



The benefits of index telephone consultations in patients referred on the two-week wait colorectal cancer pathway

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ABSTRACT

Introduction The coronavirus disease 2019 (COVID-19) pandemic led to hospitals in the UK substituting face-to-face (FtF) clinics with virtual clinic (VC) appointments. We evaluated the use of virtual two-week wait (2-ww) lower gastrointestinal (LGI) clinic appointments, conducted using telephone calls at a district general hospital in England.

Methods Patients undergoing index outpatient 2-ww LGI clinic assessment between 1 June 2019 and 31 October 2019 (FtF group) and 1 June 2020 and 31 October 2020 (VC group) were identified. Relevant data were obtained using electronic patient records. Compliance with national cancer waiting time targets was assessed. Environmental and financial impact analyses were performed.

Results In total, 1,531 patients were analysed (median age=70, male=852, 55.6%). Of these, 757 (49.4%) were assessed virtually via telephone; the remainder were seen FtF ($n=774$, 50.6%). Ninety-two (6%, VC=44, FtF=48) patients had malignant pathology and 64 (4.2%) had colorectal cancer (CRC); of these, 46 (71.9%, VC=26, FtF=20) underwent treatment with curative intent. The median waiting times to index appointment, investigation and diagnosis were significantly lower following VC assessment ($p<0.001$). The cancer detection rates ($p=0.749$), treatments received ($p=0.785$) and median time to index treatment for CRC patients ($p=0.156$) were similar. A significantly higher proportion of patients were seen within two weeks of referral in the VC group ($p<0.001$). VC appointments saved patients a total of 9,288 miles, 0.7 metric tonnes of CO₂ emissions and £7,482.97. Taxpayers saved £80,242.00 from VCs. No formal complaints were received from patients or staff in the VC group.

Conclusion Virtual 2-ww LGI clinics were effective, safe and were associated with tangible environmental and financial benefits.

KEYWORDS

Telephone clinics – Colorectal cancer – COVID-19 – Environmental impact – Cost-benefit analysis

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Introduction

For patients with suspected lower gastrointestinal (LGI) tract cancer, the two-week wait (2-ww) referral pathway facilitates rapid specialist review in secondary or tertiary care hospitals in England.¹ Patients benefit from outpatient clinic assessment within two weeks and definitive cancer treatment within 62 days.² Approximately a third of colorectal cancer (CRC) cases in the country are detected through this pathway.⁵ The coronavirus disease 2019 (COVID-19) pandemic led to significant challenges in the provision of cancer services for patients in the UK NHS.^{4,5} Numerous outpatient hospital appointments were cancelled and treatments were postponed.^{3,6} Conventional face-to-face (FtF) clinics were replaced with virtual clinic (VC) appointments, conducted using telephone or video conferencing platforms (telemedicine). As the pandemic continues, unanswered questions remain regarding the

efficacy and continued use of virtual consultations in 2-ww outpatient LGI clinics.

Substitutes for FtF clinics have been researched across various specialties long before the pandemic. Telephone VCs were shown to reduce patient, organisational and environmental costs in urology and colorectal surgery.^{7–9} In patients with inflammatory bowel disease, VCs conducted via video calling were not only safe and effective but also saved time and money for patients.¹⁰ Telephone VC appointments were found to be effective and well received by patients undergoing follow up after CRC surgery.^{11–15} Several cross-sectional surveys also reported positive patient experiences following the implementation of various VC formats in response to the COVID-19 pandemic.^{16–18} While telephone consultations were widely adopted during the COVID-19 pandemic, their effectiveness as an initial triage tool for patients referred to 2-ww LGI clinics warrants further assessment.

We evaluated data from a UK district general hospital that implemented VCs in response to the COVID-19 pandemic. From March 2020, all patients referred on the 2-ww suspected LGI cancer pathway to this organisation were initially assessed using VCs. These clinics were conducted using telephone calls (audio only) by surgical registrars or consultant colorectal surgeons. Comparisons were made with data from patients referred on this pathway seen FtF the previous year (2019). Compliance with cancer waiting time targets (WTT) as set out by NHS England was also assessed. The environmental and financial impacts were estimated.

Methods

Study design and setting

This audit was registered with the clinical governance team at the South Warwickshire NHS Foundation Trust, UK (ID: 2215). Research ethics committee approval was not required for this audit, and this was confirmed using the UK Health Research Authority 'Is my study research?' online decision tool (<http://www.hra-decisiontools.org.uk/research>). Two independent samples of patients assessed in 2-ww LGI clinics, during two five-month periods in 2020 and 2019, were identified using a prospectively maintained electronic database. Patients referred between 1 June 2019 and 31 October 2019 comprised the FtF group and those referred between 1 June 2020 and 31 October 2020 were the VC group. All patients referred on the 2-ww LGI referral pathway at this organisation were initially assessed in clinics. There was no 'straight-to-test' pathway or utilisation of faecal immunochemical (FIT) testing to triage patients for investigations. Verbal consent was obtained from patients in the VC group prior to proceeding with their index consultation over the telephone. For 2-ww patients, NHS England mandates that at least 95% of patients are assessed within two weeks of referral, and 85% of cancer patients receive definitive treatment within 62 days from referral.¹⁹ These targets comprised the audit standards.

Data collection

Data were obtained retrospectively on patient demographics (age, gender, ethnicity and postcode), activity on referral pathway (consultation type: VC or FtF, date of referral, non-attendances, index investigation, diagnoses and the index treatment in CRC patients) and dependent variables (date of initial appointment, first investigation, diagnosis and date of treatment for CRC patients). Data were also collected on the presenting symptom(s) for patients assessed in VCs. The date of diagnosis was defined as the date when a consensus of diagnosis was reached at a multidisciplinary team meeting or the earliest date when a diagnosis (or exclusion) of cancer was documented in a letter on the patient's record. The date on which the patient underwent their first definitive treatment (eg surgery, therapeutic endoscopy or oncological therapy) was defined as the date of treatment. Patients who were discharged at

first appointment were recorded on the database as having the same date of diagnosis as well as discharge.

Data analysis

Data were collated using Excel (Microsoft Corporation, USA). Statistical analysis was performed using SPSS V26 (IBM, USA). Categorical data were reported as integers and percentages. Non-parametric data were summarised as median and interquartile range (IQR). Chi-squared tests or Fisher's exact tests were performed to test for significant differences between categorical data. Time to initial appointment, first investigation, diagnosis and treatment were calculated in days by subtracting these from the date of referral. Two independent sample non-parametric Mann-Whitney *U* tests were performed to test the significance of observed differences in waiting times between the FtF and VC groups. A *p*-value of less than 0.05 was assigned as the level of statistical significance.

Financial and environmental impact analyses

The distance travelled (in miles) and time (in minutes) for travel for a return journey from the patient's registered home postcode to the closer of the two hospital sites where outpatient clinics are typically conducted were estimated using Google Maps™ Distance Matrix API (Alphabet Incorporated, USA) and RStudio Desktop V1.3 (RStudio, USA) running R V4.0.2 (r-project.org, USA). The fastest route travelled by car on a weekday to arrive by noon were set as parameters. Most outpatient clinics are typically conducted on weekdays, and the most popular mode of transport for patients in Warwickshire remains their personal vehicle according to 2011 census data.²⁰ The UK government estimate of 122.1g/km (75.9g/mile) of CO₂ emissions for cars in the country was used to calculate total CO₂ emissions saved.²¹ The number of mature trees required to offset these emissions was estimated using the formula available at www.trees.org.²² Cost of attending FtF clinics by personal vehicle for patients was estimated using the following parameters. Assuming that travel was using a personal vehicle with a UK average engine size of 1,800 cubic centimetres,²³ the fuel cost was set at 11.5 pence per mile (for diesel and petrol vehicles, UK Government),²⁴ and 45.9 pence per mile for maintaining a vehicle (the RAC).²⁵ A 1–2h parking charge of £5.10 at the hospital was also included in the calculation.²⁶ The organisational costs of VC and FtF clinic appointments were obtained from the hospital finance department. The estimates for saved miles, reduced CO₂ emissions and cost savings were extrapolated over a 12-month period.

Results

Combined analysis

In total, 1,531 patients were included in the analysis, having excluded 180 patients (VC=55; FtF=127) due to incomplete data. The median age was 70 years (IQR: 60–79). The majority (*n*=852, 55.6%) were male (Table 1). White

Caucasian patients accounted for 85.6% ($n=1,324$) of the sample, 4.2% ($n=64$) were Black Asian and Minority Ethnic (BAME) patients, and 9.5% ($n=145$) did not have their ethnicity documented. While 757 (49.4%) patients were assessed in VCs, 774 (50.6%) were seen FtF (Table 2). All index VC appointments took place in 2020 and FtF appointments in 2019. Only 128 (8.4%) patients were discharged at first appointment. Across both groups, 22 (1.4%) patients did not attend (DNA) at least one previous appointment prior to a subsequent clinic assessment. Most patients underwent endoscopy (gastroscopy, colonoscopy or flexible sigmoidoscopy) followed by imaging (computed tomography (CT) scan or CT virtual colonoscopy) or other investigations (eg examination under anaesthesia and biopsies). There were 119 patients (7.8%) who did not undergo any investigations. These 119 were among those discharged at their first appointment. Malignant pathology was detected in 92 (6.0%) patients and over two-thirds ($n=64$, 69.6%) of these were CRC. Over 70% ($n=46$) of patients with a CRC diagnosis underwent surgery or endoscopic treatment with curative intent, 9.4% ($n=6$) were referred for chemoradiotherapy and 18.8% ($n=12$) were referred for palliative treatment.

Virtual versus FtF clinic appointments

Apart from the significantly higher proportion of females assessed in VCs ($n=357$, 47.2%) compared to FtF clinics ($n=322$, 41.6%, $p=0.029$), the proportion of patients of different age groups and ethnicities assessed in VCs over FtF clinics was not statistically significantly different

($p>0.05$). Similar proportions of patients were discharged at their initial appointment following VC ($n=58$, 7.7%) or FtF assessment ($n=70$, 9.0%, $p=0.329$). A significantly higher proportion of patients who had not attended a prior appointment were being reviewed in a subsequent clinic in the VC group ($n=16$, 2.1%) compared to the FtF group ($n=6$, 0.8%, $p=0.030$).

Only three (0.4%) of the 757 patients assessed in VC appointments were subsequently seen FtF. The reasons included hearing difficulties and language barrier. The presenting complaints among patients assessed in VC appointments included change in bowel habit, rectal bleeding, weight loss, anaemia, abdominal pain, positive faecal immunochemical test or rectal mass and abdominal mass (Figure 1). The corresponding data for the FtF sample were not available. There was a significant difference in the types of first investigation patients underwent, with 54.8% ($n=415$) receiving endoscopy following VC assessment compared to 49.0% ($n=379$) after FtF assessment ($p<0.005$). However, the number of patients undergoing standard CT scans compared to CT virtual colonoscopy were similar across the two groups. There was no significant difference in the cancer detection rate between the two groups (VC=44 (5.8%); FtF=48 (6.3%); $p=0.749$). Furthermore, there was no significant difference in patients undergoing surgical (including endoscopic) treatment with curative intent in the VC ($n=26$, 70.3%) and FtF ($n=20$, 74.1%) groups ($p=0.785$). We estimated a net 51.2% reduction in FtF visits following the implementation of VCs (supplementary table 1).

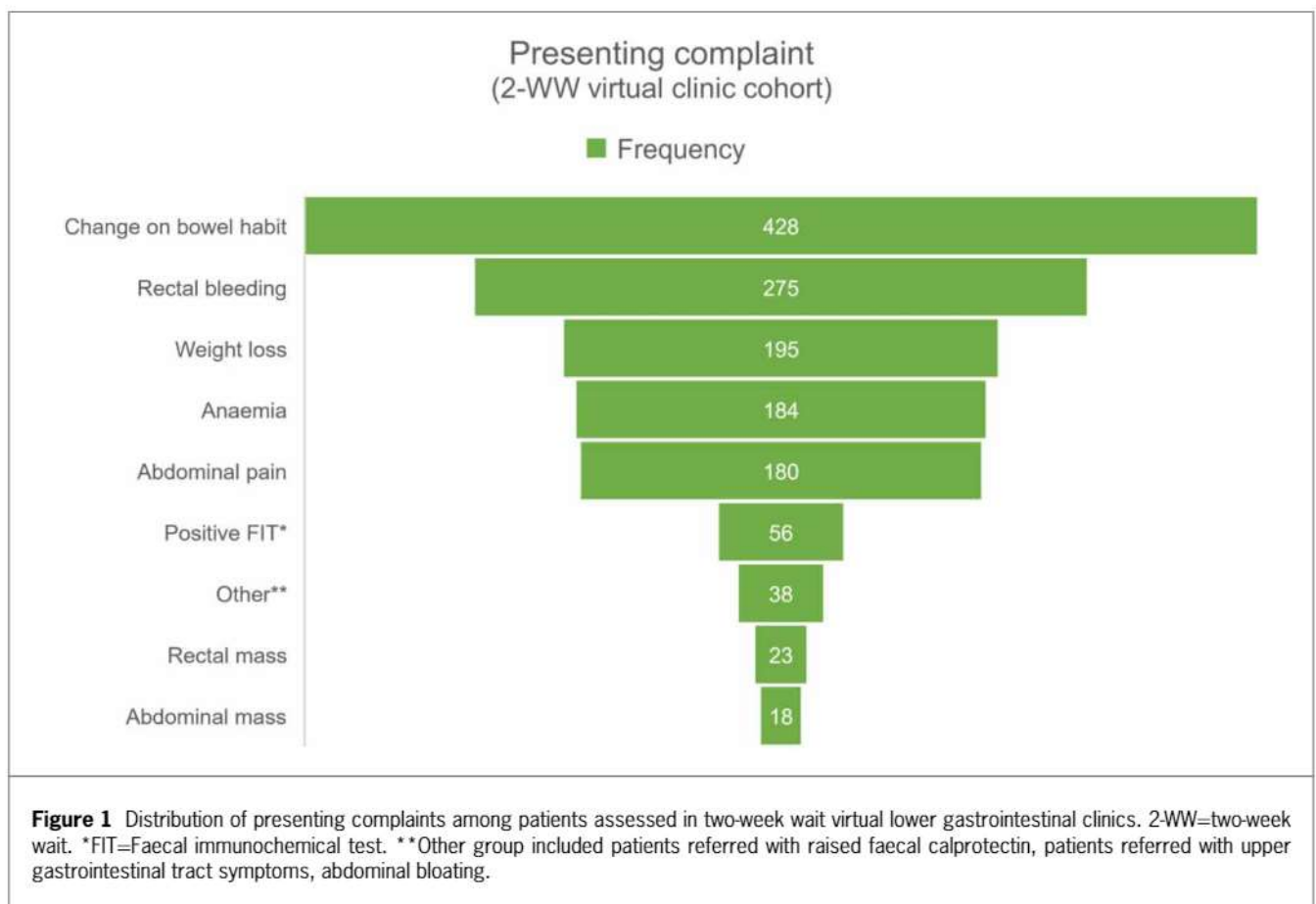
Table 1 Patient demographics

	2020 (virtual clinic)		2019 (face to face)		p-value*
	N	%	N	%	
Total	757	—	774	—	
Age years					
<30 or (blank)	4	0.5	8	1.0	0.450
30–49	68	9.0	58	7.5	
50–69	306	40.4	295	38.1	
70–89	357	47.2	391	50.5	
90–109	22	2.9	22	2.9	
Gender					
Female	357	47.2	322	41.6	0.029
Male	400	52.8	452	58.4	
Ethnicity					
BAME	32	4.2	32	4.1	0.928 [†]
Caucasian	629	83.1	695	89.8	
Not known	96	12.7	47	6.1	

*Chi-square test was performed.
[†]Analysis was performed between BAME versus not BAME (includes Caucasian and not known).

	2020 (virtual clinic)		2019 (face to face)		p-value
	N	%	N	%	
Total	757		774		
Appointment bookings					
Booked as face to face (FtF)	0	0.0	774	100.0	-
Booked as telephone	757	100.0	0	0.0	
Telephone converted to FtF	3	0.4	NA	-	
Discharged at first appointment					
Yes	58	7.7	70	9.0	0.329 ^a
No	699	92.3	704	91.0	
Non-attendance*					
At least one DNA	16	2.1	6	0.8	0.030 ^b
No DNA	741	97.9	768	99.2	
Index investigation					
Endoscopy	415	54.8	379	49.0	0.003 ^a
Imaging	269	35.5	289	37.3	
CT scan	258		270		
Virtual colonoscopy	5		2		
Other (eg EUA, MRI)	6		17		
Other	17	2.2	43	5.6	
None	56	7.4	63	8.1	
Diagnoses					
Malignant	44	5.8	48	6.2	0.749 ^a
Colorectal	37	84.1	27	56.2	
Other malignancy	7	15.9	21	43.8	
Benign	713	94.2	726	93.7	
Initial treatment of colorectal cancer patients					
Surgery***	26	70.3	20	74.1	0.785**
Other	11	29.7	7	25.9	
Chemoradiotherapy	3		3		
Palliative	8		4		
Two weeks to appointment					
Target met	656	86.7	518	66.9	<0.001 ^a
Target not met	101	13.3	256	33.1	
Sixty-two-day target to initiation of treatment for CRC patients					
Target met	30	81.1	16	59.3	0.091 ^c
Target not met	4	10.8	9	33.3	
No data	3	8.1	2	7.4	

DNA=did not attend; EUA=Examination under anaesthesia; CRC=colorectal cancer
^aChi-square test used
^bFishers exact test used
^cFishers exact test was performed – target met group vs. target not met and no data
*Only patients that did not attend a prior appointment who were eventually assessed in a subsequent clinic were included in the analysis. Those who were discharged back to the referrer without a single clinic assessment could not be identified using the available data
**Analysis performed as surgery versus other (chemoradiotherapy and palliative) using a Fisher's exact test
***Includes patient undergoing endoscopic treatment with curative intent



Waiting times

The median waiting time for a VC appointment was 7 days (IQR: 6–15) and 12 days (IQR: 7–19) for FtF appointments (Table 3). The median time to first investigation was 20 days (IQR: 15–25) and 27 days (IQR: 20–34) for VC and FtF appointments, respectively. While the median time to diagnosis was 25 days (IQR: 18–32) following VC assessment, the corresponding figure after FtF assessment was 36 days (IQR: 26–46). The median waiting time for treatment for CRC patients following an index VC appointment was 54 days (45–58) and 57 days (48–76) following an index FtF clinic assessment. Significantly lower median waiting times for initial appointment, first investigation and diagnosis were observed in patients in the VC group compared to FtF group ($p < 0.0001$). However, there was no significant difference in median waiting times for treatment in CRC patients between the two groups ($p = 0.156$).

Compliance with national standards

In the virtually assessed group from 2020, a significantly higher proportion ($n = 656$, 86.7%) of patients received an appointment within two weeks of the hospital receiving a referral, compared to patients seen FtF in 2019 ($n = 518$, 66.9%, $p < 0.001$) (Table 2). However, there was no

significant difference in the proportion of patients with a CRC diagnosis receiving definitive treatment within 62 days of receipt of referral in the VC ($n = 30$, 81.1%) and FtF groups ($n = 16$, 59.3%, $p = 0.091$).

Environmental impact

Excluding the three patients seen in FtF clinics following an index VC appointment, we estimated approximately 9,288 saved miles of travel for patients assessed in VCs during the five-month period in 2020 (Figure 2). This equates to approximately 22,291 miles over a 12-month period. The median mileage savings for patients was 9.5 (IQR: 5.5–16.8) miles. An estimated 0.7 metric tonnes of CO₂ emissions were saved or 1.7 metric tonnes when extrapolated over 12 months. Had these clinics been conducted FtF, the number of mature trees to offset the CO₂ emissions was estimated at approximately 12 trees for the five-month period, equivalent to 29 trees over 12 months.

Financial analysis

The savings on travel and parking for patients seen in VCs were estimated at a total of £7,482.97 over the five-month period. This equates to approximately £17,959.13 over 12 months. The median saving for patients was £8.35 (IQR: 6.15–12.43). In total, patients also saved approximately

Table 3 Time to outcomes in virtual versus face-to-face two-week wait lower gastrointestinal clinic appointments

	2020 (virtual clinic)	2019 (face to face)	U*	p-value
Time to initial appointment				
Median	7	12	183,610	<0.001
(IQR)	(6–13)	(7–19)		
Range	(1–36)	(1–37)		
Time to first investigation				
Median	20	27	147,012.5	<0.001
(IQR)	(15–25)	(20–34)		
Range	(3–97)	(6–85)		
Time to diagnosis				
Median	23	36	162,206	<0.001
(IQR)	(18–32)	(26–46)		
Range	(3–111)	(1–193)		
Time to treatment (CRC)				
Median	54	57	332.5	0.156
(IQR)	(45–58)	(48–76)		
Range	(8–79)	(26–173)		

*Mann–Whitney U test result

300 hours of travel time with a median of 20.4 (IQR: 14.4–30.9) minutes. The Healthcare Resource Group cost of an index FtF clinic appointment was £170.00 and £64.00 for a VC appointment. Therefore, in the wholly state-funded UK NHS, the estimated savings to taxpayers was £80,242.00 over the five-month period, extrapolated to approximately £192,580.80 over 12 months.

Discussion

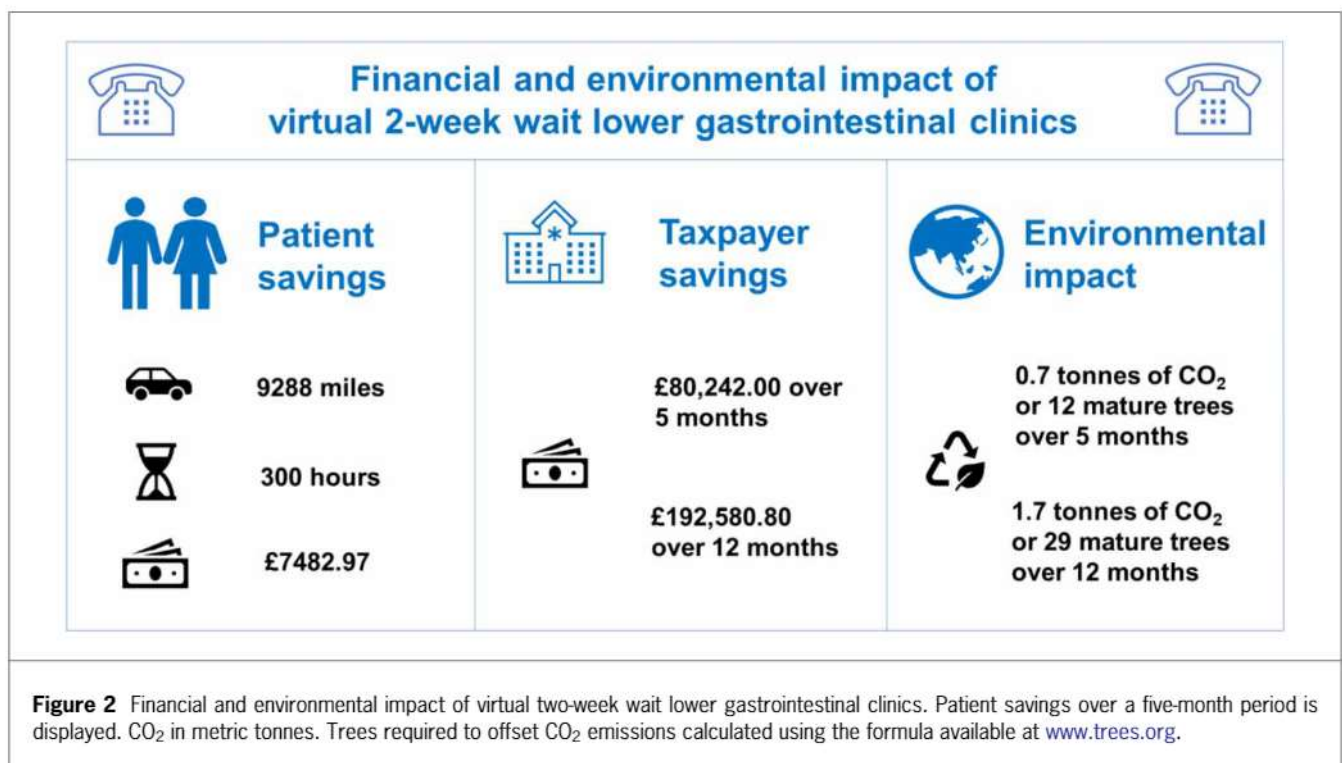
Our data showed that similar numbers of patients were assessed virtually using telephone consultations in 2020 and FtF in 2020. The demographics were comparable across the two samples. There was a significant reduction in the median time to first appointment, index investigation and diagnosis following VCs (Table 3). These findings may be partly attributable to more outpatient capacity from a net reduction of patients assessed and treated for benign conditions, across different specialties during the pandemic. VC appointments may increase the likelihood of reaching patients after a prior non-attendance. A significantly higher proportion of patients who had been unreachable at a prior appointment were reached at a subsequent telephone appointment (Table 2). Research has previously demonstrated lower non-attendance rates among patients assessed using VC appointments.²⁷ There was also a slight increase in the number of patients receiving a LGI

endoscopy as the index investigation. Perhaps the most significant limitation of VCs was the inability to perform a clinical examination, especially a rectal examination. This could have led to an increase in the use of LGI endoscopy.

The cancer detection rates across the two samples were similar. There was no significant difference in the proportion of patients receiving curative treatment and the median time to treatment, following a CRC diagnosis in the VC and FtF groups; this despite decreased flexibility in the use of operating lists due to preoperative isolation and testing during the pandemic. Furthermore, a significantly higher proportion of patients in the VC group met the national target for an outpatient appointment within two weeks. No formal patient or clinician complaints were received in relation to VCs during the five-month period evaluated. These findings are a testament to the safety and efficacy of virtual 2-wk LGI clinics. Most research evaluating the safety and efficacy of VCs had been conducted before the pandemic. Several found that telephone VCs were a safe and efficient means of following up patients after CRC surgery.^{11–14} However, recent studies have also highlighted the benefits, safety and efficacy of VCs in colorectal surgery^{16,17,28} and other specialties during the pandemic.^{7,18,29}

Patients can save time and money from VC appointments. Not having to visit hospital led to hundreds of hours in saved travel time and thousands of pounds for patients in our VC appointment cohort. The lower organisational costs associated with VCs led to tens of thousands of pounds in savings for taxpayers. Furthermore, there were environmental benefits from reduced CO₂ emissions. Such findings have been echoed by several studies.^{7–9} Sellars *et al* reported savings of 148 hours of travel time and £1,767 among 50 patients assessed using virtual colorectal surgery clinics.⁹ A systematic review by Edison *et al* of 18 studies demonstrated that virtual urology clinics led to a 0.7 to 4.35 metric tonne reduction in CO₂ emissions.³⁰ These studies as well as our findings highlight the tangible financial and environmental benefits of VCs for patients, healthcare providers and the wider public. They might encourage other specialties routinely assessing patients initially using FtF outpatient clinic appointments to explore the feasibility of VCs in their departments.

Even though our study did not directly evaluate patient or clinician perceptions of VCs, several studies have reported positive feedback from patients.^{10,16–18} However, there are concerns that VCs could lead to healthcare inequalities and barriers to access to healthcare for some patients. Patients with special needs and those who do not speak English as their first language could be at risk. Patients in lower socio-economic groups and rural communities with limited access to novel technologies could lose out. Clinicians should be concerned about barriers to effective communication, loss of non-verbal communication cues and changes to the conventional doctor–patient relationship due to VCs. Nevertheless, adverse events associated with VCs were rare.^{7,8} An alternative to FtF or VC assessment is ‘straight-to-test’ in



patients with suspected LGI cancer. The latter alongside FIT testing is a highly sensitive triage criterion for ruling out CRC and need for LGI investigations. However, clinicians remain hesitant given concerns over accuracy of referral information, range of symptoms and consent for invasive investigations. Therefore, 2-ww LGI clinic appointments continue to be scheduled in NHS hospitals around the UK, and VC appointments such as those implemented in this study could serve as an adjunct to 'straight-to-test' patient referral pathways and overcome latter concerns. Clinicians have previously raised concerns regarding the medicolegal ramifications surrounding VCs.⁵¹ The telemedicine industry is not specifically regulated in the UK.⁵² However, the General Medical Council, which is the regulatory body for clinicians in the country, sets out certain guidance for clinicians utilising these technologies;⁵³ clinicians should ensure that the same standards of good practice are followed as in the FtF setting; where this is not possible alternative arrangements must be sought and the most suitable modality for the patient agreed with them. There are also significant international variations in telemedicine practices and their regulation. The World Health Organisation highlights the need for better governance and strategy in telemedicine.⁵⁴ They supported the implementation of telemedicine during the COVID-19 pandemic.⁵⁵ Several ethical concerns related to telemedicine and remote consultations have also been raised. These relate to the impact on the doctor-patient relationship, informed consent and data protection and security.⁵⁶ However, the impact on patients is unclear,

with significant inter-patient and inter-clinician variations in opinion. More research is needed to evaluate the complexities surrounding the medicolegal aspects of virtual consultations and are beyond the scope of this study.

Limitations

Some patients had to be excluded from the original dataset due to incomplete data. Patients referred to 2-ww LGI clinics who were not assessed at any clinic appointment, for example those who DNA multiple appointments, could not be identified using this dataset. Therefore, a precise DNA rate could not be determined. There were several assumptions made during the financial and environmental impact analyses. However, the modelling was performed using previously published methods. The financial benefit analysis was limited to travel and parking savings for patients, and cost of clinic to the organisation. The study was conducted during the COVID-19 pandemic. The latter was a significant confounder given its impact on capacity for service delivery and disruptive organisational changes in the hospital. Therefore, the findings of this study must be generalised with caution post-pandemic. There were also several strengths. The sample size was relatively large, and the demographics were similar across the two groups. We were also the first to report an association with 2-ww virtual LGI consultations and improved local compliance with national cancer WTT, and their financial and environmental benefits to patients and the wider public.

Conclusion

VCs utilising telephone consultations facilitated the safe and uninterrupted provision of 2-ww index LGI clinic assessments for patients referred during the COVID-19 pandemic to this organisation. Amid confounders, VCs were associated with significant reductions in waiting time for appointments, investigations, diagnosis and a substantial increase in the proportions of patients meeting the national cancer WTT. Furthermore, there was no significant difference in the cancer detection rate or waiting time to CRC treatment. There were also considerable environmental and financial benefits attributable to VCs. Research has consistently demonstrated the benefits of VCs across various specialties. It is highly likely that VCs will continue to dominate the outpatient healthcare landscape in the future given changes in the healthcare service consumer demographic to a more technologically savvy patient population.

Author contributions

KW led and designed this project. He performed the data analysis, literature review and wrote the manuscript. DS, PW, PO, AM and CD were instrumental in patient identification and data collection. MIA, HF, JF, NL, PM, TP and SR provided expert opinion, assisted with data interpretation, reviewing and editing the manuscript. KB was the senior author for this project. She provided overall leadership, guidance and supervision for this project. She oversaw and provided valuable input during all stages of the project.

Ethical approval

This audit was registered and approved by the clinical governance team at the South Warwickshire NHS Foundation Trust (ID: 2215). Research ethics committee approval was not required for this audit, and this was confirmed using the UK Health Research Authority 'Is my study research?' online decision tool (<http://www.hra-decisiontools.org.uk/research>).

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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