

Non-Spinal Electrical Osteogenesis Stimulator

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Introduction

Non-spinal electrical osteogenesis stimulators are addressed in this guideline.

Health Equity Consideration

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Criteria

A non-spinal electrical bone stimulator is considered medically necessary when **any** of the following applies:

- The individual has a non-spinal nonunion fracture with no progress in bone healing on repeat imaging studies
- The individual has a failed non-spinal surgical joint fusion
- The individual has congenital pseudoarthrosis

Evidence Discussion

A 2023 retrospective claims analysis by Segina & Ryaby evaluated over 11,000 adults with fracture nonunion and found that use of non-invasive osteogenesis stimulator devices was associated with clinically meaningful improvements in outcomes and healthcare utilization. Individuals who received an electrical or electromagnetic stimulator demonstrated significantly lower rates of subsequent surgical intervention for nonunion compared with those who did not receive a device (13.1% vs. 18.7%; $p < 0.001$), as well as reduced postoperative opioid utilization (58.2% vs. 67.8%; $p < 0.001$), suggesting a potential analgesic benefit or improved healing trajectory.

A 2025 review by Farjaminejad & Dingle synthesized mechanistic and translational evidence on electrical stimulation (ES) for bone regeneration, emphasizing its role in modulating osteoblasts, osteoclasts, and mesenchymal stem cell activity to promote osteogenic differentiation and enhance vascularization. The authors reported that multiple ES modalities (e.g., direct current, capacitive coupling, pulsed electromagnetic field, and piezoelectric stimulation) demonstrated pro-healing effects across pre-clinical and early clinical studies, supporting their relevance for treating non-spinal skeletal injury. However, the authors also underscored that persistent limitations in clinical translation, including inconsistent treatment parameters, heterogeneous patient responses, and technical constraints related to field penetration in larger anatomical structures. Overall, the review supported the rationale for non-spinal electrical osteogenesis stimulators by affirming their mechanistic validity and promising biological effects while acknowledging the need for standardized protocols and improved clinical research designs to fully establish their therapeutic impact

Codes Addressed in This Guideline

HCPCS Code	Description
E0747	Osteogenesis stimulator, electrical, non-invasive, other than spinal applications

References

AAOS. (2014, March). *Diseases and conditions – Nonunions*. OrthoInfo. American Academy of Orthopedic Surgeons. <https://orthoinfo.aaos.org/en/about-orthoinfo/privacy-policy/>

Aleem, I. S., Aleem, I., Evaniew, N., et al. (2016). *Efficacy of electrical stimulators for bone healing: A meta-analysis of randomized sham-controlled trials*. Scientific Reports, 6, 31724. <https://doi.org/10.1038/srep31724>

Centers for Medicare & Medicaid Services. (2005). *National Coverage Decision for Osteogenic Stimulators (150.2)*. <https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=65&ncdver=2&DocID=150.2&bc=gAAAAABAAAAAA>

CGS Administrators, & Noridian Healthcare Solutions. (2020). Local Coverage Determination (LCD): *Osteogenesis Stimulators (L33796) (Revised January 1, 2020)*. Centers for Medicare & Medicaid Services. <https://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?lcdid=33796&ver=17&bc=CAAAAAAAAAAAAA>

Farjaminejad, S., & Dingle, A. M. (2025). *The role of electrical stimulation in bone regeneration: Mechanistic insights and therapeutic advances*. Bioelectronic Medicine, 11, Article 18. <https://doi.org/10.1186/s42234-025-00180-x>

Gross, C. E., Hsu, A. R., Lin, J., Holmes, G. B., & Lee, S. (2013). *Revision MTP arthrodesis for failed MTP arthroplasty*. Foot & Ankle Specialist, 6(6), 471–478. <https://doi.org/10.1177/1938640013502725>

Khalifeh, J. M., Zohny, Z., MacEwan, M., Stephen, M., Johnston, W., Gamble, P., Zeng, Y., Yan, Y., & Ray, W. Z. (2018). Electrical stimulation and bone healing: A review of current technology and clinical applications. IEEE Reviews in Biomedical Engineering, 11, 217–232. <https://doi.org/10.1109/RBME.2018.2799189>

Kohata, K., Itoh, S., Takeda, S., Kanai, M., Yoshioka, T., Suzuki, H., & Yamashita, K. (2013). *Enhancement of fracture healing by electrical stimulation in the comminuted intraarticular fracture of distal radius*. Biomedical Materials and Engineering, 23(6), 485–493. <https://doi.org/10.3233/BME-130774>

Segina, D., & Ryaby, J. (2023). *Osteogenesis stimulator devices reduce surgical intervention, opioid utilization, and overall costs in patients with fracture nonunions*. Orthopedic Reviews, 15. <https://doi.org/10.52965/001c.88398>

Shah, H., Rousset, M., & Canavese, F. (2012). *Congenital pseudarthrosis of the tibia: Management and complications*. Indian Journal of Orthopaedics, 46(6), 616–626. <https://doi.org/10.4103/0019-5413.104184>

Tay, W.-H., de Steiger, R. N., Richardson, M. D., Gruen, R. L., & Balogh, Z. J. (2014). *Health outcomes of delayed union and nonunion of femoral and tibial shaft fractures*. Injury, 45(10), 1653–1658. <https://doi.org/10.1016/j.injury.2014.06.025>

Welck, M. J., Hayes, T., Pastides, P., Khan, W., & Rudge, B. (2017). *Stress fractures of the foot and ankle*. Injury, 48(8), 1722–1726. <https://doi.org/10.1016/j.injury.2015.06.015>