

(20156)

Medical Benefit		Effective Date: 04/01/17	Next Review Date: 01/20
Preauthorization	No	Review Dates: 04/07, 05/08, 05/09, 01/10, 01/11, 07/11, 07/12, 07/13, 07/14, 07/15, 01/16, 01/17, 01/18, 01/19	

Preauthorization is recommended if the criteria in this protocol are not met.

The following protocol contains medical necessity criteria that apply for this service. The criteria are also applicable to services provided in the local Medicare Advantage operating area for those members, unless separate Medicare Advantage criteria are indicated. If the criteria are not met, reimbursement will be denied and the patient cannot be billed. Please note that payment for covered services is subject to eligibility and the limitations noted in the patient's contract at the time the services are rendered.

Populations	Interventions	Comparators	Outcomes
Individuals: • With increased risk of oral mucositis due to some cancer treatments and/or hematopoietic cell transplantation	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., oral hygiene, hydration) • Medication	Relevant outcomes include: • Symptoms • Morbid events • Quality of life • Treatment-related morbidity
Individuals: • With carpal tunnel syndrome	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With neck pain	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With subacromial impingement syndrome	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With adhesive capsulitis	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With temporomandibular joint pain	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity

Populations	Interventions	Comparators	Outcomes
Individuals: • With low back pain	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With osteoarthritic knee pain	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With heel pain (i.e., Achilles tendinopathy, plantar fasciitis)	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative therapy (e.g., physical therapy) • Medication • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With rheumatoid arthritis	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative care (e.g., exercise) • Medication	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With Bell palsy	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative care (e.g., exercise) • Medication	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With fibromyalgia	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative care (e.g., exercise) • Medication	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity
Individuals: • With chronic nonhealing wounds	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Standard wound care	Relevant outcomes include: • Symptoms • Change in disease status • Treatment-related morbidity
Individuals: • With lymphedema	Interventions of interest are: • Low-level laser therapy	Comparators of interest are: • Conservative care (e.g., exercise) • Pneumatic compression • Complete decongestive therapy	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity

DESCRIPTION

Low-level laser therapy (LLLT), also called photobiomodulation, is being evaluated to treat various conditions, including, among others, oral mucositis, myofascial pain, joint pain, lymphedema, and chronic wounds.

SUMMARY OF EVIDENCE

ORAL MUCOSITIS

For individuals who have increased risk of oral mucositis due to some cancer treatments (e.g., chemotherapy, radiotherapy) and/or HCT who receive LLLT, the evidence includes randomized controlled trials (RCTs) and systematic reviews. Relevant outcomes are symptoms, morbid events, quality of life, and treatment-related morbidity. A 2014 systematic review included 18 RCTs and found better outcomes with LLLT used to prevent oral mucositis than with control treatments. RCTs published after the systematic review had similar findings. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

MUSCULOSKELETAL AND NEUROLOGIC DISORDERS

For individuals who have carpal tunnel syndrome (CTS) who receive LLLT, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Both a 2016 systematic review and a TEC Assessment (2010) did not find sufficient evidence from RCTs that LLLT improves outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have neck pain who receive LLLT, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. A 2013 systematic review identified 17 trials, most of which were considered low quality. Only two trials were considered moderate quality, and they found that LLLT led to better outcomes than placebo for chronic neck pain. A TEC Assessment (2010) found conflicting evidence. Additionally, laser types, application dosages, and treatment schedules vary in the available evidence and require further study. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have subacromial impingement syndrome who receive LLLT, the evidence includes RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Most trials did not show a significant benefit of LLLT compared with sham treatment or with an alternative intervention (e.g., exercise). The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have adhesive capsulitis who receive LLLT, the evidence includes RCTs and a systematic review. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. A Cochrane review evaluating treatments for adhesive capsulitis identified two RCTs assessing LLLT. Due to the small number of trials and study limitations, reviewers concluded that the evidence was insufficient to permit conclusions about the effectiveness of LLLT for adhesive capsulitis. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have TMJ who receive LLLT, the evidence includes RCTs and several systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Meta-analyses of RCTs had mixed findings. A 2015 meta-analysis, which included 14 placebo controlled randomized trials, did not find a statistically significant impact of LLLT on pain, but did find that LLLT significantly improved functional outcomes (e.g., mouth opening). RCTs have not compared the impact of LLLT with physical therapy. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have low back pain who receive LLLT, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Meta-analyses of RCTs found that LLLT resulted in a significantly greater reduction in pain scores and global assessment scores than a placebo control in the immediate posttreatment setting. Meta-analyses also found that other outcomes (e.g., disability index, range of motion) were significantly better immediately after treatment with active rather than placebo LLLT, but not at longer term follow-up. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have osteoarthritic knee pain who receive LLLT, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. A 2015 systematic review, which pooled study findings, did not find that LLLT significantly reduced pain or improved function outcomes compared with a sham intervention. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have heel pain (i.e., Achilles tendinopathy, plantar fasciitis) who receive LLLT, the evidence includes RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Findings of two sham-controlled randomized trials were inconsistent, and while an RCT compared LLLT with standard care lacked long-term follow-up. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have rheumatoid arthritis who receive LLLT, the evidence includes RCTs and a systematic review. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment related morbidity. A systematic review of RCTs found inconsistent benefit of LLLT for a range of outcomes. A 2010 RCT, published after the systematic review, did not find that LLLT was significantly better than a placebo treatment on most outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have Bell palsy who receive LLLT, the evidence includes two RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. The RCT found significant short-term benefit of LLLT over exercise. Longer term outcomes (greater than six weeks) were not available. Because Bell palsy often improves within weeks and may completely resolve within months, it is difficult to isolate specific improvements from laser therapy over the natural resolution of the illness. Also, no sham-controlled trials are available. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have fibromyalgia who receive LLLT, the evidence includes RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. The RCTs evaluating LLLT for treatment of fibromyalgia are small (i.e., less than 25 patients each). One RCT (N=20 patients) found significantly better outcomes with LLLT than with sham, while another (N=20 patients) did not find statistically significant between-group differences for similar outcomes. Additional RCTs with sufficient numbers of patients are needed to establish the efficacy of LLLT for fibromyalgia. The evidence is insufficient to determine the effects of the technology on health outcomes.

WOUND CARE AND LYMPHEDEMA

For individuals who have chronic nonhealing wounds who receive LLLT, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment related morbidity. The few existing RCTs tend to have small sample sizes and potential risk of bias. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have lymphedema who receive LLLT, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. Two systematic reviews detected methodologic flaws in the available studies and did not consistently find better outcomes for patients receiving LLLT than those receiving a control condition for treatment of lymphedema. The evidence is insufficient to determine the effects of the technology on health outcomes.

POLICY

Low-level laser therapy may be considered **medically necessary** for prevention of oral mucositis in patients undergoing cancer treatment associated with increased risk of oral mucositis, including chemotherapy and/or radiotherapy, and/or hematopoietic cell transplantation (see Policy Guidelines).

Low-level laser therapy is considered **investigational** for all other indications including but not limited to:

- Carpal tunnel syndrome
- Neck pain
- Subacromial impingement
- Adhesive capsulitis
- Temporomandibular joint pain
- Low back pain
- Osteoarthritic knee pain
- Heel pain (i.e., Achilles tendinopathy, plantar fasciitis)
- Rheumatoid arthritis
- Bell Palsy
- Fibromyalgia
- Wound healing
- Lymphedema.

POLICY GUIDELINES

In the meta-analysis of 18 trials comparing LLLT to chemotherapy or chemoradiation for prevention of oral mucositis (Oberoi et al [2014]), the course of LLLT was generally from day zero through treatment. In studies of hematopoietic cell transplant (HCT), the course of LLLT began between day -seven and day zero and continued as long as day 14 to 15. In studies that began LLLT at day-seven or day-five before HCT, the course of laser therapy ended at day negative one or day zero.

Other protocols have applied low-level laser energy to acupuncture points on the fingers and hand. This technique may be referred to as *laser acupuncture*. Laser acupuncture is not reviewed herein.

MEDICARE ADVANTAGE

For Medicare Advantage the use of low-level laser therapy is considered **not medically necessary** for all indications.

BACKGROUND

ORAL MUCOSITIS

Oral mucositis describes inflammation of the oral mucosa and typically manifests as erythema or ulcerations that appear seven to 10 days after initiation of high-dose cancer therapy. Oral mucositis can cause significant pain and increased risk of systemic infection, dependency on total parenteral nutrition, and use of narcotic analgesics.

Treatment

Treatment planning may also need to be modified due to dose-limiting toxicity. There are a number of interventions for oral mucositis that may partially control symptoms, but none is considered a criterion standard treatment. When uncomplicated by infection, oral mucositis is self-limited and usually heals within two to four weeks after cessation of cytotoxic chemotherapy. Low-level laser therapy (LLLT) has been used in cancer therapy-induced oral mucositis in patients treated with radiotherapy and/or chemotherapy and hematopoietic cell transplantation.

MUSCULOSKELETAL AND NEUROLOGIC DISORDERS

CTS is the most common entrapment neuropathy and the most commonly performed surgery of the hand. The syndrome is related to the bony anatomy of the wrist. The carpal tunnel is bound dorsally and laterally by the carpal bones and ventrally by the transverse carpal ligament. Through this contained space run the nine flexor

tendons and the median nerve. Therefore, any space occupying lesion can compress the median nerve and produce the typical symptoms of CTS-pain, numbness, and tingling in the distribution of the median nerve. Symptoms of more severe cases include hypesthesia, clumsiness, loss of dexterity, and weakness of pinch. In the most severe cases, patients experience marked sensory loss and significant functional impairment with thenar atrophy.

Treatment

Mild-to-moderate cases of CTS are usually first treated conservatively with splinting and cessation of aggravating activities. Other conservative therapies include oral steroids, diuretics, nonsteroidal anti-inflammatory drugs, and steroid injections into the carpal tunnel itself. Patients who do not respond to conservative therapy or who present with severe CTS with thenar atrophy may be considered candidates for surgical release of the carpal ligament, using either an open or endoscopic approach. LLLT is also used to treat CTS.

LOW-LEVEL LASER THERAPY

LLLT is the use of red-beam or near-infrared lasers with a wavelength between 600 and 1000 nm and power between five and 500 MW. (By comparison, lasers used in surgery typically use 300 W.) When applied to the skin, LLLT produces no sensation and does not burn the skin. Because of the low absorption by human skin, it is hypothesized that the laser light can penetrate deeply into the tissues where it has a photobiostimulative effect. The exact mechanism of its effect on tissue healing is unknown; hypotheses have included improved cellular repair and stimulation of the immune, lymphatic, and vascular systems.

LLLT is being evaluated to treat a wide variety of conditions, including soft tissue injuries, myofascial pain, tendinopathies, nerve injuries, joint pain, and lymphedema.

REGULATORY STATUS

A number of low-level lasers have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process for the treatment of pain. Data submitted for the MicroLight 830[®] Laser consisted of application of the laser over the carpal tunnel three times a week for five weeks. The labeling states that the “MicroLight 830 Laser is indicated for adjunctive use in the temporary relief of hand and wrist pain associated with Carpal Tunnel Syndrome.” In 2006, GRT LITE™ was cleared for marketing, listing the TUCO Erchonia PL3000, the Excalibur System, the MicroLight 830[®] Laser, and the Acculaser Pro as predicate devices. Indications of the GRT LITE™ for CTS are similar to the predicate devices: “adjunctive use in providing temporary relief of minor chronic pain.” In 2009, the LightStream™ LLL device was cleared for marketing by FDA through the 510(k) process for adjunctive use in the temporary relief of pain associated with knee disorders treated in standard chiropractic practice. A number of clinical trials of LLLT are underway in the United States, including studies of wound healing. Since 2009, many more similar LLLT devices have received 510(k) clearance from FDA; most recently, in 2018, Super Pulsed Laser technology (Multi Radiance Medical) was approved by the FDA through the premarket approval process for use in neck and shoulder pain.

RELATED PROTOCOLS

Temporomandibular Joint Dysfunction

Treatment of Tinnitus

Services that are the subject of a clinical trial do not meet our Technology Assessment Protocol criteria and are

considered investigational. *For explanation of experimental and investigational, please refer to the Technology Assessment Protocol.*

It is expected that only appropriate and medically necessary services will be rendered. We reserve the right to conduct prepayment and postpayment reviews to assess the medical appropriateness of the above-referenced procedures. **Some of this protocol may not pertain to the patients you provide care to, as it may relate to products that are not available in your geographic area.**

REFERENCES

We are not responsible for the continuing viability of web site addresses that may be listed in any references below.

1. Lalla RV, Bowen J, Barasch A, et al. MASCC/ISOO clinical practice guidelines for the management of mucositis secondary to cancer therapy. *Cancer*. May 15 2014;120(10):1453-1461. PMID 24615748
2. Schubert MM, Eduardo FP, Guthrie KA, et al. A phase III randomized double-blind placebo-controlled clinical trial to determine the efficacy of low level laser therapy for the prevention of oral mucositis in patients undergoing hematopoietic cell transplantation. *Support Care Cancer*. Oct 2007;15(10):1145-1154. PMID 17393191
3. Figueiredo AL, Lins L, Cattony AC, et al. Laser therapy in the control of oral mucositis: a meta-analysis. *Rev Assoc Med Bras (1992)*. Sep-Oct 2013;59(5):467-474. PMID 24119379
4. Oberoi S, Zamperlini-Netto G, Beyene J, et al. Effect of prophylactic low level laser therapy on oral mucositis: a systematic review and meta-analysis. *PLoS One*. Sep 2014;9(9):e107418. PMID 25198431
5. Doeuk C, Hersant B, Bosc R, et al. Current indications for low level laser treatment in maxillofacial surgery: a review. *Br J Oral Maxillofac Surg*. Apr 2015;53(4):309-315. PMID 25740083
6. Gautam AP, Fernandes DJ, Vidyasagar MS, et al. Low level laser therapy for concurrent chemoradiotherapy induced oral mucositis in head and neck cancer patients - A triple blinded randomized controlled trial. *Radiother Oncol*. Sep 2012;104(3):349-354. PMID 22884841
7. Gautam AP, Fernandes DJ, Vidyasagar MS, et al. Low Level Helium Neon Laser therapy for chemoradiotherapy induced oral mucositis in oral cancer patients - A randomized controlled trial. *Oral Oncol*. Sep 2012; 48(9):893-897. PMID 22502814
8. Gautam AP, Fernandes DJ, Vidyasagar MS, et al. Effect of low-level laser therapy on patient reported measures of oral mucositis and quality of life in head and neck cancer patients receiving chemoradiotherapy--a randomized controlled trial. *Support Care Cancer*. May 2013;21(5):1421-1428. PMID 23224689
9. Gautam AP, Fernandes DJ, Vidyasagar MS, et al. Low level laser therapy against radiation induced oral mucositis in elderly head and neck cancer patients-a randomized placebo controlled trial. *J Photochem Photobiol B*. Mar 2015;144:51-56. PMID 25704314
10. Oton-Leite AF, Silva GB, Morais MO, et al. Effect of low-level laser therapy on chemoradiotherapy-induced oral mucositis and salivary inflammatory mediators in head and neck cancer patients. *Lasers Surg Med*. Apr 2015;47(4):296-305. PMID 25824475
11. Ferreira B, da Motta Silveira FM, de Orange FA. Low-level laser therapy prevents severe oral mucositis in patients submitted to hematopoietic stem cell transplantation: a randomized clinical trial. *Support Care Cancer*. Mar 2016;24(3):1035-1042. PMID 26248655
12. Blue Cross and Blue Shield Technology Evaluation Center (TEC). Low-level laser therapy for carpal tunnel syndrome and chronic neck pain. *TEC Assessment*. Nov 2010;Volume 25:Tab 4. PMID 21638940
13. Li ZJ, Wang Y, Zhang HF, et al. Effectiveness of low-level laser on carpal tunnel syndrome: A meta-analysis of previously reported randomized trials. *Medicine (Baltimore)*. Aug 2016;95(31):e4424. PMID 27495063

14. Fusakul Y, Aranyavalai T, Saensri P, et al. Low-level laser therapy with a wrist splint to treat carpal tunnel syndrome: a double-blinded randomized controlled trial. *Lasers Med Sci.* May 2014;29(3):1279-1287. PMID 24477392
15. Chow RT, Heller GZ, Barnsley L. The effect of 300 mW, 830 nm laser on chronic neck pain: a double-blind, randomized, placebo-controlled study. *Pain.* Sep 2006;124(1-2):201-210. PMID 16806710
16. Gross AR, Dziengo S, Boers O, et al. Low level laser therapy (LLLT) for neck pain: a systematic review and meta-regression. *Open Orthop J.* Oct 2013;7:396-419. PMID 24155802
17. Yeldan I, Cetin E, Ozdinciler AR. The effectiveness of low-level laser therapy on shoulder function in subacromial impingement syndrome. *Disabil Rehabil.* Nov 2009;31(11):935-940. PMID 19031167
18. Dogan SK, Ay S, Evcik D. The effectiveness of low laser therapy in subacromial impingement syndrome: a randomized placebo controlled double-blind prospective study. *Clinics (Sao Paulo).* Dec 2010;65(10):1019-1022. PMID 21120304
19. Abrisham SM, Kermani-Alghoraishi M, Ghahramani R, et al. Additive effects of low-level laser therapy with exercise on subacromial syndrome: a randomised, double-blind, controlled trial. *Clin Rheumatol.* May 4 2011;30(10):1341-1346. PMID 21538218
20. Bal A, Eksioglu E, Gurcay E, et al. Low-level laser therapy in subacromial impingement syndrome. *Photomed Laser Surg.* Feb 2009;27(1):31-36. PMID 19250050
21. Calis HT, Berberoglu N, Calis M. Are ultrasound, laser and exercise superior to each other in the treatment of subacromial impingement syndrome? A randomized clinical trial. *Eur J Phys Rehabil Med.* Mar 2 2011;47(3): 375-380. PMID 21364511
22. Page MJ, Green S, Kramer S, et al. Electrotherapy modalities for adhesive capsulitis (frozen shoulder). *Cochrane Database Syst Rev.* Oct 1 2014;10:CD011324. PMID 25271097
23. Stergioulas A. Low-power laser treatment in patients with frozen shoulder: preliminary results. *Photomed Laser Surg.* Apr 2008;26(2):99-105. PMID 18341417
24. Chen J, Huang Z, and Ge M, et al. Efficacy of low-level laser therapy in the treatment of TMDs: a meta-analysis of 14 randomised controlled trials. *J Oral Rehabil.* Apr 2015;42(4):291-299. PMID 25491183
25. Chang WD, Lee CL, Lin HY, et al. A meta-analysis of clinical effects of low-level laser therapy on temporomandibular joint pain. *J Phys Ther Sci.* Aug 2014;26(8):1297-1300. PMID 25202201
26. Shobha R, Narayanan VS, Jagadish Pai BS, et al. Low-level laser therapy: A novel therapeutic approach to temporomandibular disorder - A randomized, double-blinded, placebo-controlled trial. *Indian J Dent Res.* Jul-Aug 2017;28(4):380-387. PMID 28836528
27. Glazov G, Yelland M, Emery J. Low-level laser therapy for chronic non-specific low back pain: a meta-analysis of randomised controlled trials. *Acupunct Med.* Oct 2016;34(5):328-341. PMID 27207675
28. Huang Z, Ma J, Chen J, et al. The effectiveness of low-level laser therapy for nonspecific chronic low back pain: a systematic review and meta-analysis. *Arthritis Res Ther.* Dec 15 2015;17:360. PMID 26667480
29. Koldas Dogan S, Ay S, Evcik D. The effects of two different low level laser therapies in the treatment of patients with chronic low back pain: A double-blinded randomized clinical trial. *J Back Musculoskelet Rehabil.* Jul 2017;30(2):235-240. PMID 27472858
30. Huang Z, Chen J, Ma J, et al. Effectiveness of low-level laser therapy in patients with knee osteoarthritis: a systematic review and meta-analysis. *Osteoarthritis Cartilage.* Sep 2015;23(9):1437-1444. PMID 25914044
31. Bjordal JM, Johnson MI, Lopes-Martins RA, et al. Short-term efficacy of physical interventions in osteoarthritic knee pain. A systematic review and meta-analysis of randomised placebo-controlled trials. *BMC Musculoskelet Disord.* Jun 22 2007;8:51. PMID 17587446
32. Stergioulas A, Stergioula M, Aarskog R, et al. Effects of low-level laser therapy and eccentric exercises in the treatment of recreational athletes with chronic achilles tendinopathy. *Am J Sports Med.* May 2008;36(5): 881-887. PMID 18272794
33. Tumilty S, McDonough S, Hurley DA, et al. Clinical effectiveness of low-level laser therapy as an adjunct to eccentric exercise for the treatment of Achilles' tendinopathy: a randomized controlled trial. *Arch Phys Med Rehabil.* May 2012;93(5):733-739. PMID 22541305

34. Macias DM, Coughlin MJ, Zang K, et al. Low-level laser therapy at 635 nm for treatment of chronic plantar fasciitis: a placebo-controlled, randomized study. *J Foot Ankle Surg.* Sep-Oct 2015;54(5):768-772. PMID 25769363
35. Kiritsi O, Tsitas K, Malliaropoulos N, et al. Ultrasonographic evaluation of plantar fasciitis after low-level laser therapy: results of a double-blind, randomized, placebo-controlled trial. *Lasers Med Sci.* Mar 2010;25(2):275-281. PMID 19841862
36. Cinar E, Saxena S, Uygur F. Low-level laser therapy in the management of plantar fasciitis: a randomized controlled trial. *Lasers Med Sci.* Jul 2018;33(5):949-958. PMID 29273892
37. Brosseau L, Robinson V, Wells G, et al. Low level laser therapy (Classes I, II and III) for treating rheumatoid arthritis. *Cochrane Database Syst Rev.* Oct 19 2005(4):CD002049. PMID 16235295
38. Meireles SM, Jones A, Jennings F, et al. Assessment of the effectiveness of low-level laser therapy on the hands of patients with rheumatoid arthritis: a randomized double-blind controlled trial. *Clin Rheumatol.* May 2010;29(5):501-509. PMID 20082104
39. Alayat MS, Elsodany AM, El Fiky AA. Efficacy of high and low level laser therapy in the treatment of Bell's palsy: a randomized double blind placebo-controlled trial. *Lasers Med Sci.* Jan 2014;29(1):335-342. PMID 23709010
40. Ordahan B, Karahan AY. Role of low-level laser therapy added to facial expression exercises in patients with idiopathic facial (Bell's) palsy. *Lasers Med Sci.* May 2017;32(4):931-936. PMID 28337563
41. Ruaro JA, Frez AR, Ruaro MB, et al. Low-level laser therapy to treat fibromyalgia. *Lasers Med Sci.* Nov 2014;29(6):1815-1819. PMID 24801056
42. Matsutani LA, Marques AP, Ferreira EA, et al. Effectiveness of muscle stretching exercises with and without laser therapy at tender points for patients with fibromyalgia. *Clin Exp Rheumatol.* May-Jun 2007;25(3):410-415. PMID 17631737
43. Samson D, Lefevre F, Aronson N. Wound-healing technologies: low-level laser and vacuum-assisted closure. *Evid Rep Technol Assess (Summ).* Dec 2004(111):1-6. PMID 15663354
44. Chen C, Hou WH, Chan ES, et al. Phototherapy for treating pressure ulcers. *Cochrane Database Syst Rev.* 2014;7:CD009224. PMID 25019295
45. Machado RS, Viana S, Sbruzzi G. Low-level laser therapy in the treatment of pressure ulcers: systematic review. *Lasers Med Sci.* May 2017;32(4):937-944. PMID 28116536
46. Taradaj J, Halski T, Kucharzewski M, et al. Effect of laser irradiation at different wavelengths (940, 808, and 658 nm) on pressure ulcer healing: results from a clinical study. *Evid Based Complement Alternat Med* 2013; 2013:960240. PMID
47. Lucas C, van Gemert MJ, de Haan RJ. Efficacy of low-level laser therapy in the management of stage III decubitus ulcers: a prospective, observer-blinded multicentre randomised clinical trial. *Lasers Med Sci.* 2003; 18(2):72-77. PMID 12928815
48. Nussbaum EL, Biemann I, Mustard B. Comparison of ultrasound/ultraviolet-C and laser for treatment of pressure ulcers in patients with spinal cord injury. *Phys Ther.* Sep 1994;74(9):812-823; discussion 824-815. PMID 8066108
49. Taly AB, Sivaraman Nair KP, Murali T, et al. Efficacy of multiwavelength light therapy in the treatment of pressure ulcers in subjects with disorders of the spinal cord: A randomized double-blind controlled trial. *Arch Phys Med Rehabil.* Oct 2004;85(10):1657-1661. PMID 15468027
50. Smoot B, Chiavola-Larson L, Lee J, et al. Effect of low-level laser therapy on pain and swelling in women with breast cancer-related lymphedema: a systematic review and meta-analysis. *J Cancer Surviv.* Jun 2015;9(2):287-304. PMID 25432632
51. Omar MT, Shaheen AA, Zafar H. A systematic review of the effect of low-level laser therapy in the management of breast cancer-related lymphedema. *Support Care Cancer.* Aug 9 2012;20:2977-2984. PMID 22875413
52. Omar MTA, Ebid AA, El Morsy AM. Treatment of post-mastectomy lymphedema with laser therapy: double blind placebo control randomized study. *J Surg Res.* Jan 2011;165(1):82-90. PMID 20538293

53. Sung L, Robinson P, Treister N, et al. Guideline for the prevention of oral and oropharyngeal mucositis in children receiving treatment for cancer or undergoing haematopoietic stem cell transplantation. *BMJ Support Palliat Care*. Mar 2017;7(1):7-16. PMID 25818385
54. Carcia CR, Martin RL, Houck J, et al. Achilles pain, stiffness, and muscle power deficits: achilles tendinitis. *J Orthop Sports Phys Ther*. Sep 2010; 40(9):A1-26. PMID 20805627
55. News Now Staff. Laser Therapy a Slight Winner in Analysis of Electrotherapy Modalities for Adhesive Capsulitis PT in Motion News 2014; <http://www.apta.org/PTinMotion/News/2014/10/3/LaserTherapyCapsulitis/>. Accessed May 25, 2018.
56. National Institute for Health and Care Excellence (NICE). Low back pain in adults: early management [CG88]. 2009; <https://www.nice.org.uk/guidance/CG88>. Accessed May 24, 2018.
57. National Institute for Health and Care Excellence (NICE). Low back pain and sciatica in over 16s: assessment and management [NG59]. 2016; <https://www.nice.org.uk/guidance/NG59/chapter/Recommendations>. Accessed May 24, 2018.
58. Chou R, Qaseem A, Snow V, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med*. Oct 2 2007;147(7):478-491. PMID 17909209
59. Chou R, Loeser JD, Owens DK, et al. Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain: an evidence-based clinical practice guideline from the American Pain Society. *Spine (Phila Pa 1976)*. May 1 2009;34(10):1066-1077. PMID 19363457
60. Qaseem A, Wilt TJ, McLean RM, et al. Noninvasive treatments for acute, subacute, and chronic low back pain: a clinical practice guideline from the American College of Physicians. *Ann Intern Med*. Apr 4 2017; 166(7):514-530. PMID 28192789
61. American Academy of Orthopaedic Surgeons. Management of Carpal Tunnel Syndrome: Evidence-Based Clinical Guideline. 2016; https://www.aaos.org/uploadedFiles/PreProduction/Quality/Guidelines_and_Reviews/guidelines/CTS%20C PG_6 %207%202016.pdf. Accessed May 24 2018.
62. CMS Publication 100-03 Medicare National Coverage Determinations (NCD) Manual, section 270.6 270.6 - Infrared Therapy Devices (Effective October 24, 2006) (Rev. 62, Issued: 12-15-06, Effective: 10-24-06, Implementation: 01-16-07).
63. National Government Services, Inc. (Primary Geographic Jurisdiction 06 & K - Illinois, Minnesota, Wisconsin, Connecticut, New York - Entire State, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont) Local Coverage Determination (LCD): Outpatient Physical and Occupational THERAPY Services (L33631), Revision Effective Date for services performed on or after 10/01/2018.