TITLE: **Pharmacological Interventions for Back Pain: Clinical Effectiveness and Guidelines**

DATE: 24 November 2016

RESEARCH QUESTIONS

1. What is the clinical effectiveness of pharmacological interventions for the management of back pain?

2. What are the evidence-based guidelines regarding the use of pharmacological interventions for the management of back pain?

KEY FINDINGS

Eleven systematic reviews, seven randomized controlled trials, two non-randomized studies, and two evidence-based guidelines were identified regarding the effectiveness of pharmacological interventions for the management of back pain.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No methodological filters were applied to limit retrieval. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 01, 2011 and November 18, 2016.

SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria	
Population	Adults with acute or chronic back pain
Intervention	NSAIDs, acetaminophen, skeletal muscle relaxants
Comparator	Q1: Interventions compared with each other; placebo Q2: No comparator necessary
Outcomes	Q1: Benefits (e.g., pain relief, functional ability, work attendance) and harms (e.g., adverse events, including abuse or addiction) Q2: Recommendations for use
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, evidence-based guidelines

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

Eleven systematic reviews, seven randomized controlled trials, two non-randomized studies, and two evidence-based guidelines were identified regarding the effectiveness of pharmacological interventions for the management of back pain. No health technology assessments were identified.

Additional references of potential interest are provided in the appendix.

Health Technology Assessments

No literature was identified.

Systematic Reviews and Meta-analyses

1. Abdel SC, Maher CG, Williams KA, Mclachlan AJ. Efficacy and tolerability of muscle relaxants for low back pain: Systematic review and meta-analysis. Eur J Pain. 2016 Jun 22
   PubMed: PM27329976

   Muscle relaxants are commonly prescribed for low back pain (LBP); however, there is limited evidence of their clinical efficacy and tolerability. **This review evaluated the efficacy and tolerability of muscle relaxants in people with LBP.** We searched online databases including Medline, EMBASE, CENTRAL and PsycINFO (inception to end October 2015) and performed citation tracking for eligible randomized controlled trials (RCTs). Two authors independently extracted data and assessed risk of bias of randomized controlled trials of muscle relaxants. Pain outcomes were converted to a common 0-100 scale. Data were pooled using a random effects model with strength of evidence assessed using GRADE. **Fifteen trials (3362 participants) were evaluated in this review. A total of five trials (496 participants) provide high quality evidence that muscle relaxants provide clinically significant pain relief in the short term for acute LBP**; MD -21.3, [-29.0, -13.5]. **There was no information on long-term outcomes**. **The median adverse event rate in clinical trials for muscle relaxants was similar to placebo** 14.1% IQR (7.0-28.7%) and 16.0% (4.1-31.2%); p = 0.5, respectively. There is

no evidence for the efficacy of benzodiazepines in LBP. **For people with acute LBP, muscle relaxants provide clinically significant short-term pain relief. For chronic LBP, the efficacy of muscle relaxants is largely unknown.** There was no eligible RCT evidence to support the efficacy of benzodiazepines in LBP. Prolonged use of these medicines in LBP cannot be guided by trial evidence. WHAT DOES THIS REVIEW ADD?: **Muscle relaxants provide clinically significant pain relief for acute low back pain. Caution must be taken with the interpretation of the findings as the evidence comes from specific muscle relaxant medicines**. Copyright Â© 2016 European Pain Federation – EFIC.

2. Bavage S, Durg S, Ali KS, Dhadde SB. Clinical efficacy and safety of eperisone for low back pain: a systematic literature review. Pharmacol Rep. 2016 Oct;68(5):903-12. PubMed: PM27371896

   Eperisone, an analgesic and centrally acting muscle relaxant has been in use for the treatment of low back pain (LBP). **The present systematic review evaluates the efficacy and safety of eperisone in patients with LBP**. Cochrane Back and Neck (CBN) Group and Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines were adopted to perform this systematic review. For risk of bias assessment CBN Group and Moga tools were used. **Seven (5 randomized controlled trials [RCTs] and 2 uncontrolled studies) studies involving 801 participants were included**. **Eperisone intervention may be effective in acute LBP patients with less adverse effects** (relative risk, 0.25; 95% confidence interval, 0.15-0.41; p<0.0001). Eperisone also improved paraspinal blood flow and was found to have efficacy similar to tizanidine in chronic LBP patients. **The included studies in this review are of smaller sample size and short duration to support eperisone use in LBP**. However, we recommend well-designed RCTs of high quality with larger sample size and longer follow-up to confirm the clinical benefits of eperisone in the treatment of acute or chronic LBP. Copyright Â© 2016 Institute of Pharmacology, Polish Academy of Sciences. Published by Elsevier Urban & Partner Sp. z o.o. All rights reserved.

3. Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. Noninvasive treatments for low back pain [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2016 Feb. (Comparative Effectiveness Review). Report No.: 169 Available from: https://www.effectivehealthcare.ahrq.gov/ehc/products/553/2178/back-pain-treatment-report-160922.pdf

4. Enthoven WT, Roelofs PD, Deyo RA, van Tulder MW, Koes BW. Non-steroidal anti-inflammatory drugs for chronic low back pain. Cochrane Database Syst Rev. 2016;2:CD012087
   PubMed: PM26863524

   BACKGROUND: Chronic back pain is an important health problem. Non-steroidal anti-inflammatory drugs (NSAIDs) are widely used to treat people with low back pain, especially people with acute back pain. Short term NSAID use is also recommended for pain relief in people with chronic back pain. Two types of NSAIDs are available and used to treat back pain: non-selective NSAIDs and selective COX-2 NSAIDs. In 2008, a Cochrane review identified a small but significant effect from NSAIDs compared to placebo in people with chronic back pain. This is an update of the Cochrane review published in 2008 and focuses on people with chronic low back pain

OBJECTIVES: To determine if NSAIDs are more efficacious than various comparison treatments for non-specific chronic low back pain and if so, which type of NSAID is most efficacious

SEARCH METHODS: We searched CENTRAL, MEDLINE, EMBASE, PubMed and two clinical trials registry databases up to 24 June 2015 for randomized controlled trials (RCTs) published in English, German or Dutch. We also screened references cited in relevant reviews

SELECTION CRITERIA: We included RCTs (double-blind and single-blind) of NSAIDs used to treat people with chronic low back pain

DATA COLLECTION AND ANALYSIS: Two review authors independently screened trials for inclusion in this Cochrane review according to the inclusion criteria. One review author extracted the data, and a second review author checked the data. Two review authors independently evaluated the risk of bias of all included trials. If data were clinically homogeneous, we performed a meta-analysis and assessed the quality of evidence using the GRADE approach

MAIN RESULTS: **We included 13 trials in this Cochrane review. Ten studies were at 'low' risk of bias.** Six studies compared NSAIDs with placebo, and included 1354 participants in total. **There is low quality evidence that NSAIDs are more effective than placebo**, with a mean difference in pain intensity score from baseline of -3.30 (95% CI -5.33 to -1.27) on a 0 to 100 visual analogue scale (VAS) with a median follow-up of 56 days (interquartile range (IQR) 13 to 91 days). Four studies measured disability using the Roland Morris Disability Questionnaire. **There is low quality evidence that NSAIDs are more effective than placebo on disability**, with a mean difference from baseline of -0.85 (95% CI -1.30 to -0.40) on a scale from 0 to 24 with a median follow-up of 84 days (IQR 42 to 105 days). **All six placebo controlled studies also reported adverse events, and suggested that adverse events are not statistically significant more frequent in participants using NSAIDs compared to placebo** (RR 1.04, 95% CI 0.92 to 1.17). Due to the relatively small sample size and relatively short follow-up in most included trials, it is likely that the proportion of patients experiencing an adverse event is underestimated. **Two studies compared different types of non-selective NSAIDs, namely ibuprofen versus diclofenac and piroxicam versus indomethacin. The trials did not find any differences between these NSAID types, but both trials had small sample sizes**. One trial reported no differences in pain intensity between treatment groups that used selective or non-selective NSAIDs. **One other trial compared diflunisal with paracetamol and showed no difference in improvement from baseline on pain intensity score**. **One trial showed a better global improvement in favour of celecoxib versus tramadol**. One included trial compared NSAIDs with 'home-based exercise'. Disability improved more in participants who did exercises versus participants receiving NSAIDs, but pain scores were similar

AUTHORS' CONCLUSIONS: Six of the 13 included RCTs showed that NSAIDs are more effective than placebo regarding pain intensity. NSAIDs are slightly more effective than placebo regarding disability. However, the magnitude of the effects is small, and the level of evidence was low. When we only included RCTs at low risk of bias, differences in effect between NSAIDs and placebo were reduced. We identified no difference in efficacy between different NSAID types, including selective versus non-selective NSAIDs. Due to inclusion of RCTs only, the relatively small sample sizes and relatively short follow-up in most included trials, we cannot make firm statements about the occurrence of adverse events or whether NSAIDs are safe for long-term use.

5. Saragiotto BT, Machado GC, Ferreira ML, Pinheiro MB, Abdel SC, Maher CG. Paracetamol for low back pain. Cochrane Database Syst Rev. 2016;(6). PubMed: PM27271789

BACKGROUND: Analgesic medication is the most frequently prescribed treatment for low back pain (LBP), of which paracetamol (acetaminophen) is recommended as the first choice medication. However, there is uncertainty about the efficacy of paracetamol for LBP
OBJECTIVES: To investigate the efficacy and safety of paracetamol for non-specific LBP
SEARCH METHODS: We conducted searches on the Cochrane Central Register of Controlled Trials (CENTRAL, which includes the Back and Neck Review Group trials register), MEDLINE, EMBASE, CINAHL, AMED, Web of Science, LILACS, and IPA from their inception to 7 August 2015. We also searched the reference lists of eligible papers and trial registry websites (WHO ICTRP and ClinicalTrials.gov)
SELECTION CRITERIA: We only considered randomised trials comparing the efficacy of paracetamol with placebo for non-specific LBP. The primary outcomes were pain and disability. We also investigated quality of life, function, adverse effects, global impression of recovery, sleep quality, patient adherence, and use of rescue medication as secondary outcomes
DATA COLLECTION AND ANALYSIS: Two review authors independently performed the data extraction and assessed risk of bias in the included studies. We also evaluated the quality of evidence using the GRADE approach. We converted scales for pain intensity to a common 0 to 100 scale. We quantified treatment effects using mean difference for continuous outcomes and risk ratios for dichotomous outcomes. We used effect sizes and 95% confidence intervals as a measure of treatment effect for the primary outcomes. When the treatment effects were smaller than 9 points on a 0 to 100 scale, we considered the effect as small and not clinically important
MAIN RESULTS: Our searches retrieved 4449 records, of which **three trials were included in the review (n = 1825 participants), and two trials were included in the meta-analysis**. For acute LBP, there is high-quality evidence for no difference between paracetamol (4 g per day) and placebo at 1 week (immediate term), 2 weeks, 4 weeks, and 12 weeks (short term) for the primary outcomes. There is high-quality evidence that paracetamol has no effect on quality of life, function, global impression of recovery, and sleep quality for all included time periods. There were also no significant differences between paracetamol and placebo for adverse events, patient adherence, or use of rescue medication. For chronic LBP, there is very low-quality evidence (based on a trial that has been retracted) for no effect of paracetamol (1 g single intravenous dose) on immediate pain reduction. Finally, no trials were identified evaluating patients with subacute LBP
AUTHORS' CONCLUSIONS: We found that paracetamol does not produce better outcomes than placebo for people with acute LBP, and it is uncertain if it has any effect on chronic LBP.

6. Wong JJ, Cote P, Sutton DA, Randhawa K, Yu H, Varatharajan S, et al. Clinical practice guidelines for the noninvasive management of low back pain: a systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration. Eur J Pain. 2016 Oct 6.
PubMed: PM27712027

We conducted a systematic review of guidelines on the management of low back pain (LBP) to assess their methodological quality and guide care. **We synthesized guidelines on the management of LBP published from 2005 to 2014 following best evidence synthesis principles.** We searched MEDLINE, EMBASE, CINAHL, PsycINFO, Cochrane, DARE, National Health Services Economic Evaluation Database, Health Technology Assessment Database, Index to Chiropractic Literature and grey literature. Independent reviewers critically appraised eligible guidelines using AGREE II criteria. We screened 2504 citations; **13 guidelines were eligible for critical appraisal, and 10 had a low risk of bias. According to high-quality guidelines**: (1) all patients with acute or chronic LBP should receive education, reassurance and instruction on self-management options; (2) **patients with acute LBP should be encouraged to return to activity and may benefit from paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs), or spinal manipulation**; (3**) the management of chronic LBP may include exercise, paracetamol or NSAIDs, manual therapy, acupuncture, and multimodal rehabilitation (combined physical and psychological treatment);** and (4) patients with lumbar disc herniation with radiculopathy may benefit from spinal manipulation. **Ten guidelines were of high methodological quality, but updating and some methodological improvements are needed**. Overall, most guidelines target nonspecific LBP and recommend education, staying active/exercise, manual therapy, and paracetamol or NSAIDs as first-line treatments. **The recommendation to use paracetamol for acute LBP is challenged by recent evidence and needs to be revisited**
SIGNIFICANCE: Most high-quality guidelines recommend education, staying active/exercise, manual therapy and paracetamol/NSAIDs as first-line treatments for LBP. Recommendation of paracetamol for acute LBP is challenged by recent evidence and needs updating. Copyright Â© 2016 European Pain Federation – EFIC.

7. Abdel SC, Maher CG, Williams KA, Mclachlan AJ. Interventions available over the counter and advice for acute low back pain: systematic review and meta-analysis. J Pain. 2014 Jan;15(1):2-15.
PubMed: PM24373568

UNLABELLED: **This systematic review evaluated evidence from randomized controlled trials investigating interventions available over the counter and advice that could be provided to people with acute low back pain**. Searches were conducted on MEDLINE, Embase, Cochrane Database of Systematic Reviews, AMED, CENTRAL, and PsycINFO for eligible randomized controlled trials. The primary outcome measure was pain. Eligible controls included placebo, no treatment, or usual care. Two reviewers extracted data and rated study quality. A random effects model was used to pool trial effects with the overall strength of evidence described using the GRADE criteria**. Thirteen randomized controlled trials (2,847 participants) evaluating advice, bed rest, simple analgesics (paracetamol, nonsteroidal anti-inflammatory drugs), heat application, and a topical rubefacient were included**. There was low-quality evidence that bed rest is ineffective and very-low-quality evidence that advice is ineffective in the short, intermediate, and long terms. **There was very-low-quality evidence that nonsteroidal anti-inflammatory drugs (ibuprofen and diclofenac "when required" dosing) provide an immediate analgesic effect** (mean differences -10.9 [95% confidence interval = -17.6 to -4.2] and -11.3 [95% confidence interval = -17.8 to -4.9], respectively). There is very-low-quality evidence that heat wrap and a capsicum-based rubefacient provide an immediate analgesic effect (mean differences -13.5 [95% confidence interval = -21.3 to -

5.7] and 17.5, P < .001, respectively), but there was no information on longer-term outcomes
PERSPECTIVE: There is limited evidence that nonsteroidal anti-inflammatory drugs, heat wrap, and rubefacients provide immediate pain relief for acute back pain and that bed rest and advice are both ineffective. Future research is needed to provide evidence to support rational use of over-the-counter remedies and advice for people with acute low back pain.

8. Chung JW, Zeng Y, Wong TK. Drug therapy for the treatment of chronic nonspecific low back pain: systematic review and meta-analysis. Pain Physician. 2013 Nov;16(6):E685-E704.
PubMed: PM24284847

BACKGROUND: Low back pain (LBP) is one of the most common health problems in adults. The impact of LBP on the individual can cause loss of health status in the form of symptoms and loss of function related to pain in the back; limitation of daily, leisure, and/or strenuous activities, and disability. LBP also poses an economic burden to society, mainly in terms of one of the most common reasons for seeking medical care (direct treatment costs), and accounts for the large number of work days lost (indirect costs). To reduce the impact of LBP on adults, drug therapy is the most frequently recommended intervention. Over the last decade, a substantial number of randomized clinical trials of drug therapy for LBP have been published
OBJECTIVE: To determine the effectiveness of drug therapy for the treatment of chronic nonspecific low back pain (CNLBP)
STUDY DESIGN: Systematic review
METHODS: A systematic review and meta-analysis of randomized controlled trials was conducted. Five databases (Medline, CINAHL, Science Direct, CAJ Full-text Database, and Cochrane databases) were searched for articles published from 2002 to 2012. The eligibility criteria were randomized trials and double-blind controlled trials of oral or injection drug therapy for CNLBP in subjects who were aged at least 18 years old, published in English or Chinese. Two independent reviewers extracted the data
RESULTS: **A total of 25 drug therapy trials were included. cyclo-oxygenase-2 (COX-2) nonsteroidal anti-inflammatory drugs (NSAIDs), tramadol, and opioids were commonly used.** Only 5 trials studied the efficacy of adjuvant analgesics of antiepileptics (n = 1) and antidepressants (n = 4) for CNLBP. The standardized mean difference (SMD) for COX-2 NSAIDs in pain relief was -12.03 (95% confidence interval [CI]: -15.00 to -9.06). The SMD for tramadol in pain relief was -1.72 (95% CI: -3.45 to 0.01). As the 95% CI crossed 0, this effect size was not considered statistically significant. The SMD for the overall effects of opioids in pain relief was -5.18 (95% CI: -8.30 to -2.05). The SMD for the partial opioid agonist drug in pain relief was -7.46 (95% CI: -11.87 to -3.04)
LIMITATIONS: **The follow-up periods of these included trials in the meta-analysis ranged from 4 to 24 weeks**. The difference of follow-up periods influenced how study outcomes were recorded. These included trials also had significant differences in patient selections. Some trials may actually include CNLBP patients with neuropathic pain, as not having focal neurological findings or signs does not mean that the pain is not neuropathic. Consequently, different pain conditions may influence patients who responded to the same drug and then influence pooled estimates of treatment effect size
CONCLUSION: This review endorses the use of COX-2 NSAIDs as the first-line drugs for CNLBP. Tramadol shows no statistically significant effect on pain relief, but has

small effect sizes in improving functioning. Among included opioid therapy studies, the overall effects of opioids and the partial opioids agonist drug had statistically significant treatment effects in pain relief for CNLBP patients.

9. Kuijpers T, van MM, Rubinstein SM, Ostelo R, Verhagen A, Koes BW, et al. A systematic review on the effectiveness of pharmacological interventions for chronic non-specific low-back pain. Eur Spine J [Internet]. 2011 Jan [cited 2016 Nov 23];20(1):40-50. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3036024
PubMed: PM20680369

The objective of this review was to determine the effectiveness of pharmacological interventions [i.e., non-steroid anti-inflammatory drugs (NSAIDs), muscle relaxants, antidepressants, and opioids] for non-specific chronic low-back pain (LBP). Existing Cochrane reviews for the four interventions were screened for studies fulfilling the inclusion criteria. Then, the literature searches were updated. Only randomized controlled trials on adults (>18 years) with chronic (>12 weeks) non-specific LBP and evaluation of at least one of the main clinically relevant outcome measures (pain, functional status, perceived recovery, or return to work) were included. The GRADE approach was used to determine the quality of evidence. **A total of 17 randomized controlled trials was included: NSAIDs (n = 4), antidepressants (n = 5), and opioids (n = 8).** No studies were found for muscle relaxants; **14 studies had a low risk of bias. The studies only reported effects on the short term (<3 months)**. **The overall quality of the evidence was low. NSAIDs and opioids seem to lead to a somewhat higher relief in pain on the short term, as compared to placebo**, in patients with non-specific chronic low back pain; opioids seem to have a small effect in improving function for a selection of patients who responded with an exacerbation of their symptoms after stopping their medication. However, **both types of medication show more adverse effects than placebo**. There seems to be no difference in effect between antidepressants and placebo in patients with non-specific chronic LBP.

10. McIntosh G, Hall H. Low back pain (acute). Clin Evid (Online) [Internet]. 2011 [cited 2016 Nov 23]. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217769
PubMed: PM21549023

INTRODUCTION: Low back pain affects about 70% of people in resource-rich countries at some point in their lives. Acute low back pain can be self-limiting; however, 1 year after an initial episode, as many as 33% of people still have moderate-intensity pain and 15% have severe pain. Acute low back pain has a high recurrence rate; 75% of those with a first episode have a recurrence. Although acute episodes may resolve completely, they may increase in severity and duration over time
METHODS AND OUTCOMES: **We conducted a systematic review and aimed to answer the following clinical questions: What are the effects of oral drug treatments for acute low back pain? What are the effects of local injections for acute low back pain? What are the effects of non-drug treatments for acute low back pain?** We searched: Medline, Embase, The Cochrane Library, and other important databases up to December 2009 (Clinical Evidence reviews are updated periodically, please check our website for the most up-to-date version of this review). We included harms alerts from relevant organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA)
RESULTS: **We found 49 systematic reviews, RCTs, or observational studies that met**

our inclusion criteria. We performed a GRADE evaluation of the quality of evidence for interventions
CONCLUSIONS: In this systematic review we present information relating to the effectiveness and safety of the following interventions: acupuncture, advice to stay active, analgesics (paracetamol, opioids), back exercises, back schools, bed rest, behavioural therapy, electromyographic biofeedback, epidural corticosteroid injections, lumbar supports, massage, multidisciplinary treatment programmes, muscle relaxants, non-steroidal anti-inflammatory drugs (NSAIDs), spinal manipulation, temperature treatments (short-wave diathermy, ultrasound, ice, heat), traction, and transcutaneous electrical nerve stimulation (TENS).

11. White AP, Arnold PM, Norvell DC, Ecker E, Fehlings MG. Pharmacologic management of chronic low back pain: synthesis of the evidence. Spine. 2011 Oct 1;36(21 Suppl):S131-S143.
PubMed: PM21952185

STUDY DESIGN: Systematic review of the literature with subgroup analysis for heterogeneous treatment effects
OBJECTIVE: **The objectives of this systematic review were to summarize prior Cochrane reports regarding the safety and effectiveness of opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), and antidepressants for treatment of chronic low back pain (LBP) and to evaluate whether certain subpopulations respond more favorably to pharmacological management**
SUMMARY OF BACKGROUND DATA: While medications are a mainstay of LBP management, there is uncertainty as to the optimal use of commonly prescribed medications such as opioids, antidepressants, and NSAIDS
METHODS: To summarize the overall treatment effect and safety for each of the three pharmacological drug classes (opioids, NSAIDs, or antidepressants), we summarized existing Cochrane reviews. To evaluate whether the effects of treatment varied by specific subgroups of patients, we sought randomized controlled trials (RCTs) evaluating one of the three pharmacological drug classes versus an alternative management for chronic LBP
RESULTS: Based on the Cochrane reviews, opioids are more effective than placebo with respect to pain and disability, with a much greater effect size for pain than disability. **When compared with NSAIDs, opioids did not confer a greater benefit with regard to pain and disability**. The rate of side effects from opioids is significantly greater than placebo with differences ranging between 2% and 9%. The systematic review of RCTs showed that antidepressants are not more effective than placebo with respect to pain, functional status, or depression. Certain subgroup treatment effects were identified, supporting our hypothesis that chronic LBP should be considered a heterogeneous set of disorders. As such, chronic LBP subgroups should be considered both when making clinical treatment decisions and when designing future research trials
CONCLUSION: Opioids and NSAIDs are effective for chronic LBP, while antidepressants have no meaningful clinical benefit. **Based on the significant rate of side effects with opioids and the lack of convincing superiority over NSAIDs, opioids are not recommended as a treatment for chronic LBP**. Attention to subgroups of patients will likely help guide treatment, and will likely help increase the clinical impact of future research
CLINICAL RECOMMENDATIONS: **Recommendation 1: NSAIDs should be considered as a treatment of chronic LBP (Strength: Strong). There is evidence**

demonstrating favorable effectiveness, but also significant side effects that may have meaningful clinical consequences. Recommendation 2: Opioids may be considered in the treatment of chronic LBP but should be avoided if possible (Strength: Weak). There is evidence demonstrating favorable effectiveness compared to placebo, similar effectiveness compared to NSAIDs, and with significant side effects including decreasing effectiveness related to habituation when used long-term. Recommendation 3: Antidepressants should not be routinely used for the treatment of chronic LBP (Strength: Strong). There is evidence that they are not more effective than placebo with respect to pain, functional status, or depression. Based on the hypothesis that chronic LBP is a symptom reflective of a heterogeneous group of disorders, categorization of certain patient specific subgroups may be helpful in guiding future treatment decision making. It is likely that inclusion of subgroup factors in future RCTs will provide information needed to improve the strength and specificity of future clinical recommendations.

Randomized Controlled Trials

12. Bedaiwi MK, Sari I, Wallis D, O'shea FD, Salonen D, Haroon N, et al. Clinical efficacy of celecoxib compared to acetaminophen in chronic nonspecific low back pain: results of a randomized controlled trial. Arthritis Care Res (Hoboken). 2016 Jun;68(6):845-52. PubMed: PM26474041

    OBJECTIVE: **In this randomized controlled trial, we compared the effect of celecoxib and acetaminophen on pain and magnetic resonance imaging (MRI) scores in patients with chronic nonspecific low back pain**
    METHODS: **A total of 50 patients with chronic nonspecific low back pain were blindly randomized into 2 groups treated with celecoxib (200 mg twice daily) or acetaminophen (500 mg twice daily).** Outcome measures included total back pain, nocturnal back pain, Oswestry Disability Index (ODI) scores, the Short Form 36 health survey to assess physical and mental status, and patient global assessment. Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index, and Bath Ankylosing Spondylitis Metrology Index scores were also assessed before and after the therapy. The Spondyloarthritis Research Consortium of Canada scoring method was used to evaluate spinal MRI changes
    RESULTS: Celecoxib showed a superior effect on total back pain, ODI, BASDAI, nocturnal back pain, and patient global assessment, compared to acetaminophen ($P < 0.05$). The number of patients with a significant change in back pain scales was higher in the celecoxib arm (ODI 34.8% versus 4.5%, nocturnal back pain 41.7% versus 9.1%, total back pain 33.3% versus 9.1%, and BASDAI 30.4% versus 9.1%; $P < 0.01$ for all). The responsiveness to celecoxib, calculated by Guyatt's Responsiveness Index, was 1.62, 1.28, 1.27, and 0.58 for the ODI, total back pain, BASDAI, and nocturnal back pain, respectively. The MRI scores for sacroiliac joints and spine showed no significant change with either treatment when compared with baseline values ($P > 0.05$)
    CONCLUSION: There was superior efficacy of celecoxib compared with acetaminophen in chronic nonspecific low back pain. Inflammatory lesions of sacroiliac joints and spine are commonly seen in nonspecific low back pain, but these lesions did not change with either celecoxib or acetaminophen treatments and were not associated with clinical response to either agent. Copyright Â© 2016, American College of Rheumatology.

13. Plapler PG, Scheinberg MA, Ecclissato CC, Bocchi de Oliveira MF, Amazonas RB. Double-blind, randomized, double-dummy clinical trial comparing the efficacy of ketorolac trometamol and naproxen for acute low back pain. Drug Des Devel Ther [Internet]. 2016 [cited 2016 Nov 23];10:1987-93. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4918732
PubMed: PM27382251

BACKGROUND: Nonsteroidal anti-inflammatory drugs (NSAIDs) are the most common type of medication used in the treatment of acute pain. Ketorolac trometamol (KT) is a nonnarcotic, peripherally acting nonsteroidal anti-inflammatory drug with analgesic effects comparable to certain opioids
OBJECTIVE: **The aim of this study was to compare the efficacy of KT and naproxen (NA) in the treatment of acute low back pain (LBP) of moderate-to-severe intensity**
PATIENTS AND METHODS: In this **10-day, Phase III, randomized, double-blind, double-dummy, noninferiority trial,** participants with acute LBP of moderate-to-severe intensity as determined through a visual analog scale (VAS) were randomly assigned in a 1:1 ratio to **receive sublingual KT 10 mg three times daily or oral NA 250 mg three times daily. From the second to the fifth day of treatment, if patient had VAS >40 mm, increased dosage to four times per day was allowed**. The primary end point was the reduction in LBP as measured by VAS. We also performed a post hoc superiority analysis
RESULTS: KT was not inferior to NA for the reduction in LBP over 5 days of use as measured by VAS scores (P=0.608 for equality of variance; P=0.321 for equality of means) and by the Roland-Morris Disability Questionnaire (P=0.180 for equality of variance test; P=0.446 for equality of means) using 95% confidence intervals. **The percentage of participants with improved pain relief 60 minutes after receiving the first dose was higher in the KT group (24.2%) than in the NA group (6.5%; P=0.049). The most common adverse effects were heartburn, nausea, and vomiting**
CONCLUSION: KT is not inferior in efficacy and delivers faster pain relief than NA.

14. Friedman BW, Dym AA, Davitt M, Holden L, Solorzano C, Esses D, et al. Naproxen with cyclobenzaprine, oxycodone/acetaminophen, or placebo for treating acute low back pain: a randomized clinical trial. JAMA. 2015 Oct 20;314(15):1572-80.
PubMed: PM26501533

IMPORTANCE: Low back pain (LBP) is responsible for more than 2.5 million visits to US emergency departments (EDs) annually. These patients are usually treated with nonsteroidal anti-inflammatory drugs, acetaminophen, opioids, or skeletal muscle relaxants, often in combination
OBJECTIVE: To compare functional outcomes and pain at 1 week and 3 months after an ED visit for acute LBP among patients randomized to a 10-day course of (1) naproxen+placebo; (2) naproxen+cyclobenzaprine; or (3) naproxen+oxycodone/acetaminophen
DESIGN, SETTING, AND PARTICIPANTS: This **randomized, double-blind, 3-group study** was conducted at one urban ED in the Bronx, New York City. Patients who presented with nontraumatic, nonradicular LBP of 2 weeks' duration or less were eligible for enrollment upon ED discharge if they had a score greater than 5 on the Roland-Morris Disability Questionnaire (RMDQ). The RMDQ is a 24-item questionnaire commonly used to measure LBP and related functional impairment on which 0 indicates no functional impairment and 24 indicates maximum impairment. Beginning in April 2012, a total of

2588 patients were approached for enrollment. Of the 323 deemed eligible for participation, 107 were randomized to receive placebo and 108 each to cyclobenzaprine and to oxycodone/acetaminophen. Follow-up was completed in December 2014
INTERVENTIONS: All participants were given 20 tablets of naproxen, 500 mg, to be taken twice a day. They were randomized to receive either 60 tablets of placebo; cyclobenzaprine, 5 mg; or oxycodone, 5 mg/acetaminophen, 325 mg. Participants were instructed to take 1 or 2 of these tablets every 8 hours, as needed for LBP. They also received a standardized 10-minute LBP educational session prior to discharge
MAIN OUTCOMES AND MEASURES: The primary outcome was improvement in RMDQ between ED discharge and 1 week later
RESULTS: Demographic characteristics were comparable among the 3 groups. At baseline, median RMDQ score in the placebo group was 20 (interquartile range [IQR],17-21), in the cyclobenzaprine group 19 (IQR,17-21), and in the oxycodone/acetaminophen group 20 (IQR,17-22). At 1-week follow-up, the mean RMDQ improvement was 9.8 in the placebo group, 10.1 in the cyclobenzaprine group, and 11.1 in the oxycodone/acetaminophen group. Between-group difference in mean RMDQ improvement for cyclobenzaprine vs placebo was 0.3 (98.3% CI, -2.6 to 3.2; P=.77), for oxycodone/acetaminophen vs placebo, 1.3 (98.3% CI, -1.5 to 4.1; P=.28), and for oxycodone/acetaminophen vs cyclobenzaprine, 0.9 (98.3% CI, -2.1 to 3.9; P=.45)
CONCLUSIONS AND RELEVANCE: Among patients with acute, nontraumatic, nonradicular LBP presenting to the ED, adding cyclobenzaprine or oxycodone/acetaminophen to naproxen alone did not improve functional outcomes or pain at 1-week follow-up. These findings do not support use of these additional medications in this setting
TRIAL REGISTRATION: clinicaltrials.gov Identifier: NCT01587274.

15. Eken C, Serinken M, Elicabuk H, Uyanik E, Erdal M. Intravenous paracetamol versus dexketoprofen versus morphine in acute mechanical low back pain in the emergency department: a randomised double-blind controlled trial. Emerg Med J. 2014 Mar;31(3):177-81.
PubMed: PM23407378

STUDY OBJECTIVE: **The objective of this study was to determine the analgesic efficacy and safety of intravenous, single-dose paracetamol versus dexketoprofen versus morphine in patients presenting with mechanical low back pain (LBP) to the emergency department (ED)**
METHODS: This **randomised double-blind study** compared the efficacy of intravenous 1 gm paracetamol, 50 mg dexketoprofen and 0.1 mg/kg morphine in patients with acute mechanical LBP. Visual analogue scale (VAS) was used for pain measurement at baseline, after 15 and after 30 min
RESULTS: A total of 874 patients were eligible for the study, and **137 of them were included in the final analysis: 46 patients from the paracetamol group, 46 patients in the dexketoprofen group and 45 patients in the morphine group**. The mean age of study subjects was 31.5 +/- 9.5 years, and 60.6% (n=83) of them were men. The median reduction in VAS score at the 30th minute for the paracetamol group was 65 mm (95% CI 58 to 72), 67 mm (95% CI 60 to 73) for the morphine group and 58 mm (95% CI 50 to 64) for the dexketoprophen group. Although morphine was not superior to paracetamol at 30 min (difference: 3.8 +/- 4.9 (95% CI -6 to 14), the difference between morphine and dexketoprofen in reducing pain was 11.2 +/- 4.7 (95% CI 2 to 21). At least one adverse effect occurred in 8.7% (n=4) of the cases in the paracetamol group, 15.5% (n=7) of the

morphine group, and 8.7% (n=4) of the dexketoprophen group (p=0.482)
CONCLUSIONS: Intravenous paracetamol, dexketoprofen and morphine are not superior to each other for the treatment of mechanical LBP in ED.

16. Emrich OM, Milachowski KA, Strohmeier M. Methocarbamol in acute low back pain. A randomized double-blind controlled study. MMW Fortschr Med. 2015 Jul;157 Suppl 5:9-16, 2015 Jul.:9-16.
PubMed: PM26168743

BACKGROUND: Muscle relaxants are widely used to treat low back pain (LBP), one of the most frequent health problems in industrialized countries. For this indication, the European Medicines Agency (EMA) recently had imposed restrictions for some muscle relaxants, anti-inflammatories and analgesics; Tetrazepam even had to be withdrawn from the market. Therefore methocarbamol remains the only approved muscle relaxant. **Methocarbamol is well-established for the treatment of LBP associated with myofascial components**, although more recent clinical studies have not been published. Therefore **this publication summarizes and revaluates post-hoc data of an efficiency study of methocarbamol, that was performed in 2002, but had not been published yet**
METHOD: This was a **randomized, placebo controlled multi-centre study**. Inclusion criteria were acute low back pain for at least 24 h associated with spasms in the pelvic/lumbar region and restriction of mobility. **Patients were randomly assigned to a group treated with orally administered Ortoton (n = 98) or placebo (n = 104). Drugs were administered for up to 8 days, but treatment of individual patients was discontinued as soon as a pain-free state was achieved.** Individual pain perception was quantified by means of a visual analog scale (VAS). The fingertip-to-floor distance was measured as an indicator of lumbar flexion. Mobility restrictions were also assessed by a modified Schober's test. In addition, a questionnaire was used by patients and physicians to rate the efficacy of treatment
RESULTS: **In the methocarbamol group 44% of the patients pre-terminated due to complete pain relief (placebo: 18%) and 19% discontinued because the treatment was considered ineffective (placebo 52%,** p < 0,0001). Measures of mobility (fingertip-to-floor distance, Schober's test) and improvement of mobility as perceived by physician and patient at the individual end of study all were clearly in favor of the patients treated with methocarbamol. At the final visit, 67% of the patients who had received Ortoton (35% of placebo patients) and 70% of their physicians (control group: 36%) considered the treatment to be effective. **No severe adverse effects were observed during the study** (7 symptoms in 5 patients)
CONCLUSION: This study showed that methocarbamol, orally administered, is an efficient and well-tolerated therapeutic option for patients suffering from acute LBP and the typically associated restrictions of mobility.

17. Williams CM, Maher CG, Latimer J, Mclachlan AJ, Hancock MJ, Day RO, et al. Efficacy of paracetamol for acute low-back pain: a double-blind, randomised controlled trial. Lancet. 2014 Nov 1;384(9954):1586-96.
PubMed: PM25064594

BACKGROUND: Regular paracetamol is the recommended first-line analgesic for acute low-back pain; however, no high-quality evidence supports this recommendation. **We aimed to assess the efficacy of paracetamol taken regularly or as-needed to**

improve time to recovery from pain, compared with placebo, in patients with low-back pain
METHODS: We did a **multicentre, double-dummy, randomised, placebo controlled trial across 235 primary care centres in Sydney, Australia, from Nov 11, 2009, to March 5, 2013**. We randomly allocated patients with acute low-back pain in a 1:1:1 ratio to **receive up to 4 weeks of regular doses of paracetamol (three times per day; equivalent to 3990 mg paracetamol per day), as-needed doses of paracetamol (taken when needed for pain relief; maximum 4000 mg paracetamol per day), or placebo**. Randomisation was done according to a centralised randomisation schedule prepared by a researcher who was not involved in patient recruitment or data collection. Patients and staff at all sites were masked to treatment allocation. All participants received best-evidence advice and were followed up for 3 months. The primary outcome was time until recovery from low-back pain, with recovery defined as a pain score of 0 or 1 (on a 0-10 pain scale) sustained for 7 consecutive days. All data were analysed by intention to treat. This study is registered with the Australian and New Zealand Clinical Trial Registry, number ACTN 12609000966291
FINDINGS: **550 participants were assigned to the regular group (550 analysed), 549 were assigned to the as-needed group (546 analysed), and 553 were assigned to the placebo group (547 analysed). Median time to recovery was 17 days (95% CI 14-19) in the regular group, 17 days (15-20) in the as-needed group, and 16 days (14-20) in the placebo group** (regular vs placebo hazard ratio 0.99, 95% CI 0.87-1.14; as-needed vs placebo 1.05, 0.92-1.19; regular vs as-needed 1.05, 0.92-1.20). We recorded no difference between treatment groups for time to recovery (adjusted p=0.79). Adherence to regular tablets (median tablets consumed per participant per day of maximum 6; 4.0 [IQR 1.6-5.7] in the regular group, 3.9 [1.5-5.6] in the as-needed group, and 4.0 [1.5-5.7] in the placebo group), and number of participants reporting adverse events (99 [18.5%] in the regular group, 99 [18.7%] in the as-needed group, and 98 [18.5%] in the placebo group) were similar between groups
INTERPRETATION: Our findings suggest that regular or as-needed dosing with paracetamol does not affect recovery time compared with placebo in low-back pain, and question the universal endorsement of paracetamol in this patient group
FUNDING: National Health and Medical Research Council of Australia and GlaxoSmithKline Australia.Copyright Â© 2014 Elsevier Ltd. All rights reserved.

18. Chandanwale AS, Chopra A, Goregaonkar A, Medhi B, Shah V, Gaikwad S, et al. Evaluation of eperisone hydrochloride in the treatment of acute musculoskeletal spasm associated with low back pain: a randomized, double-blind, placebo-controlled trial. J Postgrad Med. 2011 Oct;57(4):278-85.
PubMed: PM22120855

BACKGROUND: Eperisone hydrochloride is a centrally acting muscle relaxant inhibiting the pain reflex pathway, having a vasodilator effect
AIMS: To evaluate the efficacy and tolerability of eperisone in patients with acute musculoskeletal spasm associated with low back pain
SETTINGS AND DESIGN: **Prospective, randomized, double-blind, placebo-controlled, multicentric trial conducted at five tertiary care orthopedic centers across India**
MATERIALS AND METHODS: It was planned to enroll 240 patients of either sex between 18-60 years with acute musculoskeletal spasm (AMSP) with low back pain (LBP) due to spondylosis deformans, prolapsed disc or muscle sprain. Patients with other associated

unrelated spasm conditions were excluded. Assessments were done for finger-to-floor distance (FFD), lumbar pain, Lasegue's sign, tenderness of vertebral muscles, need for rescue medication and response to therapy for efficacy and tolerability
STATISTICAL ANALYSIS: Parametric data were analyzed by 't' test and ANOVA, and non-parametric data were analyzed using Mann-Whitney 'U' test and Kruskall-Wallis test. Proportions were compared using Fischer's (Chi-square) test
RESULTS: **Two hundred and forty patients were randomized to receive eperisone 150 mg/day in three divided doses (n=120) or placebo (n=120) for 14 days, of which 15 patients did not complete and 225 patients completed the study (eperisone, 112 and placebo, 113).** Significantly greater improvement in FFD (P<0.001) from baseline on Day 14 was seen with eperisone (150.66 to 41.75) compared to placebo (138.51 to 101.60). Improvements in other parameters were greater with the eperisone group. For 89 (79.46%) patients the therapy was rated as good-excellent with eperisone compared to 43 (38.05%) patients with placebo. Nausea, abdominal pain, headache and dizziness were the common adverse events with both therapies. Rescue drug was needed by 40 (35.71%) eperisone patients and 83 (73.45%) placebo patients
CONCLUSIONS: Eperisone hydrochloride was effective and well tolerated for the treatment of patients with AMSP with LBP.

Non-Randomized Studies

19. Bhattarai S, Chhetri HP, Alam K, Thapa P. A study on factors affecting low back pain and safety and efficacy of NSAIDs in acute low back pain in a tertiary care hospital of Western Nepal. J Clin Diagn Res [Internet]. 2013 Dec [cited 2016 Nov 23];7(12):2752-8. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3919417
PubMed: PM24551630

INTRODUCTION: Low back pain is characterized by a range of symptoms which include pain, muscle tension or stiffness, and is localized between the shoulder blades and the folds of the buttocks, with or without spreading to the legs. Non-Steroidal Anti Inflammatory Drugs (NSAIDs) are the drugs of choice which provide an analgesic effect for acute low back pain
AIM: To study the factors affecting low back pain, efficacy and safety of different non-steroidal anti-inflammatory drugs (aceclofenac, diclofenac, naproxen and nimesulide) in low back pain
METHODOLOGY: Data collection form and numeric pain rating scale were used as study tools for studying patients' demographies and severities of pain respectively. Patients prescribed with aceclofenac 100 mg , diclofenac 100 mg, naproxen 500 mg and nimesulide 100 mg for acute low back pain at Orthopaedics Outpatients Department of Manipal Teaching Hospital, Nepal, were enrolled in this study. The decrease in pain scores was recorded on 5th and 10th days of follow-up and pain scores were calculated. Descriptive statistics and Kruskal Wallis non parametric test were used for analysis
RESULTS: Among **150 patients**, 67.3% were females (n=101). Low back pain was more prevalent (24.7%) in age-group of 59-68 years and a positive correlation was seen. Similarly, low back pain was found to be high among people involved in agriculture, heavy weight lifters and non smokers. **The decrease in average pain scores was more in the patients treated with aceclofenac (4.83 +/- 0.537), followed by that in those who were treated with naproxen (4.13 +/- 0.067) and diclofenac (3.84 +/- 0.086). The decrease in pain scores was found to be lowest among patients who were treated with nimesulide (2.11 +/- 0.148). Nimesulide presented more number of side-effects**

than the comparative drugs
CONCLUSION: Different factors affect low back pain, such as age, gender, personal habit, posture, occupation, weight lifting. **Aceclofenac showed greater decrease in pain scores with lesser number of side-effects**.

20. Brzezinski K, Wordliczek J. Comparison of the efficacy of dexketoprofen and diclofenac in treatment of non-specific low back pain. Ann Agric Environ Med. 2013;Spec no. 1:52-6. PubMed: PM25000843

UNLABELLED: Work-related loads, improper lifestyle, increasing obesity, and lack of adequate prophylaxy render low back pain (LBP) one of the most common causes of chronic pain worldwide
OBJECTIVE: **The aim of the study was to compare the effect of two analgesic drugs on the effectiveness of therapy measured by pain intensity. and the degree of disability during treatment of chronic low back pain syndrome**
MATERIAL AND METHOD: The **retrospective analysis involved 185 patients undergoing treatment for chronic low back pain syndrome with dexketoprofen (DEX) and diclofenac (DIC).** Patients' gender. place of residence. cause of the pain as well as pain intensity in the visual-analogue scale (VAS) and the disability degree (Oswestry Disability Index - ODI) were analysed
RESULTS: From the first week of treatment to the end of the observation. the DEX group exhibited significantly lower values of pain intensity on the disability index. The correlation coefficients between the parameters were significantly higher in the DEX group. Analysis of variance demonstrated that the choice of NSAIDs was the most significant factor determining the effectiveness of the treatment
DISCUSSION: The cause of the pain and place of residence did not have any impact on the treatment efficacy. The pharmacological properties of dexketoprofen contribute to its beneficial effect on the therapy used. which validates the potential use of DEX in LBP management
SUMMARY: The significantly increased correlation between the aforementioned parameters suggests that administration of dexketoprofen in the management of non-specific low back pain results in a more rapid return to full physical activity and therefore more prompt return to work.

Guidelines and Recommendations

21. Goertz M, Thorson D, Bonsell J, Bonte B, Campbell R, Haake B, Johnson K, Kramer C, Mueller B, Peterson S, Setterlund L, Timming R. Adult acute and subacute low back pain [Internet]. Bloomington (MN): Institute for Clinical Systems Improvement; 2012 [cited 2016 Nov 23]. Available from:
https://www.icsi.org/_asset/bjvqrj/LBP.pdf
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https://www.icsi.org/guidelines__more/catalog_guidelines_and_more/catalog_guidelines/catalog_musculoskeletal_guidelines/low_back_pain/

22. North American Spine Society (NASS). Diagnosis and treatment of degenerative lumbar spinal stenosis. Burr Ridge (IL): North American Spine Society (NASS); 2011.
Guideline summary available from: https://www.guideline.gov/summaries/summary/34839

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APPENDIX – FURTHER INFORMATION:

Guidelines and Recommendations – Uncertain methodology

23. Toward Optimized Practice [Alberta]. Evidence-informed primary care management of low back pain [Internet]. Edmonton: Toward Optimized Practice; 2015 Dec. [cited 2016 Nov 23]. Available from: http://www.topalbertadoctors.org/download/1885/LBPguideline.pdf

Review Articles

24. Hsu E, Murphy S, Chang D, Cohen SP. Expert opinion on emerging drugs: chronic low back pain. Expert Opin Emerg Drugs. 2015 Mar;20(1):103-27. PubMed: PM25519435

INTRODUCTION: It is difficult to overestimate the personal and socioeconomic impact of chronic low back pain (CLBP). It is the leading cause of years lost to disability and poses the highest economic toll among chronic illnesses. Despite the strong need for extensive research efforts, few drugs have consistently demonstrated effectiveness for this condition AREAS COVERED: In this review, the epidemiology, rationale for mechanism-based treatment, competitive environment and market trends, and the preclinical and clinical evidence supporting over 15 different classes of analgesic medications studied for CLBP or related pain conditions are discussed. Treatments are divided by drug category, type of CLBP they are likely to treat (e.g., neuropathic or mechanical), and whether they are new formulations of existing treatments, new indications for existing treatments or represent novel mechanisms of action. Databases searched included MEDLINE, Embase, Pharmaprojects and various clinical trial registries
EXPERT OPINION: Many barriers exist for the development of medications for CLBP including difficulties in identifying pathophysiological mechanisms, biologic resiliency secondary to multiple concurrent pain pathways and off-target and sometimes serious side effects. Nevertheless, the volume and diversity of novel molecular entities has continued to surge and includes possible disease-modifying therapies such as gene and stem cell therapy.

25. Witenko C, Moorman-Li R, Motycka C, Duane K, Hincapie-Castillo J, Leonard P, et al. Considerations for the appropriate use of skeletal muscle relaxants for the management of acute low back pain. P T [Internet]. 2014 Jun [cited 2016 Nov 23];39(6):427-35. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4103716
PubMed: PM25050056

For patients with low back pain, skeletal muscle relaxants are often initiated after failure of first-line analgesics. However, these medications (reviewed in this article) are controversial alternatives that carry risks of adverse effects and increased cost.

Additional References

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27. Beavington C, Allan GM. AcetaMINophen for back osteoarthritis pain: is the effect in the name? [Internet]. Edmonton: Alberta College of Family Physicians; 2016. [cited 2016 Nov 23]. Available from: https://www.acfp.ca/tools-for-practice/articles/details/?id=345&page-title=AcetaMINophen+for+Back+Osteoarthritis+Pain%3A+Is+the+effect+in+the+name%3F

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30. McCarberg BH, Ruoff GE, Tenzer-Iglesias P, Weil AJ. Diagnosis and treatment of low-back pain because of paraspinous muscle spasm: a physician roundtable. Pain Med. 2011 Nov;12 Suppl 4:S119-27.
PubMed: PM22085373

BACKGROUND: Despite the availability of evidence-based guidelines to diagnose and treat acute low-back pain, practical application is nonuniform and physician uncertainty regarding best practices is widespread
OBJECTIVE: The objective of this study was to further optimal treatment choices for screening, diagnosing, and treating acute low-back pain caused by paraspinous muscle spasm
METHODS: Four experts in pain medicine (three family physicians and one physiatrist) participated in a roundtable conference call on October 18, 2010, to examine current common practices and guidelines for diagnosing and treating acute low-back pain and to offer commentary and examples from their clinical experience
RESULTS: Participants discussed the preferred choices and timing of diagnostic and imaging tests, nonpharmacologic therapies, nonopioid and opioid medication use, biopsychosocial evaluation, complementary therapies, and other issues related to treatment of acute low-back pain. Principal clinical recommendations to emerge included thorough physical exam and medical history, early patient mobilization, conservative use of imaging tests, early administration of muscle relaxants combined with nonsteroidal anti-inflammatory medications to reduce pain and spasm, and a strong emphasis on patient education and physician-patient communication
CONCLUSIONS: Early, active management of acute low-back symptoms during the initial onset may lead to better patient outcomes, reducing related pain and disability and, possibly, preventing progression to chronicity.Copyright Wiley Periodicals, Inc.