. Encouraging Quality Pathology Ordering in Australia's Public Hospitals. Canberra. 2012. Available at https://publicpathology.org.au/wp-content/uploads/2015/12/NCOPP-QUPP-Project-Final-Report.pdf

7 Zhi M, Ding EL, Theisen-Toupal J, Whelan J, Arnaout R. The Landscape of Inappropriate Laboratory Testing: A 15-Year Meta-Analysis. *PLoS ONE* 2013; 8(11): e78962. doi:10.1371/journal.pone.0078962

8 Hooper KP, Anstey MH, Litton E. Safety and efficacy of routine diagnostic test reduction interventions in patients admitted to the intensive care unit: A systematic review and meta-analysis. *Anaesth Intensive Care* 2021; 49: 23–34. doi:10.1177/0310057X20962113

9 Wiser Healthcare. Wiser Carbon Neutral. 2022. Available at https://www.wiserhealthcare.org.au/wiser-carbon-neutral/

10 Walsh OM, Davis K, Gatward J. Reducing inappropriate arterial blood gas testing in a level III intensive care unit: A before-and-after observational study. *Crit Care Resusc* 2020; 22: 370–7. doi:10.51893/2020.4.OA10

11 McAlister S, Barratt AL, Bell KJ, McGain F. The carbon footprint of pathology testing. *Med J Aust* 2020; 212: 377–82. doi:10.5694/mja2.50583

12 Theile H, Verstarkis L, Pietzsch A. Preoperative pathology ordering through the Pre-Anaesthetic Evaluation Unit. Featured stories, Choosing Wisely Australia. 2021. Available at https://www.choosingwisely.org.au/featured-stories/choosing-pre-operative-pathology-wisely

13 Hiscock H, Neely RJ, Warren H, Soon J, Georgiou A. Reducing Unnecessary Imaging and Pathology Tests: A Systematic Review. *Pediatrics* 2018; 141(2): e20172862. doi:10.1542/peds.2017-2862

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