The patients who received PENS had statistically significant reductions in pain intensity and disability at both follow-up points, while the sham PENS group did not. The study was limited by a small sample size. This study provides Level II evidence that percutaneous electrical nerve stimulation added to an exercise program resulted in significant improvement in pain and function at 3 months in geriatric patients with chronic LBP.

Weiner et al[20] investigated the effectiveness of percutaneous electrical nerve stimulation (PENS) for the treatment of chronic LBP in a randomized controlled trial. Patients with chronic LBP were randomized to receive one of 4 treatments twice weekly for 6 weeks: PENS (n=50), control-PENS (n=50), PENS plus general conditioning and aerobic exercise (n=50), or control-PENS plus general conditioning and aerobic exercise (n=50). Control-PENS consisted of brief electrical stimulation. Pain (McGill Pain Questionnaire) and disability (Roland Morris Questionnaire) were recorded at baseline, within one week of completing the intervention and 6 months after completing the intervention. All groups experienced improved pain and disability at 6 months. The authors concluded that the exact dose of electrical stimulation required for analgesia cannot be determined. This study provides Level I evidence that PENS and a modified PENS as the sham resulted in significant improvements in pain and function that did not improve with exercise in a geriatric population with chronic LBP at 6 months follow-up, although the addition of exercise did seem to improve fear avoidance in particular.

Deyo et al[21] compared the effect of transcutaneous electrical nerve stimulation (TENS), a program of stretching exercises, or a combination of both for the treatment of chronic LBP. Patients with LBP for at least 3 months were randomized to receive TENS (n=36), sham TENS (n=36), TENS plus exercises (n=37), or sham TENS plus exercises (n=36). Patients assigned to TENS received instructions for home-use of at least 3 45-minute TENS sessions per day. Patients allocated to receive exercise received instructions for a daily structured exercise sequence, adding one new exercise each day. Functional status (modified Sickness Impact Profile), self-reported activity level, pain (ordinal and VAS for pain, improvement and frequency) pain scale) and physical measures were recorded at baseline, after 2 and 4 weeks of therapy and 2-month follow-up after completion of the trial. There were no significant differences in outcomes in those who received TENS and no interactive effect of TENS with exercise. The authors concluded that TENS is no more effective than placebo and adds no additional benefit to exercise alone. This study provides Level I therapeutic evidence that TENS does not provide improvement in pain in patients with chronic LBP.

In a randomized double-blind crossover study, Jarzem et al[22] compared transcutaneous electrical nerve stimulation (TENS) to sham therapy in patients with chronic LBP. Patients with LBP for at least 3 months were randomized to receive TENS followed by 2 treatments of sham TENS (n=25) or sham treatment followed by 2 treatments of conventional TENS (n=25). Pain tolerance (VAS) and physical measurements were recorded upon enrollment and within an hour after each treatment. There were significant improvements in pain and physical measurements after TENS compared to sham treatment. These measurements were usually done within an hour of treatment. Durable effects from treatment were not evaluated. The authors concluded that TENS significantly reduces pain and improves physical performance on the studied measurements and should be considered for short-term pain relief. This study offers Level I therapeutic evidence that TENS provides immediate relief in patients with chronic LBP.

Marchand et al[23] aimed to compare the effect of transcutaneous electrical nerve stimulation (TENS), placebo-TENS and no treatment in patients with chronic LBP. Patients with LBP for more than 6 months were allocated into one of 3 groups using a pseudo-random assignment to control for sex, weight, diagnosis and pain severity. Patients presented to the clinic twice weekly for ten weeks to receive TENS (n=14), placebo-TENS (n=12), or no treatment (n=16). Pain intensity and unpleasantness (VAS) were recorded before and after each treatment, as well as every two hours at home during 3-day periods before treatment, 1 week after treatment and 3 and 6 months after treatment. Both TENS and placebo-TENS reduced pain intensity and unpleasantness. TENS reduced pain intensity significantly more than placebo-TENS immediately after treatment sessions and one week after sessions, but not 3 months or 6 months after. The authors concluded that TENS should be used as a short-term treatment as part of a multidisciplinary program for LBP. In critique of the methodology, this potential Level I study was downgraded due to small sample size. This study provides Level II therapeutic evidence that TENS provides immediate term pain relief in patients with chronic LBP.

Thompson et al[24] conducted a double-blind randomized controlled trial to study the effect of transcuta-

*Recommendations were developed based on a specific definition, inclusion/exclusion criteria, and the resulting literature which excluded conditions such as presence of a neurological deficit or leg pain experienced below the knee, among others. Given the **exclusion criteria**, these guideline recommendations address a subset of low back pain care as opposed to low back pain in its entirety. This clinical guideline is not intended to be a fixed treatment protocol; it is anticipated that there will be patients who require more or less treatment than what is outlined. This clinical guideline should not be construed as including all proper methods of care or excluding other acceptable methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific procedure or treatment is to be made by the physician and patient in light of all circumstances presented by the patient and the needs and resources particular to the locality or institution.*