Interferential Current Stimulation

Interferential current stimulation is considered investigational.

There are no specific CPT codes describing interferential current stimulation. The following CPT codes might be used:

- 64550 Application of surface (transcutaneous) neurostimulator
- 97014 Application of a modality to one or more areas; electrical stimulation (unattended).

The following HCPCS code might also be used:

- G0283 Electrical stimulation (unattended), to one or more areas for indication(s) other than wound care, as part of a therapy plan of care.

The following HCPCS codes are available for these stimulation devices:

- S8130 Interferential current stimulator, 2 channel
- S8131 Interferential current stimulator, 4 channel.

Interferential current stimulation (IFS) is a type of electrical stimulation that has been investigated as a technique to reduce pain, improve function and range of motion, and treat gastrointestinal disorders.
Interferential Current Stimulation

IFS uses paired electrodes of 2 independent circuits carrying high-frequency and medium-frequency alternating currents. The superficial electrodes are aligned on the skin around the affected area. It is believed that IFS permeates the tissues more effectively and with less unwanted stimulation of cutaneous nerves, is more comfortable than transcutaneous electrical nerve stimulation. There are no standardized protocols for the use of IFS; IFS may vary by the frequency of stimulation, the pulse duration, treatment time, and electrode-placement technique.

REGULATORY STATUS
A number of IFS devices have been cleared for marketing by the U.S. Food and Drug Administration through the 510(k) process, including the Medstar™ 100 (MedNet Services) and the RS-4i® (RS Medical). IFS may be included in multimodal electrotherapy devices such as transcutaneous electrical nerve stimulation and functional electrostimulation.

RATIONALE
This evidence review was created in July 2003 and has been updated regularly with searches of the MEDLINE database. The most recent literature update was performed through April 9, 2018.

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function—including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. RCTs are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

MUSCULOSKELETAL CONDITIONS
RCTs with placebo control are extremely important to assess treatments of painful conditions, due to the expected placebo effect, the subjective nature of pain assessment in general, and the variable natural history of pain that often responds to conservative care. Therefore, to establish whether an intervention for pain is effective, a placebo comparison is needed.

Clinical Context and Therapy Purpose
The purpose of using interferential current stimulation (IFS) in patients who have musculoskeletal conditions is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does use of IFS improve health outcomes for those with musculoskeletal conditions?

The following PICOTS were used to select literature to inform this review.
**Patients**
The relevant population of interest is individuals with musculoskeletal conditions.

**Interventions**
The therapy being considered is IFS.

**Comparators**
The following therapies are currently being used: physical therapy, medication, and other types of electrical stimulation.

**Outcomes**
The specific outcomes of interest are pain control, increased functional capacity, and improved quality of life.

**Timing**
IFS would be used as adjunctive treatment with observed effects to be expected within 6 months.

**Setting**
IFS treatment can be provided by physical therapists, physiatrists, and other neuromuscular specialists in the outpatient setting.

**Systematic Reviews**
A network meta-analysis by Zeng et al (2015) identified 27 RCTs on 5 types of electrical stimulation therapies used to treat pain in patients with knee osteoarthritis. Reviewers found that IFS was significantly more effective than control interventions for pain relief (standardized mean difference, 2.06; 95% credible interval, 1.10 to 3.19) and pain intensity (standard mean difference, -0.92; 95% credible interval, -1.72 to -0.05). The validity of these conclusions is uncertain due to the limitations of the network meta-analysis, which used indirect comparisons to make conclusions. A further limitation is that the findings of placebo-controlled studies were not reported separately; rather, they were pooled in the analysis of usual care comparators.

Fuentes et al (2010) published a systematic review and meta-analysis of RCTs evaluating the effectiveness of IFS for treating musculoskeletal pain. Twenty RCTs met the following inclusion criteria: adults diagnosed with a painful musculoskeletal condition (eg, knee, back, joint, shoulder, or osteoarthritic pain); compared IFS alone or as a cointervention with placebo, no treatment, or an alternative intervention; and assessed pain using a numeric rating scale. Fourteen of the trials reported data that could be pooled. IFS as a stand-alone intervention was not found to be more effective than placebo or an alternative intervention at reducing pain. For example, a pooled analysis of 2 studies comparing IFS alone with placebo did not find a statistically significant difference in pain intensity at discharge; the pooled mean difference (MD) was 1.17 (95% confidence interval [CI], -1.70 to 4.05). Also, a pooled analysis of 2 studies comparing IFS alone with an alternative intervention (eg, traction or massage) did not find a significant difference in pain intensity at discharge; the pooled MD was -0.16 (95% CI, -0.62 to 0.31). Moreover, in a pooled analysis of 5 studies comparing IFS as a cointervention with a placebo, there was a nonsignificant finding in pain intensity at discharge (MD=1.60; 95% CI, -0.13 to 3.34; p=0.07). The meta-analysis found IFS plus another intervention to be superior to a control group (eg, no treatment) for pain intensity at day 1 and 4 weeks; a pooled analysis of 3 studies found an MD of 2.45 (95% CI, 1.69 to 3.22; p<0.001). However, that analysis did not distinguish the specific effects of IFS from the cointervention nor did it control for potential placebo effects.
Randomized Controlled Trials
Two placebo-controlled randomized trials were included in the Fuentes et al (2010) meta-analysis, one of which (Defrin et al [2005]) was also included in the Zeng et al (2015) meta-analysis. The Defrin trial included 62 patients with osteoarthritic knee pain. Patients were randomized to 1 of 6 groups (4 active treatment groups and 2 control groups, sham and nontreated). Acute pre- vs posttreatment reductions in pain were found for all active groups but neither control group. Stimulation resulted in a modest pretreatment elevation of pain threshold over this 4-week trial. Taylor et al (1987) randomized 40 patients with a temporomandibular joint syndrome or myofascial pain syndrome to active or placebo IFS. Principal outcomes were pain assessed by a questionnaire and range of motion. There were no statistically significant differences in the outcomes between groups.

Two other RCTs, both published in 2012, were included in the Zeng meta-analysis. One found significantly better outcomes with IFS vs placebo while the other did not find significant differences between active and sham interventions. Atamaz et al (2012) compared IFS, transcutaneous electrical nerve stimulation, shortwave diathermy, and sham interventions for treating knee osteoarthritis. A total of 203 patients were randomized to 1 of 6 groups, 3 with active treatment and 3 with sham treatment. The primary outcome was knee pain as assessed on a visual analog scale (VAS; range, 0-100). Other outcomes included range of motion, time to walk 15 meters, paracetamol intake, the Nottingham Health Profile score, and the Western Ontario and McMaster University Osteoarthritis Index (WOMAC) score. At the 1-, 3-, and 6-month follow-ups, there were no statistically significant differences across the 6 groups in VAS pain scores, Nottingham Health Profile pain scores, or WOMAC pain scores. Moreover, WOMAC function scores, time to walk 15 meters, and Nottingham Health Profile physical mobility scores did not differ significantly among groups at any follow-up assessments. At the 1-month follow-up, paracetamol intake was significantly lower in the IFS group than in the transcutaneous electrical nerve stimulation group.

Gundog et al (2012) randomized 60 patients with knee osteoarthritis to 1 of 4 groups: 3 IFS groups at frequencies of 40 Hz, 100 Hz, and 180 Hz, and sham IFS. The primary outcome was pain intensity assessed by the WOMAC. Mean WOMAC scores 1 month after treatment were 7.2 in the 40-Hz group, 6.7 in the 100-Hz group, 7.8 in the 180-Hz group, and 16.1 in the sham IFS group (p<0.05 vs active treatment groups). Secondary outcomes (eg, VAS score) also showed significantly higher benefit in the active treatment groups compared with the sham IFS group. The number of patients assigned to each group and patient follow-up rates were not reported.

In addition to the placebo-controlled trials, several RCTs have compared IFS with another active intervention or with usual care. However, studies with active comparators, as well as those with usual care control groups, may be subject to the placebo effect. Receiving an older or known, rather than a novel, intervention, may elicit a placebo response.

Section Summary: Musculoskeletal Conditions
Placebo-controlled randomized trials of IFS for treating musculoskeletal pain and impaired function have mostly found that IFS does not significantly improve outcomes. A meta-analysis limited to placebo-controlled trials also did not find a significant benefit of IFS for treating pain and function. RCTs with usual care or active treatment comparisons may be subject to the placebo effect.
GASTROINTESTINAL DISORDERS

Clinical Context and Therapy Purpose
The purpose of using IFS in patients who have gastrointestinal disorders (eg, constipation, irritable bowel syndrome, and dyspepsia) is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does use of IFS improve health outcomes for those with gastrointestinal disorders?

The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is individuals with a gastrointestinal disorder such as constipation, irritable bowel syndrome, or dyspepsia.

Interventions
The therapy being considered is IFS.

Comparators
The following therapies are currently being used: dietary changes, medication, and other types of electrical stimulation.

Outcomes
The specific outcomes of interest are pain control, increased functional capacity, and improved quality of life.

Timing
Safety and efficacy of IFS would be evaluated at one month following a 4 week treatment.

Setting
IFS treatment can be provided by gastroenterologists in the outpatient setting.

Constipation
Several RCTs evaluating IFS for treating children with constipation and/or other lower gastrointestinal symptoms were identified. The RCTs had small sample sizes and did not consistently find a benefit of IFS. For example, Kajbafzadeh et al (2012) in Iran randomized 30 children with intractable constipation to IFS or sham stimulation. Children ranged in age from 3 to 12 years old and had failed 6 months of conventional therapy (eg, dietary changes, laxatives). Patients received 15 IFS sessions (20 minutes long), 3 times a week for 5 weeks. Over 6 months, the mean frequency of defecation increased from 2.5 times a week to 4.7 times a week in the treatment group and from 2.8 times per a to 2.9 times a week in the control group. The mean pain during defecation score decreased from 0.35 to 0.20 in the treatment group and from 0.29 to 0.22 in the control group. The authors reported a statistically significant between-group difference in constipation symptoms.

Another RCT, published by Clarke et al (2009), was conducted in Australia. Thirty-three children with slow transit time constipation (mean age, 12 years) were randomized to IFS or sham treatment. They received a dozen, 20-minute sessions over 4 weeks; the primary outcome was health-related quality of life (QOL), and the main assessment instrument used was the Pediatric Quality of Life Inventory. The authors only reported within-group changes; they did not compare the treatment and control groups. There was no statistically significant change in QOL, as perceived by the parent group. The mean parent-
Interferential Current Stimulation

reported QOL scores changed from 70.3 to 70.1 in the active treatment group and from 69.8 to 70.2 in the control group. There was also no significant difference in QOL, as perceived by the child after sham treatment. The Pediatric Quality of Life Inventory score, as perceived by the child, did increase significantly in the active treatment group (mean, 72.9 pretreatment vs 81.1 posttreatment, p=0.005).

Irritable Bowel Disease
An RCT by Coban et al (2012) randomized 67 adults with irritable bowel syndrome to active or placebo IFS. Patients with functional dyspepsia were excluded. Patients received four 15-minute IFS sessions over 4 weeks. Fifty-eight (87%) of 67 patients completed the trial. One month after treatment, primary outcome measures did not differ significantly between treatment and control groups. For example, for abdominal discomfort, the response rate (ie, >50% improvement) was 68% in the treatment group and 44% in the control group. For bloating and discomfort, the response rate was 48% in the treatment group and 46% in the placebo group. Using a VAS, 72% of the treatment group and 69% of the control group reported improvement in abdominal discomfort.

Dyspepsia
One RCT, by Koklu et al (2010) in Turkey, has evaluated IFS for treating dyspepsia. The trial randomized adults to active IFS (n=25) or sham treatment (n=25); patients were unaware of their treatment allocation. Patients received 12 treatment sessions over 4 weeks; each session lasted 15 minutes. Forty-four (88%) of 50 randomized patients completed the therapy session and follow-up questionnaires at 2 and 4 weeks. The trialists did not specify primary outcome variables; rather, they measured the frequency of 10 gastrointestinal symptoms. In an intention-to-treat analysis at 4 weeks, IFS was superior to placebo for the symptoms of early satiation and heartburn, but not for the other 8 symptoms. For example, before treatment, 16 (64%) of 25 patients in each group reported experiencing heartburn. At 4 weeks, 9 (36%) patients in the treatment group and 13 (52%) patients in the sham group reported heartburn (p=0.02). Among symptoms that did not differ between groups at follow-up, 24 (96%) of 25 patients in each group reported epigastric discomfort before treatment. In the intention-to-treat analysis, 5 (20%) of 25 patients in the treatment group and 6 (24%) of 25 patients in the placebo group reported epigastric discomfort.

Section Summary: Gastrointestinal Disorders
IFS has been tested as a treatment option for a variety of gastrointestinal conditions, with a small number of trials completed for each condition. Trial results were mixed, with some reporting benefit and others not. This body of evidence is inconclusive on whether IFS is an efficacious treatment for gastrointestinal conditions.

POSTSTROKE SPASTICITY

Clinical Context and Therapy Purpose
The purpose of using IFS in patients who have poststroke spasticity is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does use of IFS improve health outcomes for those with poststroke spasticity?

The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is individuals with poststroke spasticity.
**Interventions**
The therapy being considered is IFS.

**Comparators**
The following therapy is currently being used: standard stroke rehabilitation.

**Outcomes**
The specific outcomes of interest are improved function and QOL.

**Timing**
Effect of IFS would be assessed one hour after a single treatment.

**Setting**
IFS treatment can be provided by physical therapists and physiatrists.

**Randomized Controlled Trials**
A single-blind RCT evaluating IFS as a treatment of chronic stroke was published by Suh et al (2014).  
Forty-two inpatient stroke patients with plantarflexor spasticity were randomized to a single 60-minute session with IFS or placebo IFS treatment following 30 minutes of standard rehabilitation. In the placebo treatment, electrodes were attached; however, current was not applied. Outcomes were measured immediately before and 1 hour after the intervention. The primary outcomes were gastrocnemius spasticity (measured on a 0 to 5 Modified Ashworth Scale) and 2 balance-related measures: the Functional Reach Test and the Berg Balance Scale. Also, gait speed was measured using a 10-meter walk test, and gait function were assessed with the Timed Up & Go Test. The IFS group performed significantly better than the placebo group on all outcomes (p<0.05 for each comparison). For example, the mean (standard deviation) difference in Modified Ashworth Scale score was 1.55 (0.76) in the IFS group and 0.40 (0.50) in the placebo group. A major limitation of the trial was that outcomes were only measured 1 hour after the intervention and no data were available on longer term impacts of the intervention.

**Section Summary: Poststroke Spasticity**
Data from a small RCT with very short follow-up provides insufficient evidence on the impact of IFS on health outcomes in patients with post-stroke spasticity.

**SUMMARY OF EVIDENCE**
For individuals who have musculoskeletal conditions who receive IFS, the evidence includes RCTs and meta-analyses. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. Placebo-controlled randomized trial(s) have found that IFS, when used to treat musculoskeletal pain and impaired function(s), does not significantly improve outcomes; additionally, a meta-analysis of placebo-controlled trials did not find a significant benefit of IFS for decreasing pain or improving function. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have gastrointestinal disorders who receive IFS, the evidence includes RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, medication use, and treatment-related morbidity. IFS has been tested for a variety of gastrointestinal conditions, with a small number of trials completed for each condition. The results of the trials are mixed, with some reporting benefit and others not. This body of evidence is inconclusive on whether IFS is an efficacious treatment for
gastrointestinal conditions. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have poststroke spasticity who receive IFS, the evidence includes an RCT. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. The RCT had a small sample size and very short follow-up (immediately posttreatment). The evidence is insufficient to determine the effects of the technology on health outcomes.

SUPPLEMENTAL INFORMATION

PRACTICE GUIDELINES AND POSITION STATEMENTS

American College of Physicians and the American Pain Society
Clinical practice guidelines from the American College of Physicians and the American Pain Society, published in 2009, concluded that there was insufficient evidence to recommend interferential current stimulation (IFS) for the treatment of low back pain.17

American College of Occupational and Environmental Medicine
The American College of Occupational and Environmental Medicine published several relevant guidelines. For shoulder disorders, guidelines found the evidence on IFS to be insufficient and, depending on the specific disorder, either did not recommend IFS or were neutral on whether to recommend it.18 For low back disorders, guidelines found the evidence on IFS to be insufficient and did not recommend it. The sole exception was that IFS could be considered as an option on a limited basis for acute low back pain with or without radicular pain.19 For knee disorders, guidelines recommended IFS for postoperative anterior cruciate ligament reconstruction, meniscectomy, and knee chondroplasty immediately postoperatively in the elderly.20 This was a level C recommendation.

U.S. PREVENTIVE SERVICES TASK FORCE RECOMMENDATIONS
Not applicable.

MEDICARE NATIONAL COVERAGE
There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

ONGOING AND UNPUBLISHED CLINICAL TRIALS
Some currently unpublished trials that might influence this review are listed in Table 1.

Table 1. Summary of Key Trials

<table>
<thead>
<tr>
<th>NCT No.</th>
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<td>NCT02381665</td>
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<td>Mar 2019</td>
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NCT: national clinical trial.

REFERENCES


**CODES**

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<th>Codes</th>
<th>Number</th>
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<tr>
<td>CPT</td>
<td>64550</td>
<td>Application of surface (transcutaneous) neurostimulator</td>
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<td></td>
<td>97014</td>
<td>Application of a modality to 1 or more areas; electrical stimulation (unattended)</td>
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<tr>
<td></td>
<td>97032</td>
<td>Application of modality to one or more areas; electrical stimulation (manual), each 15 minutes (attended)</td>
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<td>HCPCS</td>
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<td>G0283</td>
<td>Electrical stimulation (unattended), to 1 or more areas for indication(s) other than wound care, as part of a therapy plan of care</td>
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<tr>
<td></td>
<td>S8130</td>
<td>Interferential current stimulator, 2 channel</td>
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<tr>
<td></td>
<td>S8131</td>
<td>Interferential current stimulator, 4 channel</td>
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<tr>
<td>ICD-10-CM</td>
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<td>Investigational for all relevant diagnoses</td>
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<td></td>
<td>G56.40- G56.42</td>
<td>Causalgia of upper limb code range</td>
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<td>G57.70- G57.72</td>
<td>Causalgia of lower limb code range</td>
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<td>G89.0-G89.4</td>
<td>Pain, not elsewhere classified code range</td>
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<td>G90.50- G90.59</td>
<td>Complex regional pain syndrome I code range</td>
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<td>M25.50- M25.579</td>
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<td>M54.00- M54.9</td>
<td>Dorsalgia code range</td>
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<td>M79.60- M79.676</td>
<td>Pain in limb, hand, foot, fingers and toes code range</td>
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<td>R52</td>
<td>Pain, unspecified</td>
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<td>ICD-10-PCS</td>
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<td>ICD-10-PCS codes are only used for inpatient services. There is no specific ICD-10-PCS code for the initiation of this therapy.</td>
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**Type of Service**

**Place of Service**
## POLICY HISTORY

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<td>06/16/16</td>
<td>Replace policy</td>
<td>Policy updated with literature review through April 25, 2016; references 1 and 10-11 added. Policy statement unchanged.</td>
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<td>06/22/17</td>
<td>Replace policy</td>
<td>Blue Cross of Idaho annual review; no change to policy statement.</td>
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<td>09/28/17</td>
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<td>06/27/18</td>
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