

# INPLASY PROTOCOL

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**Conflicts of interest:**  
None declared.

## Scapular pain in cervical radiculopathy: a scoping review protocol

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**Review question / Objective:** Population: Extracted literature will be reviewed to select primary clinical studies that report on patients with confirmed cervical radiculopathy. Confirmation of the diagnosis of cervical radiculopathy must be through advanced imaging (MRI/CT – 1973 or later) and/or through surgical intervention (including literature prior to 1973). Studies and/or guidelines that pertain to the diagnosis or other characteristics of cervical radiculopathy will also be examined for relevance to the three stated aims of this scoping review. Concept and Context: This scoping review has three aims; first, to present an overview of the literature that describes scapular symptoms arising from cervical radiculopathy. Second, to identify and analyze published diagnostic models of cervical radiculopathy that exclude or ignore scapular symptoms to understand knowledge gaps. Third, to summarize the scope of extracted literature as it relates to implications for the diagnosis of cervical radiculopathy in clinical practice. For further context, see "Background" below.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 08 July 2022 and was last updated on 08 July 2022 (registration number INPLASY202270041).

### INTRODUCTION

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**Background:** The aims of this scoping review will examine how the breadth of existing literature has evolved regarding an understanding of scapular symptoms in cervical radiculopathy, and what future studies may be needed to bring about future diagnostic consensus across professions that treat this condition. There are significant differences in the perceived role of scapular symptoms in the diagnosis of cervical radiculopathy between the orthopedic and the physical therapy literature. This review may be of significant value in musculoskeletal clinician's diagnostic understanding of scapular symptoms in cervical radiculopathy and may provide insight into whether they may be diagnosed earlier in their time course, leading to better outcomes.

**Rationale:** In his seminal 1944 paper on cervical radiculopathy Spurling described compression of cervical nerve roots resulting from lateral rupture of the cervical intervertebral discs.[1] In this study symptoms arising from this compression included neck pain and stiffness and symptoms "into the shoulder and down the arm into the hand." A 14-year population-based epidemiologic survey of cervical radiculopathy in Rochester, Minnesota published in 1994 characterized the symptoms of cervical radiculopathy as consisting of neck pain with radiation of pain "in a radicular distribution in one or both upper extremities." [2] Though spanning many decades, neither of these studies mentions scapular pain in association with cervical radiculopathy. In 1998 Tanaka et al provided a more detailed

clinical picture of cervical radiculopathy, defining the involved location of neck symptoms to include "nape pain and pain at the suprascapular, scapular or interscapular region." [3] This study emphasized that the location of pain was an important aid in diagnosing the level of the involved nerve root. Suprascapular pain was linked to C5 or C6 radiculopathy and scapular or interscapular pain with C7 or C8 radiculopathy. More recently in 2006, Tanaka et al expanded on these scapular associations, noting in their study of 50 consecutive cervical radiculopathy patients, neck or scapular pain preceded arm or finger symptoms in 70% of patients by a week or longer in 55% of patients and by one month or longer 21% of patients. [4] Forty-eight of 50 patients had pre-operative scapular, suprascapular, or interscapular pain prior to surgery; only two of 50 patients reported lower cervical spine. This study concluded that the site of scapular pain was "significantly reliable for the localization of the involved nerve root in patients with cervical radiculopathy. The study's emphasis on scapular pain as a valuable diagnostic tool was adopted by the North American Spine Society (NASS) in their 2010 Evidence-based Clinical Guidelines for the Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders, published by Bono et al in 2011. [5] In spite of this adoption by NASS over a decade ago, controversy over cervical radiculopathy persists. There is a lack of consensus regarding the definition of cervical radiculopathy and the exact location of symptoms in this condition, [6] as well as the use and utility of scapular symptoms in its diagnosis. McAnany et al retrospectively studied 239 single level surgeries for cervical radiculopathy to characterize patterns of symptom distribution as either "standard" or "nonstandard." [7] Ten symptom distributions were identified. None of these 10 distributions included scapular, suprascapular, or interscapular symptoms. An important difference between this study and Tanaka et al's paper is the average duration of symptoms at the time radicular symptom location was registered. McAnany et al registered symptom location

at the time of surgical consult, which ranged from 19 to 23 weeks, whereas Tanaka et al tracked the evolution of symptom distribution from initial onset, noting progression from neck and scapula first, with the subsequent development of arm and finger symptoms.

## METHODS

**Strategy of data synthesis:** Our strategy is to use a scoping review. Extracted literature will be independently scored by two reviewers. Stage one: Accelerated screening using the review tool in Covidence. The review tool will include pre-determined criteria. Stage two: full-text screening. Reviewers will independently screen full texts of all included studies for full eligibility criteria. Disagreements will be resolved by a consensus discussion between reviewers. The exclusion of a study in Stage two will be justified and recorded. See eligibility criteria.

**Eligibility criteria:** Literature will be included for review if the primary focus is cervical radiculopathy, including a description of radicular symptom distribution, and the literature must meet the pre-determined selection criteria to be used by the two reviewers in this scoping review. Studies will be excluded if they do not specifically pertain to cervical radiculopathy.

**Source of evidence screening and selection:** A research strategy will be composed by our research librarian and will include searches of Pubmed/Medline, Embase, Cochrane, CINAHL, and Web of Science databases. Guidelines, conference proceedings, theses and dissertations, and grey literature will also be searched based on the advice and expertise of our research librarian. The final search will be based on terms representing the clinical constructs cervical radiculopathy AND symptoms, with cataloguing of symptom = scapula\*.

**Data management:** Extracted articles will be downloaded to EndNote and de-duplicated in EndNote, Covidence or by export to R and use of a Tidyverse package. Our reviewers will conduct initial

literature screening as well as final reviews of literature using Covidence software. A form that details operational definitions will be available as a review tool in Covidence together with the standardized data charting form.

**Reporting results / Analysis of the evidence:** The scoping review will be documented through a flow diagram of the study selection process. Tables mapping the distribution of studies according to identified study categories, strata, or characteristics will be presented. The literature will be organized to address the specific aims of the study, noted above. Final data analysis will be performed using Stata 17.0 BE (College Station, Texas).

**Presentation of the results:** The results will be published in an open access journal. Graphics will include the Search Query (Table), Search Query Terms (Venn diagram - Figure), Study Selection Process (steps involved; Figure), and Final Data Extraction Variables (Table). An additional Table or Figure may be used to clarify or present observations after the analysis of evidence has been performed.

**Language restriction:** Only English search terms will be used, but studies written in other languages will not be excluded.

**Country(ies) involved:** This scoping review originated in the United States.

**Other relevant information:** The author block combines expertise from three major health sciences institutions on two continents, including the University of Colorado School of Medicine, Vrije Universiteit Amsterdam in The Netherlands, and Stanford University. Authors will leverage high level institutional resource access to ensure the successful completion and submission of this manuscript.

**Keywords:** Cervical radiculopathy, scapula, periscapular, interscapular, cervical disc herniation, radicular symptoms.

**Dissemination plans:** The manuscript will be submitted for publication in an Open Access journal. Posts to social media will be used to increase awareness of the publication.

#### **Contributions of each author:**

**Author 1 - Joel Carmichael -** Conceived of the scoping review. Article reviewer, Manuscript preparation. Corresponding author.

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