# Ultrasound use to assess Crohn's Disease in the UK: a survey of British Society of Gastroenterology Inflammatory bowel disease group members.

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**Conflict of interest:**

- SJR,- nil to declare
- GWM is in receipt of research funding from Janssen, Arla foods and Astra Zeneca. Dr Moran is a consultant for Alimentiv.
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Table 1: Comparison of imaging modalities when assessing small bowel Crohn's Disease

**Number of Figures: 2**

Figure 1: Distribution of NHS centres in the UK who responded to the BSG survey on the use of ultrasound.

Figure 2: Confidence in clinical decision making when using ultrasound and MRE assessment.

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***Author Contributions**:*

*SJR- Survey Design, Data analysis, whole study write up.*
*SAT- Survey Design, Whole manuscript review*
*GWM- Survey Design, Survey distribution, Whole Manuscript review.*

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**Abstract:**

**Background**

Data from the METRIC trial (PMID:29914843) has shown that small bowel ultrasound has very good diagnostic accuracy for disease extent, presence and activity in Crohn's Disease (CD), is well tolerated by patients and is cheaper when compared to MRI. However, Uptake of ultrasound in the UK is limited

**Methods**

We designed and conducted an online survey to assess the current usage of ultrasound throughout the UK. The survey was undertaken by BSG IBD group members between 9 June 2021 - 25 June 2021. Responses were anonymous, respondents were able to skip questions.

**Results**

103 responses were included in the data analysis Responses came from 14 different regions of the UK, from 66 individual NHS trusts. 103 respondents reported that they currently have an MRI service for Crohn's disease, where only 31 had an ultrasound service. Numbers of MRIs per month was reported as an average of 15, with a range of 3-75. The average number of ultrasounds undertaken was reported as 8 per month, with a range of 0-50. Average time for results to be reported for MRI scans was reported as between 4-6 weeks, with a range of 2 days to 28 weeks. The average time for an ultrasound to be reported was stated as 1-4 weeks, with a range of 0-8 weeks. 26 respondents were 'extremely confident' when using MRI data to make clinical decisions, 5 were 'very confident' were somewhat confident and 3 were not so confident. Only 6 respondents stated they would be extremely confident in using ultrasound to make clinical decisions, 17 people stated they would be very confident, 20 were somewhat confident, 15 not so confident and 15 not at all confident. Of those respondents who did not have access to an ultrasound service, 72 stated that they would be interested in developing an ultrasound service.

**Conclusion**

There is an appetite for the uptake of ultrasound in the UK for assessment of CD, however there remains a significant number of UK centres with little or no access to an ultrasound service. There is a difference in the levels of confidence that clinicians have in using ultrasound as a diagnostic tool in the UK. Further research is necessary to understand why this is the case. Results from this survey will go on to inform our future work in developing an implementation package for ultrasound in the UK in the NHS

**Summary:**

1. *What is already known about this subject?*

ultrasound is used widely in central Europe and Canada. Despite ultrasound being a quicker, cheaper and more preferable test for patients, the uptake of ultrasound use in the UK is still limited. The METRIC study has shown that ultrasound has comparable sensitivity and specificity to MRE when detecting presence and extent of small bowel CD.

2. What are the new findings?

Nationally there are longer waiting times for MRE and ultrasounds assessments. Gastroenterologists report that they are more confident in using MRE reports to make clinical decisions than ultrasound reports, its is not yet clear why this is the case. The survey has shown that there are some centre in the UK that are using ultrasound as part of their IBD assessment, however there still remains many UK NHS centres who do not use ultrasound but have indicated that they would wish to in the future.

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

This survey is part of a programme of work being led by the NIHR Nottingham Biomedical Research Centre. This programme of work will investigate aspects of existing ultrasound =use in the UK, training needs of the IBD team, confidence in clinical decision making, of the IBD team using ultrasound, cost effectiveness of an ultrasound pathway in IBD care and stakeholder perceptions of the implementation of ultrasound in the NHS. Mixed methods data will be collected and used to create an implementation package to support the implementation of ultrasound nationally for the care of patients living with IBD.

**Introduction:**

Inflammatory Bowel Disease (IBD) refers to two conditions; Crohn's Disease (CD) and Ulcerative Colitis, typically characterised by chronic inflammation of the gastrointestinal tract. Disease distribution in CD varies with up to 70% of patients having small bowel involvement.[1]

The incidence and prevalence of CD in Europe ranges from 0.5 to 10.6 cases per 100,000 person-years, and from 1.522 to 21312 cases per 100,000 persons respetively.[2] In the United Kingdom (UK) it is estimated that there are 300,000 people affected by IBD, one of the highest world-wide.[3]

The mean cost per patient-year during follow-up has been reported as £2971 (median £602 [180–2948]) for patients with CD, with an overall annual cost to the National Health Service (NHS) of up to £470 million.[4] During the first five years following IBD diagnosis 50-75% of the budget is attributed to the use of biologic therapy.[4]

To ensure optimal long term clinical outcomes, current recommendations based on the Selecting Therapeutic targets in IBD (STRIDE-II[5]) suggest using objective measures as treatment targets, rather than symptom resolution. A wide array of biological therapies are employed in treating IBD and objectively assessing treatment response has significantly increased the projected IBD healthcare burden for the next decade.[6] To ensure cost-effective IBD practice, complex and expensive pharmacological interventions should be targeted at patients most likely to benefit.[7]

Cross sectional imaging is used to diagnose and monitor disease activity in small bowel CD (SBCD).[8] Magnetic Resonance Enterography (MRE) is often employed as a first modality in the UK for assessment and monitoring of SBCD.[8] Waiting times for an NHS MRE may be up to 4 weeks or in some instances longer, and have increased due to the impact of the Covid-19 pandemic. Radiological reporting is then undertaken at a later date and may also add to delays. There is still a clinical need to find quicker, more tolerable and cheaper alternatives for monitoring patients with IBD.

Small bowel (enteric) ultrasound is an alternative to MRE, and has the potential to significantly reduce waiting times, speed up clinical decision making and improve patient experience and outcomes.[9] ultrasound is widely used for assessing and monitoring IBD internationally, and the METRIC[10,11] trial has demonstrated its relative diagnostic accuracy in comparison to MRE.

The NIHR-funded METRIC trial is the largest comparative diagnostic accuracy trial of MRE and ultrasound in CD.[10] The study reported that sensitivity for detecting small bowel disease was 97% and 92% for MRE and ultrasound respectively. Specificity was 96% for MRE and 84% for ultrasound.[10] These findings were concordant in both new diagnosis and suspected relapse.[10,11]

NHS tariff reports from 2021/2022 detail the cost for a MRE procedure with intravenous contrast to be £162, with a reporting cost of £22. In comparison the cost of ultrasound is £51, inclusive of reporting, hence making it a less costly and potentially more cost-effective

alternative. There is a large clinical need to correctly identify responders and non-responders to therapy in a timely, cost effective and efficient manner,.[7,12] However ultrasound is not commonly used in the NHS, unlike in Central Europe and Canada.[13,14]. Many authors report this is likely down to lack of available training,[9,15–17] although questions over high interobserver variation and suboptimal accuracy have dogged ultrasound for many years. The actual barriers to adoption of ultrasound in the NHS UK are to date speculative, and remain largely unknown.

**Methods**:

We designed and conducted an online survey to assess the current usage of ultrasound throughout the UK (Table 1). The survey was undertaken by BSG IBD group members between 9 June 2021 - 25 June 2021. The BSG IBD group consists of Consultant and Trainee gastroenterologists with a special interest in IBD and IBD specialist Nurses. There are 1410 members of the BSG IBD group, The survey was sent to all members on the 9th and 22nd of June 2021, the survey was sent twice as the deadline for responses was extended by a week. Responses were anonymous, respondents were able to skip questions if they were unsure of the answers or if the question was not relevant to them (i.e. they do not currently use ultrasound). The survey was accessible via online link, no reminders were sent.

The questionnaire comprised of 14 questions. Questions were focused on the respondents experiences of MRE and ultrasound use in relation to the clinical IBD care they deliver. We asked respondents to report only on plain ultrasound examinations. We did not collect data regarding other forms of ultrasound examination such as elastography or doppler. We collected data relating to the regions of the UK where respondents work clinically, and their opinions about whether they would like to use ultrasound for monitoring of IBD in the future if they did not already do so.

**Results:**

There were 106 respondents, this is a response rate of 7.5%. there were 2 incomplete forms, these were removed, and one international respondent, was also removed given the UK focus of the survey. 103 responses were included in the data analysis.

Responses came from 14 different regions of the UK, from 66 individual NHS trusts. Figure 1 shows the distribution of the responding centers, showing those that currently use ultrasound, those that would like to in the future and those that do not.

103 respondents reported that they currently have an MRI service for Crohn's disease, where only 31 had access to ultrasound service. Of those respondents who did not have access to an ultrasound service, 72 stated that they would be interested in developing an ultrasound service.

55 of respondents reported that they always use MRI when clinically appropriate, 39 reported they 'usually' utilised MRI, 8 stated sometimes and 1 person stated that they never use MRI. 46 respondents reported that they never use ultrasound, 12 rarely use it, 22 sometimes with only 5 respondents usually using it, and 6 always using ultrasound.

The number of MRIs performed per month was reported as an average of 15, with a range of 3-75. The average number of ultrasounds undertaken was reported as 8 per month, with a range of 0-50. Average time from referral for results to be reported for MRI scans was reported as between 4-6 weeks, with a range of 2 days to 28 weeks. The average time for an ultrasound to be reported was stated as 1-4 weeks, with a range of 0-8 weeks.

30 respondents reported that they had access to both MRE and ultrasound. Not all respondents completed all sections of the survey questionnaire. 9 different sites were reported to have access to both MRE and ultrasound, with five of those being University hospitals Trusts, and four NHS Foundation trusts. 21 respondents did not complete which NHS trust they were currently employed by. 25 of respondents with access to both modalities submitted data relating to waiting times; in these centers the average waiting time from referral to report was reported as 4.6 weeks for MRE and 3.4 weeks for ultrasound.

26 respondents were 'extremely confident' when using MRI data to make clinical decisions, 5 were 'very confident' were somewhat confident and 3 were not so confident. Only 6 respondents stated they would be extremely confident in using ultrasound to make clinical decisions, 17 people stated they would be very confident, 20 were somewhat confident, 15 not so confident and 15 not at all confident (Figure 2)

**Discussion:**

MRE is the first line imaging modality used to accurately stage small bowel disease location, complexity and activity in newly diagnosed CD. [10,18] MRE is also most commonly used to measure disease response to biological therapies. However, once disease location and phenotype are established, in many patients, there is an equipoise between MRE and small bowel ultrasound in subsequent disease follow up and monitoring. SBUS has been shown to be equally accurate for evaluating enteric disease [30–35], cheaper, quicker, better tolerated and, most importantly, preferred by patients.[10,19–22] Despite this, US is not widely implemented for CD in the UK, for reasons we do not fully understand.

The treat-to-target paradigm present in IBD management guidelines is similar in other chronic diseases.[23–26] Management strategies in CD reflect a step-up paradigm, where patients clinical symptoms in conjunction with markers of inflammation tend to guide investigation or medical intervention.[27,28] Mucosal healing, defined by the absence of ulcerations, is recommended as the therapeutic goal in clinical practice.[5,8,29]

The equipment required is readily available in most hospitals. ultrasound could be a robust alternative to more invasive and expensive imaging techniques. Besides being quick, well tolerated, relatively inexpensive and readily available, ultrasound is reported and interpreted at the time of scanning and allows for early clinical decision-making in routine IBD care.[9,36] Importantly, the METRIC[10] study found no major difference between MRE and ultrasound in terms of therapeutic decision-making, indicating that the differences in accuracy between the two tests do not translate to differences in patient management. Both tests had a similar level of concordance compared to the reference standard in terms of therapeutic decisions (77% for MRE and 78% for ultrasound). This sub-study on decision-making, although well-

designed, was a paper-based exercise with small numbers; further evidence is required to ensure these results reflect real-world practice.

The results from the METRIC[21] study were used to underpin a cost-effectiveness analysis showing that ultrasound was more cost-effective than MRE in the management of suspected relapse; it was estimated that ultrasound saves the NHS an average of £299 per patient, with a negligible –0.0001 (–0.013 to 0.011) impact on QALYs. There is scarce empirical evidence presenting comprehensive data relating to cost or cost effectiveness of ultrasound.[9] In the METRIC study ultrasound was considered highly acceptable by patients when compared with MRE.[22] ultrasound is often seen as having limited clinical utility due to operator dependence.[36] However, every diagnostic technique, including endoscopy, has a degree of subjectivity and operator dependence and this criticism is perhaps more reflective of a previous lack of identifiable international performance and training standards.[36] The training needs for gastroenterologists are similar to those of radiologists as set out in the ECCO-ESGAR guidelines[12], this can be time consuming, even when supported by abdominal radiology specialists and in partnership with radiology departments.[9,16,36] There is no current literature relating to any other IBD healthcare worker undertaking ultrasound training.

**Conclusions:**

This survey was the first step in a project of further work to investigate patient or HCPs preferences for service delivery for imaging for assessment and monitoring imaging in IBD. ultrasound has been shown to be similar in accuracy to MRE in detecting presence SBCD. ultrasound is reported as quicker, more acceptable to patients and potentially safer when compared to MRE. ultrasound is used widely in central Europe, Canada and some parts of the USA, but has not been as widely embraced in the UK. It would seem prudent to investigate broader stakeholder perceptions of the use of ultrasound to better understand perceived or potential barriers and enablers to ultrasound implementation in the world-wide healthcare systems and recognise and manage preferences for future service delivery.

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