

# INPLASY

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## The Neurological Exam en Español: A Methodological Study to Develop a Standardized Clinical Tool for Healthcare Professionals

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## ADMINISTRATIVE INFORMATION

**Support** - None.**Review Stage at time of this submission** - Data extraction.**Conflicts of interest** - We declare no conflicts of interest.**INPLASY registration number:** INPLASY202560097**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 October 2025 and was last updated on 25 October 2025.

## INTRODUCTION

**Study aim** The aim of this methodological study is to identify, compare, and synthesize existing Spanish translations of the neurological examination in order to develop a standardized, clinically and culturally appropriate educational tool for healthcare professionals. Neurological examinations, which rely heavily on verbal communication and patient understanding, present unique challenges in cross-linguistic contexts. The lack of standardized Spanish-language resources creates barriers for non-Spanish-speaking clinicians and trainees attempting to perform accurate and comprehensive assessments.

This study seeks to address these gaps by conducting a scoping review of Spanish-language neurological exam resources available in the grey literature. By systematically mapping existing translations, evaluating their completeness, and

comparing variability across resources, we aim to develop a synthesized, standardized bilingual tool optimized for accessibility. The tool is designed for beginner non-native Spanish-speaking clinicians and learners at all fluency levels, with the goal of improving confidence, clarity, and cultural appropriateness in pediatric neurological care delivery.

The ultimate objective is to promote equitable neurological care by bridging language barriers. The synthesized tool will serve as a teaching resource and a clinical aid, and piloted as part of Workshop 3: The Neurological Exam en Español for the 2025 Child Neurological Society Annual Meeting.

**Background** There are more than 40 million Spanish speakers in the United States and this represents a significant language barrier in medicine. In clinical practice, language discordance between patients and healthcare

providers contributes to disparities in diagnostic accuracy, establishing the physician-patient relationship, and overall quality of care. Pediatric neurology is a specialty where communication is particularly critical. The neurological examination requires precise instructions, nuanced questioning, and patient understanding of tasks ranging from cognitive assessments to motor commands.

Despite the critical importance of language concordance, there is no standardized Spanish-language neurological examination tool for clinicians or medical trainees. Notable existing resources have been published by the American Academy of Neurology and Medical Spanish at UCLA. Currently, fragmented resources exist across grey literature sources such as institutional handouts, PDFs, websites, and instructional videos. These resources vary in completeness, terminology, and clarity, with some omitting key exam components or failing to provide pronunciation support for non-native speakers. This variability leaves trainees and providers without reliable guidance, potentially reinforcing inequities in care for Spanish-speaking populations.

Importantly, because no peer-reviewed publications of Spanish neurological exam translations were identified, our search strategy focuses on grey literature sources. We focused on identifying and comparing public, readily accessible existing translations through a scoping review using the Arksey and O'Malley framework. To enhance transparency, this study also aligns with the PRISMA-ScR reporting guideline and is registered on INPLASY.

By applying rigorous methodology to the identification and analysis of Spanish-language neurological exam resources, this study will produce a standardized bilingual tool aimed towards novice Spanish-speakers, but open to all fluency levels. The tool is intended to support both medical learners and practicing clinicians in performing accurate neurological examinations with Spanish-speaking patients. This tool was disseminated as a physical pocket-guide and virtually available via QR code.

In summary, this study addresses an urgent gap at the intersection of language, culture, and clinical neurology. By creating an accessible, standardized English-to-Spanish neurological exam tool, we aim to promote health equity and medical education simultaneously.

## METHODS

**Search strategy** Because no PubMed- or Scopus-indexed studies on Spanish neurological exam translations were found, the search strategy focused on grey literature sources. Searches were conducted on Google using combinations of English and Spanish terms, including but not limited to:

- "neurological exam Spanish translation"
- "Neurological exam in spanish"
- "examen neurológico PDF"
- "examen neurológico en español handout"
- "Spanish neurological exam guide"
- "examen neurológico translation"

The first 10–15 pages of Google search results were reviewed for each query, recognizing that grey literature is less consistently indexed than peer-reviewed literature.

Additional targeted searches were performed on specific institutional and medical education websites, including U.S. medical schools, international neurology training programs, and open-access repositories for teaching materials. YouTube and other video-sharing platforms were also reviewed to identify instructional videos with Spanish-language neurological exam content, with an emphasis on from credible institutions.

All resources were downloaded, catalogued, and reviewed for accessibility. Resources were categorized by:

- Title
- Author/organization (if available)
- Source type (PDF, website, video, institutional handout)
- Full or Partially complete exam translation

In total, 34 digitally available resources were identified. After preliminary screening and application of eligibility criteria, 8 resources were included for full data extraction. Duplicates and incomplete resources were excluded.

**Eligibility criteria** Inclusion criteria include sources that met all of the following:

- Language: Neurological exam that are fully or partially translated into Spanish. Our primary focus was specifically English to Spanish translations, but not limited if no English translation was available. There was no regional or dialect preference.
- Content Type:
  - Structured neurological exams (e.g., checklists, scripts, guides)

- Educational materials meant for clinicians or medical learners and intended for use in healthcare settings
- Accessibility: Publicly accessible defined as being available at no cost online, downloadable PDFs, institutional websites, or online textbooks available to learners
- Target Audience:
- Designed for Spanish-speaking patients
- Preference for exam designed for healthcare professionals
- Relevance:
- Must include at least one of the following: Mental Status Exam, Cranial Nerves, Motor, Sensory, Reflexes, Coordination, or Gait
- Date Range: No strict limit, but ideally materials published or updated in the last 15 years.
- Format: We accepted websites, PDFs, scanned handouts, online modules, textbooks, or appendices in academic articles. To note, only videos from academic institutions were considered.

#### Exclusion criteria:

- Resources not related to the neurological exam (e.g., psychiatric or general medical assessments without neurology content).
- Spanish resources unrelated to translation (e.g., patient education brochures with no English equivalent).
- Inaccessible links or broken documents.
- Duplicates of the same resource across different sites.
- Materials that contained only isolated vocabulary lists without exam instructions.
- Videos from non-academic institutions or organizations.

**Data extraction** Data extraction was performed using a standardized Excel matrix. Each resource was assigned by the following:

- Source details (type, author/organization, completeness).
- Exam components included (introductions, mental status, cranial nerves, motor/strength, sensory, reflexes, coordination, gait, additional phrases).
- Completeness score (0–5) based on coverage of exam components.

Three reviewers independently extracted data, with discrepancies resolved through discussion. Extracted data were then tabulated for comparison across resources.

**Outcome definitions** Data synthesis was descriptive and qualitative, consistent with scoping review methodology. Frequencies were calculated

for resource types, inclusion of major exam components, and phrases.

Completeness scores were based on a 1-5 scale grading rubric:

- 1 - Very Limited: Only 1-2 sections were included (e.g., only vocabulary, anatomy, or general Spanish phrases)
- 2 - Limited: 2-3 exam components covered (e.g., mental status, CNS, motor), but missing key exam areas such as reflexes or gait.
- 3 - Moderate: 4-5 sections present. Mostly complete but lacks some exam elements or depth (e.g., no reflexes or coordination). Translation generally usable but may require adjustments.
- 4 - Near-complete: 5–6 sections included, clear formatting, clinically usable. Minor gaps (e.g., brief cerebellar section, no gait exam). Good translation quality.
- 5 - Fully complete: Includes all 7 major neuro exam sections: Mental Status, Cranial Nerves, Motor, Sensory, Reflexes, Coordination/Cerebellar, Gait & Station. Excellent translation quality.

Completeness scores were then averaged across included resources to establish a composite overall score.

Comparative analysis was conducted to identify variability in translations across resources and to highlight consistent terms or phrases. Thematic analysis was also performed to reflect variation and trends in translations. Extracted components were then synthesized into a draft standardized tool.

An additional section, Introductions, was independently added. The final tool and language was adjusted to the informal tense with intention towards use for pediatric patients. Easeability was also considered when multiple translations existed and the final translations were selected based on universally standard individual words, most commonly used phrases, and adjusted for the appropriate difficulty level for non-native speakers. The draft tool underwent refinement through expert feedback, focusing on clarity, clinical relevance, and feasibility for non-native speakers. Feedback was incorporated iteratively until consensus was achieved.

Given the descriptive nature of the study, no inferential statistical analysis was performed.

**Country(ies) involved** United States of America.

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