



NBOCA

National Bowel
Cancer Audit



NATCAN

National Cancer Audit
Collaborating Centre

National Bowel Cancer Audit Quality Improvement Plan – September 2024





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Cancer Audit

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Royal College of Surgeons of England

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The Association of Coloproctology of Great Britain and Ireland (ACPGBI) is the professional body that represents colorectal surgeons, nurses, and allied health professionals who advance the knowledge and treatment of bowel diseases in Britain and Ireland.



The Association of Cancer Physicians (ACP) is the specialist society for medical oncologists in the UK. It works with and for its members to support and promote the specialty and to help improve medical care for cancer patients.



The National Cancer Audit Collaborating Centre (NATCAN) is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP). NATCAN delivers national cancer audits in non-Hodgkin lymphoma, bowel, breast (primary and metastatic), oesophago-gastric, ovarian, kidney, lung, pancreatic and prostate cancers. HQIP is led by a consortium of the Academy of Medical Royal Colleges and the Royal College of Nursing. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical, and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies. <https://www.hqip.org.uk/national-programmes>

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Executive Summary

The National Bowel Cancer Audit (NBOCA) has been commissioned to evaluate the quality of care for people diagnosed with bowel cancer in NHS hospitals across England and Wales.

It aims to help NHS organisations to benchmark their bowel cancer care against measurable standards, to identify unwarranted variation in care, and to provide tools to help services improve quality of care for people with bowel cancer.

The NBOCA Quality Improvement Plan sets out the scope, care pathway, five quality improvement goals and ten performance indicators for NBOCA. The indicators aim to better understand the determinants of variation in the treatment of people with bowel cancer and the outcomes they experience.

The Audit covers the care pathway, from diagnosis to end of life care, for people diagnosed for the first time with bowel cancer in NHS hospitals in England and Wales.

The following quality improvement goals have been identified for NBOCA:

1. Improving the diagnostic pathway
2. Improving perioperative care
3. Improving oncological care
4. Improving management of stage four disease
5. Improving end of life care

NBOCA has identified ten performance indicators, mapped to these five quality improvement goals and clinical guidelines. This Quality Improvement Plan sets out improvement methods, improvement activities and approaches to evaluation of these goals and activities.

1. Introduction

1.1 Aim and objectives of the Quality Improvement Plan

The NBOCA Quality Improvement Plan builds on the previous [Scoping Exercise](#) which set out the scope and care pathway of NBOCA and identified five key quality improvement goals. The Quality Improvement Plan aims to define ten performance indicators, and how they map to the NBOCA quality improvement goals, national guidelines, and standards. These performance indicators will be used by NBOCA to monitor progress towards its improvement goals and to stimulate improvements in bowel cancer care.

The Quality Improvement Plan describes the approach taken to develop NBOCA's quality improvement goals and performance indicators. In addition, it aims to set out the improvement methods and activities that will support implementation of the plan, including strategies for reporting and disseminating results, in addition to describing the approaches to evaluation.

The NBOCA Quality Improvement Plan was developed in consultation with key stakeholders, including people with lived experience of bowel cancer, and will be reviewed on an annual basis.

1.2 The National Cancer Audit Collaborating Centre

NBOCA is part of [the National Cancer Audit Collaborating Centre \(NATCAN\)](#) a new national centre of excellence which aims to strengthen NHS cancer services by looking at treatments and patient outcomes across England and Wales. It was set up on 1st October 2022 to deliver six new national cancer audits, including kidney, ovarian, pancreatic, breast (two separate audits in primary and metastatic disease) and non-Hodgkin Lymphoma. Existing audits in [prostate](#), [lung](#), [bowel](#), and [oesophago-gastric](#) cancers moved into NATCAN in 2023. The centre is commissioned by the Healthcare Quality Improvement Partnership (HQIP) on behalf of NHS England and the Welsh Government.

The aim of the ten NATCAN Audits is to:

1. Provide regular and timely evidence to cancer services of where patterns of care in England and Wales may vary.
2. Support NHS services to increase the consistency of access to treatments and help guide quality improvement initiatives.
3. Stimulate improvements in cancer detection, treatment and outcomes for patients, including survival rates.

Further information about NATCAN and key features of its approach to Audit can be found in the appendix.

2. Background on bowel cancer

Bowel cancer is the 4th most common cancer in the UK. Almost 43,000 people are diagnosed with bowel cancer every year in the UK. Around 268,000 people living in the UK today have been diagnosed with bowel cancer.¹

2.1 Main issues in bowel cancer care and outcomes

Through a key partnership with The Association of Coloproctology of Great Britain and Ireland (ACPGBI), NBOCA was established in 2010 as a surgical Audit reporting on short-term post-operative outcomes. It has since worked to broaden its clinical scope to better drive quality improvement. This requires an improved understanding of:

- Complex patients: heterogeneity in terms of e.g. deprivation, ethnicity, age, frailty, molecular subtypes of bowel cancer, and comorbidities.
- Complex pathways/ service structure e.g. multi-modal treatment options, patients having noncurative treatment, not all diagnosing hospitals offer all specialist services, capacity constraints.
- Cancer as a chronic disease: patients are living longer with bowel cancer requiring longer-term outcomes to be measured and quality of life becoming increasingly important.

2.2 Care pathways

Work will continue to broaden the clinical scope of the Audit, to include patients with all stages of disease, and from screening to end of life care. Work will also continue to understand the impact of patient and tumour factors and service structure on care and outcomes. Work will also continue to broaden the scope of the Audit to include a wider range of long-term outcomes. More details on plans to broaden NBOCA's clinical scope are available in the [NBOCA Scoping Document](#).

2.3 Guidelines on the management of bowel cancer

Recommendations on the delivery of high-quality care by bowel cancer services have been published by NICE in its guideline on the management of colorectal cancer² and by professional medical associations³.

¹ <https://www.bowelcanceruk.org.uk/about-bowel-cancer/bowel-cancer/>

² National Institute for Health and Care Excellence. Colorectal cancer (NICE guideline NG151). 2020. <https://www.nice.org.uk/guidance/ng151>

³ The Association of Coloproctology of Great Britain and Ireland. Guidelines for the management of cancer of the colon, rectum and anus. 2017.

2.4 Variation in care and outcomes

NBOCA has highlighted various improvements in the quality of care delivered to patients with bowel cancer, including that patients' survival following major resection has improved significantly over the last 5 years.

Areas of concern highlighted in the 2023 State of the Nation report include:

- Only 37% of providers met the quality improvement (QI) target 'more than 95% of patients seen by clinical nurse specialist'.
- 39% of patients did not have their diverting ileostomy closed within 18 months of their anterior resection, with wide institutional variation.
- Wide institutional variation in the use of adjuvant chemotherapy for stage 3 colon cancer.
- 22% of patients experience severe acute toxicity following adjuvant chemotherapy for stage 3 colon cancer.

NBOCA will continue to explore the determinants of variation in patient care and outcomes, including frailty, co-morbidity, ethnicity, deprivation, and patient geography. Better understanding of determinants of variation will guide strategies to reduce inequalities in cancer care and outcomes, a key aim of NHS England's Core20PLUS5 initiative⁴.

<https://www.acpgbi.org.uk/resources/guidelinesmanagement-cancer-colon-rectum-anus-2017/>

⁴ NHS England. Core20PLUS5 (adults) – an approach to reducing healthcare inequalities. <https://www.england.nhs.uk/about/equality/equality-hub/national-healthcare-inequalities-improvement-programme/core20plus5/>

3. Approach to developing the Quality Improvement Plan

3.1 Approach to developing the Audit scope

This NBOCA Quality Improvement Plan builds on the [NBOCA Scoping Document](#), which quantified improvement goals, prioritised performance indicators and identified the data sources best able to measure these.

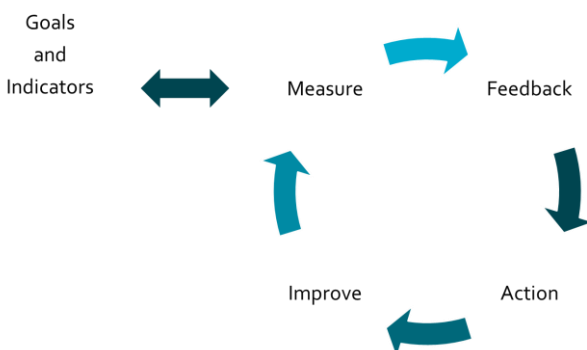
This Quality Improvement Plan sets out the patient inclusion and care pathway in Section 4. Section 5 outlines ten prioritised indicators that have been mapped to clinical guidelines and five improvement goals. In Sections 6 and 7, the quality improvement framework and improvement activities are outlined. Finally, Section 8 sets out the approaches to evaluation of the Quality Improvement Plan. The Quality Improvement Plan is expected to evolve over subsequent years as priorities change and further indicators become measurable.

The NBOCA scope has developed over many years, guided by the [Clinical Advisory Group](#) and [Patient and Public Involvement Forum](#). The scope of the Audit has broadened, as set out in Section 5, to include a wider set of indicators, mapped to clinical guidelines, covering a wider set of patients. This has been possible as more datasets have become routinely available and methodological development has been carried out within the NBOCA Project Team to develop and validate indicators and risk-adjustment models.

3.2 Approach to prioritising performance indicators

Clinical Performance Feedback Intervention Theory (CP-FIT)⁵ states that developing improvement goals and performance indicators are the first steps in the audit and feedback cycle (Figure 1).

Figure 1: The audit and feedback cycle



Using the five quality improvement goals, NBOCA developed a list of indicators to gauge the performance of NHS providers.

Prioritisation of ten indicators from this list of candidates was informed by the following set of key principles.

The audit and feedback cycle is only as strong as its weakest link: to enhance NBOCA’s ability to inform improvements in care, its performance indicators must have three properties:

- **Measurable** so that they can be the basis of credible feedback about performance. This property means that the indicators can be defined with available data in a valid, reliable, and fair manner that allows performance to be attributed to a specific unit.²
- **Actionable** so that feedback translates into action to improve care. Indicators should therefore be important and address a specific pathway of care that is clear to all stakeholders. Stakeholders should understand the drivers of variation in performance within this pathway and control the levers for change. These changes should be evidence-based and address policy priorities.
- **Improvable** so that actions have the desired effect on patient care. There should therefore be clear scope for improvement (low baseline levels or large unwarranted variation) in a large population and a receptive context, with no unintended consequences. Some interventions may have demonstrated improvements to certain indicators in existing literature.

Some of these properties are difficult to know in advance of selecting and investigating a performance indicator (such as existing levels of performance, the drivers of low performance, or interventions that can improve care). In addition, clinical practice and its context may change over time so that properties of indicators also change (such as whether they relate to a policy priority). Therefore, NBOCA’s goals and performance indicators are likely to evolve over time too. Recommendations will also evolve and become more focused as the NBOCA learns through the audit and feedback cycle.

3.3 Data provision

NBOCA will use information from routine national healthcare datasets. These capture details on the diagnosis, management and treatment of every patient newly diagnosed with bowel cancer in England and Wales. Further details on data acquisition can be found in the appendix.

⁵ Brown B, Gude WT, Blakeman T, van der Veer SN, Ivers N, Francis JJ, et al. 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. *Implement Sci* 2019;14:40.

3.4 Data limitations

For accurate and timely benchmarking, it is essential that data used by NBOCA:

1. Includes all the data items required to measure and risk-adjust performance indicators
2. Is timely
3. Has a high-level of case-ascertainment
4. Has high levels of data completeness
5. Is accurate.

NBOCA will use existing linked national datasets to identify patients diagnosed with bowel cancer. National cancer registry data will be provided by the NDRS (National Disease Registration Service) for patients in England and the Wales Cancer Network for patients in Wales.

For patients treated in England, Rapid Cancer Registration Data (RCRD) linked to other national healthcare datasets will be used for quarterly reporting and for the more recently diagnosed patients in the State of the Nation Reports. This dataset is mainly compiled from Cancer Outcomes and Services Dataset (COSD) records and is made available more quickly than the gold standard National Cancer Registration Data (NCRD). The speed of production means that case ascertainment and data completeness are lower, and the range of data items in the RCRD is limited. For example, only 3-character ICD-10 codes are available in the RCRD, which means the specific site of the tumour within the bowel is not captured in this dataset. This may restrict the extent to which risk adjustment can be applied to indicators used for quarterly reporting. For patients treated in Wales, no equivalent of RCRD is currently available.

For patients diagnosed since April 2022, NBOCA no longer uses data collected directly by clinical teams through the Clinical Audit Platform. NBOCA encourages clinicians to engage with coders and data administrators to ensure data accuracy, especially on staging information provided to NDRS and the Welsh Cancer Network.

3.5 Stakeholder involvement

NBOCA is a clinical methodological partnership. Clinical leadership is provided by the clinical co-leads. The [NBOCA Project Team](#) are supported by twice yearly meetings with stakeholders in the [NBOCA Clinical Advisory Group](#), including clinicians from across the patient pathway, patients, charity representatives and commissioners. The ACPGBI provides a strong partnership through its representation in the NBOCA Clinical Advisory Group. The [NBOCA Patient and Public Involvement \(PPI\) Forum](#) provides the patient perspective. These trusted long-term relationships ensure the clinical relevance of NBOCA work, engagement with clinicians, and impact on quality improvement initiatives. As with all key

NBOCA outputs, feedback was sought from the Clinical Advisory Group and the PPI Forum when developing the [NBOCA Scoping Document](#) and this Quality Improvement Plan.

3.6 Service provision

NBOCA's [organisational surveys](#) have provided an overview of the bowel cancer services at NHS Providers, such as on-site advanced colorectal MDT, palliative care services, and acute oncology services. Future work will continue to explore geographical variation in the availability of services including:

- Surgical innovation such as robotic-assisted surgery.
- Emergency services including the availability of bowel stenting and acute oncology services.
- Multi-disciplinary services such as palliative care.

4. Audit Scope

4.1 Patient inclusion criteria

NBOCA includes:

- Patients with a recorded diagnosis of bowel cancer, as documented by the International Classification of Diseases codes (ICD-10: C18 Malignant neoplasm of colon, C19 Malignant neoplasm of rectosigmoid junction or C20 Malignant neoplasm of rectum)
- Age 18 years or above at diagnosis
- Diagnosed or treated in the NHS in England or Wales.

Patients diagnosed with the following are **excluded**:

- Neuroendocrine/ Carcinoid tumours
- Melanomas
- Sarcomas.

Patients with diagnoses based on death certificate only are also excluded.

4.2 Care pathway

The NBOCA Quality Improvement Plan aims to involve all members of the multidisciplinary clinical team in the patient pathway, from diagnosis and perioperative care to oncological care, stage 4 disease and end of life care with emphasis on both patient outcomes and experience.

5. Quality Improvement Goals and Performance Indicators

Quality Improvement goal	Performance indicators and local target [^]	National Guidance/Standards
Improving the diagnostic pathway	More than 95% of patients seen by Clinical Nurse Specialist (CNS)	ACPGBI Guidelines (2017) “Patients with colorectal cancer should meet and have access to a CNS as ‘Key Worker’ for advice and support from the time of their initial diagnosis.”
	More than 90% of patients to have mismatch repair (MMR) or microsatellite instability (MSI) tested at or around diagnosis* [#]	NICE Clinical Guidelines [DG27] (2017) “Offer testing to all people with colorectal cancer, when first diagnosed, using immunohistochemistry for MMR proteins or MSI testing to identify tumours with deficient DNA mismatch repair, and to guide further sequential testing for Lynch syndrome”
	More than 70% data completeness of seven items for risk adjustment (age, sex, ASA grade, pathological TNM stage (tumour, node, metastasis staging) and site of cancer) in patients undergoing major surgery [†]	
Improving perioperative care	Annual rectal cancer resection volume greater than 20 cases per centre^R	NICE Clinical guideline [NG151] (2020) “Providers performing major resection for rectal cancer should perform at least 10 of these operations each year.” NBOCA results show that most providers in England and Wales perform at least 20 cases of rectal cancer surgery per year. Therefore, a target of 10 cases per year would not have a large impact on current practice.
	Less than 6% risk-adjusted 90-day mortality after bowel cancer resection	ACPGBI Guidelines (2017) “Colorectal units should expect to achieve an operative mortality of less than 20% for emergency surgery and less than 5% for elective surgery for colorectal cancer.”
	Less than 10% risk-adjusted 30-day unplanned return to theatre after bowel cancer resection	ACPGBI Guidelines (2017) “Colorectal units should audit their leak rate for colorectal cancer surgery.”
	Less than 15% risk-adjusted 30-day unplanned readmission after bowel cancer resection	NHS England utilises unplanned readmission as a marker of quality of care.
	Less than 35% risk-adjusted proportion of patients with unclosed diverting ileostomy 18-months after anterior resection	ACPGBI Guidelines (2017) “The permanent stoma rate following rectal cancer resection of colorectal units should be audited.”
	More than 50% of bowel cancer resections via a minimally invasive approach [†]	

Continued overleaf

Quality Improvement goal	Performance indicators and local target [^]	National Guidance/Standards
Improving oncological care	More than 50% of patients with Stage 3 colon cancer receiving adjuvant chemotherapy	NICE Clinical guideline [NG151] (2020) “For people with stage 3 colon cancer (pT1-4, pN1-2, M0) offer adjuvant chemotherapy.” ACPGBI Guidelines (2017) “Adjuvant chemotherapy should be considered in older patients with stage 3 colorectal cancer, with appropriate tailoring of treatment.”
	Less than 33% of patients experiencing severe acute toxicity during/after adjuvant chemotherapy for stage 3 colon cancer**	National guidelines not available. NBOCA team developed coding framework to identify severe acute toxicity from systemic anti-cancer therapy using hospital administrative data.
	10% to 60% of rectal cancer patients undergoing major resection receiving neoadjuvant treatment	NICE Clinical guideline [NG151] (2020) “Offer preoperative radiotherapy or chemoradiotherapy to people with rectal cancer that is cT1-T2, cN1-N2, M0, or cT3-T4, any cN, M0.”
	Greater than 70% risk-adjusted 2-year overall survival rate after bowel cancer resection	NHS England utilises long-term survival from cancer as a marker of quality of care.
	Recruitment to at least one National Institute for Health and Care (NIHR) portfolio trial in rectal organ preservation ^{R#}	
Improving management of stage four disease	More than 95% of patients with synchronous liver metastases discussed at specialist liver MDT [#]	
	More than 80% of patients with stage 4 disease at diagnosis who have genetic tumour profiling (KRAS, NRAS, BRAF) ^{#*}	NICE Clinical guideline [NG151] (2020) Test for RAS and BRAF V600E mutations in all people with metastatic colorectal cancer suitable for systemic anti-cancer treatment.
Improving end of life care	Risk-adjusted 30-day mortality after palliative systemic treatment in patients with stage 4 disease	
	More than 95% of patients referred to palliative care or enhanced supportive care clinic within last year life [#]	

[^]Details of the five Quality Improvement Goals and the associated ten Performance Indicators are outlined in the table above. The Audit publishes the performance indicators in its annual State of the Nation report and, where appropriate, in quarterly reports. The publication of indicators is aligned with data availability and the completion of robust, methodological development work including appropriate risk-adjustment models.

*Only applicable for patients with histological confirmation of bowel cancer

To be introduced once methodological development work is complete

† Contextualising measure

^R Only applicable to centres undertaking rectal cancer surgery

** Severe acute toxicity defined as toxicity requiring an overnight stay, from administration of the first cycle of chemotherapy up until 8 weeks after administration of the last cycle of chemotherapy.

Driver diagrams are a tool that can be used to help understand which local actions have the potential to improve care. The NBOCA team have developed a driver diagram highlighting potential areas within the adjuvant chemotherapy care pathway that may drive variation in severe acute toxicity during or after adjuvant chemotherapy (Figure 2)⁶.

Further driver diagrams will be developed for indicators which are to be a focus of a NBOCA quality improvement initiative (Section 7.5). For example, the Audit is developing a quality improvement initiative to improve care for patients undergoing anterior resection with diverting ileostomy. Figure 3 overleaf outlines the potential areas that may drive variation in ileostomy closure.

Figure 2: Example driver diagram for indicator “Severe acute toxicity during or after adjuvant chemotherapy for stage 3 colon cancer”.



⁶Boyle JM, et al. Development and validation of a coding framework to identify severe acute toxicity from systemic anti-cancer therapy using hospital administrative data. Epidemiol. 2022. doi: 10.1016/j.canep.2022.102096.

Figure 3: Example driver diagram for indicator “Ileostomy closure after rectal cancer resection”⁷.



*LARS: Lower anterior resection syndrome

⁷ Borucki, J.P., Schlaeger, S., Crane, J., Hernon, J.M. and Stearns, A.T. (2021), Risk and consequences of dehydration following colorectal cancer resection with diverting ileostomy. A systematic review and meta-analysis. *Colorectal Dis*, 23: 1721-1732

Dukes' Club Research Collaborative. Factors impacting time to ileostomy closure after anterior resection: the UK closure of ileostomy timing cohort study (CLOSE-IT). *Colorectal Dis*, 2021 23: 1109-1119.

Fielding A, Woods R, Moosvi SR, Wharton RQ, Speakman CTM, Kapur S, Shaikh I, Hernon JM, Lines SW, Stearns AT. Renal impairment after ileostomy formation: a frequent event with long-term consequences. *Colorectal Dis*. 2020 Mar;22(3):269-278.

Keane C, Fearnhead NS, Bordeianou LG, et al. International consensus definition of low anterior resection syndrome. *Dis Colon Rectum*. 2020; 63: 274-284

Rombey T, Panagiotopoulou IG, Hind D, et al. Preoperative bowel stimulation prior to ileostomy closure to restore bowel function more quickly and improve postoperative outcomes: a systematic review. *Colorectal Dis*. 2019 Sep;21(9):994-1003.

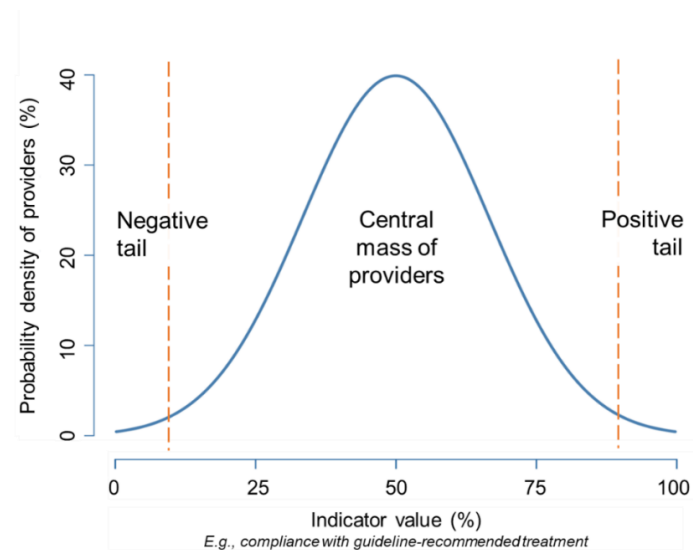
Rutter MD, East J, Rees CJ, et al. British Society of Gastroenterology/Association of Coloproctology of Great Britain and Ireland/Public Health England post-polypectomy and post-colorectal cancer resection surveillance guidelines *Gut* 2020;69:201-223.

Vogel I, Reeves N, Tanis PJ, Bemelman WA, Torkington J, Hompes R, Cornish JA. Impact of a defunctioning ileostomy and time to stoma closure on bowel function after low anterior resection for rectal cancer: a systematic review and meta-analysis. *Tech Coloproctol*. 2021 Jul;25(7):751-760.

Vogel, I, Vaughan-Shaw, PG, Gash, K, Withers, KL, Carolan-Rees, G, Thornton, M, et al. Improving the time to ileostomy closure following an anterior resection for rectal cancer in the UK. *Colorectal Dis*. 2022; 24: 120– 127.

6. Quality Improvement Framework

The figure below shows a hypothetical example of how a performance indicator may be distributed across NHS providers nationally at a single time point. This distribution can be separated into three domains: the negative tail (suggestive of worse performance), the central mass (centred on the national average, for example), and the positive tail (suggestive of better performance).



Each domain is associated with a different set of methods for improving healthcare:

Negative tail

Example methods: Regulation and public reporting of outliers

- Clinical audit has traditionally focused on the negative tail to improve healthcare. This approach implies that some NHS providers are doing something systematically wrong that can be resolved through direct intervention. Such intervention may be necessary to assure minimum standards of care and to reduce inequality between the best and worst performing NHS providers. Cancer audits that pre-date NATCAN have formally reported negative outliers (see Appendix).

Central mass

Example methods: Statistical process control and iterative testing of interventions

- Most providers exist in the central mass of the distribution (by definition) which may present the greatest scope for improving average levels of care nationally. Methods in this domain suggest that all providers can improve their performance, regardless

of baseline levels. Internal audits and evaluation inform iterative testing of interventions to achieve the highest standards of care. Longitudinal monitoring provides feedback about whether improvements occur or not.

Positive tail

Example methods: Positive deviance

- Some NHS providers perform exceptionally well despite similar constraints to others, which presents opportunities to learn how this is achieved. 'Positive deviance' approaches assert that generalisable solutions to better performance already exist within the system. Such solutions are more likely to be acceptable and sustainable within existing resources. These approaches aim to identify local innovations and spread them to other settings (see Appendix).

NBOCA will select which methods to implement to improve bowel cancer care after investigating the distributions of its performance indicators (outlined in Section 5). This includes the distribution of performance indicators between providers at a given time point and within providers over time. It also includes investigation of variation at the patient, hospital, and regional levels to see where most variation exists, and which variables help to explain it (see Appendix for more detail).

7. Improvement activities

Improvement activities and outputs of NBOCA will be aligned to the Quality Improvement Plan. NBOCA will (1) engage in key collaborations, (2) align with other initiatives in bowel cancer care, and (3) provide outputs to support quality improvement at national, regional, and local level.

The two principal strategies for reporting NBOCA results will be producing:

- A short 'State of the Nation' (SotN) report for NHS providers in England and Wales. This annual report will publish five key recommendations and will highlight where services should focus quality improvement activities. These recommendations will be at the Cancer Alliance level where applicable and be formed between Audit teams, clinical reference groups and major national stakeholders.
- A quarterly dashboard will facilitate benchmarking and the monitoring of performance at regular intervals so improvements can be tracked over time.

7.1 National and Regional

NBOCA undertakes various activities that directly support national stakeholders and regional NHS organisations to tackle system-wide aspects related to the delivery of high-quality bowel cancer services:

Stakeholder	NBOCA activity
<i>NATIONAL</i>	
NHS England and Wales	Identify issues and make recommendations on the organisation and delivery of bowel cancer services. Involve national leadership, as required. Recommendations published in Audit's State of the Nation reports.
National incentives	Provide the Care Quality Commission (CQC), Care Inspectorate Wales, and Getting It Right First Time (GIRFT) with information to support local visits to NHS organisations and options for aligning recommendations with specific incentives. Present at the NHS Cancer Programme National Workshops on variation in bowel cancer treatments and outcomes.
Professional organisations	Identify issues and make recommendations regarding the delivery of bowel cancer care that fall within the remit of the ACPGBI and other relevant professional organisations.
<i>REGIONAL</i>	
Cancer Networks / Alliances / Vanguard	Support the monitoring role of Welsh Cancer Networks and the English Cancer Alliances / Integrated Care Boards by publishing results for their region/area.

At a national level, the NBOCA team will also provide the National Cancer Registration and Analysis Service (NCRAS) Data Improvement Leads (in England), and the Wales Cancer Network with information to help them support their NHS organisations to improve the quality of their routine data submissions.

7.2 Local

NBOCA supports local NHS cancer services in their care of bowel cancer patients in the following ways:

NBOCA feedback activity	Description
Annual "State of the Nation" Reports	State of the Nation reports that allow NHS organisations in England and Wales to benchmark themselves against clinical guideline recommendations and the performance of their peers.
Outlier reporting	Providers with performance indicator results more than three standard deviations from the expected level of performance (or more than two standard deviations from the mean in three years) are considered potential outliers as per the NBOCA Outlier Policy . NBOCA will support potential outliers to identify areas for improvement.
Web-based dashboard	Presents results for individual NHS organisations that allows the user to compare the results of a selected provider against peers, regions and the national results.
Local Action Plan template	Allows NHS organisations to document how they will respond to the State of the Nation Report recommendations.
Interventions	This will include possible interventions that have been identified in the literature linked to the performance indicators assessed by the Audit or include interventions developed by Providers /Alliances in the NHS.
Targets	Each performance indicator has a local target, e.g. more than 95% of patients seen by Clinical Nurse Specialist. NBOCA monitors how well providers are meeting these targets, including in its annual State of the Nation Report. Local targets for performance indicators are selected based on national guidelines. In the absence of national guidelines, targets are developed through assessing the distribution of individual provider results for the performance indicator in NBOCA. The targets are selected through a review of the existing literature and a consensus process between the NBOCA Project Team and Clinical Advisory Group, with the aim of stimulating quality improvement.

⁸ Taylor MJ, McNicholas C, Nicolay C, Darzi A, Bell D, Reed JE. Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Qual Saf.* 2014 Apr;23(4):290-8. doi: 10.1136/bmjqs-2013-001862.

7.3 Improvement tools

The NATCAN website includes a [Quality Improvement Resources page](#) with links to the RCSEng website and other web-based material that direct healthcare providers to various quality improvement tools including:

- 'How to' guides including quality improvement methodology
- Links to existing resources
- Links to training courses for quality improvement
- Good practice repository with contact information where possible.

7.4 Improvement workshops

Each year NBOCA runs a Quality Improvement workshop at the ACPGBI Annual Meeting, aiming to stimulate the use of the Audit's output for a range of quality improvement activities. Each workshop focuses on a particular activity of the Audit, including for example the Audit's findings on the ongoing implementation of new diagnostic and treatment modalities. The 2023 ACPGBI QI workshop focused on the variation in unclosed ileostomy after anterior resection. The workshop helped stimulate a quality improvement initiative to improve care for these patients. NBOCA also engages with the NHS Cancer Programme's National Workshops, recently highlighting variation in the use of neoadjuvant therapy and adjuvant chemotherapy.

7.5 Designing a National Quality Improvement Initiative

Using rapid cancer registry data, NBOCA will design a national Quality Improvement initiative aiming "to close the audit cycle" following an approach commonly referred to as the "plan-do-study-act" method.⁸ The Royal College of Surgeons has previously utilised a similar approach to deliver a national Quality Improvement initiative⁹.

The 2023 State of the Nation report highlighted that nationwide 39% of patients did not have their diverting ileostomy closed within 18 months of their anterior resection. The NBOCA team delivered a Quality Improvement workshop on unclosed ileostomy at the ACPGBI 2023 Annual Meeting. With emerging evidence of the negative impact of unclosed ileostomy on patient quality of life and even potentially on long-term survival, this is a key focus area for NBOCA quality improvement.

⁹ Bamber JR, Stephens TJ, Cromwell DA, Duncan E, Martin GP, Quiney NF, Abercrombie JF, Beckingham JJ; Cholecystectomy Quality Improvement Collaborative. Effectiveness of a quality improvement collaborative in reducing time to surgery for patients requiring emergency cholecystectomy. *BJS Open.* 2019 Oct 8;3(6):802-811. doi: 10.1002/bjs5.50221.

7.6 Patient and Public Involvement

The NBOCA Patient and Public Involvement (PPI) Forum (previously named Patient and Carer Panel), is a key stakeholder group developed in consultation with the charities Bowel Cancer UK and Bowel Research UK as well as the ACPGBI Patient Liaison Group.

Members of the NBOCA PPI Forum are regularly consulted on the design of the Audit and the communication of its results. Examples of this include:

- *the development and review of patient information materials and summaries of the State of the Nation reports.*
- *co-development of scientific papers that explore NBOCA datasets in greater depth.*
- *undertaking a key advisory role in developing the design and function of the NBOCA website to ensure that patients and the public can easily find relevant results together with appropriate explanatory information.*
- *shape the development of the NBOCA quality improvement goals, activities and outputs by ensuring this work is relevant from a patient perspective.*

7.7 Communication and dissemination activities

NBOCA communicates regularly with stakeholders, providers, patients and the public in several ways, including:

- Regular posts and interactions with the NBOCA community of X (formerly Twitter)
- News updates to NBOCA contacts at local, regional and national level.
- Contribution of items for newsletters created by patient associations
- Presentations at national conferences such as the ACPGBI Annual Meeting, Association of Surgeons of Great Britain and Ireland International Surgical Congress, and Cancer Research UK conferences.
- Publication of articles in medical journals and other media.

8. Evaluation

NBOCA will report year-on-year progress against improvement goals to the Audit's Clinical Advisory Group and in the State of the Nation reports on an annual basis. This will focus on describing how values of performance indicators have changed over time at a national level.

To evaluate the impact of specific NBOCA or other national interventions on the performance of NHS providers, quasi-experimental methods (when allocation of providers to certain groups cannot be controlled) or trial-based methods (when group allocation can be controlled) will be used.

NBOCA will examine the opportunities for and strengths and limitations of quasi-experimental and trial-based evaluation methods once it is more fully established.

Appendix

1. National Cancer Audit Collaborating Centre (NATCAN)

NBOCA is part of the National Cancer Audit Collaborating Centre ([NATCAN](#)), a national centre of excellence launched on 1st October 2022 to strengthen NHS cancer services by looking at treatments and patient outcomes in multiple cancer types across England and Wales. The centre was commissioned by the Healthcare Quality Improvement Partnership (HQIP) on behalf of NHS England and the Welsh Government with funding in place for an initial period of three years.

NATCAN is based within the Clinical Effectiveness Unit ([CEU](#)), the academic partnership between the Royal College of Surgeons of England (RCS Eng) and the London School of Hygiene & Tropical Medicine. The CEU is recognised as a national centre of expertise in analytic methodology and the development of administrative and logistic infrastructure for collating and handling large-scale data for assessment of healthcare performance.

NATCAN was set up on 1st October 2022 to deliver six new national cancer audits, including kidney, ovarian, pancreatic, breast (two separate audits in primary and metastatic disease) and non-Hodgkin Lymphoma. Existing audits in [prostate](#), [lung](#), [bowel](#), and [oesophago-gastric](#) cancers moved into NATCAN in 2023. This critical mass of knowledge and expertise enable it to respond to the requirements of the funders and stakeholders.

The aim of the ten NATCAN Audits is to:

1. Provide regular and timely evidence to cancer services of where patterns of care in England and Wales may vary.
2. Support NHS services to increase the consistency of access to treatments and help guide quality improvement initiatives.
3. Stimulate improvements in cancer detection, treatment and outcomes for patients, including survival rates.

Key features of NATCAN's Audit approach

The design and delivery of the audits in NATCAN has been informed by the CEU's experience delivering national Audits, built up since its inception in 1998. Key features of all Audit projects within the CEU include:

- Close clinical-methodological collaboration
- Use of national existing linked datasets as much as possible

- Close collaboration with data providers in England (National Disease Registration Service [NDRS, NHSE] and Wales (Wales Cancer Network [WCN], Public Health Wales [PHW])
- A clinical epidemiological approach, informing quality improvement activities.
- "Audit" informed by "research".

All these features will support NATCAN's focus on the three "Rs", ensuring that all its activities are clinically relevant, methodologically robust, and technically rigorous.

Organisational structure of NATCAN

Centre Board

NATCAN has a multi-layered organisational structure. [NATCAN's Board](#) provides top-level governance and oversees all aspects of the delivery of the contract, ensuring that all audit deliverables are produced on time and within budget and meet the required quality criteria. The Board also provides the escalation route for key risks and issues. It will also consider NATCAN's strategic direction. The Board meets at six-monthly intervals and receives regular strategic updates, programme plans, and progress reports for sign-off. Risks and issues are reported to the NATCAN Board for discussion and advice.

Executive Team

[NATCAN's Executive Team](#) is chaired by the Director of Operations (Dr Julie Nossiter) and includes the Clinical Director (Prof Ajay Aggarwal), the Director of the CEU (Prof David Cromwell), the Senior Statistician (Prof Kate Walker), and the Senior Clinical Epidemiologist (Prof Jan van der Meulen) with support provided by NATCAN's Project Manager (Ms Verity Walker). This Executive Team is responsible for developing and implementing NATCAN's strategic direction, overseeing its day-to-day running, and coordinating all activities within each of cancer audits. This group meets monthly. The Executive Team provide six-monthly updates to NATCAN's Board.

Advisory groups

The Executive Team is supported by two external groups. First, the Technical Advisory Group including external senior data scientists, statisticians, and epidemiologists as well as representatives of the data providers (NDRS, NHSD and WCN, PHW), co-chaired by NATCAN's Senior Statistician and Senior Epidemiologist, advises on national cancer data collection, statistical methodology, development of relevant and robust performance indicators to stimulate QI, and communication to practitioners and lay audiences.

Second, the Quality Improvement Team includes national and international experts who have extensive experience in QI and implementation research. This team provides guidance on the optimal approaches to change professional and organisational

behaviour. It is chaired by NATCAN's Clinical Director and managed by the Director of Operations.

This set-up provides a transparent and responsive management structure allowing each audit to cater for the individual attributes of the different cancer types, while also providing an integrated and consistent approach across the NATCAN audits. The integrated approach will result in efficient production of results through sharing of skills and methods, a common "family" feel for users of audit outputs, and a shared framework for policy decisions and project management.

Audit Project Teams

Audit development and delivery is the responsibility of each Project Team. The [Project Team](#) works in partnership to deliver the objectives of the audit and is responsible for the day-to-day running of the audit and producing the deliverables. It leads on the audit design, data collection, data quality monitoring, data analysis and reporting.

Each cancer audit Project Team is jointly led by two Clinical Leads representing the most relevant professional organisations, and senior academics with a track record in health services research, statistics, data science and clinical epidemiology, affiliated to the London School of Hygiene and Tropical Medicine. In addition, each audit will have a clinical fellow, who contributes to all aspects of the audits, reinforcing the audits' clinical orientation and contributing to capacity building.

The delivery of the Audit is coordinated by an audit manager who is supported by NATCAN's wider infrastructure. Data scientists with experience in data management and statistics and methodologists with experience in performance assessment and QI work across audits.

Audit Clinical Reference/Advisory Groups

Each audit has a [Clinical Advisory Group](#) representing a wide range of stakeholders. This group acts as a consultative group to the Project Team on clinical issues related to setting audit priorities, study methodology, interpretation of audit results, reporting, QI, and implementation of recommendations.

Effective collaboration within the centre and across audits facilitates the sharing of expertise and skills in all aspects of the delivery process, notably: designing the audits, meeting information governance requirements, managing and analysing complex national cancer data to produce web-based indicator dashboards / state of the nation reports, and supporting quality improvement.

This organisation creates "critical mass" and audit capacity that is able to respond to the requirements of the funders (NHS England and Welsh Government) and the wider stakeholder "family".

Audit PPI Forums

Patients and patient charities are involved in all aspects of the delivery of the cancer audits. Each audit has a standalone Patient and Public Involvement (PPI) Forum to provide insight from a patient perspective on strategic aims and specific audit priorities. This includes shaping the development of each audit's quality improvement initiatives by ensuring this work is relevant from a patient perspective. A key activity of the PPI Forums is to actively participate in the production of patient-focused audit outputs (including patient and public information, patient summaries of reports, infographics and design and function of the NATCAN website), guiding on how to make this information accessible.

2. Data provision

The NATCAN Executive Team has worked closely with data providers in England (NDRS, NHSE) and in Wales (WCN, PHW) to establish efficient “common data channels” for timely and frequent access to datasets, combining data needs for all cancers into a single request in each Nation and only using routinely collected data, thereby minimising the burden of data collection on provider teams.

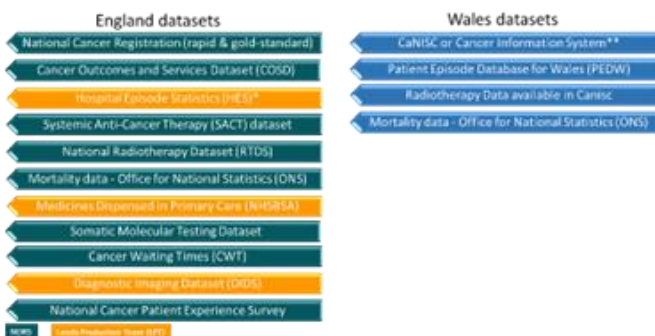
Annual and quarterly data

NATCAN will utilise two types of routinely collected data in England. First, an annual “gold-standard” cancer registration dataset, released on an annual basis with a considerable delay between the last recorded episode and the data being available for analysis, and second, a “rapid” cancer registration dataset (RCRD), released at least quarterly with much shorter delays (3 months following diagnosis). The CEU’s recent experience with English rapid cancer registration data, in response to the COVID pandemic has demonstrated the latter’s huge potential,¹⁰ despite a slightly lower case ascertainment and less complete staging information.

NATCAN will utilise these data across all cancers linked to administrative hospital data (Hospital Episode Statistics/Systemic Anti-Cancer Therapy/Radiotherapy Data Set/Office for National Statistics among other routinely collected datasets, see Figure 1) for describing diagnostic pathway patterns, treatments received and clinical outcomes.

An equivalent data request will be made to the Wales Cancer Network (WCN)/Public Health Wales (PHW).

Figure 1. National datasets available to NATCAN



* Includes inpatient and outpatient data and Emergency care Dataset (ECDS).

** NHS Wales will use Welsh registry information for the initial years data for the Audit. NATCAN submitted a request for historical data from the Welsh Cancer Registry in Q4 2023. From 2022 data submissions will be from either Canisc or the new cancer dataset forms.

3. Quality Improvement Methods – Supplementary information

Negative tail

Regulation and public reporting of outliers

National cancer audits that pre-date NATCAN have used a formal process for reporting outliers publicly. This process includes contacting outliers before publication to: (1) verify the data, (2) identify the reasons for the low level of performance identified, and (3) determine what corrective interventions have been put in place. The findings are reported publicly and may inform care practices in other NHS providers.

Central mass

Statistical process control and iterative testing of interventions

Most providers exist in the central mass of the distribution (by definition). Just because something is common it does not mean that it is alright: performance may be systematically below an achievable standard nationally for example (such as 75% of eligible patients receiving a particular treatment). We recommend that individual providers verify their performance data and undertake internal audits to assess areas for improvement and consider evaluation of their processes of care.

Positive tail

Positive deviance

Positive deviants may perform consistently better than comparators over time or demonstrate a clear upward trend in performance between two time points. It may be possible to learn from these providers to identify practices of care that have driven high levels of performance. This could include care protocols or factors related to system organisation which may inform quality improvement amongst providers in the negative tail and central mass of performance.

Determinants of variation

To support targeting of improvement interventions and recommendations, the Audit will analyse particular patient, hospital and regional factors associated with variation in processes and outcomes of care. For example, for the utilisation of a particular evidence-based treatment, factors associated with utilisation may include advanced age, social deprivation and frailty, clinician preferences, and regional policies. Findings may be reported at an aggregated national or regional (alliance) level and can support NHS providers to target interventions or evaluation at particular patient populations.

¹⁰ Nossiter J, Morris M, Parry MG, Sujenthiran A, Cathcart P, van der Meulen J, Aggarwal A, Payne H, Clarke NW. Impact of the Covid-19 pandemic on the diagnosis and treatment of men with prostate cancer. *BJU Int.* 2022; doi: 10.1111/bju.15699