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Dissemination Strategies for Clinical Practice Guidelines Focused on Imaging for Low Back Pain: A Scoping Review

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ABSTRACT

Objective: To investigate campaigns developed for the dissemination of clinical practice guidelines for the appropriate use of imaging for low back pain.

Method: A scoping review was conducted to identify resources which report on dissemination strategies for low back pain imaging clinical practice guidelines. A database search was conducted of MEDLINE, CINAHL, Cochrane Reviews, Scopus, Google, Google Scholar and National Health Service Websites. The full text of relevant resources identified from the title and abstract screen were retrieved and assessed for inclusion eligibility.

Results: The initial search identified 1087 resources. Following a title, abstract and full-text screen, 26 resources were included for final synthesis. Relevant data were extracted and categorised into the following three key components: (1). Location of the campaign, (2). Campaign details, (3). Dissemination strategies as defined by five methods (educational resources, presentations and interactive interventions, media form, clinical decision support, and other). Educational resources and interactive interventions were the most commonly used strategies, with media resources implemented the least.

Conclusion: Low back pain imaging clinical practice guidelines have been disseminated to clinicians at regional and national levels; however, there are few international campaigns. The comprehensive list of dissemination strategies included in this study has created a foundation to facilitate the design of future campaigns to enhance the scope of trialled strategies to consider the complexities of clinical practice and its ever present need to change.

1 | Introduction

The overuse of medical imaging for low back pain (LBP) has been well documented in recent literature (Buchbinder et al. 2020; Hill et al. 2023; Morgan et al. 2019) despite clinical practice guidelines recommending its conservative and judicious use (L. Chou et al. 2018; Lin et al. 2020). Imaging is regarded as a low-value investigation for non-specific LBP, a condition that often lacks an identifiable pathological cause. Despite this, research indicates that imaging is routinely used in the management of non-specific low back pain. This leads to unnecessary and potentially harmful interventions in response to incidental findings and using healthcare resources without improving patient outcomes (Kjelle et al. 2024). A recent systematic review found that people who received imaging for LBP incurred higher medical costs, used more healthcare services,

Summary

- Campaigns promoting LBP imaging guidelines employed diverse methods, including educational resources, workshops, media campaigns, and clinical decision support, but sustaining long-term behaviour change remains a challenge.
- Entrenched habits, cultural norms, and patient expectations drive inappropriate imaging practices, requiring strategies that align with clinicians' values and beliefs while addressing systemic barriers.
- Successful strategies from other fields, such as social media campaigns in knee injury management, demonstrate the potential for targeted messaging to shift clinical practices and reduce unnecessary healthcare costs.
- Future campaigns could adopt co-designed interventions to address biases, systemic incentives, and clinician engagement, ensuring better adherence to guidelines and improved patient care.

and required more time off work compared with those who received no imaging (Kjelle et al. 2024). However, despite these findings, and the clear guidance provided by clinical guidelines, there is an exponential growth of imaging in LBP management (Buchbinder et al. 2020; Foster et al. 2018; Suman et al. 2021).

Clinicians encounter several challenges in following clinical practice guidelines for medical imaging for LBP. A significant barrier is the public perception that imaging is required for accurate diagnosis and treatment planning, which creates pressure on clinicians to deviate from guidelines (Buchbinder et al. 2020; R. Chou et al. 2011; Hall et al. 2021; Sharma et al. 2020). Clinicians also have the added concern of potential litigation if they miss rare but serious pathologies such as fractures or malignancies, adding another layer of complexity to guideline adherence (Foster et al. 2018; Hall et al. 2019; Jenkins et al. 2018; Sharma et al. 2020; Zhao et al. 2024).

Efforts to reduce unnecessary imaging have been the focus of various systematic reviews, many of which have evaluated campaigns aimed at promoting the appropriate use of imaging for LBP (Belavy et al. 2022; Jenkins et al. 2015; Kovacs et al. 2018; Liu et al. 2018; Tzortziou Brown et al. 2016; Zhao et al. 2024). However, these reviews predominantly focus on outcomes, such as a reduction in imaging rates, rather than on the specific dissemination strategies used to promote adherence to guidelines. Understanding the strategies that have been used is an important step in identifying the necessary components to drive a sustained behaviour change in clinical practice.

This scoping review aims to explore the dissemination strategies used in campaigns designed to improve the implementation of clinical practice guidelines in imaging for low back pain.

2 | Methods

In this review, imaging is defined by the search terms in Table 1, including all medical imaging methods relevant to LBP. This scoping review was informed by the five-step methodological framework developed by Arksey and O'Malley (2005), and refined by Levac et al. (2010), including (1) identifying the research question, (2) identifying relevant resources, (3) selecting, (4) charting the data, and (5) collating, summarising, and reporting the results. To ensure a robust review was conducted, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA) principles were followed (Tricco et al. 2018).

2.1 | Identifying the Research Question

We developed a broad research question to inform a conceptually defined and targeted search strategy (Arksey and O'Malley 2005; Levac et al. 2010). The research question was What strategies have been used to disseminate LBP imaging CPGs for clinicians?

2.2 | Identifying the Relevant Resources

We identified key search concepts that reflect the research question and conducted a preliminary search on the MEDLINE, CINAHL, Scopus and Cochrane databases. The research team discussed the first 10 papers and additional papers of interest identified in a free search. The search strategy presented in Table 1 was refined to the following key search areas: imaging, low back pain, dissemination, and clinicians. The initial search was undertaken in MEDLINE, CINAHL, Cochrane Reviews, Scopus, Google, Google Scholar and National Health Service Websites for the following countries: the United Kingdom, New Zealand, Sweden, Australia, Norway, the United States of America, and Denmark (based on our database and Google search results). The first 100 results from our Google and Google Scholar searches were screened. One researcher (SH) independently assessed the titles and abstracts of records identified in the initial search for relevance, with a high threshold for abstract screening. Relevant records were retrieved, and the full text was assessed for inclusion eligibility.

2.3 | Selection

Inclusion and exclusion criteria were considered in the context of the research question to establish an iterative process of resource selection (Arksey and O'Malley 2005; Levac et al. 2010). Inclusion criteria were published and grey literature available in English, or clinical guideline dissemination strategies (either as a primary or secondary aim) that informed the appropriate use of imaging for low back pain in national, regional or international campaigns. Campaigns were eligible for inclusion when directed at health care providers as primary or secondary populations, as long as the data for the health care providers was presented separately. Resources were excluded when presented as decision aids (e.g. clinical pathways or referral forms, but with no dissemination strategy) were intra-practice campaigns, individual services, or local strategies. Campaigns that exclusively targeted the public were also excluded. Two articles were sent

TABLE 1 | Search terms.

	Key concept	Search terms
1	Imaging	imaging OR radiology OR scan OR scans OR x-ray OR x-rays OR 'magnetic resonance imaging' OR MRI OR MRIs OR ultrasound OR ultrasounds OR endoscopy OR endoscope OR 'tactile imaging' OR 'computer tomography' OR 'computer tomography' OR 'CT scan' OR 'CT scans' OR diagnostic OR 'unnecessary imaging' OR 'inappropriate imaging'
2	Low back pain	'low back pain' OR 'lower back pain' OR LBP OR 'lumbar pain' OR lumbago
3	Dissemination	dissemination OR disseminating OR implementation OR implementing OR 'knowledge translation' OR 'knowledge translating' OR distribution OR distributing OR spreading OR spreads OR communication OR campaign OR campaigns OR campaigning OR strategy OR strategies
4	Clinicians	clinician OR clinicians OR practitioner OR practitioners OR therapist OR therapist OR 'health care worker' OR 'health care workers' OR physician OR physicians

to each author and independently screened for inclusion with reasoning recorded. The results were discussed, and inclusion criteria refined.

2.4 | Charting the Data

Included resources were reviewed using a two-phase qualitative content analysis (Arksey and O'Malley 2005; Levac et al. 2010). In the initial phase, we extracted information on the study (author, year, country, and location). The second phase included a re-reading of each resource in full and the extraction of the campaign information (campaign name, purpose, population, duration, CPGs referenced, dissemination strategies, and key message). The research question and inclusion criteria informed this process. This data is charted in Table 2 and used to identify three key components. The first key component (location) regards the country where the campaign was produced in. The second key component (campaign details) is directly related to the question and includes population, duration, and the CPGs referenced. The final key component identified five potential methods of dissemination, including: (1) educational resources (e.g. booklet, poster, infographic, package, video, and website), (2) presentations and interactive interventions (e.g. conference, symposium, webinar, seminar, workshop, training session, and meeting), (3) media form (e.g. press release, newspaper, TV commercial, podcast, and social media), (4) clinical decision support (CDS) (e.g. alert, reminder, and best practice card), and (5) other (e.g. audit, follow-up, DVD, and feedback).

2.5 | Collating, Summarising, and Reporting the Results

This step involved the synthesis of all extracted information to present a comprehensive record of strategies that have disseminated LBP imaging CPGs (Arksey and O'Malley 2005; Levac et al. 2010). The synthesised findings informed the summary and implications of this study.

2.6 | Ethical Approval

This scoping review did not require ethical approval.

3 | Results

The search was completed by February 2024. Details of the database and grey literature searches and the screening process are shown in Figure 1. The initial database search identified 1013 resources, and 74 were identified from the grey literature, making a total of 1087. Following the screening of the inclusion criteria, six additional resources were identified from a hand search of included systematic reviews, resulting in 26 resources included for the final synthesis. Two articles were discussed prior to being excluded as their selection status was initially inconclusive and required cross-checking.

3.1 | Location

The campaigns included were conducted in Canada (n = 3) (Ammendolia et al. 2004; Cheng et al. 2017; Khoury et al. 2019), Australia (n = 7) (Buchbinder and Jolley 2007; Coombs et al. 2021; French et al. 2013, 2022; Jenkins, French, et al. 2022; Jenkins, French, et al. 2022; Morgan et al. 2019), United States of America (n = 5) (Rezaii et al. 2020; Schectman et al. 2003; K. Y. Wang et al. 2018, 2021; Zafar et al. 2019), United Kingdom (n = 7) (Buchbinder et al. 2020; Dey et al. 2004; Eccles et al. 2001; Kerry et al. 2000; Matowe et al. 2002; Oakeshott et al. 1994; Robling et al. 2002), Netherlands (n = 1) (Suman et al. 2018) and Sweden (n = 1) (Schröder 2021). Refer to Table 2 for further details.

3.2 | Campaign Details

Twenty-four campaigns were identified in the 26 included resources.

TABLE 2 | Campaign details and methods of dissemination.

Author Year published Country	Campaign name	Campaign purpose	Population Duration Location	Clinical practice guideline(s) referenced	Method of dissemination	Key message for imaging
Ammendolia et al. 2004 CA	Ontario educational intervention strategy for low back pain imaging	To provide an overview on the evidence for radiography use and the associated potential risks.	Practitioners and public Sustained: 1998 Regional	Multiple guidelines mentioned; unable to identify	Educational resource: Package Interactive intervention: Workshop, meeting, feedback Media: Newspaper	Use guidelines to guide use of radiography tools for low back pain.
Buchbinder and Jolley 2007 AUS	Victorian work cover authority public health campaign	To provide focused unambiguous supportive advice about the management of simple acute low back pain.	Practitioners and public Sustained 1997–1999 Regional	The back book UK 1996: RCGP guidelines	Media: TV commercial	Avoid unnecessary diagnostic testing and treatment.
Buchbinder et al. 2020 UK	Lancet low back pain series	To address the increasing and costly effects of disabling low back pain.	Practitioners and public Sustained: 2018 International	NICE low back and sciatica; ACP guidelines; national clinical guidelines for non-surgical treatment.	Media: Social media, press release, podcast	Strategies must be targeted towards the population, clinicians and health care administrators to lower imaging rates.
Cheng et al. 2017 CA	Canadian association of emergency physicians (CAEP) top five for CW	To present the Canadian association of emergency physicians (CAEP) top five list of CW recommendations.	Clinicians only Onetime: 2014 National	Choosing wisely CA	Presentation: Conference	Don't order lumbosacral (low back) spinal imaging in patients with non-traumatic low back pain who have no red flags/ pathologic indicators
Coombs et al. 2021 AUS	Implementation of clinical innovation model of care for acute LBP	To implement guideline-based NSW agency of clinical innovation model of care for acute low back pain through a multifaceted intervention strategy	Clinicians only Sustained: 2018 Regional	Multiple guidelines mentioned, including NICE, Dutch guidelines; unable to identify all.	Educational resources: Guideline and recommendation copy, website, poster Interactive intervention: Seminar Clinical decision support Other: Audit and feedback	Diagnostic imaging is not routinely indicated for acute NSLBP; diagnostic imaging is not recommended for patients with chronic NSLBP

(Continues)

TABLE 2 | (Continued)

Author Year published Country	Campaign name	Campaign purpose	Population Duration Location	Clinical practice guideline(s) referenced	Method of dissemination	Key message for imaging
Dey et al. 2004 UK	RCGP outreach educational strategy	To raise awareness of the RCGP guidelines, adapted to the local context; emphasise the key Messages in the guidelines; identify potential barriers to implementation; and suggest strategies for overcoming the barriers identified.	Practitioners only One-off: 1999 Regional	RCGP guidelines	Educational resource: Poster Interactive intervention: Meeting	RCGP guidelines advise against the use of lumbar spine X-rays, bed rest and secondary referral, and recommend simple analgesia, gentle exercise and the consideration of physical therapies
Eccles et al. 2001 UK	England and Scotland's RCR guideline dissemination	To distribute the UK royal college of radiologist guidelines for imaging.	Practitioners only Sustained: 2001 International	UK royal college of radiologists	Educational resources: Guideline and recommendation copy Other: Feedback and reflection points	In either acute (< 6 weeks) or chronic back pain, without adverse features, radiograph is not routinely indicated.
French et al. 2013 AUS	IMPLEMENT (IMPLEmenting a clinical practice guideline for acute low back pain evidence-based manageMENT)	To inform primary care practitioners of the evidence-based management of acute musculoskeletal pain, including non-specific LBP.	Practitioners only One-off: 2003, 2007 National	Australian national health and medical research council (NHMRC) 2003	Educational resources: Guideline and recommendation copy, website Interactive intervention: Workshop Other: DVD	1. Plain film x-rays were necessary only if fracture is suspected 2. Provide advice to stay active, including the avoidance of advising more than 2 days of bed rest
French et al. 2022 AUS	Acute low back pain implementing guidelines (ALIGN).	To increase chiropractors' and physiotherapists' adherence to recommendations from a clinical practice guideline for acute low back pain, compared with passive dissemination of the guideline.	Practitioners only Sustained: 2010 Regional	Australian acute musculoskeletal pain guidelines 2003.	Educational resources: Package Interactive intervention: Training session Presentation: Symposium Other: DVD, follow-up	1. To avoid routine imaging 2. Give advice to stay active
Jenkins, French, et al. 2022 AUS	Low back pain management booklet	To address two behaviours contributing to the overuse of imaging in general medical practice: (1)	Practitioner and public One-off: 2019 Regional	ACP-APS guideline	Educational resources: Booklet, website Interactive intervention: Training session	Imaging or further investigations do not usually help LBP.

(Continues)

TABLE 2 | (Continued)

Author Year published Country	Campaign name	Campaign purpose	Population Duration Location	Clinical practice guideline(s) referenced	Method of dissemination	Key message for imaging
		pressure from patients to refer for imaging; and (2) GPs using imaging referrals to reassure patients with LBP and to quickly acknowledge their concerns.				
Jenkins, French, et al. 2022 AUS	Low back pain management booklet	To address two behaviours contributing to the overuse of imaging in general medical practice: (1) pressure from patients to refer for imaging; and (2) GPs using imaging referrals to reassure patients with LBP and to quickly acknowledge their concerns.	Practitioners and public Sustained: 2017 Regional	ACP-APS guideline	Educational resources: Booklet Interactive intervention: Training session Other: Follow-up	Imaging or further investigations do not usually help LBP.
Kerry et al. 2000 UK	St George's healthcare trust RCR guideline dissemination 1995	To distribute the UK royal college of radiologist guidelines for imaging	Practitioners only Sustained: 1995 Regional	Modified royal college of radiologists guidelines 1995	Educational resources: Guideline and recommendation copy Other: Audit, feedback and reflection points	In either acute (< 6 weeks) or chronic back pain, without adverse features, imaging is not routinely indicated.
Khoury et al. 2019 CA	Choosing wisely CA recommendations for headache and lumbar imaging	To increase awareness and consideration of the guidelines during the referral process.	Clinicians only Onetime: 2017 Regional	Choosing wisely CA	Educational resource: Infographic, pamphlet	Consider red flags of imaging before completing referrals.
Matowe et al. 2002 UK	Grampian RCR guideline dissemination	To test whether guideline dissemination had influenced general practitioners' referral patterns.	Practitioners only One-off: 1997 Regional	Royal college of radiologists guidelines 1995	Educational resource: Guideline and recommendation copy	In either acute (< 6 weeks) or chronic back pain, without adverse features, imaging is not routinely indicated.

(Continues)

TABLE 2 | (Continued)

Author Year published Country	Campaign name	Campaign purpose	Population Duration Location	Clinical practice guideline(s) referenced	Method of dissemination	Key message for imaging
Morgan et al. 2019 AUS	NPS medicine wise LBP programme	To reduce inappropriate CT scans and X-rays of the lower back by improving GP's referral practice for acute LBP presentations	Clinicians & public Onetime: 2013 National	National health and medical research council guidelines 2003	Educational resource: Package and resource promotion Clinical decision support Other: Audit & feedback	Diagnostic imaging tests should not be used in the routine assessment of patients with acute LBP in the absence of red flags
Oakeshott et al. 1994 UK	Department of clinical radiology campaign	To encourage GPs to practice in align with the RCG and reduce use of imaging.	Practitioners only Sustained: 2012–2015 Regional	Royal college of radiologists guidelines	Educational resources: Guideline and recommendation copy	In either acute (< 6 weeks) or chronic back pain, without adverse features, imaging is not routinely indicated.
Rezaii et al. 2020 USA	Radiology support, communication and alignment network (R-SCAN)	To reduce the harm and waste inherent in inappropriate imaging by improving collaboration between radiologists and image-ordering clinicians; and by providing evidence-based guidelines and resources that promote the appropriate use of imaging.	Clinicians only Sustained: 2015–2018 National	ACR appropriateness criteria | choosing wisely recommendations	Educational resources: Package, guideline and recommendation copy, videos Other: Audit and feedback	1. Use of R-SCAN among a wide range of US practices resulted in a significant increase in proportion of high- value medical imaging cases after its intervention phase. 2. R-SCAN participation was also associated with a decrease in the total number of low-value imaging cases.
Robling et al. 2002 UK	South glamorgan guideline dissemination	To assess the impact of disseminating local guidelines.	Practitioners only Sustained 2001 Regional	Royal college of radiologists guidelines; locally produced	Educational resources: Guideline and recommendation copy Presentation: Seminar Other: Feedback and reflection points	In either acute (< 6 weeks) or chronic back pain, without adverse features, imaging is not routinely indicated.
Schectman et al. 2003 USA	Washington guideline-based back pain evaluation and management strategy	To suggest optimal strategies for the initial evaluation, testing, and treatment of acute low back	Practitioners and public Sustained: 1994–1995	National and local expert-designed guidelines	Educational resources: Guideline and recommendation copy, videos, pamphlet Interactive intervention: Training session Other: Follow-up, audit	Unable to be retrieved.

(Continues)

TABLE 2 | (Continued)

Author Year published Country	Campaign name	Campaign purpose	Population Duration Location	Clinical practice guideline(s) referenced	Method of dissemination	Key message for imaging
Schröder 2021 SWE	Better back model of care	To evaluate a multifaceted implementation strategy and a best practice physiotherapy healthcare Model for LBP.	Practitioners and public Sustained: 2017–2018 Regional	NICE low back and sciatica; Danish national clinical guidelines for non-surgical treatment of low back pain	Educational resources: Website, pamphlet Interactive intervention: Workshop	Diagnostic x-rays are rarely necessary. Plain x-rays for acute NSLBP are of limited diagnostic value, expose people to unnecessary ionising radiation, and provide no benefits in physical function, pain, or disability
Suman et al. 2018 NLD	Chain care guideline non-specific low back complaints guideline implementation	To disseminate the chain care guideline non-specific low back complaints 2010 guidelines	Clinicians & public Onetime: 2014 Regional	Chain care guideline non-specific low back complaints - Dutch guidelines 2010	Educational resources: Guideline and recommendation copy, interactive website Interactive intervention: Training session Media: Social media	Diagnostic imaging is not routinely indicated for acute and is not recommended for chronic non-specific LBP.
K. Y. Wang et al. 2018 USA	Radiology support, communication and alignment network (R-SCAN)	To reduce inappropriate LS MRI referrals for uncomplicated LBP from outpatient clinics in harris county, Texas.	Practitioners only One-off: 2016 Regional	ACR appropriateness criteria | choosing wisely recommendations ACP	Interactive intervention: Learning session Presentation: Presentation, webinar	Do not use MRI for uncomplicated LBP cases
K. Y. Wang et al. 2021 USA	Radiology support, communication and alignment network (R-SCAN); secondary to Y. X. J. Wáng et al. 2018	To ensure continued ongoing communication between radiology and primary care to remove barriers to evidence-based practice guidelines as provided through the ACR in conjunction with guidelines provided by American college of physicians and the American pain society.	Practitioners only One-off: 2017 Regional	ACR appropriateness criteria | choosing wisely recommendations ACP	Interactive intervention: Learning session Clinical decision support: Best practice card	Imaging is not needed for acute LBP unless red flag symptoms are present

(Continues)

TABLE 2 | (Continued)

Author Year published Country	Campaign name	Campaign purpose	Population Duration Location	Clinical practice guideline(s) referenced	Method of dissemination	Key message for imaging
Zafar et al. 2019 USA	Clinical decision alerts	To provide guideline informed feedback or alerts to primary care providers ordering lumbar spine MRI for LBP.	Practitioners only Sustained: 2012–2015 Regional	ACP-APS guideline	Clinical decision support: Alerts Other: Feedback and reflection points	Imaging should be obtained for complicated LBP

Abbreviations: ACP = American College of Physicians; ACR = American College of Radiology; APS = American Pain Society; AUS = Australia; CA = Canada; CT = computerised tomography; CW = Choosing Wisely; GP = General Practitioner; LBP = low back pain; NICE = National Institute for Health and Care Excellence; NLD = Netherlands; NPS = National Prescribing Service; NSLBP = non-specific low back pain; MRI = magnetic resonance imaging; NSW = New South Wales; RCGP = Royal College of General Practitioners; RCR = Royal College of Radiologists; RSCAN = Radiology Support, Communication and Alignment Network; SWE = Sweden; UK = United Kingdom; USA = United States of America.

3.2.1 | Target Population

Of the 24 campaigns, 15 campaigns targeted clinicians only. Nine campaigns targeted clinicians and the public. Refer to Table 2 for further details.

3.2.2 | Duration

Eleven campaigns were one-time strategies, providing a solitary contact point with the CPG resources or workshops. Thirteen campaigns were sustained dissemination strategies, providing multiple contact points across time, including follow-up calls or workshops. Refer to Table 2 for further details.

3.2.3 | Clinical Practice Guidelines

The CPGs disseminated in these campaigns were the National Health and Medical Research Council Guidelines 2003 ($n = 1$), Choosing Wisely (CW) ($n = 5$), American College of Radiology (ACR) Appropriateness Criteria ($n = 3$), Dutch Chain Care Guideline for non-specific LBP Complaints ($n = 2$), National Institute for Health and Care Excellence ($n = 3$), Australian National Health and Medical Research Council (NHMRC) Guidelines 2003 ($n = 1$), American College of Physicians (ACP) ($n = 6$), Royal College of General Practitioners (RCGP) Guidelines ($n = 2$), Danish National Clinical Guidelines for non-surgical treatment of LBP ($n = 2$), The Back Book UK 1996 ($n = 1$), Australian Acute Musculoskeletal Pain Guidelines 2003 ($n = 1$), and UK Royal College of Radiologists ($n = 5$). The most referenced CPGs were ACP, CW, and the UK Royal College of Radiologists. Additional CPGs were included in three campaigns; however, they were unable to be identified (Ammendolia et al. 2004; Coombs et al. 2021; Schectman et al. 2003). Refer to Table 2 for further details.

3.3 | Methods of Dissemination

Multiple dissemination strategies were implemented by the 24 campaigns. Two campaigns used a single method of dissemination through educational resources (Khoury et al. 2019), and an interactive intervention (Cheng et al. 2017). The remaining 22 campaigns used multiple strategies to disseminate their selected CPGs. No dissemination strategies included disincentives for inappropriate imaging. Three studies looked at merit-based incentive schemes providing payments for following CPGs for imaging (Rezaii et al. 2020; K. Y. Wang et al. 2018, 2021). Refer to Table 2 for further details.

3.3.1 | Educational Resources

Educational resources were the most common dissemination strategy used by 18 of the 24 campaigns (75%). This included pamphlets ($n = 2$), booklets ($n = 2$), posters in practices and departments ($n = 2$), and infographics ($n = 1$). A copy of CPGs or recommendations was used in 10 campaigns, with the majority being distributed by mail. Four campaigns implemented educational packages made up of multiple resources and one

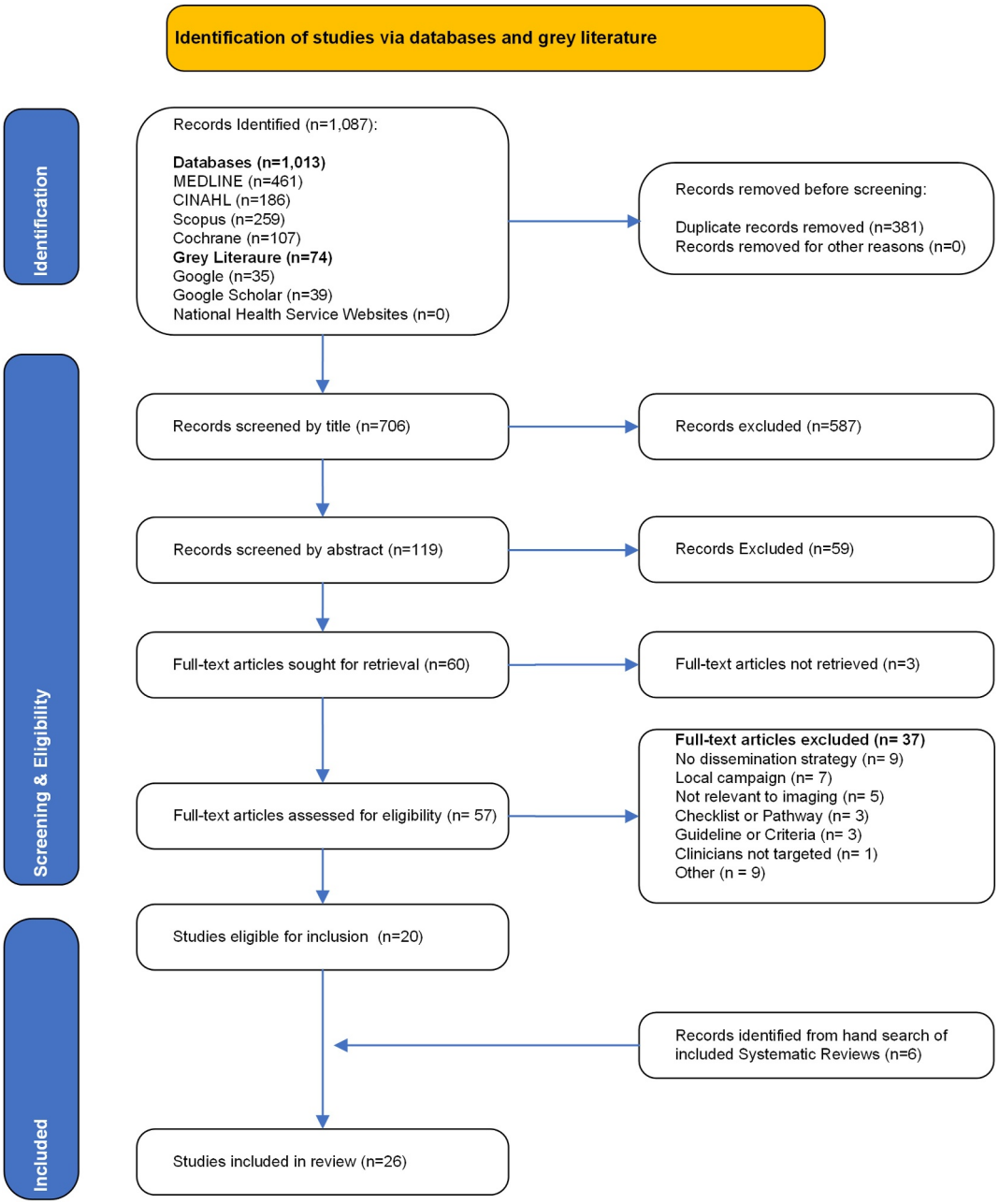

FIGURE 1 | PRISMA-ScR flow chart.

campaign used educational videos. Five campaigns used a website to provide access to CPGs and additional educational resources. Refer to Table 2 for further details.

3.3.2 | Presentations and Interactive Interventions

The different forms of presentations and interactive interventions identified come under audio-visual presentations and were employed by 15 campaigns (62.5%). Presentations refer to strategies where information was communicated to an audience of clinicians, and were used in four campaigns (16.7%), including a presentation and webinar ($n = 1$), seminar ($n = 1$), conference ($n = 1$), and a symposium ($n = 1$). Interactive interventions were strategies where clinicians engaged with campaign facilitators; these were used in 11 (46%) campaigns. This included learning sessions ($n = 2$), meetings ($n = 2$), feedback sessions ($n = 1$), workshops ($n = 3$), and training sessions ($n = 5$). Refer to Table 2 for further details.

3.3.3 | Media Form

Dissemination through media was the least commonly employed strategy. Four campaigns (16.7%) distributed their relevant CPGs through a variety of media outlets, targeting the public and clinicians. These included social media, television commercials, newspapers, press releases, and a podcast. Refer to Table 2 for specific campaign details.

3.3.4 | Clinical Decision Support

Five campaigns (20.8%) used Clinical decision support (CDSs), which are defined as CPG informed strategies that guide clinicians' decision making when ordering imaging for LBP. Two campaigns used undefined CDSs (Coombs et al. 2021; Morgan et al. 2019), with the remaining three campaigns utilising alerts (Zafar et al. 2019), reminders (Eccles et al. 2001), and best practice cards (K. Y. Wang et al. 2021). The alerts and reminders were programmed into clinical software, producing CPG recommendations during assessment reporting and imaging referrals.

3.3.5 | Other (Feedback, Audit, Follow-up and DVD)

Feedback, audits, follow-ups and DVD recordings were the additional dissemination strategies identified in 11 campaigns (46%) that did not fit the method categories. They include feedback on referral patterns and behaviour ($n = 7$), audits of images ordered ($n = 5$), follow-ups on clinicians attending in-person interventions ($n = 3$) and DVD recordings from workshops and conferences ($n = 2$). Refer to Table 2 for further details.

4 | Discussion

This review analysed campaigns developed to disseminate clinical practice guidelines (CPGs) for the appropriate use of imaging for LBP. We found many strategies for disseminating CPGs; however, the ongoing overuse of medical imaging for low back pain (LBP) suggests there is a significant gap in their designs, potentially limiting their effective implementation (Buchbinder et al. 2020; Hill et al. 2023; Morgan et al. 2019). There were 24 campaigns conducted regionally and nationally that used a range of dissemination methods. These methods were categorised into educational resources, presentations and interactive interventions, media campaigns, clinical decision support tools, and other strategies which do not fit the methods identified (feedback, audio follow-up and DVD).

A notable aspect of these campaigns is the diversity and combination of dissemination methods used and their differing roles. Educational resources, such as brochures and online modules, were central in raising public awareness about clinical guidelines (Zhao et al. 2024). Presentations and interactive workshops reinforced this knowledge through direct engagement with healthcare professionals. Media campaigns and clinical decision support tools were often tailored to address specific barriers faced by clinicians. For example, Zhao et al. (2024) demonstrated some evidence of a short-term reduction of routine imaging (less than 12 months) following the use of educational resources. However, these changes were not sustained beyond 12 months, possibly due to broader contextual and systemic factors. While educational resources are pivotal, their impact is limited without complementary strategies that address the diverse barriers clinicians face (Belavy et al. 2022; Jenkins et al. 2015; Kovacs et al. 2018; Liu et al. 2018; Tzortziou Brown et al. 2016).

Successful campaigns in other clinical domains provide valuable insights. It may be beneficial to reflect on other areas of health practice where a change in clinical behaviour has improved patient outcomes. There has been a significant shift to more prudent and appropriate management of knee injury with an increase in meniscal repair rather than meniscectomy, reflecting an increased awareness of long-term consequences (Bansal et al. 2021; Bhan 2020). The phrase 'save the meniscus' has been widely used in research and social media postings (Ponkilainen et al. 2023). This example highlights how a social media campaign improved clinical practice and reduced unnecessary healthcare spending. Adapting strategies similar to LBP imaging campaigns could amplify their reach and impact.

Educational resources, targeted messaging, and interprofessional collaboration may be key to shifting imaging behaviour (Y. X. J. Wáng et al. 2018). However, this is complicated by the many factors that influence clinicians' imaging decisions (Tanner et al. 2024). The persistence of inappropriate imaging practices may stem from competing interests and established cultural norms within healthcare settings. Financial incentives, professional biases, and entrenched practices can create resistance to change, making it difficult to align clinician behaviour with guideline recommendations. Effective dissemination strategies to change clinician imaging behaviour must address these underlying cultural and systemic barriers.

Using a co-design methodology has successfully driven dissemination strategies in healthcare service improvement by incorporating the knowledge and experience of clinicians to create behaviour change (Fylan et al. 2021). By integrating clinicians' perspectives and addressing systemic barriers, campaigns can foster an environment conducive to sustainable behaviour change. Additionally, introducing financial disincentives for inappropriate imaging could further encourage adherence to clinical guidelines.

This was the first review to provide a comprehensive overview of dissemination strategies of clinical practice guidelines in the context of imaging for LBP and identify opportunities for future research. A key strength of this review is that it was conducted by a team of active clinicians and researchers. One limitation is the difficulty of linking specific campaigns with their corresponding clinical guidelines. Campaigns were excluded if they did not refer to specific dissemination campaigns which included guidelines such as Choosing Wisely, as it was unclear whether they had been promoted using targeted campaigns.

5 | Conclusion

This study identified a wide range of strategies used in campaigns disseminating imaging guidelines for low back pain. However, bridging the gap between evidence-based practice and clinical behaviour remains a challenge, with reported changes often being short-term despite a wide range of strategies used. Addressing the underlying issues that drive the continued use of inappropriate imaging needs to ensure messaging aligns with clinicians' values and beliefs. This may also require consideration of broader strategies such as implementing disincentives

for inappropriate imaging and adopting co-design principles to prioritise systemic and cultural barriers in the development of targeted resources.

Author Contributions

Sam Hickey, Nicola L. Saywell, Julia Hill and Thomas Adams were responsible for conceptualisation and design. Sam Hickey conducted an initial literature review and results analysis, which was reviewed by Nicola L. Saywell, Julia Hill and Thomas Adams. Sam Hickey was responsible for the preparation of the manuscript with contributions and review from Nicola L. Saywell, Julia Hill and Thomas Adams.

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The authors have nothing to report.

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The authors declare no conflicts of interest.

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The authors have nothing to report.

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