Australian Government

Department of Health, Disability and Ageing

GP Pathology Requesting

Project Report

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Acknowledgements

Ethics approval and trial registration

The GP Pathology Requesting Project (project) was approved by the Bond University Human Research Ethics Committee (JH03507) on 30 November 2021, in compliance with the *National Statement on Ethical Conduct in Human Research*.

The trial was prospectively registered on the Australian New Zealand Clinical Trials Registry (ACTRN12622000566730) on 13 April 2022.

Research team

This project was conducted by the Department of Health, Disability and Ageing (department) in partnership with Wiser Healthcare.

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Contributors from Wiser Healthcare include Professor Denise O'Connor (Monash University), Professor Paul Glasziou (Bond University), Associate Professor Alexandra Gorelik (Monash University), Professor Kristen McCaffery (The University of Sydney), Associate Professor Rae Thomas (Tropical Australian Academic Health Centre), Honorary Adjunct Assistant Professor Ray Moynihan (Bond University), and Professor Rachelle Buchbinder (Monash University).

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Further publications

Gorelik, A., Schram, D., Elwick, A., Glasziou, P., Buchbinder, R., McCaffery, K., Thomas, R., & O'Connor, D. (2023). Statistical Analysis Plan: Pathology test requesting trial. *OSF Preprints*. https://doi.org/10.31219/osf.io/jrgmu

O'Connor, D. A., Glasziou, P., Schram, D., Gorelik, A., Elwick, A., McCaffery, K., Thomas, R., & Buchbinder, R. (2023). Evaluating an audit and feedback intervention for reducing overuse of pathology test requesting by Australian general practitioners: Protocol for a factorial cluster randomised controlled trial. *BMJ Open*, *13*(5), e072248. https://doi.org/10.1136/bmjopen-2023-072248

O'Connor, D. A., Glasziou, P., Schram, D., Gorelik, A., Elwick, A., McCaffery, K., Thomas, R., & Buchbinder, R. (2026). Nationwide audit and feedback to reduce overuse of pathology tests among high-requesting general practitioners in Australia: a factorial, cluster-randomised, controlled trial. *The Lancet Primary Care*, 100140. https://doi.org/10.1016/j.lanprc.2026.100140

Overuse of testing in Australia

Unnecessary healthcare is recognised as a common problem around the world with the overuse of diagnostic tests a contributing factor[1]. Over-testing happens when patients are referred for diagnostic tests that are unlikely to change their treatment or improve their health. Over-testing can harm patients, as it increases the risk of overdiagnosis and overtreatment. For example, over-testing increases the chance of false positive results or incidental findings leading to unnecessary follow-up tests, treatments, or procedures, some of which may be invasive.

There is growing evidence that pathology tests may be overused in general practice, both in Australia and overseas. Work by the Medicare Benefits Scheme (MBS) Review Taskforce[2] and the Australian Commission on Safety and Quality in Health Care[3] show opportunities to support general practitioners (GPs) to improve their use of pathology testing, including by audit and feedback interventions, clinical decision support, and education.

Overuse of pathology in general practice

A meta-analysis of global studies suggests that 20% to 40% of pathology tests may be unnecessary[4]. In Australia, the number of people receiving pathology tests has increased over time. Between 2012-13 and 2022-23, the proportion of Australians who received at least one pathology test rose from 53% to 59%. In 2022-23 alone, 113.9 million pathology tests were claimed on the MBS[5]. Based on historical data, most of these services are likely to originate in general practice[6].

Australian and international clinical guidelines for some patient presentations recommend not using pathology tests as a first line of diagnosis, unless there are specific “red flag” symptoms suggesting a serious or specific underlying condition[7,8]. However, evidence suggests that while Australian general practice does not always align with these guidelines, the reasons for deviation are difficult to identify in part because they are not routinely captured[9].

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[1] Brownlee, S. et al. (2017). Evidence for overuse of medical services around the world. *The Lancet*, *390*(10090), 156–168.
[2] Australian Government Department of Health, Disability and Ageing. (2018). *Medicare Benefits Schedule Review Taskforce: Report from the Diagnostic Medicine Clinical Committee*.
[3] Australian Commission on Safety and Quality in Health Care. (2018). *Third Australian Atlas of Healthcare Variation*. Australian Institute of Health and Welfare.
[4] Zhi, M. et al. (2013). The landscape of inappropriate laboratory testing: A 15-year meta-analysis. *PLoS ONE*, *8*(11), e78962.
[5] Australian Institute of Health and Welfare. *Pathology, imaging and other diagnostic services*.
[6] Bayram, C. et al. (2009). *Evidence-practice gap in GP pathology test ordering: a comparison of BEACH pathology data and recommended testing.* University of Sydney, Family Medicine Research Centre.
[7] Wilson, J. et al. (2014). Fatigue--a rational approach to investigation. *Australian Family Physician*, *43*(7), PMID: 25006608
[8] Van Bokhoven, M. A. et al. (2009). Influence of watchful waiting on satisfaction and anxiety among patients seeking care for unexplained complaints. *The Annals of Family Medicine*, *7*(2), 112–120.
[9] Hardie, R. A. et al. (2020). *Enhancing patient outcomes through evaluation of the appropriateness and quality use of pathology in general practice. A report to the Department of Health Quality Use of Pathology Program.* Australian Institute of Health Innovation.

International literature identifies a complex interplay of drivers across multiple domains that can contribute to overdiagnosis (see Table 1)[10].

Table 1: Example drivers of overdiagnosis

Domain	Example driver
Culture	Biased media reporting
Health system	Complexity of care
Industry and technology	Promotion of new or improved tests
Professional	Fear of litigation
Patients and the public	Expectation that practitioners will "do something"

While patient reassurance may motivate some pathology requesting, evidence shows that unnecessary tests do not improve reassurance and may increase patient anxiety[11]. For example, Australian GPs may request tests for patients with general or unexplained fatigue; in most cases, these tests do not lead to a clear diagnosis or clinically significant findings[12,13].

Pathology tests may be inappropriately used as screening tools, even when patients have no related symptoms[14]. For example, between 2003 and 2018, the likelihood of a patient having clinically low vitamin D levels stayed the same. Over the same time, Australian GP requests for vitamin D tests increased 30-fold[15]. Many clinical practice guidelines advise against testing vitamin D levels in people without symptoms and do not support its use for population-wide screening[16]. Guidance provided by the Royal Australian College of General Practitioners (RACGP)[17] and the Royal College of Pathologists of Australasia (RCPA) supports that testing for vitamin D deficiency is not routinely recommended[18,19].

[10] Pathirana, T., Clark, J., & Moynihan, R. (2017). Mapping the drivers of overdiagnosis to potential solutions. *BMJ*, *358*, j3879.
[11] Rolfe, A., & Burton, C. (2013). Reassurance after diagnostic testing with a low pretest probability of serious disease. *JAMA Internal Medicine*, *173*(6), 407.
[12] Wilson et al. (2014).
[13] Gialamas, A. et al. (2003). Investigating tiredness in Australian general practice. Do pathology tests help in diagnosis? *Australian Family Physician*, *32*(8), PMID: 12973880.
[14] Hardie et al. (2020).
[15] Zurynski, Y. et al. (2023). Vitamin D testing in children and adolescents in Victoria, Australia: Are testing practices in line with global recommendations? *Archives of Disease in Childhood*, *108*(9), 742–747.
[16] McChesney, C. et al. (2022). Do not routinely test for vitamin D. *BMJ*, *378*, e070270.
[17] Royal Australian College of General Practitioners. (2022). *For GPs – Vitamin D testing.* In *First Do No Harm: A guide to choosing wisely in general practice.*
[18] Harrison, M. et al. (2023). *Use and Interpretation of Vitamin D testing.* The Royal College of Pathologists of Australasia.
[19] Royal College of Pathologists of Australasia. (2024). *Manual of Use and Interpretation of Laboratory Tests* (8th ed.).

Alternatively, healthcare practitioners may request broader or less specific tests instead of more targeted tests. For example, the RCPA[20] and the Therapeutic Guidelines Limited[21] recommend ferritin tests for the assessment of iron deficiency. Despite this, one Australian study found that hospital healthcare practitioners requested 36 iron studies tests for every ferritin test[22].

General practitioners play an important role in delivering high-quality healthcare. Patients often see a GP first for health concerns, placing GPs in a position of stewardship for evidence-based care and appropriate use of pathology testing.

Randomised controlled trial

As part of its commitment to high-quality healthcare, the Australian Government has taken a targeted approach to reduce low-value care. Raising GP awareness of clinical guidelines and their own test requesting patterns can support them to focus pathology requests on situations where the results are likely to change a patient's care and improve their health outcomes. This approach underpins the project.

The department worked with Wiser Healthcare to design a quality improvement intervention aimed to reduce potential over-testing by Australian GPs. The department and Wiser Healthcare evaluated this intervention through a randomised controlled trial (RCT).

The intervention provided high-requesting GPs with feedback letters advising how often they requested certain combinations of pathology tests. The feedback letters compared their requesting patterns with those of peers in similar geographic areas[23]. The RCT assessed whether receiving a feedback letter changed how often GPs requested the test combinations when compared with a control group that did not receive feedback.
The RCT also investigated whether the following elements changed the response to feedback:

- delivery in a glossy pamphlet
- invitation to take part in continuing professional development (CPD)-accredited education
- inclusion of information about the cost of pathology testing to the Medicare system.

Appendix A provides further details on the RCT design and statistical analysis. A peer-reviewed paper describing the project was published by O'Connor et al. in 2026[24].

[20] Royal College of Pathologists of Australasia. (2024).
[21] Therapeutic Guidelines (2022). *Overview of iron deficiency.* Therapeutic Guidelines.
[22] Banker, T. R. et al. (2023). To test or to not test: A retrospective cross-sectional study on potentially inappropriate use of pathology testing in South Australian hospitals. *American Journal of Clinical Pathology*, *161*(4), 342–348.
[23] Peers were defined as other GPs practising in similar geographic regions in Australia based on the GP's primary practice address.
[24] O'Connor, D. A. et al. (2026). Nationwide audit and feedback to reduce overuse of pathology tests among high-requesting general practitioners in Australia: a factorial, cluster-randomised, controlled trial. *The Lancet Primary Care*, 100140.

Research background

A Cochrane review of 292 RCTs from around the world found that giving performance feedback to healthcare practitioners led to small but meaningful changes in practitioner behaviour, with 81% of included studies focusing on medical practitioners[25]. Previous international RCTs targeting over-testing behaviour among GPs have shown mixed results - 3 studies found no significant effect[26,27,28] while 2 reported a positive impact[29,30].

Earlier work by the department and Wiser Healthcare, the Reducing Overuse of Diagnostic Imaging project, showed that a national feedback intervention reduced potential overuse of musculoskeletal diagnostic imaging in Australian general practice[31,32,33]. The design of this project drew on the principles and lessons from the earlier project.

Test selection

The project focused on 5 pathology tests identified as being at risk of overuse:

- iron studies
- thyroid stimulating hormone (TSH)
- thyroid function test (TFT)
- vitamin D
- vitamin B12.

To avoid discouraging appropriate testing, the project grouped these tests into 10 combinations of 2-3 tests each based on subject matter expert advice (see Appendix A).

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[25] Ivers, N. et al. (2025). Audit and Feedback: Effects on Professional Practice. *Cochrane Database of Systematic Reviews*, *2025*(3), CD000259.
[26] Baker, R., Smith, J. F., & Lambert, P. C. (2003). Randomised controlled trial of the effectiveness of feedback in improving test ordering in general practice. *Scandinavian Journal of Primary Health Care*, *21*(4), 219–223.
[27] Trietsch, J. et al. (2017). Effect of audit and feedback with peer review on general practitioners' prescribing and test ordering performance: a cluster-randomized controlled trial. *BMC Family Practice*, *18*(1), 53.
[28] Lillo, S. et al. (2021). A randomized controlled study of biochemical tests in primary care: Interventions can reduce the number of tests but usage does not become more appropriate. *Clinical Chemistry and Laboratory Medicine (CCLM)*, *60*(3), 343–350.
[29] Verstappen, W. H. J. M. et al. (2003). Effect of a practice-based strategy on test ordering performance of primary care physicians. *JAMA, 289*(18), 2407.
[30] Thomas, R. E. et al. (2006). Effect of enhanced feedback and brief educational reminder messages on laboratory test requesting in primary care: a cluster randomised trial. The Lancet, 367(9527), 1990–1996
[31] O'Connor, D. A. et al. (2022). Effect of an individualized audit and feedback intervention on rates of musculoskeletal diagnostic imaging requests by Australian general practitioners. *JAMA*, *328*(9), 850.
[32] Australian Government Department of Health, Disability and Ageing. (2021). *Reducing Overuse of Diagnostic Imaging: Project Report*.
[33] Korenstein, D., & Gillespie, E. F. (2022). Audit and Feedback—Optimizing a strategy to reduce low-value care. *JAMA*, *328*(9), 833.

Letter development

The initial design process drew on evidence from earlier studies that examined how performance feedback influences practitioner behaviour[34, 35, 36] including studies of Australian GPs[37]. The feedback letters were further developed using input from peak medical organisations, and volunteer practising GPs through semi-structured interviews. The RCT tested 8 different versions of the feedback letters.

Key messages and formats

All feedback letters included the following standard wording (see Appendix B):

- a graph comparing the GP's rate of requesting with the median rate of peers.38
- a table showing, for the GP's most requested test combinations:
    - number of requests
    - request rate compared to 1000 consultations
    - peer's median request rate
    - percentile for number of requests.
- acknowledgement the data did not capture clinical reasons for test requests.
- encouragement to reflect on the GP's pathology requesting and best practice guidance.
- information on the benefits of reducing unnecessary testing.
- links to clinical guidelines and patient resources on appropriate pathology requesting.

All data presented in the standard wording (personalised requesting and peer comparison) was based on MBS data from a 24-month baseline period (1 July 2019 to 30 June 2021).

The letters were adapted to test 3 feedback variations separately and in combination:

- the physical letter appearance - standard letter print or colourful pamphlet
- information about the cost (Medicare schedule fee) of the requested pathology test combination (see Appendix C)
- invitation to participate in CPD-accredited education (see Appendix D).

[34] Ivers, N. et al. (2012). Audit and Feedback: Effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*, *2012*(7), CD000259.
[35] Brehaut, J. C. et al. (2016). Practice feedback interventions: 15 suggestions for optimizing effectiveness. *Annals of Internal Medicine*, *164*(6), 435.
[36] Brown, B. et al. (2019). Clinical Performance Feedback Intervention Theory (CP-FIT): a new theory for designing, implementing, and evaluating feedback in health care Based on a systematic review and meta-synthesis of qualitative research. *Implementation Science*, *14*(1), 40.
[37] O'Connor et al. (2022).
[38] Peers were defined as other GPs practising in similar geographic regions in Australia based on the GPs primary practice address.

Identified GPs were allocated into 9 groups with each group to receive one of the following:

1. no letter (control group)
2. letter with only standard wording
3. pamphlet with only standard wording
4. letter with additional cost information
5. pamphlet with additional cost information
6. letter with additional CPD invitation
7. pamphlet with additional CPD invitation
8. letter with additional cost information and CPD invitation
9. pamphlet with additional cost information and CPD invitation.

Behavioural insights principles

In addition to the above referenced studies on performance feedback impacts, the project team applied behavioural insights to support effective communication and encourage change.

The design process used principles from the EAST framework[39], which recommends making desired behaviours easy, attractive, social, and timely (see Figure 1). Principles from the EAST framework (see Table 2) and other behavioural research (see Table 3) were applied to the design of the feedback letters for the project.

Figure 1: EAST framework[40]

Table 2: EAST principles applied to the project

Easy	Simple, clear language Specific, actionable advice
Attractive	Key messages highlighted Personalised feedback
Social	Requesting compared with peers Credible messenger (Chief Medical Officer)
Timely	Requesting data from previous 24 months

[39] Behavioural Insights Team. (2024). EAST Framework: Four simple ways to apply behavioural insights: Revised and updated edition. In *BIT*. Behavioural Insights Ltd.
[40] Image adapted with permission from the Behavioural Insights Team.

Table 3: Behavioural principles and applications

Principle	Explanation	Application in project
Information bias	Professionals look for information when reminded of their role (e.g. as a GP) and its specific tasks (e.g. requesting pathology tests)[41].	Highlighted the important role GPs play in selecting pathology tests. Outlined patient benefits from appropriate pathology requesting.
	People prefer trusted professional sources (e.g. peak bodies or clinical guidelines) when seeking health information[42].	Provided links to material sourced from and attributed to peak medical representative bodies including RACGP and RCPA. Invited GPs to attend RACGP CPD-accredited education.
Attribute substitution	When faced with a complex issue, people unconsciously replace it with a simpler concept. This can lead to systemic errors if the simpler concept is a poor substitute.[43]	Presented all recipients the same key data (e.g. requesting rates and peer comparison) as a focussed attribute when considering their pathology requesting.
Frequency format	People understand relative frequencies (e.g. 1 in 100) more easily than other formats (e.g. 1% or probability of 0.01)[44].	Presented the rate of pathology requests per 1,000 patient consults instead of less relatable percentages or probabilities.
Cost feedback	Being aware of costs reduces unnecessary or discretionary use[45], without discouraging appropriate or necessary use (e.g. pathology tests essential for specific presentations).[46].	Provided the Medicare benefit payable for requested pathology combinations and a comparison figure of the amount payable for a sole iron studies test.

[41] Leckie, G. J., Pettigrew, K. E., & Sylvain, C. (1996). Modeling the information seeking of professionals: A general model derived from research on engineers, health care professionals, and lawyers. *The Library Quarterly*, *66*(2), 161–193.

[42] Soroya, S. H. et al. (2020). From information seeking to information avoidance: Understanding the health information behavior during a global health crisis. *Information Processing & Management*, *58*(2), 102440.

[43] Kahneman, D., & Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 49–81). Cambridge University Press.

[44] Kahneman & Frederick (2002).

[45] Fogarty, A. W. et al.(2013). Hospital clinicians' responsiveness to assay cost feedback: A prospective blinded controlled intervention study. *JAMA Internal Medicine*, *173*(17), 1654.

[46] Lewis, S. et al. (2019). Does cost feedback modify demand for common blood tests in secondary care? A prospective controlled intervention study. *Future Healthcare Journal*, *6*(3), 204–208.

Sampling and randomisation

The project included 5,964 GPs who, during the baseline period, were in the top 10% of requesters for both the 10 selected test combinations overall and 2 or more of the individual test combinations. The study randomly allocated these GPs to 1 of 9 groups (see Figure 2).

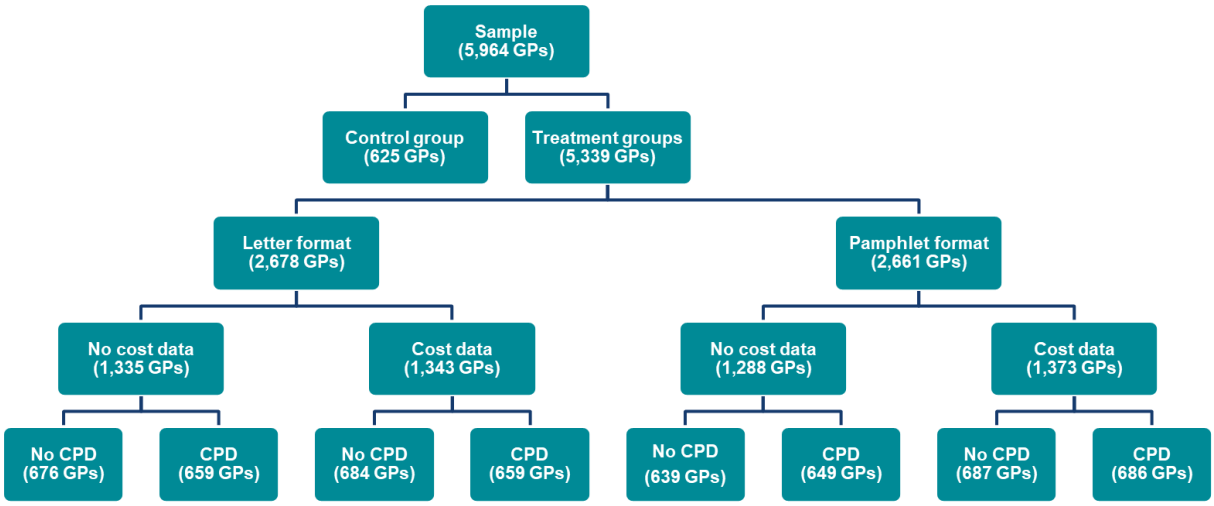


Figure 2: RCT design showing GPs allocated to each group at randomisation

The project used routinely collected MBS data to:

- identify the GPs
- prepare personalised feedback for each GP
- analyse outcomes for the 9 groups.

All feedback letters were mailed out on 12 May 2022. The project collected follow-up data for the 12 months after the feedback was sent.

To address the impact of COVID-19 lockdowns and surges on testing patterns, the feedback included data from 24 months of prior requesting to ensure a representative baseline. Comparing the feedback groups to the control group allowed the analysis to account for external factors such as COVID-19 and normal seasonal variations.

Results

Overall, the project found that GPs who received personalised feedback requested 32% fewer combinations of tests than those in the control group over 12 months (see Figure 4). This translates to an estimated 41,925 fewer test combinations performed in that time. This is among the largest behavioural changes for RCTs involving this type of feedback[47].

Feedback letter recipients also reduced the requesting rate the 5 individual pathology tests examined. This suggests that GPs did not simply start requesting tests individually rather than in combinations (see Appendix A, table 6).

[47] Ivers et al. (2025).

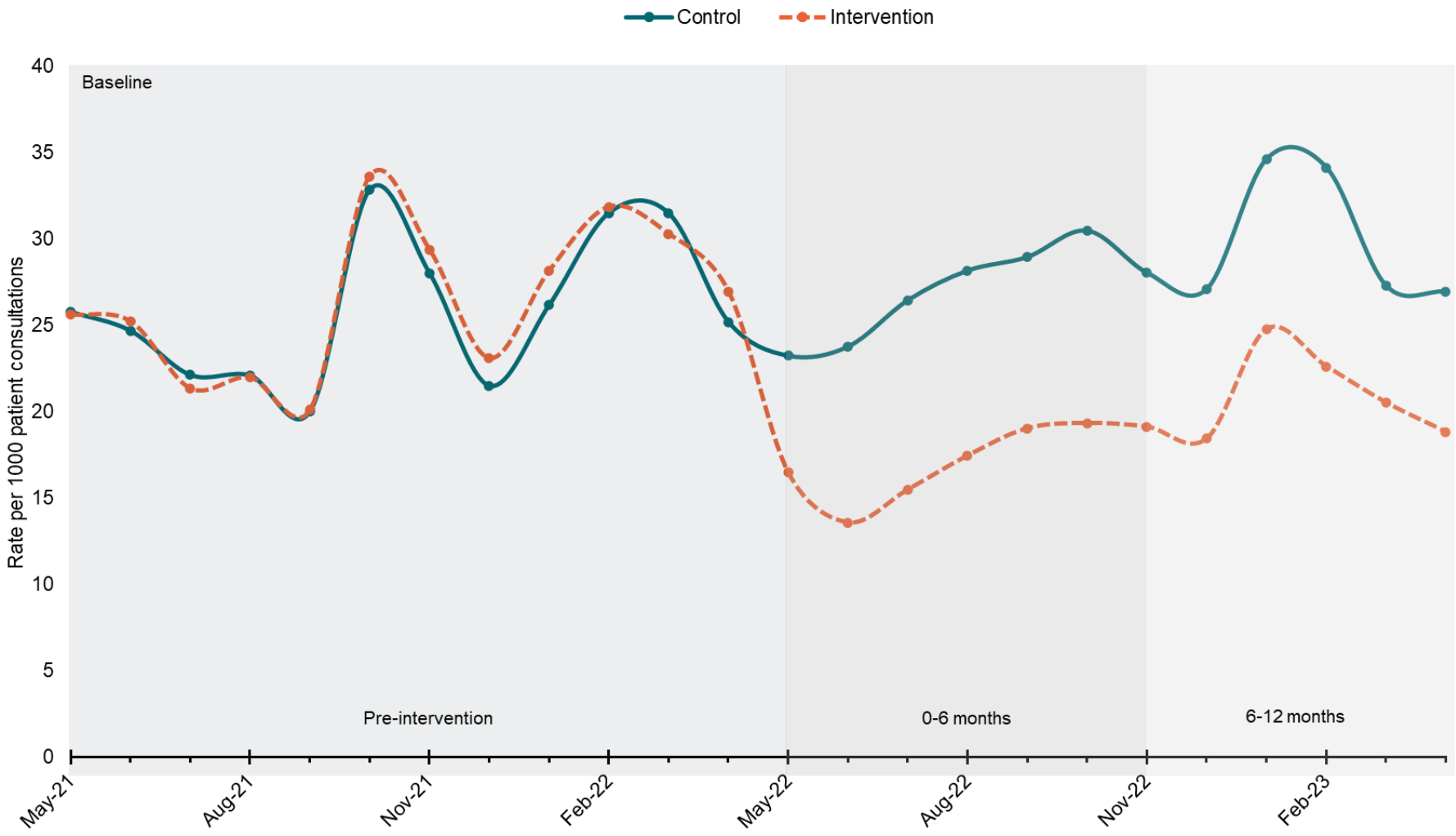


Figure 3: Changes in pathology requesting rates between intervention and control

The addition of cost data, invitation for CPD and/or glossy pamphlet presentation did not appear to have an important impact on how GPs responded to the feedback. Of the 2,653 GPs receiving an invitation, 167 (7%) attended the CPD-accredited education. This number was too small to allow meaningful comparison between those who attended and those who did not despite the invitation.

The intervention had similar effects for GPs regardless of their geographic area (metropolitan or rural), their requesting rate during the baseline period, and the number of combinations the GP requested above the 90th percentile prior to receiving a letter. The analysis identified a small increased behavioural change for GPs who self-reported as male, and GPs who had been practicing for more than 10 years.

Limitations and future opportunities

This study analysed routinely collected MBS data, which does not capture information about the rationale for, or outcome of, testing. As such, only the change in the number of tests could be determined. Future studies could assess the reasons for changes following this type of intervention to determine the effect on patient outcomes.

Concluding points

Sending feedback letters to GPs who request high volumes of pathology test combinations is a simple, low-cost intervention which can significantly change GP pathology requesting behaviour. The project resulted in an estimated 41,925 fewer pathology test combinations performed nationwide over the study period. Receiving any feedback resulted in a 32% relative reduction in the overall rate of pathology test combination requests over 12 months compared to the control group. Taken together, these findings provide robust evidence to support the use of personalised feedback for promoting evidence-based care in general practice.

Appendix A – Details of statistical analyses

This project was conducted as a factorial cluster RCT for GPs requesting selected combinations of pathology tests rendered in the period from 1 July 2019 to 30 June 2021. Comparatively high requesting GPs were randomly allocated to 1 of 8 intervention groups or a control group. Intervention group GPs received individualised written feedback on their pathology requesting rates from the Chief Medical Officer in May 2022, while control group GPs received nothing.

Full details of the trial and analyses can be found in the published statistical analysis plan[48] and trial protocol[49].

Outcome metrics analysed

The primary outcome was the overall rate of requests for any of the targeted combinations of pathology tests (number of requests per 1,000 patient consultations[50]) billed to Medicare, displayed in the feedback letters, over 0 to 6 months.

The request rates for combinations not displayed in feedback letter, and overall rate of requests over 6 to 12 months and 0 to 12 months, were secondary outcomes. For ease of reading, outcomes for 0 to 12 months were used in this report.

While the intervention addressed the use of pathology tests in combination, variations in request rates for individual pathology tests were monitored for patterns of requesting which may provide insight into requesting behaviour. This included monitoring ferritin requesting in case GPs switched from iron study test requesting after receiving a letter.

The dataset recorded the number of pathology requests for the selected test combinations by GPs that were completed by a pathologist and claimed from Medicare. The analysed data does not include requests for pathology which did not have a benefit claimed from Medicare, including if the patient did not action the request.

Pathology tests of interest

Under Medicare, unique identifying numbers (MBS item numbers) are assigned to pathology tests (see Table 3 for item numbers assigned to the tests in the project). Requesting rates were examined per individual tests and combinations. This allowed the study to compare a practitioner's requesting to others, even if they were requesting different pathology tests.

[48] Gorelik, A. et al. (2023). Statistical Analysis Plan: Pathology test requesting trial. *OSF Preprints*.
[49] O'Connor et al. (2023).
[50] MBS Category 1 – Professional Attendances items (including face to face and telehealth).

Table 4: MBS item numbers[51] for pathology tests selected for project

MBS item number	Test type
66596	Iron studies
66716	Thyroid stimulating hormone
66719	Thyroid function test
66833	Vitamin D
66838 & 66839[52]	Vitamin B12

To reduce the risk of discouraging GPs from appropriately ordering pathology tests, requesting rates of combinations was given in the feedback letters to GPs. Combinations were selected based on subject matter expert and medical advisor advice regarding the likelihood a patient would present with symptoms for which all tests in a combination would provide meaningful clinical guidance.

The 10 combinations examined were:

1. iron studies, TSH and vitamin D
2. iron studies, vitamin D and vitamin B12
3. iron studies, TSH and vitamin B12
4. iron studies, TFT and vitamin B12
5. iron studies, TFT and vitamin D
6. TSH, vitamin D and vitamin B12
7. iron studies and vitamin D
8. iron studies and vitamin B12
9. iron studies and TFT
10. TSH and vitamin D

Population and sampling

The population of interest was GPs classified as 'high requesters' (see below for definition). Geographic areas were defined using the Modified Monash Model[53] (MMM) applying at the time, grouped to metropolitan (MM 1) and regional/rural (MM 2 – MM 5).

GPs were selected for inclusion in the sample if they met all the following criteria:

- classified as a 'high requester' - in the top 10% of GP requestors for both:
    - combinations overall
    - 2 of the 10 combinations
- had a minimum of 1,000 patient consultations in both 1 July 2019 to 30 June 2020, and 1 July 2020 to 30 June 2021.

[51] Note: MBS items and MMM classifications are updated periodically and may have been amended during and after this project.
[52] MBS items numbers 66838 and 66839 collectively considered vitamin B12 differentiate between first line testing and testing following abnormal/inconclusive first line tests.
[53] Australian Government Department of Health, Disability and Ageing. (2025). *Modified Monash Model*.

GPs were excluded from the sample if:

- they had not requested the combinations which had been rendered between 1 July 2019 and 30 June 2021 and claimed from Medicare.
- their Medicare primary practice address was either:
    - located in an area classified as MM 6 (remote communities) or MM 7 (very remote communities).
    - listed as an aged care facility, hospital, or Royal Flying Doctor Service.
- they participated in user testing for the feedback letters.
- they had been the subject of any department compliance activity within 12 months before feedback letters were sent.

Matching and randomisation

GPs were assigned to 3,371 clusters based on self-reported practice locations classified as their primary practice based on MBS data. Clusters ranged in size from 1 to 11 GPs and averaged 1.7 GPs per cluster. Randomisation occurred at the cluster level and was stratified by geographic region (metropolitan or regional/rural). Randomisation was conducted using a computer-generated algorithm in statistical software package R Studio (version 4.0.0).

Clusters had an equal chance of being in any of the 9 groups and the final allocations were:

- Control: 375 clusters (625 GPs)
- Letter + Cost + CPD: 375 clusters (659 GPs)
- Pamphlet + Cost + CPD: 375 clusters (686 GPs)
- Letter + CPD: 374 clusters (659 GPs)
- Pamphlet + CPD: 375 clusters (649 GPs)
- Letter + Cost: 374 clusters (684 GPs)
- Pamphlet + Cost: 374 clusters (687 GPs)
- Letter Only: 375 clusters (676 GPs)
- Pamphlet Only: 374 clusters (639 GPs)

Analysis

The primary analysis excluded GPs who did not have at least one patient consultation between 12 May 2022, and 11 May 2023 (232 GPs). A secondary per-protocol analysis excluded GPs whose letters were returned to sender (342 GPs), and a tertiary analysis of active practitioners excluded GPs who conducted fewer than 500 consultations over the first 6 months post-intervention delivery (225 GPs).

The analysis compared the intervention groups collectively to the control group for each outcome metric. This was achieved by conducting multilevel mixed effect linear regression analysis adjusted for the baseline pathology requesting rate of each GP, remoteness and years of practice. The tables below present the results for the main comparison (feedback vs. control) and according to the inclusion of an invitation to CPD-accredited education (yes vs. no), inclusion of cost information (yes vs. no), and feedback format (letter vs. pamphlet).

Results

Table 5: Participant characteristics at baseline [a]

	Intervention									Control
	P+CPD (n=621)	L only (n=657)	L+C (n=660)	P+C+CPD (n=668)	P only (n=611)	L+C+CPD (n=626)	P+C (n=662)	L+CPD (n=630)	All (n=5,135)	(n=597)
GP age (years)										
Under 40	83 (13·4%)	81 (12·3%)	95 (14·4%)	86 (12·9%)	88 (14·4%)	86 (13·7%)	93 (14·1%)	88 (14·0%)	700 (13·6%)	79 (13·2%)
40 - 49	197 (31·7%)	192 (29·2%)	203 (30·8%)	203 (30·4%)	194 (31·8%)	182 (29·1%)	194 (29·3%)	177 (28·1%)	1,542 (30·0%)	186 (31·2%)
50 - 59	183 (29·5%)	207 (31·5%)	178 (27·0%)	204 (30·5%)	167 (27·3%)	174 (27·8%)	198 (29·9%)	199 (31·6%)	1,510 (29·4%)	176 (29·5%)
60 - 69	109 (17·6%)	138 (21·0%)	145 (22·0%)	120 (18·0%)	130 (21·3%)	138 (22·0%)	139 (21·0%)	120 (19·1%)	1,039 (20·2%)	120 (20·1%)
70 and over	49 (7·9%)	39 (5·9%)	39 (5·9%)	55 (8·2%)	32 (5·2%)	46 (7·3%)	38 (5·7%)	46 (7·3%)	344 (6·7%)	36 (6·0%)
Gender (self-reported)										
Female	407 (65·5%)	440 (67·0%)	430 (65·2%)	449 (67·2%)	395 (64·6%)	413 (66·0%)	445 (67·2%)	398 (63·2%)	3,377 (65·8%)	384 (64·3%)
Male	213 (34·3%)	217 (33·0%)	230 (34·9%)	219 (32·8%)	216 (35·5%)	213 (34·0%)	217 (32·8%)	232 (36·8%)	1,757 (34·2%)	212 (35·5%)
Unknown	1 (0·2%)	0 (0·0%)	0 (0·0%)	0 (0·0%)	0 (0·0%)	0 (0·0%)	0 (0·0%)	0 (0·0%)	1 (0·02%)	1 (0·02%)
Geographical region										
Metropolitan	503 (81·0%)	547 (83·3%)	535 (81·1%)	538 (80·5%)	528 (86·4%)	546 (87·2%)	571 (86·3%)	510 (81·0%)	4,278 (83·3%)	501 (83·9%)
Regional/rural	118 (19·0%)	110 (16·7%)	125 (18·9%)	130 (19·5%)	83 (13·6%)	80 (12·8%)	91 (13·7%)	120 (19·0%)	857 (16·7%)	96 (16·1%)
State										
Australian Capital Territory	12 (1·9%)	16 (2·4%)	9 (1·4%)	5 (0·7%)	8 (1·3%)	15 (2·4%)	8 (1·2%)	29 (4·6%)	102 (2·0%)	12 (2·0%)
New South Wales	212 (34·1%)	238 (36·2%)	211 (32·0%)	213 (31·9%)	225 (36·8%)	203 (32·4%)	224 (33·8%)	205 (32·5%)	1,731 (33·7%)	204 (34·2%)
Northern Territory	1 (0·2%)	0 (0·0%)	5 (0·8%)	1 (0·2%)	0 (0·0%)	1 (0·2%)	3 (0·5%)	2 (0·3%)	13 (0·3%)	2 (0·3%)
Queensland	121 (19·5%)	104 (15·8%)	146 (22·1%)	113 (16·9%)	118 (19·3%)	110 (17·6%)	126 (19·0%)	108 (17·1%)	946 (18·4%)	105 (17·6%)
South Australia	40 (6·4%)	48 (7·3%)	50 (7·6%)	48 (7·2%)	33 (5·4%)	40 (6·4%)	32 (4·8%)	39 (6·2%)	330 (6·4%)	50 (8·4%)
Tasmania	28 (4·5%)	12 (1·8%)	19 (2·9%)	26 (3·9%)	7 (1·1%)	6 (1·0%)	1 (0·2%)	7 (1·1%)	106 (2·1%)	9 (1·5%)

(Table 4 continues on next page)

	Intervention									Control
	P+CPD (n=621)	L only (n=657)	L+C (n=660)	P+C+CPD (n=668)	P only (n=611)	L+C+CPD (n=626)	P+C (n=662)	L+CPD (n=630)	All (n=5,135)	(n=597)
(Continued from previous page)										
Victoria	167 (26·9%)	159 (24·2%)	161 (24·4%)	204 (30·5%)	155 (25·4%)	175 (28·0%)	186 (28·1%)	185 (29·4%)	1,392 (27·1%)	146 (24·5%)
Western Australia	40 (6·4%)	79 (12·0%)	59 (8·9%)	57 (8·5%)	65 (10·6%)	76 (12·1%)	82 (12·4%)	55 (8·7%)	513 (10·0%)	69 (11·6%)
NA	0 (0·0%)	1 (0·2)	0 (0·0%)	1 (0·2)	0 (0·0%)	0 (0·0%)	0 (0·0%)	0 (0·0%)	2 (0·04%)	0 (0·0%)
Years in practice										
Median	11·8	12·7	12·1	12·8	13·2	13·8	13·1	12·9	12·8	12·1
Q1 - Q3	6·4 - 28·6	6·1 - 29·3	6·3 - 28·2	6·7 - 28·6	6·9 - 28·3	6·2 - 29·4	5·7 - 29·3	6·2 - 31·0	6·3 - 29·2	6·6 - 29·9
Total Category 1 patient consultations [b]										
Median	4,967	4,804	5,132	4,764	5,028	4,868	5,228	5,174	4,992	4,925
Q1 - Q3	3,096-7,827	2,987-7,272	3,064-7,467	3,050-7,469	3,030-7,845	3,129-7,154	3,266-7,785	3,192-7,828	3,107-7,597	2,961-7,150
Total targeted pathology combinations										
Median	2	3	2	3	3	2	2	2	2	2
Q1 - Q3	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3
Overall request rate, per 1,000 consultations										
Median	52·6	53·8	52·1	52·1	51·5	51·3	54·1	49·7	52·1	54·2
Q1 - Q3	39·8 - 68·7	39·7 - 69·8	39·1 - 67·0	38·1 - 69·3	38·3 - 68·7	37·5 - 68·7	41·2 - 69·2	37·4 - 65·5	39·0 - 68·5	39·9 - 69·4
Overall request rate of displayed combinations, per 1,000 consultations										
Median	27·1	27·6	26·3	26·6	26·3	26·9	28·6	26·7	26·9	26·6 [c]
Q1 - Q3	16·0 - 41·7	17·2 - 41·3	15·6 - 39·2	16·5 - 40·9	16·6 - 38·9	15·2 - 40·6	17·8 - 40·5	15·8 - 39·7	16·3 - 40·3	17·3 - 41·7

P - Pamphlet; C - Cost information; L - Letter; CPD - Continuing Professional Development (CPD)-accredited education.

[a] Baseline time period: 12 May 2021 - 11 May 2022

[b] Refers to any professional attendance by a GP

[c] Includes combinations that would have been included if randomised into the intervention arm

Table 6: Overall request rate for main comparison and each intervention factor

	Intervention	Control [a]	Main model [b] (adjusted rate difference [CI, p-value])	Adjusted model [c] (adjusted rate difference [CI, p-value])
Overall				
N	5,135	597		
Baseline	26·9 (16·3 to 40·3)	26·6 (17·3 to 41·7)	..	..
0-6 months [d]	17·7 (8·2 to 31·5)	27·5 (16·5 to 42·2)	-9·8 (95% CI -10·7 to -8·8; p<0·0001)	-9·9 (95% CI -10·9 to -8·9; p<0·0001)
>6 months to 12 months	21·7 (9·9 to 37·8)	30·7 (18·3 to 48·5)	-9·0 (95% CI -10·1 to -8·0; p<0·0001)	-9·1 (95% CI -10·2 to -8·0; p<0·0001)
0-12 months	19·7 (9·4 to 34·2)	28·8 (17·8 to 45·2)	-9·8 (95% CI -10·6 to -8·6; p<0·0001)	-9·7 (95% CI -10·8 to -8·6; p<0·0001)
CPD-accredited education (yes, no)				
N	2,545[e]	2,590[f]		
Baseline	26·8 (15·9 to 40·6)	26·9 (16·8 to 39·9)	..	..
0-6 months	17·5 (8·0 to 32·2)	18·0 (8·4 to 31·2)	-0·1 (98·3% CI -0·8 to 0·6; p=0·78)	-0·2 (98·3% CI -0·9 to 0·6; p=0·64)
>6 months to 12 months	21·1 (9·8 to 38·1)	22·2 (10·2 to 37·2)	-0·2 (98·3% CI -1·0 to 0·6; p=0·59)	-0·3 (98·3% CI -1·1 to 0·6; p=0·45)
0-12 months	19·2 (9·2 to 34·2)	20·1 (9·7 to 34·1)	-0·3 (98·3% CI -1·1 to 0·5; p=0·34)	-0·4 (98·3% CI 1·2 to 0·4; p=0·26)
Cost information (yes, no)				
N	2,616[e]	2,519[f]		
Baseline	26·9 (16·3 to 40·4)	26·9 (16·4 to 40·2)	..	..
0-6 months	17·8 (8·4 to 31·8)	17·7 (8·0 to 31·3)	0·2 (98·3% CI -0·5 to 0·9; p=0·52)	0·2 (98·3% CI -0·6 to 0·9; p=0·58)
>6 months to 12 months	21·7 (9·8 to 38·3)	21·9 (10·2 to 37·1)	-0·6 (98·3% CI -1·4 to 0·2; p=0·058)	-0·7 (98·3% CI -1·5 to 0·2; p=0·055)
0-12 months	19·5 (9·4 to 34·6)	20·0 (9·5 - 33·6)	-0·2 (98·3% CI -0·9 to 0·6; p=0·61)	-0·2 (98·3% CI -1·0 to 0·6; p=0·58)
Feedback format (pamphlet, letter)				
N	2,562[e]	2,573[f]		
Baseline	26·9 (16·7 to 40·4)	26·8 (15·9 to 40·1)	..	..
0-6 months	18·4 (8·3 to 32·4)	17·02 (8·1 to 31·0)	0·7 (98·3% CI 0·0 to 1·4; p=0·014)	0·7 (98·3% CI -0·0 to 1·5; p=0·0195)
>6 months to 12 months	22·4 (10·2 to 38·4)	21·3 (9·8 to 37·1)	0·9 (98·3% CI 0·1 to 1·7; p=0·0047	0·9 (98·3% CI 0·01 to 1·8; p=0·0083)
0-12 months	20·4 (9·7 to 34·6)	19·1 (9·3 to 33·8)	0·7 (98·3% CI -0·04 to 1·5; p=0·024)	0·7 (98·3% CI -0·1 to 1·5; p=0·033)

(Table 5 continues on next page)

Intervention	Control [a]	Main model [b] (adjusted rate difference [CI, p-value])	Adjusted model [c] (adjusted rate difference [CI, p-value])

(Continued from previous page)

Data are median (IQR), unless otherwise indicated. All rates are expressed as requests per 1,000 patient consultations. CPD=continuing professional development. GP=general practitioner.

[a] Includes combinations that would have been included if randomised into the intervention group.

[b] Estimates were adjusted for the baseline rate of displayed pathology requests of each GP as well as remoteness and years of practice.

[c] Main model with further adjustments for GP age, gender, and baseline number of targeted pathology test combinations above the 90th percentile.

[d] Primary outcome.

[e] Includes those who received the intervention based on a specific factor.

[f] Includes those randomised in the intervention group who did not receive the specific intervention.

Table 7: Analysis of secondary outcomes for the main comparison

	Intervention	Control	Main model (adjusted rate difference [95% CI; p-value])
Iron studies (66596), Thyroid Stimulating Hormone (TSH) (66716) and Vitamin D (66833)			
N	1,469	180	··
Baseline	18·2 (13·4 to 24·4)	17·6 (12·5 to 25·4)	··
0-6 months	11·5 (5·2 to 18·3)	16·9 (11·4 to 25·4)	-6·7 (-7·6 to -5·8; p<0·0001)
>6 months to 12 months	13·5 (6·0 to 21·3)	18·3 (11·7 to 27·6)	-5·7 (-6·6 to -4·8; p<0·0001)
0-12 months	12·4 (6·1 to 19·8)	17·7 (11·5 to 27·1)	-6·1 (-7·1 to -5·2; p<0·0001)
Iron studies (66596), Vitamin D (66833) and Vitamin B12 (66838/66839)			
N	1,419	181	··
Baseline	21·4 (15·8 to 28·4)	21·4 (15·8 to 28·6)	··
0-6 months	14·5 (5·8 to 24·8)	24·0 (16·0 to 31·9)	-10·4 (-11·3 to -9·5; p<0·0001)
>6 months to 12 months	19·0 (7·8 to 31·3)	27·8 (18·3 to 38·0)	-9·8 (-10·8 to -8·8; p<0·0001)
0-12 months	16·6 (7·2 to 27·6)	25·6 (18·5 to 34·6)	-10·4 (-11·4 to -9·4; p<0·0001)
Iron studies (66596), TSH (66716) and Vitamin B12 (66838/66839)			
N	992	106	··
Baseline	4·0 (2·1 to 6·3)	3·6 (1·9 to 5·2)	··
0-6 months	2·5 (0·9 to 5·0)	3·4 (1·5 to 7·7)	-1·2 (-1·6 to -0·8; p<0·0001)
>6 months to 12 months	3·4 (1·3 to 6·8)	4·4 (2·4 to 7·7)	-1·1 (-1·6 to -0·6; p<0·0001)
0-12 months	3·0 (1·2 to 4·7)	4·2 (2·4 to 7·2)	-1·3 (-1·8 to -0·8; p<0·0001)
Iron studies (66596), Thyroid Function Tests (TFT) (66719) and Vitamin B12 (66838/66839)			
N	1,498	164	··
Baseline	3·0 (0·7 to 9·9)	3·6 (1·0 to 10·4)	··
0-6 months	2·2 (0·5 to 6·9)	2·8 (0·7 to 9·4)	-0·6 (-1·3, 0·1; p=0·095)
>6 months to 12 months	2·7 (0·6 to 8·7)	3·6 (0·7 to 10·7)	-0·6 (-1·4, 0·2; p=0·15)
0-12 months	2·7 (0·7 to 7·6)	3·4 (0·8 to 10·3)	-0·7 (-1·5, 0·1; p=0·077)

(Table 6 continues on next page)

	Intervention	Control	Main model (adjusted rate difference [95% CI; p-value])
(Continued from previous page)			
Iron studies (66596), TFT (66719) and Vitamin D (66833)			
N	1,484	198	..
Baseline	4·2 (2·7 to 6·8)	4·2 (2·6 to 6·7)	..
0-6 months	2·5 (1·0 to 4·8)	4·0 (2·0 to 6·6)	-1·4 (-1·7 to -1·1; p<0·0001)
>6 months to 12 months	2·9 (1·0 to 5·5)	4·0 (2·2 to 7·5)	-1·4 (-1·7 to -1·1; p<0·0001)
0-12 months	2·8 (1·2 to 5·0)	4·0 (2·5 to 6·8)	-1·4 (-1·7 to -1·1; p<0·0001)
TSH (66716), Vitamin D (66833) and Vitamin B12 (66838/66839)			
N	881	97	..
Baseline	6·9 (3·3 to 13·1)	7·4 (4·2-12·0)	..
0-6 months	3·4 (1·2 to 7·8)	8·1 (2·3 to 17·0)	-3·4 (-4·1 to -2·7; p<0·0001)
>6 months to 12 months	3·9 (1·2 to 9·8)	7·2 (3·6 to 15·5)	-3·2 (-3·9 to -2·4; p<0·0001)
0-12 months	3·8 (1·4 to 8·7)	8·3 (3·0 to 14·6)	-3·3 (-4·0 to -2·5; p<0·0001)
Iron studies (66596) and Vitamin D (66833)			
N	1,477	164	..
Baseline	11·7 (8·1 to 16·8)	10·8 (8·4 to 14·7)	..
0-6 months	8·1 (4·4 to 13·5)	10·6 (7·2 to 15·4)	-3·0 (-3·7 to -2·2; p<0·0001)
>6 months to 12 months	9·2 (4·6 to 14·7)	10·9 (7·2 to 16·1)	-2·3 (-3·0 to -1·6; p<0·0001)
0-12 months	8·9 (2·9 to 14·0)	10·7 (7·6 to 15·5)	-2·5 (-3·3 to -1·7; p<0·0001)
Iron studies (66596) and Vitamin B12 (66838/66839)			
N	1,425	155	..
Baseline	12·1 (8·5 to 17·7)	12·4 (8·4 to 17·0)	..
0-6 months	9·9 (5·6 to 16·0)	12·8 (9·1 to 19·3)	-3·1 (-4·0 to -2·2; p<0·0001)
>6 months to 12 months	12·4 (6·8 to 19·5)	15·7 (10·3 to 23·7)	-3·7 (-4·7 to -2·7; p<0·0001)
0-12 months	11·2 (6·5 to 17·3)	14·4 (9·7 to 21·5)	-3·4 (-4·3 to -2·5; <0·0001)

(Table 6 continues on next page)

	Intervention	Control	Main model (adjusted rate difference [95% CI; p-value])
(Continued from previous page)			
Iron studies (66596) and TFT (66719)			
N	1,153	133	..
Baseline	7·3 (4·8 to 11·2)	7·0 (4·5 to 10·1)	..
0-6 months	6·0 (3·3 to 10·0)	7·4 (4·2 to 11·1)	-1·5 (-2·3 to -0·7; p<00001)
>6 months to 12 months	7·2 (3·9 to 11·9)	8·0 (4·2 to 13·4)	-1·1 (-2·0 to -0·1; p=0·029)
0-12 months	6·8 (3·9 to 1·3)	7·9 (4·4 to 12·0)	-1·3 (-2·2 to 0·5; p=0·0031)
TSH (66716) and Vitamin D (66833)			
N	1,002	109	..
Baseline	7·3 (4·1 to 12·7)	8·1 (4·5 to 14·5)	..
0-6 months	4·7 (1·9 to 9·4)	8·0 (3·8 to 12·5)	-2·5 (-3·2 to -1·8; p<0·0001)
>6 months to 12 months	5·4 (2·2 to 11·1)	7·6 (3·6 to 15·0)	-1·6 (-2·4 to -0·7; p=0·0003)
0-12 months	5·1 (2·4 to 9·9)	7·6 (3·8 to 14·5)	-2·2 (-3·0 to -1·4; p<0·0001)
Ferritin (66593) [a]			
N	5,135	597	..
Baseline	0·2 (0·0 to 1·3)	0·1 (0·0 to 1·5)	..
0-6 months	0·3 (0·0 to 5·1)	0·0 (0·0 to 1·8)	1·1 (0·3 to 1·9; p=0·0090)
>6 months to 12 months	0·3 (0·0 to 4·8)	0·0 (0·0 to 1·9)	0·9 (0·1 to 1·7; p=0·021)
0-12 months	0·4 (0·0 to 5·2)	0·2 (0·0 to 1·8)	1·0 (0·2 to 1·9; p=0·012)
Iron studies (66596)			
N	5,135	597	..
Baseline	66·7 (47·1 to 87·8)	68·5 (48·6 to 90·6)	..
0-6 months	58·3 (33·2 to 81·2)	73·1 (49·9 to 96·7)	-15·3 (-17·7 to -12·8; p<0·0001)
>6 months to 12 months	70·6 (41·5 to 96·8)	82·6 (55·1 to 109·8)	-16·7 (-19·4 to -13·9; p<0·0001)
0-12 months	64·3 (38·1 to 88·2)	73·1 (50·8 to 96·3)	-16·0 (-18·6 to -13·4; p<0·0001)

(Table 6 continues on next page)

	Intervention	Control	Main model (adjusted rate difference [95% CI; p-value])
(Continued from previous page)			
TSH (66716)			
N	5,135	597	..
Baseline	27·0 (17·5 to 39·3)	27·9 (18·8 to 40·8)	..
0-6 months	25·5 (15·6 to 37·9)	28·1 (17·6 to 41·8)	-2·1 (-3·1 to -1·0; p<0·0001)
>6 months to 12 months	30·0 (18·4 to 44·5)	30·7 (30·0 to 47·1)	-0·8 (-2·0 to 0·4; p=0·21)
0-12 months	27·8 (17·4 to 41·0)	29·4 (19·0 to 42·8)	-1·6 (-2·7 to -0·5; p=0·0040)
TFT (66719)			
N	5,135	597	..
Baseline	16·6 (9·8 to 25·3)	16·4 (10·3 to 26·0)	..
0-6 months	15·3 (9·0 to 24·4)	17·5 (10·0 to 26·0)	-2·2 (-3·4 to -1·1; p<0·0001)
>6 months to 12 months	18·3 (10·9 to 28·5)	20·5 (12·7 to 30·4)	-2·5 (-3·8 to -1·3; p<0·0001)
0-12 months	16·7 (10·2 to 26·0)	18·8 (11·5 to 27·7)	-2·4 (-3·6 to -1·2; p<0·0001)
Vitamin D (66833)			
N	5,135	597	..
Baseline	42·7 (27·2 to 58·1)	45·0 (28·5 to 59·6)	..
0-6 months	33·7 (18·1 to 51·2)	47·4 (27·9 to 63·4)	-11·9 (-13·3 to -10·4; p<0·0001)
>6 months to 12 months	40·6 (21·5 to 60·8)	50·1 (29·1 to 71·0)	-9·9 (-11·4 to -8·2; p<0·0001)
0-12 months	37·3 (20·7 to 55·3)	48·5 (28·7 to 67·0)	-10·9 (-12·4 to -9·4; p<0·0001)
Vitamin B12 (66838/66839)			
N	5,135	597	..
Baseline	36·3 (23·1 to 50·8)	37·6 (24·8 to 52·1)	..
0-6 months	30·3 (16·6 to 47·5)	43·3 (25·2 to 58·4)	-10·0 (-11·4 to -8·6; p<0·0001)
>6 months to 12 months	39·1 (22·3 to 57·7)	48·6 (31·3 to 68·5)	-9·4 (-11·0 to -7·9; p<0·0001)
0-12 months	34·4 (19·9 to 52·4)	45·6 (28·4 to 62·8)	-9·5 (-11·0 to -8·1; p<0·0001)

(Table 6 continues on next page)

	Intervention	Control	Main model (adjusted rate difference [95% CI; p-value])
(Continued from previous page)			

Data are median (IQR), unless otherwise indicated. All rates expressed as requests per 1,000 patient consultations.

[a] Ferritin was not included in the ten combinations of pathology tests targeted by the audit and feedback but was considered a possible substitute for iron studies.

Appendix B – Text of intervention letter

Chief Medical Officer

Your reference: **«LNXXXXXX»**

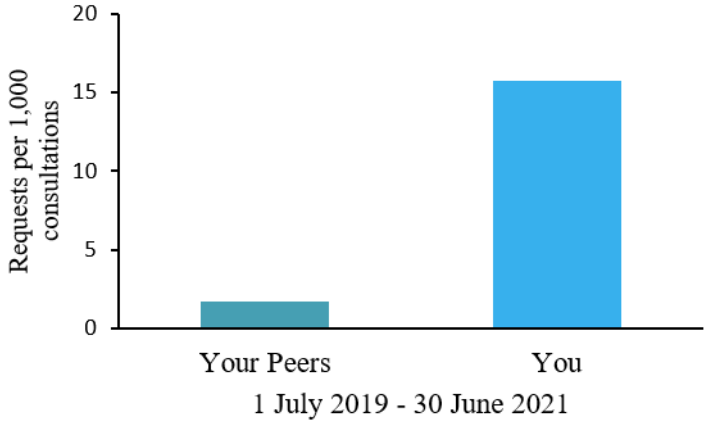
11 May 2022
«title» «firstname» «surname»
«address line 1»
«address line 2»
«suburb» «state» «postcode»

Dear «title» «surname»

Your rate of requesting of combinations of pathology tests is higher than 90% of General Practitioners (GPs) practicing in similar geographical regions in Australia

You may be aware that overuse of pathology testing has become a problem in Australia. Many requested tests have a low diagnostic value and do not result in a change to patient management. As part of the Department of Health's commitment to the best practice use of pathology requesting, I am writing to you because your requests for certain pathology test combinations are higher than 90% of GPs practicing in similar geographic regions in Australia.

We have identified combinations of pathology tests, rather than specific tests. This is because it is uncommon for a patient to require all these tests at the same time; however, you have repeatedly requested these tests in combination. Your requests for the two-year period between 1 July 2019 to 30 June 2021 are displayed in the table on page 3, while the graph below illustrates your rate of pathology requests for «highest combo» in combination.



GPs play an essential role in ensuring pathology requesting meets clinical guidelines and is limited to only those clinical situations where it has a reasonable likelihood of altering management and supports the sustainability of Medicare. This letter contains information and data to provide you with the opportunity to reflect on your pathology requesting in line with best practice guidance and make changes where appropriate.

For example, the Royal College of Pathologists of Australia (RCPA) recommends that pathology tests only be requested when:

- a patient history and physical examination have been conducted, including a review of previous pathology reports;
- if appropriate, a period of "watchful waiting" has been observed; and
- the patient's presentation indicates a specific clinical need for each individual test requested and default test combinations are avoided.[54]

There are no authoritative guidelines that recommend routine requesting of the pathology combinations noted on page 3 in patients who are well.

The benefits of reducing unnecessary pathology testing include: reducing the potential for false positive results, incidental findings, and unnecessary treatment; decreased patient expectations for future testing; reduced patient anxiety resulting from unnecessary testing; and reduced wastage of healthcare resources, funding, and time.

Resources to support you

Please visit **https://www.health.gov.au/supporting-quality-pathology** for best practice resources that may be useful for yourself and your patients. You can also access these resources by scanning the QR code on this page. These include but are not limited to:

	Resources for Medical Practitioners	**Resources for Patients**
RACGP	• Responding to patient requests for tests not considered clinically appropriate	• Appropriate Diagnostic Testing – Patient Information Sheet
RCPA	• Manual for Pathology Tests	• Pathology: The Facts (pamphlet) • Lab Tests Online (online tool)

Further guidance from RACGP and RCPA on pathology testing is provided on page 4.

We welcome your feedback

If you have any questions or feedback, including suggestions on how we can better support you, please contact my team at **pathology.requesting@health.gov.au**, or on **1800 565 778**.

Please quote your reference number located on the top right corner of page 1 of this letter when contacting my team.

Yours sincerely

Professor Paul Kelly
Chief Medical Officer
Department of Health
Your Pathology Requesting Data

[54] **https://www.rcpa.edu.au/Library/Publications/Common-Sense-Pathology**

In the two-year period from 1 July 2019 to 30 June 2021, your requests for the MBS pathology test combinations listed in the table are **higher than 90%** of GPs practicing in similar geographic regions.

Test combination	Number you requested	Request rate of your GP peers	Your request rate	Your percentile
«highest combination»	XXX	XX.X	XX.X	XX%
«second highest combination»	XXX	XX.X	XX.X	XX%
«optional: third highest combination»	XXX	XX.X	XX.X	XX%

Request rate is calculated per 1,000 consultations. Your request rate is based on XXXX consultations you conducted from 1 July 2019 to 30 June 2021. The request rate of your GP peers has been calculated using the median rate of the selected MBS item combinations by GPs

Why am I receiving pathology requesting data?

You are receiving this information because from 1 July 2019 to 30 June 2021 you requested the selected pathology combinations more often than 90% of GPs practicing in similar geographic regions in Australia (i.e., population density and remoteness similar to your primary practice address. See our resource page at **https://www.health.gov.au/supporting-quality-pathology** for more information).

We are unable to determine the clinical reason for your pathology requests from MBS data however your request rate is higher than 90% of your peers. We acknowledge that requesting rates are influenced by many factors, including special interest areas of GPs and the demography of their patients, and higher rates of requesting may reflect these factors. The information contained in the letter is provided to support you to review your requesting of these pathology test combinations in line with best practice guidance and inform improvements to your requesting if necessary.

How did you account for varying patient loads or number of days worked?

The rates in the table are calculated per 1,000 consultations to account for varying patient loads or days worked throughout the year.

Best practice guidance from RACGP and RCPA on pathology test requesting

The RACGP's position statement on appropriate test requesting:

> *"GPs should only order medical imaging and pathology tests that are clinically indicated."*

The RACGP, through Choosing Wisely Australia, recommends:

> *"Don't test thyroid function as population screening for asymptomatic patients."*

The RCPA's recommendation on Vitamin D testing:

> *"Routine screening of adults (including pregnant women), healthy infants and children for vitamin D deficiency is not currently recommended."*

The RCPA position statement on Vitamin B12, which recommends:

> *"Testing for Vitamin B12 or Folate deficiencies in patients with non-specific symptoms such as weakness and tiredness is not recommended."*

The resources page at **https://www.health.gov.au/supporting-quality-pathology** includes RACGP and RCPA guidance on supporting patients presenting with non-specific symptoms such as weakness and tiredness.

Appendix C – Cost information

Your Pathology Requesting Data

In the two-year period from 1 July 2019 to 30 June 2021, your requests for the MBS pathology test combinations listed in the table are **higher than 90%** of GPs practicing in similar geographic regions.

Test combination	Number you requested	Request rate of your GP peers	Your request rate	Your percentile	Cost per combination
«highest combination»	XXX	XX.X	XX.X	XX%	$XX.XX
«second highest combination»	XXX	XX.X	XX.X	XX%	$XX.XX
«optional: third highest combination»	XXX	XX.X	XX.X	XX%	$XX.XX

Request rate is calculated per 1,000 consultations. Your request rate is based on XXXX consultations you conducted from 1 July 2019 to 30 June 2021. The request rate of your GP peers has been calculated using the median rate of the selected MBS item combinations by GPs

An individual iron studies test costs $27.70. During the two-year period from July 2019 to June 2021, the total cost of all iron studies conducted in Australia amounted to $446 million. More information on the individual and cumulative costs of pathology testing can be found at **https://www.health.gov.au/supporting-quality-pathology**

Appendix D – Invitation to CPD

Gain Continuing Professional Development (CPD) Points

The Department of Health invites you to attend a CPD-accredited webinar on improving the quality of pathology requesting scheduled for **6 June 2022 7-8pm** (Australian Eastern Standard Time). This webinar is worth **2 CPD points** and has been initiated and funded by the Department of Health. Please register at the website:

https://tinyurl.com/2ssnb67s

or

the QR code

By attending the webinar, you will also be provided with a guide to completing a self-directed review of your pathology requesting. This activity will involve a quality improvement process to:

- identify best practice guidelines;
- collect and analyse data; and
- identify and implement changes/improvement in your pathology requesting.

Completion of this additional Plan Do Study Act activity will allow you to submit a self-directed CPDAA worth **40 points.**

Appendix E – Bibliography

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