

General Practitioner Experiences Using a Low Back Pain Management Booklet Aiming to Decrease Non-indicated Imaging for Low Back Pain

Hazel J Jenkins (✉ hazel.jenkins@mq.edu.au)

Macquarie University <https://orcid.org/0000-0002-0535-687X>

Niamh A Moloney

Macquarie University Faculty of Medicine and Health Sciences

Simon D French

Macquarie University Faculty of Science and Engineering

Chris G Maher

The University of Sydney School of Medicine

Blake F Dear

Macquarie University Faculty of Medicine and Health Sciences

John S Magnussen

Macquarie University Faculty of Medicine and Health Sciences

Mark J Hancock

Macquarie University Faculty of Medicine and Health Sciences

Research

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Abstract

Background

Imaging is overused in the management of low back pain and effective interventions to decrease use have not been developed. An intervention, incorporating a low back pain management booklet and practitioner training session, to reduce non-indicated imaging for low back pain has been developed based on theories of behaviour change. This study aimed to explore general medical practitioner experiences using the low back pain management booklet in clinical practice to 1) determine the adoption, feasibility of use, and appropriateness of the booklet; and 2) identify implementation strategies to address barriers to use.

Methods

Fourteen general medical practitioners were recruited and trained to use the booklet with low back pain patients over a minimum five-month period. Quantitative data on use of the booklet were collected and analysed descriptively. Qualitative data were collected in general medical practitioner interviews and thematically analysed. Barriers to use were identified and mapped to suitable implementation strategies using the Behaviour Change Wheel.

Results

The 14 general medical practitioners used the booklet with 73 patients. General medical practitioners thought using the booklet helped improve patient management and helped reduce pressure to refer for non-indicated imaging. Facilitators for using the booklet included patient's requesting imaging and lower practitioner confidence in managing low back pain. Barriers included accessible storage and remembering to use the booklet. Implementation strategies were identified to increase adoption and feasibility of use, including development of a digital version of the booklet.

Conclusions

General medical practitioners reported that the low back pain management booklet was useful for clinical practice, particularly with patients requesting imaging. Barriers to use were identified and implementation strategies to address these barriers will be incorporated into future effectiveness studies. This study forms one of a series of studies to develop and test an intervention to reduce non-indicated imaging for low back pain; a successful intervention would decrease healthcare costs and improve patient management.

Contributions To The Literature

- The adoption, feasibility, and appropriateness of a low back pain management booklet designed to reduce non-indicated imaging for low back pain were assessed.

- General medical practitioners found the booklet most useful when patients were requesting non-indicated imaging or needed more reassurance.
- General medical practitioners thought the booklet could help to decrease non-indicated imaging. They found the booklet useful to reassure patients and provide management advice.
- Key barriers to use included a lack of storage space and remembering to use the booklet.
- Implementation strategies to improve adoption and feasibility of use of the booklet were developed using theory-informed approaches.

Background

Imaging is overused in the management of low back pain, with approximately one third of imaging referrals inconsistent with clinical guidelines (1). Imaging is indicated when there is suspicion of serious underlying pathology such as infection or cancer, but does not generally improve outcomes for patients with non-specific low back pain (2, 3). Overuse of imaging may lead to inappropriate diagnoses, further unnecessary investigation or treatment, and unnecessary radiation exposure (2–5). In the 2017/18 financial year, Medicare, the Australian public healthcare system, spent AUD\$180 million on low back imaging (6). Decreasing non-indicated imaging for low back pain in general practice is challenging, and few effective interventions have been demonstrated to date (7).

An intervention was recently developed (8) to help general medical practitioners reduce non-indicated imaging for low back pain. The intervention was developed to address identified clinician and patient behaviours within a clinical consult which lead to an overuse of imaging for low back pain (Additional file 1). The intervention includes clinician training and provision of a low back pain management booklet designed to be used during clinical interactions with patients. The training session (Additional file 2) is used to demonstrate the use of the booklet to clinicians and provide education on appropriate imaging for low back pain. The booklet (available online at <https://tinyurl.com/lowbackpaineducation> (9)) can be used to screen the patient for indicators for imaging, educate and communicate with the patient about low back pain and the need for imaging, and provide a customised patient management plan.

Preliminary testing of the developed booklet has been performed in both Australia (8) and, with a translated version of the booklet, in Finland (10). Qualitative responses from both studies were consistent: patients found the booklet easy to read and understand and general medical practitioners thought it would be helpful to decrease non-indicated imaging (8, 10). Healthcare consumers also indicated that they liked the hardcopy booklet, and would continue to refer to it in the future (8). However, some implementation concerns were raised, with general medical practitioners reporting that a lack of time and suitable storage space may limit their ability to remember to use a hardcopy booklet (8, 10), thus decreasing the potential effectiveness of the intervention. Therefore, assessment of implementation outcomes, such as adoption, appropriateness, and feasibility of use, are important to determine whether the intervention can be used successfully in clinical practice or whether further strategies to improve implementation are needed (11).

The aim of this study was to explore general medical practitioner experiences using the booklet in clinical practice to determine: 1) how general medical practitioners used the booklet (adoption); 2) barriers and facilitators impacting use of the booklet (feasibility); 3) how helpful general medical practitioners found the booklet (appropriateness); 4) suggestions for improvement to the booklet or associated clinician training in using the booklet; and 5) implementation strategies to address identified barriers to use.

Methods

General medical practitioners from metropolitan Sydney, Australia were asked to trial the booklet within their clinical practice. This paper is reported in accordance with the standards for reporting qualitative research (12) and the consolidated criteria for reporting qualitative research (COREQ; Additional file 3) (13). The intervention has been described using the template for intervention description and replication (TiDleR; Additional file 4). Ethics approval was granted by Macquarie University Human Research Ethics Committee, reference number: 5201600298.

General medical practitioner recruitment

Purposive sampling of general medical practitioners currently seeing patients with low back pain was performed, between May to October 2017, to achieve adequate diversity in practice location, years in clinical practice and sex. We estimated a minimum of ten general medical practitioners would be required for this study, based on the sample size needed for thematic saturation during a previous qualitative study on the development of the booklet (8).

Study procedure

General medical practitioners attended a 20-minute face-to-face training session with one of the research team (HJ) to instruct them in the study aims and requirements and deliver the training session developed for the intervention (Additional file 2). Demographic information and beliefs about the usefulness of imaging for low back pain were obtained from general medical practitioners (Additional file 5).

The study period ran from May, 2017 to April, 2018. General medical practitioners were asked to use the booklet with patients presenting with low back pain as they deemed appropriate, and complete a de-identified record sheet of patients with whom they used the booklet. Recorded data included low back pain characteristics, how the booklet was used, suspicion of underlying pathology, and imaging referral (Additional file 6).

At the conclusion of the study period general medical practitioners participated in a fifteen-minute audio-recorded semi-structured interview with one of the researchers (HJ). Open-ended interview questions were developed, related to the first four aims of this study (Additional file 5). Further 'probe' questions were developed to be used as required to explore general medical practitioner responses. Probe questions related to clinician behaviour were developed using the Theoretical Domains Framework (14, 15). General

medical practitioners were given an AUD\$60 gift voucher for their time in attending the training session and participating in the end of study interview.

Quantitative data analysis

Data from the de-identified patient record sheets were used to assess how general medical practitioners used the booklet, including: 1) how many patients the low back pain management booklet was used with; 2) characteristics of patients with whom the booklet was used; 3) concerns of possible serious pathology; 4) proportion of imaging referral when the booklet was used; 5) proportion of imaging referral in patients with no underlying suspicion of serious pathology; and 6) how the booklet was used with each patient (e.g. customised or not customised, discussed throughout the consult or provided at the end of the consult only). In the case of missing data, the partial data provided was included in the analysis with adjusted denominators.

Qualitative data analysis

Interviews were initially transcribed by one researcher (HJ) and imported into NVivo qualitative data analysis software; QSR International Pty Ltd. Version 12, 2018 for analysis. Coding was performed for each study aim prior to performing thematic analysis (16). Aims two and three, relating to clinician behaviour, were initially coded using the domains outlined in the theoretical domains framework (14). Thematic analysis of all coded data was then performed to determine final themes for each study aim.

Two researchers (HJ and NM), both with prior experience in coding and using the theoretical domains framework independently coded three interviews. Coding was compared and discussed, and sufficient consistency was observed between the two researchers after two rounds of discussion to allow one researcher (HJ) to code the remaining interviews. Themes were initially developed by HJ, before discussion with MH, NM, and SF to reach consensus. The resultant themes were then sent to all authors for overall discussion and final consensus.

Mapping of implementation strategies to address identified barriers

The Behaviour Change Wheel (17) was used to map the identified barriers to using the booklet to appropriate implementation strategies, to increase use of the booklet in clinical practice. Identified barriers were mapped to the COM-B model and the theoretical domains framework to identify the behavioural domains requiring change. Appropriate behavioural change techniques and implementation strategies were selected with consideration of the APEASE criteria (Affordability, Practicability, Effectiveness and cost-effectiveness, Acceptability, Side-effects and safety, Equity) (17) and identified suggestions from general medical practitioners to improve implementation of the intervention. Proctor's specifications were used to define the implementation strategies (18). One researcher (HJ) performed the initial mapping, which was then discussed and finalised with the research team.

Results

General practitioner participants

Twenty-one general medical practitioners were approached to participate. Of these, four (19%) declined as they either did not consistently see patients with low back pain, or did not want to participate. Of the 17 general medical practitioners that participated in the study, 14 (82%) completed the interview at the end of the study; three general medical practitioners could not be contacted. Of the 14 general medical practitioners completing the study, 57% (8/14) were female, with a mean (SD) of 16.6 (10.0) years in clinical practice. Sixty-four percent (9/14) reported performing continuing education in low back pain in the last two years. Only two general medical practitioners (14%) reported a special interest in low back pain. All general medical practitioners either completely disagreed or disagreed with the statements 'Imaging of the lumbar spine is useful in the workup of patients with acute low back pain' (8/14 completely disagreed, 6/14 disagreed) and 'I am likely to order imaging for acute low back pain' (13/14 completely disagreed, 1/14 disagreed). Practice locations were in a spread of low (2/14; 14%), medium (5/14; 36%), and high (7/14; 50%) socioeconomic areas, as determined by postcode and socioeconomic index (19).

How general medical practitioners used the booklet (adoption)

General medical practitioners participated in the study for between five to 11 months (mean, SD: 8.4, 2.2), depending on their date of recruitment into the study. They used the booklet between zero to 15 times (mean, SD: 5.2, 4.1) each, for a total use across all clinicians with 73 low back pain patients. The patient record form was fully completed for 71% of patients (52/73), with partial data available for the rest.

Most patients with whom the booklet was used had low back pain presentations of less than 2 weeks duration (30/52, 57.7%, 95%CI: 44.2, 70.1). Previous episodes of low back pain had been experienced by 39 of 57 patients (68.4%, 95%CI: 55.5, 79.0). Prior imaging for low back pain was performed in 16 of 57 patients (28.1%, 95%CI: 18.1, 40.8). General medical practitioners reported concern of underlying serious pathology in four of 57 patients (7.0%, 95%CI: 2.8, 16.7).

General medical practitioners commonly customised the booklet to the patient and either discussed the booklet throughout the consult (27/60, 45.0%, 95%CI: 33.1, 57.5), or gave the customised booklet to the patient to read at the end of the consult (25/60, 41.7%, 95%CI: 30.1, 54.3). For the remaining patients, general medical practitioners did not customise the booklet and either handed it to the patient to take home (4/60, 6.7%, 95%CI: 2.6, 15.9), or discussed the booklet with patients who subsequently declined to take it home (4/60, 6.7%, 95%CI: 2.6, 15.9). This quantitative data was consistent with themes arising from the interviews (Table 1). General medical practitioners who did not use the booklet during the consult but provided it to the patient to read at home thought there was value in providing the patient with further information; but thought they had either already discussed what they needed with the patient using their own strategies, or were running short of time for further discussion.

Most general medical practitioners reported that they found the booklet useful, and would be likely to continue using it in the future, particularly with specific patients: those that requested imaging or required

more reassurance or information about their low back pain.

“I genuinely think it’s [the booklet] really useful and I’ll continue to use it” (GP10)

“I’d certainly consider using it [the booklet], but not necessarily with every single patient that I see with back pain” (GP8)

One general medical practitioner did not use the booklet during the study and two general medical practitioners reported that they would be unlikely to continue to use the booklet. These general medical practitioners reported that they already felt confident that patients would follow their advice without additional resources and they either don’t keep paper booklets in their office, or they would forget to use it.

“I suspect that there’d be more of me forgetting to use it [the booklet] again [moving forward]” (GP11)

Barriers and facilitators impacting use of the booklet (feasibility)

Themes relating to barriers and facilitators impacting on general medical practitioners’ use of the low back pain management booklet are presented in Table 2. Key barriers included the ability to conveniently store and remember to use the booklet, and a lack of time during the consult. Facilitators included the ease of use of the booklet, and the perceived usefulness of the booklet to help educate and reassure the patient in a time efficient manner, particularly for clinicians who felt less confident in their ability to manage patients with low back pain. In particular, the request for imaging by the patient acted as a reminder to use the booklet.

How helpful general medical practitioners found the booklet (appropriateness)

Imaging referral was provided to six of 57 patients (10.5%, 95%CI: 4.9, 21.1) with whom the booklet was used; however, suspicion of underlying serious pathology was reported in three of these patients. Of the 53 patients with no suspicion of underlying serious pathology, three received imaging referrals that were likely to be non-indicated (5.7%, 95%CI: 1.9, 15.4).

The perceived effects on low back pain management of using the booklet, as identified by general medical practitioners (Table 3), were largely consistent with how the booklet had been designed to work (Figure 1) (8). Most general medical practitioners reported that they felt using the booklet improved their ability to manage patients with low back pain without using non-indicated imaging, particularly with patients who were requesting imaging or needed more reassurance. Some general medical practitioners already felt confident managing low back pain without non-indicated imaging, and didn’t feel using the booklet greatly impacted them. Three general medical practitioners reported some uncertainty as to whether using the booklet would reduce patient pressure for imaging, particularly if the patient had a strong desire for imaging.

Suggestions for improvement to the booklet or associated clinician training

Suggested improvements to the booklet: Very few suggestions were made about improving the content or layout of the booklet. One general medical practitioner suggested a checklist of specific symptoms indicating the need for imaging instead of the decision-tree. Other suggestions for improvement (e.g. links to other low back pain information sources) were already present in the booklet but were overlooked by general medical practitioners. Further emphasis of these features in the booklet during clinician training is indicated to increase awareness of them.

Suggested improvements to the implementation of the low back pain management booklet: The most commonly reported barrier to using the booklet was the ability to store and remember to use a hardcopy version. General medical practitioners suggested a digital version of the booklet would facilitate use.

“I generally find that paper resources are harder to use than computer-based resources because you’ve got to stop and find them in drawers of other paper resources. So perhaps just a PDF version of the same thing would be more useful” (GP11)

“I think looking forward, a booklet like that must have something online because you’re going to lose a lot of doctors that just don’t use things that are paper based, they don’t look for it, it’s not what they do, not how they’ve been taught” (GP12)

Suggestions for format of a digital version varied including: 1) an A4 information handout to be printed off the computer and handed to patients; 2) a digital version of the booklet that could be worked through with the patient in a similar fashion to the hardcopy booklet, and printed out as needed; or 3) a digital copy of the booklet which could be emailed to patients. Digital versions were suggested to be integrated within practice management software with built-in electronic reminders, to further trigger memory to use the booklet. General medical practitioners reported that they were quite accustomed to using digital documents and printing information sheets for patients, and would be likely to use the booklet in the same way.

“The practice software does have information sheets that are built into the software as well, so I mean if the booklet could be incorporated in that way it would be helpful. Because we do print off information sheets” (GP6)

“You know something that’s easy to access and easy to print off would be doable. So I’ve got some things saved, some PDF’s saved in a share drive that I can access pretty easily, so yes potentially having it [the booklet] that way would be good” (GP9)

Additional benefits to a digital version of the booklet were suggested, such as decreased cost, increased accessibility, and keeping content up-to-date.

Some general medical practitioners saw benefit in a hardcopy version of the booklet being available to patients in the waiting room in addition to the digital version.

“I think so, absolutely [patient pick up the booklet in the waiting room and bring to the consult]. I mean I don't want to waste your money printing lots of them but I think it could be worthwhile, and the other thing is that someone could actually pick them up if they're coming to see you about that particular problem. They could see that [the booklet] there, and pick it up and bring it in with them, and then they're ready to discuss it with you” (GP3)

Suggested improvements to the training session: Most general medical practitioners felt the face-to-face training provided was adequate, and they were able to use the low back pain management booklet effectively. The need for face-to-face training was seen as a potential barrier, and an online option, such as a pre-recorded video or webinar, was suggested. Two general medical practitioners reported concerns that online training may not be suitable, as it may get lost in the volume of online information they receive, or clinicians may not be motivated to engage in it. Two general medical practitioners suggested that increased information on appropriate examination routines within the training session would be useful. One general medical practitioner requested more information on possible management strategies such as exercises.

Mapping of barriers to implementation strategies

The mapping of the identified barriers to implementation strategies is presented in Table 4 with definitions of the implementation strategies outlined in Additional file 7. Additional implementation strategies selected in this process included: development of a digital version of the booklet to allow for easy storage; hardcopy booklets available for patients in the reception area; reminders to use the booklet through the practice management software; audit and feedback of imaging referral behaviour to clinicians; and selection of a local opinion leader to champion use of the booklet. The proposed implementation strategies were selected to increase the adoption, feasibility, and fidelity of use of the booklet.

Discussion

This study found varied use of the low back pain management booklet by general medical practitioners in clinical practice. Low users of the booklet were more likely to be confident in their management of low back pain and reported not needing additional resources. General medical practitioners were more likely to use and continue to use the booklet when patients requested non-indicated imaging or needed more reassurance. Most general medical practitioners thought the low back pain management booklet was appropriate for clinical practice, and likely to work as designed to help improve low back pain management and reduce non-indicated imaging. The booklet was feasible to use in clinical practice; however, important barriers to use were identified, including available storage and remembering to use the booklet. A digital version of the booklet was strongly favoured by all general medical practitioners. Implementation strategies were identified to increase use of the booklet in clinical practice.

Strengths of this study included the use of both quantitative and qualitative methods to assess the feasibility of use of the booklet in clinical practice. Quantitative data showed variable use of the booklet

by general medical practitioners and qualitative analysis identified and explored barriers and facilitators potentially influencing use. Implementation strategies to address identified barriers were selected using a theory-informed model. The hard-copy format of the booklet was identified by general medical practitioners as one of the main reasons they did not use it. This is consistent with concerns raised during development (8), and previous research utilising hard-copy patient education material in an intervention to improve general medical practitioner management of low back pain (20). Hard-copy patient education booklets have been successfully used in clinical practice for interventions to reduce antibiotic prescriptions for upper respiratory tract infections (21, 22). This discrepancy in results may be related to the more frequent presentation of upper respiratory tract infections to general medical practitioners compared to low back pain, facilitating clinician memory of the educational resources (23).

A limitation of this research was the lack of feedback from patients regarding their experience in receiving the booklet. Future research would benefit from exploring patient feedback to assess how useful they found the booklet. Feedback from health consumers during booklet development (8) indicated that they liked the hard-copy booklet and would be likely to continue to refer to the booklet after the consult. Similarly, in the Finland study (described below), approximately 50% of patients receiving a translated version of the booklet during a clinical consult reported that they found the booklet useful (10). Another possible limitation is the low usage of the booklet by some of the participating general medical practitioners. On average general medical practitioners used the booklet less than once per month (mean usage: 5 booklets in 8 months); however, it is possible that this usage may reflect the low volume of low back pain patients seen by clinicians rather than a lack of usage of the booklet. Qualitative reporting from the general medical practitioners on the approximate percentage of low back pain patients with which they used the booklet varied, from using the booklet with no patients (one general medical practitioner) to using it with all presenting patients (three general medical practitioners). Eight of the general medical practitioners reported using the booklet with between 10 to 40% of low back pain presentations. Barriers to using the booklet were identified in this study and implementation strategies have been developed to increase the use of the booklet moving forward.

Qualitative responses in this study are consistent with those from a Finnish study using a translated version of the same booklet (10). Eighty percent of healthcare practitioners (general medical practitioners and physiotherapists) who used the booklet in clinical practice believed using the booklet helped them to manage low back pain without non-indicated imaging and 75% said they would continue to use the booklet (10). Barriers to using the booklet were also similar, including a lack of time and remembering to use the booklet (10). In both the current study and the Finnish study (10) some practitioners thought that the booklet may be less useful for patients with strong beliefs in the need for imaging. However, general medical practitioners in the current study were more likely to use the booklet with patients who requested non-indicated imaging or required more reassurance that imaging wasn't required. During development of the intervention (8) it was identified that a key barrier to the appropriate use of imaging by clinicians was patients requesting imaging or believing in the importance of imaging. Therefore, it seems likely that using the booklet with these patients may help to reduce this barrier. Poorer imaging beliefs in patients have also been shown to be associated with particular demographic characteristics such as patients with

older age, lower educational levels, and those coming from cultural backgrounds other than Britain, North America, Europe, or Australia (24). Therefore, it is important that clinicians are informed during training that the booklet may be more useful in these specific populations, and that the booklet is available in a suitable format to be useful to these patients.

The results of this study will be used to further inform the development and implementation of an intervention to reduce non-indicated imaging for low back pain in general medical practice. The identified implementation strategies to increase intervention use will be incorporated into the planned studies to assess the effectiveness of the intervention in clinical practice. Options for a digital version of the low back pain management booklet will be explored to aid clinician storage and recall. To allow clinicians to continue to educate and reassure patients during a consultation, a digital version of the booklet that can be worked through on the computer in a similar manner to the hard-copy version will likely be necessary. A printable version will be developed to allow clinicians to provide the patient with a customised management plan and written reinforcement of their advice, which was seen as important by both general medical practitioners and patients (8).

Conclusion

General medical practitioners reported that the low back pain management booklet was useful for clinical practice, particularly with patients requesting imaging. General medical practitioners thought using the booklet could help to improve patient management and reduce patient pressure to refer for non-indicated imaging. Key barriers to using the booklet included a lack of storage space and remembering to use it, making a digital version of the booklet preferable. Strategies to increase use of the booklet were identified and will be incorporated into future implementation measures. This study is one part of a series designed to develop and test an intervention to reduce non-indicated imaging for low back pain; a successful intervention would decrease healthcare costs and improve patient management.

Declarations

Ethics approval and consent to participate: Ethics approval was granted by Macquarie University Human Research Ethics Committee, reference number: 5201600298. All participants consented to participate.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare they have no competing interests.

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Authors' contributions: All authors made substantial contributions to all of the following: (1) conception and design of the study; data interpretation and conclusions; (3) revision of the manuscript; and (4) final approval of the version to be submitted. In addition, HJ recruited and trained participants, administered the study, and performed the interviews; HJ, NM, MH and SF collated and analysed the data; and HJ drafted the initial manuscript.

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Tables

Table 1: Themes related to ‘How general medical practitioners used the booklet’

Theme	Quotes
<p>Used as designed throughout the consult to: 1) show patients why they don't require imaging, 2) demonstrate key educational messages, and 3) provide a customised patient management plan</p>	<p>“I go through it [the booklet] together with them [patients], so I actually use it as an educational tool” (GP2)</p> <p>“I like the diagrams that are in there [decision tree at beginning] that I can sort of go through and say, well you don't have all these symptoms, so you don't need any imaging” (GP2)</p> <p>“Yes, that's not bad [to have somewhere to write patient management] because you're not giving them necessarily a prescription for prescription drugs, so it doesn't hurt to write something down, some instructions, and when to come back in for review” (GP8)</p>
<p>Used at the end of the consult only, by customising the management plan and providing it to the patient</p>	<p>“Mostly at the end of the consultation, I'd talk to them about it all and then at the end I'd remember to use it [the booklet], and go through it then and fill in some information” (GP9)</p>
<p>No customisation, given to the patient as a hand-out to read at home at the end of the consult only</p>	<p>“If I thought that someone didn't need imaging, I simply, towards the end of the consult, gave it [the booklet] to them. I gave it to them to take and read, and in our practice, there was a follow-up appointment made at the time, and at that time we discussed the content of the book” (GP5)</p>
<p>Used throughout consult to discuss the key messages, but not customised or given to the patient</p>	<p>“Whilst I did go through it [the booklet] with a few patients who were half-interested in looking at it, they didn't want to take it away, they just thought that they didn't want the material but were happy just to talk about it” (GP6)</p>

Table 2: Themes related to ‘Barriers and facilitators impacting use of the booklet’

Theme	Facilitator or Barrier	Quotes
Storage location and remembering to use the booklet	Facilitator: Storing the booklet in a visible location with convenient access	"Yes I did find the booklet OK to use, and because it was somewhere where I can reach it, it was good" (GP2)
	Barrier: Nowhere to store the booklet with good visibility or convenient access	"In offices you just lose pieces of paper and little booklets and all of the rest. You don't have room to store everything" (GP4)
	Barrier: Forgetting to use the booklet	"I only used the one and I think that's probably not the booklet, but because it's difficult to remember" (GP1)
Clinician having the necessary knowledge/ skills to use the booklet	Facilitator: Training or clinician prior knowledge was sufficient to use the booklet	"I think it [the training] was absolutely fine, the booklet's quite self-explanatory, it's quite clearly laid out so that was fine" (GP1)
	Barrier: Some points were missed in the training session, and the booklet wasn't used completely	"Yes, I think I missed a few points [in training] so that's what I failed to explain fully to my patients" (GP14)
Perceived usefulness of the booklet within a consult	Facilitator: The information in the booklet is appropriate and useful for patient education	"My general experience [with the booklet] was that it was very helpful, that it helps explain this to the patients really well. It was very didactical, it followed a logical order and I found it very useful" (GP7)
	Facilitator: The booklet was used because the clinician felt the patient required more education or reassurance	"I think for instance I felt [in the patients that did use the booklet with] there was an expectation that was either voiced or implied of imaging, and so to sort of counter that view the booklet was handy" (GP5)
	Barrier: Booklet was not needed as current clinician method of managing clinical consults sufficient	"So I think that the main reason that I didn't use the booklet more is that I do feel quite confident in being able to sort out when to use imaging" (GP1)
	Barrier: Clinician felt the patient didn't require more education or reassurance	"Not everybody comes and asks for an X-ray, some of them understand it's muscular not underlying bone pathology there you know" (GP13)
	Barrier: Low back pain an uncommon presentation for the clinician	"I might see a back pain patient you know, maybe only once a fortnight because I don't have that big throughput" (GP3)
Time efficiency of	Facilitator: Use of the	"I think also at least in a couple of cases

using the booklet in a consult	booklet improved time efficiency in the consult	[when used the booklet] that I recall, I was very much pushed for time. It's handy to say, here it is, have a read" (GP5)
	Barrier: Not enough time in a consult to use additional resources	"The time factor [why didn't use the booklet with other patients], because if lots of patients are waiting, if you don't have a lot of time, then I didn't go into this much detail" (GP13)
	Barrier: Using the booklet took additional time in the consult	"I mean it [using the booklet] did add time for me. I could imagine that there could be ways to do it that it wouldn't, but that's just not how I, I suppose, talk to people" (GP9)
Perceived receptiveness of the patient to receiving the booklet	Facilitator: Clinician felt the patient would be receptive to receiving the booklet	"Yes they [the patients] liked it [the booklet], I think patients always like to go away with something, so yes I think they liked it" (GP9)
	Barrier: Clinician felt the patient would not be receptive to receiving the booklet	"Whilst I did go through it [the booklet] with a few patients who were half-interested in looking at it, they didn't want to take it away" (GP6)

Table 3: Themes related to 'How helpful general medical practitioners found the booklet'

Theme	Quotes
Improved clinician knowledge of how to manage patients with LBP	<p data-bbox="467 174 1549 247">“I feel like having read the information [in the booklet], it’s something that I’ve incorporated into the talk I give to patients with back pain” (GP6)</p> <p data-bbox="467 268 1549 373">“It [the booklet] also helped me, remind me of a few things which I forget sometimes because I can’t necessarily always remember all these things or sometimes I just focus more on one thing or the other” (GP7)</p>
Improved clinician-patient communication and management	<p data-bbox="467 394 1549 468">“It was useful to have that approach [in the booklet] to show them [the patients] when we might need it [imaging] and when we don’t need it” (GP5)</p> <p data-bbox="467 489 1549 594">“I actually found the booklet really comprehensive. I found it really helpful [to reduce unnecessary imaging], so I don’t think you need, I mean I wouldn’t use other things” (GP2)</p> <p data-bbox="467 615 1549 688">“Yes, yes, it allows you to initiate it [conversation with patient that imaging isn’t necessary]” (GP12)</p>
Perceived to improve patient understanding and acceptance	<p data-bbox="467 720 1549 825">“I think the booklet was, for me, a quick way of explaining the rationale behind not imaging, and the patient seemed to appreciate this to a greater depth when given the booklet” (GP5)</p> <p data-bbox="467 846 1549 919">“I think if you did have someone who was quite adamant to want imaging it [the booklet] would be then more useful for those certain patients” (GP6)</p> <p data-bbox="467 940 1549 1171">“I find that when I did that [use the booklet], it had a fairly good response with the patients because they realise the importance of it. First of all it was reassuring for them that they don’t have something that serious so that they need an X-ray. On the other hand it also gives them a framework of what we can be doing, or can be done for them, to alleviate their back discomfort or pain and that this is something quite manageable without the need for a lot of investigations” (GP7)</p>
Reinforced clinician management advice, both during and after the consult	<p data-bbox="467 1192 1549 1297">“I think giving people written data, you know like a written pamphlet, gives a bit more credibility to what you say, so you can educate people about not needing imaging” (GP11)</p> <p data-bbox="467 1318 1549 1497">“It [the booklet] probably backs me up, makes me feel more confident, and I think I’ve got some research backing me up and then I can counter it [patient request for imaging], and I can say well look there’s this and they’ve done this, and they’ve looked at this, and if you’re worried then this can be our plan” (GP3)</p> <p data-bbox="467 1518 1549 1654">“I think they [the patients on receiving the booklet] appreciated that it wasn’t just my opinion that they didn’t need medication, or an X-ray, and it was acknowledged by, if you like, another valid source, that such investigations were unnecessary” (GP5)</p>
Confident in current ability to manage patient with low back pain without non-indicated imaging, additional resources not required	<p data-bbox="467 1675 1549 1812">“I think it [the booklet] would be reassuring for lots of clinicians but for me personally I think I can communicate my confidence to the patient and I might be wrong but I feel they’re OK with me just explaining why they don’t need anything” (GP1)</p> <p data-bbox="467 1833 1549 1938">“I’m pretty confident that I don’t need to do the imaging in the first place, so I don’t know whether it [using the booklet] makes a tremendous difference for me really” (GP7)</p>

Uncertain whether using the booklet will impact patient pressure for imaging

"I guess it [the booklet] helps reinforce the message for people who are accepting the message, but I think the people that really have come in with an agenda and you can't sway them, the booklet's not going to sway" (GP4)

Table 4: Mapping barriers to using the booklet to implementation strategies

Barrier	COM-B/TDF Domain	Behavioural change techniques	Implementation strategy (EPOC taxonomy)	Implementation strategy (detail)
Nowhere to store the booklet with good visibility or convenient access	Physical opportunity/Environmental	Adding objects to the environment	Educational materials	Patient education booklet provided in both digital and hardcopy formats
			Environment	Areas identified or created to place booklets (waiting room, office space)
Forgetting to use the booklet	Psychological capability/Memory	Adding objects to the environment	Educational materials	Patient education booklet provided in both digital and hardcopy formats
		Prompts/cues	Reminders	Automatic reminders to use booklet through practice management software
		Information about social and environmental consequences	Educational outreach visit	Strategies to remember to use the booklet discussed in the individualised training session for the clinician
Some points were missed in the training session, and the booklet wasn't used completely	Psychological capability/Knowledge	Information about social and environmental consequences	Educational outreach visit	Individualised training session for clinician with discussion of key points and modelling use of the booklet
			Educational materials	Training resources provided for future clinician reference (low back pain)

				guidelines, training video and sheets to use the booklet)
Booklet was not needed as current clinician method of managing clinical consults sufficient	Reflective motivation/Beliefs about capabilities	Feedback on outcomes of behaviour	Audit and feedback	Low back imaging referral audit, provided to the clinician (individual and population data) to show current imaging referral behaviour
		Feedback on outcomes of behaviour	Educational outreach visit	Individualised training session for clinician with discussion of how the booklet may help in different scenarios
		Credible source	Local opinion leader	Champion within each clinic to encourage active engagement with decreasing non-indicated imaging for low back pain
Clinician felt the patient didn't require more education or reassurance	Reflective motivation/Beliefs about consequences	Information about social and environmental consequences	Educational outreach visit	Individualised training session for clinician with discussion of patient beliefs and need for reassurance
Not enough time in a consult to use additional resources	Physical capability/Physical skills Reflective motivation/Beliefs about consequences	Instruction on how to perform a behaviour Demonstration of the behaviour	Educational outreach visit	Individualised training session for clinician with modelling of how to use the booklet and educate the patient within a standard consult

Clinician felt the patient would not be receptive to receiving the booklet	Reflective motivation/Beliefs about consequences	Information about social and environmental consequences	Educational outreach visit	Individualised training session for clinician with discussion of patient receptiveness for educational resources
		Credible source	Local opinion leader	Champion within each clinic to encourage active engagement with decreasing non-indicated imaging for low back pain

Figures

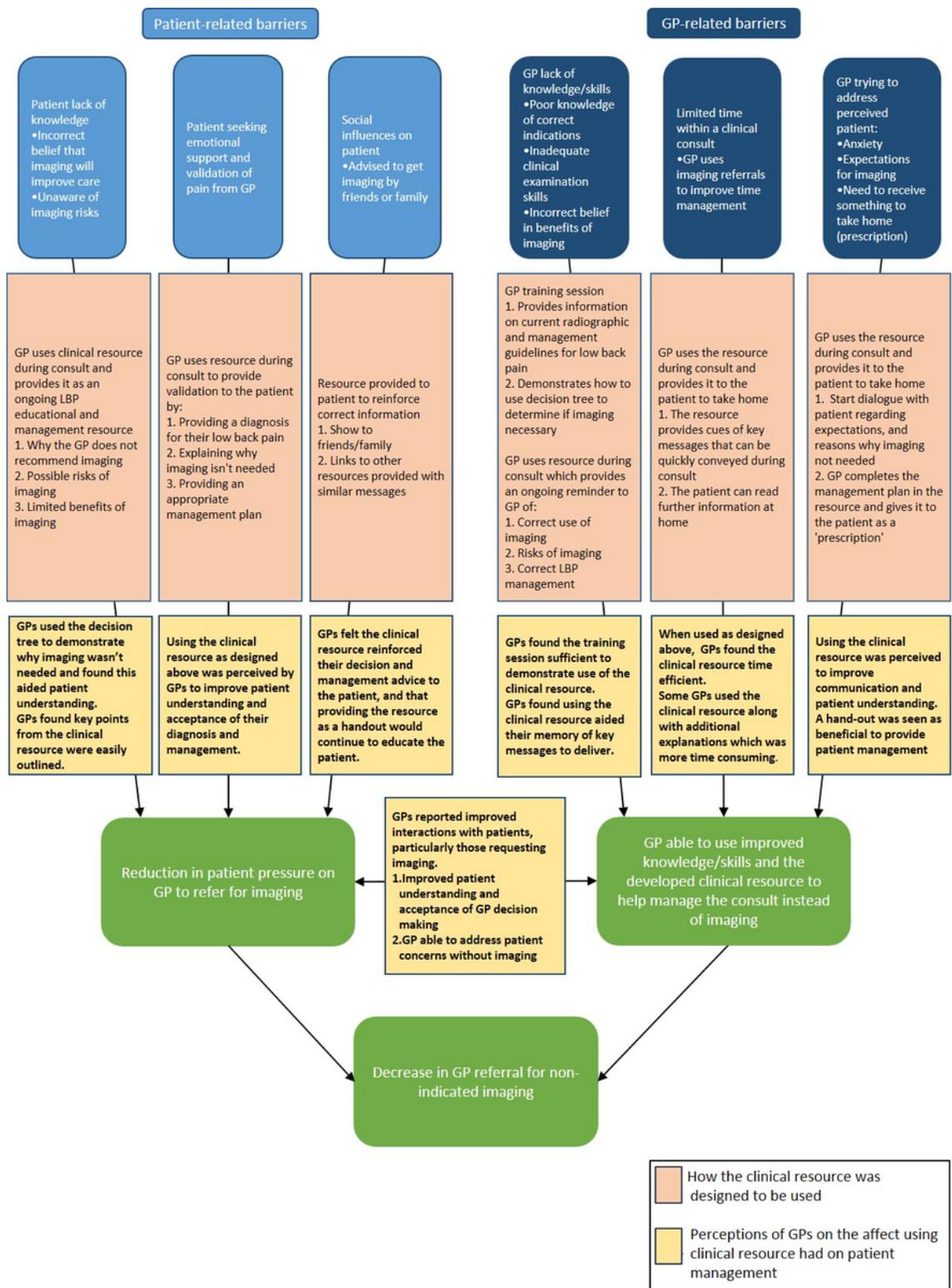


Figure 1

General medical practitioner perceptions of the usefulness of the booklet This figure has been adapted with consent from Figure 3 in 'Using behaviour change theory and preliminary testing to develop an implementation intervention to reduce imaging for low back pain' (8): a concept map of how the intervention was designed to target identified barriers to appropriate use of imaging for low back pain.

General medical practitioner perceptions of the usefulness of the booklet have been added in the yellow boxes.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Additionalfile7Implementationstrategy.docx](#)
- [Additionalfile6Patientrecord.docx](#)
- [Additionalfile5Questionnaire.docx](#)
- [Additionalfile4TIDieRChecklist.docx](#)
- [Additionalfile3COREQchecklist.docx](#)
- [Additionalfile2Training.docx](#)
- [Additionalfile1Figure.docx](#)