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Physiotherapy-led care versus physician-led care for persons with low back pain: A systematic review

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Abstract

Objective: To summarise the evidence on the effect of physiotherapy-led versus physician-led care on clinical outcomes, healthcare use, and costs in persons with low back pain.

Data sources: PubMed, Web of Science, CINAHL, Embase, and PEDro were systematically searched with the latest search performed in July 2024. Reference lists of articles were hand-searched.

Review methods: Studies comparing clinical outcomes, healthcare use, or costs between adults with low back pain first consulting a physiotherapist and those first consulting a physician were included. Methodological quality was assessed with the Newcastle-Ottawa Scale. Study design, clinical setting, patient characteristics, and group effects were extracted. Findings on outcomes assessed in two or more studies were synthesised narratively. Certainty of evidence was determined using the GRADE approach.

Results: Eighteen studies comprising 1,481,980 persons with low back pain were included. Most studies were non-randomised retrospective or prospective cohort studies. In primary care (15 studies), consistent evidence, though of mostly very low certainty, indicated that physiotherapy-led care leads to higher patient satisfaction, less use of medication, injections and imaging, fewer physician's visits, lower total healthcare costs, and less sick leave compared to physician-led care, without increased harm. In emergency care (three studies), evidence of very low certainty showed that physiotherapy-led care leads to shorter waiting and treatment times, and fewer hospital admissions.

Conclusion: Physiotherapy-led care is a clinically, time- and cost-effective care pathway for low back pain, although the certainty of evidence was overall very low. Further high-quality research with a greater focus on clinical outcomes is warranted.

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Introduction

Low back pain is the leading cause of disability worldwide[1] and imposes a significant personal and economic burden.[2] Around 30% of acute low back pain cases progress to chronic pain,[3] with risk factors for chronicity including high baseline disability and pain, fear-avoidance behaviour, and early exposure to non-guideline-concordant care.[3–5] Current guidelines for low back pain discourage routine imaging and surgery[6,7] and recommend non-pharmacological treatments, such as education, reassurance, advice to resume normal activities, exercise therapy, manual therapy, and multimodal rehabilitation and cognitive behavioural therapy if necessary.[6–11] Each of these treatment strategies fall within the expertise of the physiotherapist.[12]

Traditionally, primary care physicians are responsible for the management of persons with low back pain. However, this approach could delay or prevent access to physiotherapy,[13] despite the demonstrated benefits of starting physiotherapy early (i.e., within 2 weeks) on pain and disability.[14] Moreover, as many countries face a shortage of general practitioners,[15–17] and low back pain is one of the most common reasons for visiting a primary care physician,[18] alternative care pathways could help reduce the physicians' workload. Physiotherapy-led care, in which patients self-refer to a physiotherapist, is one of the alternative pathways and has already shown better clinical outcomes, higher patient satisfaction, and lower costs compared to traditional care models for musculoskeletal conditions in general.[19–21] Therefore, this systematic review aimed, for the first time, to summarise the evidence on the effects of physiotherapy-led compared to physician-led care for low back pain specifically, given its major role in global disability. We hypothesised that physiotherapy-led care would result in greater improvements in pain intensity and disability, and lower healthcare use, healthcare costs, and sick leave, without any evidence of increased harm, compared to physician-led care.

Methods

This systematic review was registered in the International Prospective Register of Systematic Reviews (PROSPERO, CRD42023402591) and was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines.[22]

In February 2024, PubMed, Web of Science, CINAHL, Embase, and PEDro were systematically searched from inception onwards. Two reviewers (PS, NG) developed the search strategies. We combined free text words and Medical Subject Headings terms (in PubMed) related to physiotherapy-led care and low back pain, and did not apply any filters or limits (see Supplementary File 1). After removing duplicates in Endnote (Clarivate Analytics, USA), the records were screened in Rayyan.ai (Rayyan Systems, Inc., USA). Finally, the reference lists of relevant studies were hand-searched. A final update of the search, including an additional search in Google Scholar as a secondary source, was performed on July 10, 2024.

Eligibility screening was performed independently by two reviewers (PS, NG), starting with the titles and abstracts and followed by the full texts of the remaining articles. Disagreement between reviewers was resolved through discussion and input from a third reviewer (LJ), if needed. Eligible studies were selected using the Population Intervention Comparison Outcome Study Design (PICOS) framework. Studies had to include (a subgroup of) persons with low back pain (*P*) and could take place in primary care or the emergency department. At least one group had to receive physiotherapy through direct access, self-referral, or direct allocation to a physiotherapist without first consulting or being evaluated by a physician or nurse practitioner (I). Moreover, studies had to include at least one group that first consulted a physician or nurse practitioner who proposed further treatment, which could but did not have to include physiotherapy (C). Studies also had to report original, quantitative data assessing clinical outcomes (e.g. pain, disability, patient satisfaction), healthcare use, healthcare costs, and/or sick leave (O). Finally, studies had to be original, peer-reviewed, and published in English, French, or Dutch. Therefore, conference abstracts, doctoral theses, press releases, and other grey literature sources were not eligible for inclusion. Finally, commentaries, reviews, letters to the editor, case studies, and case reports were not included.

Two reviewers (PS, NG) independently extracted the following information from the studies using a piloted computer form: country, study design, care setting and role of the physiotherapist, characteristics of the study groups (sample size, age, gender, body mass index, duration of low back pain, baseline pain and disability levels, and group differences in these characteristics), and key findings. When studies compared the effect of multiple first providers (e.g. physiotherapists, primary care physicians, general practitioners, nurse practitioners, emergency medicine physicians, physical medicine and rehabilitation physicians, chiropractors, acupuncturists), only the findings for the groups seeing a physiotherapist and primary care physician first were extracted. The results for primary and emergency care were described separately to account for the distinct roles of physiotherapists working in these settings (e.g. physiotherapists in emergency care perform an initial evaluation and suggest further management but do not actually treat the patient). Due to the large diversity in outcomes, we could not perform a meta-analysis. Therefore, findings for outcomes that were assessed in two or more studies were synthesised according to the method of Ojha et al. (2014)[21]; results were considered to be consistent when more than half of the studies reported significant group differences in the same direction (e.g. favouring physiotherapy-led care). Outcomes that were only examined in one study were reported in the tables but not in the text.

Methodological quality was assessed independently by two reviewers (PS, NG) using the valid and reliable Newcastle-Ottawa Scale.[23,24] This scale was customised. For instance, studies had to control for age and comorbidity to receive two stars for comparability (see Supplementary File 2). Discrepancies between reviewers were resolved through discussion, and if needed, input from a third reviewer (LJ). Studies were judged as "very high risk" (≤2 stars), "high risk" (3–4 stars), "moderate risk" (5–6 stars), or "low risk" (≥7 stars) according to Greig et al. (2023).[25]

Finally, we created summary of findings tables using to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.[26] Evidence from randomised controlled trials started at high certainty, evidence from observational studies at low certainty. The certainty of evidence was downgraded if ≥50% of the studies showed moderate or high risk of bias, the observed effects were inconsistent across studies, the studies' methodology did not align with the PICOS criteria (e.g. evaluation and treatment in the physiotherapy-led care group were performed by different physiotherapists), the studies included <400 participants, and studies were industry-funded. Upgrading was performed when a large magnitude of effect with narrow confidence intervals was found.[26]

Results

In February 2024, we retrieved 19,108 records of which 6902 were duplicates. We excluded 12,206 articles based on title and abstract screening. Screening the full-texts led to 15 eligible articles, and hand-searching their reference lists resulted in two more studies to include (see Fig. 1). Updating the search in July 2024 yielded one more eligible study. No additional relevant articles were found in Google Scholar.

The studies' sample sizes varied greatly, from 10 to 957,619 persons with low back pain.

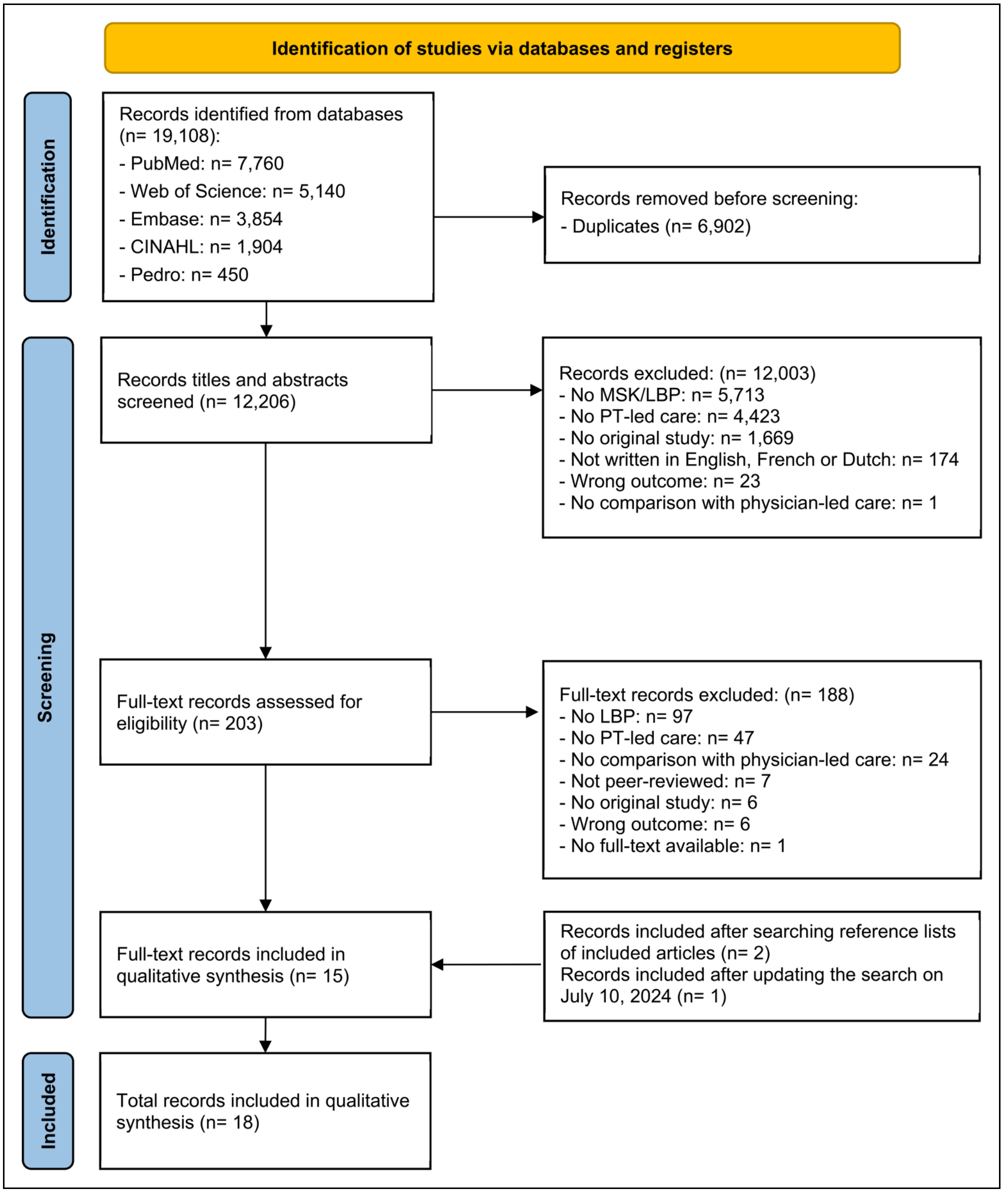

Figure 1. PRISMA flow chart. MSK: musculoskeletal; LBP: low back pain; PT: physiotherapy.

Fifteen studies investigated physiotherapy-led care in primary care (see Table 1), of which 11 were retrospective cohort studies,[27–37] two were prospective cohort studies,[38,39] one was a randomised controlled study,[40] and one was a cross-sectional study.[41] The physiotherapy- and physician-led care groups were similar in age and gender in two studies (13%),[29,30] and differed significantly in three studies (20%).[31,38,41] The 10 remaining studies (67%) did not report[36,37,39] or compare age and gender between groups.[27,28,32–35,40] However, most considered age as a covariate in the analyses.[27,28,32–34,37,40]

Table 1. Abridged data extraction table of studies in primary care.

First author, year of publication and study design	Participants' characteristics per group	Key findings
Walsh 2024 Prospective cohort study	PT first, not qualified to prescribe or inject: $n = 32$ PT first, qualified to prescribe or inject: $n = 48$ Physician first: $n = 18$	*Disability:* Similar improvement after 3 ($p = .882$) and 6 months ($p = .449$)
Bise 2023 Retrospective cohort study	Acute LBP PT first: $n = 1226$ Physician first: $n = 15,199$	*Episode duration:* PT first: 14-day shorter (no p-values) *Medication:* PT first: Reduced risk of opioid prescription after one year (HR: 0.35, **95%CI: 0.34–0.37**) *Radiography:* PT first: Reduced risk after one year (HR: 0.23, **95%CI: 0.23–0.24**) *Advanced imaging:* PT first: Reduced risk after one year (HR: 0.27, **95%CI: 0.26–0.27**) *Injections:* PT first: Reduced risk after one year (HR: 0.39, **95%CI: 0.37–0.40**) *Surgery:* PT first: Reduced risk after one year (HR: 0.36, **95%CI: 0.34–0.42**) *Referral to specialist:* PT first: Reduced risk after one year (HR: 0.36, **95%CI: 0.35–0.37**) *ED visit:* PT first: Reduced risk after one year (HR: 0.63, **95%CI: 0.56–0.67**) *Costs:* PT first: $1013 lower LBP-related costs and $4997 lower total costs after one year (no p-values)
Morso 2022 Cross-sectional study	PT first: $n = 308$ Physician first: $n = 149$	*Education in first visit:* PT first: 30% more patients received education (no p-values). Equal odds compared to chiropractor first ($p = .38$). Physician first: Lower odds compared to chiropractor first (**$p < .001$**)
Crowell 2022 Retrospective cohort study	Athletic patients PT first: $n = 1845$ Physician first: $n = 467$	*Medication:* PT first: Fewer prescriptions for NSAIDs (**$p < .001$**), muscle relaxers (**$p = .007$**) *Imaging:* PT first: Greater compliance to imaging recommendations (**$p < .001$**). Similar number of imaging with abnormal findings ($p = .67$, $p = .05$), clinically significant findings ($p = .180$), findings requiring specialist referral ($p = .590$). Waited 19 days longer (**$p < .001$**) and had 2.7 more visits before imaging (**$p < .001$**)
Harwood 2022 Retrospective cohort study	Patients with new diagnosis PT first: $n = 109,480$ Physician first: $n = 957,619$	*Adverse events:* Similar frequency of serious illness diagnoses related to LBP after one year (no p-values) *Medication:* PT first: 7% fewer patients received early opioid prescription, 3% fewer patients received long-term prescription after one year (no p-values) *Radiography:* PT first: 7% fewer patients received X-ray after one year (no p-value) *Advanced imaging:* PT first: Similar number of patients received advanced imaging after one year (no p-value) *ED visits:* PT first: Similar frequency after one year (no p-value) *Hospitalisation***:** PT first: Similar frequency after one year (no p-value) *Surgery*: PT first: Similar frequency after one year (no p-value)

(Continued)

Table 1. (Continued)

First author, year of publication and study design	Participants' characteristics per group	Key findings
		Costs: PT first: $1747 higher total costs, $288 higher out-of-pocket costs after one year (no *p*-values)
Kiljańska 2021 Retrospective cohort study	Pre-intervention cohort (no PT first): $n = 27{,}034$ Post-intervention cohort (mix of PT first and physician first sub-cohorts): $n = 43{,}104$ Post-intervention PT first sub-cohort: $n = 11{,}997$ Post-intervention physician first care sub-cohort: $n = 31{,}107$	*Patient satisfaction:* PT first: Higher satisfaction (***p* < .001**) *Radiography:* Post-intervention cohort: Less compared to pre-intervention cohort after one year (***p* < .001).** PT first sub-cohort: Less compared to physician first sub-cohort after one year (***p* < .001**) *Advanced imaging:* Post-intervention cohort: Less compared to pre-intervention cohort after one year (***p* < .001).** PT first sub-cohort: Less compared to physician first sub-cohort after one year (***p* < .001**) *Visits to doctor:* Post-intervention cohort: Fewer visits compared to pre-intervention cohort after one year (***p* < .001**). PT first sub-cohort: Lowest number of visits compared to physician first sub-cohort, and pre-intervention group after one year (**all *p* < .001**) *Use of rehabilitation services:* Post-intervention cohort: Lower compared to pre-intervention cohort after one year (***p* < .001**). PT first sub-cohort: Lower compared to physician-first sub-cohort after one year (***p* < .001**) *Sick leave:* Post-intervention cohort: Less and shorter compared to the pre-intervention cohort after one year (***p* < .001**). PT first sub-cohort: Lowest number and shortest sick leaves compared to pre-intervention cohort and physician first sub-cohort after one year (**all *p* < .001**)
Garrity 2020 Retrospective cohort study	New onset of LBP PT first: $n = 2297$ Physician first: $n = 58{,}301$	*Costs:* In unrestricted-access states: PT first: Similar 30-day ($p = .30$), 14% higher 90-day costs ($p = .002$) In provisional access states: PT first: 19% higher 30-day costs ($p < .001$), 28% higher 90-day costs ($p < .001$)
Kazis 2019 Retrospective cohort study	New onset of LBP PT first: $n = 3499$ Physician first: $n = 114{,}782$	*Medication:* PT first: Lower odds of early (OR = 0.15, **95%CI = 0.13–0.17**) and long-term opioid use (OR = 0.27, **95%CI = 0.15–0.48**) after one year
Frogner 2018 Retrospective cohort study	New LBP diagnosis PT first: $n = 12{,}906$ PT later: $n = 17{,}135$ No PT: $n = 118{,}825$	*Medication:* PT first: Fewer opioid prescriptions (***p* < .001**), 89% lower probability (***p* < .001**) after one year *Radiography:* PT first: Fewer X-rays (***p* < .001**), 17% lower probability (***p* < .005**) after one year *Advanced imaging:* PT first: Less advanced imaging (***p* < .001**), 28% lower probability (***p* < .001**) after one year *ED visits:* PT first: Fewer visits (***p* < .001**), 38% lower probability (***p* < .001**) after one year *Hospitalisation:* PT first: More hospitalisations (***p* < .001**), 19% higher probability (***p* < .001**) after one year *Costs:* PT first: Lower total, provider, outpatient, inpatient, and out-of-pocket costs compared to

(Continued)

Table 1. (Continued)

First author, year of publication and study design	Participants' characteristics per group	Key findings
		PT later (**all $p<.001$**) after one year. Lower outpatient, inpatient, and out-of-pocket costs compared to No PT (**all $p<.001$**) after one year. Similar pharmacy costs compared to PT later and No PT ($p>.001$) after one year. Higher provider costs compared to No PT (**$p<.001$**) after one year.
Magel 2018 Prospective cohort study	PT first: $n=124$ Physician first: $n=276$	*Disability:* PT first: Greater functional improvement (**$p=.002$**) *Duration of PT care:* PT first: Shorter after 6 months. (**$p=.045$**) *Radiography:* PT first: Fewer X-rays after 6 months (**$p<.05$**) *Advanced imaging:* PT first: Less advanced imaging after 6 months (**$p<.05$**) *Epidural injection:* PT first: Fewer after 6 months (**$p<.05$**) *PT visits:* PT first: Similar number of visits after 6 months (no p-value) *Referred visit to spine surgeon:* PT first: Fewer visits after 6 months (**$p<.05$**)
Fritz 2015 Retrospective cohort study	New episode of LBP PT first: $n=48$ Physician first: $n=409$	*Duration care episode:* PT first: Similar after one year ($p=.87$) *Spinal injection:* PT first: Similar risk after one year (OR: 0.27, 95% CI: 0.04–2.15) *Radiography:* PT first: 13% fewer X-rays (no p-values), lower risk (**$p=.017$**) after one year *Advanced imaging:* PT first: 8% less advanced imaging (no p-values), similar risk (OR: 0.40, 95% CI: 0.11–1.46) after one year *ED visit:* PT first: Similar risk (OR: 0.36, 95% CI: 0.05–2.82) after one year *Visit to spine surgeon:* PT first: Similar risk (OR: 1.35, 95% CI: 0.35–5.31) after one year *Surgery:* PT first: No patient had surgery. *Costs:* PT first: $263 lower total costs (no p-value), no association with total costs ($p=.34$) after one year
Bornhöft 2015 Retrospective cohort study	Musculoskeletal conditions, subgroup back pain PT first: $n=249$ Physician first: $n=456$	*Medication:* PT first: Lower odds of analgesics prescription after 6 months (**$p<.001$**) and 12 months (**$p<.001$**) *Visit to general practitioner:* PT first: Lower odds of visiting twice or more after 12 months (OR: 0.53, **95% CI: 0.33–0.84**) *Referral to specialist:* PT first: Lower odds after 6 and 12 months (all **$p<.001$**) *Sick leave:* PT first: Lower odds after 6 months (**$p=.001$**) and 12 months (**$p=.009$**)
Pendergast 2012 Retrospective cohort study	Ambulatory PT episodes, subgroup "spine problems" PT first: $n=5844$ Physician first: $n=13,879$	*PT visits:* PT first: Fewer visits (**$p=.001$**) *Costs:* PT first: Lower PT and non-PT claims during PT episode (all **$p<.001$**). Similar non-PT claims in 30 days before and 60 days after PT episode
Leemrijse 2008 Retrospective cohort study	PT first: $n=507$ Physician first: $n=836$	*Discharge reasons, achievement of treatment goals:* No association with group
Overman 1988 Randomised controlled trial	PT first: $n=107$ Physician first: $n=67$	*Pain, symptom recurrence, anxiety:* PT first: Similar after one month (no p-values) *Disability:* PT first: Similar after one month (no p-values). Subgroup with more severe disability: Greater improvement (no p-values)

(Continued)

Table 1. (Continued)

First author, year of publication and study design	Participants' characteristics per group	Key findings
		Adverse events: PT first: 3 patients diagnosed with extensive medical issues, but PT's evaluations were appropriate *Patient satisfaction*: PT first: Similar overall (no *p*-value), higher for interest shown, time spent, time waited, and questions understood **(all $p < .05$)** *Medication*: PT first: Fewer prescriptions for muscle relaxers (**$p < .01$**), narcotics (**$p < .01$**) and non-narcotic analgesics (**$p < .001$**) *Radiography*: PT first: Similar number of X-rays (no *p*-value). *Healthcare utilization*: PT first: More referrals to PT (**$p < .01$**), less bed rest recommended (**$p < .001$**), similar recommendations regarding limiting activity *Education during first visit*: PT first: More education (**$p < .01$**)

LBP: low back pain; PT: physiotherapy; RMDQ: Roland Morris Disability Questionnaire; OR: odds ratio; HR: hazard ratio, 95% CI: 95% confidence interval. Statistically significant findings are highlighted in bold.

Six of the 15 studies (40%) included persons with acute low back pain or with a new episode of low back pain after a period without insurance claims, healthcare visits, or medical diagnoses related to low back pain.[27,30–34] Two studies (13%) included a mixture of persons with acute, subacute, and chronic pain,[29,41] and seven studies (47%) did not report low back pain duration.[28,35–38,40] Only three of the 15 studies (20%) collected information on baseline disability,[38–40] and none reported pain intensity at baseline. Finally, only two studies (13%) reported the participants' body mass index.[27,30]

Three studies investigated the effect of physiotherapy- compared to physician-led care in the emergency department. Two studies were prospective cohort studies,[42,43] and one was a retrospective cohort study[44] (see Table 2). Age and gender were similar between groups in one study,[44] differed in a second study,[42] and were not reported in the third study.[43] One study included persons with acute low back pain,[43] and two did not specify low back pain duration.[42,44] Finally, none of the studies reported body mass index, disability or pain at baseline.

Eight out of 18 studies (44%) showed low risk of bias, seven (39%) displayed moderate risk of bias, and three (17%) exhibited high risk of bias (see Table 3).

Findings in primary care

The 15 studies in primary care measured clinical outcomes (e.g. pain, disability, patient satisfaction, reasons for discharge, duration of the low back pain or care episode), healthcare use (e.g. medication, invasive procedures, medical imaging, physiotherapy sessions, general practitioner visits, referrals to medical specialists, hospitalisation rate, emergency department visits), education provided during the first visit, healthcare costs, sick leave, and adverse events. The key findings, as well as the summary of findings and GRADE assessment, are presented in Tables 1 and 4. The detailed data extraction and summary of findings tables, reporting the means and standard deviations, between-group differences, and other statistics, can be found in Supplementary Files 3 and 5.

Table 2. Abridged data extraction table of studies in emergency department.

Reference Study design	Participants' characteristics per group	Key findings
Sayer 2018 Retrospective cohort study	Acute LBP PT first: $n = 360$ Physician first: $n = 729$	*Waiting time:* PT first: Shorter (**$p < .001$**) *Treatment time:* PT first: Similar ($p = .159$) *Compliance to recommendation of being admitted, discharged, or transferred within 4h:* PT first: Greater compliance (**$p < .005$**). Odds ratio of complying if seen by PT compared to physician first was 3.85 (**$p < .001$**) *Length of stay:* PT first: Shorter (**$p < .001$**) *Hospitalisation rate:* PT first: Fewer patients hospitalised (**$p < .001$**). Odds ratio of being hospitalised if seen by physician compared to PT first was 3.38 (**$p < .001$**) *Representation to ED after discharge:* PT first: Similar ($p = .26$)
Schulz 2016 Prospective cohort study	Acute LBP PT first: $n = 19$ Physician first: $n = 10$	*Pain, disability:* PT first: No difference at discharge, and 2 and 6 weeks after discharge ($p = .148$–.988) *Days off work, days off sport:* PT first: No difference at 2 or 6 weeks after discharge ($p = .089$–.870) *Patient satisfaction:* PT first: Greater at discharge (**$p = .009$–.024**). No difference at 2 and 6 weeks after discharge ($p > .05$) *Medication:* PT first: Fewer patients received anxiolytics prescription at discharge (**$p = .019$**). No difference for opioid, paracetamol and NSAIDs prescription at discharge ($p = .234$–.930), and at 2 or 6 weeks after discharge ($p = .126$–.943) *Imaging:* PT first: Fewer imaging at discharge (**$p = .042$**). No difference at 2 and 6 weeks after discharge ($p = .372$, $p = .130$)
De Gruchy 2015 Prospective cohort study	PT first: $n = 120$ Physician first: $n = 700$	*Treatment time:* PT first: Shorter (**$p < .001$**) *Discharge destination:* PT first: More often to home (**$p = .037$**)

LBP: low back pain; PT: physiotherapy; ED: emergency department. Statistically significant findings are highlighted in bold.

Consistent evidence in favour of physiotherapy-led care was found for disability, the duration of the pain or care episode, and patient satisfaction. Two out of three studies showed greater improvements in *disability* in patients receiving physiotherapy-led care compared to physician-led care at one month[40] and six months follow-up.[38] One of these studies only observed this result in patients who reported more severe disability at baseline and no *p*-value was mentioned.[40] The third study showed no group difference in the improvement in disability.[39] For the *duration of the pain or care episode*, one study found a significantly, seven-day shorter physiotherapy care episode in the physiotherapy-led care group[38] and one study reported a 14-day shorter pain episode (no *p*-value mentioned).[27] The third study found no group difference.[30] Finally, two studies showed greater *patient satisfaction* in physiotherapy-led compared to physician-led care.[35,40] The certainty of evidence for these three clinical outcomes was very low.

Regarding adverse events, two studies found that physiotherapy-led care was as *safe* as physician-led care, with very low certainty of evidence,[33,40] as there were similar rates of serious illness diagnoses related to low back pain in both groups in the year following the first visit (no *p*-value reported).[33] Moreover, even when some patients in the physiotherapy-led care group were later diagnosed with serious medical problems, physicians considered the initial physiotherapists' evaluations appropriate.[40]

Table 3. Methodological quality assessment using the Newcastle-Ottawa scale.

	Selection of study groups				Comparability	Ascertainment of outcome				
Study	Representative-ness of exposed cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome not present at start	Comparability of cohorts	Assess-ment of outcome	Follow-up long enough	Adequacy of follow-up	Total score	Risk category
Primary care										
Walsh et al.			★	★		★			3	High
Bise et al.	★	★	★	★	★★	★	★	★	9	Low
Morso et al.	★	★	★	★	★				5	Moderate
Crowell et al.			★	★		★			3	High
Harwood et al.	★	★	★	★	★★	★	★		8	Low
Kiljanska et al.			★	★		★	★		4	High
Kazis et al.	★	★	★	★	★★	★	★		8	Low
Garrity et al.	★	★	★	★	★★	★			7	Low
Frogner et al.	★	★	★	★	★★	★	★		8	Low
Magel et al.	★	★	★	★		★			5	Moderate
Fritz et al.	★	★	★	★	★★	★	★		8	Low
Bornhöft et al.	★		★	★	★★	★	★		7	Low
Pendergast et al.	★	★	★	★	★★	★			7	Low
Leemrijse et al.	★	★	★	★	★	★			6	Moderate
Overman et al.	★	★	★	★		★			5	Moderate
Emergency department										
Sayer et al.	★	★	★	★	★	★			6	Moderate
Schulz et al.	★	★	★	★		★			5	Moderate
De Gruchy et al.	★	★	★	★	★	★			6	Moderate

Table 4. Abridged summary of findings table of studies in primary care.

Outcomes	Effect PT-led vs physician-led	Sample size PT-led vs physician-led	Certainty of evidence
Pain intensity	Overman: Equal between groups (no p-value)	65 vs 41 #[a]	⊕◯◯◯ Very low
Disability	Walsh: Equal improvement after 3 ($p = .882$) and 6 months ($p = .449$) Magel: Greater improvement after 6 months (**$p = .002$**) Overman: Equal improvement in total group, greater in patients with severe disability (no p-values)	32 vs 48 vs 18 #[b] 85 vs 56 #[b] 65 vs 41 #[a]	⊕◯◯◯ Very low
Duration of episode	Bise: 14 days shorter (no p-value) Magel: 7 days shorter (**$p = .045$**) Fritz: No association with group ($p = .87$)	1226 vs 15,199[b] 124 vs 96[b] 48 vs 409[b]	⊕◯◯◯ Very low
Adverse events, harm	Harwood: Similar frequency of serious illness diagnosis after 1 year (no p-value) Overman: In case of serious illness diagnosis, PT's evaluation was appropriate	109,480 vs 957,686[b] 107 vs 67 #[a]	⊕◯◯◯ Very low
Patient satisfaction	Kiljanska: 9% greater (no p-value) Overman: Similar overall (no p-value), greater on specific items (all **$p < .05$**)	3104 vs 95,123[b] 65 vs 41 #[a]	⊕◯◯◯ Very low
Medication	Bise: Less likely to receive prescription after 1 year (HR: 0.35, **95%CI: 0.34–0.37**) Crowell: Less likely to receive prescription (**$p < .001$, $p = .007$**) Harwood: 7% less early opioid use, 3% less long-term opioid use (no p-values) Frogner: Less prescriptions (**$p = .001$**), lower probability (**$p < .001$**) after 1 year Kazis: Lower odds of early (OR: 0.15, **95%CI: 0.13–0.17**), long-term opioid use (OR: 0.27, **95%CI: 0.15–0.48**) Bornhoft: Lower odds after 6 (OR: 0.11, **95%CI: 0.08–0.16**), 12 months (OR: 0.13, **95%CI: 0.09–0.20**) Overman: Less prescriptions (all **$p < .01$**)	1226 vs 15,199[b] 93 vs 50 #[b] 109,480 vs 957,686[b] 12,996 vs 17,135 vs 118,825[b] 3499 vs 114,782[b] 249 vs 456[b] 107 vs 67 #[a]	⊕⊕◯◯ Low
Radiography	Bise: Less likely after 1 year (HR: 0.23, **95% CI: 0.23–0.24**) Harwood: 7% fewer X-rays after 1 year (no p-value) Kiljanska: Less X-rays after 1 year (**$p < .001$**) Frogner: Lower probability after 1 year (**$p < .005$**) Magel: Fewer X-rays after 6 months (**$p < .05$**) Fritz: Lower odds after 1 year (**$p = .017$**) Overman: Similar (no p-value)	1226 vs 15,199[b] 109,480 vs 957,619[b] 11,997 vs 31,107[b] 12,996 vs 17,135 vs 118,825[b] 124 vs 276[b] 48 vs 409[b] 107 vs 67 #[a]	⊕⊕◯◯ Low

(Continued)

Table 4. (Continued)

Outcomes	Effect PT-led vs physician-led	Sample size PT-led vs physician-led	Certainty of evidence
Advanced imaging	Bise: Less likely after 1 year (HR: 0.27, **95%CI: 0.26–0.27**) Harwood: Similar after 1 year (no p-value) Kiljanska: Less imaging after 1 year (**$p < .001$**) Frogner: Lower probability after 1 year (**$p < .001$**) Magel: Less imaging after 6 months (**$p < .05$**) Fritz: Similar after 1 year (OR: 0.40, 95%CI: 0.11–1.46)	1226 vs 15,199[b] 109,480 vs 957,619[b] 11,997 vs 31,107[b] 12,996 vs 17,135 vs 118,825[b] 124 vs 276[b] 48 vs 409[b]	⊕⊕◯◯ Low
Surgery	Bise: Less likely after 1 year (HR: 0.36, **95%CI: 0.34–0.42**) Harwood: Similar after 1 year (no p-value)	1226 vs 15,199[b] 109,480 vs 957,619[b]	⊕◯◯◯ Very low
Injections	Bise: Less likely after 1 year (HR:0.39, **95%CI: 0.37–0.40**) Magel: Fewer injections after 6 months (**$p < .05$**) Fritz: Similar after one year (OR: 0.27, 95%CI: 0.04–2.15)	1226 vs 15,199[b] 124 vs 276[b] 48 vs 409[b]	⊕⊕◯◯ Low
Visits to medical specialists	Bise: Less likely after 1 year (HR: 0.36, **95%CI: 0.35–0.37**) Magel: Fewer visits after 6 months (**$p < .05$**) Fritz: Similar after 1 year (OR: 1.3, 95%CI: 0.35–5.31 Bornhoft: Lower odds after 6 (OR: 0.41, **95%CI: 0.27–0.61**) and 12 months (OR: 0.45, **95%CI: 0.29–0.70**)	1226 vs 15,199[b] 124 vs 276[b] 48 vs 409[b] 249 vs 456[b]	⊕⊕◯◯ Low
Visits to GP	Kiljanska: Fewer visits after 1 year (**$p < .001$**) Bornhoft: At least one GP visit: Similar odds after 6 (OR: 0.78, 95%CI: 0.56–1.09) and 12 months (OR: 0.85, 95%CI: 0.59–1.23). At least two GP visits: Lower odds after 12 months (OR: 0.53, **95%CI: 0.33–0.84)**	11,997 vs 31,107[b] 249 vs 456[b]	⊕◯◯◯ Very low
Visits to PT	Kiljanska: Less visits after 1 year (**$p < .001$**) Magel: Similar after 6 months (no p-value) Pendergast: Lower risk (**$p = .001$**) Overman: More referrals to PT (**$p < .01$**)	11,997 vs 31,107[b] 124 vs 276[b] 5844 vs 13,879[b] 107 vs 67 #[a]	⊕◯◯◯ Very low
Visits to emergency department	Bise: Less likely after 1 year (HR: 0.63, **95%CI: 0.56–0.67**) Harwood: Similar after 1 year (no p-value) Frogner: Lower probability after 1 year (**$p < .001$**) Fritz: Similar odds after 1 year (OR: 0.3, 95%CI: 0.05–2.82)	1226 vs 15,199[b] 109,480 vs 957,619[b] 12,996 vs 17,135 vs 118,825[b] 48 vs 409[b]	⊕◯◯◯ Very low
Hospitalisation	Harwood: Similar after 1 year (no p-value) Frogner: Higher probability after 1 year (**$p < .001$**)	109,480 vs 957,619 [b] 12,996 vs 17,135 vs 118,825[b]	⊕◯◯◯ Very low
Education during 1st visit	Morso: 30% more (no p-value) Overman: More (**$p < .01$**)	308 vs 149 [b] 107 vs 67 #[a]	⊕◯◯◯ Very low
Total costs	Bise: $4997 less after 1 year (no p-value)	1226 vs 15,199[b]	

(Continued)

Table 4. (Continued)

Outcomes	Effect PT-led vs physician-led	Sample size PT-led vs physician-led	Certainty of evidence
	Harwood: $1753 more after 1 year (no *p*-value)	109,480 vs 957,619[b]	⊕◯◯◯ Very low
	Garrity: Similar costs in unrestricted access states (*p* = .30), higher in provisional access states (***p*** **< .001**)	2297 vs 58,301[b]	
	Frogner: Lower after 1 year (***p*** **< .001**)	12,609 vs 17,135[b]	
	Fritz: No association between costs and first provider type (*p* = .34)	48 vs 409[b]	
	Pendergast: Lower (***p*** **< .001**)	5844 vs 13,879[b]	
Sick leave	Kiljanska: Fewer sick leaves (***p*** **< .001**), shorter sick leaves (***p*** **< .001**) after 1 year	11,997 vs 15,199 [b]	⊕◯◯◯ Very low
	Bornhoft: Lower odds after 6 (OR: 0.52, **95%CI: 0.35–0.78**) and 12 months (OR: 0.58, **95%CI: 0.38–0.87**)	249 vs 456[b]	

PT: physiotherapy; 95%CI: 95% confidence interval; HR: hazard ratio; OR = odds ratio; RR: relative risk. [a]randomised controlled trial, [b]observational study # Study sample < 400 participants. Statistically significant findings are highlighted in bold.

In terms of healthcare use, we found consistent evidence of less medication use, less medical imaging, and fewer spinal injections in physiotherapy-led compared to physician-led care. All seven studies on *medication use* demonstrated significantly fewer prescriptions for opioid- and non-opioid-containing drugs in the physiotherapy-led care group up to one year follow-up.[27–29,31,33,34,40] Additionally, six out of seven studies found significantly lower use of *radiography* in the physiotherapy-led care group at six months[38] and one year follow-up,[27,30,31,33,35] with one study not reporting *p*-values.[33] The seventh study found no group differences.[40] Four out of six studies observed significantly less *advanced medical imaging* in the physiotherapy-led compared to the physician-led care group at six months[38] and one year follow-up,[27,31,35] while two other studies found no difference between groups.[30,33] Furthermore, two out of three studies reported that significantly fewer patients had received a *spinal epidural injection* six months[38] and one year after their first visit with a physiotherapist compared to with a physician.[27] The third study found no group difference.[30] For *surgery*, evidence was inconsistent, as one out of two studies found a significantly lower risk for surgery in the physiotherapy-led compared to the physician-led care group at one year follow-up,[27] while the other study observed similar rates of surgery in both groups (no *p*-value).[33] The certainty of evidence for medication, radiography, advanced medical imaging and spinal injections was low, and for surgery very low.

Furthermore, studies consistently showed that physiotherapy-led care resulted in fewer consultations with general practitioners and medical specialists. Two studies found significantly fewer *general practitioners' visits* at one year follow-up in physiotherapy-led care,[28,35] and three out of four studies observed significantly fewer *visits or referrals to medical specialists and spine surgeons* in the physiotherapy-led care group at six months[28,38] and one year follow-up.[27,28] The fourth study found no difference between groups.[30] Findings for the use of physiotherapy, visits to the emergency department, and hospitalisation rates were inconsistent across studies. Two

Table 5. Abridged summary of findings table of studies in emergency care.

Outcomes	Effect PT-led vs physician-led	Sample size PT-led vs physician-led	Certainty of evidence
Pain intensity	Schulz: Similar at discharge ($p = .149$), after 2 weeks ($p = .528$), after 6 weeks ($p = .769$)	19 vs 10 # [b]	⊕◯◯◯ Very low
Disability	Schulz: Similar at discharge ($p = .310$), after 2 weeks ($p = .368$), after 6 weeks ($p = .988$)	19 vs 10 # [b]	⊕◯◯◯ Very low
Patient satisfaction	Schulz: Higher (**$p = .024$**)	19 vs 10 #[b]	⊕◯◯◯ Very low
Medication	Schulz: Fewer anxiolytics prescriptions at discharge (**$p = .019$**). Similar opioid, paracetamol and NSAIDs prescriptions at discharge ($p = .234$–$.930$), after 2 and 6 weeks ($p = .126$–$.943$)	19 vs 10 #[b]	⊕◯◯◯ Very low
Imaging	Schulz: Less at discharge (**$p = .042$**). Similar after 2 and 6 weeks ($p = .372$, $p = .130$)	19 vs 10 #[b]	⊕◯◯◯ Very low
Treatment time	Sayer: Similar ($p = .159$) De Gruchy: Shorter (**$p < .001$**)	360 vs 729 [b] 120 vs 700 [b]	⊕◯◯◯ Very low
Discharge destination	Sayer: Fewer hospitalisations (**$p < .001$**) De Gruchy: More discharges to home (**$p = .037$**)	360 vs 729 [b] 120 vs 700 [b]	⊕◯◯◯ Very low

PT: physiotherapy, [b]observational study, # Study sample < 400 participants. Statistically significant findings are highlighted in bold.

out of four studies noted a significantly lower *use of physiotherapy* services in physiotherapy-led care,[35,37] while one study reported significantly more referrals to physiotherapy in persons seeing a physiotherapist first, although the total number of physiotherapy visits was unclear.[40] Finally, the fourth study found no group difference (no *p*-value reported).[38] Two out of four studies reported a significantly lower risk of visiting the *emergency department* in the physiotherapy-led care group at one year follow-up,[27,31] while the two remaining studies reported no group difference.[30,33] Finally, one out of two studies found a significantly higher *hospitalisation rate* (but equal hospitalisation costs) at one year follow-up in persons receiving physiotherapy first compared to those receiving physiotherapy later and those not receiving physiotherapy,[31] while the second study found no group difference in hospitalisation rate.[33] The certainty of evidence for visits to general practitioners, physiotherapy and the emergency department and for the hospitalisation rate was very low, for referrals to medical specialists low.

Regarding *healthcare costs*, evidence consistently favoured physiotherapy-led care. Four out of six studies observed significantly lower physiotherapy and non-physiotherapy-related costs,[37] significantly lower total costs,[31] and $987 lower medical and pharmacy claims costs and $4995 lower total healthcare costs in the physiotherapy-led care group (no *p*-values).[27] Moreover, in American states that only allow access to physiotherapy under specific conditions, physiotherapy-led care was associated with significantly higher 30-day costs than physician-led care, while equal costs were found in states that allow unrestricted access to physiotherapy.[32] By contrast, one study observed $1753 higher total costs in the physiotherapy-led care group at one year follow-up (no *p*-values).[33] The sixth study found no association between physiotherapy- or physician-led care and total healthcare costs at one year follow-up.[30] The certainty of evidence for healthcare costs was very low.

Moreover, two studies reported, with very low certainty of evidence, that persons in physiotherapy-led care received *education* significantly more often than those in physician-led care.[40,41] Finally, both studies on *sick leave* found, with very low certainty of evidence, significantly fewer and shorter sick leaves,[35] as well as significantly lower odds of being prescribed sick leave at six months and one year follow-up in the physiotherapy-led compared to the physician-led care group.[28]

Findings in emergency departments

The studies at the emergency department evaluated clinical outcomes (e.g. pain, disability, days off work and sports, patient satisfaction), healthcare use (e.g. medication use, medical imaging), and emergency department performance measures (e.g. waiting and treatment time, length of stay, representation rate after discharge, discharge destination). The key findings are presented in Table 3. Table 5 provides the summary of findings and GRADE assessment per outcome. Detailed data extraction and summary of findings tables, reporting the mean and standard deviation, between-group difference, and other statistics, can be found in Supplementary Files 4 and 6.

Both studies comparing emergency department performance measures between patients first seen by an advanced practice physiotherapist and those first seen by other clinicians found that significantly more persons were *discharged to home* in the physiotherapy-led care group,[42,44] with very low certainty of evidence. Moreover, the odds of being *admitted to the hospital* were significantly greater when first seeing a physician, by 338%.[44] Finally, one study reported a significantly, 117-min shorter *treatment time* in the physiotherapy-led care group,[42] while the second study did not find any group difference.[44] The certainty of evidence was very low.

Discussion

This systematic review synthesised the findings of studies comparing physiotherapy- and physician-led care for low back pain in primary and emergency care. The evidence consistently showed, with very low to low certainty, that physiotherapy-led care resulted in (1) better clinical outcomes (pain duration and disability), (2) less healthcare use (e.g. medication prescription, imaging, invasive procedures), (3) lower healthcare costs and (4) reduced sick leave. Moreover, similar results for adverse events were found between groups.

The most commonly studied outcomes were imaging, medication, and injection prescription. Since serious underlying spinal pathology is only rarely present in persons with low back pain and early imaging for low back pain has been associated with longer disability and inappropriate treatment,[5,45] routine diagnostic imaging is not recommended. This also helps to avoid unnecessary radiation exposure and surgery.[10,46,47] Despite guidelines recommending cautious use of medication due to its limited effects, potential harm, and related costs,[6,48] overuse is a common problem in low back pain management.[49,50] This review suggests that physiotherapy-led care aligns better with guidelines for imaging and medication prescription and with the "As Low As Reasonably Achievable" (ALARA) principle for radiation overexposure.[51] In most studies, physiotherapists were not allowed to prescribe medication or imaging. Nevertheless, prescription rates remained lower up to one year after first visiting a physiotherapist, giving patients sufficient time to seek help from other providers (e.g. in[27,31,33,35]). Even when physiotherapists could prescribe medication and imaging, prescription rates remained lower.[29] This suggests that, in addition to legal and regulatory restrictions, differences in education and practice between healthcare providers also explain variations in healthcare use. For instance, higher imaging and medication prescription rates in physicians could be associated with their biomedical view of low back pain, assuming mainly structural causes,[52] despite current guidelines advocating a biopsychosocial approach.[10,46] Second, direct access to physiotherapy may result in earlier physiotherapy treatment, potentially preventing the transition to chronicity,[14] a major contributor to rising costs.[3]

We also found consistent evidence of very low certainty for fewer (referred) consultations with other care providers in physiotherapy-led care.[27,28,35,38] This could help lower the risk for overtreatment,[53] and could prevent patients from receiving contradictory messages and diagnostic labels that increase their perceived need for imaging and surgery.[54,55] The reduced healthcare use in physiotherapy-led care was also reflected in the lower healthcare costs observed in this group.[27,31,32,37]

When evaluating the effectiveness of care pathways, it is important to consider patient-reported clinical outcomes. Unfortunately, only five studies in primary care included clinical outcomes.[35,36,38–40] Nevertheless, the limited evidence of low certainty was in favour of physiotherapy-led care, as seeing a physiotherapist first resulted in higher patient satisfaction[35,40] and greater functional improvement.[38,40] This finding aligned well with previous systematic reviews on the effect of direct access to physiotherapy in persons with musculoskeletal pathologies in general.[19–21,56] However, more high-quality studies on the clinical effect of physiotherapy-led care for low back pain are needed.

Finally, in countries where direct access has not been implemented yet and it remains the primary care physician's responsibility to perform diagnostic triage and red flag screening,[57] a common worry is that physiotherapists may not be capable of recognising symptoms that should raise the level of concern.[58] Two studies in this review showed that physiotherapy-led care was not associated with increased harm, as the diagnosis of serious pathologies was similar in both care pathways.[33,40] This was also observed in a large controlled trial on direct access to physiotherapy for musculoskeletal pathologies.[59] Nevertheless, previous studies using clinical vignettes found that physiotherapists sometimes do fail to recognise red flags.[60,61] It is clear that physiotherapists working in direct access models need to master the required competencies, such as red flag detection and triaging skills,[62] to ensure safe and adequate management. Hence, education should target these skills, in accordance with the mandatory postgraduate training in The Netherlands.[36]

Finally, in emergency care, physiotherapy-led care resulted in shorter waiting and treatment times and reduced admissions to the hospital. Moreover, small effects in favour of physiotherapy-led care on imaging, medication prescription, and patient satisfaction were found.[42–44] Low-certainty evidence and the limited number of studies, however, require cautious interpretation.

The limitations of this review mainly relate to the methodological heterogeneity between studies. First, the level of concern of serious underlying pathology was only rarely evaluated, although this is an important parameter of safety. Second, some studies investigated the effects of physiotherapy after self-referral compared to after referral by a physician, while in other studies physicians in the physician-led care pathway could refer to physiotherapy but were not obligated to. Third, differences in national healthcare systems between countries hampered the comparison of healthcare costs across studies. Fourth, the large diversity in outcomes prevented us from performing a meta-analysis. Finally, despite the fact that the treatment recommendations for persons with acute and chronic low back pain differ, the heterogeneity of patient populations within and between studies and the lack of reporting on the duration of low back pain symptoms prevented us from determining whether the effect of physiotherapy-led care differed between acute and chronic pain populations.[63]

In summary, physiotherapy-led care for low back pain was found to be a valid and safe alternative to physician-led care, resulting in better clinical outcomes and lower healthcare costs. However, the overall certainty of evidence was low. Future high-quality randomised controlled trials that focus more on clinical outcomes are needed to confirm these findings. The results of this review can be used to guide the development of adjusted evidence-based care pathways for low back pain.

Clinical messages

- Physiotherapy-led care for low back pain (LBP) appears to result in lower healthcare use, sick leave, and healthcare costs, and higher patient satisfaction than physician-led care.
- Physiotherapy-led care for LBP seems to be more in line with clinical guidelines.
- Physiotherapy-led care for LBP appears to be safe.

Author contributions

PS, NG, and LJ conceived the study. PS and NG developed the search strategies, selected the eligible studies and performed the data extraction, quality assessment, assessment of certainty of evidence, and data synthesis. PS and NG wrote the first draft of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

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Supplemental material

Supplemental material for this article is available online.

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