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Key performance indicators for the National Bowel Cancer Screening Program

Technical report

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Acknowledgments

Abbreviations

ABS	Australian Bureau of Statistics
ACD	Australian Cancer Database
AIHW	Australian Institute of Health and Welfare
AHMAC	Australian Health Ministers' Advisory Council
ARIA	Accessibility/Remoteness Index for Australia
ASGS	Australian Statistical Geography Standard
BS Aus	BreastScreen Australia
CCPHPC	Community Care and Population Health Principal Committee
CRC	Colorectal Cancer
DCIS	Ductal carcinoma in situ
EC	European Commission
FOBT	Faecal occult blood test
GP	General practitioner
ICD-10	International Statistical Classification of Diseases and Related Health Problems 10th Revision
ICRCSN	International Colorectal Cancer Screening Network
IRSD	ABS Index of Relative Socioeconomic Disadvantage
METeOR	Metadata online registry
NBCSP	National Bowel Cancer Screening Program
NCSP	National Cervical Screening Program
NHPC	National Health Performance Committee
NZ	New Zealand
PBSF	Population Based Screening Framework
PI	Performance indicator
UK	United Kingdom
WHO	World Health Organisation

Summary

Cancer contributes significantly to the burden of illness in the Australian community. Bowel cancer is one of the most significant cancer types in terms of incidence and mortality. In 2010, 14,860 people were diagnosed with bowel cancer and in 2011 there were 3,999 deaths from the disease. Screening for bowel cancer is available in Australia through the National Bowel Cancer Screening Program (NBCSP), which aims to reduce the incidence, illness and mortality related to bowel cancer through screening to detect cancers and pre-cancerous lesions in their early stages, when treatment is most successful.

Reporting statistics about the NBCSP in a standardised way is vital to ensure that governments, researchers and health workers have access to relevant and reliable statistics about the performance of the program over time. This report describes the National Bowel Cancer Screening Program Performance Indicator Set (NBCSP PIs) and is a reference tool for anyone who wishes to understand, measure and report the progress of bowel cancer screening in Australia.

The indicators were developed by the National Bowel Cancer Screening Program Report and Indicator Working Group (the working group) and have been endorsed by the Standing Committee on Screening, the Community Care and Population Health Principal Committee, the National Health Information Standards and Statistics Committee and the National Health Information and Performance Principal Committee. The indicators are consistent with the five Australian Population Based Screening Framework (PBSF) steps of recruitment, screening, assessment, diagnosis and outcomes.

This report outlines both the development process and the technical specification for the 11 agreed indicators that are part of the NBCSP PIs. This report also identifies data sources and any future data development.

Table S.1: NBCSP performance indicators

PBSF step	PBSF aim	NBCSP performance indicator
Recruitment	Targeted population encouraged to participate in screening	01—Participation rate
Screening	Targeted population who participate in screening	02—Screening positivity rate
Assessment	Screened population who require further assessment	03—Diagnostic assessment rate
		04—Time between positive screen and diagnostic assessment
Diagnosis	Assessed participants diagnosed with the condition	05a—Adenoma detection rate
		05b—The positive predictive value of diagnostic assessment for detecting adenoma
		06a—Colorectal cancer detection rate
		06b—The positive predictive value of diagnostic assessment for detecting colorectal cancer
		07—Interval cancer rate
		08—Cancer clinic-pathological stage distribution
Outcomes	Reduced morbidity and mortality from the condition	09—Adverse events—hospital admission
		10—Incidence of colorectal cancer
		11—Mortality from colorectal cancer

1   Introduction

The NBCSP aims to reduce the morbidity and mortality from bowel cancer by actively recruiting and screening the target population for early detection or prevention of the disease. This report describes the key performance indicators for the National Bowel Cancer Screening Program (NBCSP) and is designed to be used as a reference tool by anyone who wishes to report on the performance of the NBCSP in Australia.

Measuring performance through indicators

> **Box 1.1: What is an indicator?**
>
> An indicator is a statistic that can describe a situation concisely, help assess progress and performance, and act as a guide to decision making.

Indicators (see Box 1.1) are important health surveillance tools that are used to establish points of reference, monitor the health of populations, and evaluate the outcomes of treatments, health service use, interventions and health programs (AIHW 2008a).

It is important to note that, although an indicator does not provide the entire picture, it can indicate change. For example, a drop in rates of deaths from selected chronic diseases may not necessarily mean that these diseases are becoming less prevalent, but it may mean that treatments have improved or new treatments have been developed that extend the lives of those with the conditions.

More often than not, indicators are grouped within sets, and may be specific to a committee, a disease of interest, a population group or a concept to be measured. For example, the National Health Performance Committee manages a suite of indicators that are used to report on health sector performance (NHPC 2004). Similarly, the Australian Institute of Health and Welfare (AIHW) was involved in the development of the key indicators of progress for chronic disease and associated determinants (AIHW 2009), the national indicators for monitoring diabetes (AIHW 2007) and the key national indicators of children's health, development and wellbeing (AIHW 2008b).

The National Bowel Cancer Screening Program

Cancer contributes significantly to the burden of illness in the Australian community. Of the many types of cancer, bowel cancer is one of the most significant in terms of incidence and mortality. In 2010, 14,860 people were diagnosed with bowel cancer and in 2011 there were 3,999 deaths from bowel cancer—9% of all deaths from invasive cancers, and second only to lung cancer.

Screening for bowel cancer is available in Australia through the NBCSP, which aims to reduce the morbidity and mortality associated with bowel cancer (see Box 1.2 for NBCSP goals and objectives). The NBCSP, implemented in 2006, currently offers free bowel cancer screening using a faecal occult blood test kit (FOBT) to people turning 50, 55, 60 and 65 years of age. The program is scheduled to be expanded from July 2015, with phasing in of biennial screening for those aged 50 to 74 by 2020.

Box 1.2: NBCSP goal and objectives

Goal

To reduce the morbidity and mortality from bowel cancer by actively recruiting and screening the target population for early detection or prevention of the disease.

Objectives

1. To achieve participation levels that maximise the population benefit of early detection of bowel cancer in the target population.

2. To enable equitable access to the program for men and women in the target population, irrespective of their geographic, socioeconomic, disability or cultural background, to achieve patterns of participation that mirror the general population.

3. To facilitate the provision of timely, appropriate, high quality and safe diagnostic assessment services for program participants.

4. To maximise the benefits and minimise harm to individuals participating in the program.

5. To ensure the program is cost effective and maintains high standards of program management and accountability.

6. To collect and analyse data to monitor participant outcomes and evaluate program effectiveness.

Source: National Bowel Cancer Screening Program Policy Framework Phase Three, July 2013-June 2017. Endorsed by the Community Care and Population Health Principal Committee 30 May 2013.

The FOBT screening kit, mailed to invitees when they reach a target age, enables participants to take two separate screening samples, which are then mailed to the program's pathology laboratory for testing. The pathologist classifies an FOBT as positive if blood is detected in a sample, because the presence of blood generally indicates a potential bowel abnormality, including cancer and pre-cancerous changes, which requires further investigation. Participants who have a positive FOBT test are recommended to have a colonoscopy to identify the source of the bleeding. Data on invitations sent, and invitees' progression through the screening pathway, are recorded in a central NBCSP register.

To allow optimal performance monitoring and evaluation of programs such as the NBCSP, it is vital that governments, researchers and health workers have access to up-to-date, standardised and relevant program statistics. These are used to develop a baseline of evidence and subsequently enable the monitoring of change in the screening environment for the population as a whole, and in population subgroups.

Development of NBCSP performance indicators

The NBCSP data items and measures agreed by the Implementation Advisory Group in 2006 for phase one (2006–2008) have been used as the basis for the AIHW's NBCSP monitoring reports since 2006; however, these were never formalised. The NBCSP phase two review (2011) recommended that key performance indicators be developed to enhance program monitoring and transparency. The Department of Health contracted the AIHW under its policy renewal process to develop formal performance indicators that were consistent with the *Population Based Screening Framework* (AHMAC 2008).

The NBCSP performance indicator development process was undertaken by the working group (See list of members in Appendix D).

Initial review

As a first step, the working group reviewed a number of existing frameworks and performance indicators, including:

- the *National Health Performance Framework* (NHPC 2009)
- the *Population Based Screening Framework* (AHMAC 2008)
- indicators used for existing Australian cancer screening programs
- the report on the development of a NBCSP Quality Framework (DLA Phillip Fox 2010)
- the *Improving Colonoscopy Services in Australia* report from the NBCSP Quality Working Group (NBCSP-QWG 2009)
- international colorectal cancer screening indicator sets, after contextualising to the Australian environment.

Defining the scope and purpose

Following a review of existing frameworks and performance indicators, the working group defined that the NBCSP performance indicators would:

- be used by the Department of Health to inform on NBCSP performance and to assist future program planning and policy
- be consistent with the *Population Based Screening Framework* (see Box 1.3)
- incorporate flexibility to allow for future changes to the program
- be designed, where possible, to allow comparison with other international performance indicators
- not include an indicator on the cost-effectiveness of the program, or the consumer experience
- not include continuous quality improvement steps or measures
- not include targets (for example, a target participation rate).

Box 1.3: The Australian Population Based Screening Framework stages

Recruitment: Targeted population encouraged to participate in screening

Screening: Targeted population who participate in screening

Assessment: Screened population who require further assessment

Diagnosis: Assessed participants diagnosed with the condition

Outcomes: Reduced morbidity and mortality from the condition

Source: AHMAC 2008.

Literature review

The working group conducted a literature review to identify international colorectal cancer screening initiatives. A list of 53 colorectal cancer screening indicator sources were examined, including indicator sets from the International Colorectal Cancer Screening Network (ICRCSN), the European Commission, the United Kingdom, Scotland, Canada, Italy, Wales, New Zealand, France and Finland. Performance indicators for Australia's

National Cervical Screening Program and BreastScreen Australia and the *Improving Colonoscopy Services in Australia* (NBCSP-QWG 2009) report were also reviewed.

The review identified that the ICRCSN would like to create a set of internationally comparable performance indicators for colorectal cancer screening. The working group agreed to use the ICRCSN's suggested colorectal cancer screening indicators as a starting point for indicator development, and that the NBCSP indicators should be aligned, where possible, with those used by other countries (Benson et al. 2012; European Commission et al. 2010; Scottish Bowel Screening Programme 2012; Department of Health 2005; Blanks & Moss 2012; Zorzi et al. 2007; Bowel Screening Wales 2011; Goulard et al. 2008; Moss et al. 2012; Malila et al. 2011).

Reviewing existing performance indicators

The existing Australian and international indicator sets were reviewed to identify a list of potentially suitable performance indicators, given the Australian context. About 60 performance indicators were regarded as potentially suitable for inclusion. The review involved describing each indicator's attributes, investigating which international colorectal cancer screening initiatives used the indicator and assessing (where possible) how the indicator was performing where it was used. Each proposed indicator was considered based on its appropriateness for the Australian context, usability, collectability and duplication. See Appendix B for the full list of the indicators considered for the NBCSP performance indicator set. From this list, the working group developed 11 indicators that would be appropriate for measuring the performance of the NBCSP at the national level.

Consultation and endorsement

The proposed performance indicators were reviewed by the NBCSP Program Delivery Advisory Group and Clinical Advisory Group. They were then endorsed by the Standing Committee on Screening (SCoS) in 2013 and the Community Care and Population Health Principal Committee (CCPHPC) under the auspice of the Australian Health Ministers' Advisory Council (AHMAC) in 2014.

After endorsement of the performance indicators by the CCPHPC, they—along with the required data elements to create and analyse the indicators—were published on the Metadata Online Registry (METeOR). METeOR is Australia's online repository for national metadata standards for health, housing and community services statistics and information. The METeOR items were further endorsed by both the National Health Information Standards and Statistics Committee and the National Health Information and Performance Principal Committee in 2014—steps outlined in *Creating nationally-consistent health information: engaging with the national health information committees* (AIHW 2010).

Data limitations

The NBCSP indicators aim to provide a comprehensive picture of the performance of the NBCSP in Australia, and were designed with the future in mind. Some indicators are aspirational, in that there was either a lack of national data or a lack of completeness of data at the time of their creation. For some indicators, further maturity of the NBCSP, such as the phasing in of biennial screening, will assist with the completeness of data.

Indicators with available data, which could be improved with additional data:

- *Indicator 05a (adenoma detection rate) and 05b (the positive predictive value of diagnostic assessment for detecting adenoma)* could be improved by an increase in the proportion of forms returned for those undergoing diagnostic assessment. Further, adenoma information could be collected by jurisdictional cancer registries (for example, bowel cancer behaviours of 'benign' or 'in situ'), and this could potentially be used to confirm, or enhance, diagnostic assessment form data.

- *Indicator 06a (colorectal cancer detection rate) and Indicator 06b (the positive predictive value of diagnostic assessment for detecting colorectal cancer)* could be improved by an increase in the proportion of forms returned for those undergoing diagnostic assessment. Further, data availability could be improved by linking NBCSP records to the Australian Cancer Database (ACD). At present, the currency of ACD reporting data is generally behind the NBCSP reporting period and therefore reporting using ACD data, if possible, would affect the NBCSP period being reported.

- *Indicator 07 (interval cancer rate)* requires linkage of NBCSP records to the ACD. However, at present the ACD reporting period is generally behind the NBCSP reporting period and therefore the NBCSP interval cancer rate time period reported is affected by the currency of the ACD data.

- *Indicator 09 (adverse events – hospital admission)* may require linkage with hospital data. The NBCSP Register as a data source for adverse events has limitations, but it could be used until a more complete data source becomes available.

Indicators with no available data that require data development:

- *Indicator 08 (cancer clinico-pathological stage distribution)* requires linkage with either the jurisdictional cancer registries or the ACD. However, not all cancer registries currently record bowel cancer staging data. Where stage is recorded, not all jurisdictions have complete data and staging systems vary.

2 Indicators

Overview of the performance indicators

The NBCSP PI set comprises the 11 endorsed indicators used for monitoring the NBCSP (Table 2.1). They may also be of interest to a wider range of health and health-related professionals who collect and/or use the data in relation to the NBCSP.

The NBCSP PIs provide concise, unambiguous definitions for items related to NBCSP reporting.

Table 2.1: NBCSP performance indicators

PBSF step[a]	No.	Program performance indicator	Related NBCSP objectives[b]
Recruitment	01	Participation rate	O2, O5, O6
Screening	02	Screening positivity rate	O1, O4, O5
Assessment	03	Diagnostic assessment rate	O2, O3, O4
Assessment	04	Time between positive screen and diagnostic assessment	O2, O3, O4
Diagnosis	05a	Adenoma detection rate	O1, O4
Diagnosis	05b	The positive predictive value of diagnostic assessment for detecting adenoma	O1, O4
Diagnosis	06a	Colorectal cancer detection rate	O1, O4
Diagnosis	06b	The positive predictive value of diagnostic assessment for detecting colorectal cancer	O1, O4
Diagnosis	07	Interval cancer rate	O1, O4
Diagnosis	08[c]	Cancer clinic-pathological stage distribution	O1, O4
Outcomes	09[c]	Adverse events—hospital admission	O3, O4
Outcomes	10[d]	Incidence of colorectal cancer	O6
Outcomes	11[d]	Mortality from colorectal cancer	O6

(a)   The Australian Population Based Screening Framework stages. See Box 1.3 for more information.
(b)   See Box 1.2 for more information.
(c)   Indicators 8 and 9 are aspirational performance indicators (performance indicators where data are not currently available; however, when data becomes available, they would be reported).
(d)   Indicators 10 and 11 are contextual performance indicators (performance indicators not specific to the NBCSP, but provide context on the burden of bowel cancer in Australia, which may be related to bowel screening activity and outcomes).

The NBCSP performance indicators are summarised in the following section; however, they can also be viewed on METeOR:
<http://meteor.aihw.gov.au/content/index.phtml/itemId/533361>.

The corresponding NBCSP data set specifications for the performance indicators can be viewed on METeOR: <http://meteor.aihw.gov.au/content/index.phtml/itemId/529201>.

PI 01—Participation rate

Table 2.2: PI 01—Participation rate

Indicator details	
Description	The percentage of people invited to screen through the NBCSP in a 24-month period who returned a completed screening test within the defined 24-month period or the following 6 months.
Rationale	The participation rate is a key indicator that measures the proportion of those invited who participate in the program. Without participation, the NBCSP cannot achieve earlier detection. The program should therefore monitor participation to ensure acceptability, equity and uptake, with the aim that reductions in incidence, morbidity and mortality can be achieved.
	Participation is the number of people screened, not the number of tests completed and is divided by the number of people invited.
	National Health and Medical Research Council guidelines recommend a two-yearly screening interval for colorectal cancer screening in Australia (ACN 2005), and a rollout for this is currently underway. Accordingly, this participation indicator counts participation activity over a 24-month period and uses a 6-month follow-up period to ensure those invited have had time to respond.
	Although it would be ideal to adjust for people who do not screen because they participate in other forms of screening or surveillance, this is not currently possible due to restrictions in the data available. However, people who opt off or suspend from the program without completing the test will not be counted.
Computation	100 x (numerator ÷ denominator)
Numerator	The number of people invited to screen through the NBCSP in a 24-month period who returned a completed screening test within the defined 24-month period or the following 6 months.
Denominator	The number of people invited in a defined 24-month period, excluding those who either opted off or suspended without completing a screening test.
Disaggregation	Items will be presented by sex and age group, by: • state and territory • socioeconomic status • remoteness area • Indigenous status • main language spoken at home • disability status • disease screening invitation round • screening test type. Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program Frequency: 6-monthly (register snapshot) Data custodian: Medicare Australia
Comments:	Disease screening invitation rounds are classified as 'first', 'second' or 'third and subsequent'. Screening test type could include FOBT or other future screening tests, as data becomes available. See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 02—Screening positivity rate

Table 2.3: PI 02—Screening positivity rate

Indicator details	
Description	The percentage of people who returned a valid NBCSP screening test and received a positive screening result (warranting further assessment) in a defined 12-month period.
Rationale	The positive screening test rate determines the diagnostic assessment workload and lesion detection rate. It is important that the accepted positivity range is reviewed, revised if necessary, and defensible.
	Monitoring this is useful for program planning and quality assurance. Further, monitoring the positivity rate by various stratifications may reveal emerging positive or negative trends that need to be investigated, and rectified if necessary.
	As a measure of program performance, the screening positivity is presented for a defined 12-month period. To ensure the latest screening results are being monitored, this indicator counts all tests analysed in the defined period, not tests from those invited in the defined period; therefore, the cohort monitored is different from that in the participation indicator.
Computation	100 x (numerator ÷ denominator)
Numerator	The number of people who returned a valid NBCSP screening test and received a positive screening result in a defined 12-month period.
Denominator	The number of people who retuned a valid screening test for analysis in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by: - state and territory - socioeconomic status - remoteness area - Indigenous status - main language spoken at home - disability status - disease screening round - screening test type. Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
Comments:	A valid screening test is one that was able to be analysed to return either a positive or negative result. Inconclusive screening tests are not included.
	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Screening test type could include FOBT or other future screening tests, as data becomes available.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 03—Diagnostic assessment rate

Table 2.4: PI 03—Diagnostic assessment rate

Indicator details	
Description	The percentage of people who returned a positive NBCSP screening test in a 12-month period, and had a follow-up diagnostic assessment, measured 12 months after the defined period.
Rationale	The appropriate movement of people from participation to diagnostic assessment is a key indicator of the efficiency and the impact of the program in reducing morbidity and mortality from colorectal cancer.
	While not all participants with a positive screen will necessarily undergo assessment, according to the *Population Based Screening Framework* (AHMAC 2008), systems should be in place to ensure timely follow-up to diagnostic assessment for individuals with a positive screening test.
	Assessment services should be managed in a way that provides equity of access to the relevant assessment services regardless of geographic location, ethnicity or socioeconomic status. Annual monitoring of the diagnostic assessment rate by various stratifications may reveal emerging positive or negative trends that need to be investigated and rectified if necessary.
	To reduce the effect of any time lag between invitation, positive screen and diagnostic assessment, this indicator includes all those with a positive screen in the defined period, not all those invited in the defined period.
Computation	100 x (numerator ÷ denominator)
Numerator	The number of people who received a positive NBCSP screen in a defined 12-month period and had a follow-up diagnostic assessment within the defined period or the following 12 months.
Denominator	The number of people who received a positive screen in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by: • state and territory • socioeconomic status • remoteness area • Indigenous status • main language spoken at home • disability status • diagnostic assessment type • patient hospital election status (public or private). Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program Frequency: 6-monthly (register snapshot) Data custodian: Medicare Australia
Comments:	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available. See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 04—Time between positive screen and diagnostic assessment

Table 2.5: PI 04 — Time between positive screen and diagnostic assessment

Indicator details	
Description	For those who received a positive NBCSP screening test (warranting further assessment) in a defined 12-month period, the time interval between the positive screening test and a follow-up diagnostic assessment, measured as median, 90th percentile, and participant diagnostic assessments within certain time cut offs, measured 12 months after the defined period.
Rationale	Waiting for a definitive diagnosis following a positive screen can create anxiety.
	There are various steps, participant decisions and wait times in the pathway between a positive screen and a diagnostic assessment. Therefore, this indicator should not be considered a hospital wait time indicator. However, after a positive screen, further diagnostic evaluation should occur in a timely fashion as there is a defined risk of colorectal cancer in those with a positive screening test—and any harms (such as anxiety) from a positive screen should be minimised.
Numerator	All NBCSP participants who received a positive screen in a defined 12-month period who underwent diagnostic assessment within 12 months of the defined period.
	For all people who underwent a diagnostic assessment after a positive screen in a 12-month period (as measured 12 months after the period to be reported):
	• The median and 90th percentile value (in days) between the date the positive screen result was sent to the participant and the subsequent diagnostic assessment date
	• The number of participants for whom the time between the date of the positive screen result and diagnostic assessment was less than or equal to 30 days, less than or equal to 60 days, less than or equal to 90 days, less than or equal to 180 days, less than or equal to 360 days or greater than 360 days.
Disaggregation	Items will be presented by sex and age group, by:
	• state and territory
	• socioeconomic status
	• remoteness area
	• Indigenous status
	• main language spoken at home
	• disability status
	• disease screening round
	• diagnostic assessment type
	• patient hospital election status (public or private).
	Some disaggregations may result in numbers too small for publication.
Unit of measure	Time (e.g. days, hours)
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
Comments:	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 05a—Adenoma detection rate

Table 2.6: PI 05a — Adenoma detection rate

Indicator details	
Description	The proportion of people who returned a valid NBCSP screening test in a defined 12-month period who were diagnosed with an adenoma within the defined period or the following 12 months.
Rationale	Adenomas are benign growths that have the potential to become cancerous, and their removal is likely to lower the risk of future colorectal cancer. Therefore, the adenoma detection rate (particularly the detection of advanced adenomas) is one measure of the effectiveness of the program.
	This indicator is defined to calculate the proportion of people who screened and had an adenoma detected, not the number of adenomas found per 100 diagnostic assessments. Therefore, it should not be used as a measure of the quality of diagnostic assessment.
	To reduce the effect of any time lag between invitation, positive screen, diagnostic assessment and histopathology, this indicator includes all those who screened in the defined period, not all those invited in the defined period (who had a positive screen).
Computation	10,000 x (numerator ÷ denominator)
Numerator	The number of people who returned a valid NBCSP screening test in a defined 12-month period who were diagnosed with an adenoma within the defined period or the following 12 months.
Denominator	The number of people who returned a valid screening test for analysis in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by:
	• state and territory • socioeconomic status • remoteness area • Indigenous status • main language spoken at home • disability status • disease screening round • screening test type • diagnostic assessment type • patient hospital election status (public or private) • colorectal polyp(s) type.
	Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
Comments:	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Screening test type could include FOBT or other future screening tests, as data becomes available.
	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available.
	Colorectal polyp(s) type includes advanced adenoma and non-advanced adenoma.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 05b—Positive predictive value of diagnostic assessment for detecting adenoma

Table 2.7: PI 05b—Positive predictive value of diagnostic assessment for detecting adenoma

Indicator details	
Description	The percentage of people who returned a positive NBCSP screening test (warranting further assessment) that underwent a diagnostic assessment and were diagnosed with an adenoma, measured 12 months after the defined period.
Rationale	The NBCSP aims to maximise the early detection of colorectal cancer in the target population. Adenomas are benign growths that have the potential to become cancerous, and their removal is likely to lower the risk of future colorectal cancer in these patients.
	This indicator calculates the positive predictive value of follow-up assessment for detecting adenomas. This is a measure of the quality and effectiveness of diagnostic assessment for detecting serious colorectal abnormality.
	Monitoring the positive predictive value of diagnostic assessment for detecting adenoma by various stratifications may also reveal emerging positive or negative trends that need to be investigated and rectified if necessary.
	To reduce the effect of any time lag between invitation, positive screen, diagnostic assessment and histopathology, this indicator includes all those who underwent diagnostic assessment in the defined period, not all those invited in the defined period (who had undergone diagnostic assessment).
Computation	100 x (numerator ÷ denominator)
Numerator	The number of people who returned a positive NBCSP screening test that underwent a diagnostic assessment and were diagnosed with an adenoma within a defined 12-month period or the following 12 months.
Denominator	The number of people who underwent diagnostic assessment to follow up a positive screening test in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by:
	• state and territory
	• socioeconomic status
	• remoteness area
	• Indigenous status
	• main language spoken at home
	• disability status
	• disease screening round
	• diagnostic assessment type
	• patient hospital election status (public or private)
	• colorectal polyp(s) type.
	Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
Comments:	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available.
	Colorectal polyp(s) type includes advanced adenoma and non-advanced adenoma.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 06a—Colorectal cancer detection rate

Table 2.8: PI 06a—Colorectal cancer detection rate

Indicator details	
Description	The proportion of people who returned a valid NBCSP screening test in a 12-month period and were diagnosed with a screen-detected colorectal cancer, measured 12 months after the defined period.
Rationale	The NBCSP aims to maximise the early detection of colorectal cancer in the target population.
	This can be achieved by detecting cases of colorectal cancer before a person has symptoms, enabling early intervention. The cancer detection rate is a key indicator of program effectiveness, especially when comparing this rate to the known colorectal cancer incidence rate in the target population. Monitoring the cancer detection rate by various stratifications may also reveal emerging positive or negative trends that need to be investigated and rectified if necessary.
	To reduce the effect of any time lag between invitation, positive screen, diagnostic assessment and histopathology, this indicator includes all those who screened in the defined period, not all those invited in the defined period (who had a positive screen).
Computation	10,000 x (numerator ÷ denominator)
Numerator	The number of people who returned a valid NBCSP screening test in a defined 12-month period who were diagnosed with a screen-detected colorectal cancer within the defined period or the following 12 months.
Denominator	The number of people who returned a valid screening test for analysis in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by:
	• state and territory
	• socioeconomic status
	• remoteness area
	• Indigenous status
	• main language spoken at home
	• disability status
	• disease screening round
	• diagnostic assessment type
	• patient hospital election status (public or private).
	Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
Comments:	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 06b—Positive predictive value of diagnostic assessment for detecting colorectal cancer

Table 2.9: PI 06b — Positive predictive value of diagnostic assessment for detecting colorectal cancer

Indicator details	
Description	The percentage of people who returned a positive NBCSP screening test (warranting further assessment) that underwent a diagnostic assessment and were diagnosed with cancer, measured 12 months after the defined period.
Rationale	This indicator calculates the positive predictive value of follow-up assessment for detecting cancers. This is a measure of the quality and effectiveness of diagnostic assessment.
	The NBCSP aims to maximise the early detection of colorectal cancer in the target population.
	This can be achieved by detecting cases of colorectal cancer before a person has symptoms, enabling early intervention.
	Monitoring the cancer detection rate by various stratifications may also reveal emerging positive or negative trends that need to be investigated and rectified if necessary.
	To reduce the effect of any time lag between invitation, positive screen, diagnostic assessment and histopathology, this indicator includes all those who underwent diagnostic assessment in the defined period, not all those invited in the defined period (who had undergone diagnostic assessment).
Computation	100 x (numerator ÷ denominator)
Numerator	The number of people who returned a positive NBCSP screening test that had a diagnostic assessment and were diagnosed with screen-detected cancer in a defined 12-month period or the following 12 months.
Denominator	The number of people who underwent diagnostic assessment to follow up a positive screening test in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by: • state and territory • socioeconomic status • remoteness area • Indigenous status • main language spoken at home • disability status • disease screening round • diagnostic assessment type • patient hospital election status (public or private). Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
Comments:	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 07—Interval cancer rate

Table 2.10: PI 07 — Interval cancer rate

Indicator details	
Description	The proportion of people who returned a NBCSP screening test in a defined 12-month period who were diagnosed with colorectal cancer (not involving a positive NBCSP screen and positive assessment) in the following 24-month period, or before their next screen, whichever comes first.
Rationale	An interval cancer is a colorectal cancer that is diagnosed after a screen that detected no cancer and before the next screen or in the following 24 months, whichever is earlier. Interval cancers are inevitable in a population based screening program; a low interval cancer rate is desirable.
	A high interval cancer rate reduces the potential for the program to achieve reductions in morbidity and mortality from colorectal cancer. Monitoring interval cancer rates is also important to assess the diagnostic assessment component of the screening pathway.
	Monitoring the interval cancer rate by various stratifications may also reveal emerging positive or negative trends that need to be investigated and rectified if necessary.
Computation	10,000 x (numerator ÷ denominator)
Numerator	The number of people who returned an NBCSP screening test in a defined 12-month period who were diagnosed with colorectal cancer in the following 24 months (or before their next screen), after negative or inconclusive screen(s), or a positive screen and negative assessment(s).
Denominator	The number of people who returned a negative screening test or a positive screening test with a negative diagnostic assessment in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by:
	• state and territory
	• socioeconomic status
	• remoteness area
	• Indigenous status
	• main language spoken at home
	• disability status
	• disease screening round
	• screening test type
	• screening test result and colorectal polyp(s) found indicator.
	Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
Comments:	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Screening test type could include FOBT or other future screening tests, as data becomes available.
	Screening test result and colorectal polyp(s) found is disaggregated by negative screen, or positive screen result and negative diagnostic assessment screening outcomes.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 08—Cancer clinico-pathological stage distribution

Table 2.11: PI 08—Cancer clinico-pathological stage distribution

Indicator details	
Description	The percentage of people who had received a NBCSP invite and were later diagnosed with colorectal cancer in a defined 12-month period, by clinico-pathological stage.
Rationale	A key goal of the NBCSP is to detect colorectal cancers at an earlier clinico-pathological stage than would otherwise have been detected if there was no organised colorectal screening program in Australia.
	Detecting cancer at an earlier clinico-pathological stage is associated with improved patient prognosis (Morris et al. 2007).
Computation	100 x (numerator ÷ denominator)
Numerator	The number of people who had received an NBCSP invitation, and were later diagnosed with colorectal cancer in a defined 12-month period, by clinico-pathological stage (either Stage I, Stage II, Stage III, Stage IV, Stage unknown or Inadequately staged).
Denominator	The number of people who were diagnosed with colorectal cancer in the defined 12-month period that had received a NBCSP invitation.
Disaggregation	Items will be presented by sex and age group, by: - state and territory - socioeconomic status - remoteness area - Indigenous status - main language spoken at home - disability status - disease screening round (for those who screened) - screening test type - diagnostic assessment type - screen-detected/Interval/did not screen. Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
	Additional clinico-pathological stage data required. See Data limitations.
Comments:	Disease screening rounds are classified as 'first screen' or 'subsequent screens', where subsequent is disaggregated into greater than 2 years and less than or equal to 2 years after previous screen.
	Screening test type could include FOBT or other future screening tests, as data becomes available.
	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available.
	Screen-detected refers to cancers diagnosed after a positive screen. Interval-detected cancers refer to cancer diagnosed after a negative screen. Did not screen refers to cancers diagnosed in those who did not screen (within 2 years) after their last invitation.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 09—Adverse events (hospital admission rate)

Table 2.12: PI 09 — Adverse events (hospital admission rate)

Indicator details	
Description	The rate at which people who had a diagnostic assessment in a defined 12-month period were admitted to hospital within 30 days of the assessment, measured 6 months after the defined period.
Rationale	As with any invasive procedure, there is the risk of an adverse event occurring with a colonoscopy or other diagnostic assessment.
	Maximising benefit and minimising harm is an important tenet of population screening. Accordingly, it is important to report the known harms from screening when monitoring the performance of the program. Further, many international colorectal screening programs report this indicator, which would bring Australian monitoring in line with International programs and allow comparisons to be computed if required.
	To operationalise the monitoring of adverse events, the rate at which people who had a diagnostic assessment in a 12-month period were admitted to hospital within 30 days of that procedure should be monitored.
	To reduce the effect of any time lag between invitation, positive screen, and diagnostic assessment (with adverse event), this indicator includes all those who had a diagnostic assessment in the defined period, not all those invited in the defined period (who had a diagnostic assessment).
Computation	10,000 x (numerator ÷ denominator)
Numerator	The number of people who returned a positive NBCSP screening test and had a diagnostic assessment in a defined 12-month period who were admitted to hospital in the next 30 days.
Denominator	The number of people who returned a positive NBCSP screening test and had a diagnostic assessment in the defined 12-month period.
Disaggregation	Items will be presented by sex and age group, by:
	• state and territory
	• socioeconomic status
	• remoteness area
	• Indigenous status
	• main language spoken at home
	• disability status
	• diagnostic assessment type
	• patient hospital election status (public or private).
	Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	National Bowel Cancer Screening Program
	Frequency: 6-monthly (register snapshot)
	Data custodian: Medicare Australia
	Additional source of hospital admission data may be required. See Data limitations.
Comments:	Diagnostic assessment type could include colonoscopy, CT colonography or other appropriate investigation, as data becomes available.
	See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 10—Colorectal cancer incidence rate

Table 2.13: PI 10—Colorectal cancer incidence rate

Indicator details	
Description	The incidence rate of colorectal cancer per 100,000 estimated resident population in a 12-month period.
Rationale	Incidence data provide contextual information about the number of new cases of colorectal cancer in the population which can inform National Bowel Cancer Screening Program (NBCSP) planning.
Computation	100,000 x (numerator ÷ denominator)
Numerator	The number of new cases of colorectal cancer in a 12-month period.
Denominator	Australian estimated resident population.
Disaggregation	Items will be presented by sex and age group, by: • state and territory • socioeconomic status • remoteness area • Indigenous status. Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	Australian Cancer Database Frequency: Annual Data custodian: Australian Institute of Health and Welfare ABS Estimated resident population (total population) Frequency: Quarterly Data custodian: Australian Bureau of Statistics ABS Indigenous experimental estimates and projections (2001 Census-based) Frequency: Periodic Data custodian: Australian Bureau of Statistics
Comments:	Primary, malignant ICD-10 topology codes C18–C20 are used to define colorectal cancer. See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

PI 11—Colorectal cancer mortality rate

Table 2.14: PI 11—Colorectal cancer mortality rate

Indicator details	
Description	The mortality of colorectal cancer per 100,000 estimated resident population in a 12-month period.
Rationale	Mortality data provide contextual information about trends in the level of colorectal cancer mortality in the population which can inform the National Bowel Cancer Screening Program (NBCSP) planning.
Computation	100,000 x (numerator ÷ denominator)
Numerator	The number of deaths of colorectal cancer in a defined 12-month period.
Denominator	Australian estimated resident population.
Disaggregation	Items will be presented by sex and age group, by: - state and territory - socioeconomic status - remoteness area - Indigenous status Some disaggregations may result in numbers too small for publication.
Unit of measure	Person
Data source	AIHW National Mortality Database Frequency: Annual Data custodian: Australian Institute of Health and Welfare ABS Estimated resident population (total population) Frequency: Quarterly Data custodian: Australian Bureau of Statistics ABS Indigenous experimental estimates and projections (2001 Census-based) Frequency: Periodic Data custodian: Australian Bureau of Statistics
Comments:	Primary, malignant ICD-10 topology codes of C18–C20 are used to define colorectal cancer. See Appendix C for information on how disaggregations, such as remoteness area, socioeconomic status, Indigenous status, preferred correspondence language and disability status, are computed.

Source: METeOR.

Appendix A: National Health Performance Committee indicator guidelines

National Health Performance Committee indicator guidelines (NHPC 2004) state that indicators, when used at a program level to whole of system level, should have all or some of the following qualities:

- Be worth measuring: The indicators represent an important and salient aspect of the public's health or the performance of the health system.
- Be measurable for diverse populations: The indicators are valid and reliable for the general population and diverse populations (that is, Aboriginal and Torres Strait Islander populations, sex, rural/urban and socioeconomic status).
- Be understood by people who need to act: People who need to act on their own behalf or that of others should be able to readily comprehend the indicators and what can be done to improve health.
- Galvanise action: The indicators are of such a nature that action can be taken at the national, state, local or community level by individuals, organised groups and public and private agencies.
- Be relevant to policy and practice: Actions that can lead to improvement are anticipated and feasible—they are plausible actions that can alter the course of an indicator when widely applied.
- Reflect results of actions when measured over time: If action is taken, tangible results will be seen indicating improvements in various aspects of the nation's health.
- Be feasible to collect and report: The information required for the indicator can be obtained at reasonable cost in relation to its value and can be collected, analysed and reported on in an appropriate time frame.
- Comply with national processes of data definitions.

Appendix B: Reviewed indicators

Table B.1 shows a list of the indicators reviewed by the working group. Whether the indicator was considered suitable for inclusion in the national performance indicator set is also shown. Other indicators with broad working group support, but which were not selected to be part of the set, are listed in Table B.2.

Table B.1: International indicators considered by the working group, grouped into screening 'themes'

Group	Indicator	Suitable	Indicator source[a]	Indicator
Participation	Number of pre-notification letters	N	NZ	–
	Coverage rate	N	ICRCSN, EC, Italy, Wales, NZ[b], Finland	–
	Participation rate	Y	ICRCSN, EC, Scotland, Canada, Italy[c], Wales, France, England, Finland, BS Aus, NCSP	P1 01
	Screening retention (rescreening rate)	N	Canada, BS Aus[d], NCSP[d]	–
	Utilisation	N	Canada	–
	Number of people ceased and suspended	N	Wales, NZ[e]	–
Screening test	FOBT inadequacy rate	N	ICRCSN, EC, Canada[f], Italy, Wales, NZ	–
	FOBT positivity rate	Y	ICRCSN, Scotland, Italy, Wales, NZ, France, England, Finland, BS Aus[g], NCSP[g]	PI 02
GP	Number and rate of people who do not contact GP	N	Wales	–
	Rate of referral to follow-up colonoscopy after positive test	N	EC	
	Pre-assessment waits/completed	N	NZ	–
	Did not attend GP at pre-assessment and colonoscopy	N	NZ	–
Colonoscopy	Diagnostic/therapeutic endoscopy rate	Y	ICRCSN, Scotland, Canada[h], Italy, Wales, France, England	PI 03
	Compliance with follow-up colonoscopy after positive screen	N	EC, UK, Wales	–
	Adherence to follow-up	N	Italy	–
	Rate of complete colonoscopies. Follow-up and screening colonoscopies to be recorded separately	N	EC, Scotland, UK, Italy, Wales	–
	Rescope procedures 3, 6,12 months	N	Wales	–
	Sedation rates	N	Wales	–
	Proportion of polipectomies not performed during the diagnostic colonoscopy	N	Italy	–

(continued)

Table B.1 (continued): International indicators considered by the working group, grouped into screening 'themes'

Group	Indicator	Suitable	Indicator source[a]	Indicator
Wait time	Wait time (from notification of positive result to colonoscopy)	Y		PI 04
	Maximum time between test and receipt of result should be 15 days	N	EC, Italy, Wales	–
	Time between invitation and laboratory receiving FOBT	N	Wales	–
	Time between participant completing test to receipt in laboratory	N	Wales	–
	Time between laboratory getting FOBT and result (laboratory turnaround)	N	Wales	–
	Time between getting result and contacting GP	N	Wales[i]	–
	Maximum time between referral after positive screening (any modality) and follow-up colonoscopy should be 31 days	N	EC, Scotland[i], Canada[j], Italy[i], Wales[j], NZ[j]	–
	Time interval between positive colonoscopy/FS and definitive management should be within 31 days	N	EC, Canada[k], Italy[k]	–
Pathology	Biopsies and lesions identified in the screening program and the subsequent resection specimen should be reported on a proforma	N	EC, Wales[l]	–
	Rate of high-grade neoplasia reported by pathologists in a FOBT screening program	N	EC	–
	Availability of polyps for pathological examination	N	UK	–
	Cytology/histology correlation	N	BS Aus	–
Outcome: Diagnosis	Cancer detection rate	Y	ICRCSN, Scotland[m], UK[m], Canada[m], Italy[m], Wales[m], NZ, France, England Finland, BS Aus, NCSP	PI 06a
	Polyp cancer detection rate	N	Scotland	–
	Percentage of polyp cancers	N	Scotland	–
	Adenoma detection rate	Y	ICRCSN, Scotland[n], UK[n], Canada, Italy[n], Wales[n], NZ, France, England, Finland, BS Aus[n]	PI 05a
	High-risk adenoma detection rate	N	Scotland	–
	Polyp detection rate	N	ICRCSN, Wales	–
	Detection rate at follow-up	N	Italy	–
	Prevalence/incidence ratio	N	Italy	–
Outcome: Staging	Percentage of people with screen detected cancers who are at each stage (1 for each stage level, including unknown)	Y	Scotland, Canada[o], Wales, France, England	PI 08
	Percentage of people with screen detected cancers that are 'Dukes' stage Not Known'	N	Scotland	–
	Percentage of people with screen detected cancers that are 'Not staged'	N	Scotland	–
	Proportion of screen-detected cancers that are stage III+ (Italian)	N	Italy	–

(continued)

Table B.1 (continued): International indicators considered by the working group, grouped into screening 'themes'

Group	Indicator	Suitable	Indicator source[a]	Indicator
Outcome: Location	Percentage of people with screen detected cancers that are malignant neoplasms of the colon (ICD-10 C18)	N	Scotland	–
	Percentage of people with screen detected cancers that are malignant neoplasms of the rectosigmoid junction (ICD-10 C19)	N	Scotland	–
	Percentage of people with screen detected cancers that are malignant neoplasms of the rectum (ICD-10 C20)	N	Scotland	–
Outcome: Interval	Interval CRC incidence	Y	Canada, Italy, Wales, France, BS Aus	PI 07
	Sensitivity, program	N	BS Aus	–
Outcome: Adverse events	Percentage of colonoscopic complications	N	Scotland, UK, Canada, Italy, Wales, NZ, England	–
	Mortality (all causes)[p]	Y	ICRCSN, Canada	PI 09
	Mortality (colonoscopy-specific)	N	ICRCSN, Canada[q], Wales	–
Outcome: Other	Bowel cancer mortality	Context		PI 11
	Bowel cancer incidence	Context		PI 10
	CRC incidence, by exposure to screening	N		–
	CRC mortality, by exposure to screening	N		–
	Non-CRC mortality, by exposure to screening	N		–

(a) See 'Sources' below for references.

(b) NZ coverage rate includes kits sent.

(c) Italy measures the inverse of participation rate; that is, measure the unreturned rate.

(d) BreastScreen Australia measures screening retention within 27months. Australian NCSP Screening retention includes 'early' rescreening and rescreening after reminder.

(e) NZ also measures the number of people who opt off.

(f) Canada excludes people who have later returned an adequate kit.

(g) BreastScreen Australia is a 'Recall to Assessment' rate. Australian NCSP is a cytology breakdown rate.

(h) Canada diagnostic endoscope rate is within 180 days of positive.

(i) Wales also measures the time between results and GP appointment.

(j) Scotland also has indicators for 'referral to pre-assessment', and 'preassessment to colonoscopy'. Canada also has median and 90th percentile times (in days) between positive laboratory result and colonoscopies, limited to 180 days maximum. Italy has from call for 'assessment' to 'assessment' procedure. Wales also measure time from invitation to colonoscopy. NZ had a 'time target'.

(k) Canada has 3 very similar indicators: 'measure time interval for pathological diagnosis', 'median' and '90th percentiles times' (in days). Italy has time between 'assessment' and assessment result. Also, between CRC diagnosis and surgery date.

(l) Wales has a number of related indicators.

(m) Scotland has a different calculation. UK uses both 'screened' and 'colonoscopies' as denominator, plus 'prevalent' and 'incident' versions. Canada has all screened, all positive screens, positive screens who had colonoscopy from follow up performed within 180 days of positive. Canada also has versions for CRC, advanced adenoma, adenoma+CRC and advanced adenoma + CRC, with rate given 'per thousand screened'. Italy has FOBT for both CRC and advanced adenoma. Wales has prevalent and incident rounds.

(n) Scotland has a different calculation. UK uses both 'screened' and 'colonoscopies' as denominator, plus Prevalent and Incident versions. Italy includes 'proximal' advanced adenoma. Wales includes both adenoma and advance adenoma. BreastScreen Australia measures DCIS detection.

(o) Canada includes those with positive FOBT and colonoscopy within 180 days.

(p) Outcome adverse event mortality (all causes) indicators was changed to adverse events 30-day hospital admission indicator.

(q) Canada: the indicator is not related to CRC interventions

Note: ICRCSN: International Colorectal Cancer Screening Network, EC: European Commission, UK: United Kingdom, NZ: New Zealand, BS Aus: BreastScreen Australia, NCSP: Australia National Cervical Screening Program.

Sources: ICRCSN: Benson et al. 2012; EC: European Commission et al. 2010; Scotland: Scottish Bowel Screening Programme 2012; UK: Department of Health 2005, Blanks & Moss 2012; Canada: Sourced by Graeme Young from National Colorectal Cancer Screening Network; Italy: Zorzi et al. 2007; Wales: Bowel Screening Wales 2011; NZ: Sourced by James St John from NZ Ministry of Health; France: Goulard et al. 2008; England: Moss et al. 2012; Finland: Malila et al. 2011; BS Aus: Department of Health and Ageing 2004; NCSP: AIHW 2011.

Table B.2: Other performance indicators with broad working group support

Group	Indicator	Suitable
Coverage/participation	Up to date with screening	N
Assessment	Clinical assessment (positive FOBT who see their GP/people with positive FOBT)	N

Appendix C: Classifications

Geographic classification

The ability to access and provide a wide range of services is influenced by the distance between clients and providers, be it for the clients to travel to the service providers or for the providers to travel to deliver services close to a person's home. The geographical location of areas is therefore an important concept in planning and analysing the provision of services.

Geographic location is classified according to the ABS Australian Statistical Geography Standard (ASGS) Remoteness Structure, which groups geographic areas into six categories. These categories, called Remoteness Areas, are based on ASGS Statistical Area level 1 units and defined using the Accessibility/Remoteness Index for Australia (ARIA). ARIA is a measure of the remoteness of a location from the services provided by large towns or cities. Accessibility is judged purely on distance to 1 of the metropolitan centres. A higher ARIA score denotes a more remote location. The 6 Remoteness Areas are listed in Table C.1; the sixth, *Migratory* area, is not used. The category *Major cities* includes Australia's capital cities, with the exceptions of Hobart and Darwin, which are currently classified as *Inner regional*. Further information is available on the ABS website.

Table C.1: Remoteness areas for the Australian Statistical Geography Standard

Region	Collection districts within region
Major cities	CDs with an average ARIA index value of 0 to 0.2
Inner regional	CDs with an average ARIA index value greater than 0.2 and less than or equal to 2.4
Outer regional	CDs with an average ARIA index value greater than 2.4 and less than or equal to 5.92
Remote	CDs with an average ARIA index value greater than 5.92 and less than or equal to 10.53
Very remote	CDs with an average ARIA index value greater than 10.53
Migratory	Areas composed of off-shore, shipping and migratory CDs

Residential address location of invitees (at the time of invitation) will be mapped to ASGS Remoteness Areas, using the most appropriate geographical unit available.

Socioeconomic classification

A person's health, and their ability to access and provide a wide range of services, is also influenced by the relative socioeconomic advantage and disadvantage of the area in which they live.

Socioeconomic classification is based on the ABS Index of Relative Socioeconomic Disadvantage (IRSD) for people living in different geographic areas. Geographic areas are assigned a score based on attributes such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations. It does not refer to the socioeconomic situation of a particular individual, but instead refers to the area in which a person lives. A low score on this index means an area has more low-income families, people with little training and high unemployment, and may be considered disadvantaged relative to other areas with higher scores. However, such an area is also likely to contain some people who are relatively advantaged. When area-level indexes are used as proxy measures of

individual level socioeconomic advantage and disadvantage, many people are likely to be misclassified. Geographic areas may be excluded where no score is determined due to low populations or high levels of non-response in the underlying census.

Residential address location of invitees (at the time of invitation) will be mapped (using a correspondence file) to the IRSD for that geographic area using the most appropriate geographical unit available. Caution should always be taken when analysing the results of data that have been converted using correspondences, and the potential limitations of the data taken into account.

Indigenous status, main language spoken at home and disability status identification

Identification of participants as Aboriginal or Torres Strait Islander, having a disability, or speaking a language other than English at home is by self-identification through return of a completed participant details form along with their completed screening test. As membership of these subgroups is only known for invitees who participate, it is not currently possible to accurately determine NBCSP participation rates (PI 01) for these subgroups.

Screening test positivity cut-off

FOBT screening test

Currently in 2014, the Magstream HemSp using New HemTube B (Fujirebio Inc, Tokyo) FOBT screening test is used as the screening tool, with the positivity value set at > 20ng/mL haemoglobin when the sample is analysed. Each participant is asked to collect 2 samples, and both samples are tested individually. If either of the 2 samples are positive, the overall result is interpreted as positive. The expected positivity range for this test is 4–10%, with positivity values outside of this range potentially requiring investigation.

Adenoma definitions

Adenoma definitions are counted on a participant level, with advanced adenomas taking precedence over non-advanced adenomas. For performance indicators that disaggregate by advanced adenoma and non-advanced adenoma, a participant with both advanced and non-advanced adenomas, would only be counted with the advanced adenoma—the lesion with the worse prognosis. Accordingly, a participant diagnosed with both an adenoma and a colorectal cancer would not be counted as having an adenoma, because the colorectal cancer would take precedence and their outcome would be recorded in the cancer-related indicators instead. Therefore, a count of all adenomas is a count of all people diagnosed with at least 1 adenoma (and without a colorectal cancer), not all adenomas found.

- Advanced adenoma: Any histopathologically confirmed adenomas that show villous change and/or high grade dysplasia and/or diameter of 10 mm or greater. Or a person with 3 or more histopathology-confirmed adenomas of any kind.
- Non-advanced adenoma: All other confirmed adenomas not considered advanced.
- All adenomas: Advanced and non-advanced adenomas combined.

Appendix D: NBCSP Report and Indicator Working Group members

For the duration of the NBCSP performance indicator development work (April 2012–current), the working group was comprised of the following members (Table D.1).

Table D.1: National Bowel Cancer Screening Program Report and Indicator Working Group members

Member	Position	
Ms Mary Crum	Senior Analyst, New South Wales Health Department	Chair[a]
Prof. James St John	Honorary Senior Associate, Cancer Council Victoria	
Prof. Graeme Young	Professor of Global Gastrointestinal Health, Flinders University	
Prof. David Hewett	Gastroenterologist, Queensland Health	
Ms Kathleen O'Connor	Project Coordinator, Bowel Cancer Screening Implementation Team, Western Australia Department of Health	
Ms Kate Jorgenson	Manager, Bowel Screening Section, Department of Health	Chair[a]
Ms Angela Brehaut	Bowel Screening Section, Department of Health	
Ms Christine Sturrock[b]	Manager, Cancer and Screening Unit, Australian Institute of Health and Welfare	
Mr David Meere	Project Manager, National Bowel Cancer Screening Program Monitoring, Australian Institute of Health and Welfare	Secretariat
Ms Melissa Goodwin[c]	Senior data analyst, Cancer and Screening Unit, Australian Institute of Health and Welfare	
Ms Theresa Negrello	Data analyst, Cancer screening, Australian Institute of Health and Welfare	Observer

(a)   Mary Crum resigned from her role on the working group on 8 November 2012. Kate Jorgenson took on the Chair role at that time.
(b)   Chris Sturrock resigned from the working group on 4 June 2012.
(c)   Melissa Goodwin resigned from the working group on 1 August 2013.

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List of tables

This report provides provide a summary of the development process and the technical specification for the 11 agreed performance indicators that are part of the National Bowel Cancer Screening Program Performance Indicator Set. This report is a reference tool for anyone who wishes to understand, measure and report the progress of bowel cancer screening in Australia.