Patient Preference and Adherence

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ORIGINAL RESEARCH

The Acceptability of Diagnostic Tests in the United Kingdom

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Purpose: It is increasingly acknowledged that public acceptability should be considered when designing, evaluating, and implementing healthcare interventions; especially for vulnerable groups.

Patients and Methods: A voluntary, self-reported, anonymous questionnaire with ethical approval and patient and public involvement was distributed online through social media over a 6-month period to explore acceptability of diagnostic tests.

Results: Ninety-three individuals replied to the questionnaire, of which the majority were female (89.2%) heterosexual (92.4%) white (81.6%) and resided in England (94.6%). The most encountered diagnostic test was an X-ray (92.4%) and the least encountered test was a bone marrow biopsy with local anaesthetic (0%). A sputum sample test was the most perfectly acceptable investigation (83.8%). One percent of participants felt that the cervical smear test was perfectly acceptable With reference to hysteroscopy, 44% felt a hysteroscopy was perfectly acceptable under general anaesthesia, compared to no participants with local anaesthetic or sedation. Forty one percent of participants felt a diagnostic laparoscopy was perfectly acceptable.

Conclusion: The findings from this study provide insight into the acceptability of medical tests from a patient perspective and will inform a more explorative qualitative study to ensure researchers are aiming to produce tests that are sensitive, specific and importantly acceptable.

Plain Language Summary: The development of a medical test should always acknowledge the views of the public in terms of its acceptability. We conducted an online questionnaire-based study that explored the view of the public, in the United Kingdom (UK), regarding a series of non-invasive and invasive medical tests. Ninety-three individuals replied to the questionnaire and the majority were female (89.2%) and most resided in England (94.6%). The most encountered diagnostic test was an X-ray (92.4%) and the least encountered test was a bone marrow biopsy (test to remove soft tissue inside a bone through a needle) with local anaesthetic (0%). A sputum sample test was the most perfectly acceptable investigation (83.8%). Participants also explained that if the test was looking for cancer, or if the reason for the test was due to pain symptoms, then they were more likely to have the test. We will explore our findings further through our next study by interviewing participants and ensuring the patient and public voice is represented for the different medical tests.

Keywords: medical investigations, tolerability, patient centered, investigations

Introduction

When diagnosing pathologies, medical professionals have a multitude of tests available in their armory from minimally to extremely invasive. Whilst it is important to use such tests in clinical practice, there is limited existing literature on the acceptability of medical tests amongst individuals in the United Kingdom (UK). It is increasingly acknowledged that acceptability should be considered when designing, evaluating, and implementing healthcare interventions.[1,2] If a patient considers a test as "acceptable", then they are more likely to undergo it.[3] The Medical Research Council (MRC)[3] has set guidance on the various factors that should be considered when developing a medical intervention (MRC, 2008) with

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direction offered on how the concept of acceptability can be explored, both quantitatively and qualitatively.[4] In addition, the health technology evaluations guidance from the National Institute of Health and Care Excellence (NICE, 2023),[5] also makes it clear that patient acceptability must be considered in the development of medical tests. The term acceptability is broad in nature and encompasses treatment acceptability as well as social acceptability.[6,7] Previous literature has primarily focused on either the physical and psychological considerations towards medical test acceptability[8,9] or the overall patient satisfaction of a medical test.[10,11] The extant literature is useful in understanding patient acceptability, more structured and objective ways of assessing patient acceptability for medical tests needs to be explored. The concept of test acceptability is important as the patient is more likely to undergo the respective test and then be diagnosed with the condition of interest; therefore, improving clinical outcomes.[11]

Whilst guidance on what considerations researchers must explore when developing a medical test is available, there is still limited research involving patient views on acceptability,[12] with a call for further research advocated.[13] The overall objective of our study was to explore, amongst the public in the UK, the attitudes and acceptability of non-invasive and invasive medical tests for benign conditions; an area where there is currently a dearth of literature available.

Materials and Methods

Ethics

This online anonymous questionnaire was approved by the University of Liverpool's Institute of Life Course and Medical Sciences Research Ethics Committee (ref – 12171).

The Questionnaire

An initial review of pre-existing literature exploring the acceptability of medical tests amongst individual's was performed and informed our questionnaire design. A patient and public group at a local hospital in the East of England allowed us to pretest the initial survey to ensure language appropriateness and the best structure for questions before finalizing the survey (Supplementary File).

To enable a broad number of participants to participate in the study, the survey was advertised through the social media platform X (formally Twitter) and the local hospital through posters and word of mouth. Participation in the study was entirely voluntary and the study included all respondents over the age of eighteen years able to provide consent and residing in the UK. The questionnaire was available for completion from May 2023 to November 2023. The sample size was not pre-calculated.

The online questionnaire contained an initial written consent section, where the respondents declared their voluntary consent to take part in the study as well as publication of their anonymised results, prior to commencing the study questions. The questionnaire was split into participant demographic details; information on if they had had prior medical tests (at any point in their life) involving bodily fluids, imaging, and more specifically on previous experience of other invasive tests used in current clinical practice. Subsequent questions explored the acceptability of these same tests to the participants using a 7-point Likert scale (totally unacceptable, unacceptable, lightly unacceptable, neutral, slightly acceptable, acceptable and perfectly acceptable). The final section included an open white space box for participants to convey any other views they felt to be important.

The questionnaire data was initially entered into a Microsoft Excel (Microsoft 365, 2021 version) spreadsheet and analyzed with basic quantitative methods, including organising the demographic data into clear categories. The specific findings in relation to the tests encountered and the acceptability of medical tests was included as Tables on Microsoft Word (Microsoft 365, 2021 version). The open space responses were analyzed through Braun and Clarkes[14] reflexive thematic analysis method. No participant identifiable data was collected.

Results

Ninety-three individuals in total replied to the questionnaire, with a completion rate of 100%. Most participants were female (89.2%), heterosexual (92.4%) white (81.6%) and resided in England (94.6%) (Table 1).

Table 1 Participant Demographics

Participant Demographics		Number of Participants (%)
Gender	Female	83 (89.2%)
	Male	10 (10.8%)
	Nonbinary	0
	Prefer not to answer	0
Age	18–24	14 (15.1%)
	25–34	34 (36.6%)
	35–44	14 (15.1%)
	45–54	18 (19.3%)
	55–64	10 (10.7%)
	65–74	3 (3.2%)
Sexual orientation	Heterosexual	86 (92.4%)
	Homosexual	3 (3.2%)
	Bisexual	1 (1.1%)
	Asexual	1 (1.1%)
	Prefer not to say	1 (1.1%)
	Other	1 (1.1%)
Ethnicity	Asian or Asian British (Indian)	1 (1.1%)
	Asian or Asian British (Pakistani)	0
	Asian or Asian British (Bangladeshi)	0
	Asian or Asian British (Chinese)	0
	Asian or Asian British (other)	1 (1.1%)
	Black, Black British (Caribbean)	0
	Black, Black British (African)	0
	Any other Black, Black British or Caribbean background	0
	Mixed or multiple ethnic groups	1 (1.1%)
	White (English, Welsh, Scottish, Northern Irish or British)	76 (81.6%)
	White (Irish)	1 (1.1%)
	White (Gypsy or Irish traveller)	0
	White (Roma)	1 (1.1%)
	Any other White background	12 (12.9%)
	Other ethnic group	0
Residence	England	88 (94.6%)
	Wales	4 (4.3%)
	Scotland	0
	Ireland	0
	Not documented	1 (1.1%)
Education	No formal education	0
	Primary education	0
	Secondary education or high school	8 (8.6%)
	Vocational qualification	15 (16.1%)
	University education (undergraduate)	24 (25.8%)
	University education (postgraduate)	46 (49.5%)

The most encountered diagnostic test in our recruited cohort was an X-ray (92.4%), followed by urine sample (91.4%), ultrasound (87%) and ear, nose, and throat swab (78.4%) (presumably secondary to the recent global pandemic). The least encountered tests were bone marrow biopsy with local anaesthetic (0%) joint fluid aspiration (1.1%) and lumbar puncture (4.3%). With regards to invasive tests, a skin biopsy was the most encountered (29%), followed by a laparoscopy (20.4%) and upper gastrointestinal endoscopy with sedation (17.2%) (Table 2).

Table 2 Encountered Diagnostic Tests

Medical Test		Number of Participants (%)
Samples of bodily fluids	Urine test	85 (91.4%)
	Sputum test	26 (27.9%)
	Stool test	34 (36.5%)
Swab tests	Throat/nose/mouth	73 (78.4%)
	Cervical smear test	73 (78.4%)
	Swab from vagina, penis or rectum	46 (49.4%)
Invasive tests	Skin biopsy	27 (29.0%)
	Lumbar puncture	4 (4.3%)
	Joint aspiration with local anaesthetic	1 (1.1%)
	Bone marrow biopsy with local anaesthetic	0
	Upper gastrointestinal endoscopy with sedation	16 (17.2%)
	Upper gastrointestinal endoscopy with general anaesthesia	2 (2.2%)
	Colonoscopy with sedation	10 (10.8%)
	Colonoscopy with general anaesthetic	2 (2.2%)
	Hysteroscopy with sedation	3 (3.3%)
	Hysteroscopy with local anaesthetic	5 (5.4%)
	Hysteroscopy with general anaesthetic	4 (4.3%)
	Hysteroscopy with no analgesia	5 (5.4%)
	Arthroscopy with general anaesthetic	8 (8.6%)
	Laparoscopy	19 (20.4%)
	Open abdominal surgery	14 (15.0%)
Imaging	X-ray	86 (92.4%)
	Computerised Tomography(CT)	31 (33.3%)
	Magnetic Resonance Imaging (MRI)	43 (46.2%)
	Ultrasound of any body part	81 (87.0%)
	Internal ultrasound (vagina or rectum)	53 (56.9%)
	Mammogram	27 (29.0%)

A sputum test was the most perfectly acceptable investigation (83.8%), followed by a urine test (81.7%) and blood test (80.5%). One percent of participants felt that the cervical smear test was perfectly acceptable With reference to hysteroscopy, 5.3% had previously undergone the procedure without any analgesia, 5.3% with local anaesthetic, 4.3% with general anaesthesia and 3.3% with sedation. Additionally, 44% felt a hysteroscopy was perfectly acceptable under general anaesthesia, but no participants rated it perfectly acceptable under local anaesthetic or with sedation. Forty one percent of participants also felt a diagnostic laparoscopy to be a perfectly acceptable test. More broadly, in terms of invasive tests, the most "perfectly acceptable" test was a diagnostic laparoscopy under general anaesthetic (40.8%), followed by a skin biopsy (34.4%) and cystoscopy under general anaesthesia (31.1%) (Table 3).

We stratified the encountered tests and their acceptability by age (Supplementary File). Although none of those aged 18–24 years had had a cervical smear the majority (12 participants) found the test to be totally unacceptable or unacceptable This level of unacceptability was echoed across the other age categories despite the high levels of the test being encountered. Joint aspiration under local anaesthetic was only encountered by one participant but all the age groups over 35 years found the test much more acceptable than those under 35 years. Hysteroscopy, no matter the age, was mostly totally unacceptable across all age groups (41 participants for hysteroscopy under sedation and 33 for hysteroscopy under local anaesthetic) unless under general anaesthetic. Laparoscopy under GA was found to be mostly perfectly acceptable (38 participants) no matter the age category.

Table 3 Acceptability of Diagnostic Tests

Medical test		Totally Unacceptable N (%)	Unacceptable N (%)	Lightly Unacceptable N (%)	Neutral N (%)	Slightly Acceptable N (%)	Acceptable N (%)	Perfectly Acceptable N (%)[a]
Samples of bodily fluids	Urine test	6 (6.4%)	0	0	0	1 (1.07%)	10 (10.7%)	76 (81.7%)
	Sputum test	6 (6.4%)	0	0	0	2 (2.1%)	7 (7.5%)	78 (83.8%)
	Stool test	6 (6.4%)	0	1 (1.07%)	0	3 (3.2%)	17 (18.2%)	66 (70.9%)
	Any blood test	6 (6.4%)	0	0	0	1 (1.07%)	11 (11.8%)	75 (80.56%)
Swab tests	Throat/nose/mouth	6 (6.4%)	0	0	2 (2.1%)	1 (1.07%)	11 (11.8%)	73 (78.4%)
	Cervical smear test	49 (52.6%)	18 (19.3%)	8 (8.6%)	9 (9.6%)	7 (7.5%)	1 (1.07%)	1 (1.07%)
	Swab from vagina, penis or rectum	35 (37.6%)	24 (25.8%)	16 (17.2%)	5 (5.3%	10 (10.7%)	3 (3.2%)	0
Invasive tests	Skin biopsy	6 (6.4%)	6 (6.4%)	11 (11.8%)	10 (10.7%)	6 (6.4%)	22 (23.6%)	32 (34.4%)
	Lumbar puncture	23 (24.7%)	2 (2.1%)	5 (5.3%)	4 (4.3%)	9 (9.6%)	26 (27.9%)	24 (25.8%)
	Joint aspiration with local anaesthetic	21 (22.5%)	16 (17.2%)	15 (16.1%)	13 (13.9%)	2 (2.1%)	7 (7.5%)	19 (20.4%)
	Bone marrow biopsy with local anaesthetic	18 (19.3%)	15 (16.1%)	13 (13.9%)	9 (9.6%)	11 (11.8%)	11 (11.8%)	16 (17.2%)
	Upper gastrointestinal endoscopy with sedation	21 (22.5%)	5 (5.3%)	7 (7.5%)	12 (12.9%)	11 (11.8%)	13 (13.9%)	24 (25.8%)
	Upper gastrointestinal endoscopy with general anaesthesia	10 (10.7%)	8 (8.6%)	13 (13.9%)	8 (8.6%)	18 (19.3%)	13 (13.9%)	23 (24.7%)
	Colonoscopy with sedation	14 (15.0%)	20 (21.5%)	11 (11.8%)	6 (6.4%)	4 (4.3%)	15 (16.1%)	23 (24.7%)
	Colonoscopy with general anaesthetic	1 (1.07%)	8 (8.6%)	19 (20.4%)	10 (10.7%)	17 (18.2%)	20 (21.5%)	18 (19.3%)
	Hysteroscopy with sedation	41 (44.0%)	22 (23.6%)	19 (20.4%)	9 (9.6%)	2 (2.1%)	0	0
	Hysteroscopy with local anaesthetic	33 (35.4%)	30 (32.2%)	19 (20.4%)	8 (8.6%)	2 (2.1%)	1 (1.07%)	0
	Hysteroscopy with general anaesthetic	0	0	3 (3.2%)	8 (8.6%)	8 (8.6%)	33 (35.4%)	41 (44%)
	Cystoscopy with sedation	20 (21.5%)	18 (19.3%)	31 (33.3%)	15 (16.1%)	5 (5.3%)	1 (1.07%)	3 (3.2%)
	Cystoscopy with general anaesthesia	3 (3.2%)	4 (4.3%)	5 (5.3%)	12 (12.9%)	15 (16.1%)	25 (26.8%)	29 (31.1%)
	Arthroscopy with general anaesthetic	3 (3.2%)	7 (7.5%)	9 (9.6%)	9 (9.6%)	23 (24.7%)	18 (19.3%)	24 (25.8%)
	Laparoscopy with general anaesthetic	3 (3.2%)	2 (2.1%)	5 (5.3%)	3 (3.2%)	16 (17.2%)	26 (27.9%)	38 (40.8%)
	Open abdominal surgery	12 (12.9%)	13 (13.9%)	12 (12.9%)	7 (7.5%)	21 (22.5%)	13 (13.9%)	15 (16.1%)
Imaging	X-ray	0	0	1 (1.07%)	2 (2.2%)	17 (18.2%)	28 (30.1%)	45 (48.3%)
	Computerised Tomography(CT)	7 (7.5%)	13 (13.9%)	19 (20.4%)	13 (13.9%)	12 (12.9%)	14 (15.0%)	15 (16.1%)
	Magnetic Resonance Imaging (MRI)	6 (6.4%)	7 (7.5%)	19 (20.4%)	15 (16.1%)	14 (15.0%)	16 (17.2%)	16 (17.2%)
	Ultrasound of any body part	3 (3.2%)	0	4 (4.3%)	2 (2.1%)	4 (4.3%)	36 (38.7%)	44 (47.3%)
	Internal ultrasound (vagina or rectum)	25 (26.8%)	19 (20.4%)	19 (20.4%)	15 (16.1%)	4 (4.3%)	8 (8.60%)	3 (3.2%)
	Mammogram	9 (9.6%)	5 (5.37%)	8 (8.60%)	15 (16.1%)	25 (26.8%)	18 (19.3%)	13 (13.9%)

Note: [a]N, number of participants.

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In the final open text box, respondents provided insight into the factors that would influence whether they would have a medical test or not. Some (seven participants) stated that awareness of the need for the test, good communication and relaying information would influence their decision.

> Having the test explained to me properly and the reason why it is recommended is really important to me. If its not explained properly, then I am less likely to have it.

> Sometimes, you just want the doctor to explain what will happen if the test does not go ahead and how it will affect me. Its good and well telling me I need to have a test, but providing you with all the information is important.

Some participants (22) explained that if the medical test was looking for a potential cancer, then they were more likely to have the test; regardless of how invasive it was.

> Cancer is obviously something really scary. No matter how invasive the test was, if it was for a cancer diagnosis, then I am more likely to have it.

> I Knew the Cystoscopy Was Looking for Cancer and so as Horrible as the Test Sounded, I Had It Done.

Twelve participants provided insight into the factors that would influence whether they were likely to undergo an investigation or not. One factor was if they were experiencing pain or pain-related symptoms and its impact on quality of life.

> I have had pain for years and knowing how this impacts me on a day to day basis, I wanted to have all the tests out there to find a cause. Sadly, they haven't got to the bottom of it.

> My life has become bed ridden because of the pain in my spine. At first, I just dealt with it, but as time went on, I started to take more and more painkillers and more time off work. Eventually, I wanted to have tests done to find out what was going on.

Twenty-three participants were more likely to accept a medical test (including a blood test) if analgesia was provided.

> I am severely needle phobic and without a cream on my hand, there was no way I was going to have the blood tests before my surgery.

> I had a hysteroscopy for bleeding recently and they said I can have it under a general anaesthetic or in a clinic. There was no way I was going to have it without a general.

> They found something on a CT scan and said I needed a camera test to look inside my bowel. There was no way I could have had this without sedation. I just wanted to be knocked out.

Some participants (14) explained that if they perceived a medical test was going to accurately diagnose an abnormality, then they were more likely to undergo it, regardless of how invasive it was.

> If I knew that the test was going to definitely pick up the problem, then I am more likely to have it. It doesn't matter even if its invasive.

The term acceptability in relation to medical tests varied amongst participants. Some participants (eight) discussed this in terms of their previous experience and others (19) discussed this from their own perceptions of the specific test.

> If I have had the test before and it was unpleasant, I am unlikely to consider it acceptable for the second time.

> My friend had a MRI scan and said it was really loud. I needed one, but I was too scared of the noise. Eventually, I had it as the doctor said I needed it.

With reference to screening tests, whilst 32 participants provided insight into their awareness on the importance of such tests, this did not necessarily mean they were likely to accept the test.

> I missed my cervical screening a few times. I know that cervical cancer can kill you, but I was just embarrassed and didn't want to have it done.

> I had a weird lump on my breast come up. The doctor kept saying it was nothing to worry about. Eventually, another doctor said I should have a mammogram. I didn't go at first as I was too scared in case it was cancer as I just couldn't face it.

Discussion

Summary

This study has provided useful insight into the public acceptability regarding a broad range of medical tests used in current medical practice in the UK. Participants provided insight into various factors that influenced whether they were likely to undergo a medical test or not. If a life-threatening condition, such as a cancer diagnosis, was suspected, or if the underlying reason for the test was due to pain-related symptoms, then participants were more likely to consider undergoing the test.

Findings in Relation to the Wider Literature

There is limited literature exploring the acceptability of medical tests. To our knowledge, this is the first study in the United Kingdom to explore the acceptability of multiple medical tests amongst individuals under one research study. Most of the research is focused on screening programmes and their acceptability to patients.[15] For a medical test to be patient centered, it must be acceptable to individuals, and every effort must be made to incorporate testing of acceptability into the development of the medical test.[15] The information gathered with regards to cervical smears is concerning, almost all of those in the 18–24 years age group (who had not yet encountered the test) found the test to be unacceptable. This highlights the urgent need to educate with regards to the importance, and the process of the cervical smear to dispel myths and ensure good uptake. There is limited evidence on whether the actual result of an investigation influences the overall experience of having that test. Robb et al[16] found that 98% of their participants were happy to undergo a colonoscopy to rule out bowel cancer and Vis et al[17] state that participants placed great importance on a test if it was reported negative, following concerns about a "feared outcome".

The definition of the term acceptability in relation to medical tests varies significantly in the literature. Sekhon, Cartwright and Francis[12] developed a framework in which the acceptability of healthcare interventions can more broadly be explored prospectively, retrospectively and concurrently (whilst having the actual test). It is defined as

> a multi-faceted construct that reflects the extent to which people delivering or receiving a healthcare intervention consider it to be appropriate, based on anticipated or experienced cognitive and emotional responses to the intervention.

And is composed of seven constructs which include the perceived effectiveness, ethicality, affective attitude, burden, cost, intervention coherence and self-efficacy.[12]

If a medical test is acceptable to an individual, then they are more likely to adhere to the respective treatment[18] and our study findings corroborated with this; especially if a particular test was required as part of long-term monitoring for a specific disease. Sekhon, Cartwright and Francis[12] reviewed published systematic reviews that explored acceptability of medical tests concluding that only eight out of 43 reviews adopted self-report and observed behavioral measures as part of their assessment of test acceptability. They also made the point that patient satisfaction is often confused with patient acceptability.[12] Participants in our study provided insight into this finding as they made it clear that being satisfied with a medical test after undergoing it, does not necessarily mean the test is acceptable to the individual. In agreement, Forster et al[19] also stated that the acceptability of medical tests and the actual experience of a medical test should be explored separately.

In a semi-structured interview study with 22 men with prostate cancer, two patient partners and ten General Practitioners (GPs), Merriel et al[20] explored the acceptability of MRI in the diagnosis of prostate cancer. They found that an MRI scan was acceptable to both patients and GPs. Participants explained that they had confidence in the test, which they perceived to have the ability to accurately detect an abnormality. Participants in our study also provided insight into whether a test is considered acceptable to them if they felt it was good enough to detect an abnormality, particularly in relation to invasive tests.

Strengths and Limitations

Our study broadly explores the acceptability of medical investigations amongst the public for benign conditions, filling the existing gap in the current literature. We present critical discussion around the concept of acceptability and health seeking behaviours for non-cancer related conditions, yet interpretation of our findings must be considered with several limitations. Firstly, the findings are drawn from an online questionnaire, and as such, further qualitative exploration of the open space questions was not possible and online recruitment will have limited other participants without access to the internet to participate. The sample size and distribution of ethnicities and mainly female participants included precludes generalizability of these results. It is possible that prior experience of a medical test may have influenced the perception of test acceptability, however, it is not possible to make this conclusion from our findings. The findings relate to a broad range of medical tests and thus, the term acceptability was explored within the context of many investigations. The questionnaire specifically explored the acceptability of medical tests in relation to non-cancer related conditions, and therefore, important influences of health seeking behaviour related to cancer related investigations may have been missed.

Implications

The findings highlight the wide variety of acceptability seen by the public cohort we questioned. The experience of all medical tests should be evaluated as part of service delivery to ensure the patient voice on test acceptability is heard and importantly listened to. Our findings will serve as a further reminder to policy makers on the importance of patient acceptability when considering medical tests as part of a clinical pathway. The findings also highlight the importance of adequate counselling prior to an investigation, particularly those of an invasive nature. Our study highlights the need for further research to explore the concept of acceptability from the patient perspective for the multitude of medical tests used in clinical practice. As authors of this study, we will next be exploring the acceptability of gynaecological investigations; particularly those that are considered more invasive in more detail through robust qualitative methods. This will enable psychological factors that influence patient decision making when accepting or declining such tests to be explored.

Conclusion

The design and implementation of any medical test must always involve patient and public groups to determine its acceptability. Our research study will increase awareness amongst healthcare professionals on the acceptability of medical tests and allow them to reflect on what information is provided to patients prior to undergoing the test and facilitate informed decision making. Understanding why a medical test is not acceptable to an individual will enable policy makers to explore this further when making important decisions about clinical guidelines. The findings from our study will enable other researchers to explore in more detail, through qualitative work, the acceptability of individual medical tests that are of special interest to them. Most research has focused on the concept of acceptability in relation to screening tests, but the findings from this study should be used to explore this concept further in relation to invasive clinical interventions used in clinical practice managing non-cancerous pathologies.

Data Sharing Statement

The data obtained from this research study is available upon reasonable request by emailing the corresponding author.

Ethical Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and ethical approval was obtained from the University of Liverpool Institute of Life Course and Medical Sciences Research Ethics Committee [12171].

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

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