



# Impacts of the Delayed Surgical Correction of Adolescent Idiopathic Scoliosis and its Repercussions for the Brazilian Unified Health System: Systematic Review Protocol

## *Impactos da espera para correção cirúrgica da escoliose idiopática do adolescente e suas repercussões para o Sistema Único de Saúde: Protocolo de revisão sistemática*

Mariana Demétrio de Sousa Pontes<sup>1,5</sup> Thabata Pasquini Soeira<sup>2,5</sup> Mariangela Louzada Sampaio<sup>3</sup>   
Carlos Fernando Pereira da Silva Herrero<sup>4,5</sup>

<sup>1</sup> Department of Orthopedics, Pediatric Orthopedics Division, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil

<sup>2</sup> Department of Physical Therapy, Neurofunctional Physical Therapy Division, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil.

<sup>3</sup> Department of Physical Therapy, Universidade de Ribeirão Preto (UNAERP), Ribeirão Preto, São Paulo, Brazil.

<sup>4</sup> Department of Orthopedics, Spine Surgery Division, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil.

<sup>5</sup> Department of Orthopedics and Anesthesiology, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, SP, Brazil

Address for correspondence Mariana Demétrio de Sousa Pontes, MD, MSc, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, Av. Bandeirantes, 3900, 11 andar - Vila Monte Alegre, 14048-900, Ribeirão Preto, São Paulo, Brasil  
(e-mail: marianadpontes@gmail.com).

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### Abstract

#### Keywords

- scoliosis
- waiting lists
- spine
- adolescent health
- Unified Health System
- systematic review

Surgical correction is an effective treatment for adolescent idiopathic scoliosis (AIS) with deformities over 45°. In the Brazilian Unified Health System (SUS, Sistema Único de Saúde), if the surgical procedure is indicated, the patients are placed on a waiting list and wait until the treatment can be performed. An extended waiting period can be harmful due to worsening symptoms and increased treatment costs. Additionally, it has negative effects on the mental health and quality of life of these patients. This paper is a systematic review protocol to answer the following question: “What is the impact of the delayed surgical correction of AIS considering costs and quality of life?” Collecting health status information is the first step to improve high complex public health actions. Future publications from this protocol may serve as a subsidy to point out

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potential priority criteria to enhance the global health of AIS patients and the management of Brazilian public health financial resources.

## Resumo

A correção cirúrgica é uma opção efetiva de tratamento para casos de Escoliose Idiopática do Adolescente (EIA) com curvas acima de 45°. No âmbito do Sistema Único de Saúde (SUS), os pacientes avaliados nos centros de referência e com indicação cirúrgica são cadastrados em fila de espera até que o tratamento definitivo possa ser realizado. Um período de espera extenso pode ser prejudicial, do ponto de vista de piora dos sintomas e de aumento do custo de tratamento, além de gerar efeitos negativos na saúde mental e na qualidade de vida do paciente. O presente artigo trata-se do protocolo de uma revisão sistemática que buscará responder o questionamento: “Qual o impacto do tempo de espera para correção cirúrgica da EIA do ponto de vista de custo e qualidade de vida?” O aperfeiçoamento das ações de saúde pública, na esfera da alta complexidade, inicia-se com o levantamento de informações sobre a situação de saúde de determinada condição. Diante disso, as futuras publicações provenientes deste protocolo poderão servir como subsídio para apontar possíveis critérios de prioridade, com o intuito de promover melhoria tanto no âmbito da saúde global de pacientes com EIA, quanto na gestão financeira da saúde pública brasileira.

## Palavras-chave

- escoliose
- listas de espera
- coluna vertebral
- saúde do adolescente
- sistema único de saúde
- revisão sistemática

## Introduction

Adolescent idiopathic scoliosis (AIS) is a condition that can result in spinal pain and trunk imbalance. AIS impacts the physical, psychological, and social health of those affected.<sup>1</sup>

Current guidelines determine the treatment of spinal deformities within the Brazilian Unified Health System (SUS, Sistema Único de Saúde).<sup>2</sup> Patients who need specialized care are referred via the system's network to accredited referral centers for high-complexity care. The individuals are then evaluated by the spine surgeon and, if the surgical procedure is indicated, they are placed on a waiting list and wait until the treatment can be performed. Surgeries for AIS correction requires time, experienced staff, technical resources, and expensive implants.<sup>3–6</sup> Additionally, due to the underfunding of surgeries for spinal deformities in the public health system patients are subjected to constantly expanding waiting lists.<sup>7,8</sup> This long wait until definitive treatment is harmful to patients due to deformity worsening, increased treatment cost, and negative effects on mental health and quality of life.<sup>9,10</sup>

## Rationale

For the cases of AIS requiring surgical correction, the time elapsed between surgical indication and the proposed treatment may cause progression of the deformity, increase the risk of complications, and impact the patient's quality of life. Therefore, it is critical to investigate the effects of the delayed surgical treatment in these patients and its consequences for SUS from a cost-effectiveness point of view. Since there are no published systematic reviews or registered protocols on this topic, this protocol has the novelty quality expected from a systematic review. Improvement of high-complexity public health actions begins by collecting information on the health status of a condition.<sup>2</sup> As such, future publications based on

this protocol may point out potential priority criteria to enhance the global health of AIS subjects and the management of Brazilian public health financial resources.

The main objective of this systematic review is to synthesize the best available evidence on the impacts of waiting for surgical correction of AIS and its repercussions for SUS. The secondary objectives are to investigate the effects generated by the SUS waiting list for AIS surgical correction, considering cost-effectiveness and quality of life.

## Methods

### Research Questions

This study will answer the following question: What is the impact of the delayed surgical correction of AIS considering costs and quality of life? The research question was designed based on the acronym PICO,<sup>11</sup> in which P is the included population, I is the intervention or exposure, C is the comparator, and O stands for outcomes. The population consists of subjects with AIS who were referred to surgery and are on the waiting list for treatment. We will compare their outcomes regarding treatment costs and quality of life to those presented by subjects operated on earlier.

### Eligibility Criteria

Eligibility criteria followed the research question, defined by the acronym PICO.<sup>11</sup> The articles selected for the systematic review must present a sample of male and female AIS patients, aged from 10 to 18 years, referred to surgical treatment, and placed on waiting lists.

### Information Sources

Queries will occur in the following databases: MEDLINE (via PubMed), Embase, LILACS, SciELO, Scopus, Web of Science,

LIVIVO, Regional Portal of the Biblioteca Virtual em Saúde (BVS), and Cochrane Library. A manual query will complement database searches to include the gray literature and minimize publication bias. This manual query consists of reading the bibliography of the papers and conducting additional research in the Brazilian Digital Library of Theses and Dissertations (BDTD, Biblioteca Digital Brasileira de Teses e Dissertações), Google Scholar, ClinicalTrials.gov, Brazilian Registry of Clinical Trials (ReBEC, Registro Brasileiro de Ensaios Clínicos), and the OpenGrey platform.

### Search Strategy

The terms used in the search will include the following: *waiting time*, *wait time*, *waiting list*, *wait list*, *delaying surgery*, *scoliosis*, *adolescent idiopathic scoliosis*, and *AIS*. There were no limits regarding language and year of publication. Advanced searches will employ the Boolean operators [OR] and [AND].

Two independent researchers will carry out the queries following the recommendations of the Peer Review of Electronic Search Strategies (PRESS) protocol.<sup>12</sup> We will record the number of articles found in a Microsoft Excel table (Microsoft Corp. Redmond, WA, USA), version 15.29.

### Data Record

Two independent researchers will select the studies for systematic review. Selection will occur in two stages. During the first phase, reviewers will choose potentially relevant studies from titles and abstracts. In a second phase, they will read the full text of the previously selected studies. Then, they will evaluate these papers according to the eligibility criteria.

A third party, an expert in the subject, will solve any disagreements by consensus with the remaining researchers. In addition to that, we will use the Mendeley (Mendeley, London, UK) reference manager, available as an online application, to avoid duplication and facilitate file sharing among researchers.

The two evaluators will extract study data in a paired, independent manner. The Rayyan (Rayyan Systems Inc., Cambridge, MA, USA) systematic review manager, available as a web application, will allow a better exploration of the findings of the included studies. The third researcher will analyze any potential disagreement.

The form for data extraction will contain the following:

- a) general information: title, authors, year of publication, study design, country of origin;
- b) demographics: age, gender;
- c) methodologies used in the study: objectives, randomization, intervention, and control techniques;
- d) findings: number of patients, measurement tools, follow-up time, statistical tests, descriptive information.

If any data is missing, researchers will attempt to contact the authors of the primary studies to obtain outstanding information for the systematic review. If this is not possible, researchers will evaluate the data published alone.

### Analysis of the Risk of Bias of the Included Studies

Assessment of the risk of bias will include sample representativeness, methods for participant selection, outcomes measurement, and confounding factors control. Additionally, we will consider potential conflicts of interest in the included studies.

### Data Synthesis

Available evidence will be displayed as a narrative synthesis and meta-analysis, if possible. Statistical tests will analyze the frequency and association measures of the studies. Effect or global estimate measures will interpret findings, which will be displayed in forest plot graphs. This analysis will use the Review Manager (RevMan; The Cochrane Collaboration, London, UK) software from the Cochrane organization. Heterogeneity control ( $I^2$ ) will be performed by subgroup and sensitivity analysis.

### Evidence Quality Assessment

After completing the critical assessment of the methodological quality of the studies and synthesizing findings, we will assess the evidence quality for each outcome prioritized in the systematic review. We will use the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system to rank the level of the evidence set for each outcome as high, moderate, low, or very low.

### Register

The systematic review protocol register occurred at the International Prospective Register of Systematic Reviews (PROSPERO) database from the University of York<sup>13</sup> (CRD42020212134).

### Amendments

This protocol does not represent a change to a previously completed or published protocol. If necessary, we will include protocol amendments documentation on the PROSPERO platform.<sup>13</sup>

### Authors Contribution

MDSP: data acquisition, analysis, and interpretation; manuscript preparation.

TPS: data acquisition, analysis, and interpretation.

MLS: data acquisition.

CFPSH: study conception, design, and review

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### Conflict of Interests

The authors declare that there is no conflict of interests.

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