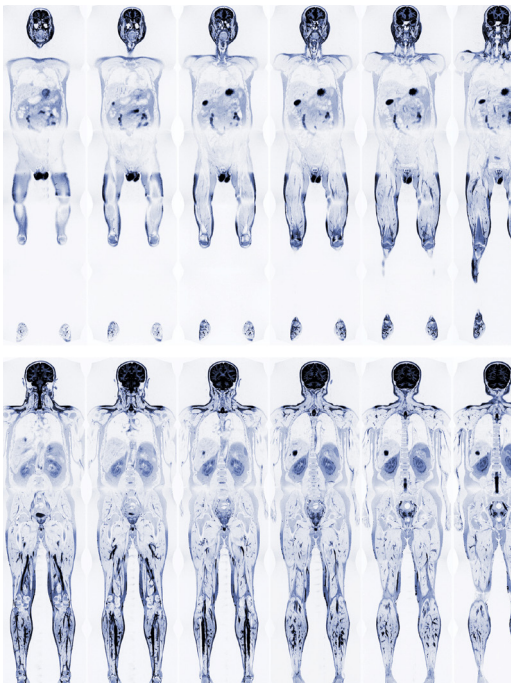
Overdiagnosis and overtesting



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Background
Overdiagnosis and overtesting are recognised as prevalent in medical practice and can cause harm to patients.

Objective
This article seeks to define these terms, highlight some common examples and provide an approach to navigating clinical encounters where patients present for healthcare.

Discussion
A patient-centred and shared decision-making approach is the best way to balance risks and harms for individual patients when considering screening or diagnostic tests. There are useful resources available that are designed specifically for general practitioners and their patients to support making the best decision with an individual.

A MANAGEMENT CONSULTANT aged 50 years who works for a large international firm presents requesting a 'whole-body MRI (magnetic resonance imaging)' scan and blood tests for his 'half a century check-up'. He is fit and healthy, but he wants to take out life insurance, and his employer has said they would pay for any tests that he needs done. 'Just do everything, Doc' is the patient request.

A female patient aged 60 years with no symptoms of cardiovascular disease (CVD) presents requesting a coronary artery calcium (CAC) score. She saw an article on the news recommending it, and a friend also had it done and found it 'really reassuring'. She has a family history of CVD and thought it might be a good idea in order to assess her own risk. 'What do you think, Doctor?'

In a world of personalised medicine, and the increasing sophistication of medical investigations, how should patient requests such as this be approached? A key component of general practice is preventive healthcare. How should general practitioners (GPs) approach preventive healthcare requests that are out of scope of evidence-based guidelines such as The Royal Australian College of General Practitioners' (RACGP's) *Guidelines for preventive activities in general practice* (Red Book)?[1] If the user is paying, should GPs grant these patient requests? Are there any potential harms from 'testing everything'? There are a number of factors that need to be considered, including overtesting and concomitant issues of overdiagnosis.

Overdiagnosis is defined as the diagnostic labelling of symptoms or signs that, if left untreated, will not cause significant morbidity or mortality.[2,3] Overdiagnosis is not a wrong diagnosis or a misdiagnosis; the diagnosis is a correct diagnosis, but the patient will come to no harm from the underlying benign disease process. Overdiagnosis can occur in a variety of ways, including through the increased sensitivity of more advanced tests, widening of disease definitions and labelling of risk factors as diseases, and it can also result from participation in population screening.[3,4]

For example, more advanced imaging modalities such as MRI may find smaller lung lesions that then require ongoing monitoring and follow-up.[3] Age-related findings that are also common in people without symptoms, for example in the spine or knee, may erroneously be considered the cause of a patient's symptoms.[5] An example of an expanded disease definition is in the 2017 joint hypertension guideline from the American Heart Association and the American College of Cardiology. This guideline defines hypertension as a blood pressure greater than 130/80 mmHg

and recommends treatment at that level. This means that nearly half of adults in the US (46.7%) now have hypertension requiring treatment.[6] The Australian Heart Foundation and UK National Institute for Health and Care Excellence guidelines continue to classify hypertension as >140/90 mmHg.[7,8]

Screening tests can result in overdiagnosis because of the higher sensitivity and technological sophistication of imaging.[9] It is estimated that 18–24% of cancers in Australia are overdiagnosed.[10] This occurs when indolent cancers that were never going to cause harm are detected on screening tests, particularly if testing occurs outside of screening program guidelines, where harms may start to outweigh benefits. Once identified, while some patients may opt for regular surveillance, these indolent cancers are often treated, as an individual's prognosis cannot be ascertained with certainty from population-based statistics. Many patients would consider that doing nothing in response to a cancer diagnosis was an unacceptable management plan.[11]

Overtesting is a related concept that occurs when having a test is unwarranted. Overtesting can occur in both symptomatic and asymptomatic patients. The test does not help in making a diagnosis, and it does not alter a patient's management.[12] An example of this would be requesting a coronary artery computed tomography (CT) scan in a patient whose cardiovascular risk is already high. The pretest probability of having CVD is already high; therefore, having the test would be unlikely to significantly alter this probability. Overtesting can also lead to overdiagnosis. For example, imaging in someone with uncomplicated acute low back or knee pain may lead to overdiagnosis of the benign age-related changes and lead to overtreatment.[13]

Overtesting can occur because of clinician concern about medicolegal responsibilities. As well, clinicians do not want to miss anything serious out of concern for their patients and may request tests to reassure both themselves and their patients. However, this may identify 'incidentalomas' that then require management (as well as lead to overdiagnosis). Overtesting can also occur because of lack of continuity of care if a patient has already had a test performed and does not inform their regular GP. For example, they may forget or not appreciate that they have had a test, or it is not uploaded into their My Health Record. There is also an administrative and time burden related to trying to obtain results from another health provider, which may inadvertently lead to retesting. Patients may present requesting specific tests because of information they have found from poor-quality information sources (the internet or 'Dr Google')[9] or through requests from alternative medicine practitioners.

Why is overdiagnosis and overtesting a problem?

There are potential harms from overdiagnosis and overtesting that need to be considered. Treatment of the overdiagnosed condition may cause harm, for example side effects from medication or adverse events from unnecessary surgery. One harm of overtesting with CAC scoring could be a low-risk outcome falsely reassuring a patient, so they may not follow healthy lifestyle advice, and it does not rule out non-calcified plaque being present, which is an important CVD risk predictor.[14] Financial costs to patients include out-of-pocket payments for tests, time off work and insurance considerations. Identification of an abnormality might lead to a cascade of further testing and follow-up that may include more invasive testing as well as exposure to ionising radiation. And all of this can cause unnecessary anxiety for patients and their families.[9,10] An additional harm that should be considered is the environmental cost of unnecessary tests such as CT and MRI scans, which both have a large carbon footprint.[15]

There are many examples of tests with potential for overtesting and overdiagnosis. This includes CAC scores in those without indications,[16] *MTHFR* gene testing in asymptomatic healthy patients,[17] vitamin D testing in patients with no risk factors,[18] anti-Müllerian hormone testing for predicting natural conception or perimenopause,[19] gut microbiome testing as a diagnostic tool,[20] ultrasonography for people with uncomplicated shoulder pain,[5] and 'routine' periodic tests such as full blood count, liver function tests and thyroid function tests in asymptomatic patients.[21]

How could the earlier clinical scenarios be approached?

Understanding the issues related to overdiagnosis and overtesting and when these are likely to occur is important in order to address them. Patient-centred care and shared decision making is the key approach.[21] Patient-centred communication improves patient satisfaction as well as improving health outcomes.[21,22] It is important to have conversations with patients that discuss risks and benefits of any diagnostic testing. Using time as a diagnostic tool, with appropriate monitoring and safety-netting, is a commonly used approach in general practice. Identifying the patient's concerns, ideas and expectations, along with providing adequate explanations on the rationale for investigations, is important.[21] Understanding the patient's personal beliefs and values is important to understand how results of investigations might be interpreted. People often believe that tests are harmless. There are cultural beliefs that more testing and more treatment is better.[11] It is important to ensure patients understand any potential harms in order to make an informed decision. It is also important that patients are made aware of the costs, not just to themselves, but of waste in the healthcare system and the environment of unnecessary testing.[11,15] Further information on shared decision making can be found in this issue of *Australian Journal of General Practice*.

There are useful resources that can assist with having the conversation with patients and providing them with evidence to support their choices. Clinical guidelines, particularly those with plain-language summaries, can be shared with patients. Useful online resources include: RACGP's *First do no harm*, Choosing Wisely Australia, the Handbook of Non-Drug Interventions (HANDI) and the Australian Commission on Safety and Quality in Health Care website.[23–27]

Scenario 1: The whole-body 'check-up'

Whole-body MRI scans are expensive and promoted as offering 'peace of mind' in revealing potentially treatable cancers that would otherwise have gone undiagnosed. However, a systematic review of whole-body MRI scanning revealed a substantial number of false-positive results (pooled rate of 16%, 95% confidence interval: 1.9–65.8%)

or indeterminate incidental findings that required ongoing follow-up.[28] There is also a significant false-negative rate from whole-body MRI (2.0–2.8%),[28,29] which could lead to false reassurance of the absence of cancer.[29] In particular, whole-body MRI may be inadequate for detecting breast, thyroid and colon cancers.[29]

This patient should be informed of the false-positive and false-negative rates and the implications for his ongoing health of both outcomes. In line with his personal values, the patient can then consider whether the test is worth the expense and potential for harm.

Scenario 2: 'Recommended by a friend'

The consultation and discussion would include an assessment of the patient's absolute cardiovascular risk.[30] If the patient is already at high risk of CVD or has symptoms suggestive of coronary heart disease, the test is not indicated.[16] On the other hand, in someone with a low 5-year absolute risk score but family history of premature CVD, this test may be reasonable.[14,30]

Discuss with the patient whether a high or low result on this test will change the management of their cardiovascular risk.[14,16] Discussing the potential risks of the test is also important; this includes the financial out-of-pocket costs and incidental findings on CT. Useful online resources available to assist the patient to make a decision about whether to use CAC include the Australian CVD risk calculator and *First do no harm*.[23,30]

In addition to GP advice, the Choosing Wisely campaign has put information into patients' hands by getting patients to ask these five questions of their GPs: Do I really need this test? What are the risks? Are there simpler, safer options? What happens if I do not do anything? What are the costs? Considering the responses to these questions assists with shared decision making and patient-centred care.[25]

Conclusion

Issues concerning overdiagnosis and overtesting are prevalent in general practice. A patient-centred and shared decision-making approach is the best way to balance risks and harms for individual patients. There are useful resources specifically for GPs and their patients to determine what is best for an individual.

Key points

- Overdiagnosis is the labelling of harmless conditions that do not require treatment.
- Overtesting occurs when an investigation result will not change management.
- Harms from overtesting and overdiagnosis include unnecessary treatment and follow-up.
- A shared decision-making approach with patients can help avoid harm.

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References

References are available online only.

References

1. The Royal Australian College of General Practitioners (RACGP). Guidelines for preventive activities in general practice. 10th edn. RACGP, 2025. Available at www.racgp.org.au/getattachment/3eddf0a7-7cec-4064-a44b-5bde6c2515a5/Guidelines-for-preventive-activities-in-general-practice.aspx [Accessed 20 December 2025].
2. Brownlee S, Chalkidou K, Doust J, et al. Evidence for overuse of medical services around the world. Lancet 2017;390(10090):156–68. doi: 10.1016/S0140-6736(16)32585-5.
3. Doust J, Glasziou P. Is the problem that everything is a diagnosis? Aust Fam Physician 2013;42(12):856–59.
4. Moynihan R, Doust J, Henry D. Preventing overdiagnosis: How to stop harming the healthy. BMJ 2012;344(7859):e3502. doi: 10.1136/bmj.e3502.
5. Haas R, Gorelik A, O'Connor DA, Pearce C, Mazza D, Buchbinder R. Patterns of imaging requests by general practitioners for people with musculoskeletal complaints: An analysis from a primary care database. Arthritis Care Res (Hoboken) 2025;77(3):402–11. doi: 10.1002/acr.25189.
6. Jones DW, Ferdinand KC, Taler SJ, et al; Writing Committee Members. 2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM Guideline for the prevention, detection, evaluation and management of high blood pressure in adults: A report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation 2025;152(11):e114–218.
7. National Heart Foundation of Australia. Guideline for the diagnosis and management of hypertension in adults. National Heart Foundation of Australia, 2016.
8. National Institute for Health and Care Excellence (NICE). Hypertension in adults: Diagnosis and management. NICE guideline [NG136]. NICE, 2019.
9. The Royal Australian College of General Practitioners (RACGP). Too much medicine: Position statement. RACGP, 2018. Available at www.racgp.org.au/advocacy/position-statements/view-all-position-statements/clinical-and-practice-management/too-much-medicine [Accessed 20 December 2025].
10. Glasziou PP, Jones MA, Pathirana T, Barratt AL, Bell KJ. Estimating the magnitude of cancer overdiagnosis in Australia. Med J Aust 2020;212(4):163–68. doi: 10.5694/mja2.50455.
11. Moynihan R, Barratt AL, Buchbinder R, et al. Australia is responding to the complex challenge of overdiagnosis. Med J Aust 2018;209(8):332–34. doi: 10.5694/mja17.01138.
12. Lam JH, Pickles K, Stanaway FF, Bell KJL. Why clinicians overtest: Development of a thematic framework. BMC Health Serv Res 2020;20(1):1011–11. doi: 10.1186/s12913-020-05844-9.
13. Yelland M. Diagnostic imaging for back pain. Aust Fam Physician 2004;33(6):415–19.
14. Jennings GLR, Audehm R, Bishop W, et al. National Heart Foundation of Australia: Position statement on coronary artery calcium scoring for the primary prevention of cardiovascular disease in Australia. Med J Aust 2021;214(9):434–39. doi: 10.5694/mja2.51039.
15. Barratt A, McGain F. Overdiagnosis is increasing the carbon footprint of healthcare. BMJ 2021;375:n2407. doi: 10.1136/bmj.n2407.
16. Liew G, Chow C, van Pelt N, et al. Cardiac Society of Australia and New Zealand Position Statement: Coronary artery calcium scoring. Heart Lung Circ 2017;26(12):1239–51. doi: 10.1016/j.hlc.2017.05.130.
17. Hickey SE, Curry CJ, Toriello HV. ACMG Practice Guideline: Lack of evidence for MTHFR polymorphism testing. Genet Med 2013;15(2):153–56. doi: 10.1038/gim.2012.165.
18. Harrison MDJ, Lu Z. Use and interpretation of vitamin D testing. The Royal College of Pathologists of Australasia, 2019.
19. Copp T, Thompson R, Hammarberg K, et al. Attitudes, knowledge and practice regarding the anti-Müllerian hormone test among general practitioners and reproductive specialists: A cross-sectional study. BJOG 2024;131(8):1072–79. doi: 10.1111/1471-0528.17741.
20. Porcari S, Mullish BH, Asnicar F, et al. International consensus statement on microbiome testing in clinical practice. Lancet Gastroenterol Hepatol 2025;10(2):154–67. doi: 10.1016/S2468-1253(24)00311-X.
21. Morgan S, Coleman J. We live in testing times – Teaching rational test ordering in general practice. Aust Fam Physician 2014;43(5):273–76.
22. Haverfield MC, Tierney A, Schwartz R, et al. Can patient-provider interpersonal interventions achieve the quadruple aim of healthcare? A systematic review. J Gen Intern Med 2020;35(7):2107–17. doi: 10.1007/s11606-019-05525-2.
23. The Royal Australian College of General Practitioners (RACGP). First do no harm: A guide to choosing wisely in general practice. RACGP, 2022. Available at www.racgp.org.au/clinical-resources/clinical-guidelines/key-racgp-guidelines/view-all-racgp-guidelines/first-do-no-harm/about-first-do-no-harm [Accessed 20 December 2025].
24. Wiser Health Care. Wiserhealthcare: A research collaboration for reducing overdiagnosis and overtreatment Australia. Wiser Healthcare, 2016. Available at www.wiserhealthcare.org.au [Accessed 7 November 2025].
25. Choosing Wisely Australia. Australian Commission on Safety and Quality in Health Care, 2025. Available at www.choosingwisely.org.au [Accessed 7 November 2025].
26. The Royal Australian College of General Practitioners (RACGP). Handbook of Non-Drug Interventions (HANDI). RACGP, 2025. Available at www.racgp.org.au/clinical-resources/clinical-guidelines/handi [Accessed 20 December 2025].
27. Australian Commission on Safety and Quality in Health Care (ACSQHC). Shared decision making. ACSQHC, 2025. Available at www.safetyandquality.gov.au/our-work/partnering-consumers/shared-decision-making [Accessed 7 November 2025].
28. Kwee RM, Kwee TC. Whole-body MRI for preventive health screening: A systematic review of the literature. J Magn Reson Imaging 2019;50(5):1489–503. doi: 10.1002/jmri.26736.
29. Basar Y, Alis D, Tekcan Sanli DE, Akbas T, Karaarslan E. Whole-body MRI for preventive health screening: Management strategies and clinical implications. Eur J Radiol 2021;137:109584. doi: 10.1016/j.ejrad.2021.109584.
30. Australian Chronic Disease Prevention Alliance. Australian Cardiovascular Disease Risk Calculator. Commonwealth of Australia, 2025. Available at www.cvdcheck.org.au [Accessed 7 November 2025].