Northern Ireland Colorectal Cancer Audit

Measuring the quality of care for patients diagnosed 2018

(With comparisons to other UK regions and previous NICR reports 2006, 2001 & 1996)

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This report should be cited as:

HG Coleman, ST Hawkins, AT Gavin. Northern Ireland Colorectal Cancer Audit. Measuring the quality of care for patients diagnosed 2018. N.Ireland Cancer Registry, Queen's University Belfast, 2022.

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Abbreviations

CaPPS	Cancer Patient Pathway System
ASNS	Age Standardised Net Survival
BCSP	Bowel Cancer Screening Programme
CIO	Cancer Intelligence Officer
CNS	Clinical Nurse Specialist
CRC	Colorectal Cancer
CRG	Clinical Reference Group
CRM	Circumferential Resection Margin
CT	Computerised Tomography Scan
DCO	Death Certificate Only
FAP	Familial Adenomatous Polyposis
FIT	Faecal Immunochemical Test
FOB	Faecal Occult Blood
GP	General Practitioner
HNPCC	Hereditary Non-Polyposis Colorectal Cancer
HPB	Hepato-Pancreato-Biliary
HSC	Health and Social Care
HSCT	Health and Social Care Trust
IBD	Inflammatory Bowel Disease
ICD	International Classification of Disease
KPI	Key Performance Indicator
MDT	Multi-Disciplinary Team
MRI	Magnetic Resonance Imaging
MSI	Microsatellite Instability
NBOCA	National Bowel Cancer Audit
NHS	National Health Service
NI	Northern Ireland
NICaN	Northern Ireland Cancer Network
NICE	National Institute for Clinical Excellence
NICR	Northern Ireland Cancer Registry
NIPACS	Northern Ireland Picture Archive and Communications System
PAS	Patient Administrative System
QUB	Queen's University Belfast
RISOH	Regional Information System for Oncology and Haematology
RQIA	Regulation & Quality Improvement Authority
TAMIS	Transanal Minimally Invasive Surgery
TEM	Transanal Endoscopic Microsurgery

Foreword

It is with great pleasure that we welcome this report on the investigation, treatment and outcomes for patients from N. Ireland diagnosed with colorectal cancers.

We are very grateful to the Public Health Agency which funded this work.

The expertise of NI Cancer Registry staff enabled acquisition of funding, collation and analysis of data and skilled presentation of the results while continually linking with the clinical teams to ensure the availability of the data and interpretation of the results. We hope that the findings from this work which has enabled comparisons with similar audits in the rest of the UK will inspire confidence in clinical practice here, while also identifying areas for enhanced learning to continually improve patient care and enhance provision of colorectal cancer services.

It is worth noting that for audits to be effective they need to be cyclical. We hope that this audit will be repeated to measure change in service especially since the COVID-19 pandemic, and monitor the implementation of recommendations.

Mr Barry McAree

Colorectal Cancer Clinical Reference Group Chair (from April 2021 onwards) – Northern Ireland Cancer Network

with thanks to

Mr Damian McKay

Colorectal Cancer Clinical Reference Group Chair (2017 to April 2021) – Northern Ireland Cancer Network

November 2022

Acknowledgements

This report was compiled at the request of the NI Cancer Network (NICaN) Colorectal Cancer Group which was keen to monitor progress since the most recent audit of Colorectal Cancer care in Northern Ireland (NI) in 2006, which was preceded by 2001 and 1996 audits.

I am grateful to the clinicians for their help in interpretation and final presentation. A special word of gratitude to the NICaN Colorectal Cancer Group chairs during the tenure of this audit, current chair Mr Barry McAree and former chair Mr Damian McKay for their dedication and enthusiastic championing of this report.

In terms of data collection thank you to the following clinical staff:

- Miss Etain McGuinness
- Miss Catherine Rossborough
- CNS Martina Finn
- CNS Deirdre Cunningham
- CNS Julie D Hanna
- The Northern Trust Colorectal surgical team
- Mr Damian McKay and Southern Trust clinical teams
- Dr Richard Park
- All NICAN Colorectal CRG members and colleagues who provided edits and data checks following draft report circulations.

The Northern Ireland Cancer Registry (NICR) is funded by the Public Health Agency (PHA) and this project was possible thanks to additional funding by the PHA.

The quality of data in this project is a result of the work of the NICR Cancer Intelligence Officers, especially Dr Jamie Roebuck who meticulously extracted detailed information from electronic clinical records for analysis and presentation in this report. Initial early data cleaning was conducted by Dr Karen Cafferkey. The analysis of data presented was undertaken by Professor Helen Coleman and Sinéad Hawkins.

The work of the NICR including the production of this report is the result of the work of the Registry team. I wish also to record my thanks to members of the NICR Steering Group and Council who guide that work. This work uses data provided by patients and collected by health services as part of their care and support.

Anna Gavin .

Anna Gavin

Director, N. Ireland Cancer Registry 1994-2022

November 2022

Background to NI Colorectal Cancer Audits

The Northern Ireland Cancer Registry (NICR) is the official statistics provider for cancer incidence, prevalence and survival across Northern Ireland (NI). It holds incidence data on cancers from 1993-2019 and has previously undertaken audits of the quality of cancer care for several cancers. Previous audit reports can be accessed via this link:

https://www.qub.ac.uk/research-centres/nicr/research-audits/Audits/

The NICR was awarded funding from the Public Health Agency for a NI-specific colorectal cancer audit to ensure delivery of a high quality, clinically effective service with continuous improvement to patient survival and patient related outcomes.

This audit is the first since the introduction of the Bowel Cancer Screening programme in 2010-2012 and will be a resource for comparison of service delivery over time in NI and with peer regions across Great Britain and countries across the world. It will also provide an accurate reflection of colorectal cancer services pre-COVID.

Introduction to Colorectal Cancer

Colorectal cancer (CRC) is the third most common cancer worldwide, although incidence and mortality rates vary; CRC is more common in more developed countries. However, CRC incidence rates are changing – generally increasing in low and middle-income countries while remaining the same or decreasing in higher income countries (Arnold et al, 2017). In Europe, CRC accounts for 12% of cancer cases (excluding the common non-melanoma skin cancer (NMSC)), and it is the second and third most common cause of cancer death in males and females, respectively (Ferlay et al, 2018).

In NI, CRC is the third most common cancer, with only cancer of the lung and prostate (in males) or breast (in females) being more common (excluding NMSC). During 2015-2019, there were on average 1,171 new cases of CRC diagnosed annually, of which over half (55%) were in males. In 2019, the absolute risk of developing CRC prior to age 75 was 1 in 24 for males and 1 in 34 for females living in NI (NICR annual official statistics).

There has been a year-on-year increase since 1996in the number of rectal (n=188--296), colon and rectosigmoid junction (n=519--801) and total colorectal cancers (n=707--1097) included in clinical audits. These increases are largely explained by the ageing population in NI.

In NI, the majority of CRC cases occur in older persons, with half diagnosed over age 73 in females and 71 in males (Figure 1 and Appendix 1).

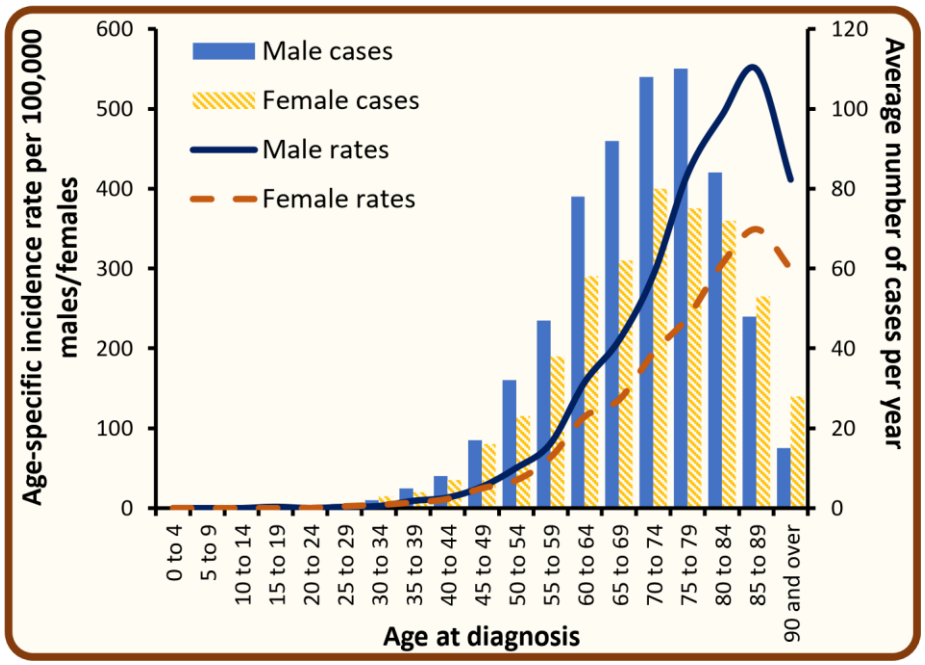


Figure 1. Colorectal cancer incidence by age and sex in NI, 2015-2019.

There is evidence of increasing CRC incidence in those younger than 50 years in Europe and the USA (Araghi et al, 2019). In NI in 2018, 6.6% of CRC cases were diagnosed in patients aged under 50 years with the number and proportions in those under age 50 decreasing from 84 cases in 2007 (7%) to 59 cases in 2018 (5%).

The incidence of CRC, calculated taking population size and age structure into account, is over 10% higher in individuals residing in the most deprived areas of NI, compared with the population average.

In NI, the crude number of colorectal cancer cases has increased from 919 cases in 1993 to 1222 cases in 2019, an increase of 33% (Figure 2, Table 1).

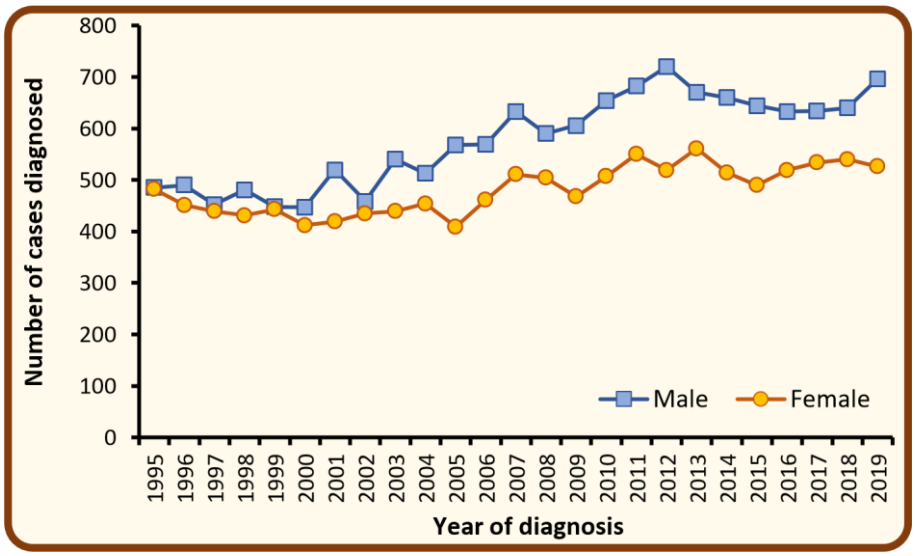


Figure 2. Trend in number of colorectal cancer patients by sex in NI, 1995-2019.

Table 1. Number of colorectal cancer patients by sex in NI, 2009-2019.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Male	606	654	682	720	670	660	644	633	634	640	696
Female	469	507	550	519	561	514	490	519	534	540	526
Both	1075	1161	1232	1239	1231	1174	1134	1152	1168	1180	1222

Many changes in incidence may be due to changes in the population number or age structure, therefore age standardisation is used to overcome such differences. The European age-standardised incidence rate of CRC decreased from 82.9 per 100,000 in 1992 to 72.9 per 100,000 in 2019 (Figure 3, Appendix 1).

Among males, age-standardised incidence rates of CRC decreased by 14.1% from 104.4 per 100,000 person years in 2010-2014 to 89.7 cases per 100,000 persons years in 2015-2019.

Among females, age-standardised incidence rates of CRC decreased by 9.3% from 65.6 per 100,000 person years in 2010-2014 to 59.5 cases per 100,000 persons years in 2015-2019.

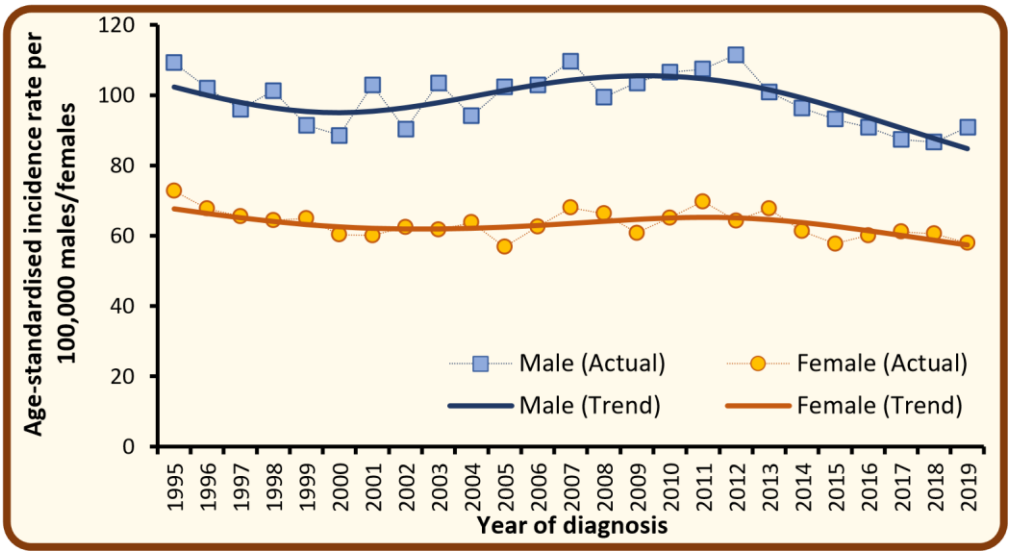


Figure 3. Trends in age-standardised incidence of colorectal cancer by sex in NI, 1995-2019.

Bowel Cancer Screening

The observed recent decline in age-standardised CRC incidence can be partly attributed to the introduction of a population-based Bowel Cancer Screening Programme (BCSP) in 2010-2012 in NI.

This is the first NI CRC audit to take place since the roll-out of the BCSP in NI. Previous CRC audits in NI examined data from patients diagnosed in 1996, 2001 and 2006.

The BCSP originally used a faecal occult blood (FOB) test, which is mailed every 2 years to eligible participants between the ages of 60-74 years (expanded from an initial age range of 60-69 years when first introduced). The FOB-based test was replaced by the more sensitive quantitative faecal immunochemical test (FIT) in 2021. Those individuals with a positive FOB/FIT test are offered colonoscopy or CT colonography by way of further investigation to diagnose or exclude CRC.

The introduction of BCSP has affected incidence, stage distribution and survival outcomes of patients with bowel cancer compared with previous years of audit data; following an expected increase due to the detection of prevalent cancers in 60-74 year olds, the proportion of CRC cases in that age group decreased from 45% in 2012 to 40% of CRC cases in 2018, reflecting the detection and removal of precancerous polyps (Figure 4).

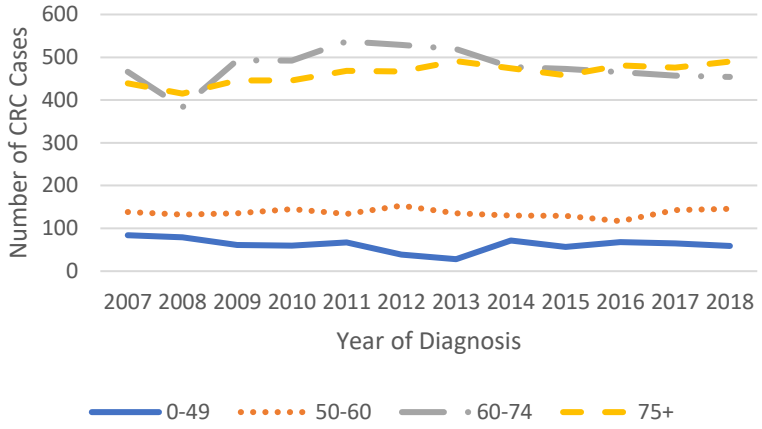
Cancers detected as part of BCSP would be expected to be diagnosed at an earlier stage, with better survival outcomes, compared with non-screening detected cancers for individuals of the same age. Further details can be found in Appendix 1.

It should be noted that other UK nations began Bowel Cancer Screening earlier than NI, and modalities of screening and/or age ranges covered are slightly different. For example, Scotland screens 50–74-year-olds and transitioned to using FIT in 2017. Wales replaced FOB with FIT screening in September 2019 and offers this to 60–74 year olds. England previously offered an additional “BowelScope” – a flexible sigmoidoscopy procedure at age 55 years, prior to a FIT test (or FOB test in some cases) every 2 years between 60-74 years. “BowelScope” is no longer offered in England. FIT screening implementation began in England in June 2019 (Cancer Research UK).

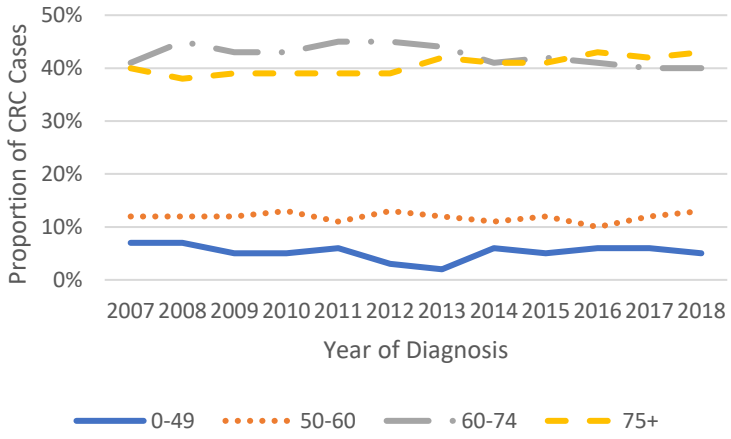
The screening FIT threshold is determined by a range of factors, including screening colonoscopy service capacity. Prior to the transition to FIT within BCSP, the programme had noted a higher positivity rate compared to other UK regions. Analysis was never able to identify a plausible reason for this, therefore there was uncertainty as to whether this increased positivity rate would persist after the introduction of FIT. Both considerations influenced the decision for FIT screening to be introduced at an initial threshold of 150 micrograms Hb/g.

Policy priorities within BCSP include working towards an ambition screening threshold of 20 micrograms Hb/g and age extension to 50-59 year old individuals.

(a) Trends in the number of colorectal cancer patients by age group, 2007-2018, NI.



(b) Trends in proportions of colorectal cancer patients by age group, 2007-2018, NI



(c) Trends in the proportion of colorectal cancer patients within the age group eligible for screening, 2007-2018, NI

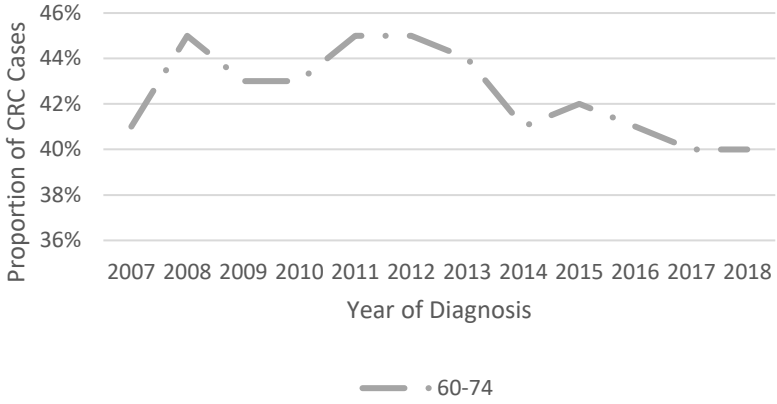


Figure 4 (a-c). The changing distribution of colorectal cancer by age groups, following the introduction of Bowel Cancer Screening in 2010, with full roll-out implemented by 2012 in NI.

Footnote: Legends reflect age groups, with 60-74 year olds eligible for Bowel Cancer Screening in NI.

Prevalence

▪ At the end of 2019, there were 8,861 people (Males: 4,813; Females: 4,048) living with CRC in NI who had been diagnosed with the disease during 1995-2019.

▪ Of these, 54.3% were male, 49.2% were aged 75 and over, and 11.2% had been diagnosed in the previous year. See Appendix 1.

Survival

▪ Survival from CRC varies by age at diagnosis, with poorer five-year survival in NI among the oldest patient populations. Five-year net survival (which takes account of the higher level of death from other causes in older persons) ranged from 70.6% among patients aged 15-44 at diagnosis to 51.1% among those aged 75 and over.

▪ Survival from CRC is also strongly linked with stage at diagnosis. Age-standardised five-year net survival ranged from 98.2% for stage I disease to 7.8% for stage IV disease in CRC patients in NI.

▪ Five-year survival among patients aged 60 to 74 whose cancer was detected by screening was 90.9% compared to 60.7% among those who were not detected via screening.

Further details can be found in Appendix 1.

▪ Survival was slightly lower for colon cancer than rectal cancer patients when comparing the 1 and 5 year survival, except for male 5 year age standardised net survival.

Table 2. Survival of colorectal cancer patients diagnosed 2010-2014 in NI, by tumour site.

	Observed Survival 1 Year	Observed Survival 5 Year	1 Year ASNS	5 Year ASNS	Male 5 Year ASNS	Female 5 Year ASNS
Colon	74.4	48.4	79.4	60.6	61.3	59.9
Rectum	81.7	53.1	84.6	62.1	59.9	65.5

ASNS: Age Standardised Net Survival; ASNS removes the effect of deaths from causes unrelated to cancer. Observed survival is the proportion of patients alive and includes deaths from causes other than cancer.

Further information on cancer statistics is available on the NICR website:
https://www.qub.ac.uk/research-centres/nicr/

Risk Factors

The biggest risk factor for CRC is increasing age, however approximately 5% of CRCs are hereditary. The two most common inherited colorectal cancer syndromes are hereditary nonpolyposis colorectal cancer (HNPCC), an autosomal dominant gene accounting for 3-4% of CRCs and familial adenomatous polyposis (FAP) (Mantovani et al., 2017). Individuals with inflammatory bowel disease (IBD) are also known to have an increased risk of CRC, with an estimated 1% of patients developing CRC after 10 years of IBD duration, rising to 5% of patients who have had IBD for more than 20 years (Lutgens et al., 2013). Other key modifiable risk factors are as follows.

Body fatness, nutrition and physical activity

A comprehensive global report on how diet, nutrition and physical activity affect CRC risk was published by the World Cancer Research Fund/American Institute for Cancer Research in 2018 (World Cancer Research Fund/American Institute for Cancer Research. Continuous Update Project Expert Report, 2018). There is strong evidence that being overweight or obese, being tall, high alcohol intake, or consuming a diet high in red or processed meat is associated with an increased risk of CRC. There is convincing evidence that being physically active is associated with a decreased risk of CRC. There is also probable evidence that consuming a diet high in wholegrains, foods containing dietary fibre, dairy produce and taking calcium supplements (dose >200mg/day) is associated with a reduced risk of CRC.

Tobacco smoking

A pooled analysis of 188 studies found that tobacco smoking is associated with a 14-17% increased risk of CRC, however this risk is higher for certain molecular subtypes of CRC (Botteri et al., 2020). Quitting smoking reduces risk of CRC in addition to other cancers and diseases of the lung and circulation.

Medications

Strong evidence exists for a protective effect of taking aspirin on CRC risk (Bosetti et al. 2020). Results from long-term follow-up of the International CAPP2 trial were published in 2020 and support evidence that individuals with Lynch syndrome (who are genetically predisposed to have an increased risk of CRC) should take low dose aspirin in order to reduce their risk (Burn et al., 2020). Hormone replacement therapy (HRT) use in postmenopausal women is also associated with a reduced risk of CRC, however this small absolute risk reduction must be weighed against the known increased risk of breast cancer associated with HRT use (Green et al., 2012).

Molecular Profiling of Colorectal Cancer

It is acknowledged that, since the publication of the last NI audit, there have been major strides in the ability to classify CRC according to its molecular profile. For example, the tumour microsatellite instability (MSI) status, *KRAS* or *BRAF* mutation status, will potentially be factored into Lynch syndrome testing or treatment decisions for patients in some instances.

Similar to audits in the rest of the UK, we have not captured this information for the purposes of this audit. We recognise that such information is important for collection in future audits.

Impact of COVID-19 pandemic

This audit provides an important benchmark for the standard of CRC treatment and care in NI just prior to the COVID-19 pandemic. Ongoing monitoring of the impact of COVID-19 pandemic on cancer diagnoses are published on a regular basis on the NICR website, see: https://www.qub.ac.uk/research-centres/nicr/

Aims and Methods

Audit Aims

This Audit has two aims:

1) To drive improvement in patient outcomes from CRC care by describing the pathway for presentation, investigation, treatment, and outcomes for patients diagnosed 2018 with primary CRC in NI and compare changes since 2006.
2) To compare processes of care for this cohort of patients with similar information from Scotland contained in the 2017 Audit led by the Information Services Division https://beta.isdscotland.org/find-publications-and-data/conditions-and-diseases/cancer-qpis/colorectal-cancer/27-june-2017/ and from England and Wales contained in the National Bowel Cancer Audit (NBOCA) https://www.nboca.org.uk/

Methods

- CRC cases (ICD 10 codes C18-C20) with an incident date of diagnosis of 01/01/2018 to 31/12/2018 were extracted from the NICR database.
- Additional information was extracted from Regional Information System for Oncology and Haematology (RISOH), Patient Administrative system (PAS) and Radiotherapy datasets from both NI cancer centres.
- A NICR Cancer Intelligence Officer (CIO) then supplemented this information following review of the following electronic care systems:
    - The Multidisciplinary Team Meeting administration system - Cancer Patient Pathway System (CaPPS);
    - Labcentre: a regional database of all pathology reports in NI;
    - NI picture archive and communications system (NIPACS) and Royal Victoria Hospital Imaging systems. These systems store radiology scans and associated data.

Clinicians from each of the five Health and Social Care (HSC) Trusts then added information not routinely available to the NICR. At the time of data collection in 2020, clinicians were working under the constraints of the COVID19 pandemic, however while most datasets were returned, the Northern Trust had some missing data which were provided later.

The 22 Key Performance Indicators (KPIs) presented in this report were identified by the Northern Ireland Cancer Network (NICaN) Colorectal Clinical Reference Group (CRG) as important measures of cancer service provision.

Comparisons for each KPI were made with similar information from the Scottish Audit, National Bowel Cancer Audit (NBOCA) for England and Wales and with previous NICR audit datasets. Iterative feedback was received on draft documents following presentation to the NICaN Colorectal CRG before publication.

HSC Trust of treatment was determined by Trust of surgery but for patients who did not have surgery Trust, their allocated primary Trust on CaPPs was used. This methodology was configured to ensure that patients who had treatments across multiple Trusts were not counted more than once in the audit, and Trusts had a reflective number of cases based on the numbers of patients that they treat.

Data were anonymised prior to statistical analysis, which took place in the secure environment of the NICR. Data were cleaned, coded and analysed using Microsoft Excel and Stata version 14.2 (StataCorp, TX, USA). Analysis was conducted separately for colon and rectosigmoid junction tumours (C18-19) and rectal tumours (C20) where relevant. Chi-squared tests were conducted to compare proportions of patients between categories, where appropriate.

Inclusion criteria for patients in the audit:

- All patients with a confirmed new primary cancer of the colon or rectum (ICD 10- C18-C20); irrespective of cancer history of any site;
- Patients with adenocarcinoma;
- Patients with synchronous colorectal tumours (analysed separately).

Exclusion criteria:

- Patients with cancer of unknown primary origin;
- Patients with anal cancer;
- Patients with appendiceal cancer;
- Patients with carcinoid/endocrine tumours, lymphoma, melanoma, or sarcoma;
- Patients with metastasis in the colon or rectum originating from another primary site;
- Patients with carcinoma-in-situ, non-invasive tumours, or dysplasia.

Table 3 below shows data for each year that an audit has been conducted in NI, and comparative methods for exclusions. Additional exclusions for 2018 data, for example excluding melanomas and lymphomas, were applied to ensure that data are comparable to similar reports from England, Wales and Scotland.

Table 3. Comparison of number of patients included in the NI audits for colorectal cancer across audit years (1996, 2001, 2006, 2018).

	Colon & RS Junction (C18 and C19)				Rectum (C20)			
	1996	2001	2006	2018	1996	2001	2006	2018
Total number of patients recorded in NICR	537	617	661	890	193	203	249	305
Exclusions – DCO*	1	1	0	1	0	0	0	0
Exclusions – Insufficient information	16	17	7	7	6	0	3	8
Exclusion- Morphology, appendix	N/A	N/A	N/A	63	N/A	N/A	N/A	0
Total exclusions	17	18	7	89	6	0	3	9
Total Reported*	**520 (97%)**	**599 (98%)**	**654 (99%)**	**801 (90%)**	**187 (97%)**	**203 (100%)**	**246 (99%)**	**296 (97%)**

Footnote: DCO: Death Certificate Only; RS Junction: Rectosigmoid junction; Figures in the 1996, 2001 and 2006 published NI CRC audit reports include cancers of the anus. These have been excluded from the above table and from all tables in this report comparing 2018 data with earlier audit years.

A total of 1,097 CRC patients with unique primary tumours were included in the NI Colorectal Cancer Audit for incident patients diagnosed in 2018.

An additional 19 patients with synchronous colorectal tumours were audited and intended to be analysed separately; however this low number precludes most meaningful analysis. The majority of patients with synchronous CRCs had two tumours within the colon and rectosigmoid junction.

Patient Demographics

Age and sex distribution

Table 4. Age and sex distribution of colorectal cancer patients diagnosed in 2018, NI.

	Number of patients (%)		
Age group, years	**Male**	**Female**	**All patients**
<50	25 (4%)	31 (6%)	56 (5%)
50 to 59	74 (12%)	65 (13%)	139 (13%)
60 to 74	262 (44%)	174 (35%)	436 (40%)
75 and over	238 (40%)	228 (46%)	466 (42%)
Total	599 (100%)	498 (100%)	1,097(100%)

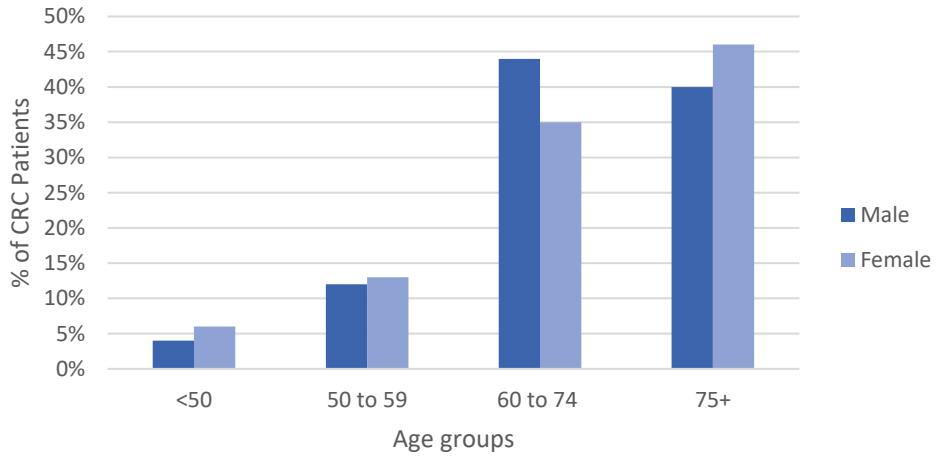


Figure 5. Age and sex distribution of colorectal cancer patients diagnosed in 2018, NI.

- In the 2018 audit, 599 CRC patients (55%) were male and 498 (45%) were female.
- 'Early-onset' CRC (diagnosis at age 50 years or younger) accounted for 5% of cases.
- 82% of CRC patients were diagnosed at age 60 years or older.
- The age range that are eligible for Bowel Cancer Screening (60-74 years) accounted for 40% of all CRC patients in 2018; this age group included the highest proportion of all male patients (44%).
- Almost half of all female CRC patients (46%) were diagnosed at age 75 years or older, compared with 40% of male CRC patients. Differences in proportions of CRC between males and females by age groups presented were not statistically significant (p=0.16).

Age distribution by colorectal cancer site

Table 5. Age group distribution by colorectal cancer site of patients diagnosed in 2018, NI.

	Number of patients (%)		
Age group, years	**Colon & RS junction**	**Rectum**	**All patients**
<50	34 (4%)	22 (7%)	56 (5%)
50 to 59	90 (11%)	49 (17%)	139 (13%)
60 to 74	306 (38%)	130 (44%)	436 (40%)
75 and over	371 (46%)	95 (32%)	466 (42%)
Total	801 (100%)*	296 (100%)	1,097(100%)

*% may not total 100% due to rounding.

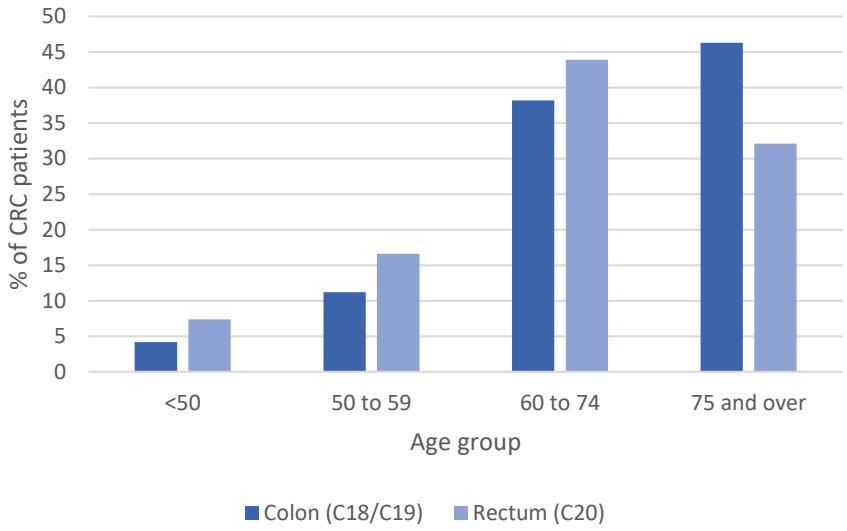


Figure 6. Age group distribution by colorectal cancer site for colorectal cancer patients diagnosed in 2018, NI.

- 85% of colon (including rectosigmoid junction) cancer patients were aged 60 years and over, compared with 76% of rectal cancers.
- The highest proportion of rectal cancers (44%) was diagnosed amongst the age group eligible for screening (60-74 year olds), while 38% of colon cancers were diagnosed in this age group.
- For colon cancers, there was a steady increase in cases with age, with the highest proportion of cases diagnosed in patients aged over 75 years (46%).
- Differences in proportions of CRC by tumour location between age groups was statistically significant with rectal cancer more common in younger age groups and colon cancer more common in older age groups ($p<0.001$).

Socio-economic status

Table 6. Deprivation quintile of colorectal cancer patients across each audit year (1996, 2001, 2006, 2018), NI.

	Number of patients (%)			
Deprivation quintile based on area of residence at diagnosis	**1996 (n=719)**	**2001 (n=812)**	**2006 (n=913)**	**2018 (n=1,097)***
Quintile 1 (Most affluent, least deprived)	106 (15%)	126 (15%)	170 (19%)	228 (21%)
Quintile 2	129 (18%)	170 (21%)	180 (20%)	235 (21%)
Quintile 3	164 (23%)	152 (19%)	189 (21%)	230 (21%)
Quintile 4	162 (23%)	172 (21%)	195 (21%)	229 (21%)
Quintile 5 (Least affluent, most deprived)	158 (22%)	192 (24%)	179 (20%)	172 (16%)

*Data on area of residence, used to derive deprivation quintile, was missing for n=3 patients.

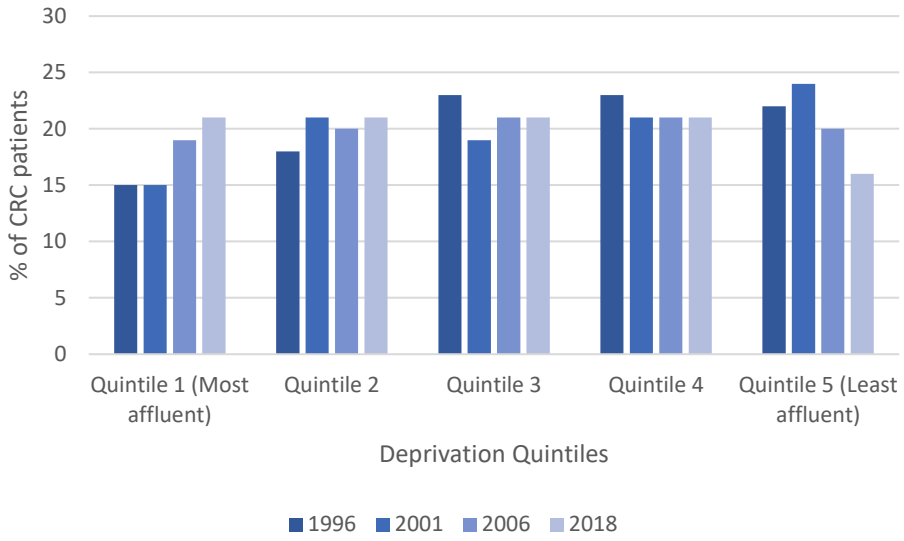


Figure 7. Deprivation quintile of colorectal cancer patients across each audit year (1996, 2001, 2006, 2018), NI.

- As shown above, there was an increase over time in the proportion of CRC diagnosed among those living in more affluent areas. There was also a reduction in the proportion of cases among those living in the least affluent area.
- *(Note this is different to the standardised patterns presented in Appendix 1, which take account of the population size and age structure)*

Comorbidities

Table 7. Frequency of other bowel disease and comorbidities across each audit year among colorectal cancer patients (1996, 2001, 2006, 2018), NI.

Other Bowel Disease	Number of patients (%)			
	1996 (n=719)	2001 (n=812)	2006 (n=913)	2018 (n=1,097)
Ulcerative colitis/colitis (non-infective)/ Crohn's disease	8 (0.3%)	15(0.7%)	18 (0.9%)	11 (1%)
Familial adenomatous polyposis	Not recorded	7 (<1%)	5 (<1%)	0
Diverticular disease	39 (5%)	58 (7%)	126 (14%)	91 (8%)
Other malignancy of any organ (excluding non-melanoma skin cancer)	41 (6%)	68 (8%)	92 (10%)	100 (9%)
Charlson comorbidity score*				
0			Not collected	691 (63%)
1				178 (16%)
2				140 (14%)
3				46 (4%)
4+				42 (4%)

Note: Non-infective colitis data were not collected 2018; Caution is required in interpreting the 2018 comorbidity data, which relies entirely on information retrieval from electronic systems and therefore is different in methodology to previous audits where case note review took place.

*Charlson comorbidity score was calculated on the basis of points assigned for the following, with no points assigned for the colorectal tumour if metastatic: AIDS (6), other non-colorectal metastatic solid tumour (6), other solid tumour without metastases in the last 5 years (2), lymphoma (2), leukaemia (2), moderate or severe liver disease (3), mild liver disease (2), moderate or severe renal disease (2), diabetes with end organ damage (2), diabetes without end organ damage (1), hemiplegia (2), peptic ulcer disease (1), connective tissue disease (1), chronic pulmonary disease (1), dementia (1), cerebrovascular disease (1), peripheral vascular disease (1), congestive heart failure (1), myocardial infarction (1).

- Although inflammatory bowel disease is a recognised risk factor for CRC, only 1% of patients had a recorded history of Ulcerative colitis or Crohn's disease in 2018; this is similar to previous audit years.
- Approximately 1 in 10 patients with CRC had a previous history or concurrent diagnosis of another malignancy in 2018; this was similar to earlier audit years. The most common previous or concurrent cancer types were prostate cancer (n=25), breast cancer (n=22), lung cancer (n=10), bladder cancer (n=7) and kidney cancer (n=5).
- The Charlson comorbidity score was estimated in CRC patients diagnosed in 2018. More than one third of patients are presenting with a comorbidity score of 1+, and one in five patients had a score of 2+.
- The prevalence of co-morbidities in CRC patients increased with age, from approximately one in five patients aged <60 years, to approximately one in three 60-74 year olds, and approximately one in two patients aged 75 years or older having a Charlson comorbidity score of 1+.

Tumour characteristics

Staging and Histopathology Characteristics

Table 8. Frequency of colorectal cancer stage at diagnosis overall, and by colorectal cancer subsite in patients diagnosed in 2018, NI.

	Number of patients (%)		
Stage Group	**Colon & RS junction (n=801)**	**Rectal (n=296)**	**All patients (n=1,097)**
I (early)	92 (12%)	52 (18%)	144 (13%)
II	225 (28%)	47 (16%)	272 (25%)
III	188 (23%)	103 (35%)	291 (27%)
IV (late)	195 (24%)	48 (16%)	243 (22%)
Not Known	101 (13%)	45 (15%)	147 (13%)

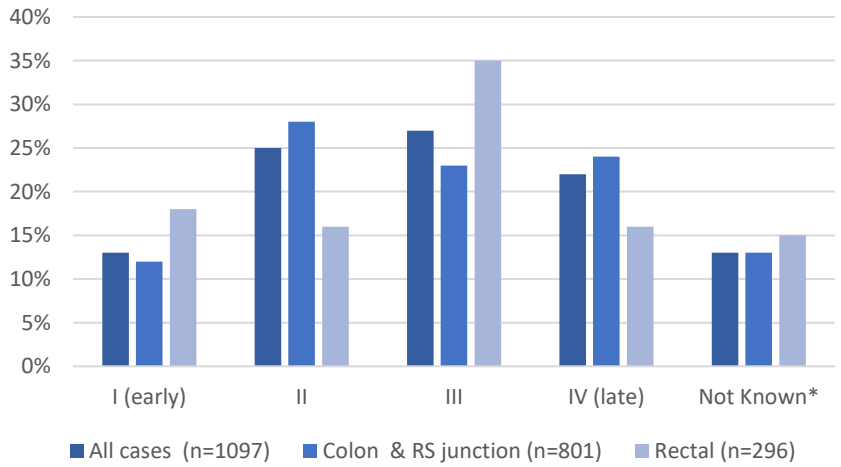


Figure 8. Frequency of colorectal cancer staging overall, and by colorectal cancer subsite in patients diagnosed in 2018, NI.

- In 2018, 87% of cases had a stage assigned. The two main reasons why a case is unable to have a stage assigned are either that there is insufficient diagnostic information available to satisfy UICC TNM8 requirements to assign a stage, or that there is a clinically complex case where a stage is unable to be assigned.
- 13% of CRC patients presented with early disease (stage I), 52% presented with stage II or III disease, and 22% presented with advanced metastatic colorectal cancer (stage IV). This was a reduction from 26% in 1996.

Staging comparisons with previous audit years

Table 9. Stage at presentation for colorectal cancer overall, and by subsite for all age groups across each audit year (1996, 2001, 2006, 2018), NI.

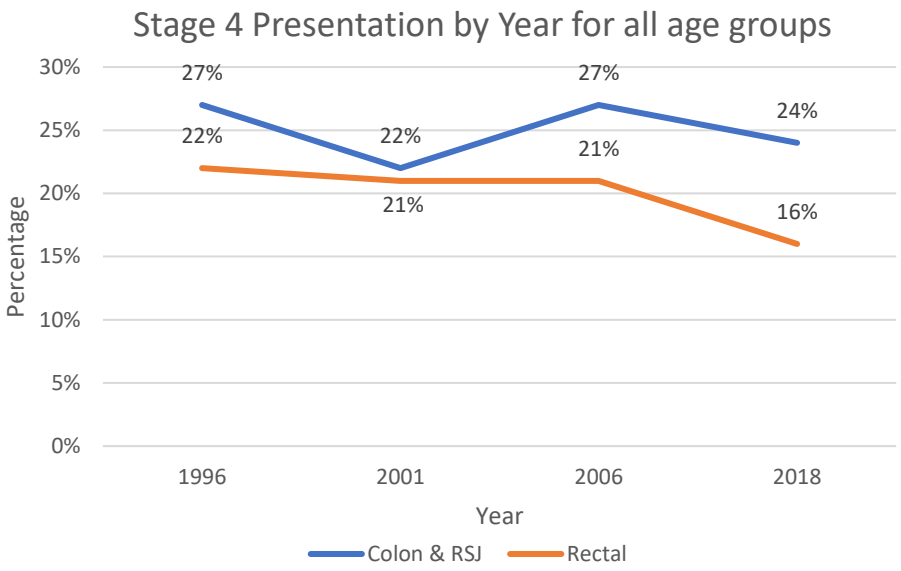
		Number of patients (%)*				
	Site	Stage 1	Stage 2	Stage 3	Stage 4	Stage Unknown
1996	Colorectal (n=707)	59 (8%)	239 (34%)	148 (21%)	182 (26%)	79 (11%)
	Colon & RSJ (n=519)	35 (7%)	187 (36%)	109 (21%)	140 (27%)	48 (9%)
	Rectal (n=188)	24 (13%)	52 (28%)	39 (21%)	42 (22%)	31 (16%)
2001	Colorectal (n=802)	88 (11%)	211 (26%)	238 (30%)	173 (22%)	92 (11%)
	Colon & RSJ (n=599)	52 (9%)	170 (28%)	191 (32%)	131 (22%)	55 (9%)
	Rectal (n=203)	36 (18%)	41 (20%)	47 (23%)	42 (21%)	37 (18%)
2006	Colorectal (n=892)	108 (12%)	245 (27%)	231 (26%)	225 (25%)	83 (9%)
	Colon & RSJ (n=646)	62 (10%)	189 (29%)	169 (26%)	173 (27%)	53 (8%)
	Rectal (n=246)	46 (19%)	56 (23%)	62 (25%)	52 (21%)	30 (12%)
2018	Colorectal (n=1097)	144 (13%)	272 (25%)	291 (27%)	243 (22%)	147 (13%)
	Colon & RSJ (n=801)	92 (12%)	225 (28%)	188 (23%)	195 (24%)	101 (13%)
	Rectal (n=296)	52 (18%)	47 (16%)	103 (35%)	48 (16%)	46 (16%)

*% may not total 100% due to rounding. *Stage at diagnosis for years 1996-2006 are recorded in UICC TNM5, and 2018 is recorded as TNM8.

- The number of CRC patients has risen from 707 in 1996 to 1,097 in 2018, an increase of 390 incident patients.
- There was an increase in stage I CRC being detected, rising from 59 patients in 1996 to 144 patients diagnosed in 2018. The proportion has increased from 8% in 1996 to 13% in 2018
- The number of stage IV (metastatic disease) CRC patients increased from 182 in 1996 to 243 in 2018. The proportion of CRC patients presenting with stage IV has stayed approximately the same over the audit years (26% in 1996, 22% in 2001, 25% in 2006, and 22% in 2018).
- The proportion of rectal cancer patients diagnosed with stage IV disease has decreased over time from 21%-22% of all rectal cancer patients in 1996-2006, to 16% of rectal cancer patients in 2018.

- These improvements in stage-shift amongst <u>all age groups</u> diagnosed with CRC are highlighted in Figures 9(a) and (b).

(a)



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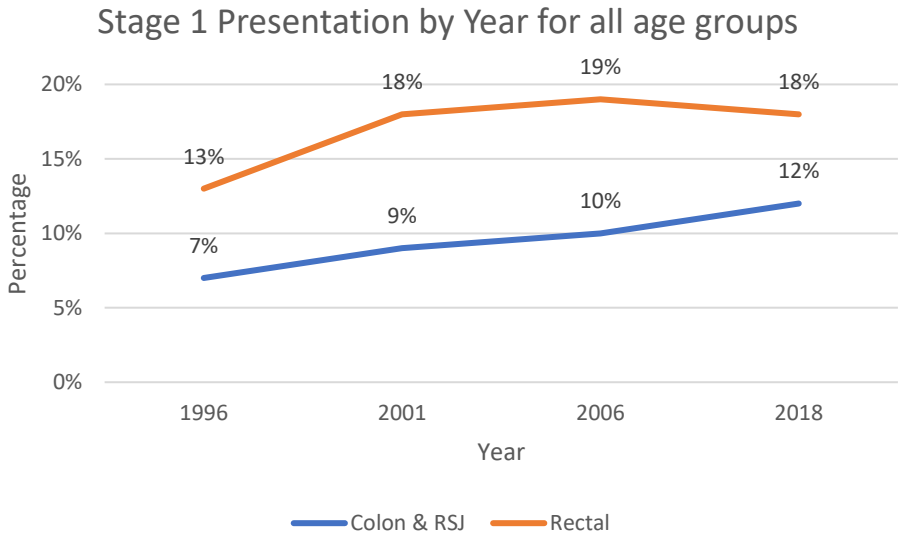


Figure 9. (a) The reduction in Stage IV rectal tumours and (b) the increase in Stage I colon and rectosigmoid junction tumours for <u>all age groups</u> across each audit year (1996, 2001, 2006, 2018), NI.

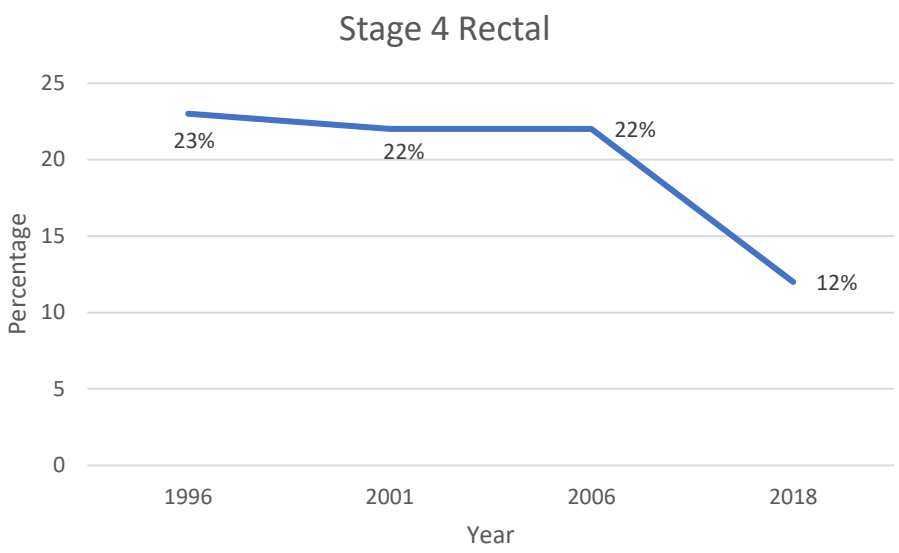
Table 10. Stage at presentation for colorectal cancer overall, and by subsite in age group eligible for screening (60-74 years), regardless of mode of presentation, across each audit year (1996, 2001, 2006, 2018), NI.

Audit Year	Site	Number of patients (%)				
		Stage 1	Stage 2	Stage 3	Stage 4	Stage Unknown
1996	Colorectal (n=314)	25 (8%)	107 (34%)	78 (25%)	82 (26%)	22 (7%)
	Colon & RSJ (n=235)	16 (7%)	83 (35%)	58 (25%)	64 (27%)	14 (6%)
	Rectal (n=79)	9 (11%)	24 (30%)	20 (25%)	18 (23%)	8 (10%)
2001	Colorectal (n=337)	41 (12%)	92 (27%)	99 (29%)	81 (24%)	24 (7%)
	Colon & RSJ (n=247)	20 (8%)	75 (30%)	76 (31%)	61 (25%)	15 (6%)
	Rectal (n=90)	21 (23%)	17 (19%)	23 (26%)	20 (22%)	9 (10%)
2006	Colorectal (n=363)	46 (13%)	111 (31%)	101 (28%)	90 (25%)	15 (4%)
	Colon & RSJ (n=255)	24 (9%)	84 (33%)	72 (28%)	66 (26%)	9 (4%)
	Rectal (n=108)	22 (20%)	27 (25%)	29 (27%)	24 (22%)	6 (6%)
2018	Colorectal (n=436)	71 (16%)	112 (26%)	117 (27%)	103 (24%)	33 (7%)
	Colon & RSJ (n=306)	45 (15%)	89 (29%)	71 (23%)	88 (29%)	13 (4%)
	Rectal (n=130)	26 (20%)	23 (18%)	46 (35%)	15 (12%)	20 (15%)

*% may not total 100% due to rounding. *Stage at diagnosis for years 1996-2006 are recorded in UICC TNM5, and 2018 is recorded as TNM8.

- An improvement in staging distribution was particularly evident for rectal tumours amongst the age group eligible for screening (60-74 year olds), with the proportion of patients diagnosed with stage IV metastatic rectal cancer declining from 23% in 2006 to 12% in 2018. This stage-shift appears to have led to an increase in the proportion of stage 3 rectal tumours amongst 60-74 year olds, increased from approximately 25%-27% in 1996-2006 to 35% in 2018, rather than earlier stage 1 or 2 tumours.
- Amongst the age group eligible for screening, there has been an increase in the proportion of colon and rectosigmoid junction tumours diagnosed at early stage 1 in 2018 (15%, compared with 7%-9% being diagnosed as Stage I in 1996, 2001 and 2006).

(a)



(b)

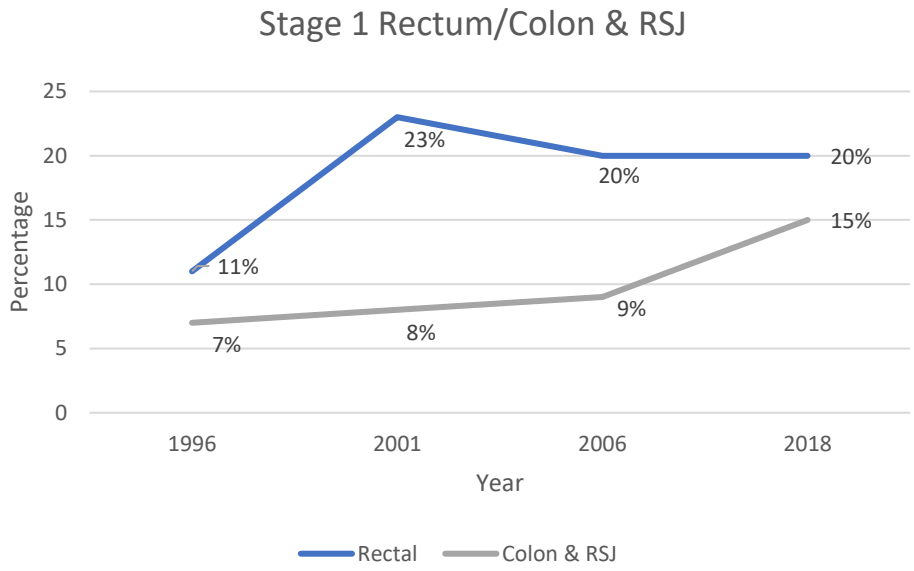


Figure 10. (a) The reduction in Stage IV rectal tumours and (b) the changes in Stage I colon and rectosigmoid junction and rectal tumours for the age group eligible for screening (60-74 years) across each audit year (1996, 2001, 2006, 2018), NI.

Staging within Bowel Cancer Screen-detected tumours

Table 11. Stage at presentation for colorectal cancer overall, and by subsite in screen-detected tumours in 60-74 year olds diagnosed in 2018, NI.

		Number of patients (%)				
Audit Year	Site	Stage 1	Stage 2	Stage 3	Stage 4	Stage Unknown
2018	Colorectal (n=91)	25 (27%)	29 (32%)	27 (30%)	5 (5.5%)	5 (5.5%)
	Colon & RSJ (n=60)	17 (28%)	23 (38%)	15 (25%)	*	*
	Rectal (n=31)	8 (26%)	6 (19%)	12 (39%)	*	*

*Small numbers <5 cannot be reported to maintain anonymity.

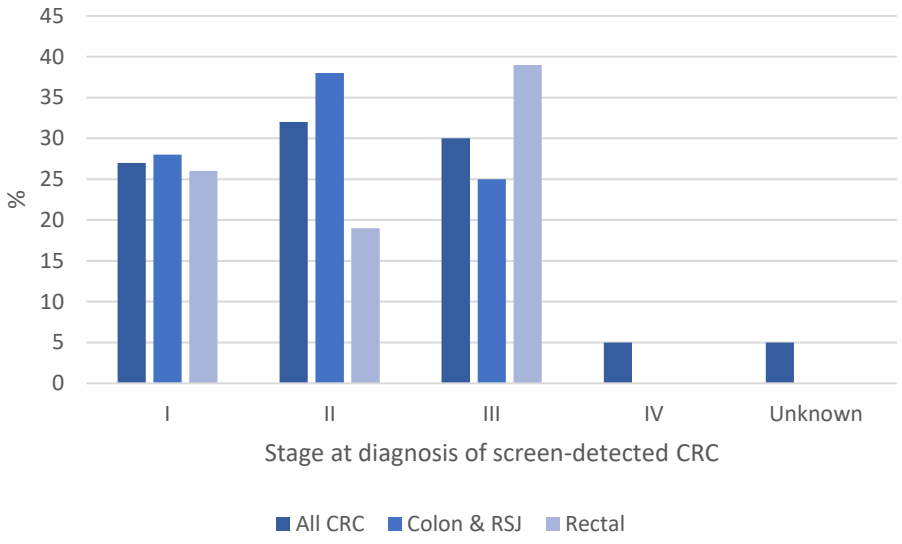


Figure 11. Stage at presentation for colorectal cancer overall, and by colorectal cancer subsite in screen-detected tumours in 60-74 year olds diagnosed in 2018, NI.

- Of the 436 CRC diagnosed in 60-74 year olds, 91 (21%) were detected via Bowel Cancer Screening.
- Approximately 1 in 4 (27%) Bowel Cancer Screen-detected CRC were diagnosed at stage I, with over half (59%) diagnosed at stage I or II combined.
- Approximately 1 in 20 (5.5%) screen-detected CRC were diagnosed at stage IV.

Histopathology

Table 12. Frequency of colorectal cancer histopathology characteristics overall, and by subsite, in patients diagnosed in 2018, NI.

	Number of patients (%)		
	All patients (n=1,097)	Colon & RS junction (n=801)	Rectal (n=296)
Morphology			
Adenocarcinoma	959 (87%)	677 (87%)	282 (95%)
Other	8 (1%)	6 (1%)	*
Unspecified	130 (12%)	118 (15%)	*
Grade			
Well differentiated	35 (3%)	27 (3%)	8 (3%)
Moderately differentiated	657 (60%)	464 (58%)	193 (65%)
Poorly differentiated	117 (11%)	97 (12%)	20 (7%)
Unknown/Not applicable	288 (26%)	213 (27%)	75 (25%)
Extramural venous invasion	247 (23%)	199 (25%)	48 (16%)

*Small numbers <5 cannot be reported to maintain anonymity; other cells anonymised to prevent disclosure. Note that the denominator is all tumours, not just microscopically verified colorectal cancers (non-microscopically verified tumours have an unspecified morphology). .

- The majority of CRC were classified as adenocarcinomas, including mucinous tumours, representing 95% of rectal tumours and 84% of colon and rectosigmoid junction tumours.
- Colon and rectosigmoid junction tumours were more likely to have adverse features such as poor differentiation (12% v 7%, p=0.04) and extramural venous invasion (25% v 16%, p=0.002) compared with rectal tumours.

Referral and Diagnosis

Presentation

Table 13. Source of referral to specialist care of colorectal cancer patients diagnosed in 2018, NI.

Mode of Presentation	Number of patients (%)** All ages			Number of patients (%) 60-74 year olds only, i.e. eligible for Bowel Cancer Screening		
	All patients (n=1097)	Colon & RS junction (n=801)	Rectum (n=296)	All patients (n=436)	Colon & RS junction (n=306)	Rectum (n=130)
Outpatients*	410 (37%)	283 (35%)	127 (43%)	141 (32%)	92 (30%)	49 (38%)
Emergency Admissions	137 (12%)	110 (14%)	27 (9%)	33 (8%)	25 (8%)	8 (6%)
Screening	91 (8%)	60 (7%)	31 (10%)	91 (21%)	60 (20%)	31 (24%)
Other Referral	228 (21%)	175 (22%)	53 (18%)	80 (18%)	61 (20%)	19 (14%)
Not recorded	231 (21%)	173 (22%)	58 (20%)	91 (21%)	68 (22%)	23 (18%)

* Includes 8 patients who were referred to Outpatients following a presentation at A&E in 2018.
**% may not total 100% due to rounding.

- 2018 represents the first audit year following the introduction of population-based Bowel Cancer Screening; overall 8% of CRC were identified by screening, accounting for 7% of colon and 10% of rectal cancer patients. This is similar to the most recent 2019 NICR factsheet (Appendix 1), in which 8.6% of all CRC were detected by screening.
- In the age group eligible for screening, Bowel Cancer Screening identified 21% of new CRC diagnosed in 60-74 year olds in 2018.
- Overall, 12% (equivalent to approximately 1 in 8 CRC patients) presented as an emergency admission.
- Using a different definition of having an emergency admission within 30 days prior to CRC diagnosis, the 2019 CRC factsheet reported that 18.5% of CRC patients had an emergency presentation.
- CRC patients within the Bowel Cancer Screening-eligible population (aged 60-74 years) were less likely to present via outpatients (32% vs 37%) or emergency (8% vs 12%) compared with all CRC patients.

Health and Social Care Trust of Treatment

CRC patients are treated at all five Health and Social Care (HSC) Trusts in NI, with the Belfast Trust and South Eastern Trusts each treating 23% of patients, while the Western Trust accounted for 14% of CRC patients treated in NI in 2018.

Table 14. Distribution of colorectal cancer patients diagnosed in 2018 by Trust of treatment, NI.

Trust of Treatment	All cases (n=1,097)	Colon & RS junction (n=801)	Rectal (n=296)
Belfast	258 (23.5%)	185 (23%)	73 (25%)
Northern	231 (21%)	165 (21%)	66 (22%)
Southern	213 (19%)	161 (20%)	52 (17.5%)
South Eastern	247 (22.5%)	189 (24%)	58 (19.5%)
Western	148 (14%)	101 (13%)	47 (16%)
Northern Ireland Total	1,097 (100%)	801 (100%)	296 (100%)

Table 15. Distribution of colorectal cancer patients diagnosed in 2018 by Trust of treatment and Trust of Residence, NI.

	Frequency (%) of Patients from their Trust of Residence*					
Trust of Treatment	Belfast residents (n=204)	Northern residents (n=298)	Southern residents (n=237)	South Eastern residents (n=206)	Western residents (n=149)	All patients (n=1,097)
Belfast	154 (75%)	49 (16%)	7 (3%)	45 (19%)	*	258
Northern	0	230 (77%)	0	*	0	231
Southern	0	12 (4%)	193 (93%)	*	*	213
South Eastern	50 (25%)	*	*	186 (78%)	0	247
Western Trust	0	*	*	0	145 (97%)	148

Data on Trust of Residence was missing for n=3 patients.
*Small numbers <5 cannot be reported to maintain anonymity; other cells anonymised to prevent disclosure.

- The majority of patients were treated within their Trust of residence.
- The Belfast and South Eastern HSC Trusts had the highest proportion of cross-over, with 25% of Belfast HSC Trust resident patients treated in the South Eastern HSC Trust, and 19% of South Eastern HSC Trust resident patients treated in the Belfast HSC Trust.
- 77% of Northern HSC Trust resident patients were treated in the Northern HSC trust, with 16% treated in the Belfast HSC Trust, and smaller numbers treated in other Trusts.
- Almost all patients residing in the Southern and Western HSC Trusts were treated in those trusts (93% and 97%, respectively).

Table 16. Frequency of colorectal cancer patients diagnosed in 2018, recorded as being discussed at Multidisciplinary Team Meetings (MDM), by (a) Trust of treatment, and (b) across audit report years (2001, 2006, 2018), NI.

(a)

	Number of patients (%)		
Trust	**Colorectal**	**Colon & RS junction**	**Rectal**
Belfast (n=258)	253 (98%)	180 (97%)	73 (100%)
Northern (n=231)	224 (97%)	158 (96%)	66 (100%)
Southern (n=213)	208 (98%)	156 (97%)	52 (100%)
South Eastern (n=247)	239 (97%)	181 (96%)	58 (100%)
Western (n=148)	144 (97%)	97 (96%)	47 (100%)

(b)

Site	**Number of patients (%)**		
	2001 (n=802)	**2006 (n=892)**	**2018 (n=1,097)**
Colorectal	169 (21%)	535 (60%)	1,068 (97%)
Colon & RS junction	107 (18%)	370 (57%)	772 (96%)
Rectal	62 (10%)	165 (67%)	296 (100%)

- In 2018, the vast majority of CRC patients (97-98%) had been discussed at Multidisciplinary Team Meetings (MDMs) across all Trusts in NI, reflecting the substantive change in clinical practice from earlier audit years and achievement of recommendations from the NI 1996 Campbell report ("Cancer Services – Investing for the Future").
- In 2018, 100% of rectal cancer patients had been discussed at MDMs in 2018, compared with 21% in 2001 and 60% in 2006.
- The vast majority (96%) of colon cancer patients diagnosed in 2018 were discussed at MDMs.
- Of the 29 colon cancer patients (4%) not discussed at MDMs, 13 patients died within one month of their diagnosis, suggesting death before any MDM could take place. Many were stage IV (n=12) or unknown stage (n=14), reflecting advanced disease. Few patients (n<5) had a histologically confirmed basis of diagnosis, with the remainder diagnosed via imaging, clinical opinion etc. All were aged >60 years old, and 23 were aged >=75 years old.

Table 17. Timeline of patient pathways to Multidisciplinary Team Meetings (MDM) from point of referral and time of clinical diagnosis for colorectal cancer patients diagnosed in 2018, NI.

	Number of patients (%)	
	Referral Time to MDM (n=1,097)	Time Diagnosis to MDM (n=1,097)
Not recorded	66 (6%)	29 (3%)
	Referral to MDM (n=1,031)*	Diagnosis to MDM (n=1,068)*
Duration (Days)		
Day 1	23 (2%)	100 (9%)
Day 14	258 (25%)	639 (60%)
Day 31	526 (51%)	988 (93%)
Day 62	842 (82%)	1,056 (99%)

*Numbers and percentages are cumulative of patients seen by this day, of those with a timeline recorded.

- In 2018, approximately half of CRC patients (51%) were discussed at MDM within 31 days of their referral for investigation; rising to 82% being discussed at MDM within 62 days of referral.
- Of the 189 patients who were not discussed at a MDM within 62 days of referral, the majority had been referred to Outpatients through their GP or other Consultant referral (n=126, 67%), with a notable proportion referred through Bowel Cancer Screening (n=26, 14%).
- The vast majority of patients were discussed at MDM within 31 days (93%) of their clinical diagnosis of cancer, rising to 99% of the CRC patients discussed at MDM being discussed within 62 days of diagnosis.
- In NI the Cancer Patient Pathway System (CaPPS) is used as an administration system for MDTs and the data input into CaPPS is used for Northern Ireland's Official Statistics for Cancer Waiting times. It is crucial that each cancer patient's data are input into this system to ensure that cancer waiting times are correct and all patients are accounted for.

KEY PERFORMANCE INDICATORS – Referral and Diagnosis

This section outlines the Key Performance Indicators (KPIs) agreed by the NI Colorectal Cancer Clinical Reference Group for Multi-Disciplinary Team meetings (MDM), Clinical Nurse Specialist (CNS) involvement and pre-treatment radiological imaging.

KPI: Multi-Disciplinary Team and Clinical Nurse Specialist (CNS) Referrals

The first KPI relates to the number of patients being discussed by a Multi-Disciplinary Team meeting (MDM) *prior to treatment*, as recorded in their notes.

A CRC MDM is a dedicated meeting where patient's medical notes and diagnostic investigations are discussed and a treatment plan options are formulated for patients to provide the best care that can be delivered depending on their individual clinical needs. Members of a multidisciplinary team include (but are not limited to): surgeons, oncologists, pathologists, radiologists, clinical nurse specialists, stoma care nurses, palliative care clinicians and dietitians.

The second KPI relates to the number of patients discussed by a CNS prior to treatment, as recorded in the notes.

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Referral and Diagnosis KPIs exclude 216 CRC** patients for the following reasons:

- Patients who had an emergency surgery
- Patients who had polypectomy or local excision as their only course of treatment
- Patients who died within 5 days of their diagnosis

This left **881** colorectal cancer patients for inclusion in this KPI analysis, **representing 80%** of all colorectal cancer patients in the 2018 audit.

Table 18. Colorectal cancer patients diagnosed in 2018 discussed at Multi-Disciplinary Team meetings and by Clinical Nurse Specialists, NI.

Total number of patients in region	Number of patients (%) discussed by MDM prior to treatment	Data on CNS Completeness* (%)	Number of patients reviewed by CNS as % of data completeness
Northern Ireland (n=881)	861 (98%)	91%	671 (84%)
HSC Trust			
Belfast Trust (n=217)	213 (98%)	99%	174 (81%)
Northern Trust (n=182)	178 (98%)	88%	117 (73%)
Southern Trust (n=159)	155 (97%)	89%	121 (85%)
South Eastern Trust (n=206)	202 (98%)	91%	176 (94%)
Western Trust (n=117)	113 (97%)	85%	83 (83%)
Other UK Comparators			
West of Scotland 2018/19 (n=1322)	1,278 (97%)		
NBOCA (n=29,766)			25,598 (86%)
KPI target	95%		N/A

* Data were not available universally across Trusts. The proportion of patients reviewed by CNS must therefore be interpreted in the context of data completeness.

- NI showed a strong performance for MDM discussion prior to treatment at 98%.
- Performance across all Trusts was comparable with 97% average in the West of Scotland and greater than the Scottish national target of 95%.
- The data for patients with a *record available* of having been seen by a CNS were 91% for NI overall, ranging from 85% in the Western Trust to 99% in the Belfast Trust.
- When accounting for data availability, the variation in recorded CNS referrals ranged from 73% of patients having a dedicated CNS referral in the Northern Trust to 94% of patients in the South Eastern Trust.
- In England/Wales, 86% of CRC patients were seen by a CNS, which is slightly higher than the NI average of 84%.

KPI: Radiological Imaging

Three KPIs related to radiological imaging were investigated to assess the full staging information required to inform the optimal treatment plan for patients.

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Radiological imaging KPIs exclude 424 CRC** (349 colon cancer and 75 rectal cancer) patients for the following reasons:

- Patients who had an emergency surgery
- Patients who had polypectomy or local excision as their only course of treatment
- Patients who did not receive any chemotherapy/radiotherapy/surgery as a treatment option.
- Patients receiving palliative or supportive care - the latter including patients deemed unfit for treatment.
- Patients with known contraindications for MRI scans. Data on contraindications, for example metallic implants, body weight, contrast allergy etc, to MRI scanning, which were largely not available for analysis in this audit and so this should be considered as incomplete. This may affect interpretation of regional variation in MRI scanning.

This left 452 colon cancer patients for inclusion in this KPI analysis, **representing 56%** of all colon cancer patients in the 2018 audit.
This left 221 rectal cancer patients for inclusion in this KPI analysis, **representing 75%** of all rectal cancer patients in the 2018 audit.

Further analysis was conducted and presented excluding patients who underwent polypectomy followed by surgery.

Data are presented as percentages for most analyses to prevent disclosure of the small number of patients (n<5) who did not receive full imaging in some Trusts.

KPI: Radiological imaging for colon cancer

This KPI assesses the number of colon cancer patients who have received a **CT scan of the pelvis, abdomen and chest** in order to have the full complement of imaging required for staging **prior to their first day of definitive treatment** (i.e. elective surgery, chemotherapy and/or radiotherapy).

Table 19. Colon cancer patients diagnosed in 2018 receiving full imaging prior to first treatment, NI.

Total number of patients in region	Number of patients (%) receiving full imaging	Proportion of patients (%) receiving full imaging, excluding patients who had polypectomy followed by surgery
Northern Ireland (n=452)	419 (93%)	(96%)
HSC Trust		
Belfast Trust (100%)	94%	96%
Northern Trust (100%)	96%	98%
Southern Trust (100%)	92%	96%
South Eastern Trust (100%)	89%	91%
Western Trust (100%)	93%	98%
Other UK Comparators		
West of Scotland (2018/19) (n=627)	604 (96%)	N/A
KPI target*	95%	N/A

- Overall, NI fell just below the KPI target of 95%, with 93% of colon (including rectosigmoid junction) cancer patients diagnosed in 2018 having had full staging CT scanning prior to their first definitive treatment.
- This ranged from 89%-96% across HSC Trusts, with the Northern Trust exceeding the 95% target.
- When patients who have polypectomy as their first scheduled treatment, and have a subsequent surgery afterwards are excluded from full CT staging scan analysis, regional performance for full CT staging scanning increases to 96%, ranging from 91% to 98%. This exceeds the 95% target for NI overall, and for four of five Trusts.
- In the West of Scotland comparator region, 96% of patients received full imaging prior to their first definitive treatment. This ranged from 95% in North Glasgow to 98% in Ayrshire & Arran, with six out of seven of the MDT areas in the West of Scotland meeting the KPI target.

KPI: Radiological imaging for rectal cancer

This KPI assesses the number of rectal cancer patients who have received a full complement of **pelvic, abdominal and chest CT scanning** prior to their first definitive treatment, and the number of rectal cancer patients who received full **pelvic, abdominal and chest CT scanning and a pelvic MRI** scan **prior to their first day of definitive treatment** (i.e. elective surgery, chemotherapy and/or radiotherapy).

Table 20. Rectal cancer patients diagnosed in 2018 receiving full imaging prior to first treatment, NI.

	CT scanning	CT scanning excluding patients who had polyp-ectomy followed by surgery	CT & Pelvic MRI scanning	CT & Pelvic MRI scanning excluding patients who had polyp-ectomy followed by surgery
Total number of patients in region	**Number of patients (%)**	**(%)**	**Number of patients (%)**	**(%)**
Northern Ireland (n=221)	213 (96%)	99%	181 (82%)	84%
HSC Trust				
Belfast Trust (100%)	100%	100%	83%	83%
Northern Trust (100%)	98%	100%	85%	86%
Southern Trust (100%)	93%	100%	72%	78%
South Eastern Trust (100%)	92%	96%	79%	83%
Western Trust (100%)	97%	100%	87%	89%
Other UK Comparators				
West of Scotland (2018/19) (n=260)		N/A		258 (99%)
KPI target		N/A		95%

- The majority of rectal cancer patients across NI (96%) received full CT imaging of the pelvis, abdomen and chest prior to their first definitive treatment.
- This ranged from 92-100% across HSC Trusts, with three HSC Trusts scanning >95% of patients: Belfast, Northern, and Western HSC Trusts.
- Amongst rectal cancer patients, 82% received a pre-treatment MRI scan in addition to their CT imaging. This ranged from 72%-87% across HSC Trusts, improving slightly to 78%-89% (and 84% for NI overall) once patients who had polypectomy followed by surgery were excluded.
- No Trusts met the 95% target for pre-treatment MRI and full CT imaging, even when rectal cancer patients who had polypectomy followed by surgery were excluded from analysis.
- In the West of Scotland comparator region, 99% of patients received full imaging including a pelvic MRI scan prior to their first definitive treatment.

Treatment

Overview of Combined Treatment for Colorectal Cancer Patients

Table 21. Overview of combined treatment modalities including chemotherapy, radiotherapy & surgery for colorectal cancer patients diagnosed in 2018, NI.

Treatment	Number of patients (%)							
	Colon & RS junction (C18-19)				Rectum (C20)			
	1996 (n=520)	2001 (n=599)	2006 (n=654)	2018 (n=801)	1996 (n=187)	2001 (n=203)	2006 (n=246)	2018 (n=296)*
Surgery only	332 (64%)	377 (63%)	352 (54%)	344 (43%)	105 (56%)	82 (40%)	68 (28%)	70 (24%)
Polypectomy only**	/	/	/	31 (4%)	/	/	/	21 (7%)
Chemotherapy only	5 (1%)	*	13 (2%)	29 (4%)	*	*	5 (2%)	16 (5%)
Radiotherapy only	0	*	*	6 (1%)	*	*	9 (4%)	19 (6%)
Surgery & Chemotherapy	117 (23%)	149 (25%)	161 (25%)	193 (24%)	16 (9%)	27 (13%)	20 (8%)	26 (9%)
Surgery & Radiotherapy	5 (1%)	10 (2%)	6 (<1%)	*	25 (13%)	29 (14%)	53 (22%)	19 (6%)
Chemotherapy & Radiotherapy	0	0	0	8 (1%)	*	*	9 (4%)	30 (10%)
Surgery & Chemotherapy & Radiotherapy	9 (2%)	11 (2%)	17 (3%)	*	21 (11%)	33 (16%)	45 (18%)	71 (24%)
No treatment	52 (10%)	45 (8%)	101 (15%)	186 (23%)	14 (8%)	24 (12%)	37 (15%)	24 (8%)

*% may not total 100% due to rounding. Small numbers <5 cannot be reported to maintain anonymity; other cells anonymised to prevent disclosure.
**Polypectomy or local excision only cases were not presented separately in 1996, 2001, 2006 audit years.

- In 2018, 23% (n=186) of colon (including rectosigmoid junction) cancer patients and 8% (n=24) of rectal cancer patients were recorded as having received no treatments.
- 87% (n=568) of colon cancer patients and 70% (n= 207) of rectal cancer patients had surgical treatment either as their sole treatment or in combination.
- 31 colon cancer patients (4%) underwent polypectomy only excisions and did not receive any other chemotherapy or radiotherapy treatments. This corresponding proportion was higher for patients with rectal tumours (7%, n=21).
- 29% (n=230) of colon cancer patients and 48% (n=143) of rectal cancer patients had chemotherapy, with the majority receiving this as a combination treatment.

- 2% (n=14) of colon cancer patients and 47% (n=139) of rectal cancer patients had radiotherapy, again usually as a combination treatment.
- A lower proportion of colon cancer patients were recorded as receiving surgical management only (43% in 2018), compared with earlier audit years. This reflects increased use of combination therapies, and may reflect more appropriate colon cancer patient selection for surgery.
- There was a rise in colon cancer patients who did not receive any treatment (23% in 2018, an increase of 8% from a reported 15% in 2006).
- Rectal cancer patients were more likely to receive all three treatment modalities in 2018 compared with earlier audit years (24% v 18% or less), and were less likely to receive surgery alone or no treatment in 2018 compared with 2006.

Table 22. Investigation of potential patient factors associated with having no treatment recorded for colorectal cancer patients diagnosed in 2018, NI.

Patient factors	Number of patients (%)			
	1996 (n=66)*	2001 (n=69)*	2006 (n=138)*	2018 (n=210)
Aged less than 80 years at diagnosis	43 (64%)	36 (52%)	97 (42%)	77 (37%)
Aged 80 years or greater at diagnosis	24 (36%)	33 (48%)	43 (58%)	133 (63%)
Dukes D or TNM8 Stage 4	32 (48%)	35 (51%)	75 (54%)	100 (48%)*
Died within 4 weeks of diagnosis	30 (47%)	22 (33%)	37 (29%)	33 (16%)

*Please note that these numbers differ slightly due to how data were displayed in previous audits.

- Of the 210 CRC patients recorded as not having received any treatment following their diagnosis in 2018, almost two thirds were aged 80 years or older.
- Almost half (48%) of CRC patients who did not receive any treatment were diagnosed with Stage 4 metastatic disease, while another 47% had unknown stage of CRC.
- Approximately 1 in 6 (16%) of CRC patients who did not receive any treatments had died within 4 weeks of their diagnosis meaning invasive treatments/therapy would have been inappropriate and unlikely to improve the patient outcomes.
- Frequently recorded reasons for no treatment in 2018 included patients being deemed as unfit for treatment, or patient choice.

Surgery

Treatment: Timelines from Diagnosis to Surgery

Table 23. Timeline of patient pathways from diagnosis to surgery for all colorectal cancer patients diagnosed in 2018 and underwent surgery, NI.

	Number of patients (%)			
	1996 (n=637)	2001 (n=724)	2006 (n=728)	2018 (n=727)
Not recorded	1 (<1%)	2 (<1%)	1 (<1%)	0 (0%)
Surgery by	(n=636)	(n=722)	(n=727)	(n=727)
Day 1	261 (41%)	415 (57%)	319 (44%)	290 (40%)
Day 14	514 (81%)	514 (71%)	391 (54%)	316 (44%)
Day 31	604 (95%)	636 (88%)	485 (67%)	420 (58%)
Day 62	620 (97%)	690 (96%)	608 (84%)	620 (85%)

*Numbers and percentages are cumulative of patients operated on by this day, of those with a timeline recorded.

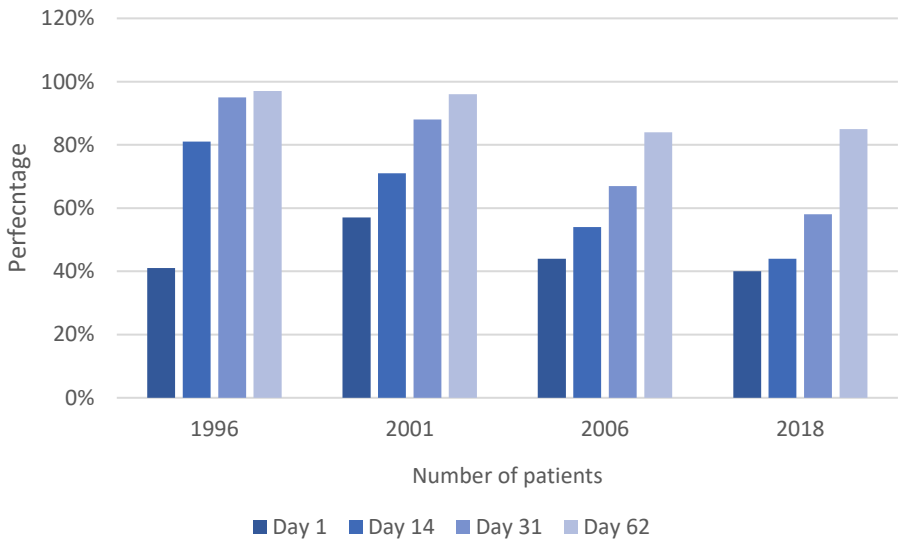


Figure 12. Timeline of diagnosis to surgery for colorectal cancer patients diagnosed in 2018 by Day 1, 14, 31 and 62 (cumulative), NI.

- Two thirds of CRC patients diagnosed in 2018 underwent a surgical resection (n=727, 67%).
- Of the patients who underwent major surgical resections for CRC diagnosed in 2018 in NI, 58% had their surgery within 31 days of diagnosis and 85% had their operation within 62 days of their date of diagnosis.

Table 24. Timeline of patient pathways from diagnosis to surgery for colorectal cancer patients diagnosed in 2018 and underwent surgery (excluding emergency surgery and patients having neo-adjuvant treatment), NI.

	Number of patients (%)			
	1996 (n=446)	2001 (n=465)	2006 (n=405)	2018 (n=620)
Not recorded	1 (<1%)	1 (<1%)	0	0
Surgery by	(n=445)	(n=464)	(n=405)	(n=620)
Day 1	163 (37%)	415 (57%)	142 (35%)	234 (38%)
Day 14	352 (79%)	514 (71%)	186 (46%)	253 (41%)
Day 31	424 (95%)	636 (88%)	260 (64%)	351 (57%)
Day 62	438 (98%)	690 (96%)	360 (89%)	547 (88%)

*Numbers and percentages are cumulative of patients operated on by this day, of those with a timeline recorded.

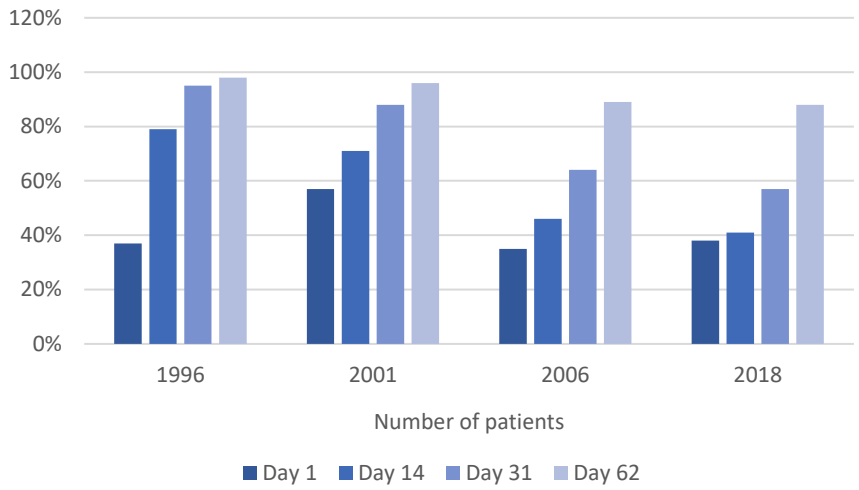


Figure 13. Timeline of diagnosis to surgery for colorectal cancer patients diagnosed in 2018 by Day 1, 14, 31 and 62 (cumulative) (excluding emergency surgery and patients having neo-adjuvant treatment), NI.

- Excluding emergency referrals and patients undergoing neoadjuvant treatment, of the patients who underwent major surgical resections for CRC diagnosed in 2018 in NI, 57% had their surgery within 31 days of their date of diagnosis, with 88% of patients operated on within 62 days of their diagnosis.
- Table 24 shows that waiting times from date of diagnosis to surgery where surgery is the first definitive treatment in a patient's treatment plan have increased over time, with 98% of patients diagnosed in 1996 having their operation within 62 days, compared with 88% of patients diagnosed in 2018.
- While total patient numbers have increased, the proportion of patients meeting the target times for surgery fell over time.

Treatment: Surgery by Stage

Table 25. Frequency of colorectal cancer patients diagnosed in 2018 receiving surgery by stage, NI.

Site	Stage	Number of patients (%)	
Colorectal		**Surgery* (n=727)**	**All patients (n=1,097)**
	Stage I (Early)	100 (69%)	144
	Stage II	266 (98%)	272
	Stage III	261 (90%)	291
	Stage IV (Late)	78 (32%)	243
	Not known	22 (15%)	147
Colon & RS junction		**Surgery (n=541)**	**All patients (n=801)**
	Stage I (Early)	69 (75%)	92
	Stage II	223 (99%)	225
	Stage III	178 (95%)	188
	Stage IV (Late)	66 (34%)	195
	Not known	5 (5%)	101
Rectal		**Surgery (n=186)**	**All patients (n=296)**
	Stage I (Early)	31 (60%)	52
	Stage II	43 (91%)	47
	Stage III	83 (81%)	103
	Stage IV (Late)	12 (25%)	48
	Not known	17 (37%)	46

*Includes 25 patients who had a polypectomy or local excision followed by a surgical resection.

- Of CRC patients diagnosed in 2018 at Stage I, 69% underwent a major surgical resection. The majority of the remainder had a polypectomy. This ranged from 60% of rectal cancer patients to 75% of colon (including rectosigmoid junction) cancer patients.
- The vast majority of colon cancer patients diagnosed with Stage II (99%) or Stage III (95%) disease underwent major surgical resections.
- The corresponding proportions were slightly lower for rectal cancer patients, with 91% and 81% of patients diagnosed with Stage II or Stage III disease, respectively, undergoing major surgical resections.
- Of CRC patients diagnosed in 2018 with Stage IV (metastatic disease), 32% (25% of rectal cancer patients to 34% of colon cancer patients) underwent a major surgical resection.

Treatment: Surgery by Resection Type

(N.B. Restricted to the n=727 patients who underwent a surgical resection)

Table 26. Frequency of colorectal cancer patients diagnosed in 2018 receiving surgical resections by type across each audit year (1996, 2001, 2006, 2018), NI.

Site		Number of Major Surgical Procedures (%)			
		1996 (n=446)	2001 (n=532)	2006 (n=518)	2018 (n=541)
Colon & RS junction	Anterior resection	54 (12%)	79 (15%)	63 (12%)	56 (10%)
	Right hemicolectomy	208 (47%)	211 (40%)	252 (49%)	283 (52%)
	Left hemicolectomy	51 (11%)	72 (14%)	66 (13%)	40 (7%)
	Sigmoid colectomy	82 (18%)	101 (19%)	67 (13%)	51 (9%)
	Transverse colectomy	9 (2%)	10 (2%)	5 (1%)	9 (2%)
	Other**	42 (10%)	59 (11%)	65 (12%)	102 (19%)
		1996 (n=159)	2001 (n=160)	2006 (n=181)	2018 (n=186)
Rectal	Abdomino-perineal resection	51 (32%)	43 (27%)	55 (30%)	54 (29%)
	Anterior resection	77 (48%)	97 (61%)	100 (55%)	60 (32%)
	Other**	25 (19%)	20 (12%)	26 (15%)	72 (39%)

*Small numbers <5 cannot be reported to maintain anonymity; other cells anonymised to prevent disclosure.
**Other includes Hartmann's procedure, Total colectomy, and for rectal cancers includes sigmoid colectomy and left hemicolectomy or other procedures not listed. TEM and TAMIS procedures are not included.

- The number of major CRC surgeries performed on patients in NI has increased during each audit year. In the 22 years since the first audit in 1996, to 2018 there are now an extra 122 major surgeries performed annually, representing an approximate 20% increase.
- Approximately half (52%) of colon cancer patients diagnosed in 2018 underwent right hemicolectomy, this represents a small proportional increase compared with earlier audit years.
- There has been a decrease in the proportion of colon cancer patients diagnosed in 2018 undergoing left hemicolectomy (7% v 11%-13%) or sigmoid colectomy (9% v 13%-18%) in earlier audit years.
- There has been a substantive change in surgical practice for rectal cancer patients compared with earlier audit years: the proportion of patients undergoing anterior resection has reduced substantially (down from 55% in 2006 to 31% in 2018).
- Rectal cancer patients are now more likely to undergo other procedures such as Hartmann's procedure, with a small number also receiving newer, less invasive surgery techniques not considered as major surgical resections, such as transanal endoscopic microsurgery (TEM) and transanal minimally invasive surgery (TAMIS), and therefore are not presented in Table 26.

Treatment: Surgery by Trust of Treatment

(N.B. Restricted to the n=727 patients who underwent a surgical resection)

Table 27. Frequency of colorectal cancer patients diagnosed in 2018 receiving surgery and/or polypectomy by Trust of treatment, NI.

Site	Trust	Number of patients (%)*			
		No Surgery (n=311)	Surgery** (n=727)	Polypectomy only (n=59)	All patients (n=1,097)
Colorectal	Belfast	70 (27%)	180 (70%)	8 (3%)	258
	Northern	71 (31%)	149 (65%)	11 (5%)	231
	Southern	52 (24%)	146 (69%)	15 (7%)	213
	South Eastern	79 (32%)	152 (62%)	16 (6%)	247
	Western	39 (26%)	100 (68%)	9 (6%)	148

*A small number of patients (n<5) underwent surgery outside of Northern Ireland. They are included in the above table with the corresponding Trust which was responsible for referral and subsequent treatments.
**Includes 25 patients who had a polypectomy or local excision followed by a surgical resection.

- All HSC Trusts performed major surgical resections on a minimum of 100 patients who had been diagnosed with incident CRC in 2018.
- The Belfast Trust performed major surgical resections on the largest number of CRC patients diagnosed in 2018 (n=180).
- The Northern, Southern, and South Eastern Trusts performed major surgical resections on similar numbers of CRC patients diagnosed in 2018 (n=149, n=146 and n=152, respectively).
- The Western Trust performed major surgical resections in 100 patients with incident CRC diagnosed in 2018.
- The proportion of patients within each HSC Trust who underwent surgery ranged from 62% in the South Eastern Trust to 70% in the Belfast Trust.
- The Belfast Trust had the lowest proportion of patients receiving polypectomy only treatment (3%), with the equivalent figure ranging from 5%-7% in other HSC Trusts.
- The differences between Trusts in the proportion of patients who underwent surgery or polypectomy/local excision only compared with no surgery were not statistically significant (p=0.33). Note also this does not account for the 'case mix' between Trusts, for example differences in patient age structure or comorbidities.

Treatment: Surgery by Hospital of surgery

(N.B. Restricted to patients who underwent a surgical resection in NI).

Table 28. Frequency of colorectal cancer patients diagnosed in 2018 receiving surgery by Hospital of surgery, NI.

Hospital	Number of patients (%)**		
	All cases (100%)	Colon & RS junction (100%)	Rectal (100%)
Belfast Trust			
Belfast City Hospital (BCH)	150 (21%)	105 (19%)	45 (24%)
Royal Victoria Hospital (RVH)	27 (4%)	*	*
Mater Hospital (MIH)	*	*	*
South Eastern Trust			
Ulster Hospital (UH)	152 (21%)	119 (22%)	33 (18%)
Northern Trust			
Antrim Hospital (ANT)	78 (11%)	53 (10%)	25 (13%)
Causeway Hospital (COL)	71 (10%)	57 (11%)	14 (8%)
Southern Trust			
Craigavon Area Hospital (CAH)	141 (19%)	105 (19%)	36 (19%)
Daisy Hill Hospital (DHH)	5 (1%)	5 (1%)	0 (0%)
Western Trust			
Altnagelvin Hospital (AH)	77 (11%)	47 (9%)	30 (16%)
South West Acute Hospital (SWAH)	23 (3%)	*	*

*Small numbers <5 cannot be reported to maintain anonymity; other cells anonymised to prevent disclosure; % may not total 100% due to rounding or to maintain anonymity.
**Includes 25 patients who had a polypectomy or local excision followed by a surgical resection.
Methods note: A small number of patients (n<5) underwent surgery outside of Northern Ireland. They are excluded from the table above and column total numbers are not displayed to prevent disclosure.

- Ten hospital sites performed surgery for CRC patients diagnosed in 2018 in NI.
- The majority of surgery for CRC patients diagnosed in 2018 within the Belfast Trust took place at the Belfast City Hospital site (n=150), with 27 patients operated on at the Royal Victoria Hospital site.
- All surgery for CRC patients diagnosed in 2018 within the South Eastern Trust took place at the Ulster Hospital site (n=152).
- The majority of surgery for CRC patients diagnosed in 2018 within the Southern Trust took place at the Craigavon Area Hospital site (n=141). The five CRC patients operated on at Daisy Hill Hospital were all emergency/urgent admissions.

- The hospital site of surgery for CRC patients diagnosed in 2018 within the Northern Trust was more evenly split across two main sites between Antrim Hospital (n=78) and Causeway Hospital (n=71).
- The majority of surgery for CRC patients diagnosed in 2018 within the Western Trust took place at the Altnagelvin Hospital site (n=77), with 23 taking place at the Erne Hospital (n=23)
- Similar trends in the location of the Hospital site of surgery were observed when considering colon cancer and rectal cancer patients separately.
- The number of hospital sites performing CRC surgery has reduced slightly from 14 hospitals in 2006 to 10 in 2018
- Two hospitals performed CRC surgery on five or fewer patients in 2018: the Mater Hospital and Daisy Hill Hospital.

Treatment: Surgery by Number of operators

(N.B. Restricted to patients who underwent a surgical resection in NI)

Table 29. Frequency of major surgical resections performed on colorectal cancer patients diagnosed in 2018 in NI, by number of operators.

Categories of the frequency of major resection performed by surgeons	Number of operators who performed each category of resections	Total number of patients having a major resection	Number of cases (%) who presented as an emergency**
20 or more resections	19	>500 (69%)*	66 (13%)
10 – 19 resections	12	177 (24%)	31 (18%)
2 – 9 resections	10	34 (5%)	18 (53%)
Single operators	12	12 (2%)	11 (92%)
Total operators	53	N/A	N/A

*Precise cell count not displayed to maintain anonymity and prevent disclosure of small number of patients (n<5) who underwent surgery outside of Northern Ireland. They are excluded from the table above and column total numbers are not displayed to prevent disclosure

**Of the 727 patients who underwent a major surgical resection, 35 did not have either emergency or elective assigned.

- The majority of patients (69%) diagnosed with CRC in NI who underwent a major surgical resection were operated on by one of 19 colorectal surgeons who had performed 20 or more surgical resections on incident CRC patients diagnosed in NI in 2018. (In 2006, 10 surgeons performed at least 20 operations, 41% of patients).
- A further 24% of patients diagnosed with CRC in NI who underwent a major surgical resection were treated by one of 12 colorectal surgeons who had performed 10-19 surgical resections on CRC patients diagnosed in NI in 2018. (13 surgeons in 2006 performed 10-19 operations, 27% of patients). It is important to consider that once surgical resections for recurrences (not evaluated in this audit) are considered, surgeons within the upper limits of this category could meet the NICE recommended threshold of 20 or more total CRC surgeries each year.
- 5% of CRC patients (n=34) diagnosed with CRC in NI in 2018 who underwent a major surgical resection were treated by one of 10 colorectal surgeons who had performed 2-9 surgical resections on CRC patients diagnosed in 2018. Approximately half of these resections were under emergency circumstances (n=18, 53%). (In 2006, 47 surgeons performed between 2-9 operations on 28% of patients).
- Twelve operations were performed by single operators, with the majority of these (n=11, 92%) performed under emergency surgery circumstances. (In 2006, 25 operations were performed by single operators on 4% of patients).

- Overall, a small number of patients (n=17, 2%) had their operation performed under elective circumstances by a surgeon performing less than 10 procedures in CRC patients diagnosed in 2018.

Table 30. Frequency of major surgical resections performed on colorectal cancer patients diagnosed in 2018, by number of operators per Trust, NI.

Trust of surgery	Number of operators performing 20+ major surgeries in any Trust **	Number of patients (%) treated by operators who have performed 20+ major surgeries for CRC	Number of operators who performed less than 20 major CRC resections in any Trust **	Number of patients (%) who have been treated by operators who have performed less than 20 surgeries in any trust
Belfast	6	162 (90%)	4	17(10%)
Northern	1	20 (13%)	14	129 (87%)
Southern	4	106 (73%)	7	40 (27%)
South Eastern	6	139 (92%)	5	13 (8%)
Western	3	75 (76%)	5	24 (24%)
Total**	19	>500 (69%)*	34	223 (31%)

* A small number of patients (n<5) underwent surgery outside of Northern Ireland. They are excluded from the table above and column total numbers or precise cell counts are not displayed to prevent disclosure.
**Please note that in some instances a surgeon had performed more than 20 surgeries across more than one Trust. There are 53 surgeons in total but in some instances they were counted across more than one Trust to show overall experience.
Methods note: Also note that the audit exclusions such as recurrences and other morphological subtype can decrease the number of surgeries a colorectal surgeon actually performed. These exclusions are consistent with exclusions used in other UK audits.

- Overall in NI, 69% of CRC patients diagnosed in 2018 who underwent surgery had their surgery performed by operators who have performed 20 or more major resections for CRC. This reflected a wide range in practice across HSC Trusts.
- The Northern Trust recorded 15 operators performing surgeries on a total of 149 CRC patients diagnosed in 2018, and only one operator had completed 20 or more major resection for patients diagnosed with CRC in 2018. 87% of CRC patients in the Northern Trust had their surgery performed by a surgeon who had completed less than 20 resections on CRC patients diagnosed in 2018.
- The South Eastern Trust recorded 11 operators, operating on a total of 152 CRC patients diagnosed in 2018. Only 8% of CRC patients in this Trust had surgery performed by a surgeon who had completed less than 20 major CRC surgeries in patients diagnosed in 2018.

Treatment: Surgery and ASA grading

(N.B. Restricted to the n=727 patients who underwent a surgical resection)

Table 31. ASA (American Society of Anaesthesiologists) grading, an assessment for anaesthesia and surgery for colorectal patients diagnosed in 2018 who had surgery, NI.

ASA Grade	Number of patients (%) (n=727)
1 (Normal, healthy)	8 (1%)
2	44 (6%)
3	22 (3%)
4 (Severe systemic disease)	6 (<1%)
Not recorded	647 (89%)

- ASA grading in 2018 was very poorly recorded, with 89% of ASA grading for surgery patients not recorded (although this is likely to be assessed but not written in patient notes). This is lower than in previous years. ASA grading was not recorded in 28% of 2006 cases.
- 6% of the 733 CRC patients who underwent surgery were recorded as ASA grade 2, and 3% were recorded as ASA grade 3.

Treatment: Anastomotic Leak following Surgery

(N.B. Restricted to the n=727 patients who underwent a surgical resection)

Table 32. Anastomotic leak following surgical resections by (a) tumour subsite and (b) across audit report years (1996, 2001, 2006, 2018), NI.

(a)

Anastomotic leak post-surgical resection 2018	Number of patients (%)		
	Colorectal (n=727)*	Colon & RS junction (n=541)	Rectal (n=186)
Yes	39 (5%)	26 (5%)	13 (7%)
No	502 (69%)	394 (73%)	108 (58%)
Not recorded / Not applicable	75 (10%) / 111 (15%)	54 (10%) / 67 (12%)	21 (11%) / 44 (24%)

(b)

Site	Anastomotic leak post-surgical resection	Number of patients (%)			
		1996 (n=583)	2001 (n=681)	2006 (n=678)	2018 (n=727)*
Colorectal	Yes	18 (3%)	28 (4%)	42 (6%)	39 (5%)
	No	503 (86%)	634 (93%)	615 (91%)	502 (69%)
	Not recorded / Not applicable	62 (11%)	19 (3%)	21 (3%)	75 (10%) / 111 (15%)

*% may not total 100% due to rounding.

- Of all CRC patients diagnosed in 2018 who underwent a major surgical resection, 1 in 20 (5%) experienced an anastomotic leak following surgery. A similar proportion of anastomotic leaks were observed to previous audit report years.
- The proportion of patients who had a post-surgical resection anastomotic leak was slightly higher for rectal cancer patients (7%) than colon cancer patients (5%).
- Data by HSC Trust is not shown due to small numbers. There was a small variation in proportion of CRC patients who experienced an anastomotic leak following surgery across trusts, ranging from 2-7%.
- The proportion of patients who had a post-surgical resection anastomotic leak was slightly higher for cancer patients having emergency surgery (8%) than elective surgery (5%).
- The related Key Performance Indicators in comparison with other UK regions are shown on pages 61 and 68.

KEY PERFORMANCE INDICATORS – Surgery

This section outlines the Key Performance indicators (KPIs) agreed by the NI Colorectal Cancer Clinical Reference Group for surgery.

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the surgery KPIs are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

These **727** CRC patients for inclusion in these KPI analyses **represent 66%** of all CRC patients in the 2018 audit.

Table 33. KPI: Number of patients with colorectal cancer who had distant metastasis at time of surgery by Trust of Treatment in 2018, NI.

Total number of patients in region	Number of patients (%)
Northern Ireland (n=727)	78 (11%)
HSC Trust	
Belfast Trust (n=180)	29 (16%)
Northern Trust (n=149)	12 (8%)
Southern Trust (n=146)	12 (8%)
South Eastern Trust (n=152)	17 (11%)
Western Trust (n=100)	8 (8%)
Other UK Comparators	
NBOCA 2018/2019 (n=16,474)	988 (6%)
KPI target	N/A

- Across Northern Ireland in 2018, 11% of all major surgeries for new CRC patients occurred in patients who had metastasis (spread outside of the bowel) recorded in their staging information.
- This ranged from 8-16% across HSC Trusts, however differences were not statistically significant (p=0.08).
- This is a higher proportion than recorded in England/Wales, where 6% of all major CRC surgeries were performed on patients who had metastatic disease recorded at diagnosis.

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the surgery KPIs are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

These **727** CRC patients for inclusion in these KPI analyses **represent 66%** of all CRC patients in the 2018 audit.

The KPI on liver metastases relate only to the **177 CRC patients who had a liver metastasis** at diagnosis.

Table 34. KPI: Colorectal cancer patients diagnosed in 2018 who had surgery for liver metastasis that were discussed at Hepato-Biliary (HPB) Multidisciplinary Team Meeting (MDM), NI.

Total number of patients in region with liver mets	Number of patients with liver metastasis who had a HPB MDM (%)	Number of patients With liver metastasis who had liver surgery (%)
Northern Ireland (n=177)	40 (23%)	18 (10%)
HSC Trust		
Belfast Trust (n=48)	8 (17%)	*
Northern Trust (n=35)	8 (23%)	*
Southern Trust (n=27)	9 (33%)	5 (19%)
South Eastern Trust (n=44)	6 (14%)	*
Western Trust (n=23)	9 (39%)	5 (22%)
Other UK Comparators	N/A	N/A
KPI target	N/A	N/A

*Small numbers <5 cannot be reported to maintain anonymity.

- The number of CRC patients who had a liver metastasis recorded at presentation across NI was 177 in 2018.
- Of the 177 patients with a liver metastasis at presentation, less than a quarter (23%) had a discussion at a Hepato-Biliary MDM. Such discussions are important for patient outcomes as the surgeons who are expert in liver metastasis resections are involved in the discussion regarding treatment intent and whether a liver lesion is suitable for surgery.
- 18 (10%) of all patients who had a liver metastasis had liver surgery, of whom 17 (94%) had a discussion at a dedicated HPB MDT pre-operation.

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **this KPI is restricted to the 84 CRC patients who underwent polypectomy or local excision,** e.g. TEM or TAMIS procedures, as part of their treatment.

These **84** CRC patients for inclusion in this KPI analysis **represent 8%** of all CRC patients in the 2018 audit.

Table 35. KPI: Number of colorectal cancer patients diagnosed in 2018 who underwent a major surgical resection post-polypectomy, where polypectomy was initial treatment, NI.

Polypectomy (number of patients)	Number of patients undergoing major surgery post-polypectomy (%)
Northern Ireland (n=84)	25 (30%)
Other UK Comparators	Not reported
KPI target	N/A

- Of the 84 CRC patients in NI who had a polypectomy or local excision as a treatment, approximately one third (n=25, 30%) went on to have a major surgery.

- Due to small numbers, we are unable to report numbers of patients who underwent polypectomy and had distant metastasis at diagnosis or a major surgery post-polypectomy data by HSC Trust.

- This variable is not measured by the English/Welsh or Scottish Audit reports. There was no target set by the Colorectal NICaN CRG for this measurement.

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the surgery KPIs are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

These **727** CRC patients for inclusion in these KPI analyses **represent 66%** of all CRC patients in the 2018 audit.

Table 36. KPI: Number of colorectal cancer patients diagnosed in 2018 undergoing major surgical resection recorded as urgent or emergency, NI.

Total number of patients in region	Number of patients recorded as urgent or emergency surgery (%)
Northern Ireland (n=727)	126 (17%)
HSC Trust	
Belfast Trust (n=180)	25 (14%)
Northern Trust (n=149)	30 (20%)
Southern Trust (n=146)	33 (23%)
South Eastern Trust (n=152)	23 (15%)
Western Trust (n=100)	15 (15%)
Other UK Comparators	
NBOCA 2018/2019 (n=16,474)	2,439 (15%)
KPI target	N/A

- Approximately 1 in 6 CRC patients diagnosed in 2018 who underwent a surgical resection (n=126, 17%) had their operation under emergency circumstances. This highlights a continued need for public health awareness campaigns and improvements in early diagnosis of CRC.
- The proportion of CRC patients diagnosed in 2018 who underwent emergency surgery in NI at 17% is lower, and thus better, than the comparable England/Welsh audit figure of 15%.
- The proportion of emergency major surgery resection rates across the five HSC Trusts ranged from 14% of patients being admitted on an emergency basis in the Belfast Trust to 23% in Southern Trust. Whilst this range is clinically significant due to the number of cases being treated and the local resources required to perform additional emergency procedures, the differences are not statistically significant (p=0.20).

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the surgery KPIs are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

These **727** CRC patients for inclusion in these KPI analyses **represent 66%** of all CRC patients in the 2018 audit.

Table 37. KPI: Number of colorectal cancer patients diagnosed in 2018 who underwent major resection by surgical access type, NI.

	Number of patients (%)			
Total number of patients in region	**Laparoscopic Surgery as Planned**	**Laparoscopic Converted to Open**	**Open surgery as Planned**	**Not recorded**
Northern Ireland (n=727)	280 (39%)	37 (5%)	369 (51%)	41 (6%)
HSC Trust				
Belfast Trust (n=180)	73 (41%)	*	83 (46%)	*
Northern Trust (n=149)	28 (19%)	*	114 (77%)	*
Southern Trust (n=146)	61 (42%)	9 (6%)	70 (48%)	6 (4%)
South Eastern Trust (n=152)	65 (43%)	*	62 (41%)	*
Western Trust (n=100)	53 (53%)	*	40 (40%)	*
Other UK Comparators				
NBOCA 2018/2019 (n=16,474)	10,543 (64%)	1,317 (8%)	4,613 (28%)	N/A
KPI target	N/A	N/A	N/A	

*Small numbers <5 cannot be reported to maintain anonymity; other cells anonymised to prevent disclosure; % may not total 100% due to rounding.

- Across all of NI, the proportion of CRC patients diagnosed in 2018 who underwent laparoscopic surgery as planned was 39%. This is considerably lower than comparable rates in England (64%).
- The range of CRC patients in Cancer Alliances in England/Wales that had a laparoscopic completed surgery in 2018/2019 was 45%-80%. Four out of five HSC Trusts in NI fall below the lower range of 45%, with the Western Trust being the exception (53%).
- Rates of laparoscopic surgery within the Northern Trust are notably lower than other HSC Trusts in NI (19% vs 41-53%). Differences in laparoscopic surgery rates between HSC Trusts were statistically significant ($p<0.001$).

- 37 (5%) of incident CRC patients diagnosed in NI had a laparoscopic attempted surgery that was converted to open surgery. This is lower, and therefore better, than the equivalent laparoscopic conversion rate in England/Wales (8%).
- Approximately half of incident CRC patients (51%) diagnosed in 2018 in NI who underwent surgery had a planned open surgery, with 44% having a laparoscopic attempted surgery. This contrasts with the England/Wales average of 28% of patients having a planned open surgery and 72% having a laparoscopic attempted surgery.
- Current NICE guidelines recommend that patients are offered laparoscopic surgery when clinically appropriate and by surgeons who have had the appropriate training and complete the procedure an appropriate number of times to maintain competence. Open surgeries are associated with significant post-operative pain and longer hospital stays. Laparoscopic procedures are associated with a quicker ability for patients to return to normal activities.

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the surgery KPIs are restricted to the 727 CRC** patients who underwent major surgical resections. The KPIs related to length of hospital stay also excluded patients for the following reasons:

- patients who underwent polypectomy or local excision, followed by a surgical resection
- unknown hospital length of stay recorded
- unknown 'urgency' of surgery.

The KPI for length of hospital stay following **elective** surgery includes **534** CRC patients for inclusion in the analyses, **representing 49%** of all CRC patients in the 2018 audit.
The KPI for length of hospital stay following **emergency** surgery includes **124** CRC patients for inclusion in the analyses, **representing 11%** of all CRC patients in the 2018 audit.

Table 38. KPI: Number of colorectal cancer patients diagnosed in 2018 who underwent major resection by length of stay in hospital for (a) elective surgeries and (b) emergency surgeries, NI.

(a)

	Number of patients (%)		
Total number of elective surgery patients in region	**Hospital length of stay 5 days or less**	**Hospital length of stay 6-10 days**	**Hospital length of stay over 10 days**
Northern Ireland (n=534)	114 (21%)	241 (45%)	179 (34%)
HSC Trust			
Belfast Trust (n=144)	29 (20%)	60 (42%)	55 (38%)
Northern Trust (n=112)	13 (12%)	53 (47%)	46 (41%)
Southern Trust (n=99)	30 (30%)	46 (47%)	23 (23%)
South Eastern Trust (n=100)	33 (33%)	46 (46%)	21 (21%)
Western Trust (n=79)	9 (11%)	36 (46%)	34 (43%)
Other UK Comparators			
NBOCA (Trust range)	23%-49%		
KPI target	N/A	N/A	N/A

*Small numbers <5 cannot be reported to maintain anonymity.

(b)

	Number of patients (%)		
Total number of emergency surgery patients in region	**Hospital length of stay 5 days or less**	**Hospital length of stay 6-10 days**	**Hospital length of stay over 10 days**
Northern Ireland (n=124)	9 (7%)	31 (25%)	84 (68%)
HSC Trust range*	0%-15%	10%-39%	54%-82%
Other UK Comparators			
NBOCA (Trust range)	7%-38%		
KPI target	N/A	N/A	N/A

*Data presented as % ranges across Trusts; Small numbers <5 cannot be reported to maintain anonymity.

- Throughout NI, approximately 1 in 5 (21%) CRC patients diagnosed in 2018 who underwent elective surgery had a length of stay of 5 days or less in hospital.
- There was variation in the proportion of inpatients staying 5 days or less in hospital following elective surgery for CRC, ranging from 11% recorded in the Western Trust to 33% in the South Eastern Trust. This variation was statistically significant ($p<0.001$). The equivalent range for Alliances within the NBOCA English audit was 23%-49%.
- Approximately 1 in 3 CRC patients (34%) diagnosed in 2018 in NI who underwent elective surgery had a length of stay of greater than 10 days in hospital.
- CRC patients diagnosed in 2018 who had emergency surgery generally had longer lengths of hospital stay compared with their counterparts who underwent elective surgery. Throughout NI, 7% of CRC patients who underwent emergency surgery had a length of stay of 5 days or less in hospital, while 68% had a length of hospital stay of greater than 10 days.
- The proportion of CRC patients who underwent emergency surgery and had a length of stay of 5 days or less ranged from 0%-15% by Trust, with the equivalent proportions in the English audit being 7%-38%.
- For both elective and emergency patients, NI remains behind England for inpatient stays of 5 days or less. Longer length of time spent as inpatient may be due to other factors such as emergency admission rate, open surgery rate, more comorbidities or need for rehabilitation.

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **these surgery KPIs on readmissions and reoperations are restricted to the CRC** patients who underwent major surgical resections in NI, excluding patients who underwent polypectomy or local excision, followed by a surgical resection.

Data are presented as percentages to prevent disclosure of the small number of patients (n<5) who underwent surgery outside of NI, and who are excluded from this analysis.

Table 39. KPI: Proportion of colorectal cancer patients diagnosed in 2018 who underwent major resection and were (a) re-admitted to hospital or (b) re-operated on within 30 days of surgery, NI.

Total number of patients in region	Proportion of patients re-admitted within 30 days of surgery	Proportion of patients re-operated on within 30 days of primary surgery
Northern Ireland (100%)	(8%)	(5%)
HSC Trust		
Belfast Trust (100%)	(8%)	(6%)
Northern Trust (100%)	(12%)	(8%)
Southern Trust (100%)	(9%)	(4%)
South Eastern Trust (100%)	(4%)	(2%)
Western Trust (100%)	(11%)	(3%)
Other UK Comparators		
NBOCA (n=18,849 n=16,520)	1,707 (10.5%)	1,294 (7.8%)
West of Scotland (2018/19, n=943)		46 (4.9%)
KPI target	N/A	Scottish target <10%

Data are presented as percentages to prevent disclosure of the small number of patients (n<5) who underwent surgery outside of NI, who are excluded from this analysis.

- Overall in NI, 8% of incident CRC patients diagnosed in 2018 who underwent major surgery as their initial surgical procedure were re-admitted to hospital within 30 days of surgery. This ranged from 4% in the South Eastern Trust to 12% in the Northern Trust, but although possibly clinically significant, these results were not statistically significant (p=0.19).
- The overall proportion in NI is lower and better than the English/Welsh average audit finding of 10.5%.
- 5% of CRC patients diagnosed in 2018 in NI who underwent major surgery as their initial surgical procedure were re-operated on within 30 days of their primary surgery. This ranged from 2%-8% between HSC Trusts, which was not statistically significantly different (p=0.09).
- This is comparable with data for re-operation rates within 30 days from the West of Scotland (4.9%) and lower and better than the English/Welsh 2018/19 audit data of 7.8%.
- There are no set targets for these readmission and reoperation surgical KPIs.

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the surgery KPIs are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

This KPI analysis is then restricted to **colon and rectosigmoid junction** cancer patients diagnosed in 2018 and excludes patients undergoing surgeries not involving anastomosis of the colon, for example APER.

Table 40. KPI: Number of colon cancer patients diagnosed in 2018 undergoing major surgical resection involving anastomosis of the colon and having anastomotic leak, NI.

Total number of patients in region undergoing surgical procedure involving anastomosis of the colon	Number of patients undergoing surgical procedure involving anastomosis of the colon and having anastomotic leak (%)
Northern Ireland (n=540)	26 (5%)
Other UK Comparators	
West of Scotland (n=989)	30 (3%)
KPI target	N/A (Scotland Target 5%)

- Approximately 1 in 20 (5%) colon (including rectosigmoid junction) cancer patients experience an anastomotic leak following major surgery. This is slightly higher than equivalent proportions reported in the Scotland audit (3%) but similar to the target set in that report (5%).
- Of the 26 colon cancer patients who had an anastomotic leak following major surgery, 14 (54%) were treated surgically and 5 (19%) were treated with radiological assisted procedures.

KEY PERFORMANCE INDICATORS – Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the surgery KPIs are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

The KPIs related to lymph node pathological examination also excluded patients who underwent long course neo-adjuvant chemo-radiotherapy or radiotherapy.

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The KPI for pathological lymph node examination includes **633** CRC patients for inclusion in the analyses, **representing 58%** of all CRC patients in the 2018 audit.

Table 41. KPI: Number of colorectal cancer patients diagnosed in 2018 undergoing major surgical resection recorded as having >12 lymph nodes pathologically examined (excluding patients who received neo-adjuvant chemoradiotherapy or radiotherapy), NI.

Trust of Treatment (number of patients in region)	Number of patients who underwent surgical resection where >12 lymph nodes were pathologically examined (%)
Northern Ireland (n=633)	551 (87%)
HSC Trust	
Belfast Trust (n=156)	142 (91%)
Northern Trust (n=130)	113 (87%)
Southern Trust (n=128)	109 (85%)
South Eastern Trust (n=133)	113 (85%)
Western Trust (n=86)	74 (86%)
Other UK Comparators	
West of Scotland (n=815)	773 (94.8%)
NBOCA	(82%)
KPI target	N/A (Scottish target 80%)

- Overall in NI, 87% of CRC patients diagnosed in 2018 undergoing major surgery (excluding neo-adjuvant chemotherapy or radiotherapy had >12 lymph nodes examined pathologically).
- This ranged from 85%-91% between HSC Trusts but this was not statistically significantly different (p=0.54).
- All HSC Trusts exceeded the Scottish Audit target of 80% for this KPI, although was slightly lower than rates observed within the Scottish Audit (94.8%).

KEY PERFORMANCE INDICATORS – Rectal Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **these Rectal Surgery KPIs include all 296 Rectal cancer** patients in the audit.

An exclusion criterion for patients who died within a very short time of their diagnosis (0-5 days) was intended, but did not need to be applied, as all rectal cancer patients survived beyond this short interval time.

Table 42. KPI: Proportion of rectal cancer patients diagnosed in 2018 (a) who underwent major surgical resection and (b) underwent Abdominoperineal Excision of Rectum (APER), NI.

Trust of Treatment (Number of rectal cancer patients)	Number of patients (%)	
	Patients with rectal cancer who underwent major surgical resection	Patients who underwent Abdominoperineal resection (APER)
Northern Ireland (n=296)	186 (63%)	54 (29%)
HSC Trust		
Belfast Trust (n=73)	47 (64%)	16 (34%)
Northern Trust (n=66)	39 (59%)	12 (31%)
Southern Trust (n=52)	36 (69%)	8 (22%)
South Eastern Trust (n=58)	33 (57%)	8 (24%)
Western Trust (n=47)	31 (66%)	10 (32%)
Other UK Comparators		
NBOCA 2018/2019 (n=8.416)	3,899 (46%)	2,020 (24%)
KPI target	N/A	N/A

- Approximately two thirds (63%) of rectal cancer patients in NI underwent a major surgical resection. This exceeds the equivalent figure in the England/Wales audit, of 46%.
- The proportion of rectal cancer patients undergoing surgical resections ranged from 57% in the South Eastern Trust to 69% in the Southern Trust. Differences between Trusts were not statistically significant (p=0.39).
- Overall in NI, almost 1 in 3 rectal cancer patients (29%) underwent an APER following their diagnosis. This is higher than the equivalent figure in the England/Wales audit (24%).
- The proportion of rectal cancer patients undergoing APER ranged from 22% in the Southern Trust to 34% in the Belfast Trust. Differences between Trusts close to statistical significance (p=0.05).

KEY PERFORMANCE INDICATORS – Rectal Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Rectal Surgery KPIs are restricted to the 296 Rectal cancer** patients who underwent major surgical resections. This includes patients who underwent polypectomy or local excision, followed by a surgical resection. The following exclusions were applied:

- Patients who had an emergency surgery
- Patients who had polypectomy or local excision as their only course of treatment
- Patients who did not have locally advanced disease (Stage 2 or 3)

This left rectal cancer patients who had a pre-operation MRI at which **circumferential resection margin status was assessed,** designed to facilitate a margin-negative resection for patients receiving neo-adjuvant chemotherapy or radiotherapy (long course chemo-radiotherapy, long course radiotherapy, or short course radiotherapy with long course intent).

Data are presented as percentages to prevent disclosure of the small number of patients (n<5) who had threatened or involved circumferential resection margin and did not receive neo-adjuvant therapies.

Table 43. KPI: Frequency of patients with locally advanced rectal cancer diagnosed in 2018 with threatened or involved circumferential resection margin (CRM) on pre-operative MRI who received neo-adjuvant chemotherapy or radiotherapy, NI.

Trust of Treatment (Number of rectal cancer patients undergoing elective surgery)	Number of patients (%)	
	Patients who had pre-operation MRI CRM status recorded as either, threatened, or involved CRM	Patients who had threatened or involved CRM who had neo-adjuvant chemotherapy or radiotherapy
Northern Ireland (100%)	30%	94%
Other UK Comparators		
West of Scotland	N/A	97%
KPI target	N/A	Scotland target 90%

- The number of rectal cancer patients who had long or short course chemotherapy as part of a neoadjuvant surgical pathway in NI is shown in Table 43. 30% of locally advanced rectal cancer patients diagnosed in 2018 and were eligible for this analysis had this pathway in NI.
- Neoadjuvant therapy for rectal surgery is used to reduce the tumour and to achieve clear circumferential resection margins (CRM). Of those patients who had a threatened or involved CRM, 94% had neo-adjuvant chemotherapy or radiotherapy prior to surgery. This is below the observed equivalent rates in Scotland of 97%, but above the Scotland KPI target of 90%.
- Please note that numbers were too small to report results separately by Trusts.

KEY PERFORMANCE INDICATORS – Rectal Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Rectal Surgery KPIs are restricted to the 296 Rectal cancer** patients who underwent major surgical resections. This includes patients who underwent polypectomy or local excision, followed by a surgical resection. The following exclusions were applied:

- Patients who had an emergency surgery
- Patients who had polypectomy or local excision as their only course of treatment

This left **171** rectal cancer patients (**representing 58%** of all rectal cancer patients diagnosed in 2018) for inclusion in this KPI.

Table 44. KPI: Frequency of patients with rectal cancer diagnosed in 2018 who undergo surgical resection in which the circumferential margin is clear of tumour following neo-adjuvant treatment, NI.

Trust of Treatment (Number of rectal cancer patients undergoing elective surgery)	Number of patients (%)	
	Patients who had long or short course neoadjuvant chemotherapy or radiotherapy prior to elective primary surgical resection	Patients who had elective primary surgical resection following neo-adjuvant chemotherapy or radiotherapy in which the circumferential margin is clear of tumour
Northern Ireland (n=171)	81 (47%)	71 (88%)
Other UK Comparators		
West of Scotland	(96%)	(89%)
NBOCA (n=4,604)		3,704 (87.9%)
KPI target	N/A (Scotland target 95%)	N/A (Scotland target 85%)

- 47% of rectal cancer patients had long or short course chemotherapy or radiotherapy as part of a neoadjuvant surgical pathway in NI.
- Neoadjuvant therapy for rectal surgery is used to reduce the tumour prior to surgery. For those patients that had neoadjuvant therapy, when the post-surgical pathological specimens were reviewed 88% of cases had a CRM which was clear of tumour. This is comparable with the West of Scotland audit, which had an average of 89% of post neo-adjuvant therapy surgical cases with clear CRM.
- Numbers were too small to report results separately by Trusts.

KEY PERFORMANCE INDICATORS – Rectal Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Rectal surgery KPIs are restricted to the 296 Rectal cancer** patients who underwent major surgical resections. This includes 8 rectal cancer patients who underwent polypectomy or local excision, followed by a surgical resection.

This analysis then excludes patients undergoing surgeries not involving anastomosis of the rectum, for example APER.

This left **132** rectal cancer patients for inclusion in this KPI analysis, **representing 45%** of all rectal cancer patients in the 2018 audit.

Table 45. KPI: Number of rectal cancer patients diagnosed in 2018 undergoing major surgical resection involving anastomosis of the rectum and having anastomotic leak, NI.

Total number of patients in region undergoing surgical procedure involving anastomosis of the rectum	Number of patients undergoing surgical procedure involving anastomosis of the rectum and having anastomotic leak (%)
Northern Ireland (n=132)	13 (10%)
Other UK Comparators	
West of Scotland (n=681)	37 (5.4%)
KPI target	N/A (Scotland target 10%)

- Approximately 1 in 10 (10%) rectal cancer patients experience an anastomotic leak following major surgery. This is higher than equivalent proportions reported in the Scotland audit (5.4%) but meets the target set in that report (10%).
- Of the 13 rectal cancer patients who had an anastomotic leak following major surgery, 7 (54%) had their anastomotic leak treated via surgery.

KEY PERFORMANCE INDICATORS – Rectal Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Rectal surgery KPIs are restricted to the 296 Rectal cancer** patients who underwent major surgical resections. This includes 8 rectal cancer patients who underwent polypectomy or local excision, followed by a surgical resection.

This left **186** rectal cancer patients for inclusion in these KPI analyses, **representing 63%** of all rectal cancer patients in the 2018 audit. Data for this variable were collected up to 1-year post stoma insertion. For other peer audits data was captured up until 18 months post stoma insertion. Therefore, the data from peer nations is not comparable.

Table 46. KPI: Frequency of rectal cancer patients diagnosed in 2018 undergoing major surgical resection with a stoma (a) fitted at surgery and (b) still in place 12 months post-operation, NI.

Trust of Treatment (Number of rectal cancer patients)	Number of patients (%)	
	Patients with stoma fitted at surgery	Patients with stoma still in place 12 months post-operation
Northern Ireland (n=186)	133 (72%)	(87%)
HSC Trust		
Belfast Trust (n=47)	39 (83%)	(83%)
Northern Trust (n=39)	25 (64%)	*
Southern Trust (n=36)	29 (81%)	(69%)
South Eastern Trust (n=33)	16 (48%)	*
Western Trust (n=31)	24 (77%)	*
Other UK Comparators	N/A	N/A
KPI target	N/A	N/A

*Small numbers <5 cannot be reported to maintain anonymity. The Northern and South Eastern Trust data should be interpreted with caution as no data was recorded for 10 and 12 patients in these HSC Trusts, respectively.

- Approximately 7 in 10 (72%) rectal cancer patients diagnosed in 2018 and undergoing surgery had a stoma fitted at surgery. Reported differences between Trusts are largely attributable to missing data.
- The type of stoma fitted was a colostomy (including end or loop colostomy) for 68 patients (50%), loop ileostomy for 49 patients (37%) or other ileostomy (including end ileostomy) for 16 patients (12%).
- For patients who had a stoma performed as part of their rectal cancer treatment, 87% still had their stoma in place 12 months after surgery.

Chemotherapy

Table 47. Frequency of colorectal cancer patients diagnosed in 2018 who received chemotherapy after diagnosis, across audit report years (1996, 2001, 2006, 2018), NI.

		Number of patients (%)			
Site	**Chemotherapy**	**1996 (n=707)**	**2001 (n=802)**	**2006 (n=892)**	**2018 (n=1,097)**
Colorectal	Yes	169 (24%)	228 (28%)	268 (30%)	377 (34%)
	No	332 (47%)	540 (67%)	602 (67%)	720 (66%)
	Not recorded	206 (29%)	34 (%)	0 (0%)	0 (0%)
		1996 (n=519)	**2001 (n=599)**	**2006 (n=646)**	**2018 (n=801)**
Colon & RS junction	Yes	131 (25%)	164 (27%)	189(29%)	234 (29%)
	No	241 (46%)	407 (68%)	457 (70%)	567 (71%)
	Not recorded	147 (28%)	28(5%)	0 (0%)	0 (0%)
		1996 (n=188)	**2001 (n=203)**	**2006 (n=246)**	**2018 (n=296)**
Rectal	Yes	38 (20%)	64 (32%)	79 (32%)	143 (48%)
	No	91 (48%)	133 (66%)	167 (68%)	153 (52%)
	Not recorded	59 (31%)	6 (3%)	0 (0%)	0 (0%)

- Overall, approximately one third (34%) of all CRC patients diagnosed in 2018 were recorded as having received chemotherapy.
- This represents a small increase in colon (including rectosigmoid junction) cancer patients receiving chemotherapy in 1996 (29% v. 25%), although this reflects stable trends compared with 2006.
- For patients with cancer of the rectum, 48% received chemotherapy in 2018, a substantial increase on 2006 (32%) and earlier audit years.

KEY PERFORMANCE INDICATORS – Chemotherapy

This section outlines the Key Performance indicators (KPIs) agreed by the NI Colorectal Cancer Clinical Reference Group for chemotherapy.

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Chemotherapy KPIs are restricted to the** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

These **727** CRC patients were then restricted to patients with Stage II (Dukes B) disease and were aged 50-74 years. The population age of 50-74 was based on the age group selected by a Scotland audit. It is recommended that this patient group should be considered for adjuvant chemotherapy to reduce risk of local and systemic recurrence

A detailed case note review was conducted for patients eligible for this KPI who did not receive adjuvant chemotherapy. From this, patients who choose not to receive adjuvant chemotherapy or were deemed to have low risk Stage II tumours were excluded from this analysis.

This left **71 CRC patients** for inclusion in this KPI analysis, **representing 6%** of all CRC patients in the 2018 audit.

Table 48. KPI: Frequency of high-risk Dukes B (TNM Stage II) colorectal cancer patients aged 50-74 years diagnosed in 2018 undergoing major surgical resection who received adjuvant chemotherapy, NI.

Trust of Treatment (Number of patients with high risk Dukes B aged 50-74 years who underwent surgical resection)	Number of patients with high risk Dukes B colorectal cancer aged 50-74 years who received adjuvant chemotherapy (%)
Northern Ireland (n=71)	32 (45%)
Other UK Comparators	
West of Scotland (n=75)	56 (75%)
KPI target	N/A (Scotland target 50%)

*Results not reported by HSC Trust due to small numbers <5 which cannot be reported to maintain anonymity.

- The proportion of CRC patients diagnosed in 2018 with a 'high-risk' Dukes B/Stage II tumour eligible to be considered for this KPI who had adjuvant chemotherapy was 45% in NI. This is below the Scotland target of 50% and below the equivalent reported comparator in a Scottish audit of 75%.

KEY PERFORMANCE INDICATORS – Chemotherapy

This section outlines the Key Performance indicators (KPIs) agreed by the NI Colorectal Cancer Clinical Reference Group for chemotherapy.

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Chemotherapy KPIs outlined below are restricted to the** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

These **727** CRC patients were then restricted to patients with Stage III (Dukes C) disease and were aged 50-74 years. The population age of 50-74 was based on the age group selected by a Scotland audit. It is recommended that this patient group should be considered for adjuvant chemotherapy to reduce risk of local and systemic recurrence A detailed case note review was conducted for patients eligible for this KPI who did not receive adjuvant chemotherapy. From this, patients who choose not to receive adjuvant chemotherapy were excluded from this analysis.

This left **147 CRC patients** for inclusion in this KPI analysis, **representing 13%** of all CRC patients in the 2018 audit.

Table 49. KPI: Frequency of Dukes C (TNM Stage III) colorectal cancer patients aged 50-74 years diagnosed in 2018 undergoing major surgical resection who received adjuvant chemotherapy, NI.

Trust of Treatment (Number of patients with Dukes C colorectal cancer aged 50-74 years who underwent surgical resection)	Number of patients with Dukes C colorectal cancer aged 50-74 years who received adjuvant chemotherapy (%)
Northern Ireland (n=147)	114 (78%)
HSC Trust	
Belfast Trust (n=29)	23 (79%)
Northern Trust (n=25)	23 (92%)
Southern Trust (n=32)	27 (84%)
South Eastern Trust (n=40)	25 (62%)
Western Trust (n=21)	16 (76%)
Other UK Comparators	
West of Scotland (n=134)	121(90.3%)
KPI target	N/A (Scotland target 70%)

- The proportion of CRC patients diagnosed in 2018 with a Dukes C/Stage III tumour eligible to be considered for this KPI who had adjuvant chemotherapy was 78% in NI. This exceeds the Scottish target of 70%.
- Some regional variation existed, with only 62% of CRC patients eligible for this analysis in the South Eastern Trust receiving adjuvant chemotherapy.
- All other HSC Trusts exceeded the target, ranging from 76% in the Western Trust to 92% in the Northern Trust.

Reasons for not receiving adjuvant chemotherapy

- The reasons for not receiving adjuvant chemotherapy were further explored where possible and included: neoadjuvant chemotherapy resulting in disease clearance, co-morbidities or patient fitness, slow recovery from surgery, or disease progression resulting in the indication for chemotherapy being changed to palliative.

Radiotherapy

Table 50. Frequency of colorectal cancer patients diagnosed in 2018 who received radiotherapy after diagnosis, across audit report years (1996, 2001, 2006, 2018), NI.

		Number of patients (%)			
Site	**Radiotherapy**	**1996 (n=707)**	**2001 (n=802)**	**2006 (n=892)**	**2018 (n=1,097)**
Colorectal	Yes	65 (9%)	91 (11%)	143 (16%)	157 (14%)
	No	307 (43%)	684 (85%)	749 (84%)	820 (75%)
	Not recorded	335(47%)	27 (3%)	0 (0%)	120 (11%)
		1996 (n=519)	**2001 (n=599)**	**2006 (n=646)**	**2018 (n=801)**
Colon & RS junction	Yes	14 (3%)	23 (4%)	27(4%)	18 (2%)
	No	243 (47%)	557 (93%)	619 (96%)	691 (86%)
	Not recorded	262 (50%)	19 (3%)	0 (0%)	92 (12%)
		1996 (n=188)	**2001 (n=203)**	**2006 (n=246)**	**2018 (n=296)**
Rectal	Yes	51 (27%)	68 (33%)	116 (47%)	139 (47%)
	No	64 (34%)	127 (63%)	130 (53%)	129 (44%)
	Not recorded	73 (38%)	8(4%)	0 (0%)	28 (9%)

*% may not total 100% due to rounding

- Since 1996, the number of patients receiving radiotherapy has increased by an additional 92 patients by 2018, from 65 patients in 1996 to 157 patients in 2018. The biggest increase of patients using radiotherapy treatments are in rectal cancers with an additional 88 patients attending radiotherapy in 2018 compared with 1996.
- Of rectal cancer patients diagnosed in 2018, almost half (47%) had a record of having received radiation therapy after diagnosis; this is very similar to the proportion of patients treated in 2006 (47%).
- A small number (n=18, 2%) of colon (including rectosigmoid junction, who accounted for 9 of these patients) cancer patients had a record of having received radiotherapy after diagnosis. The majority received radiotherapy with palliative intent.

Patient Survival

Table 51. The proportion of colorectal cancer patients surviving after diagnosis across each audit year (1996, 2001, 2006, 2018).

		Proportion of patients (%)			
Site	**Time**	**1996 (n=707)**	**2001 (n=802)**	**2006 (n=892)**	**2018 (n=1,097)**
Colorectal	30 days	91%	92%	93%	96%
	60 days	88%	88%	87%	91%
	6 months	79%	79%	77%	83%
	12 months	70%	73%	71%	78%
		1996 (n=519)	**2001 (n=599)**	**2006 (n=646)**	**2018 (n=801)**
Colon & RS junction	30 days	90%	90%	92%	95%
	60 days	87%	87%	85%	89%
	6 months	78%	78%	74%	79%
	12 months	70%	72%	68%	74%
		1996 (n=188)	**2001 (n=203)**	**2006 (n=246**	**2018 (n=296)**
Rectal	30 days	95%	96%	95%	99%
	60 days	90%	91%	93%	97%
	6 months	82%	82%	85%	92%
	12 months	70%	76%	78%	88%

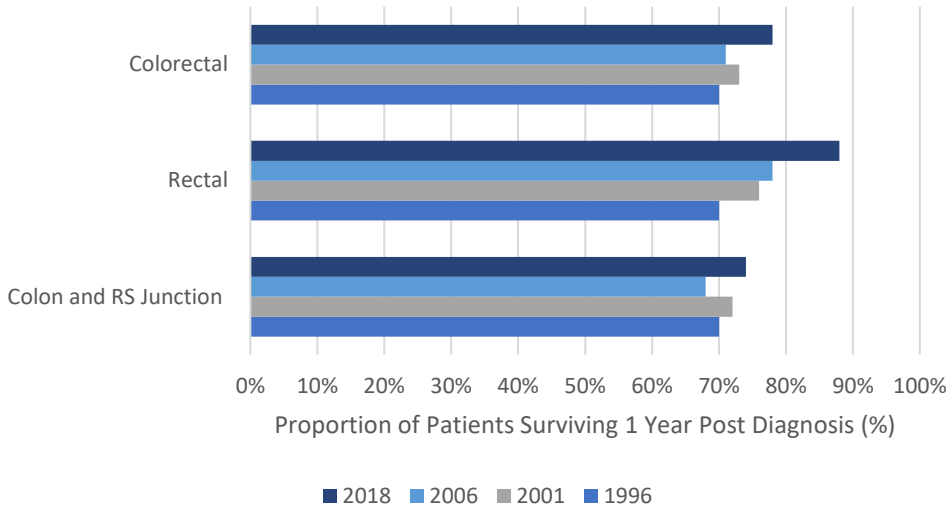

Figure 14. Proportion of colorectal cancer patients surviving 1 Year post-diagnosis by audit year of incidence, NI.

- In 2018 95% of patients survived at least 30 days after their diagnosis. This declines to 92%, 83% and 78% surviving at least 60 days, 6 months and 12 months after diagnosis
- The proportion of patients surviving at least 12 months after their diagnosis is higher for rectal cancer patients than colon cancer patients (88% v. 74%, respectively).
- There has been an improvement in survival for both colon and rectal cancer patients over time: a further 8% of CRC patients survived at least 12 months after diagnosis compared with 1996. This reflects an additional 18% and 4% of rectal and colon cancer patients, respectively, surviving at least one year after diagnosis in 2018 compared with 1996.

Patient Survival by Stage

Table 52. Proportion of colorectal cancer patients surviving after diagnosis, across audit report years (1996, 2001, 2006, 2018), by disease stage, NI.

		Proportion of patients alive (%)				
Site	**Time**	**Dukes A**	**Dukes B**	**Dukes C**	**Dukes D**	**Not Known**
1996 (n=707)	30 days	95%	97%	93%	86%	81%
	60 days	95%	96%	92%	79%	70%
	6 months	95%	95%	89%	53%	61%
	12 months	93%	90%	81%	35%	49%
	Time	**Dukes A**	**Dukes B**	**Dukes C**	**Dukes D**	**Not Known**
2001 (n=802)	30 days	98%	97%	96%	87%	74%
	60 days	95%	96%	93%	79%	68%
	6 months	93%	95%	88%	55%	54%
	12 months	91%	92%	82%	43%	46%
	Time	**Dukes A**	**Dukes B**	**Dukes C**	**Dukes D**	**Not Known**
2006 (n=892)	30 days	98%	96%	97%	86%	83%
	60 days	96%	93%	96%	73%	73%
	6 months	94%	91%	93%	50%	47%
	12 months	91%	89%	89%	36%	36%
	Time	**TNM Stage I**	**TNM Stage II**	**TNM Stage III**	**TNM Stage IV**	**Not Known**
2018 (n=1097)	30 days	99%	97%	99%	90%	93%
	60 days	99%	97%	98%	76%	85%
	6 months	96%	96%	95%	53%	69%
	12 months	95%	95%	92%	42%	61%

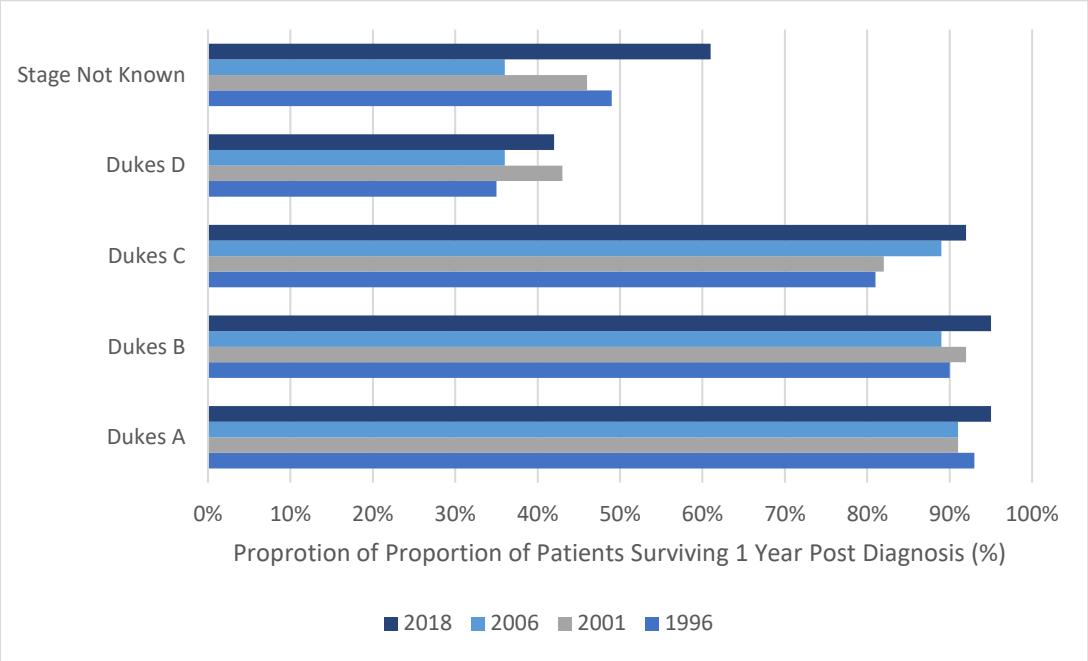

Figure 15. Proportion of colorectal cancer patients surviving 1 year post diagnosis, by audit year and by stage, NI.

- For CRC patients diagnosed in 2018, the proportion of patients surviving at least one year after their diagnosis had improved across all stages compared with earlier audit years: 95% of Stage I and II patients, 92% of Stage III patients and 42% of Stage IV patients were alive one year after their diagnosis.
- There has been a small improvement in the proportion of CRC patients diagnosed with Dukes A/ Stage I disease who survived at least one year, rising from 93% of patients diagnosed in 1996 to 95% of patients diagnosed in 2018.
- Similarly, the proportion of CRC patients diagnosed with Dukes B/Stage II disease who survived at least one year after diagnosis increased from 90% of patients diagnosed in 1996 to 95% of patients diagnosed in 2018.
- The biggest gains in 1 year survival were observed in locally advanced Dukes C/Stage III CRC patients. An additional 11% of Dukes C/Stage III patients diagnosed in 2018 were alive one year after diagnosis, compared with patients diagnosed in 1996.
- One year survival amongst CRC patients diagnosed at Stage IV varied in previous audit years, ranging from 35%-43% during 1996, 2001 and 2006. For CRC patients diagnosed in 2018 with metastatic/late-stage disease, approximately four in 10 (42%) were still alive one year after diagnosis. This fits within the ranges previously reported during 1996, 2001 and 2006, suggesting limited improvement in Stage IV patient outcomes from earlier years.
- *(Please note that Official Statistics for NICR data on cancer survival in CRC patients can be found in Appendix 1, or on our website, see*: https://www.qub.ac.uk/research-centres/nicr/*)*

Patient Survival by Trust

Table 53. Proportion of colorectal cancer patients diagnosed in 2018 surviving at least one year after diagnosis, by Trust of Treatment, NI.

Trust of Treatment	Number of patients (%)	
	Patients who died within one year of diagnosis	Patients who survived at least one year after diagnosis
HSC Trust		
Belfast Trust (n=258)	66 (26%)	192 (74%)
Northern Trust (n=231)	52 (23%)	179 (77%)
Southern Trust (n=213)	43 (20%)	170 (80%)
South Eastern Trust (n=247)	56 (23%)	191 (77%)
Western Trust (n=148)	24 (16%)	124 (84%)

Methods note: This analysis does not account for the 'case mix' between Trusts, for example differences in patient age structure or comorbidities.

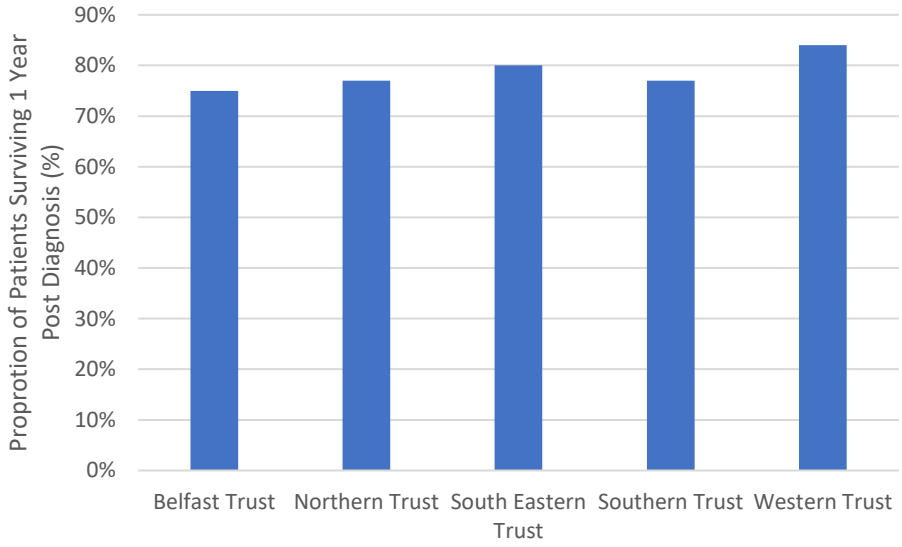

Figure 16. Proportion of colorectal cancer patients surviving 1 year post diagnosis for patients diagnosed in 2018 by Trust of Treatment, NI.

- The proportion of CRC patients still alive one year after diagnosis ranged from 74% to 84% across HSC Trusts in NI.
- The differences in one year observed survival of CRC patients diagnosed in 2018 between Trusts was not statistically significant (p=0.28).

Patient Survival by Age Group

Table 54. Proportion of colorectal cancer patients diagnosed in 2018 surviving at least one year after diagnosis, by age group at diagnosis, NI.

Age group at diagnosis	Number of patients (%)	
	Patients who died within one year of diagnosis	Patients who survived at least one year after diagnosis
<50 years (n=56)	8 (14%)	48 (86%)
50-59 years (n=139)	14 (10%)	125 (90%)
60-74 years (n=436)	70 (16%)	366 (84%)
75+ years (n=466)	149 (32%)	317 (68%)

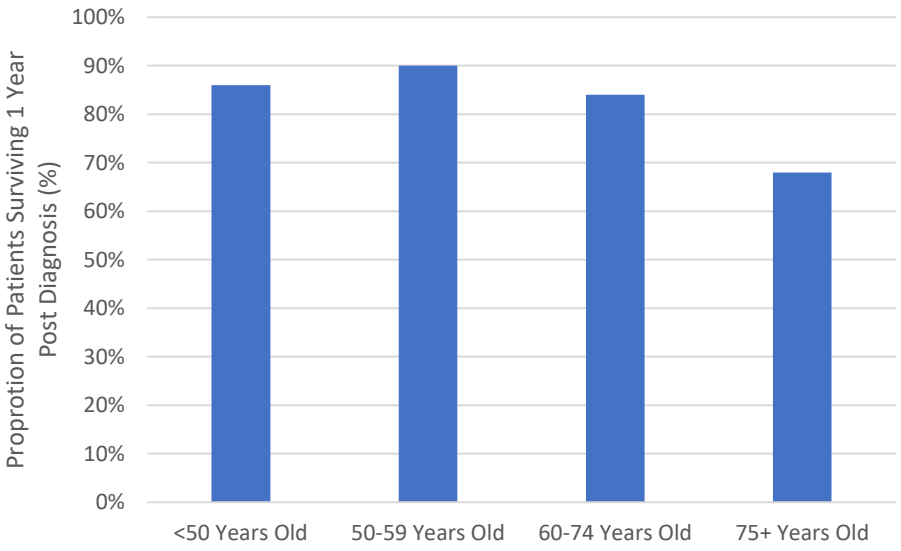

Figure 17. Proportion of colorectal cancer patients diagnosed in 2018 surviving 1 Year Post diagnosis, by Age at diagnosis, NI.

- The proportion of CRC patients still alive one year after diagnosis in 2018 was highest amongst 50-59 year olds (90%), reducing to 84% in 60-74 year olds and 68% in 75+ year olds.
- One year observed survival in early-onset CRC (in adults aged <50 years) was 86%, slightly lower than 50-59 year olds.
- The differences in one year observed survival of CRC patients diagnosed in 2018 between age groups was statistically significant ($p<0.001$).

KEY PERFORMANCE INDICATORS – Patient Survival

Patient Mortality within 30 days and 90 days of Elective Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Patient Survival KPIs following surgery are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

Patients for whom the nature of surgery was unknown were excluded.

This KPI analysis considers **565** CRC patients who underwent elective surgery, **representing 52%** of all CRC patients in the 2018 audit.

Table 55. KPI: Frequency of colorectal cancer patients diagnosed in 2018 undergoing elective major surgical resection who died within (a) 30 days and (b) 90 days post-operation, NI.

Trust of Treatment (Number of patients who underwent elective surgery)	Number of patients (%)	
	Patients who died within 30 days of elective surgery	Patients who died within 90 days of elective surgery
Northern Ireland (n=565)	<5	8 (1.4%)
Other UK Comparators		
West of Scotland (n=792)	5 (0.6%)	12 (1.5%)
NBOCA (n=776)		192 (1.7%)
KPI target	<3%	<4%

- Eight patients died within 90 days of having elective surgery, following a CRC diagnosis in 2018. This represents 1.4% of all CRC patients undergoing elective surgery in NI, which is similar to proportions reported in other UK audits and is below the KPI target of <4%.
- Numbers were too small to report the patients who died within 30 days of elective surgery.

KEY PERFORMANCE INDICATORS – Patient Survival

Patient Mortality within 30 days and 90 days of Emergency Surgery

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the Patient Survival KPIs following surgery are restricted to the 727 CRC** patients who underwent major surgical resections. This includes 25 patients who underwent polypectomy or local excision, followed by a surgical resection.

Patients for whom the nature of surgery was unknown were excluded.

This KPI analysis considers **126** CRC patients who underwent emergency surgery, **representing 11%** of all CRC patients in the 2018 audit.

Table 56. KPI: Frequency of colorectal cancer patients diagnosed in 2018 undergoing emergency major surgical resection who died within (a) 30 days and (b) 90 days post-operation, NI.

Trust of Treatment (Number of patients who underwent emergency surgery)	Number of patients (%)	
	Patients who died within 30 days of emergency surgery	Patients who died within 90 days of emergency surgery
Northern Ireland (n=126)	6 (4.7%)	15 (11.9%)
Other UK Comparators		
West of Scotland (n=145)	8 (5.5%)	13 (9%)
NBOCA (n=1,708)	N/A	196 (11.5%)
KPI target	<15%	<20%

- Six patients died within 30 days of having emergency surgery in NI, following a CRC diagnosis in 2018. This represents 4.7% of all CRC patients undergoing emergency surgery in NI, which is lower than the equivalent figure reported in a Scottish audit (5.5%) and well within the KPI target of <15%.
- Fifteen patients died within 90 days of having emergency surgery, following a CRC diagnosis in 2018. This represents 11.9% of all CRC patients undergoing emergency surgery in NI, which is slightly higher than the equivalent figure reported in a Scottish audit (9%), and comparable to NBOCA audit figures (11.5%) and below the KPI target of <20%.

KEY PERFORMANCE INDICATORS – Patient Survival

Patient Mortality within 30 days and 90 days of neo-adjuvant and adjuvant chemotherapy receipt

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, **the 30 day and 90 day mortality following Chemotherapy KPIs are restricted to the CRC** patients who received chemotherapy, and for whom both the chemotherapy intent (adjuvant or neo-adjuvant) and date chemotherapy ended was recorded.

Table 57. KPI: Frequency of colorectal cancer patients diagnosed in 2018 who died within 30 days or 90 days of receiving (a) neo-adjuvant chemotherapy or (b) adjuvant chemotherapy, NI.

Number of patients in region who received chemotherapy	Number of patients (%)	
	Patients who died within 90 days following neo-adjuvant chemotherapy	Patients who died within 90 days following adjuvant chemotherapy
Northern Ireland Total (Neoadjuvant n=31, Adjuvant n=147)	0 (0%)	*
Other UK Comparators		
West of Scotland (Neoadjuvant n=112, Adjuvant n=232)	1 (0.9%)	4 (1.7%)
KPI target	N/A (Scotland target <2%)	<2%

*Numbers too low to publish.

- All patients who received neo-adjuvant chemotherapy were alive 30 days and 90 days post-treatment.
- The numbers of patients who died within 30 days or 90 days following adjuvant chemotherapy were too low to report.
- NI falls below the Scottish target of 2% or less for 90-day mortality for neo-adjuvant and adjuvant chemotherapy survival.

KEY PERFORMANCE INDICATORS – Clinical Trials

Methods notes:

Of the 1,097 CRC patients included in the 2018 CRC audit analysis, all (100%) are considered for **the Clinical Trials KPI.**

Table 58. KPI: Number of colorectal cancer patients diagnosed in 2018 with a record of entry into clinical trials, NI.

Number of patients (%)	Number of patients (%) who entered a clinical trial
Northern Ireland Total (n=1,097)	15 (1.4%)
Other UK Comparators	
West of Scotland	8.8%
KPI target	Scotland target 15%

The Audit database for incident CRC patients diagnosed in 2018 was merged with the NI Clinical Trials database for CRC clinical trials which took recruited patients to trials in 2018 and 2019. This has shown very low participation in clinical trials for CRC patients in NI, with only 1.4% of CRC patients being recruited to clinical trials. The majority of patients were recruited within the Belfast HSC Trust, and the Southern and Western HSC Trusts did not recruit CRC patients to any clinical trials linked with the NI Clinical Trials unit.

This is despite eight trials being open in 2018 for CRC patient recruitment in NI, as listed below:

- A Phase I trial of LY3143921 hydrate in solid tumours
- Add-Aspirin Trial
- Aristotle
- CHALLENGE-UK
- CReST2
- FAK-PD1 v1
- FOCUS-4: Molecular selection of therapy in colorectal cancer
- National Study of Colorectal Cancer Genetics

Regional MDTs and local Trusts must work to increase patient recruitment into clinical trials. All patients who are eligible should be considered for clinical trial participation. Note that patients who were offered a trial but did not participate are not included in these figures.

Summary of Key Performance Indicators

Please note: Targets are mirrored against the National Scottish Colorectal Cancer Audit Colorectal Cancer Quality Performance Indicators document published in 2017 for patients diagnosed between 2013-2016, and the English and Welsh National Bowel Cancer Audit (NBOCA) published in 2020 for patients diagnosed between 2017-2018.

In the visual summary displaying in Table 59 below, if a KPI target has been set by a peer nation and a Trust or NI does not meet that target it is automatically highlighted red.

If a KPI does not yet have a target assigned:

- If the KPI is within 5% of the NI average, this is displayed as a green box.
- If the KPI is within 5-10% of the NI average, this is displayed as an amber box.
- If the KPI is from >10% of the NI average, this is displayed as a red box.

Table 59 (a). Visual summary of the Key Performance Indicators measured for colorectal cancer patients diagnosed in 2018, NI (continued).

KPI	Belfast HSC Trust	Northern HSC Trust	Southern HSC Trust	South Eastern HSC Trust	Western HSC Trust	NI	West of Scotland	NBOCA/ England and Wales	Target
REFERRAL AND DIAGNOSIS									
Imaging Colon	96%	98%	96%	91%	98%	98%	96%	N/A	95%
Imaging Rectum MRI +CT	83%	86%	78%	83%	89%	89%	99%	N/A	95%
MDT Meeting	98%	98%	97%	98%	97%	97%	97%	N/A	95%
CNS Review	81%	73%	85%	94%	83%	84%	N/A	86%	N/A
TREATMENT									
Major Resection Rates on patients with Mets at diagnosis	16%	8%	8%	11%	8%	11%	N/A	6%	N/A
Post Polypectomy resection	*	*	*	*	*	30%	N/A	N/A	N/A
Emergency surgery rate	14%	20%	23%	15%	15%	17%	N/A	19%	N/A
Laparoscopic Surgery	41%	19%	42%	43%	53%	39%	N/A	45%-80% range	N/A
Major resection rectal cancer	64%	59%	69%	57%	66%	63%	N/A	46%	N/A
Neoadjuvant therapy	*	*	*	*	*	94%	97%	N/A	90%
Surgery and Circumferential Margins	*	*	*	*	*	88%	89%	N/A	85%**
Adjuvant Chemotherapy High risk Dukes B	*	*	*	*	*	45%	75%	N/A	50% +
Adjuvant Chemotherapy Dukes C	79%	92%	84%	62%	76%	78%	90%	N/A	70%+
APER rates	34%	31%	22%	24%	32%	33%	N/A	24%	N/A

*Numbers are too low to publish. **Note target will increase to 95% in future Scottish audits.

Summary of Key Performance Indicators

Please note: Targets are mirrored against the National Scottish Colorectal Cancer Audit Colorectal Cancer Quality Performance Indicators document published in 2017 for patients diagnosed between 2013-2016, and the English and Welsh National Bowel Cancer Audit (NBOCA) published in 2020 for patients diagnosed between 2017-2018.

In the visual summary displaying in Table 59 below, if a KPI target has been set by a peer nation and a Trust or NI does not meet that target it is automatically highlighted red.

If a KPI does not yet have a target assigned:

- If the KPI is within 5% of the NI average, this is displayed as a green box.
- If the KPI is within 5-10% of the NI average, this is displayed as an amber box.
- If the KPI is from >10% of the NI average, this is displayed as a red box.

Table 59 (b). Visual summary of the Key Performance Indicators measured for colorectal cancer patients diagnosed in 2018, NI (continued).

KPI	Belfast HSC Trust	Northern HSC Trust	Southern HSC Trust	South Eastern HSC Trust	Western HSC Trust	NI	West of Scotland	NBOCA/ England and Wales	Target
TREATMENT									
Length of stay **Elective** 5 or less days	20%	12%	30%	33%	11%	21%	N/A	23-49%	Within GB range
Length of stay **Emergency** 5 or less days	*	*	*	*	*	7%	N/A	7-38%	Within GB range
30 day Re-admission rate	8%	12%	9%	4%	11%	8%	N/A	10.5%	N/A
30 day Re-operation rate	6%	8%	4%	2%	3%	8%	4.9%	8%	<10%
Anastomotic dehiscence: colon	*	*	*	*	*	5%	3%	N/A	<5%
Anastomotic dehiscence: rectum	*	*	*	*	*	10%	N/A	N/A	<10%
12 Month Rectal Cancer Stoma Rate	83%	*	69%	*	*	87%	N/A	N/A	N/A
Surgery for Liver Mets discussion at MDT	*	*	*	*	*	94%	N/A	N/A	N/A
Lymph Node Yield	91%	87%	85%	85%	86%	87%	94.8%	82%	80%

*Numbers are too low to publish.

Summary of Key Performance Indicators

Please note: Targets are mirrored against the National Scottish Colorectal Cancer Audit Colorectal Cancer Quality Performance Indicators document published in 2017 for patients diagnosed between 2013-2016, and the English and Welsh National Bowel Cancer Audit (NBOCA) published in 2020 for patients diagnosed between 2017-2018.

In the visual summary displaying in Table 59 below, if a KPI target has been set by a peer nation and a Trust or NI does not meet that target it is automatically highlighted red.

If a KPI does not yet have a target assigned:

- If the KPI is within 5% of the NI average, this is displayed as a green box.
- If the KPI is within 5-10% of the NI average, this is displayed as an amber box.
- If the KPI is from >10% of the NI average, this is displayed as a red box.

Table 59 (c). Visual summary of the Key Performance Indicators measured for colorectal cancer patients diagnosed in 2018, NI.

KPI	Belfast HSC Trust	Northern HSC Trust	Southern HSC Trust	South Eastern HSC Trust	Western HSC Trust	NI	West of Scotland	NBOCA/ England and Wales	Target
SURVIVAL									
30 Day Mortality Rate post **Elective** Surgery	*	*	*	*	*	*	0.6%	N/A	<3%
90 Day Mortality Rate post **Elective** Surgery	*	*	*	*	*	1.4%	1.5%	1.7%	<4%
30 Day Mortality Rate post **Emergency** Surgery	*	*	*	*	*	4.7%	5.5%	N/A	<15%
90 Day Mortality Rate post **Emergency** Surgery	*	*	*	*	*	11.9 %	9%	11.5%	<20%
30 Day Mortality post **adjuvant** chemotherapy	*	*	*	*	*	*	*	N/A	N/A
30 Day Mortality post **neoadjuvant** chemotherapy	0%	0%	0%	0%	0%	0%	*	N/A	N/A
90 Day Mortality post **adjuvant** chemo	*	*	*	*	*	*	1.7%	N/A	<2%
90 Day Mortality post **neoadjuvant** chemotherapy	0%	0%	0%	0%	0%	0%	0.9%	N/A	<2%
CLINICAL TRIALS									
Clinical trials participation	*	*	*	*	*	1.4%	8.8%	N/A	Scot-land target 15%

*Numbers are too low to publish.

Summary and Recommendations:

Key findings	Recommendations
Patient demographics and comorbidities	
• The number of CRC cases has increased from 919 cases in 1993 to 1222 cases in 2019, an increase of 33%; mostly attributable to ageing of the population, as age-standardised incidence rates fell by 14% in men and 9% in women.	• The service should be funded to ensure that it is able to meet the demand of increased numbers. • Primary prevention and health promotion campaigns remain important, for example reducing obesity or improving physical activity, given the increasing numbers of patients being diagnosed with CRC. • Early diagnosis and attendance at Bowel Cancer Screening when invited should be encouraged.
• One third of CRC patients have at least one co-morbidity (partly reflecting the age distribution of patients with 82% over age 60) with one in ten CRC patients having a previous or concurrent cancer diagnosis (excluding non-melanoma skin cancers). • One in eight CRC patients in this audit present as an emergency, higher for patients with colon and rectosigmoid junction (14%) than rectal tumours (9%)	• Treatment pathways and co-decision making need to be increasingly aware of complex medical histories and multimorbidity with which CRC patients are presenting. For example, multi-disciplinary team care such as cardio-oncology may be increasingly required. • Consider research into factors associated with emergency presentation in CRC patients and identify if the number of emergency surgeries can be reduced further, for example through public health awareness campaigns of symptoms and improvements in early diagnosis of CRC.

Key findings	Recommendations
Impact of Bowel Cancer Screening	
• The introduction of Bowel Cancer Screening has led to an improved stage distribution of CRC, driven by screen-detected tumours, with an increase in the proportion of Stage I colon and rectosigmoid junction tumours detected in 60-74 years olds. • CRC patients in the screening-eligible age group are less likely to present as an emergency. • The number of rectal cancers diagnosed in the screening-eligible age group has increased. • A proportionate reduction in metastatic rectal cancer has been observed in patients diagnosed in 2018, compared with earlier audit years.	• Continued evaluation of the impact of Bowel Cancer Screening is warranted, particularly to evaluate the recent change from FOB testing evaluated in this report to qFIT in 2021. • Expansion of Bowel Cancer Screening to younger age groups has been implemented in other parts of the UK and high-income countries such as the USA. This is a policy priority for the Bowel Cancer Screening in Northern Ireland.

Key findings	Recommendations
Multi-Disciplinary Team Meeting (MDM)	
• Northern Ireland is showing a strong performance for MDM discussion prior to treatment at 97%. This is evident across all Trusts. • The vast majority of patients were discussed at MDM within 31 days (93%) of their clinical diagnosis of cancer, rising to 99% of the CRC patients discussed at MDM being discussed within 62 days of diagnosis. • Of the 189 patients who were not discussed at a MDM within 62 days of referral, the majority had been referred to Outpatients through their GP or other Consultant referral (n=126, 67%), with a notable proportion referred through Bowel Cancer Screening (n=26, 14%). • Of the 177 patients with a liver metastasis, less than a quarter (23%) had a discussion at a Hepato-Biliary MDT.	• The high level of MDM discussion should continue with additional resource allocated to account for the increasing number of patients. • The introduction of Rapid Diagnostic Hubs should be given due consideration to help improve timelines from referral to MDM discussions. • In NI the Cancer Patient Pathway System (CaPPS) is used as an administration system for MDTs and the data input into CaPPS is used for Northern Ireland's Official Statistics for Cancer Waiting times. It is crucial that each cancer patient's data are input into CaPPS (and/or its successor system) to ensure that cancer waiting times are correct and all patients are accounted for. • The number of patients who have a CRC metastasis to the liver and are discussed at a dedicated HPB MDT should increase to ensure equitable access to care. Liver specialists need to be involved in the decision making of these patients.
Clinical Nurse Specialist (CNS) Referrals	
• Regional variation exists with regards to (Clinical Nurse Specialists (CNS) referrals • Four out of five Trusts are experiencing levels of CNS referrals below that seen in comparator regions in England (86%).	A robust way of monitoring CNS review should be established to enable measurement of the impact of this service and to ensure consistency of service provision across NI. Additional funding and capacity may be required to facilitate this.

Key findings	Recommendations
Radiological Imaging	
• Regional variation exists with regards to full staging CT scanning in colon cancer patients prior to treatment, ranging from 91% - 98% across HSC Trusts, with four of five Trusts exceeding the 95% target. • Near universal CT imaging of rectal cancer patients was evident across NI. • Regional variation exists with regards to pelvic MRI scanning in rectal cancer patients, and no Trusts met the 95% target for pre-treatment MRI and full CT imaging, according to available data.	• Sharing of best practices across Trusts for radiological imaging to ensure equitable access to staging scans. • Better recording of contra-indications to radiological imaging data to be made available in NI.
Surgery	
VOLUME • There has been a 13 % increase in the number of CRC patients undergoing surgery in 2018 compared with 1996. • All HSC Trusts performed major surgical resections on a minimum of 100 patients who had been diagnosed with incident CRC in 2018. • Approximately 1 in 6 CRC patients diagnosed in 2018 who underwent a surgical resection (n=127, 17%) had their operation under emergency circumstances. • Approximately two thirds (63%) of rectal cancer patients underwent major surgery, which is higher than rates in England/Wales (46%). • The proportion of rectal cancer patients undergoing APER differed significantly across HSC Trusts, from 22% in the	• Workforce planning for CRC surgery in NI needs to consider the increasing number of patients and changing procedural practices, particularly for rectal cancer patients.

Southern Trust to 33% in the Belfast Trust. • There has been a more substantive change in surgical practice for rectal cancer patients compared with earlier audit years: the proportion of patients undergoing anterior resection has reduced substantially, while patients undergoing other procedures such as Hartmann procedure, or newer, less invasive surgery techniques such as transanal endoscopic microsurgery (TEM) and transanal minimally invasive surgery (TAMIS) has increased. **LOCATION OF SURGERY** • The number of hospital sites performing CRC surgery had reduced slightly from 14 hospitals in 2006 to 10 in 2018. Of the 10 hospital sites, two were performing CRC surgery on 5 or less patients who were diagnosed in 2018. • The Northern Trust recorded 15 operators performing surgeries on a total of 149 CRC patients diagnosed in 2018, with only one operator completing 20 or more major resections for patients diagnosed with CRC in 2018. 87% of CRC patients in the Northern Trust had their surgery performed by a surgeon who had completed less than 20 resections on CRC patients diagnosed in 2018. **LAPAROSCOPIC SURGERY** • Across all of NI, the proportion of CRC patients diagnosed in 2018 who underwent laparoscopic surgery as planned was 39%. This is considerably lower than comparable rates in England (64%). Rates of laparoscopic surgery	• A review to be undertaken to ensure that surgeons performing elective major CRC surgery complete volumes of colorectal surgery in line with ACPGBI recommendations to ensure high standards and good outcomes of patient care. • Regional MDT and local teams to undergo a review and identify training needs to increase the proportion of patients who have major surgery utilising laparoscopic or laparoscopic assisted surgical access as a part of post Covid19 recovery planning. • Current NICE guidelines recommend that patients are offered laparoscopic surgery when clinically appropriate and by surgeons who have had the appropriate training and complete the

within the Northern Trust are notably lower than other HSC Trusts in NI (19% vs 41-53%). • The range of incident CRC patients in Cancer Alliances in England/Wales that had a laparoscopic completed surgery in 2018/2019 was 45%-80%. Four out of 5 HSC Trusts in NI fall below the lower range of 45%, with the Western Trust being the exception (53%). • Approximately half of CRC patients (51%) diagnosed in 2018 in NI who underwent surgery had a planned open surgery, with 44% having a laparoscopic attempted surgery. This contrasts with the England/Wales average of 28% of patients having a planned open surgery and 72% having a laparoscopic attempted surgery.	procedure an appropriate number of times to maintain competence. Open surgeries are associated with significant post-operative pain and longer hospital stays. Laparoscopic procedures are associated with a quicker ability for patients to return to normal activities.
ANASTOMOTIC LEAKS • The proportion of CRC patients who experienced a post-surgical resection anastomotic leak was 5% (5% in colon and 10% in rectal cancer patients); this has not changed substantially compared with earlier audit years.	• Further research is required to help predict and prevent anastomotic leak in post operative CRC major surgery, to reduce anastomotic leakage rates in NI from 5% of all colon cancer patients and 10% of rectal cancer patients.
POLYPECTOMY • One third of CRC patients who undergo polypectomy as their initial course of treatment then require a subsequent major surgical resection.	• NICaN Colorectal CRG to ascertain if a 30% major resection rate post-polypectomy is appropriate and to lead on guidance for this KPI.
WAITING TIMES • Waiting times from date of diagnosis to surgery where surgery is the first definitive treatment in a patient's treatment plan have increased over time, with 98% of patients diagnosed in 1996 having their operation within 62 days, compared with 88% of patients diagnosed in 2018.	• A review to be undertaken by the NICaN Colorectal CRG into CRC waiting times to encompass waits from referral to diagnosis, diagnosis to treatment and referral to treatment to quantify bottlenecks in system that lead to breaches in referral to treatment

	Cancer Waiting Times Targets. Some delays may be appropriate due to neoadjuvant therapies or prehabilitation prior to surgery.
LENGTH OF STAY • For both elective and emergency patients, NI remains behind England for the proportion of CRC patients with inpatient stays of 5 days or less (21% compared with 23-49% in England). Longer length of time spent as inpatient may be due to other factors including lower levels of laparoscopic surgery. • CRC patients diagnosed in 2018 who had emergency surgery generally had longer lengths of hospital stay compared with their counterparts who underwent elective surgery.	• NICaN CRG to audit inpatient stays, to create a plan to reduce surgical inpatient stays in line with other UK regions. • Further research to be encouraged to investigate the reasons for longer inpatient stays and to understand further how to reduce inpatient stays where appropriate.
NODAL EXCISION • All HSC Trusts exceeded the 80% target for 12 or more nodes to be excised at major surgery and pathologically examined.	• Good practice to continue.
MULTIPLE THERAPIES • Of rectal cancer patients who had a threatened or involved Circumferential Resection Margins) CRM, 94% had neo-adjuvant chemotherapy or radiotherapy prior to surgery. • A lower proportion of colon cancer patients were recorded as receiving surgical management only (43% in 2018), compared with earlier audit years. This reflects increased use of combination therapies, and may reflect more appropriate colon cancer patient selection for surgery.	• Recommendations on CRM surgical resection KPIs to be advised by NICaN subgroup (note that the target will be increased to 95% in the next audit in Scotland).

Key findings	**Recommendations**
Chemotherapy	
• Overall, approximately one third (34%) of all CRC patients diagnosed in 2018 were recorded as having received chemotherapy. For rectal cancer patients, 48% received chemotherapy in 2018, a substantial increase on earlier audit years. • In KPIs, the proportion of CRC patients diagnosed in 2018 with a Dukes C/Stage III tumour who had adjuvant chemotherapy was 78% in NI. This exceeds the Scottish target of 70%. Only the South Eastern Trust (62%) did not meet this target. Valid reasons such as comorbidities were provided for most patients not receiving adjuvant chemotherapy.	• The continued increase in the proportion of patients prescribed chemotherapy has implications for service provision, as overall numbers of patients also increase. • NICaN to review current evidence base for adjuvant chemotherapy in CRC patients with high risk stage II and stage III disease to feedback/inform future audit KPI formation for this cohort of patients.
Radiotherapy	
• Of rectal cancer patients diagnosed in 2018, almost half (47%) had a record of having received radiation therapy. This represents a substantive increase from previous audit years (e.g. 27% of patients received radiotherapy in 1996).	• The continued increase in the proportion of rectal cancer patients prescribed radiotherapy has implications for service provision, as overall numbers of patients also increase.
Palliative/Supportive care pathways	
• 22% of CRC Patients (24% Colon including rectosigmoid junction and 16% Rectum) presented with stage IV (late) disease. • There was a rise in colon cancer patients who did not receive any	• Use of Palliative Care Services should be included in data available for audits

treatment (23% in 2018, an increase from a reported 15% in 2006).	
Key findings	**Recommendations**
Survival	
• Survival has improved over time, and is strongly related to stage at diagnosis. • Survival is higher for patients detected via screening and lowest for those presenting as an emergency. • In 2018, 95% of CRC patients survived at least 30 days after their diagnosis. This declines to 92%, 83% and 78% surviving at least 60 days, 6 months and 12 months after diagnosis. • The proportion of patients surviving at least 12 months after their diagnosis is higher for rectal cancer than colon cancer (88% v. 74%, respectively). • For CRC patients diagnosed in 2018, the proportion of patients surviving at least one year after their diagnosis had improved across all stages compared with earlier audit years: 95% of Stage I and II patients, 92% of Stage III patients and 42% of Stage IV patients were alive one year after their diagnosis. • The biggest gains in 1 year survival were observed in locally advanced Dukes C/Stage III CRC patients. An additional 11% of Dukes C/Stage III patients diagnosed in 2018 were alive one year after diagnosis, compared with patients diagnosed in 1996. • Eight CRC patients (1.4%) died within 90 days of having elective surgery, similar to findings in other UK audits. • 30 day and 90 day-mortality following emergency surgery for CRC in NI was 4.7% and 11.9%, respectively. This is comparable with other UK regions. • 30 day and 90 day-mortality following neoadjuvant or adjuvant chemotherapy	• Annual monitoring of survival via the official statistics and ongoing participation in international survival studies is recommended. • Post-surgical mortality is in keeping with peer nations. Good practice to continue. • NI is showing appropriate patient selection for chemotherapy evidenced by nil/low 30-day and 90-day mortality following chemotherapy. Good practice to continue.

was nil or too low to report, respectively.	
Key findings	**Recommendations**
Clinical Trials	
• There was extremely low participation in clinical trials for CRC patients in NI. During 2018, the Southern and Western HSC Trusts did not participate in any clinical trials linked with the NI Clinical Trials unit.	• Infrastructure issues are a likely barrier; Regional MDTs and local Trusts must work to increase CRC patient recruitment into clinical trials in NI. All eligible patients should be considered for clinical trial participation.
Data collection for future CRC audits	
• In NI the Cancer Patient Pathway System (CaPPS) is used as an administration system for MDTs and the data input into CaPPS is used for Northern Ireland's Official Statistics for Cancer Waiting times. • Recording of ASA grading in patients undergoing surgery is poorly available from retrospective case note review.	• It is crucial that each cancer patient's data are input into CaPPS to ensure that cancer waiting times are correct and all patients are accounted for. • Capture of molecular profiling of CRC is recommended where possible, given the implications of screening of Lynch syndrome. • Data collection on the proportion of patients having enhanced recovery protocols post-surgery to audit post-surgical care. • For further NI audits data capture should include contraindication to treatments and MRI scanning. • Recording of ASA grading is collected prospectively in other national audits and Encompass may improve the ability to capture this information for future NI audits • NICaN should form an audit subgroup which will ensure that data relating to future advancements creating change in patient pathways are collected for analysis. • Rolling prospective data collection for audits, in line with other UK regions, which in turn will require continuous funding. • Continued emphasis on collecting data relevant for Key Performance Indicator

	analysis to enable benchmarking of care with other nations.

Glossary

Abdomino-Perineal Excision of the Rectum (APER) – An operation to remove the entire rectum and anal canal.

Adenoma - a growth arising from the inner lining of the bowel, which is usually benign (non-cancerous), but over time has the potential to develop into a cancer. For this reason, they are generally removed.

Adjusted - a way of reporting results that takes into account differences between the patients that each Trust / hospital / surgeon is treating. This allows comparisons to be made more fairly.

Anastomotic leak – An anastomosis is the join formed between two ends of bowel, after a portion (containing the cancer), has been removed. A breakdown of an anastomosis may occur, allowing bowel contents to leak out into the abdomen.

Anterior resection – An operation to remove part or all of the rectum.

Adjuvant treatment – An additional therapy (e.g. chemotherapy or radiotherapy) provided to improve the effectiveness of the primary treatment (e.g. surgery).

Bowel cancer screening – Screening is a way of identifying apparently healthy people who may have an increased risk of a particular condition. The NI Bowel Cancer Screening Programme offers screening every two years to all men and women aged 60 to 74.

Colonoscopy - A method of examining the lining of the entire colon (from rectum to caecum) and obtaining tissue samples (biopsies) using a long, thin flexible tube called an endoscope.

Chemoradiotherapy - Chemotherapy given concurrently with radiotherapy

Chemotherapy – Drug therapy used to treat cancer. It may be used alone, or in conjunction with other types of treatment (e.g. surgery or radiotherapy).

Circumferential Resection Margin - This is a specific type of ***resection margin*** that is important in ensuring that rectal tumours are completely removed from the body. As most of the rectum is embedded within other body tissues it requires the surgeon to cut around the outer wall (circumference) of the rectum to remove it. This edge is termed the circumferential resection margin. (see also ***Resection margins*** and ***Residual tumour*** entries)

Clinical Nurse Specialists (CNS) – These are experienced, senior nurses who have undergone specialist training. They play an essential role in improving communication with a cancer patient, being a first point of contact for the patient and coordinating the patient's treatment.

Computed Tomography (CT) scan – An imaging modality that uses X-ray radiation to build up a 3-dimensional image of the body.

Colostomy – A stoma (surgical opening) constructed by bringing the large bowel (colon) out onto the surface of the skin.

Curative care – This is where the aim of the treatment is to cure the patient of the disease.

Hartmann's procedure – An operation to remove an area of the bowel on the left hand side of the abdomen and top end of the rectum. It also involves the formation of a colostomy (see above).

Hospital Activity Statistic - A database which contains data on all in-patients treated within NHS Trusts in Northern Ireland. This includes details of admissions, diagnoses and those treatments undergone.

Ileostomy – A stoma (surgical opening) constructed by bringing the end or a loop of small intestine (ileum) out onto the surface of the skin.

Laparoscopic surgery - This is a surgical technique (also called minimally invasive or keyhole surgery) where the surgeon accesses the inside of the body without having to make the large skin incisions used in open surgery. To do this, they use an instrument called a laparoscope (which contains a camera and light source) along with other specialised equipment which can be inserted through several small skin incisions. In general, patients who have laparoscopic surgery have a shorter hospital stay and faster recovery time.

Local recurrence - The reappearance of cancer cells after treatment, at the same place they were originally found.

Lymph nodes – Lymph nodes are small bean shaped organs, often also referred to as lymph 'glands', which form part of the immune system. They are distributed throughout the body and can be one of the first places to which cancers spread.

Magnetic resonance imaging (MRI) – A type of scan that uses strong magnetic fields and radio waves to produce detailed images of the inside of the body.

Metastasis- Spread of cancer away from the original site to form deposits elsewhere in the body, usually via the bloodstream or the lymphatic system. The deposits may be referred to as metastases, metastatic deposits or secondary cancers.

Multi-disciplinary team (MDT) – A group of professionals from diverse specialties that works to optimise diagnosis and treatment throughout the patient pathway.

National Institute of Health and Clinical Excellence (NICE) – An independent organisation responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health.

Neo-adjuvant treatment – Chemotherapy (and/or radiotherapy) treatment for cancer to improve the effectiveness of another treatment, usually surgery. Neo-adjuvant therapy is given prior to the other treatment (surgery). This is usually given to reduce the size, grade or stage of the cancer and therefore improve the effectiveness of the surgery performed.
(see also ***Adjuvant treatment****)*

Palliative care – The care given to patients whose disease cannot be cured. It aims to improve quality of life rather than extend survival and concentrates on relieving physical and psychological distress.

Percent (%) – per 100. For example, 50 per cent of patients means 50 patients out of 100 patients.

Palpable mass - A tumour that can be felt by hand during a physical examination.

Patient Journey - A technical term used within the NHS to describe the various stages that an individual patient may experience as they progress from referral and diagnosis through to treatment.

PET (positron emission tomography) scan- - (also called PET imaging or a PET scan), is a diagnostic examination that involves the acquisition of physiologic images based on the detection of positrons. Positrons are tiny particles emitted from a radioactive substance administered to the patient. The subsequent views of the human body developed by this technique are used to evaluate a variety of diseases.

Polyp - Small outgrowth of tissue arising from the inner lining of the colon.

Positive margin (see circumferential resection margin) - Positive margin refers to cancer in which the surgeon is physically unable to remove all of the disease with a margin of healthy normal tissue, and so there is concern that it is possible that cancerous disease might remain/have been left behind.

Radiotherapy - A treatment for cancer that uses high energy ionising radiation (usually X-rays) to kill cells

Randomised controlled trials (RCTs) - A clinical trial in which subjects are randomly allocated to different groups for the purpose of studying the effect of a new intervention, for example a drug or other therapy.

Resection margins - These are the areas around a block of tissue that have been cut (resected) during surgery to remove a tumour from the body. To ensure all the tumour has been removed, surgeons aim to have a rim of healthy normal tissue at all the margins – these are called 'clear' or 'negative margins'. If tumour cells are found at any of the margins these are called 'involved' or 'positive' margins and implies that not all the tumour has been removed. Resection margins are usually assessed by pathologists and are an important factor when considering the treatment options for a patient.
(see also ***Circumferential resection margin*** and ***Residual tumour*** entries)

Residual tumour (R) - The presence or absence of any residual tumour in the body following surgical removal of the main tumour can be assessed and coded by pathologists using the letter 'R'. If the resection margins are negative or clear, this is called an R0 resection and it implies that all the main tumour was removed at surgery. However, if the margins are positive then this indicates that there is residual tumour remaining in the body. These are called either R1 resections (if tumour cells can only be seen with a microscope) or R2 resections (when the tumour is visible to the naked eye).
(see also ***Circumferential resection margin*** and ***Resection margins*** entries)

Short course preoperative radiotherapy- Radiotherapy immediately and directly before surgery for rectal cancer, with the intention of reducing the risk of the cancer returning after appropriate surgery.

Sigmoidoscopy - A narrower, shorter tube than that used in colonoscopy, (which can be flexible or rigid), with a camera on the end that allows visual inspection of the lining of the rectum and sigmoid colon (the S-shaped part of the colon).

Stage - a way of describing the size of a cancer and the extent to which it has grown or spread from its original site. Staging is important because it helps decide which treatments are required. Staging involves clinical, surgical and pathology assessments. Restaging is a repeat of this process to investigate recurrent disease to establish whether the cancer has progressed since the last staging was carried out.

Stent – A flexible, hollow tube designed to keep a segment of the colon (large bowel) open when it has become blocked.

Stoma – A surgical opening in the abdomen through which the bowel is brought out onto the surface of the skin. (See also Colostomy and Ileostomy for two types of stoma)

TAMIS – Transanal Minimally Invasive Surgery - the removal of rectal tumours performed via the anus.

Trust - an organisation within the HSC, made up of one or more hospitals, and generally serving one geographical area.

Ulcerative colitis - A disease that causes inflammation and sores, called ulcers, in the lining of the large intestine. The most common symptoms are abdominal pain and bloody diarrhoea.

Ultrasound scan - A type of imaging technique, which uses high-frequency sound waves to generate images of the body's organs.

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Appendix 1. Colorectal Cancer Official statistics for Northern Ireland, 2019.

Incidence

During 2015-2019:

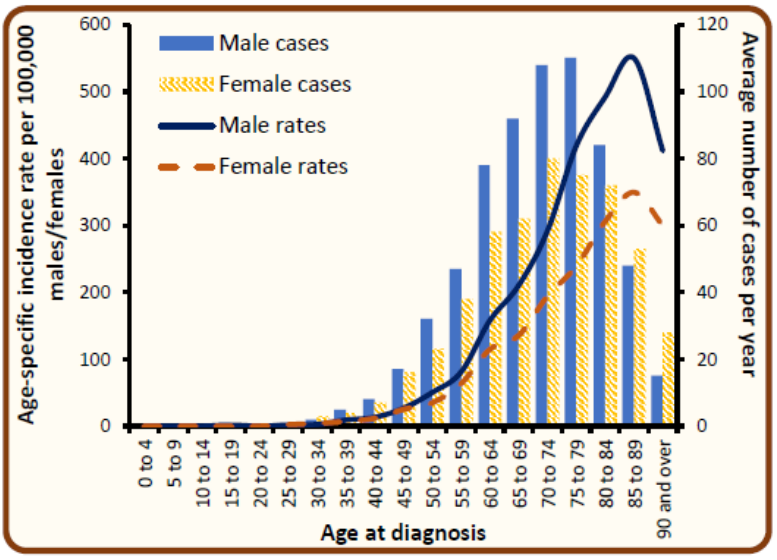
- There were 649 male and 522 female cases of colorectal cancer diagnosed each year.
- Colorectal cancer made up 13.1% of all male cancers (ex NMSC), and 10.6% of all female cancers (ex NMSC).
- The risk of colorectal cancer before the age of 75 was 1 in 24.1 for men and 1 in 34.3 for women, while before the age of 85 the risk was 1 in 11.9 for men and 1 in 18.1 for women.

Incidence by age at diagnosis - *Colorectal cancer, Cases in 2015-2019*

During 2015-2019:

- The median age at diagnosis was 71 for men and 73 for women.
- Cancer risk increased with age, with 39.6% of men and 43.7% of women aged 75 years or more at diagnosis.
- 10.3% of cases were diagnosed among those aged under 55.

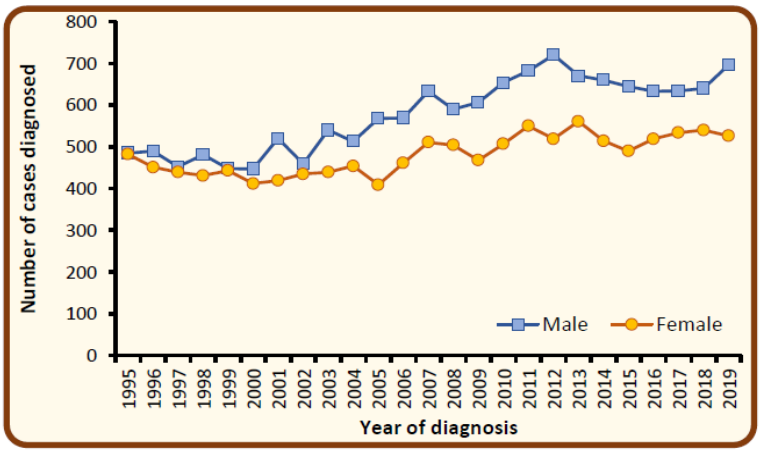
Age at diagnosis	Average cases per year		
	Male	Female	Both sexes
0 - 54	66	54	121
55 - 64	125	96	221
65 - 74	200	142	342
75 +	257	228	486
All ages	649	522	1,171



Incidence by year of diagnosis - *Colorectal cancer, Cases in 1995-2019*

- Among males the number of colorectal cancer decreased by 4.1% from an annual average of 677 cases in 2010-2014 to 649 cases in 2015-2019.
- Among females the number of cases of colorectal cancer decreased by 1.5% from an annual average of 530 cases in 2010-2014 to 522 cases in 2015-2019.

Year of diagnosis	Male	Female	Both sexes
2010	654	507	1,161
2011	682	550	1,232
2012	720	519	1,239
2013	670	561	1,231
2014	660	514	1,174
2015	644	490	1,134
2016	633	519	1,152
2017	634	534	1,168
2018	640	540	1,180
2019	696	526	1,222

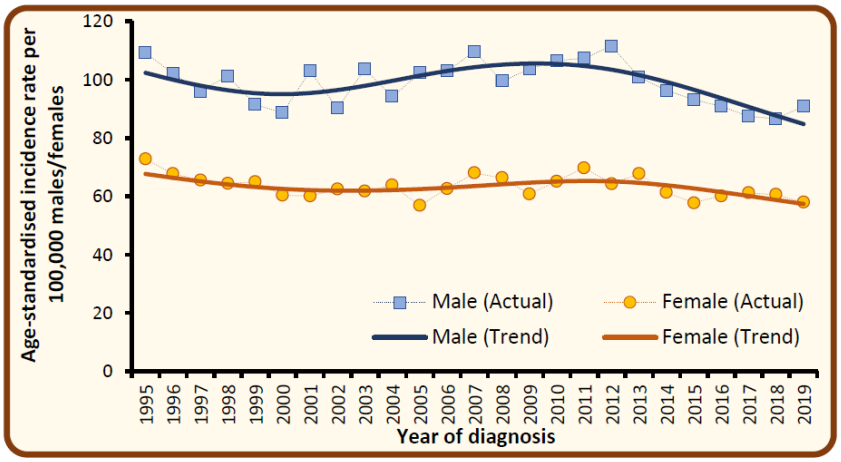


Note: Annual averages have been rounded to the nearest integer. Sums of numbers in table rows or columns may thus differ slightly from the given total.
NMSC: Non-melanoma skin cancer

Trends in age-standardised incidence rates - *Colorectal cancer, Cases in 1995-2019*

▪ Among males age-standardised incidence rates of colorectal cancer decreased by 14.1% from 104.4 per 100,000 person years in 2010-2014 to 89.7 cases per 100,000 persons years in 2015-2019. This difference was statistically significant.

▪ Among females age-standardised incidence rates of colorectal cancer decreased by 9.3% from 65.6 per 100,000 person years in 2010-2014 to 59.5 cases per 100,000 persons years in 2015-2019. This difference was statistically significant.



Age-standardised incidence rates illustrate the change in the number of cases within a population of a fixed size and age structure (2013 European Standard).

They thus represent changes other than those caused by population growth and/or ageing.

Trends can also be influenced by changes in how cancer is classified and coded. (e.g. the move from ICD-0-2 to ICD-0-3 in 2019).

Trends in age-standardised incidence rates by age - *Colorectal cancer, Cases in 1995-2019*

For the annual average number of cases diagnosed, between 2010-2014 and 2015-2019 there was:

▪ a decrease of 9.9% among males aged 0 to 64, a decrease of 12.7% among males aged 65 to 74 and an increase of 9.8% among males aged 75 and over.

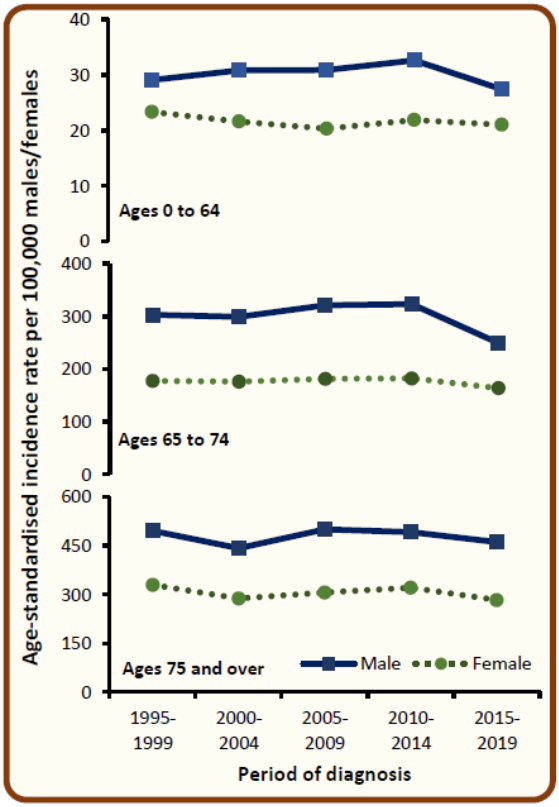
▪ an increase of 2.0% among females aged 0 to 64, a decrease of 0.7% among females aged 65 to 74 and a decrease of 4.2% among females aged 75 and over.

Age group	Average cases per year			
	2010-2014		2015-2019	
	Male	Female	Male	Female
0 to 64	213	148	192	151
65 to 74	229	143	200	142
75 and over	235	239	258	229
All ages	677	530	649	522

For age-standardised incidence rates, between 2010-2014 and 2015-2019 there was:

▪ a decrease of 16.0% among males aged 0 to 64, a decrease of 22.8% among males aged 65 to 74 and no significant change among males aged 75 and over.

▪ no significant change among females aged 0 to 64, no significant change among females aged 65 to 74 and a decrease of 11.7% among females aged 75 and over.



Incidence by deprivation quintile - *Colorectal cancer, Cases in 2015-2019*

The annual number of cases during 2015-2019 varied in each deprivation quintile due to variations in population size and age.

After accounting for these factors, incidence rates:

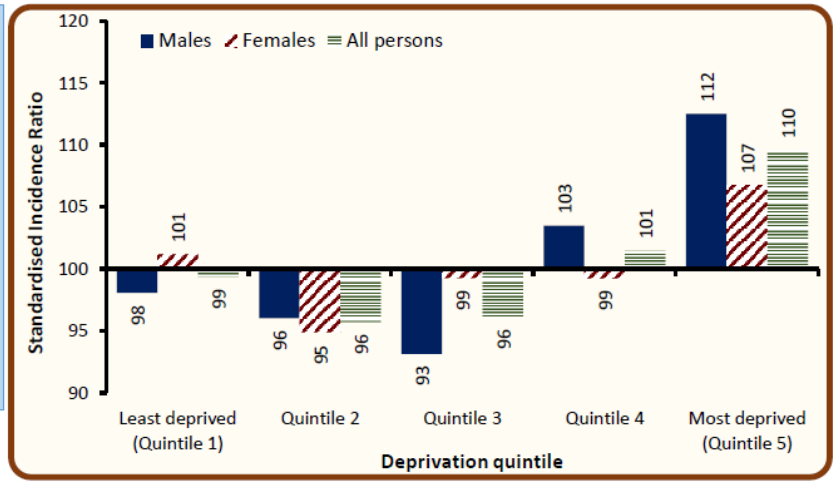
- in the most socio-economically deprived areas were 9.5% higher than the NI average.
- in the least socio-economically deprived areas did not vary significantly from the NI average.

Deprivation quintile	Average cases per year		
	Male	Female	Both sexes
Least deprived (Quintile 1)	135	114	249
Quintile 2	133	104	237
Quintile 3	129	107	236
Quintile 4	134	104	238
Most deprived (Quintile 5)	118	93	211
Northern Ireland	649	522	1,171

Standardised incidence ratios compare incidence rates in each deprivation quintile with the Northern Ireland incidence rate.

A value above 100 means that incidence rates in that deprivation quintile are greater than the Northern Ireland average.

This measure takes account of population size and age structure. Differences are thus not a result of these factors.



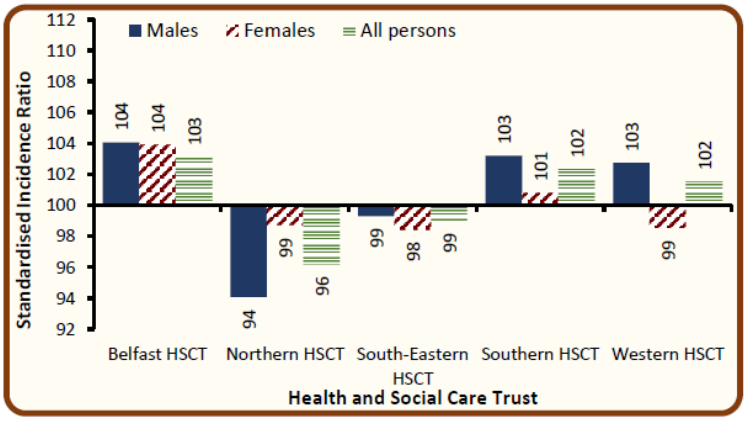
Incidence by Health and Social Care Trust (HSCT) - *Colorectal cancer, Cases in 2015-2019*

The annual number of cases during 2015-2019 varied in each HSCT due to variations in population size and age.

After accounting for these factors, incidence rates:

- in Belfast HSCT did not vary significantly from the NI average.
- in Northern HSCT did not vary significantly from the NI average.
- in South-Eastern HSCT did not vary significantly from the NI average.
- in Southern HSCT did not vary significantly from the NI average.
- in Western HSCT did not vary significantly from the NI average.

Health and Social Care Trust	Average cases per year		
	Male	Female	Both sexes
Belfast HSCT	118	104	222
Northern HSCT	164	137	300
South-Eastern HSCT	136	108	244
Southern HSCT	126	96	222
Western HSCT	106	77	183
Northern Ireland	649	522	1,171



Standardised incidence ratios compare incidence rates in each HSC Trust with the Northern Ireland incidence rate. A value above 100 means that incidence rates in that HSC Trust are greater than the NI average.

This measure takes account of population size and age structure. Differences are thus not a result of these factors.

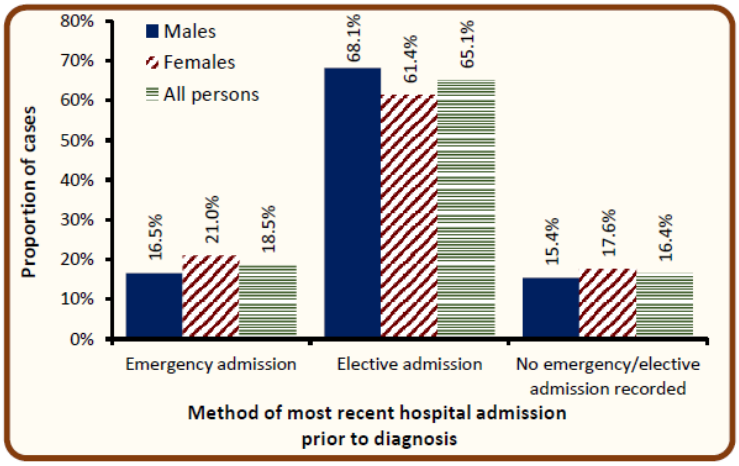
Data for Local Government Districts and Parliamentary Constituencies are available at www.qub.ac.uk/research-centres/nicr

Incidence by method of most recent admission to hospital - *Colorectal cancer, Cases in 2015-2019*

During 2015-2019:

- 18.5% of cases had an emergency admission to hospital recorded up to 30 days prior to cancer diagnosis.
- 16.5% of male cases had an emergency admission up to 30 days prior to diagnosis, compared to 21.0% of female cases.
- In 16.4% of diagnosed cases there was no record of a hospital inpatient admission up to 30 days prior to the diagnosis.

Method of admission	Average cases per year		
	Male	Female	Both sexes
Emergency admission	107	109	217
Elective admission	442	320	763
No emergency/elective admission recorded	100	92	192
Total	649	522	1,171



Admission method refers to the most recent hospital inpatient admission that a patient had prior to cancer diagnosis, regardless of reason for the admission.

Admissions are considered up to a maximum of 30 days prior to diagnosis. Admissions up to two days post diagnosis are also considered to allow for a reasonable margin or error in data recording.

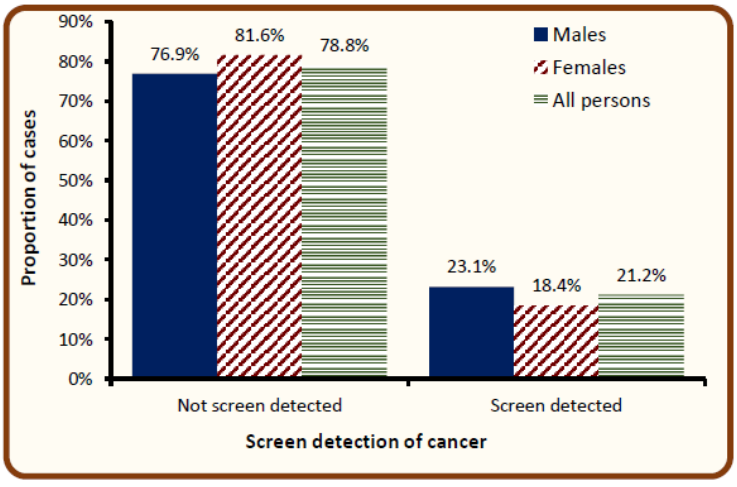
The majority of patients with no inpatient admission recorded prior to diagnosis are likely to have been diagnosed via an outpatient route.

Incidence by screen detection of cancer - *Colorectal cancer, Ages 60 to 74, Cases in 2015-2019*

During 2015-2019:

- 21.2% of cases diagnosed among those aged 60 to 74 were detected by bowel cancer screening.
- 23.1% of cases among males aged 60 to 74 were screen detected, compared to 18.4% of cases among females in the same age group.

Screen detected	Average cases per year		
	Male	Female	Both sexes
Not screen detected	214	163	377
Screen detected	64	37	101
Total	278	200	478



Bowel cancer screening is currently offered to all Northern Ireland residents aged 60 to 74 every two years.

This simple test checks for signs of colorectal cancer. In particular it can identify people who have no noticible cancer symptoms. Screening can thus help detect cancer at an early stage when treatment is more effective.

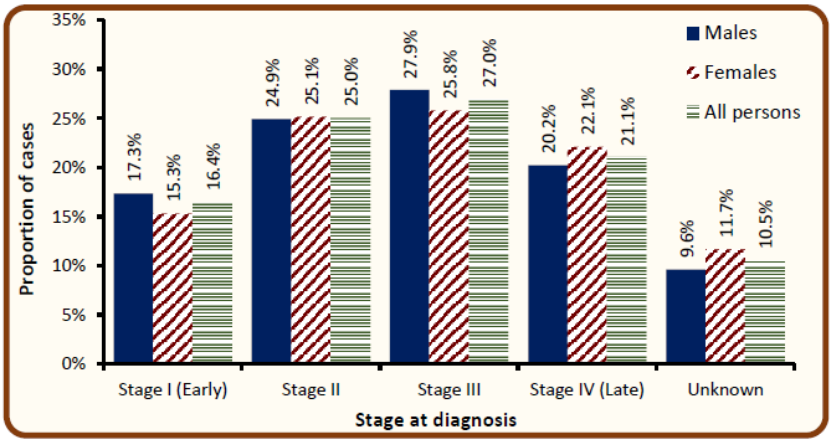
The presented figures are for people with colorectal cancer who were inititally identified via screening. It does not include those identified with polyps or who had a negative test.

Incidence by stage at diagnosis - *Colorectal cancer, Cases in 2015-2019*

During 2015-2019:

- 89.5% of cases diagnosed had a stage assigned.
- 16.4% of cases were diagnosed at stage I. (18.4% of staged cases)
- 21.1% of cases were diagnosed at stage IV. (23.5% of staged cases)
- Among cases which were staged, 22.4% of male cases were diagnosed at stage IV, compared to 25.0% of female cases.

Stage at diagnosis	Average cases per year		
	Male	Female	Both sexes
Stage I (Early)	113	80	192
Stage II	162	131	293
Stage III	181	135	316
Stage IV (Late)	131	115	247
Unknown	62	61	123
All stages	649	522	1,171



Cancer stage describes the size of a cancer and how far it has grown and spread.

This information is used to help decide what treatments are needed.

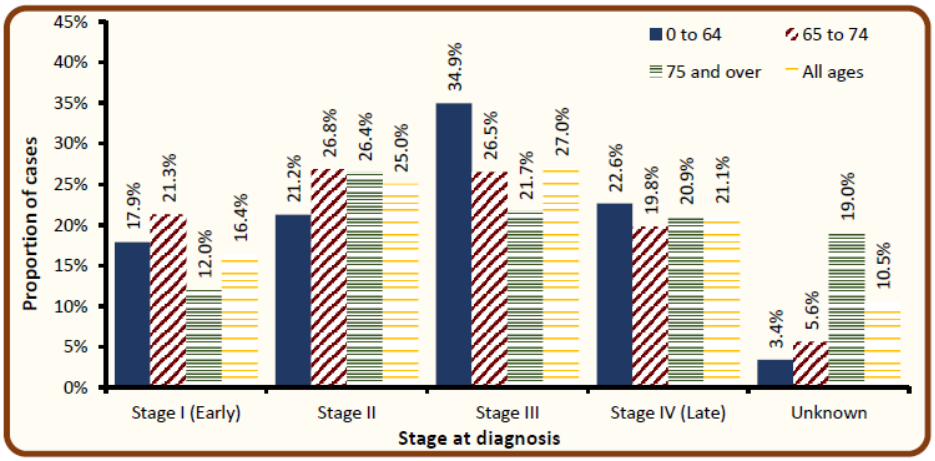
The classification used here to stage cancer is the TNM classification (Version 7 prior to 2018, Version 8 from 2018 onwards).

Incidence by age and stage at diagnosis - *Colorectal cancer, Cases in 2015-2019*

During 2015-2019:

- 19.0% of cases among those aged 75 and over did not have a stage assigned at diagnosis, compared to 3.4% of cases among those aged 0 to 64.
- Among cases which were staged, 25.8% of cases among those aged 75 and over were diagnosed at stage IV, compared to 23.4% of cases among those aged 0 to 64.

Stage at diagnosis	Average cases per year			
	0 to 64	65 to 74	75 and over	All ages
Stage I (Early)	61	73	58	192
Stage II	73	92	129	293
Stage III	120	91	105	316
Stage IV (Late)	77	68	102	247
Unknown	12	19	92	123
All stages	343	342	486	1,171



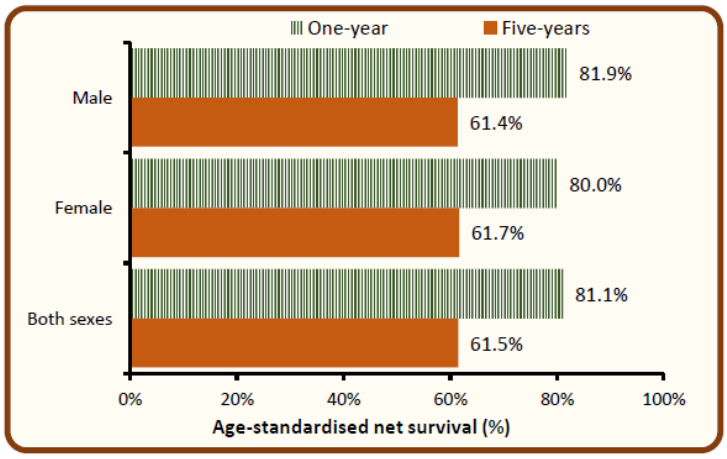
Survival

- 76.7% of patients were alive one year and 50.3% were alive five years from a colorectal cancer diagnosis in 2010-2014. (observed survival)
- Age-standardised net survival (ASNS), which removes the effect of deaths from causes unrelated to cancer, was 81.1% one year and 61.5% five years from a colorectal cancer diagnosis in 2010-2014.
- Five-year survival (ASNS) for colorectal cancer patients diagnosed in 2010-2014 was 61.4% among men and 61.7% among women.

Gender	Observed survival		Age-standardised net survival	
	One-year	Five-years	One-year	Five-years
Male	78.4%	50.7%	81.9%	61.4%
Female	74.6%	49.8%	80.0%	61.7%
Both sexes	76.7%	50.3%	81.1%	61.5%

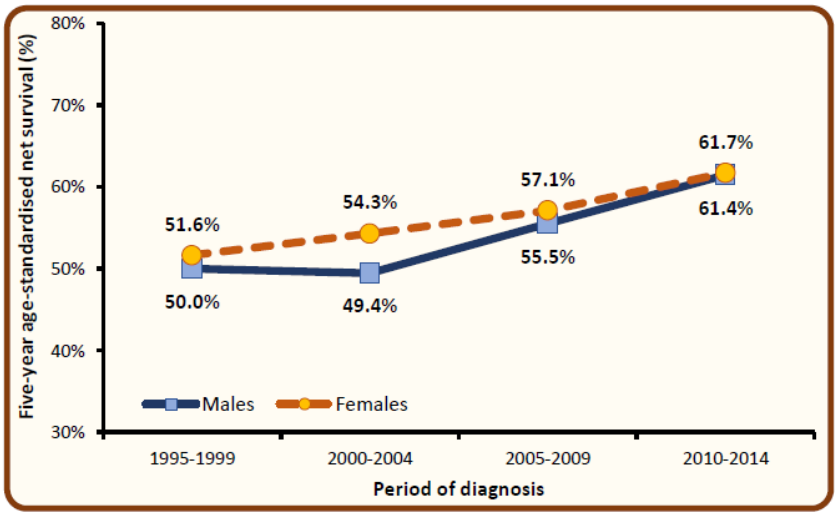
Observed survival is the proportion of patients still alive one/five years after diagnosis. However, in this measure patients may have died from causes unrelated to their cancer.

Age-standardised net survival is the proportion of patients who would survive if the patient could not die from causes unrelated to their cancer. This measure is more typically used in studies of cancer survival.



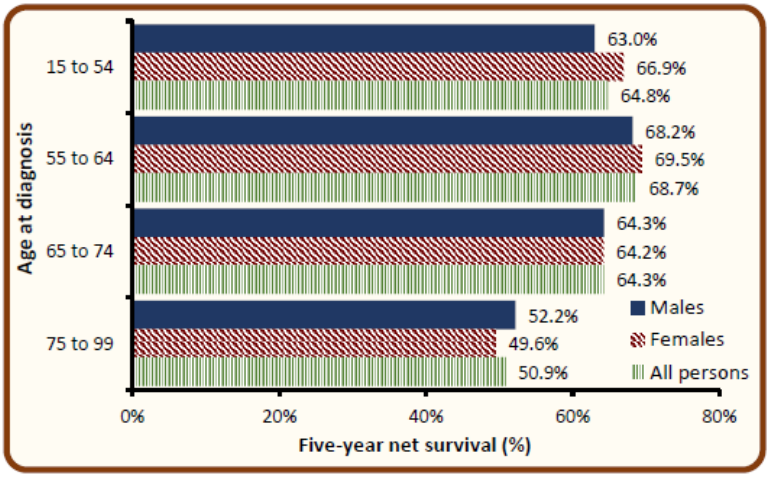
Trends in survival - *Colorectal cancer, Patients diagnosed in 1995-2014*

- Among men five-year survival (ASNS) from colorectal cancer increased from 55.5% in 2005-2009 to 61.4% in 2010-2014. This difference was statistically significant.
- Among women five-year survival (ASNS) from colorectal cancer increased from 57.1% in 2005-2009 to 61.7% in 2010-2014. This difference was not statistically significant.



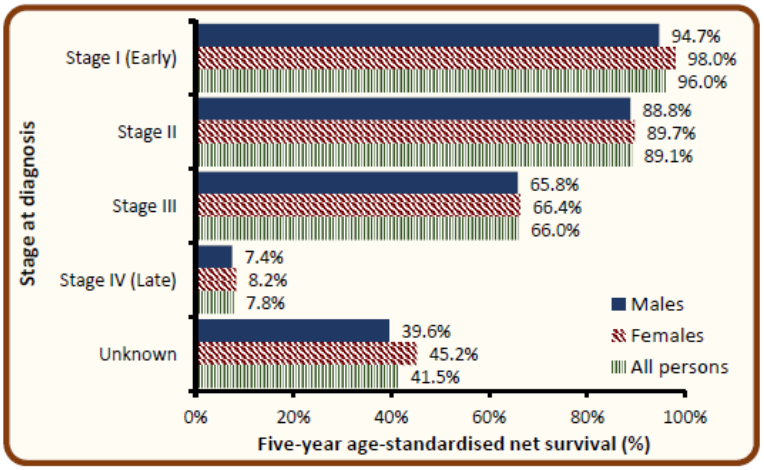
Survival by age at diagnosis - *Colorectal cancer, Patients diagnosed in 2010-2014*

- Survival from colorectal cancer among patients diagnosed in 2010-2014 was related to age with better five-year survival among younger age groups.
- Five-year net survival ranged from 68.7% among patients aged 55-64 at diagnosis to 50.9% among those aged 75 and over.
- Five-year net survival among patients aged 75 and over was 52.2% for men and 49.6% for women.



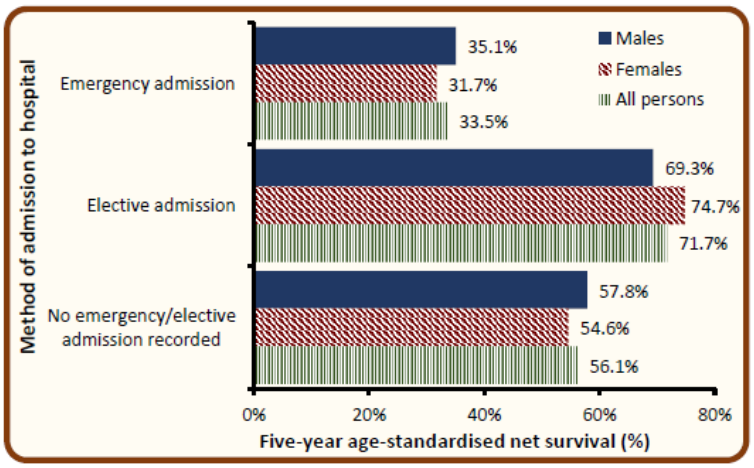
Survival by stage at diagnosis - *Colorectal cancer, Patients diagnosed in 2010-2014*

- Stage at diagnosis is one of the most important factors in colorectal cancer survival with five-year survival decreasing as stage increases.
- Five-year survival (ASNS) ranged from 96.0% for early stage (stage I) disease to 7.8% for late stage (stage IV) disease.
- Five-year survival (ASNS) for unstaged cancer was 41.5%.
- Five-year survival (ASNS) for stage IV cancer was 7.4% for men, compared to 8.2% for women.



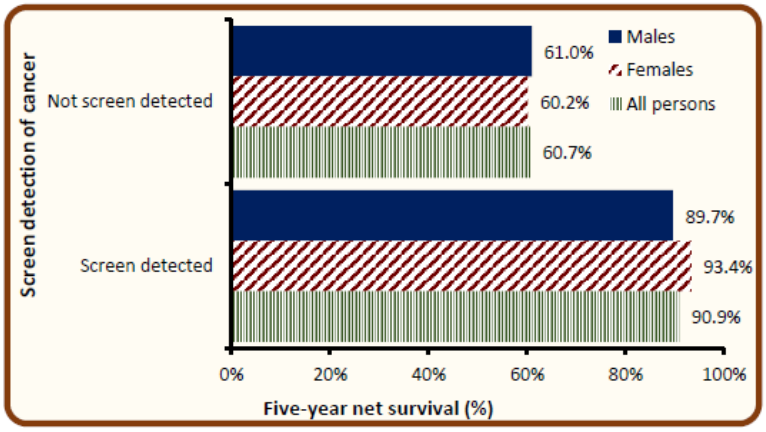
Survival by method of most recent admission to hospital - *Colorectal cancer, Patients diagnosed in 2010-2014*

- Five-year survival (ASNS) among patients who had an emergency admission to hospital within 30 days prior to their cancer diagnosis was 33.5% compared to 71.7% among those with elective admissions and 56.1% among those who had no hospital admissions recorded within 30 days prior to diagnosis.
- Five-year survival (ASNS) among patients who had an emergency admission to hospital within 30 days prior to their cancer diagnosis was 35.1% for men, compared to 31.7% for women.



Survival by screen detection of cancer - *Colorectal cancer, Ages 60-74, Patients diagnosed in 2010-2014*

- Five-year survival among patients aged 60 to 74 whose cancer was detected by screening was 90.9% compared to 60.7% among those who were not detected via screening.
- Five-year survival among patients aged 60 to 74 whose cancer was detected via sceening was 89.7% for men, compared to 93.4% for women.



Prevalence

- At the end of 2019, there were 8,861 people (Males: 4,813; Females: 4,048) living with colorectal cancer who had been diagnosed with the disease during 1995-2019.
- Of these, 54.3% were male, 49.2% were aged 75 and over, and 11.2% had been diagnosed in the previous year.

25-year prevalence refers to the number of cancer survivors who were alive at the end of 2019, and had been diagnosed with their cancer in the previous 25 years (i.e. 1995-2019).

Time since diagnosis	25-year prevalence								
	Aged 0-74			Aged 75+			All ages		
	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes
0-1 year	378	271	649	176	166	342	554	437	991
1-5 years	897	677	1,574	621	517	1,138	1,518	1,194	2,712
5-10 years	732	536	1,268	652	570	1,222	1,384	1,106	2,490
10-25 years	533	479	1,012	824	832	1,656	1,357	1,311	2,668
0-25 years	2,540	1,963	4,503	2,273	2,085	4,358	4,813	4,048	8,861

Trends in 10-year prevalence - *Colorectal cancer, Patients alive at end of each year from 2010-2019*

- Among males the number of survivors from colorectal cancer who had been diagnosed within the previous ten years (10-year prevalence) increased by 7.1% from 3,227 survivors in 2014 to 3,456 survivors in 2019.
- Among females the number of survivors from colorectal cancer who had been diagnosed within the previous ten years (10-year prevalence) increased by 8.6% from 2,521 survivors in 2014 to 2,737 survivors in 2019.

Year	10-year prevalence		
	Male	Female	Both sexes
2010	2,683	2,194	4,877
2011	2,844	2,305	5,149
2012	2,997	2,356	5,353
2013	3,107	2,464	5,571
2014	3,227	2,521	5,748
2015	3,300	2,584	5,884
2016	3,389	2,642	6,031
2017	3,369	2,640	6,009
2018	3,385	2,697	6,082
2019	3,456	2,737	6,193

Mortality

- During 2015-2019 there were 244 male and 209 female deaths from colorectal cancer each year.
- Colorectal cancer made up 10.5% of all male, and 10.0% of all female cancer deaths (ex NMSC).

Deaths by age at death - *Colorectal cancer, Deaths in 2015-2019*

- The median age at death during 2015-2019 was 75 for men and 79 for women.
- Risk of death from colorectal cancer was strongly related to age, with 52.9% of men and 60.8% of women aged 75 years or more at time of death.
- 6.4% of colorectal cancer deaths occurred among those aged under 55.

Age at death	Average deaths per year		
	Male	Female	Both sexes
0 - 54	17	13	29
54 - 64	34	24	58
65 - 74	63	45	107
75 +	129	127	256
All ages	244	209	453

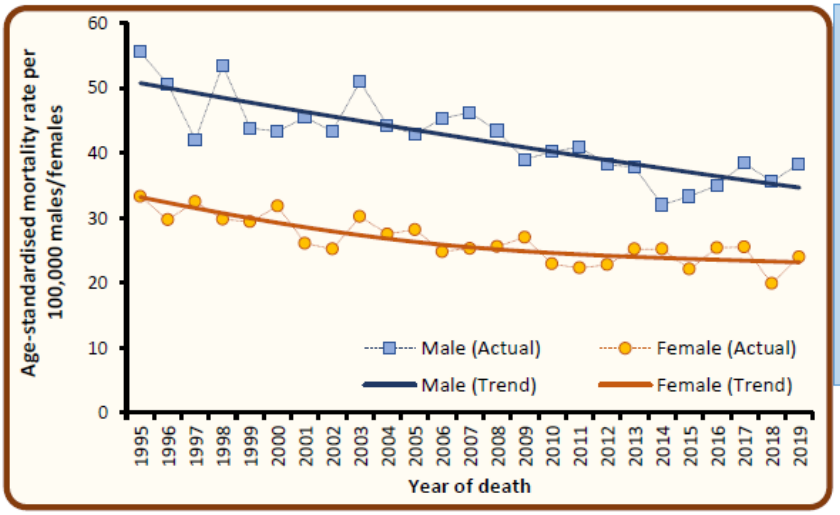
Deaths by year of death - *Colorectal cancer, Deaths in 2010-2019*

- Among males the number of deaths from colorectal cancer increased by 7.5% from an annual average of 227 deaths in 2010-2014 to 244 deaths in 2015-2019.
- Among females the number of deaths from colorectal cancer increased by 7.7% from an annual average of 194 deaths in 2010-2014 to 209 deaths in 2015-2019.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Male	231	232	231	233	208	215	230	262	245	267
Female	180	179	187	210	214	191	224	227	181	223
Both sexes	411	411	418	443	422	406	454	489	426	490

Trends in age-standardised mortality rates - *Colorectal cancer, Deaths in 1995-2019*

- Among males age-standardised mortality rates from colorectal cancer decreased by 4.0% between 2010-2014 and 2015-2019 from 37.7 to 36.2 deaths per 100,000 persons years. This difference was not statistically significant.
- Among females age-standardised mortality rates from colorectal cancer decreased by 1.3% between 2010-2014 and 2015-2019 from 23.7 to 23.4 deaths per 100,000 persons years. This difference was not statistically significant.



Mortality data are provided by the Northern Ireland General Registrar Office via the Department of Health.

Counts of the number of deaths are based upon the year that death occurred, and upon the primary cause of death only.

Age-standardised mortality rates remove changes over time caused by population growth and/or ageing.