Trends, characteristics and outcomes for patients diagnosed under 50 years old with metastatic colon cancer in England

NBOCA: Short Report
Date of publication: Thursday 10th June 2021

The Healthcare Quality Improvement Partnership (HQIP) is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing, and National Voices. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage, and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations, and crown dependencies. www.hqip.org.uk/national-programmes.

Contents

Executive Summary

Early onset colorectal cancer (EOCRC) is defined as a diagnosis of colorectal cancer (CRC) under the age of 50 years. The incidence of EOCRC appears to be increasing rapidly, and the reasons for this trend are poorly understood.

EOCRC is commonly diagnosed with more advanced disease as people below the age of 50 fall outside of the scope of the national bowel cancer screening programme. Both the general public and medical professionals are also less likely to consider CRC as an explanation for bowel symptoms in younger people, which may delay presentation. Patients with more advanced stage cancer have poorer outcomes, even though younger patients tend to be fitter and may tolerate more aggressive oncological or surgical treatment. The primary concern is that diagnostic delay has a major impact on survival.

This report corroborates findings that the incidence of EOCRC is increasing (5.2% in the 2013-14 audit reporting period vs. 5.8% in the 2017-18 period), along with the incidence of EOCRC presenting with metastatic disease (6.7% in the 2013-14 audit reporting period vs. 7.9% in the 2017-18 period).

Patients with early onset metastatic colon cancer had different characteristics compared to older patients. There was a more equal male to female distribution, and younger patients tended to be fitter. Younger patients were also more likely to be from socioeconomically deprived and/or ethnic minority groups compared to older patients. Patients with early onset metastatic colon cancer commonly presented with advanced, left-sided disease in an emergency setting.

Compared to patients aged between 50 and 70 years, patients under 50 years followed similar treatment pathways, although they were more likely to receive chemotherapy and radiotherapy treatments. Despite this, and the fact that they were generally fitter, their crude 2-year cancer-specific survival was only equivalent to those in the 50 to 70 years group (62.6% versus 63.2%), and this requires further investigation. Survival outcomes require appropriate risk-adjustment to facilitate interpretation.

It has not yet been determined from our data how aggressive the treatments of patients under 50 years were. Further work should include establishing whether EOCRC patients received more aggressive treatments (for example, how many lines and which regimens of chemotherapy were being given).

It is paramount that awareness and education of EOCRC is improved to facilitate prompt presentation, diagnosis and treatment for this patient group. This may be helped by ensuring that both Lynch status and an adequate family history are obtained for all patients presenting with CRC in order to provide appropriate information about the need for screening of first-degree relatives according to national guidelines.

Introduction

CRC (see Glossary) incidence rates have been decreasing generally in England. However, patients diagnosed with CRC who are younger than 50 years are a neglected group as they are outside the remit of the Bowel Cancer Screening Programme. Due to this, presentation only occurs once symptoms are established, contributing to a tendency for patients with early onset colorectal cancer to present with more advanced disease.(1-4) This report therefore focuses on the management of early onset metastatic colon cancer which is synchronous (see Glossary).

EOCRC, a diagnosis of CRC occurring in individuals aged below 50 years,(5) is partially explained by hereditary cancer syndromes, for example Lynch syndrome (see Glossary). However, it has been estimated that up to 70% of cases do not have any obvious causal explanation.(6)

Within the literature, it has been shown that there is an increasing incidence of EOCRC, and this has been demonstrated across Europe, the USA, Australia and New Zealand.(7, 8) Within England, incidence rates have been documented as tripling between 1990 and 2014 in patients aged 20-39 years.(8) Possible explanations for this have included rising obesity levels, dietary factors, lack of exercise, tobacco smoking, and alcohol consumption.(7)

It has recently been agreed that the bowel cancer screening age will be lowered from 60 years to 50 years across the UK.(9) In addition, since 2017 all patients diagnosed with CRC should be tested for Lynch syndrome, as well as more recently, all patients diagnosed with endometrial cancer.(10, 11) However, a national survey carried out by the National Bowel Cancer Audit (NBOCA) in 2019 demonstrated that only around half of CRC care providers were able to offer the appropriate test for Lynch Syndrome to all patients.(12)

Awareness around EOCRC has been increasing, particularly with ongoing charity campaigns such as Bowel Cancer UK's 'Never Too Young'.(13) The main issues raised by this campaign have been a lack of awareness that patients aged under 50 years can develop CRC, delays in health-seeking behaviour, and delays in specialist referral. Information regarding bowel cancer symptoms are more readily available, for example, via this NHS resource.

Patients presenting with metastatic CRC are broadly divided according to whether their cancer is operable or not (i.e. if it is resectable). Patients with *clearly resectable* disease will have treatment of liver and/or lung metastases, along with resection of their primary tumour, and differing combinations of chemotherapy. Those with *potentially resectable disease* may have chemotherapy first with the aim of downsizing the tumour burden prior to undertaking definitive treatment. Those with *unresectable disease* may receive palliative treatments that include combinations of chemotherapy, radiotherapy, and other interventions for their primary/metastatic disease dependent on symptoms. Some patients with *unresectable disease* will still undergo stenting or palliative resection of the primary tumour.(14)

There is a lack of national data describing the characteristics and outcomes of patients with EOCRC, in particular, those presenting with synchronous metastatic disease (metastatic disease present at diagnosis, rather than occurring during surveillance after initial treatment). Little is known about the treatments being provided for patients with EOCRC, how this compares to treatments given to older

patients, or how this impacts survival. Controversy also exists regarding the prognosis of EOCRC patients in comparison to older patients.(15, 16)

This report aims to address the knowledge gaps within the literature. As the management of colon and rectal cancer (see Glossary) are inherently different, this report focuses largely on patients with colon cancer.

Objectives

The objectives of this report were to:

1. Establish trends over time in England for the proportion of all CRC patients diagnosed under 50, as well as the proportion of metastatic CRC patients diagnosed under 50.

2. According to age group, establish the patient, tumour and clinical characteristics, treatment modalities and pathways, and cancer-specific survival for patients presenting with synchronous metastatic colon cancer.

Methods

NBOCA data for patients diagnosed with CRC (excluding appendiceal tumours) between 1 April 2013 and 31 March 2018 in England were used to establish time trends in the proportion of patients diagnosed with EOCRC, and the proportion of patients with metastatic disease diagnosed with EOCRC. Chi-squared tests were used to analyse the significance of these trends.

NBOCA data were also used to define the cohort of patients presenting with synchronous metastatic colon cancer (pre-treatment M1 disease recorded) between 1 June 2014 and 31 March 2018. This timeframe ensured all patients could have their treatments followed in linked data sources for a minimum of 2 years from diagnosis, whilst taking into consideration the improvement in Systemic Anti-cancer Therapy (SACT) data quality from July 2014. As SACT and RTDS data were unavailable for Wales, this report was restricted to England only.

Linked Hospital Episode Statistics Admitted Patient Care (HES-APC) records were used to establish whether treatment for liver and/or lung metastases had occurred.(17) This allowed the identification of OPCS codes (OPCS Classification of Interventions and Procedures) for liver/lung surgical resections, radiofrequency/microwave ablation, stereotactic radiosurgery, and selective internal radiation therapy (SIRT).(18) The only potential treatment that was not captured in our methodology was stereotactic ablative radiotherapy (SABR) because OPCS codes did not appear to be available for this.

Linked SACT data were used to determine whether chemotherapy was administered. These were supplemented through the identification of OPCS codes for chemotherapy within HES-APC.(19) Linked Radiotherapy Dataset (RTDS) records were used to determine whether radiotherapy had been administered.

Data regarding age, sex, performance status, tumour site, pre-treatment tumour and nodal staging, and referral method were obtained from NBOCA data. Comorbidities and socioeconomic status were obtained from HES-APC.

Comorbidities were examined using the RCS Charlson Score.(20) Socioeconomic status was derived from the Index of Multiple Deprivation, which ranks 32,482 geographical areas of England according to their deprivation index across seven domains.(21) Patients were allocated to an Index of Multiple Deprivation quintile (IMDQ) based on the national ranking of the area corresponding to their postcode. Ethnicity was obtained from linked National Cancer Registry (NCRAS) data and grouped according to Office for National Statistics (ONS) recommendation.(22)

Linked records were then used to determine which treatment modalities patients had received.

For the survival analysis, CRC-specific death was used, with death from other non-colorectal cancer causes treated as a competing risk. The date and cause of death were obtained from linkage to official death records provided by the ONS. The date of the latest available death record was 17th February 2020, meaning that data for date of death was not available for analysis after this date, and follow-up times were censored at this point.

Results

Trends over time

There was a statistically significant increase in the overall proportion of EOCRC patients over time (5.2% in the 2013-14 audit reporting period vs. 5.8% in the 2017-18 period) (Figure 1a). The proportion of all patients diagnosed with metastatic CRC that had EOCRC was substantial, due to EOCRC patients being more likely to be diagnosed with advanced disease. This proportion also increased significantly over time (6.7% in the 2013-14 audit reporting period vs. 7.9% in the 2017-18 period) (Figure 1b).

Patient, tumour and clinical characteristics

15,723 patients were diagnosed with synchronous metastatic colon cancer at presentation in England between 1 April 2013 and 31 March 2018.

For early onset metastatic colon cancer patients, there were similar numbers of men and women compared to the older age categories (Table 1), where more men were diagnosed. As expected, early onset metastatic colon cancer patients had fewer comorbidities: 71% of those under 50 were recorded as having no comorbidities compared to 61% of those aged between 50 and 70 years, and just 45% of those aged over 70 years. Similarly, 65% of those under 50 had a performance status of 0 (fully active with no restrictions on activity) compared to 48% of those aged between 50 and 70 years, and 20% of those aged over 70 years. The proportion of missing data for both comorbidity and performance status increased with age.

There were small differences in the distribution of socioeconomic status between age categories with 21% of early onset metastatic colon cancer patients in the most deprived quintile compared to

19% of those aged between 50 and 70 years, and 16% of those aged over 70 years. A higher proportion of patients with early onset metastatic colon cancer were from ethnic minority groups.

Early onset metastatic colon cancer patients were more likely to have left-sided tumours, and to present with more advanced T- and N-stage disease. For early onset metastatic colon cancer patients, one third presented as an emergency, compared to 24% of those aged between 50 and 70 years, and 28% of those aged over 70 years.

Treatment modalities

Overall, early onset metastatic colon cancer patients presenting with synchronous metastatic colon cancer were more likely to receive treatment with just 11% having no treatment at all recorded, compared to 18% of those aged between 50 and 70 years, and 49% of those aged over 70 years (Table 2, Figure 2).

There were only little differences in the surgical management of the primary tumour in early onset metastatic colon cancer patients and those aged between 50 and 70 years: 41% of those under 50 underwent primary resection of their tumour compared to 38% of those aged between 50 and 70 years (p=0.138); whilst 11% of both age categories underwent an alternative surgical procedure, for example stent insertion or stoma formation, instead of resection (p=0.980). For patients aged over 70 years, 24% underwent resection of their tumour, and 9% an alternative surgical procedure.

There was also little difference in the management of metastatic disease, with those under 50 and those aged between 50 and 70 years having similar proportions of surgical resection of liver and/or lung metastases (17% versus 15%, respectively) (p=0.080), and ablative therapies (5% versus 4%, respectively) (p=0.187). Again, differences were observed for patients aged over 70 years with just 5% having surgical resection of their metastatic disease, and 1% having ablative therapies.

There was strong evidence of differences in the proportion of patients that received chemotherapy and/or radiotherapy by age category. 83% of early onset metastatic colon cancer patients received chemotherapy compared to 71% of those aged between 50 and 70 years (p<0.001), and 12% of those under 50 received radiotherapy compared to 8% of those aged between 50 and 70 years (p<0.001). Just 33% and 4% of patients aged over 70 years received chemotherapy and radiotherapy, respectively.

Treatment pathways for early onset metastatic colon cancer patients and those aged between 50 and 70 years appeared broadly similar, apart from an increased use of chemotherapy in patients under 50 (Table 3, Figure 2). Patients aged over 70 years received significantly less treatment overall, as might be expected.

Cancer-specific Survival

62.6% (95% confidence interval: 59.6% to 65.6%) of early onset metastatic colon cancer patients died of colorectal cancer within 2 years, compared to 63.2% (95% confidence interval: 61.9% to 64.5%) of those aged between 50 and 70 years, and 75.4% (95% confidence interval: 74.4% to 76.2%) of those aged over 70 years (Figure 3).

Summary and Conclusions

This report demonstrates that:

- The proportion of patients diagnosed with EOCRC has increased from 5.2% in 2013-14 to 5.8% in 2017-18.
- Of patients diagnosed with metastatic CRC in England, the proportion of patients diagnosed with EOCRC has increased from 6.7% in 2013-14 to 7.9% in 2017-18.
- In 2017-18, the number of patients with early onset metastatic CRC represented approximately 8% (approximately 1 in 13 cases) of all patients diagnosed with metastatic CRC in England.
- Patient and clinical characteristics of patients with early onset metastatic colon cancer: there was a more equal male to female distribution, and younger patients tended to be fitter. Younger patients were also more likely to be from socioeconomically deprived and/or ethnic minority groups compared to older patients. In addition, younger patients tended to present with more advanced, left-sided disease as an emergency.
- Treatment modalities and pathways for patients with early onset metastatic colon cancer: this group were more likely to receive treatments, particularly chemotherapy (83% versus 71%) and radiotherapy (12% versus 8%) compared to those aged between 50 and 70 years. The proportion of patients having surgical intervention for the primary tumour was similar between early onset metastatic colon cancer patients and those aged between 50 and 70 years (41% versus 38%).
- Cancer-specific survival: despite early onset metastatic colon cancer patients being fitter and more likely to receive treatment, crude cancer-specific survival was only equivalent to that of patients aged between 50 and 70 years (63% versus 63%).

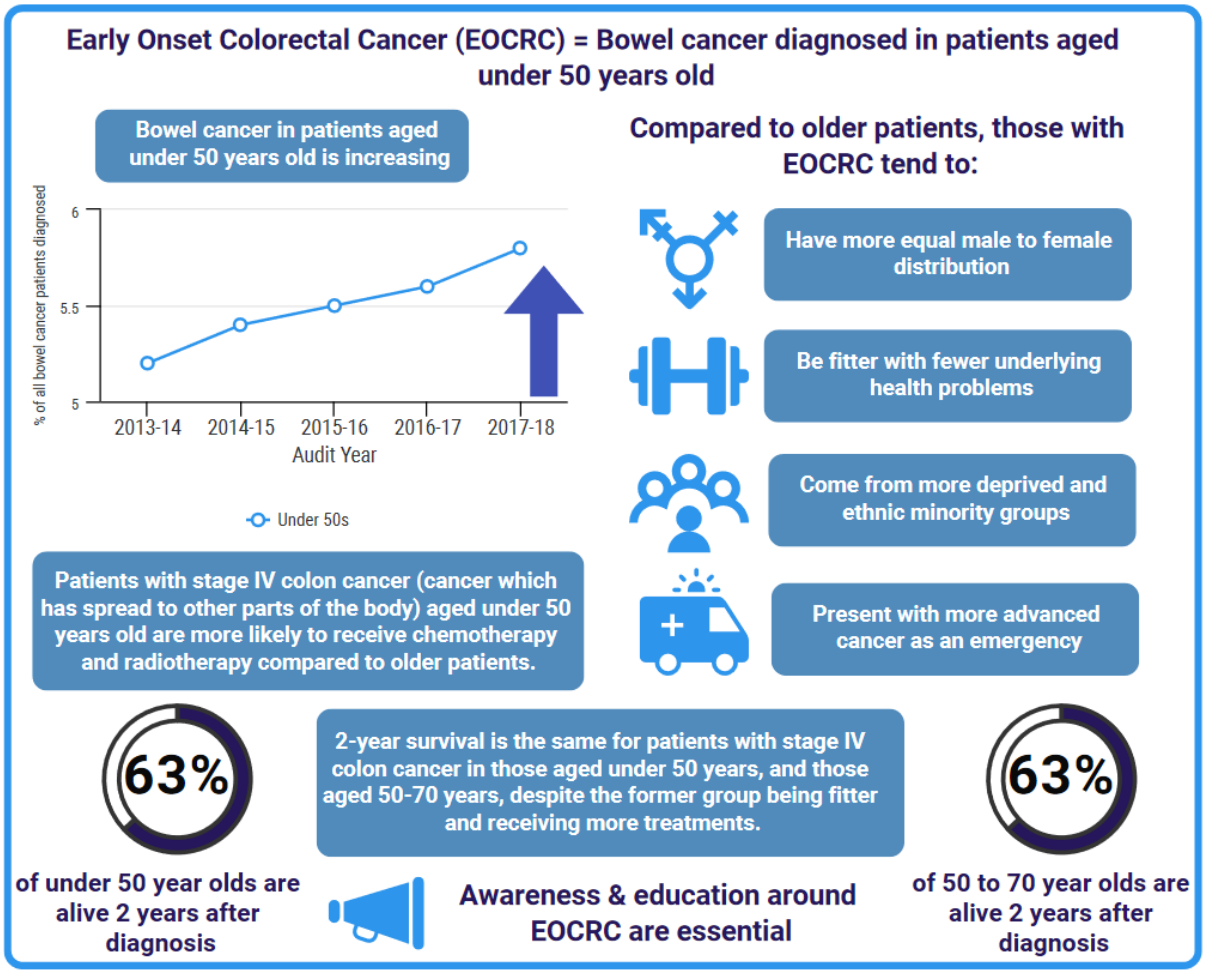
Limitations/further work

There are several methodological areas for development work:

- Further work is required to refine the classification of treatment pathways and ensure that all interventional radiological procedures for metastatic disease are being captured.
- It is necessary to improve our ability to identify SABR from administrative radiotherapy data (RTDS) as this is another important treatment for metastatic disease.
- This work presents crude cancer-specific survival outcomes. Appropriate risk-adjustment is required to account for case-mix differences between age groups to allow a more robust comparison.
- This work should be expanded to investigate in more detail what chemotherapy regimens patients are receiving, and the proximity of these treatments to death in order to further understand differences in how aggressively patients are being treated dependent on their age.
- Another important factor in response to treatment is the molecular profile of tumours in those with EOCRC. NBOCA has been collecting data on the presence or absence of Mismatch Repair proteins (to determine Lynch status) and will be extending data capture to include additional genomics information. Biomarker status is known to have prognostic influence as

well as predict the benefit of some treatments e.g. presence of RAS/ BRAF mutations status predict lack of benefit from EGFR inhibitor treatment; MSI-H status predicts immunotherapy benefit; etc. Expanding future analyses to include biomarker status may help to better understand differences in treatment strategies and survival outcomes."

- This work should also be expanded to include rectal cancer patients, whose treatment pathways can be more heterogeneous and complex than those with colon cancer.

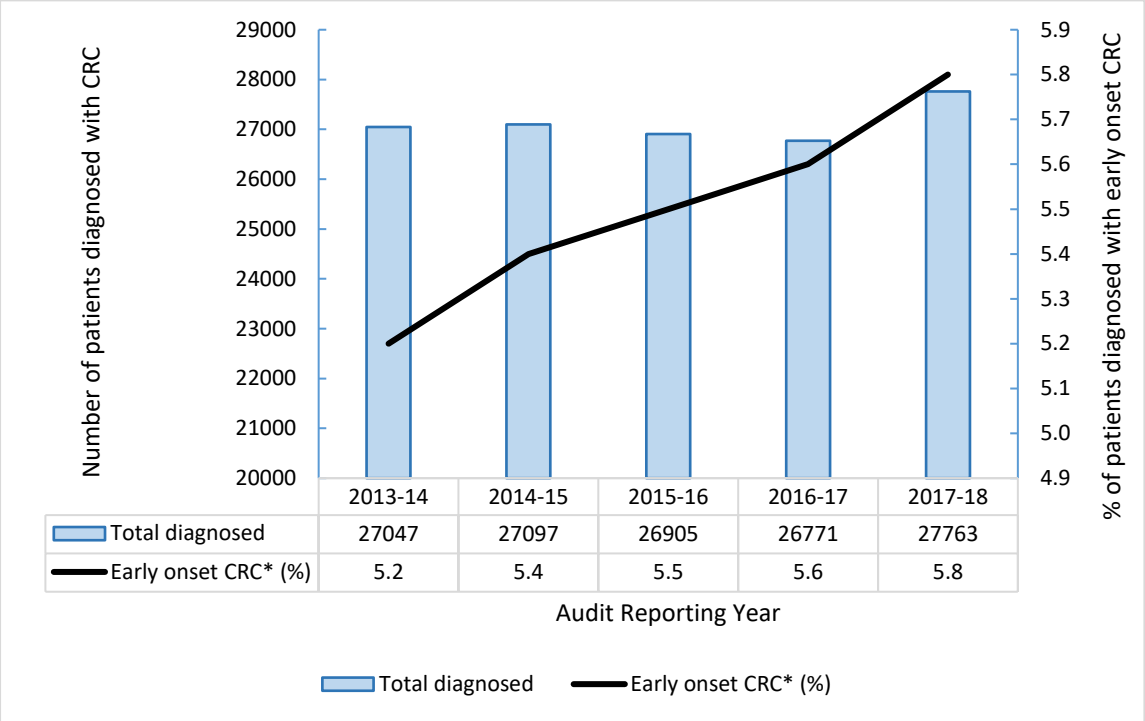


Recommendations

No.	Recommendation	Intended audience for recommendation	Evidence in the report which underpins the recommendation	Guidance available (for example, NICE guideline)
Rec 1	Awareness and education regarding EOCRC and the symptoms of CRC should continue to be promoted to the general public via campaigns such as Bowel Cancer UK's 'Never Too Young' to facilitate prompt presentation. For example, bowel cancer awareness and promotion of bowel cancer risks and indications for early screening might be considered for inclusion in the personal health curriculum for secondary schools. In addition, Lynch status and an adequate family history should be obtained for anyone diagnosed with CRC. Information should then be provided about the need for appropriate screening of first-degree relatives according to British Society of Gastroenterology guidelines, and counselling regarding bowel cancer symptoms.	Public Primary care Bowel cancer charities NHS England	Page 6 and Table 1 Patients with early onset metastatic colon cancer are more likely to present with advanced disease and as an emergency. Prompt recognition, referral and treatment of bowel cancer symptoms are crucial.	British Society of Gastroenterology (BSG) Guidelines (23) NICE Guidelines on Lynch syndrome (10) NICE Guidelines on testing strategies for Lynch syndrome in people with endometrial cancer (11) Cancer Alliance handbook for 'Implementing Lynch syndrome testing and surveillance pathways' (24) Bowel Cancer UK: Lynch syndrome (25) GIRFT: Gastroenterology report (26)

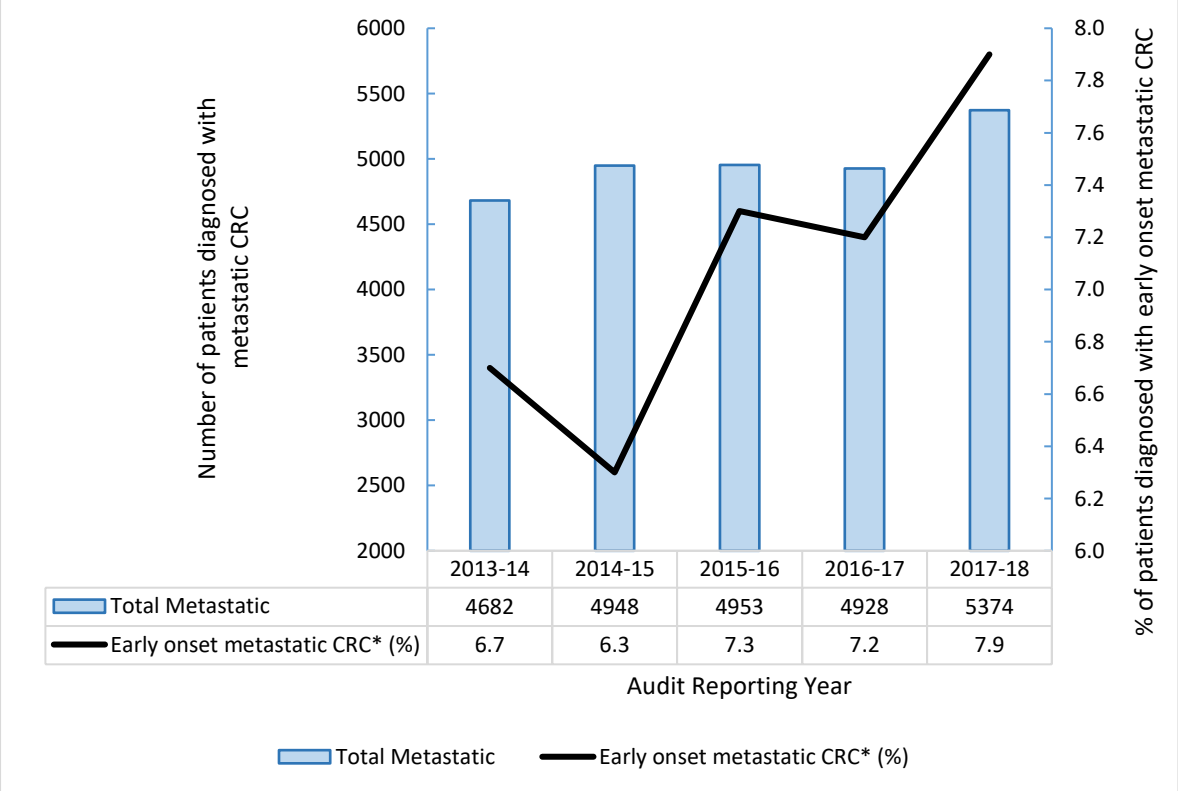
Rec 2	The increasing incidence of EOCRC should be disseminated among medical professionals, including those in primary care, who will also require support with adequate risk stratification tools like faecal immunochemical testing (FIT) and urgent referral pathways in place to facilitate prompt diagnosis.	Public Primary care Bowel cancer charities Individual MDTs	Page 6 and Figure 1a/1b The proportion of patients with EOCRC is increasing, along with an associated rise in the proportion of patients in this age group with metastatic disease.	NICE Guidelines on FIT testing (27) NHSEI guidance – Clinical guide for triaging patients with lower gastrointestinal symptoms (28) GIRFT: Gastroenterology report (26)
Rec 3	Early onset metastatic colon cancer patients appear to be particularly at risk of left-sided disease, which may be an important consideration if screening initiatives are considered in this age group.	National Screening Committee	Page 6 and Table 1 Patients with early onset metastatic colon cancer more frequently present with left-sided disease.	NICE Guidelines on colorectal cancer – prevention of colorectal cancer in those with Lynch syndrome (29)
Rec 4	There is a suggestion from these results that patients with early onset metastatic colon cancer at presentation have comparable cancer survival to those aged between 50 and 70 years, despite being a fitter group of patients. This requires further work to better understand the reasons for this finding, including adequate risk-adjustment for survival outcomes and further exploration of differences in how aggressive the treatments are.	Primary care Individual MDTs	Page 7 and Figure 3 Crude cancer-specific survival outcomes are comparable between patients with early onset metastatic colon cancer and those aged between 50 and 70 years.	Not applicable

Figure 1a – Trend over time in the overall proportion of patients diagnosed with early onset colorectal cancer in England (NB. Vertical axis does not begin at 0)



* Chi-squared test comparing proportions over time, p-value=<0.001

Figure 1b – Trend over time in the proportion of patients diagnosed with early onset metastatic colorectal cancer in England (NB. Vertical axis does not begin at 0)



* Chi-squared test comparing proportions over time, p-value=<0.001

Table 1 – Patient, tumour and clinical characteristics of patients with synchronous metastatic colon cancer at presentation, stratified according to age category

	Age (n=15,723)						
	Under 50s		50 – 70		Over 70s		p value (χ^2)
	No.	%	No.	%	No.	%	
Sex							<0.001
Male	530	49.3	3,055	56.7	4,989	53.9	
Female	546	50.7	2,329	43.3	4,273	46.1	
Missing*	0	0	0	0	1	0	
Comorbidities (RCS Charlson Score)							<0.001
0	739	70.5	3,037	60.8	3,321	44.5	
1	262	25.0	1,409	28.2	2,352	31.5	
≥2	47	4.5	549	11.0	1,795	24.0	
Missing*	28	2.6	389	7.2	1,795	19.4	
Performance Status							<0.001
0	616	64.9	2,251	48.2	1,563	20.4	
1	216	22.8	1,401	30.0	2,368	30.9	
2	74	7.8	605	13.0	1,906	24.9	
≥3	43	4.5	411	8.8	1,826	23.8	
Missing*	127	11.8	716	13.3	1,600	17.3	
IMDQ**							<0.001
1 (most deprived)	229	21.3	1,040	19.4	1,466	15.8	
2	226	21.1	1,017	18.9	1,686	18.2	
3	178	16.6	1,111	20.7	1,980	21.4	
4	225	21.0	1,105	20.6	2,033	22.0	
5 (least deprived)	215	20.0	1,097	20.4	2,091	22.6	
Missing*	3	0.3	14	0.3	7	0.1	
Ethnicity							<0.001
White	899	87.8	4,718	93.8	8,327	96.3	
Mixed	15	1.5	21	0.4	26	0.3	
Asian	45	4.4	107	2.1	111	1.3	
Black	38	3.7	122	2.4	124	1.4	
Other	27	2.6	61	1.2	63	0.7	
Missing*	52	4.8	355	6.6	612	6.6	
Tumour Side							<0.001
Right	460	42.8	2,658	49.4	5,542	59.8	
Left	616	57.2	2,726	50.6	3,721	40.2	

Pre-treatment T-stage							<0.001
T1	7	0.8	44	1.0	67	0.9	
T2	32	3.6	212	4.8	506	6.8	
T3	419	47.3	2,200	49.7	3,612	48.2	
T4	427	48.2	1,974	44.6	3,302	44.1	
Missing*	191	17.8	954	17.7	1,776	19.2	
Pre-treatment N-stage							<0.001
N0	148	16.8	818	18.2	1,746	23.1	
N1	371	42.0	1,967	43.9	3,432	45.5	
N2	364	41.2	1,699	37.9	2,368	31.4	
Missing*	193	17.9	900	16.7	1,717	18.5	
Referral Method							<0.001
Emergency Admission	349	33.4	1,267	24.0	2,563	28.2	
GP Referral	432	41.3	2,773	52.6	4,757	52.3	
Screening Referral	0	0	307	5.8	206	2.3	
Other	264	25.3	929	17.6	1,571	17.3	
Missing*	31	2.9	108	2.0	166	1.8	

*Proportions presented exclude missing information

**Index of Multiple Deprivation (see Methods)

Table 2 – Treatment modalities identified within linked administrative data for patients presenting with synchronous metastatic colon cancer

Treatment modality	Age*				
	<50 years (n=1,076)	**50-70 years (n=5,384)**	***p value*†**	**>70 years (n=9,263)**	***p value*††**
Resection of primary tumour	436 (41%)	2,052 (38%)	*0.138*	2,203 (24%)	*<0.001*
Surgical procedure without resection of primary tumour (stoma/stent)	122 (11%)	609 (11%)	*0.980*	839 (9%)	*<0.001*
Surgical resection overall:	185 (17%)	812 (15%)	*0.080*	482 (5%)	*<0.001*
Liver	159 (15%)	711 (13%)	*0.148*	411 (4%)	*<0.001*
Lung	11 (1%)	52 (1%)	*0.806*	50 (0.6%)	*0.001*
Both liver and lung	15 (1%)	49 (1%)	*0.143*	21 (0.2%)	*<0.001*
Ablative treatment liver/lung metastases	48 (5%)	195 (4%)	*0.187*	128 (1%)	*<0.001*
Selective internal radiation therapy (SIRT)	23 (2%)	76 (1%)	*0.077*	22 (0.2%)	*<0.001*
Chemotherapy (any)	894 (83%)	3,831 (71%)	*<0.001*	3,090 (33%)	*<0.001*
Radiotherapy (any)	129 (12%)	425 (8%)	*<0.001*	361 (4%)	*<0.001*
No treatment recorded	116 (11%)	946 (18%)	*<0.001*	4,514 (49%)	*<0.001*

*****percentages do not total 100%, as patients may have more than one treatment modality

† chi-squared test comparing proportions between <50 years and 50-70 years groups only

†† chi-squared test comparing proportions across all three categories

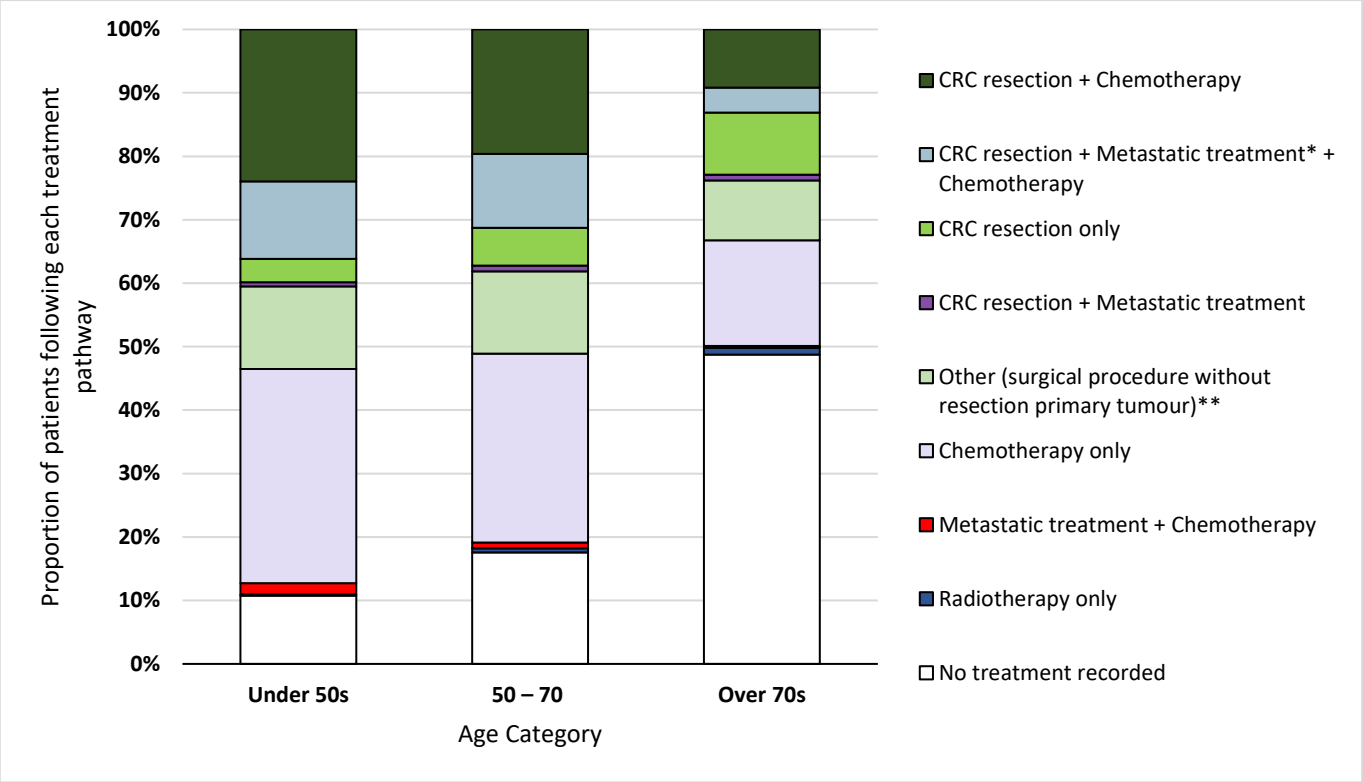
Table 3 – Different treatment pathways identified within linked administrative data for patients presenting with synchronous metastatic colon cancer

Treatment pathway	Age		
	Under 50s (n=1,076)	**50 – 70 (n=5,384)**	**Over 70s (n=9,263)**
CRC resection + Chemotherapy	258 (24%)	1,055 (20%)	851 (9%)
CRC resection + Metastatic treatment* + Chemotherapy	131 (12%)	627 (12%)	362 (4%)
CRC resection only	40 (4%)	321 (6%)	906 (10%)
CRC resection + Metastatic treatment	7 (0.7%)	49 (0.9%)	84 (0.9%)
Chemotherapy only	363 (34%)	1,601 (30%)	1,542 (17%)
Other (surgical procedure without resection of primary tumour)**	140 (13%)	699 (13%)	877 (9%)
Metastatic treatment + Chemotherapy	19 (2%)	48 (1.0%)	21 (0.2%)
Metastatic treatment only	0 (0%)	1 (0.02%)	4 (0.04%)
Radiotherapy only	2 (0.2%)	35 (0.7%)	102 (1.1%)
Selective internal radiation (SIRT) only	0 (0%)	2 (0.04%)	0 (0%)
No treatment recorded	116 (11%)	946 (18%)	4514 (49%)

*Metastatic treatment refers to surgical resection of liver or lung metastases and/or ablative therapy of liver or lung metastases

**Of these, in over 70s 36% had a record of chemotherapy versus 72% of those aged 50-70, and 89% of those <50

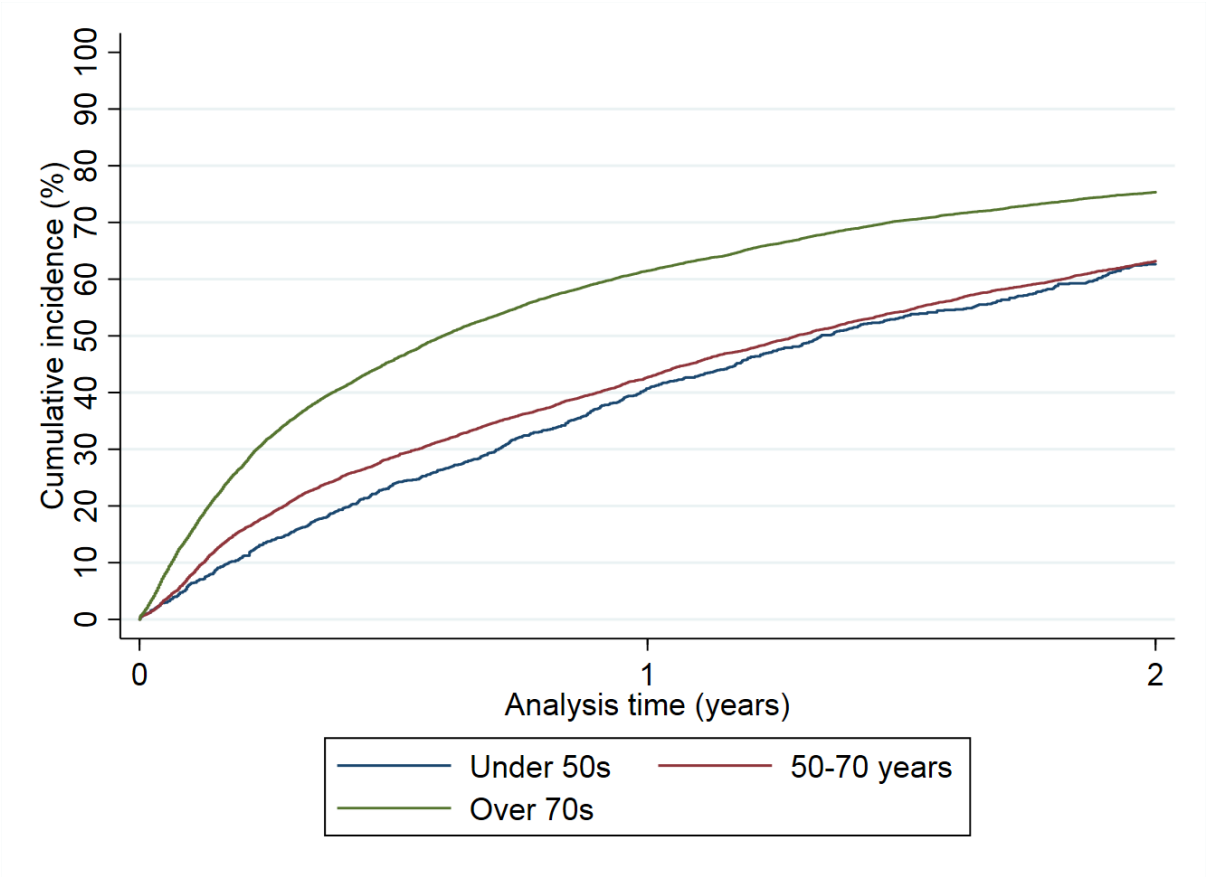
Figure 2 – The different treatment pathways identified within linked administrative data for patients presenting with synchronous metastatic colon cancer, according to age category



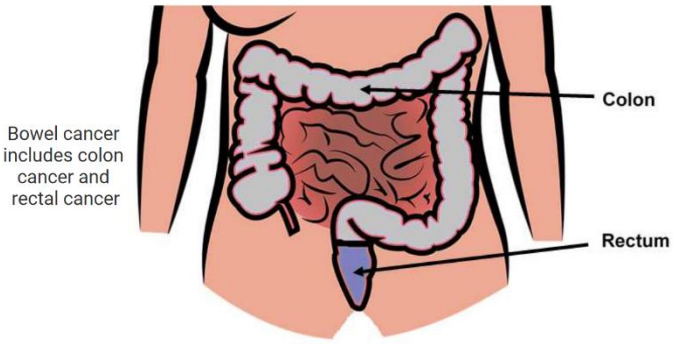
*Metastatic treatment refers to surgical resection of liver or lung metastases and/or ablative therapy of liver or lung metastases

**Of these, in over 70s 36% had a record of chemotherapy versus 72% of those aged 50-70, and 89% of those <50

Figure 3 – Cumulative incidence curve for colon cancer-specific death with competing risk of non-colon cancer death in patients with synchronous metastatic colon cancer, according to age category



Glossary



Colon cancer – 'bowel cancer' involving any part of the large bowel not including the rectum (see diagram left).

Colorectal cancer (CRC) – overarching term for 'bowel cancer' which includes both cancers of the colon and rectum.

Lynch syndrome – an inherited genetic condition which increases your risk of bowel cancer. Identifying bowel cancers which are caused by Lynch syndrome can help to identify families who might benefit from earlier and more regular screening for bowel cancer.

Metastatic disease – cancer that has spread from where it first started in the body. It can also be referred to as stage IV disease or secondary cancer.

Rectal cancer – 'bowel cancer' involving the final part of the large bowel, also known as the rectum (see diagram above).

Synchronous metastatic disease – cancer that has spread to other parts of the body at first diagnosis, rather than developing later on.

References

1. Dozois EJ, Boardman LA, Suwanthanma W, Limburg PJ, Cima RR, Bakken JL, et al. Young-onset colorectal cancer in patients with no known genetic predisposition: can we increase early recognition and improve outcome? Medicine (Baltimore). 2008;87(5):259-63.
2. Domergue J, Ismail M, Astre C, Saint-Aubert B, Joyeux H, Solassol C, et al. Colorectal carcinoma in patients younger than 40 years of age. Montpellier Cancer Institute experience with 78 patients. Cancer. 1988;61(4):835-40.
3. Griffin PM, Liff JM, Greenberg RS, Clark WS. Adenocarcinomas of the colon and rectum in persons under 40 years old. A population-based study. Gastroenterology. 1991;100(4):1033-40.
4. Kasi PM, Shahjehan F, Cochuyt JJ, Li Z, Colibaseanu DT, Merchea A. Rising Proportion of Young Individuals With Rectal and Colon Cancer. Clinical Colorectal Cancer. 2019;18(1):e87-e95.
5. Loomans-Kropp HA, Umar A. Increasing Incidence of Colorectal Cancer in Young Adults. J Cancer Epidemiol. 2019;2019:9841295-.
6. Lynch HT, de la Chapelle A. Hereditary colorectal cancer. The New England journal of medicine. 2003;348(10):919-32.
7. Vuik FE, Nieuwenburg SA, Bardou M, Lansdorp-Vogelaar I, Dinis-Ribeiro M, Bento MJ, et al. Increasing incidence of colorectal cancer in young adults in Europe over the last 25 years. Gut. 2019;68(10):1820-6.
8. Exarchakou A, Donaldson LJ, Girardi F, Coleman MP. Colorectal cancer incidence among young adults in England: Trends by anatomical sub-site and deprivation. PLOS ONE. 2019;14(12):e0225547.
9. UK Government. Bowel screening to start at 50. 2018. https://www.gov.uk/government/news/bowel-screening-to-start-at-50#:~:text=The%20independent%20expert%20screening%20committee,years%20to%20provide%20stool%20samples.
10. NICE guidelines. Molecular testing strategies for Lynch syndrome in people with colorectal cancer. Diagnostics guidance [DG27]. 2017. https://www.nice.org.uk/guidance/dg27/chapter/1-Recommendations.
11. NICE guidelines. Testing strategies for Lynch syndrome in people with endometrial cancer. Diagnostics guidance [DG42]. 2020 https://www.nice.org.uk/guidance/dg42 [
12. National Bowel Cancer Audit. Organisational Survey Results 2019. https://www.nboca.org.uk/reports/organisational-survey-results-2019/.
13. Bowel Cancer UK. Never Too Young. 2020 https://bowelcancerorguk.s3.amazonaws.com/N2Y%202020/NeverTooYoung2020_BowelCancerUK.pdf [
14. Van Cutsem E, Cervantes A, Nordlinger B, Arnold D. Metastatic colorectal cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Annals of oncology : official journal of the European Society for Medical Oncology. 2014;25 Suppl 3:iii1-9.
15. Georgiou A, Khakoo S, Edwards P, Minchom A, Kouvelakis K, Kalaitzaki E, et al. Outcomes of Patients with Early Onset Colorectal Cancer Treated in a UK Specialist Cancer Center. Cancers. 2019;11(10).
16. van der Pool AE, Damhuis RA, Ijzermans JN, de Wilt JH, Eggermont AM, Kranse R, et al. Trends in incidence, treatment and survival of patients with stage IV colorectal cancer: a population-based series. Colorectal disease : the official journal of the Association of Coloproctology of Great Britain and Ireland. 2012;14(1):56-61.
17. Hospital Episode Statistics. NHS Digital. [Available from: https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/hospital-episode-statistics.
18. NHS Digital TRUD. NHS Classifications OPCS-4.

19. National Bowel Cancer Audit. How to best capture adjvuant chemotherapy use in stage III colon cancer with linked HES-APC and SACT data. 2020.
20. Armitage JN, van der Meulen JH. Identifying co-morbidity in surgical patients using administrative data with the Royal College of Surgeons Charlson Score. The British journal of surgery. 2010;97(5):772-81.
21. English indices of deprivation 2010: Official Statistics; [Available from: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2010.
22. Office for National Statistics. Ethnic group, national identity and religion. [Available from: https://www.ons.gov.uk/methodology/classificationsandstandards/measuringequality/ethnicgroupnationalidentityandreligion.
23. Monahan KJ, Bradshaw N, Dolwani S, Desouza B, Dunlop MG, East JE, et al. Guidelines for the management of hereditary colorectal cancer from the British Society of Gastroenterology (BSG)/Association of Coloproctology of Great Britain and Ireland (ACPGBI)/United Kingdom Cancer Genetics Group (UKCGG). Gut. 2020;69(3):411-44.
24. Cancer Alliance handbook. Implementing Lynch syndrome testing and surveillance pathways. [Available from: https://future.nhs.uk/system/login?nextURL=%2Fconnect%2Eti%2Fcanc%2Fview%3FobjectID%3D18843696.
25. Bowel Cancer UK. Lynch syndrome. [Available from: https://www.bowelcanceruk.org.uk/campaigning/lynch-syndrome/.
26. Getting It Right First Time. Gastroenterology report. 2021. [Available from: https://www.gettingitrightfirsttime.co.uk/medical-specialties/gastroenterology/.
27. NICE guidelines. Quantitative faecal immunochemical tests to guide referral for colorectal cancer in primary care. Diagnostics guidance [DG30]. 2017 [Available from: https://www.nice.org.uk/guidance/dg30.
28. NHS England. Clinical guide for triaging patients with lower gastrointestinal symptoms. 2020. [Available from: https://www.nice.org.uk/Media/Default/About/COVID-19/Specialty-guides/triaging-patients-with-lower-gi-symptoms.pdf.
29. National Institute for Health and Care Excellence. Colorectal cancer. NICE guideline [NG151] 2020 [Available from: https://www.nice.org.uk/guidance/ng151.