



Bridging the Diagnostic Gap: Evaluating Electrodiagnostic Education and Clinical Practice in Doctor of Physical Therapy Programs

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Abstract

Background: Electrodiagnostic (EDX) testing—encompassing Nerve Conduction Studies (NCS) and Electromyography (EMG)—is a safe, reliable "gold standard" tool for assessing neuromuscular function and guiding physical therapy (PT) interventions. Despite falling within the legal scope of physical therapy practice in most US states, a significant clinical knowledge gap and an overall lack of awareness persist regarding the PT's role in electrodiagnosis.

Objective: This multi-phase, four-survey research initiative evaluated the current state of EMG/EDX education and clinical application from multiple stakeholder viewpoints to uncover curricular strengths and weaknesses and provide a roadmap for standardizing entry-level Doctor of Physical Therapy (DPT) curricula.

Methodology: Data were collected using a four-survey framework capturing distinct lenses of the profession: practicing licensed clinicians in Illinois (Survey 1), national ACAPT/CAPTE-accredited DPT program educators (Survey 2), a deep-dive educator follow-up on teaching barriers (Survey 3), and DPT students regarding their perceived preparedness (Survey 4).

Results: Literature synthesis confirms high clinical value; EDX changes or confirms referral diagnoses in 98% of cases, altering treatment plans for over 63% of patients, and lowers healthcare costs. Despite this, Survey 1 revealed limited knowledge and low clinical utilization among practicing PTs, driven by legal ambiguity in state practice acts (e.g., Illinois neither explicitly permits nor prohibits needle EMG). Surveys 2, 3, and 4 identified the root cause as an educational gap in DPT programs, characterized by drastic curricular inconsistencies, a lack of practical hands-on training with needle electrodes due to cost and safety, and low student confidence.

Conclusion: A profound disconnect exists between the proven clinical utility of EDX and its utilization in physical therapy. To bridge this gap, DPT programs must standardize education in alignment with APTA and Academy of Clinical Electrophysiology guidelines. Implementing accessible learning tools, such as low-cost biofeedback kits and visual data interpretation, can optimize entry-level curricula and empower future physical therapists to fully embrace electrodiagnosis.

Keywords: Electrodiagnosis (EDX); Electromyography (EMG); Doctor of Physical Therapy (DPT) Curriculum; Physical Therapy Scope of Practice.

Introduction & Statement of the Problem

Electrodiagnostic (EDX) testing, which encompasses both Nerve Conduction Studies (NCS) and Electromyography (EMG), is a highly effective, safe, and reliable tool used to assess neuromuscular function, determine injury localization, and measure the severity of conditions like Carpal Tunnel Syndrome (CTS), sciatica, back pain, and radiculopathy [1, 2].

For physical therapists (PTs), EDX is an invaluable resource for guiding clinical interventions, modifying treatment plans, and streamlining patient referrals (Hands-On Diagnostics [HODS], 2025). While performing EDX falls within the legal scope of physical therapy practice in most U.S. states, specialized board certification through the American Board of Physical Therapy Specialties (ABPTS) as an Electrophysiologic Clinical Specialist (ECS) requires an intensive post-graduate commitment, including 2,000 patient contact hours and 500 mentored studies [3].

However, there is a substantial knowledge gap and an overall lack of awareness regarding the PT's role in electrodiagnosis. This stems directly from a historical deficit of standardized, hands-on

EDX training within entry-level Doctor of Physical Therapy (DPT) curricula [4].

Purpose of This Research

To address this gap, I conducted a multi-phase, four-survey research initiative to evaluate the current state of EMG/EDX education and clinical application from multiple viewpoints. The goal of this paper is to compile these findings to uncover specific educational strengths and weaknesses, ultimately aiming to improve and standardize entry-level DPT curricula.

Methodology: The Four-Survey Framework

To capture a holistic view of the profession, my research gathered data from key stakeholders through four distinct lenses:

- **Survey 1 (The Clinician Perspective):** Target audience was practicing licensed physical therapists in Illinois to evaluate their current knowledge levels and how frequently they utilize EDX in outpatient settings.
- **Survey 2 (The Educator Perspective):** Investigated how ACAPT/CAPTE-accredited DPT programs across the United States structure and present their entry-level EMG content.
- **Survey 3 (The Deep-Dive Educator Follow-Up):** Gathered detailed qualitative and quantitative data regarding specific instructional formats, curricular variations, and barriers to teaching EDX.
- **Survey 4 (The Student Perspective):** Assessed DPT students within those same programs to gauge their actual exposure, comfort levels, and perceived preparedness for utilizing EDX after graduation.

Core Findings & Lit Review Synthesis

Clinical Value & Effectiveness

The literature strongly validates the clinical and economic benefits of EDX, which directly reinforces the importance of my research:

- **Diagnostic & Treatment Accuracy:** Studies show that EDX testing changes the initial referral diagnosis in 51.5% of cases and confirms it in 46.5%, leading to treatment modifications in over 63% of patients [5]. It boasts a high pooled sensitivity (77%) and specificity (71%) for radiculopathy [6].
- **Prognostic Power:** Patients with confirmed lumbosacral radiculopathy show faster and more successful recovery tracks post-surgery or during rehabilitation, making EDX an excellent prognostic indicator [7].
- **Cost-Efficiency:** Compared to expensive or inconsistent diagnostic methods (like MRIs or isolated muscle biopsies), EDX is highly efficient [8]. For conditions like CTS and sciatica, early EDX testing reduces total healthcare costs by confirming diagnoses quickly and preventing unnecessary, invasive surgeries [9].

Barriers to Clinical Practice

Despite its proven efficacy, my clinical survey (Survey 1) confirmed my hypothesis that practicing PTs in Illinois demonstrate **limited knowledge and a low frequency of diagnostic EMG use**. The literature indicates this is not a financial obstacle (as electrode costs are minimal), but rather a legal and cultural misunderstanding [10]:

- State practice acts across the U.S. vary wildly; some explicitly ban needle EMG (nEMG), some allow it under dry needling umbrellas, and states like Illinois neither explicitly permit nor prohibit it [2].
- This ambiguity leaves clinicians unsure of their legal boundaries and feeds a general lack of awareness that PTs are even eligible to perform these tests [4].

The Educational Gap (The Root Cause)

The findings from my educator and student surveys (Surveys 2, 3, and 4) confirmed my secondary hypothesis: entry-level DPT programs provide insufficient and inconsistent exposure to EDX.

- **Curricular Inconsistency:** Educator responses revealed that the depth of EMG information taught varies drastically by state and the individual instructor's background [11].
- **Lack of Hands-On Training:** While needle EMG (nEMG) is more diagnostically valid than surface EMG (sEMG) for differentiating myopathic vs. neuropathic muscle wasting, it is rarely taught practically [1]. Due to cost, complexity, and safety, students rarely get hands-on experience with needle electrodes.
- **Perceived Unpreparedness:** Reflecting international trends (such as studies in the UK and Chile showing minimal EMG training during schooling and clinical rotations), US students reported highly restricted exposure, leaving them feeling unprepared to apply these concepts in a clinical setting [4, 12].

Discussion & Conclusion

Summary of Outcomes

My research highlights a clear disconnect in the physical therapy profession. While EDX is a highly accurate, cost-effective tool that drastically improves clinical decision-making and patient outcomes, it remains drastically underutilized. The root of this issue lies in the entry-level DPT curriculum, where a lack of standardized education, minimal hands-on laboratory time, and varying faculty expertise result in low graduate confidence.

Moving Forward

To bridge this gap, DPT programs must align their curricula more closely with APTA and Academy of Clinical Electrophysiology guidelines [2]. Incorporating evolving learning aids, such as low-cost EMG biofeedback kits, visual data interpretation, and qualitative analogies, can help students overcome the technical complexities of physics and physiology [4].

By identifying these educational weaknesses through my survey data, this paper provides a foundational roadmap for academic programs to elevate their EDX curricula, ultimately empowering the next generation of physical therapists to fully embrace electrodiagnosis within their scope of practice.

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