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Review Article

Pain Management for Primary Care Providers: A Narrative Review of High-Impact Studies, 2014–2016

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Abstract

Objective. This manuscript reviews high-impact, peer-reviewed studies published from January 2014 to March 2016 that are relevant to pain management in primary care. Given the recent release of the US Centers for Disease Control and Prevention's "Guideline for Prescribing Opioids for Chronic Pain" emphasizing the primacy of nonopioid treatment, we focused our review on nonopioid pain management.

Design. Narrative review of peer-reviewed literature.

Methods. We searched three article summary services and queried expert contacts for high-impact, English-language studies related to the management of pain in adults in primary care. All authors reviewed 142 study titles to arrive at group consensus on article content domains. Within article domains, individual authors selected studies approved by the larger group according to their impact on primary care clinical practice, policy, and research, as well as quality of the study methods. Through iterative discussion, 12 articles were selected for detailed review, discussion, and presentation in this narrative review.

Results. We present key articles addressing each of six domains of pain management: pharmacotherapy for acute pain; interventional treatments; medical cannabis; complementary and integrative medicine; care management in chronic pain; and prevention. Within each section, we conclude with implications for pain management in primary care.

Conclusions. There is growing evidence for multiple nonopioid treatment modalities available to clinicians for the management of pain in primary care. The dissemination and implementation of these studies, including innovative care management interventions, warrant additional study and support from clinicians, educators, and policy-makers.

Key Words. Pain Management; Primary Care; Complementary and Integrative Health; Interventional Pain Management

Introduction

Primary care providers treat the majority of patients with chronic pain, and the US Department of Health and Human Services' (HHS) National Pain Strategy has recognized primary care as the hub of pain assessment and treatment in the United States [1]. However, HHS acknowledged that many primary care providers receive inadequate training in pain management and feel unprepared to handle the complex issues inherent in caring for patients with chronic pain. On the other hand, as experts in prevention and chronic disease management increasingly trained in team-based care, primary care providers are uniquely positioned to deliver the biopsychosocially oriented, evidence-based pain care promoted in the National Pain Strategy. Our aims were to review recent high-impact pain medicine studies relevant to primary care. Given the recent release of the US Centers for Disease Control and Prevention's (CDC's) "Guideline for Prescribing Opioids for Chronic Pain" emphasizing that "non-opioid therapy is preferred for treatment of chronic pain" [2], we focused our review on nonopioid pain management.

Methods

We identified peer-reviewed articles relevant to pain management in primary care published from January 1, 2014, through March 31, 2016. We first reviewed summaries of high-impact studies identified by McMaster/BMJ's Evidence Updates as relevant to primary care or pain specialty providers. The McMaster/BMJ's Evidence Updates systematically reviews over 120 journals including the Cochrane library and pain specialty journals. We further searched *New England Journal of Medicine's* Journal Watch and the American College of Physicians' Journal Club for summaries of potentially relevant studies. Additionally, we invited members of the Society of General Internal Medicine's Pain Medicine Interest Group—approximately 60 generalists with interest and expertise in pain management—to suggest relevant articles. This search strategy produced 142 references, the titles and abstracts of which were further assessed for inclusion by all authors according to relevance to pain management for primary care providers. This review and subsequent discussion was carried out in a series of three conference calls and led to group consensus on the most important article content domains. Within domains, individual authors selected and presented the most important studies for group discussion and approval based on potential impact on primary care practice, policy, and research, as well as the quality of the study methods. Authors achieved consensus on the 12 articles with the highest ratings. Key summary findings of the 12 studies are highlighted in Table 1.

Pharmacotherapy for Acute Lumbar Pain

- Friedman BW, Dym AA, Davitt M, et al. Naproxen with cyclobenzaprine, oxycodone/acetaminophen, or placebo for treatment of acute low back pain. JAMA 2015;314(15):1572–80 [3].
- Goldberg H, Firtch W, Tyburski M, et al. Oral steroids for acute radicular pain due to herniated disc: A randomized controlled trial. JAMA 2015;313(19):1915–23 [4].

Pharmacotherapy is usually the firstline treatment for acute low back pain and may include nonsteroidal anti-inflammatory drugs (NSAIDS), acetaminophen, skeletal muscle relaxants, oral steroids, or opioids. These medications are frequently used in combination to achieve greater pain relief despite a paucity of studies examining the effectiveness of combination therapy in the emergency or urgent care setting. In patients who present with acute low back pain and radiculopathy due to a herniated disc, oral steroids are commonly prescribed to hasten recovery and prevent the need for invasive treatments. Until recently, the use of oral steroids for radiculopathy due to a herniated disc was only supported by small, inadequately powered studies.

Friedman et al. evaluated whether combination pharmacotherapy was more effective than monotherapy with naproxen in patients with acute low back pain who presented to the emergency department. Using change in the Roland-Morris Disability Questionnaire, a measure of pain and function, at one-week as the primary outcome, the trial compared three treatment arms: 1) naproxen plus placebo; 2) naproxen plus cyclobenzaprine; and 3) naproxen plus oxycodone/acetaminophen. At one week, there was no significant difference in pain and function between treatment groups. Of note, patients who received combination therapy reported more side effects than those who received naproxen plus placebo.

In a related study, Goldberg et al. examined whether oral prednisone was more effective than placebo among patients with acute sciatica due to a magnetic resonance imaging (MRI)–confirmed herniated disc. Using change in the Oswestry Disability Index, a measure of pain and function, at three weeks as the primary outcome, the study compared a tapering 15-day course of oral prednisone to matching placebo. Both treatment groups improved on the primary outcome measure from baseline. However, there were adjusted differences between treatment arms of 6.4 points at three weeks and 7.4 points at 52 weeks, favoring the prednisone arm at both time points, albeit modestly. Adverse events were more frequent in the prednisone group, but were generally mild and short-lived.

Table 1 Key summary points by study

Category	Study	Key Summary Points
Pharmacotherapy for acute lumbar pain	Friedman BW, Dym AA, Davitt M, et al. Naproxen with cyclobenzaprine, oxycodone/acetaminophen, or placebo for treatment of acute low back pain. JAMA 2015;314(15):1572–80 [3].	• In patients with acute, nonradicular low back pain who presented to an emergency department, the addition of cyclobenzaprine or oxycodone/acetaminophen to naproxen alone did not improve pain or function at one week and led to more side effects.
	Goldberg H, Firtch W, Tyburski M, et al. Oral steroids for acute radicular pain due to herniated disc: A randomized controlled trial. JAMA 2015;313(19):1915–23 [4].	• In patients with acute sciatica due to MRI-confirmed herniated disc, oral prednisone led to a modest, statistically significant improvement in back pain-related function at three weeks.
Interventional pain treatments	Chou R, Hashimoto R, Friedly J, et al. Epidural corticosteroid injections for radiculopathy and spinal stenosis: A systematic review and meta-analysis. Ann Intern Med 2015;163:373–81 [5].	• Epidural steroid injection (ESI) did not show long-term benefit and showed small benefit of questionable clinical significance in the immediate or short term. • Source studies were insufficient to pool data and draw conclusions about the harms of ESI.
	Skou ST, Roos EM, Laursen MB, et al. A randomized, controlled trial of total knee replacement. N Engl J Med 2015;373:1597–606 [8].	• Total knee replacement (TKR) was more efficacious than nonsurgical management for pain and functional improvement in individuals with knee OA. Improvement was sustained at 12 months. • TKR was associated with higher risk for adverse events.
Medical cannabis or cannabinoids for pain	Whiting PF, Wolff RF, Deshpande S, et al. Cannabinoids for medical use: A systematic review and meta-analysis. JAMA 2015;313(24):2456–73 [11].	• There is evidence for the efficacy of medical cannabinoids in chronic neuropathic pain based on the pooled results from six studies of 15 weeks or shorter duration. • The pooled treatment effect was modest, and adverse effects were common. • The quality of evidence was low to moderate, and there was significant risk of bias.
Complementary and integrative medicine for low back pain	Morone NE, Greco CM, Moore CG, et al. A mind-body program for older adults with chronic low back pain: A randomized clinical trial. JAMA Intern Med 2016;176(3):329–37 [12].	• Clinically meaningful functional improvement was greater in the mindfulness meditation group than the health education group at eight weeks but did not differ at six months.
	Cherkin DC, Sherman KJ, Balderson BH, et al. Effect of mindfulness-based stress reduction vs cognitive behavioral therapy or usual care on back pain and functional limitations in adults with chronic low back pain: A randomized clinical trial. JAMA 2016;315(12):1240–9 [13].	• Clinically meaningful functional improvement was achieved by a significantly greater proportion of participants in the MBSR and CBT groups at 26 weeks compared with usual care recipients. Improvements in the MBSR group persisted at 52 weeks.
Collaborative care management in chronic musculoskeletal pain	Kroenke K, Krebs EE, Wu J, Yu Z, Chumbler NR, Bair MJ. Telecare collaborative management of chronic pain in primary care. A randomized clinical trial. JAMA 2014;312:240–8 [20].	• At 12 months, the Telecare Collaborative Management (TCM) group had a clinically significant improvement in pain and function compared with usual care. • TCM participants were more likely to rate as good to excellent both medication prescribed for their pain and overall treatment of their pain.

(continued)

Table 1 Continued

Category	Study	Key Summary Points
	Bair MJ, Ang D, Wu J, Outcalt SD, Sargent C, et al. Evaluation of Stepped Care for Chronic Pain (ESCAPE) in veterans of the Iraq and Afghanistan conflicts: A randomized clinical trial. JAMA Intern Med 2015;175:682–9 [21].	• The stepped care group experienced clinically significant improvements in three coprimary outcomes related to pain and pain-related interference compared with usual care.
Prevention	Steffans D, Maher CG, Pereira LSM, et al. Prevention of low back pain: A systematic review and meta-analysis. JAMA Intern Med 2016;176(2):199–208 [23].	• For exercise alone, pooled results of four trials provided low-quality evidence of a short-term protective effect of exercise on incident low back pain (LBP). • Exercise plus education reduced incident LBP at short-term and long-term follow-up but had no effect on prevention of LBP-related sick leave at short- or long-term follow-up.
	Dunlop DD, Song J, Semanik PA, et al. Relation of physical activity time to incident disability in community dwelling adults with or at risk of knee osteoarthritis: A prospective cohort study. BMJ 2014;348:g2472 [24].	• Increasing amounts of time per day spent in light-intensity physical activities were significantly associated with less incident disability and less disability progression, even after controlling for socioeconomic and clinical factors.
	White DK, Tudor-Locke C, Zhang Y, et al. Daily walking and the risk of incident functional limitation in knee osteoarthritis: An observational study. Arthritis Care Res 2014;66(9):1328–36 [25].	• This study demonstrated a dose-response relationship between increased steps and decreased disability.

Abbreviations: CBT = Cognitive behavioral therapy; ESI = Epidural steroid injection; LBP = Low back pain; MBSR = Mindfulness-based stress reduction; MRI = Magnetic resonance imaging; TCM = Telecare collaborative management; TKR = Total knee replacement;

Implications for Practice

In patients with acute, nonradicular low back pain who present to an emergency department, the addition of cyclobenzaprine or oxycodone/acetaminophen to naproxen alone did not improve pain or function at 1 week and led to more side effects. As such, the study by Friedman et al. provides evidence against the use of combination therapy in the emergency setting for acute low back pain. Treatment with naproxen alone provides similar benefits and avoids the added side effects of combination therapy. Relatedly, in patients with acute sciatica due to MRI-confirmed herniated disc, oral prednisone led to a modest, statistically significant improvement in back pain–related function. An important caveat related to these studies is that they were both performed in the emergency setting where patients presenting with acute back pain may differ in important ways from patients presenting to urgent or primary care settings. Also, as with any recommended therapy, risks and potential benefits of pharmacotherapy need to be discussed with patients.

Interventional Pain Treatments

- Chou R, Hashimoto R, Friedly J, et al. Epidural corticosteroid injections for radiculopathy and spinal stenosis: A systematic review and meta-analysis. Ann Intern Med 2015;163:373–81 [5].

Lumbar radiculopathy (sciatica) and spinal stenosis are common conditions [6]. Epidural steroid injection (ESI) is an increasingly used interventional treatment for lumbar radiculopathy and spinal stenosis. However, given the predominance of small studies with heterogeneous comparators and outcomes, the evidence base for ESI is unclear. Therefore, the US Centers for Medicare and Medicaid Services requested a systematic review and meta-analysis of the literature, which included randomized controlled trials comparing ESI with placebo (no injection; or saline, local anesthetic, or subcutaneous injection). Eligible studies involved adult participants with lumbar radiculopathy or spinal stenosis of any duration but not due to trauma, infection, or cancer. Outcomes were categorized as immediate (five days to two weeks), short term (two weeks to

three months), intermediate (three months to 12 months), or long term (more than 12 months).

Thirty trials for lumbar radiculopathy and eight for spinal stenosis were included. For lumbar radiculopathy, pooled results demonstrated a significant but small beneficial effect of ESI compared with placebo in both immediate pain (mean difference = −7.55, 95% confidence interval [CI] = −11.4 to −3.7) and function (mean difference = −0.33, 95% CI = −0.56 to −0.09), as well as short-term risk of proceeding to surgery (relative risk [RR] = 0.62, 95% CI = 0.41 to 0.92). For spinal stenosis, the pooled results demonstrated a significant but small beneficial effect of ESI compared with placebo only in immediate pain (mean difference = −22.0, 95% CI = −0.36 to −8.0). No intermediate or long-term pooled effects were statistically significant for lumbar radiculopathy or spinal stenosis. There were no clear differences by corticosteroid formulation, dose, anatomical approach, or patient characteristics. Serious adverse events were rare, but inconsistency in assessing and reporting harms limits the conclusions that can be drawn.

Implications for Practice

The results of this study should help providers counsel patients about the expected benefits of ESI treatment for lumbar radiculopathy or spinal stenosis. In this meta-analysis, ESI did not show benefit in the long-term and showed small benefit of questionable clinical significance in the immediate or short term. The source studies were insufficient to pool data and draw conclusions about the harms of ESI. While this review demonstrated only modest efficacy for ESI for immediate and short-term outcomes, patients with severe and persistent symptoms despite conservative interventions may still warrant referral to interventional pain management, particularly when seeking short-term improvement in symptoms [7].

- Skou ST, Roos EM, Laursen MB, et al. A randomized, controlled trial of total knee replacement. N Engl J Med 2015;373:1597–606 [8].

Total knee replacement (TKR) for osteoarthritis (OA) is common and increasing, with over 670,000 TKRs performed in the United States each year, a seven-fold increase since the 1970s [9]. Recent clinical guidelines recommend nonsurgical treatment as core therapy for knee OA [10]. These treatments include exercise, education, diet modification, use of shoe insoles, and medications. However, there were no prior high-quality randomized controlled trials of TKR compared with nonsurgical treatment for knee OA.

Skou et al. performed a randomized controlled trial examining whether TKR was more effective than nonsurgical management for patients with knee OA deemed eligible for TKR by an orthopedic surgeon. With the primary outcome of 12-month change in the Knee Injury and Osteoarthritis Outcome Score (KOOS4), a measure of pain, symptoms, function, and quality of life measured from 0 to 100, the study compared: 1) 12 weeks of nonsurgical management (exercise for 60 minutes twice weekly, two educational sessions, four dietary advice sessions, individually fitted insoles, and analgesics [acetaminophen or ibuprofen]) vs 2) TKR followed by 12 weeks of the same nonsurgical management. Secondary outcomes included symptoms, medication use, and adverse events.

Both treatment groups improved on the KOOS4 at 12 months, but in the intention-to-treat analysis, there was significantly greater improvement in the primary outcome and all secondary outcomes for the TKR group compared with the nonsurgical group. The number needed to treat with TKR instead of nonsurgical management to achieve one additional beneficial outcome was 5.7. However, there were significantly more adverse events in the TKR group than in the nonsurgical group,

Implications for Practice

TKR is more efficacious than nonsurgical management for pain and functional improvement in individuals with knee OA, and improvement was sustained at 12 months. However, TKR is associated with higher risk for adverse events. Thus, providers should discuss patients' preferences and values and use shared decision-making when considering TKR for knee OA. While some patients will choose TKR given the improvement in 12-month outcomes, some patients may prefer to intensify nonsurgical management to avoid risks of TKR.

Medical Cannabis or Cannabinoids for Pain

- Whiting PF, Wolff RF, Deshpande S, et al. Cannabinoids for medical use: A systematic review and meta-analysis. JAMA 2015;313(24):2456–73 [11].

While 23 states and the District of Columbia now allow medical cannabis, its role in various conditions including chronic pain management remains controversial. Whiting et al. performed a systematic review and meta-analysis to evaluate the evidence for efficacy and harms of medical cannabinoids. While the authors assessed a broad range of potential benefits in multiple conditions, our review is limited to the effects on chronic pain.

Using a broad search strategy, the authors sought to identify all published and unpublished studies of randomized controlled trials comparing cannabinoids with either placebo, usual care, or no treatment for 10 prespecified conditions including chronic pain through April 2015. After applying a set of inclusion criteria, the remaining studies were assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system and categorized by the Cochrane Risk of Bias Tool. Twenty-eight studies related to chronic pain management including 2,454 participants were identified. A plurality of studies involved neuropathic pain (N = 12), with three examining effects

in cancer pain and two in fibromyalgia. Of the 28 studies, 13 examined the oral mucosal spray nabiximols and four examined smoked cannabis. Two studies were deemed at low risk of bias, nine at unclear risk, and 17 at high risk of bias.

For several pain-related outcomes, there was a modest, statistically significant improvement with cannabinoids. Eight studies of moderate quality were deemed eligible for meta-analysis: one studied smoked cannabis, and seven examined nabiximols; six of these eight studied neuropathic pain. In the meta-analysis, pooled estimates were determined using random-effects models; the average number of patients who reported a reduction in pain severity of at least 30% using the 10-point pain numerical rating scale (NRS) was greater with cannabinoids than with placebo (odds ratio [OR] = 1.41, 95% CI = 0.99 to 2.00). Among the six nabiximols studies, a weighted mean difference (WMD) of −0.46 (95% CI = −0.80 to −0.11) on the NRS was found favoring nabiximols. Similarly, a WMD of −3.9 (95% CI = −7.32 to −0.47) favoring cannabinoids was seen in five studies examining the 100-point neuropathic pain scale. No difference was found in the three studies that used the Brief Pain Inventory or the three studies that assessed quality of life. Importantly, no study was longer than 15 weeks.

Whiting et al. also meta-analyzed data on adverse events related to medical cannabis, pooling the results across indications. For the 29 studies reporting any adverse event, there was a greater risk in the cannabinoid treatment groups (OR = 3.0, 95% CI = 2.4 to 3.8). Similarly, cannabinoids were associated with greater risk of serious adverse events (OR = 1.4, 95% CI = 1.0 to 1.9, 34 studies) and withdrawal from the study (OR = 2.9, 95% CI = 2.2 to 4.0, 23 studies). Most common adverse effects were neuropsychiatric symptoms such as dizziness, confusion, and disorientation, each with an OR between 4 and 5, demonstrating strong associations with cannabinoid treatment.

Implications for Practice

This systematic review and meta-analysis concluded that there is evidence for the efficacy of medical cannabinoids in chronic neuropathic pain based on the pooled results from six studies of 15 weeks or shorter duration. The pooled treatment effect was modest, and adverse effects were common. Further, the quality of evidence was low to moderate, and there was significant risk of bias. Therefore, clear scientific evidence to guide practice is lacking while access to medical cannabis expands. In light of this conundrum, we suggest that PCPs discuss the known risks and potential benefits with patients, make individualized treatment decisions, and, importantly, provide close follow-up if medical cannabis use is authorized to assess harm and benefit.

Complementary and Integrative Medicine for Low Back Pain

- Morone NE, Greco CM, Moore CG, et al. A mind-body program for older adults with chronic low back pain: A randomized clinical trial. JAMA Intern Med 2016;176(3):329–37 [12].
- Cherkin DC, Sherman KJ, Balderson BH, et al. Effect of mindfulness-based stress reduction vs cognitive behavioral therapy or usual care on back pain and functional limitations in adults with chronic low back pain: A randomized clinical trial. JAMA 2016;315(12):1240–9 [13].

Nearly 18 million U.S. adults practiced some form of meditation in 2012 [14]. Little is known about the effectiveness of mindfulness meditation for musculoskeletal pain [15]. Two randomized controlled trials examined the effectiveness of a mindfulness meditation program in adults with functional limitations due to chronic low back pain. In a trial by Morone et al., 282 older adults (mean age = 75 years, 66% women) were randomized to an eight-week mindfulness meditation program or a health education program. In a trial by Cherkin et al., 342 adults (mean age = 49 years, 66% women) were randomized to an eight-week mindfulness-based stress reduction (MBSR) program [16], a cognitive behavioral therapy (CBT) group program, or usual care. Eleven percent of participants used opioid medication for back pain, with no significant difference across intervention groups.

In the study of older adults by Morone et al., the primary outcome measure was the Roland-Morris Disability Questionnaire (RMDQ), a measure of functional limitations as a result of back pain. Clinically meaningful functional improvement was greater in the mindfulness meditation group than the health education group at eight weeks (57% vs 45%, $P = 0.051$). This difference was not sustained at six months as 49% of participants in both groups experienced clinically meaningful improvement at six months ($P = 0.97$). Among secondary outcomes, participants in the mindfulness meditation group were more likely to report a clinically meaningful improvement in most severe pain (36% vs 22%, $P = 0.02$) and marked improvement in back pain symptoms (45% vs 8%, $P < 0.01$) at six months. In the study by Cherkin et al., clinically meaningful functional improvement as measured by a modified RMDQ was achieved by 61% and 58% of participants in the MBSR and CBT groups at 26 weeks, respectively, compared with 44% of usual care recipients ($P = 0.04$). Also at 26 weeks, clinically meaningful improvement in "bothersomeness" of pain was reported by 44% and 45% of participants in the MBSR and CBT groups, respectively, vs 27% of usual care recipients ($P = 0.01$). Findings for the MBSR group persisted at 52 weeks for both outcomes. Differences between MBSR and CBT were not significant for either outcome at 26 or 52 weeks. In both trials, there were no serious adverse events reported.

Implications for Practice

These studies of mindfulness-based approaches to chronic low back pain address the urgent need for

additional evidence-based, nonpharmacologic therapies for low back pain. The clinically meaningful short- and long-term benefits and infrequent adverse events seen in these studies should prompt providers, educators, policy-makers, and payers to consider incorporating mindfulness meditation into their approaches to supporting patient-centered, multimodal pain care. First, providers should ask their patients about their experiences with nonpharmacologic modalities such as mindfulness meditation or CBT [17,18]. Second, widespread adoption of nonpharmacologic pain care in primary care settings will require training that is typically absent from current medical school and residency curricula. In the short term, providers can avail themselves of existing educational opportunities. In the long term, however, mindfulness meditation and other nonpharmacologic modalities should be taught alongside pharmacotherapy as a core competency of chronic pain care. Finally, patients' access to in-person, nonpharmacologic pain care is currently inadequate. Providers should identify available nonpharmacologic treatment options in their communities as well as within the rapidly growing community of web-based and mobile pain self-management resources [19].

Collaborative Care Management in Chronic Musculoskeletal Pain

- Kroenke K, Krebs EE, Wu J, Yu Z, Chumbler NR, Bair MJ. Telecare collaborative management of chronic pain in primary care. A randomized clinical trial. JAMA 2014;312:240–8 [20].
- Bair MJ, Ang D, Wu J, Outcalt SD, Sargent C, et al. Evaluation of Stepped Care for Chronic Pain (ESCAPE) in veterans of the Iraq and Afghanistan conflicts: A randomized clinical trial. JAMA Intern Med 2015;175:682–9 [21].

With the widespread prevalence of chronic pain, primary care providers must be engaged and activated to serve as effective firstline treatment providers and coordinate the patient's pain care. In the care of other chronic conditions, collaborative care management protocols delivered by nonphysicians in tandem with physicians can be effective, efficient, and can lead to improved patient satisfaction [22]. These two studies sought to test the effectiveness of nurse care manager–led interventions with physician oversight to optimize chronic pain care using algorithm-based, frequent-contact treatment approaches.

Kroenke et al.'s intervention (N = 249) used phone or internet-based automated symptom monitoring as inputs for a 12-month, nurse-administered, physician-supervised medication optimization algorithm. Bair et al.'s intervention (N = 241) was a stepped-care approach in which participants first underwent 12 weeks of protocol-driven medication optimization and then 12 weeks of cognitive-behavioral therapy (CBT), all administered by a nurse who was supervised by a physician. Both studies tested their interventions in Veterans Health Administration (VA) primary care settings among mostly male, mostly white participants who had chronic musculoskeletal pain. While the primary outcome for Kroenke et al. was change from baseline in the Brief Pain Inventory (BPI) severity module, Bair et al. examined three coprimary outcomes: 1) change from baseline in the 24-item Roland Morris Disability Questionnaire, 2) BPI interference subscale, and 3) the Graded Chronic Pain scale.

At 12 months, Kroenke et al.'s intervention group had a clinically significant 1.02-point improvement in BPI total score (95% CI = −1.58 to −0.47) compared with the control group. Furthermore, intervention group participants were more likely to rate as good to excellent both medication prescribed for their pain (73.9% vs 50.9%, RR = 1.5, 95% CI = 1.2 to 1.8) and overall treatment of their pain (76.7% vs 51.6%, RR = 1.5, 95% CI = 1.2 to 1.8). In Bair et al., the intervention group experienced clinically significant improvements in each coprimary outcome: at nine months, the mean decrease from baseline in the Roland Morris Disability Scale score was 3.7 (95% CI = −4.5 to −2.8) points, the mean decrease in the pain interference subscale score of the BPI was 1.7 points (95% CI = −2.1 to −1.3), and the Graded Chronic Pain Scale severity score was reduced by 11.1 points (95% CI = −13.9 to −8.3). With each outcome, these effects were statistically greater than those experienced by the control group. Furthermore, the intervention group's receipt of multimodal pain treatment was demonstrated by a mean of 5.6 telephone sessions to discuss self-management strategies and 3.6 CBT sessions.

Implications for Practice

First, these two studies demonstrated effectiveness of interventions on clinically significant pain and functional outcomes for patients with chronic pain. Second, using team-based care—pairing a nurse with a primary care physician—these interventions seem feasible and generalizable in that they avoided reliance on sometimes hard-to-access specialty care. Third, Bair et al. particularly demonstrated that multimodal, nonpharmacologic treatment can be integrated into primary care. Though neither study assessed system-level process outcomes (e.g., efficiency of care, ability of physicians to address other clinical problems more readily), these interventions may promote these important outcomes as well and should be studied in non-VA settings. While innovative care models are sometimes challenging to implement in fee-for-service settings, collaborative care models' leveraging of the skills and expertise of less expensive staff may prove cost-effective.

Prevention

- Steffans D, Maher CG, Pereira LSM, et al. Prevention of low back pain: A systematic review and meta-analysis. JAMA Intern Med 2016;176(2):199–208 [23].
- Dunlop DD, Song J, Semanik PA, et al. Relation of physical activity time to incident disability in community dwelling adults with or at risk of knee

osteoarthritis: A prospective cohort study. BMJ 2014;348:g2472 [24].
- White DK, Tudor-Locke C, Zhang Y, et al. Daily walking and the risk of incident functional limitation in knee osteoarthritis: An observational study. Arthritis Care Res 2014;66(9):1328–36 [25].

Back pain is the leading cause of disability in the United States and worldwide [26], OA is the ninth leading cause of disability in United States, and hip/knee OA is the 11th leading cause worldwide [27]. Given this considerable burden, successful prevention of acute to chronic pain transition would have widespread public health impact.

Steffans et al. performed a systematic review and meta-analysis to evaluate the evidence on the effectiveness of interventions for prevention of low back pain (LBP) and sick leave due to LBP. They included randomized controlled trials comparing prevention strategies with placebo, no intervention, or minimal intervention that aimed to prevent future episodes of LBP or sick leave due to LBP among participants without LBP at baseline. Outcome data were extracted for short-term ($\leq$12 months) and long-term (>12 months) follow-up. Twenty-one trials (total N = 30,850 participants) were included, examining six categories of prevention strategies: exercise; exercise plus education; education; back belts; shoe insoles; and other. For exercise alone, pooled results of four trials provided low-quality evidence of a short-term protective effect of exercise on incident LBP (0.65, 95% CI = 0.50 to 0.86). However, exercise plus education reduced incident LBP at short-term (0.55, 95% CI = 0.41 to 0.74, four trials) and long-term follow-up (0.73, 95% CI = 0.55 to 0.96, two trials) but had no effect on prevention of LBP-related sick leave at short or long-term follow-up. The authors found moderate-quality evidence for no effect of education alone and no effect for back belts, as well as low-quality evidence for no effect of shoe insoles.

Dunlop et al. and White et al. published similar observational studies assessing the impact of physical activity on incident disability among adults with (or at risk of) knee OA. Dunlop et al. followed 1,680 community-dwelling adults age 49 years and older at risk of knee OA over two years and assessed the impact of light physical activity (using accelerometer readings) on incident disability, defined as difficulty or dependency in carrying out activities essential to independent living. The study demonstrated that increasing quartile categories of daily time spent in light-intensity physical activities was significantly associated with less incident disability and less disability progression, even after controlling for socioeconomic and clinical factors. Similarly, White et al. followed a prospective cohort of older adults (N = 1,788) with or at risk of knee OA and examined the association between baseline activity—measured as walking steps over a seven-day period—and incident functional limitation at two years. This study demonstrated a dose-response relationship between steps and decreased disability: Each additional 1,000 steps per day at baseline was associated with a 16% and 18% reduction in incident functional limitation by performance-based and self-report measures, respectively.

Implications for Practice

Exercise interventions are effective for reducing risk of subsequent back pain, and small differences in low-intensity physical activity are associated with substantial decreased risk of incident disability. As stated by Carey and Freburger in a commentary accompanying the Steffans et al. review, "If a medication or injection were available that reduced LBP recurrence by such an amount, we would be reading the marketing materials in our journals and viewing them on television" [28]. These studies should prompt providers to increase their focus on prevention for patients at risk of recurrent back pain or OA-related disability including counseling patients on increasing and maintaining low-intensity exercise and referring patients for group or individual exercise instruction. More research is needed on optimal methods for increasing patient motivation and improving implementation of evidence-based exercise interventions.

Discussion

In addition to the key summary findings displayed in Table 1, in this review of high-impact pain management studies relevant to primary care providers, several important themes emerged. First, the studies highlighted the need for continued progress toward pain care that is systematic, multidisciplinary, and patient-centered. Second, the growing evidence for cognitive behavioral, mindfulness-based, and exercise-based interventions in the management of chronic pain has clear implications for practice, medical education, and policy-making. Given the public health threat of opioid use disorder and overdose and the lack of clear benefit of opioids for chronic pain, primary care providers should embrace these nonopioid treatments whenever possible. Third, given the growing access to cannabinoids for medical indications, including chronic pain, this review adds to the growing calls for high-quality research examining short- and long-term outcomes. Fourth, in an era where integrated health systems need to make difficult choices about resource allocation, these findings can inform decisions on the balance of interventional to noninterventional services available. On the other hand, with TKR's value in improving pain and function in knee OA, we advocate for improved access to the surgery for patients who would potentially benefit from it. Finally, collaborative care management protocols, where nurses or other providers partner with physicians to deliver effective multimodal chronic pain care, offer a promising path for bringing pain management up to speed with successful primary care–based disease management paradigms for treating other chronic conditions.

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