Influence of magnetic resonance imaging of the knee on GPs' decisions: a randomised trial

DAMASK (Direct Access to Magnetic Resonance Imaging: Assessment for Suspect Knees) Trial Team

ABSTRACT

Background

Magnetic resonance imaging (MRI) of the knee for meniscus and ligament injuries is an accurate diagnostic test. Early and accurate diagnosis of patients with knee problems may prevent the onset of chronic problems such as osteoarthritis, a common cause of disability in older people consulting their GP.

Aim

To assess the effect of early access to MRI, compared with referral to an orthopaedic specialist, on GPs' diagnoses and treatment plans for patients with knee problems.

Design of study

A multicentre, pragmatic, randomised controlled trial.

Setting

Five hundred and fifty-three patients with knee problems were recruited from 163 general practices across the UK from November 2002 to October 2004.

Method

Eligible patients were randomised to MRI or consultation with an orthopaedic specialist. GPs made a concomitant provisional referral to orthopaedics for patients who were allocated to imaging. GPs recorded patients' diagnoses, treatment plans, and their confidence in these decisions at trial entry and follow-up. Data were analysed as intention to treat.

Results

There was no significant difference between MRI and orthopaedic groups for changes in diagnosis ($P = 0.79$) or treatment plans ($P = 0.059$). Significant changes in diagnostic and therapeutic confidence were observed for both groups with a greater increase in diagnostic confidence ($P<0.001$) and therapeutic confidence ($P = 0.002$) in the MRI group. There was a significant increase in within-group changes in diagnostic and therapeutic confidence.

Conclusion

Access to MRI did not significantly alter GPs' diagnoses or treatment plans compared with direct referral to an orthopaedic specialist, but access to MRI significantly increased their confidence in these decisions.

Keywords

decision making; family practice; knee; magnetic resonance imaging.

INTRODUCTION

Each year in the UK 15% of patients who consult GPs do so for musculoskeletal disorders. The annual consulting rate for internal derangement of the knee is 32 per 1000 patient years, similar to that of rheumatoid arthritis.[1] Within the general diagnosis for internal derangement of the knee, the injuries consistently referred to are those of the meniscus, and cruciate or collateral ligaments (Veteran's Entitlement Act 1986).[2–4] Early and accurate diagnosis may potentially prevent the onset of chronic problems such as osteoarthritis[5] which is the second most common diagnosis and the most common cause of disability in older people consulting their GP.[1,6]

Imaging of the knee is a common musculoskeletal application of magnetic resonance imaging (MRI) in secondary care.[7] Technical performance of MRI of the knee has been demonstrated,[8] and systematic reviews have shown that it is an accurate diagnostic test for detecting lesions of the menisci and cruciate ligaments.[9,10] This has led some to suggest that MRI is a valuable tool for GPs in making appropriate and informed decisions.[11,12] Negative MRI findings could allow GPs to reassure patients, treat them conservatively in primary care, avoid unnecessary orthopaedic referrals, and therefore reduce waiting times[7] and save costs.[13] Positive MRI findings could confirm GPs' diagnoses and decisions to refer patients to an orthopaedic specialist, who would decide whether arthroscopy was required without the need for a follow-up appointment. The radiologist's

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report could also assist hospital specialists in prioritising outpatient appointments.[14] Conversely, patients may benefit more by being referred quickly and directly by their GP to see an orthopaedic specialist.[15] Hospital specialists could then use imaging much more selectively, limiting MRI to those patients for whom a decision to operate has already been made, which would reduce resources spent on MRI. Imaging may confuse the clinical picture if asymptomatic abnormalities are detected, possibly leading to unnecessary referrals and interventions.[16] Not all GPs are familiar with the implications of MRI findings, as reported by radiologists, and this could result in false reassurance and delays in appropriate treatment.[17]

Primary care trusts are to control over 80% of the NHS budget by 2007/08.[18] In addition, the Department of Health announced plans to reduce waiting times for diagnostic tests[19] and to support research on diagnostic imaging.[20] Nearly 1 million MRI examinations are now performed in England each year and the provision of MRI is expected to rise.[21,22] Against this background, a multicentre, pragmatic, randomised trial was conducted to address whether patients presenting to GPs with suspected internal derangement of the knee should be referred for early access to MRI or directly to an orthopaedic specialist. The principal aims were to evaluate whether direct access to MRI in primary or secondary care affects subsequent diagnosis and management, whether it improves patient outcomes, and whether it reduces costs. This study aimed to investigate the effect of direct access to MRI of the knee on GPs' diagnosis and treatment plans.

How this fits in

Magnetic resonance imaging (MRI) of the knee is an accurate diagnostic test for meniscus and ligament injuries and is a common application in secondary care. There is uncertainty about whether it should enter the diagnostic pathway in primary care through direct referral from GPs. Although early access to MRI was valuable for contributing towards GPs' diagnoses and treatment plans and significantly increased their confidence in these decisions, this did not lead to a significant difference in GPs' decisions when compared with referral to an orthopaedic specialist.

METHOD

Recruitment of patients, interventions received, and the assessment of GPs' diagnosis and treatment plans are described here.[23,24] Full details of the trial methods are presented elsewhere.[25]

Patients and recruitment

The trial was based in sites across North Wales, North East Scotland, and Yorkshire, which are areas covering urban, mixed, and rural settings with a broad socioeconomic spectrum. The total population of these geographical areas is approximately 2 million, with patients registered in over 600 general practices.

The target population for inclusion were patients aged between 18 and 55 years inclusive, presenting in general practice and for whom their GPs were considering referral to an orthopaedic specialist for suspected internal derangement of the knee (for example, menisci or ligament injuries). Patients with more complex knee problems that required direct referral to an orthopaedic specialist were excluded for the following reasons:

- urgent orthopaedic referral at initial consultation; for example, gross ligamentous injury or sudden onset of effusion;
- suspected osteoarthritis, other non-traumatic arthropathy, or isolated patello-femoral joint pain.
- chronic instability of the knee due to history of major injury;
- previous MRI examination within the same episode of care;
- previous surgical intervention (excluding diagnostic arthroscopy) on the same knee; and
- contraindications to the use of MRI; for example, pacemaker, intra-cranial aneurysm clips, or orbital metallic foreign body.

Patients were recruited from general practices between November 2002 and October 2004. In each practice participating GPs or practice nurses asked eligible and consenting patients to complete a baseline questionnaire. Patients were then randomised to the local radiology department for MRI, or referral as usual for consultation with an orthopaedic specialist. GPs made subsequent referrals for orthopaedic and MRI as necessary. The remote randomisation service at York ensured immediate and unbiased allocation of consenting patients. The randomisation procedure was stratified by experimental site, median distance from practice to hospital, and median number of partners in practices. Within strata a block allocation sequence was used: permuted random blocks of size two or four were randomly selected to generate the allocation sequence.

To avoid contaminating the evaluation by differences in waiting times between the two clinical policies, GPs made a concomitant provisional referral to orthopaedics when requesting MRI of the knee. As the trial was pragmatic in design, to reflect the consequences of routine GP access to MRI, blinding of patients or professionals to treatment allocation was not appropriate.

Table 1. Patient characteristics.

Characteristics	Trial entry assessment		Follow-up assessment	
	MRI referral (*n* = 279)	Orthopaedic referral (*n* = 274)	MRI referral (*n* = 279)	Orthopaedic referral (*n* = 266)
Mean age, years (SD)	40.1 (9.9)	39.1 (10.5)	40.2 (10.0)	39.4 (10.6)
Sex, *n* (%)				
Male	185 (66)	165 (60)	185 (66)	159 (60)
Female	94 (34)	109 (40)	94 (34)	107 (40)
Diagnostic category, *n* (%)				
Meniscal injury	224 (80)	210 (77)	154 (55)	124 (45)
Ligamentous injury	87 (31)	82 (30)	61 (22)	59 (22)
Other diagnosis[a,b]	5 (2)	9 (3)	76 (27)	77 (30)
No diagnosis	0 (0)	0 (0)	14 (5)	27 (10)
Treatment category, *n* (%)				
Orthopaedic management	279 (100)	274 (100)	195 (70)	149 (56)
Quadriceps exercises	82 (29)	71 (26)	48 (17)	28 (10)
Physiotherapy	114 (41)	101 (37)	81 (29)	85 (32)
Analgesics	151 (54)	138 (50)	49 (18)	28 (10)
Tubigrip	36 (13)	41 (15)	4 (1)	2 (1)
Nothing	47 (17)	60 (22)	23 (8)	42 (16)
Other[c,d]	11 (4)	6 (2)	11 (4)	23 (8)
Median number of days from trial entry to intervention (range)	N/A	N/A	41 (21–71)	79 (54–168)
Median number of days from intervention to completion of follow up forms (range)	N/A	N/A	42 (26–61)	54 (30–112)

[a]*Other diagnosis at trial entry: loose body, patella femoral problem, osteoarthritis, Baker's cyst, patellar ligament injury, worn meniscus.* [b]*Other diagnosis at follow-up: fracture, arthropathy, symptoms settled, bone bruise, soft tissue injury, semimembranous bursae, chondromalacia, prepatellar bursitis, patellofemoral problem, patellar tendonitis, osteomyelitis, osteochondritis, loose body, muscular imbalance, ganglion, capsulitis, meniscal cyst, inflammatory symptoms, haemarthrosis, degenerate meniscus, chondrocalcinosis.* [c]*Other treatment at trial entry: steroid injection, complementary therapy, non-steroidal anti-inflammatory drugs, advice, knee support.* [d]*Other treatment at follow-up: weight loss, specialist referral, magnetic resonance imaging (MRI) referral, awaiting review, knee support, steroid injection, acupuncture. N/A = not applicable.*

Interventions

At each hospital, the aim was to perform imaging within 12 weeks of GP referral using standard commercially available magnetic resonance imagers and imaging protocols at the discretion of the radiologist. A 2-hour educational seminar about MRI, clinical diagnosis, conservative management, and trial procedures were delivered to GPs by a consultant radiologist, consultant orthopaedic surgeon, and a trial coordinator respectively. The purpose of the educational seminar was to raise GPs' awareness of when MRI is useful in imaging of the knee for meniscus and ligament injuries; and about the clinical assessment and management of knee problems. Messages were attached to radiologists' reports to remind GPs to cancel the provisional orthopaedic appointment if necessary. The aim was to ensure that the orthopaedic appointment was within 9 months of GP referral. Orthopaedic specialists could request an MRI in accordance with normal clinical practice.

Assessment of diagnostic and therapeutic impact

To address the study's aims, GPs were asked to complete a number of standardised forms. When GPs assessed patient eligibility at baseline, they recorded patients' main diagnosis and whether they had a low, medium, or high level of confidence in that diagnosis. The diagnoses GPs could choose from were specified in terms of the probable type of injury: meniscal or ligamentous. GPs could also record 'other' diagnoses. In addition to orthopaedic referral, GPs recorded how they planned to treat the patient and whether they had a low, medium, or high level of confidence in this treatment. Treatments that GPs could choose from were no treatment, quadriceps exercises, physiotherapy, analgesics, tubigrip, or 'other'.

A second form recorded GPs' plans on receipt of the radiologist's report or letter from the orthopaedic specialist. GPs were asked the same questions about their diagnosis and treatment plan, and their confidence in these decisions. When a patient was allocated to MRI, GPs answered two further questions:

- To what extent did the MRI results inform your diagnosis?
- How did the MRI results contribute to your diagnosis and treatment plan?

GPs completed this form 2 weeks after the patients' were allocated to an intervention, and if necessary were followed up with a reminder letter 2 weeks later and a telephone reminder 4 weeks later.

GPs were asked to complete a form at 12 months if a patient had not yet received his or her allocated intervention for any reason, such as a referral not being made or the patient not attending for a hospital appointment. GPs were asked the same questions as for the baseline form and were followed up with a reminder letter 2 weeks later and a telephone reminder 4 weeks later.

When GPs recorded 'other' diagnosis or treatment plans, a consultant radiologist with 12 years' experience, a special interest in musculoskeletal radiology, and blind to the treatment allocation, classified these decisions into different categories.

Statistical analyses

A pragmatic approach was taken using intention-to-treat analyses, in that the data were analysed according to the group to which patients were originally randomised. Those patients for whom data were available at 12 months were included in this analysis. Differences in the change in diagnosis and

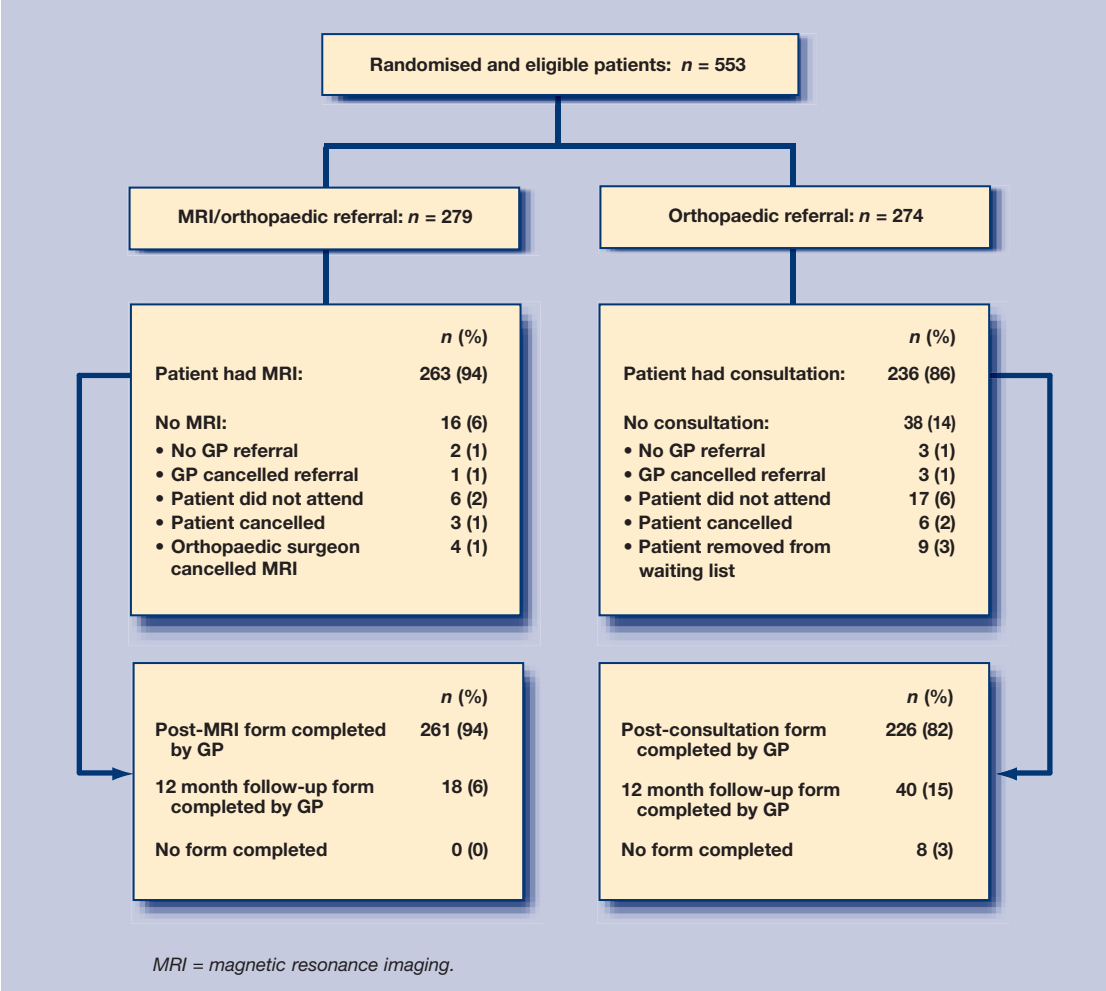

Figure 1. Flowchart of patients' progress through the trial.

treatment plans between the two independent groups were tested using the χ^2 test. The χ^2 test was also performed to test for changes in diagnostic and therapeutic confidence between the two independent groups, and the Wilcoxon-signed rank test for within-group changes. Skewed data (for example, the time interval from randomisation to when the patient had their allocated intervention) are presented as medians with interquartile ranges. The Mann–Whitney *U* test was performed to test for differences in time intervals between the two independent groups. Some forms were incomplete so the denominators in each table vary accordingly. All analyses were performed using SPSS (version 14.0).

RESULTS

Sample characteristics

Six hundred and forty-seven practices were approached to take part in the study and 285 (44%) accepted the invitation. The number of GPs per practice did not differ significantly between those who did or did not take part ($P = 0.241$). There was a significant difference in distance from a practice to hospital (2.3 kilometres; $P = 0.035$). From November 2002 to October 2004, 553 eligible and consenting patients were recruited from 163 general practices. Of these practices, only 58 (36%) recruited four or more patients with a range of 1–23 patients per practice. Patients were followed up until they received their intervention or for a period of up to 12 months.

Two hundred and seventy-nine patients were randomly allocated to MRI, and 274 were allocated to an orthopaedic specialist (Table 1). The clinical characteristics (age, sex, diagnostic, and treatment category) of the two groups at trial entry were similar and eight patients were lost to follow-up. A different GP from the one who completed the trial entry form completed the follow-up assessment form for two of 279 (1%) patients in the MRI group and six of 266 (2%) patients in the orthopaedic group. Time intervals for the two groups are shown in Table 1: from when patients were randomised, to when they received their allocated interventions, and to when the follow-up assessment forms were completed. These differences in time intervals between the two groups were significant ($P<0.001$). Figure 1 shows patients' progress through the trial and that most received their allocated intervention.

Table 2. Changes in GPs' diagnoses and diagnostic confidence.

	Original randomisation		Between-group change[a]
	MRI referral	Orthopaedic referral	
Diagnosis altered, *n* (%)			
Yes	170/279 (61)	165/266 (62)	$\chi^2 = 0.07$,
No	109/279 (39)	101/266 (38)	$P = 0.79$
Change in diagnostic confidence, *n* (%)			
Increased	168/264 (64)	80/249 (32)	$\chi^2 = 51.43$,
No effect	77/264 (29)	129/249 (52)	$P<0.001$
Decreased	19/264 (7)	40/249 (16)	
Within-group change[b]	$P<0.001$	$P = 0.006$	

[a] *The χ^2 test.* [b] *The Wilcoxon-signed rank test for within-group change in diagnostic confidence between trial entry and follow-up.*

Diagnostic impact

At trial entry a diagnosis that comprised a meniscal injury was recorded for approximately 80% of patients, a ligamentous injury for 30%, and 'other' diagnosis for 2% (Table 1). This changed at follow-up to a diagnosis of a meniscal injury for approximately 50% of patients, a ligamentous injury for 22%, and 'other' diagnosis for 30% of patients. Table 2 shows that at follow-up, there was a difference of only 1% (95% confidence interval [CI] = –7% to 9%) in a change in diagnosis between the MRI and orthopaedic groups, which was not statistically significant. The increase in diagnostic confidence between trial entry and follow-up was significantly higher in the MRI group, with a difference between the MRI and orthopaedic groups of 32% (95% CI = 23% to 40%). In addition, there were significant increases in within-group changes in diagnostic confidence.

Therapeutic impact

Table 1 also presents GPs' treatment plans at trial entry and follow-up for patients in each group. The main choice of treatment plans for patients at trial entry, other than orthopaedic management (including referral), was quadriceps exercises for approximately 30%, physiotherapy for 40%, and analgesics for 50% of patients. At follow-up, the need for these treatments fell for both groups. A change in treatment after an intervention was defined as being a change in any one of the treatment options available to GPs; for example, physiotherapy or analgesic prescription. Table 3 shows that at follow-up there was a difference in treatment plans of 3% (95% CI = 0% to 7%), which was not statistically significant. The increase in therapeutic confidence between trial entry and follow up in both groups was significantly higher in the MRI group, with a difference between groups of 14% (95% CI = 5% to 22%). There were also significant increases in within-group changes in therapeutic confidence.

Table 3. Changes in GPs' treatment plans and therapeutic confidence.

	Original randomisation		Between-group change[a]
	MRI referral	Orthopaedic referral	
Treatment altered, *n* (%)			
Yes	261/279 (94)	258/266 (97)	$\chi^2 = 3.56$,
No	18/279 (6)	8/266 (3)	$P = 0.059$
Change in therapeutic confidence, *n* (%)			
Increased	163/259 (63)	119/241 (49)	$\chi^2 = 12.59$,
No effect	87/259 (34)	100/241 (42)	$P = 0.002$
Decreased	9/259 (3)	22/241 (9)	
Within-group change[b]	$P<0.001$	$P<0.001$	

[a] *The χ^2 test.* [b] *The Wilcoxon-signed rank test for within-group change in therapeutic confidence between trial entry and follow-up.*

Contribution of imaging to diagnosis and treatment

Results from 167 of 257 (65%) patients randomised to MRI informed GPs' diagnosis 'a lot', and 'moderately' for 27% (69/257), 'a little' for 5% (14/257), and 'not at all' for 3% (7/257). The most frequent contribution of MRI to GPs' treatment plans was 'confirmation of diagnosis' (47%; 130/279), then 'establishment of diagnosis' (41%; 113/279), 'planning of treatment' (35%; 99/279), 'assessment of the extent or location of the disease' (33%; 92/279), 'exclusion of pathology' (25%; 71/279), and then 'cancel orthopaedic appointment' (10%; 27/279). For 19 of 279 patients (7%), GPs listed other contributions of the MRI report to their management plans; for seven patients it confirmed the need to see the orthopaedic specialist.

DISCUSSION

Summary of main findings

There was no significant difference between the MRI and orthopaedic groups for changes in diagnosis at trial entry and follow-up; changes in treatment plans were also not significant. Significant changes in diagnostic and therapeutic confidence were observed for both groups, with a higher increase in the MRI group. For the majority of patients the MRI results informed GPs' diagnosis 'a lot'. Diagnoses other than meniscus and ligament injuries were also made for around 30% of patients. This is not surprising when considering the extra detailed information available to GPs as feedback from the specialists. The accuracy of MRI, however, was mainly established for meniscus and ligament injuries and not other diagnoses. These injuries were present for the majority of patients and the change in other diagnosis from baseline to follow-up was

comparable for both study groups. In summary, access to MRI was valuable for contributing towards GPs' diagnoses and treatment plans and increased their confidence in these decisions; this did not result in a significant change in their practice compared with referral to an orthopaedic specialist.

Strengths and limitations of the study

The strength of this study is that a randomised trial design was used to help ensure that two similar groups of patients were compared and to provide a basis for statistical inference.[26] This design is rarely applied to the assessment of diagnostic imaging[27] because of perceived ethical concerns about randomising patients to a non-imaging policy.[28] Previous studies that have assessed the effect of MRI of the knee on clinicians' decisions have employed observational designs.[7,11,12] In the current pragmatic trial, patients were recruited from 163 general practices across the UK (median number of GPs per practice = 4; median distance of practice to hospital = 10 kilometres), so findings should be generalisable to most clinical practice. The within-group design of this study uses before-and-after forms that are similar to those used in other studies.[7,11,12] Non-response bias is limited with no forms lost to follow-up in the MRI group, and only eight of 274 (3%) in the orthopaedic group.

Limitations of this study include the sample size. The primary outcome in the trial was based on the principal objective of evaluating whether GP access to MRI improves patient outcomes,[25] so the sample size was not determined by the need to detect differences in the effect of MRI on GPs' decisions. Despite this, this trial is larger than other studies on the effect of MRI on clinicians' decisions.[29–32] It was not feasible to collect data on how many patients were approached by the general practices to attain the sample size. Therefore, it was not possible to test whether the patients included in the trial are representative of the entire population of people with knee problems. A further limitation concerns the significant difference between study groups in the time intervals from trial entry to when patients received their allocated intervention, and subsequently the completion of the follow-up form. It is conceivable that GPs' decisions are influenced by changes in the natural history of the patient's condition. Furthermore a treatment such as physiotherapy may have ended before GPs received the radiologist's report or feedback from the orthopaedic specialist. A change in treatment may not necessarily be attributed to an intervention. GPs' interpretation of what is orthopaedic management could also differ for the two groups, as the patients in the control group had already seen an orthopaedic specialist. In retrospect, GPs should have been asked to specify the reason for orthopaedic management when completing follow-up forms. Moreover, the effect of MRI on GPs' diagnoses and treatment plans is an intermediate outcome, so any difference between the two groups will not necessarily translate into a measurable benefit to patients' health, or save costs.[17,31] Nor at this time is it known whether the availability of MRI findings influenced hospital specialists' decisions about the need for further health care such as arthroscopy. Finally, the purpose of the education seminar was to influence GPs' decisions about the diagnosis and management of patients, which may have made their decisions different. However, the seminar was only 2 hours in duration and included a presentation about trial procedures and feedback session. It was not an intensive package that could bias the sample of GPs. Despite these possible criticisms, the rationale for a pragmatic approach to the design of the study was to present the variation in GPs' diagnosis and treatment plans as a consequence of two different patient care pathways, and to evaluate the more appropriate sequence of events independent of variations in waiting times.

Comparison with existing literature

Watura *et al* compared findings of MRI of the knee in 165 patients referred by GPs with 470 patients referred by orthopaedic teams and found no significant difference between the two referral pathways in normal or abnormal MRI examinations.[11] They found that when GPs refer patients for MRI or to an orthopaedic specialist, there is no significant difference in 'change of diagnosis' between the two groups. Therefore, while GPs refer similar patients to orthopaedic specialists for MRI of the knee,[11] no access to MRI does not significantly affect their diagnosis. In another study of 135 patients who were referred by GPs for MRI of the spine, brain, or knee, the need for hospital outpatient referral was avoided for 55 patients (41%).[12] In the current study, GPs recorded that MRI reduced the need for orthopaedic management for 84 patients (30%), led to cancelling the orthopaedic appointment for 27 patients (10%), and contributed towards planning treatment for 99 patients (35%). GPs' decision to cancel 10% of the orthopaedic appointments in the MRI group may be affected by the provisional orthopaedic referral and therefore could be an underestimation.

Evidence from this study about a significant increase in GPs' confidence in their decisions is consistent with the effect of MRI of the knee on hospital specialists' decisions. For example, after MRI of the knee in 332 patients, Mackenzie *et al* found a significant improvement in orthopaedic surgeons' diagnostic confidence and a significant shift away from surgical management.[17] Two smaller

studies have also shown that MRI of the knee significantly changed orthopaedic surgeons' confidence in their diagnosis.[29,30] Furthermore, the current findings are comparable with the results of studies for other musculoskeletal conditions. Gillan *et al* conducted a randomised trial of 145 patients who had symptomatic lumbar spinal disorders and were referred to orthopaedic or neurosurgeons. They found that access to imaging, mainly MRI, had no significant effect on hospital specialists' diagnosis and treatment plans, although it did increase their diagnostic confidence.[31] Blanchard *et al* found that in 99 patients referred for imaging of the shoulder, MRI significantly improved hospital specialists' diagnostic confidence and management plans.[32]

Why may GPs be more confident in their decisions when based on a radiologist's report than with the letter from the orthopaedic specialist? One explanation is that while there is variation in radiologists' style of reporting, the content of the report may be more comprehensive and detailed than an orthopaedic specialists' letter. Furthermore, patients were eligible for inclusion in the study after treatment in primary care because GPs were uncertain about what should happen next. The availability of the MRI report before the patients' out-patient appointment could assist GPs in their management of patients. Therefore, the sequence of events is important. Patients underwent MRI examination significantly earlier than attending an appointment with an orthopaedic specialist; GPs completed the follow-up forms significantly sooner for patients who had MRI; and more patients attended for MRI compared with consultation with an orthopaedic specialist. Early access to MRI provides greater continuity of care as a result of the patient receiving an intervention earlier in the care pathway. Access to technologies such as MRI also reassure GPs. For example, GPs request radiographs of the lumbar spine for validation purposes, and there is evidence from a randomised trial that patients are more satisfied with care when receiving radiography of the lumbar spine, even though there is no effect on patient outcome.[33]

Implications for future research and clinical practice

Technical performance and accuracy of MRI of the knee for meniscus and ligament injuries has been demonstrated,[8–10] but no previous study has assessed the effect on GPs' diagnosis and treatment plans. In view of government policy to increase investment in primary care, prevent unnecessary referral to hospitals,[18] and to increase provision of diagnostics,[19–22] this study is important and timely for informing evidence-based partnerships between primary and secondary care professionals. The findings presented here show that although early access to MRI significantly increased GPs' confidence in their decisions and they found it to be a valuable test, it has not changed their practice significantly. A 2-year follow-up of patients on healthcare resource use and health-related quality of life will provide more information on this topic.

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Ethics committee

Northern and Yorkshire Multi-Centre Research Ethics Committee approved the study (MREC/1/3/59)

Competing interests

The authors have stated that there are none

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