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Evaluating the impact of an enhanced triage process on the performance and diagnostic yield of oesophageal physiology studies post COVID-19

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ABSTRACT

Objectives The COVID-19 pandemic significantly impacted on the provision of oesophageal physiology investigations. During the recovery phase, triaging tools were empirically recommended by national bodies for prioritisation of referrals amidst rising waiting lists and reduced capacity. We evaluated the performance of an enhanced triage process (ETP) consisting of telephone triage combined with the hierarchical 'traffic light system' recommended in the UK for prioritising oesophageal physiology referrals.

Design In a cross-sectional study of patients referred for oesophageal physiology studies at a tertiary centre, data were compared between patients who underwent oesophageal physiology studies 6 months prior to the COVID-19 pandemic and those who were investigated within 6 months after service resumption with implementation of the ETP.

Outcome measures Adjusted time from referral to investigation; non-attendance rates; the detection of Chicago Classification (CC) oesophageal motility disorders on oesophageal manometry and severity of acid reflux on 24 hours pH/impedance monitoring.

Results Following service resumption, the ETP reduced non-attendance rates from 9.1% to 2.8% (p=0.021). Use of the 'traffic light system' identified a higher proportion of patients with CC oesophageal motility disorders in the 'amber' and 'red' triage categories, compared with the 'green' category (p=0.011). ETP also reduced the time to test for those who were subsequently found to have a major CC oesophageal motility diagnosis compared with those with minor CC disorders and normal motility (p=0.004). The ETP did not affect the yield or timing of acid reflux studies.

Conclusion ETPs can effectively prioritise patients with oesophageal motility disorders and may therefore have a role beyond the current pandemic.

Summary box

What is already known about this subject?

- Oesophageal high-resolution manometry is the gold-standard investigation for the diagnosis of major oesophageal motility disorders, such as achalasia, and has an important role in guiding therapy.
- During the ongoing COVID-19 pandemic, infection control procedures have led to reduced capacity and rising waiting lists, prompting empirical triage to prioritise oesophageal physiology investigations.

What are the new findings?

- Attendance rates for oesophageal physiology studies improved after the implementation of an enhanced triage including telephone consultation with a physiologist.
- The Association of GI Physiologists (AGIP) 'traffic light' triage system used during a teleconsultation was able to prioritise and expedite the diagnoses of major Chicago Classification oesophageal motility disorders.

How might it impact on clinical practice in the foreseeable future?

- These data support ongoing use of the AGIP triage hierarchy to prioritise the waiting lists for oesophageal physiology studies during the recovery post COVID-19.
- Enhanced triage processes may have a role in improving attendance rates beyond the current pandemic and across areas in gastroenterology and this should be investigated in future studies.

INTRODUCTION

The COVID-19 outbreak, and subsequent government restrictions, saw many outpatient and 'non-essential' healthcare services come grinding to a halt due to pooling of resources in 'essential' areas and the risk of 'aerosol-generating procedures' (AGPs) spreading in underequipped outpatient settings.[1] Oesophageal physiology procedures which require intubation of the upper gastrointestinal tract are considered AGPs due to their potential to evoke production and release of respiratory secretions in the form of aerosols.[2 3] Also given that gastrointestinal physiology studies are elective, they could not be carried out during the initial periods of lockdown restrictions

and in most centres, this saw a break in service for up to 6 months.

The resumption of oesophageal physiology tests, including high-resolution oesophageal manometry and 24 hours pH/impedance studies, were further restricted by the need to put in place appropriate infection control procedures for AGPs as recommended by several international bodies, including the British Society of Gastroenterology, which have further affected capacity[4–6] and in line with National Health Service policies.

Although considered elective, high-resolution oesophageal manometry is the gold-standard investigation for diagnosing motility disorders of the oesophagus, such as achalasia.[7] These manometry findings are classified according to the Chicago Classification (CC) of oesophageal motility disorders and can help tailor treatment[8] and guide the management of symptoms.[9] Patients suffering from motility disorders typically experience severe dysphagia to solids and liquids, regurgitation, choking and significant chest pain when eating.[10] This in turn can lead to malnutrition, risk of aspiration and significantly diminished quality of life.[11 12] Without a diagnosis, appropriate management is more difficult to achieve, which in turn can lead to negative clinical consequences.[11] To a lesser extent, the same can be said for 24 hours oesophageal pH/impedance testing. Features of pathological reflux can include debilitating symptoms such as dysphagia, severe heartburn, chest pain, chronic cough and Barrett's oesophagus.[13 14] Again, quality of life is often severely affected as patients have disrupted sleep, a restricted diet and discomfort.[15]

During the pandemic, there was a resultant rapid increase in the waiting lists for procedures,[16] highlighting the need to accurately and efficiently prioritise waiting lists and ensure that patients most likely to have a major oesophageal motility disorder are investigated first. For this reason, the Association of GI Physiologists (AGIP) council empirically devised a 'triaging hierarchy' to help centres prioritise the patients referred for oesophageal physiology studies according to the patient's symptoms and clinical background (table 1).[17] This hierarchy is designed as a 'traffic light' system which categorises referrals in terms of urgency with 'red' being the most clinically urgent and 'green' being the least. Using this system allows patients with dysphagia to be prioritised over other referrals, because severe dysphagia can quickly lead to nutritional compromise.[11] Moderate-to-intermediate dysphagia, secondary to reflux symptoms, would then fall into the amber category, whereas reflux symptoms in isolation remain in the green category.[17]

While similar empirical recommendations for resumption of motility labs have been published worldwide,[18–21] there are no published data on their impact on waiting

Table 1 AGIP triage hierarchy for oesophageal physiology study referrals

Group	Presenting symptoms	Physiological test
Red Patients in whom delayed investigation could have unfavourable clinical consequences	Suspected primary dysmotility, for example, achalasia	HR oesophageal manometry
Amber Patients who may be considered for surgical interventions and so should be prioritised for physiology studies	Symptom recurrence following treatment of a known major motility disorder, for example, symptoms post achalasia therapy	HR oesophageal manometry
	Suspected dysmotility in patients with known systemic disease, for example, scleroderma	HR oesophageal manometry±24 hours pH/impedance studies (if there are reflux symptoms and manometry is unremarkable)
	Combined reflux with moderate/intermittent dysphagia	HR oesophageal manometry±24 hours pH/impedance studies (unless there is an obstruction or other explanation from manometry)
Green Patients whose symptoms indicate that investigation can be delayed until normal practice has resumed	Reflux symptoms—patient is fit for/seeking antireflux surgery	HR oesophageal manometry+24 hours pH/impedance studies
	Refractory confirmed reflux—patient is fit for/seeking antireflux surgery	HR oesophageal manometry+24 hours pH/impedance studies (on PPI)
	Atypical reflux symptoms	HR oesophageal manometry+24 hours pH/impedance studies
	Rumination syndrome, supragastric belching or other suspected functional disorder	Postprandial HR oesophageal manometry+24 hours pH/impedance studies

The traffic light colour scheme indicates clinical priority with red being the most urgent.[17]
HR, high resolution; PPI, proton pump inhibitor.

lists and efficacy in prioritising patients with significant oesophageal motility disorders.

Following a 6-month closure of the oesophageal physiology laboratory at the initial onset of the COVID-19 pandemic (between March 18 2020 and September 28 2020), an enhanced triage process (ETP) was implemented at a tertiary neurogastroenterology unit at Wythenshawe Hospital, Manchester, UK, on resumption of services.

In this context, we evaluated the performance of an ETP incorporating the AGIP hierarchical traffic light system[17] in prioritising the diagnosis of oesophageal motility disorders.

Objectives

1. To assess the efficacy of a telephone triage system in prioritising the waiting list for oesophageal motility disorders and reducing non-attendance.
2. To compare the diagnostic yield of oesophageal high-resolution manometry before and after ETP implementation.
3. To compare the diagnostic yield of oesophageal 24 hours pH impedance for pathological reflux before and after ETP implementation.

METHODS

Enhanced triage process

The ETP involved a telephone consultation with a trained gastrointestinal physiologist for all patients on the waiting list for oesophageal physiology investigations. This consultation included a detailed clinical assessment of each patient reviewing their current symptoms, prior to offering an appointment. During this call, the physiologist explained the nature of the test and guided the patient through discussions regarding to pros and cons of proceeding with the proposed investigation and response to current treatment in controlling their symptoms. With this information, the physiologist then assigned the referral a colour according to the AGIP triaging traffic light system (table 1).[17] When appointment dates were subsequently allocated, they were done so by prioritising the referrals according to their triage colour: red, amber or green.

Oesophageal physiology studies

The equipment and software used to perform and analyse the oesophageal physiology studies was the same both before and after implementation of the ETP. Oesophageal high-resolution manometry was conducted using a solar GI water perfused manometry system (Laborie, The Netherlands) with a 24-channel catheter (Medical Measurement Systems, Canada). The findings were interpreted according to the CC V.3 for oesophageal motility disorders.[8] Twenty-four hours pH/impedance studies were performed using an Ohmega system (Laborie, The Netherlands). Catheters had 1 pH sensor and six impedance channels (Medical Measurement Systems, Canada). Findings were reported using comparison to normative values set out by Zerbib *et al*.[22]

During the halt in service, all clinic rooms used for oesophageal physiology studies were fitted with Manrose 9 inch window extractor fans (Reading, UK) which increased the air changes per hour (ACH) in the treatment room to 21. This adhered to Public Health England guidelines relating to AGPs which recommend a minimum of 6 ACH for AGPs.[23]

For all studies performed after implementation of the ETP, that is, after the COVID-19 outbreak, the extractor fans were in operation at 1250 rotations per minute for the entirety of the procedure to allow for the safe ventilation and extraction of any aerosol particles generated during the test. Level 2 personal protective equipment (PPE) was worn by all staff present during the procedure in accordance with AGIP council recommendations.[4] After the study was performed, the room was vacated for 20 min (calculated based on room cubic size and fan extraction rate) while the extractor fan continued to run. This allowed for any aerosol particles that had been generated during the procedure to either be extracted or settle prior to cleaning the room. After 20 min had passed, the room was re-entered and subsequently cleaned in accordance with local infection prevention guidelines.

Inclusion criteria

Patients who fulfilled the inclusion criteria below were included in this study:

- All patients who had an appointment for oesophageal physiology studies in the 6 months before the pandemic (September 15 2019 and March 18 2020). Patients were included whether they attended or not, and all patients who declined an appointment during this period were also included
- All patients who had an appointment for telephone triage and/or oesophageal physiology studies in the 6 months post resumption of oesophageal physiology services after implementation of the ETP (from September 29 2020 to March 28 2021). Patients who declined appointments following telephone triage and those who did not attend their investigations were also included.
- For outcomes using diagnostic yield, all patients who successfully completed oesophageal physiology investigations (oesophageal manometry±24 hours oesophageal pH and impedance studies) during the 6 months before and 6 months after service resumption post COVID-19 were included.

Data collection

Data were extracted retrospectively from prospectively maintained records within the neurogastroenterology department.

The data extracted were: date of referral; indication on referral; referring clinician urgency; appointment date; attendance; completion of test; CC classification; severity of gastro-oesophageal reflux and pathological diagnosis.

Additionally for those post ETP: AGIP triage colour; reason for declining appointment.

Statistical analyses

Data were managed in Microsoft Excel with all statistical analysis being performed using R V.3.6.3 (R Foundation for Statistical Computing, Vienna, Austria). P<0.05 was considered significant for all tests. The comparison of attendance rates and declination rates were compared using a Fisher exact test.

The adjusted time to test was calculated as the number of days between the date on which the referral was received and the date on which the patient attended their appointment. For all referrals received between March 18 2020 and September 29 2020, when service was halted, this was calculated as the days between the date on which service resumed in the department (September 29 2020) and the date on which the patient attended their appointment. If a referral was received on or after September 29 2020, then it was calculated from the date of referral. To test whether there was a change in the time taken to see patients across the two groups by resultant finding, a two-way analysis of variance (ANOVA) was used on adjusted time to test, by group and finding, with interaction. The test was considered significant if the interaction term was significant. Sensitivity analyses were performed for the waiting times.

The yield of oesophageal high-resolution manometry for major and minor CC oesophageal motility disorders and the yield of 24 hours oesophageal pH impedance findings were compared using a Kruskal-Wallis H test and Fisher exact test (where appropriate). Similarly, the rates of major, minor and normal CC oesophageal manometry findings in each AGIP triage group were compared using a Jonckheere-Terpstra (JT) test.

Risk of bias

The data were collected retrospectively from prospectively maintained health records with low risk of assessment bias. To minimise the slight risk of bias due to the longer run-in time between when patients were referred pre-COVID-19 sensitivity analyses were performed (as described above).

RESULTS

Participants

A total of 385 patients met the inclusion criteria, of which 234 successfully completed their oesophageal physiology investigation (table 2). The demographic data of those who completed oesophageal physiology investigations are shown in table 3.

Outcomes of teleconsultation with the gastrointestinal physiologist

After the implementation of the ETP, there was a higher rate of patients declining their investigation during the pandemic (16/209 (7.7%) to 50/176 (28.4%), (p<0.001), table 2) and these patients were subsequently removed from the waiting list, most commonly due to resolution of symptoms (16/50, 32%), other intercurrent health issues (10/50, 20%) and a smaller number had been already investigated elsewhere (8/50, 16%), while 6/50 (12%) declined due to their apprehensions about COVID-19.

Table 2 The outcomes of appointments and completed oesophageal physiology investigations 6 months before the COVID-19 pandemic and 6 months after resumption with enhanced triage processes (ETPs)

	Pre ETP N=209	Post ETP N=176
Attended, had test	135 (64.6%)	99 (56.2%)
Attended, unable to tolerate	39 (18.7%)	22 (12.5%)
Opted not to proceed	16 (7.7%)	50 (28.4%)*
Did not attend	19 (9.1%)	5 (2.8%)

*p<0.001

The proportion of patients who did not attend their oesophageal physiology appointments was reduced post implementation of ETP (19/209 (9.1%) to 5/176 (2.8%), p=0.021, table 2).

After excluding patients who could not tolerate their procedures, data were compared between 135 patients who were investigated before the pandemic and 99 patients who were investigated post service resumption and ETP implementation (table 3).

Efficacy of ETP in expediting diagnoses of oesophageal motility disorders

Following implementation of the ETP, those with both minor and major CC oesophageal motility disorders were seen quicker than those whose findings were reported as normal ($F_{2,225}$=5.67, p=0.004) (figure 1), whereas pre ETP, there was very little difference in the number of days it took to receive the test between the CC diagnostic groups. This relationship remained statistically significant on sensitivity analyses after removing all outliers ($F_{2,207}$=14.63, p<0.001) and patients who were not seen within 6 months ($F_{2,223}$=4.922, p=0.008).

Yield of oesophageal manometry findings and performance of AGIP triage tool

While there were no overall differences in the rates of CC motility disorders detected pre and post COVID-19 (x_1^2 = 0.751, p=0.386, table 3), there was a trend towards an increase in the detection of achalasia variants post pandemic (6/132 (4.5%) vs 12/99 (12.1%), p=0.065).

The AGIP traffic light triage system was effectively able to select patients with CC oesophageal motility disorders where significantly fewer patients in the 'green' group had a CC motility disorder (JT=8828, p=0.011) (table 3; figure 2).

Incidentally, there was no observed relationship between the referring clinician-specified urgency ('urgent' and 'routine') and the likelihood of detecting a CC motility disorder (x_1^2 = 0.0190, p=0.890, table 3.

Table 3 Summary of patient indications, triage outcomes and the diagnostic yield of oesophageal physiology investigations before and after COVID-19 and implementation of enhanced triage processes (ETPs)

				AGIP traffic light code post COVID-19/ETP		
		Pre ETP N=135	Post ETP N=99	Red N=29	Amber N=13	Green N=57
Age	Mean (SD)	50.9 (15.04)	49.5 (16.56)	49.3 (20.50)	49.3 (15.54)	49.5 (14.76)
Gender	Female	76 (56.3%)	71 (71.7%)	22 (75.9%)	10 (76.9%)	39 (68.4%)
	Male	59 (43.7%)	28 (28.3%)	7 (24.1%)	3 (23.1%)	18 (31.6%)
Referring clinician priority	Routine	115 (85.2%)	78 (78.8%)	24 (82.8%)	8 (61.5%)	46 (80.7%)
	Urgent	20 (14.8%)	21 (21.2%)	5 (17.2%)	5 (38.5%)	11 (19.3%)
Swallowing and reflux indications	Both	35 (25.9%)	16 (16.2%)	3 (10.3%)	9 (69.2%)	4 (7%)
	Swallowing only	23 (17.0%)	31 (31.3%)	26 (89.7%)	4 (30.8%)	1 (1.8%)
	Reflux only	76 (56.3%)	52 (52.5%)	0	0	52 (91.2%)
	Neither	1 (0.7%)	0	0	0	0
CC oesophageal motility diagnosis	Major	12 (8.9%)	17 (17.2%)	10 (34.5%)	5 (38.5%)	2 (3.5%)
	Minor	53 (39.3%)	34 (34.3%)	8 (27.6%)	2 (15.4%)	24 (42.1%)
	Normal	67 (49.6%)	48 (48.5%)	11 (37.9%)	6 (46.2%)	31 (54.4%)
	Not done	3 (2.2%)	0	0	0	0
Acid reflux finding on 24 hours oesophageal pH/impedance	Severe	18 (13.3%)	12 (12.1%)	1 (3.4%)	3 (23.1%)	8 (14%)
	Moderate	9 (6.7%)	4 (4.0%)	1 (3.4%)	1 (7.7%)	2 (3.5%)
	Mild	18 (13.3%)	9 (9.1%)	1 (3.4%)	0	8 (14.0%)
	Normal	67 (49.6%)	38 (38.4%)	6 (20.7%)	5 (38.5%)	27 (47.4%)
	Not done	23 (17.0%)	36 (36.4%)	20 (69.0%)	4 (30.8%)	12 (21.1%)
AGIP traffic light code	Red		29 (29.3%)			
	Amber		13 (13.1%)			
	Green		57 (57.6%)			

AGIP, Association of GI Physiologists; CC, Chicago Classification.

The yield of oesophageal reflux studies post ETPs

Most patients who underwent oesophageal high-resolution manometry underwent oesophageal 24 hours pH/impedance testing (table 3). As expected, based on the lower priority for studies with reflux indications according to the AGIP triage tool, there was no significant difference in the findings of pathological reflux in those investigated before and after the pandemic ($x_1^2 = 0.0066$, p=0.935) (table 3).

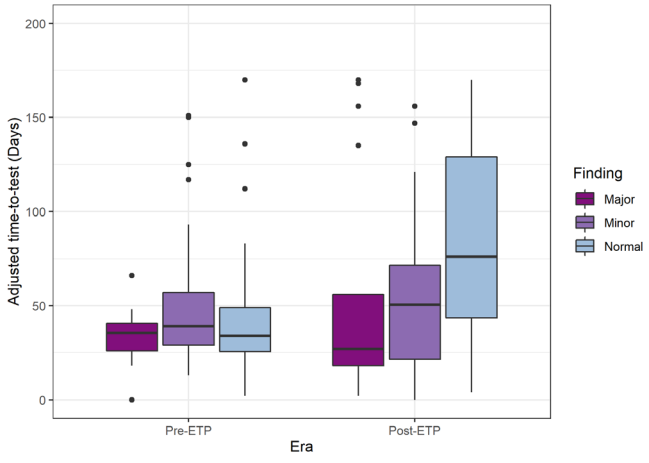

Figure 1 Comparison of the number of days to test for patients with major, minor and normal oesophageal motility (according to Chicago Classification V.3) before the pandemic and after implementation of the enhanced triage process (ETP).

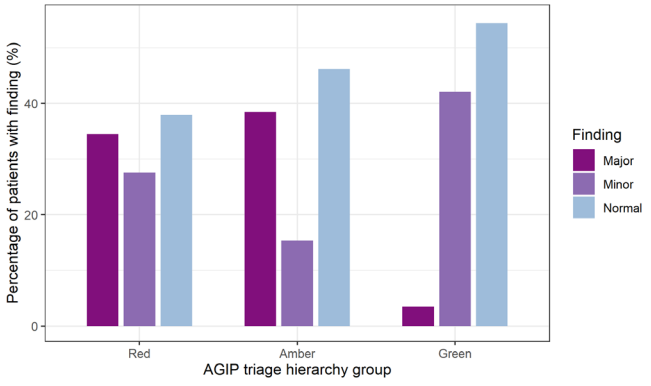

Figure 2 The diagnostic yield of oesophageal high-resolution manometry for Chicago Classification (V.3.0) oesophageal motility disorders according to Association of GI Physiologists (AGIP) triage hierarchy group—there was a significantly lower yield in the 'green' category (p=0.011).

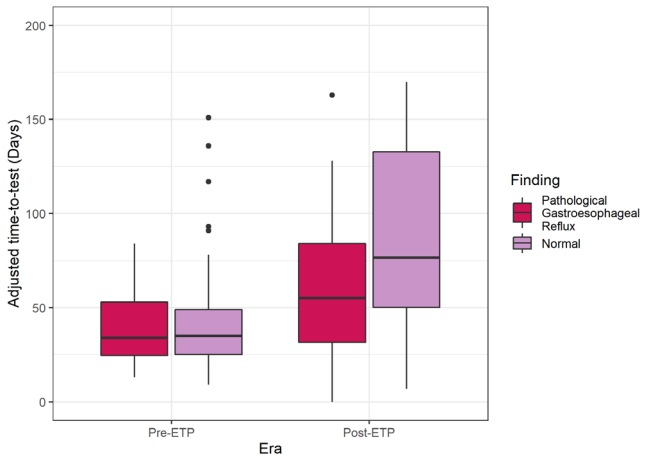

Figure 3 Comparison of the number of days patients with pathological and normal gastro-oesophageal reflux findings had to wait to be seen for 24 hours pH/impedance studies both before and after implementation of the enhanced triage process (ETP).

There was also no significant difference in the number of days to test between those with normal and abnormal acid reflux studies ($F_{1,151}$=2.552, p=0.112, figure 3).

DISCUSSION

The capacity for oesophageal physiology investigations following the COVID-19 pandemic is likely to be affected for the foreseeable future due to the aerosol-generating potential of these procedures and the requirements for stringent infection control measures. Consequently, longer than usual waiting lists for oesophageal physiology investigations are almost inevitably going to be a feature during the ongoing recovery phase of the pandemic in most gastrointestinal physiology laboratories. In this context, our study has demonstrated for the first time that an ETP using the AGIP traffic light system is effectively able to prioritise patients with CC oesophageal motility disorders and expedite their diagnoses. These findings have important clinical implications.

COVID-19 has brought into focus the need to optimise utilisation of finite healthcare resources within gastroenterology. These data certainly suggest that more judicious referrals for these investigations are required, with approximately half of the oesophageal manometry studies requested coming back normal. These data using ETPs highlight that the indications for these normal studies were often weak. Using the AGIP triaging hierarchy system, there were significantly fewer CC motility disorders in those within the 'green' triage group compared with the red and amber groups. This meant that patients who were considered a 'lower priority' according to the triage system and waited longer to be seen were found to be far less likely to have a motility disorder which required urgent management. Interestingly, the performance of the AGIP traffic light system in prioritising those with a CC oesophageal motility disorder was in contrast to the urgency of referral from the referring clinician. Clinician-specified urgency of referral had no relationship to the diagnostic yield. This therefore suggests an urgent training need for clinician referrers as to what constitutes an urgent referral for oesophageal physiology studies during the current pandemic constraints and highlights that the AGIP triage tool could routinely be adopted in the routine clinic setting to determine the urgency of referral rather than current referral practices which lack uniformity.

Our data using the AGIP triage hierarchy have also demonstrated that those with oesophageal motility disorders were seen quicker than those whose findings were normal. Before the pandemic, there was very little difference in waiting times between those who were found to have normal motility compared with those with a CC motility disorder; however, there were not the same levels of pressure on the service prior to COVID-19 and overall waiting times were much shorter. These data are therefore good evidence to support the use of the AGIP triage system during the recovery period, as commencing treatment quickly for major disorders, such as achalasia, is vital in ensuring that patients do not become malnourished or risk aspiration.[24 25] Unsurprisingly, by contrast, given that the AGIP triaging hierarchy gives a lower clinical priority to patients with reflux indications, there was no difference in the diagnostic yield of reflux studies pre and post ETP.

Our data on outcomes from telephone triage by a gastrointestinal physiologist also suggested that this intervention significantly reduced non-attendance rates for procedures. Potential explanations for this finding include the consultation being important in identifying patients who did not want or necessarily need the test prior to them being sent an appointment. The positive impact of the telephone contact is supported by the inverse relationship between reduction in non-attendances and the increase in patients who opted not to proceed after their ETP phone call. This is an important finding due to the pressures and costs of non-attendances within already overstretched healthcare services.[26 27] The most frequent reason why patients declined an appointment after the ETP was because of a resolution in symptoms. This is unsurprising, as conservative management of gastro-oesophageal reflux involving lifestyle modification and the correct use of proton pump inhibitors (PPIs) are often successful at managing symptoms in the majority of cases[28 29] and only 30% of refractory patients may require invasive intervention.[30] Several studies have outlined the importance of PPI compliance in gastro-oesophageal reflux.[31 32] The halt in service left some patients with no other option but to persevere with conservative management in the absence of further physiological testing, which may in turn have contributed to improved symptom control to the extent that oesophageal physiology tests were no longer required by the time the service resumed.

Interestingly, there is a suggestion from our data that the hiatus in oesophageal physiology testing during the

COVID-19 pandemic may have provided a unique insight into the natural history of these disorders. As discussed above, a number of patients no longer required their investigations when the service resumed due to symptom resolution. Moreover, as shown in table 3, on service resumption, the proportion of patients with a major oesophageal motility disorder almost doubled (8.9%–17.2%) in the 6 months after the pandemic, with a 167% increase in detection of achalasia variants after implementation of the ETP. One explanation for this observation could be due to the progressive nature of major motility disorders.[33–35] It is possible that those patients diagnosed with achalasia variants after the resumption of service may not have met the diagnostic criteria if their test had not been delayed due to COVID-19. The 6-month halt in service may have been enough time for primary motility disorders to develop into achalasia which, in turn, may have increased the rate of achalasia findings in the post-ETP group. An alternative explanation is that the number of patients with oesophageal motility disorders may have remained unchanged in the population over time, but due to the halt of service for 6 months, we may have seen 12-months worth of major motility diagnoses within a 6-month period on service resumption and implementation of ETP to prioritise these cases. This trend mirrors the increase in per procedure diagnostic rates in endoscopy services in the UK during the COVID-19 pandemic following introduction of enhanced vetting procedures.[36] These findings therefore highlight the importance of continuing to triage referrals effectively within wider gastroenterology services to ensure that patients with potentially significant diagnoses are prioritised to allow appropriate and timely management and avoid further delays.

While our data suggest that a form of telephone contact within the service may have an important role in identifying up to a third of patients who no longer need investigation and improving attendance rates, the future of combining the AGIP hierarchical approach and telephone triage with a trained physiologist is less clear. Telephone triage by the gastrointestinal physiologist is relatively time and resource intensive and its longer-term utility should be evaluated in future studies during later stages of the pandemic recovery. For example, we cannot eliminate that the relative risks of COVID-19 at the time of service resumption may have influenced patients choices as to whether or not to proceed with their investigations at the time and this should therefore be revisited in future studies.

CONCLUSION

Our findings have shown that ETPs can prioritise and expedite the diagnosis of major oesophageal motility disorders and can reduce non-attendance rates for oesophageal physiology investigations. ETPs may therefore have a role in future practice within gastroenterology services beyond the pandemic.

Contributors RD was involved in the study design, literature review and data collection and drafted the paper. SB analysed and performed statistical analyses and helped write the paper. JD, SAgwaonye, MH, JW and SArchbold helped with data collection and reviewed the paper. DHV conceived the study, helped with data interpretation and helped write the paper. DHV is the author guarantor responsible for the overall content.

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