Article published online: 2025-04-11



# Organization of a Pediatric Scoliosis Surgery Task Force and Analysis of Clinical and Radiographic Outcomes

## *Organização de um mutirão de cirurgia de escoliose pediátrica e análise dos resultados clínicos e radiográficos*

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Rev Bras Ortop 2025;60(1):s00441800946.

**Abstract**

**Objective** To demonstrate how a surgical task force can help provide access to surgical procedures for many patients waiting for surgery in the Brazilian Unified Health System (Sistema Único de Saúde - SUS, in Portuguese) waiting list.

**Methods** This is a retrospective cohort study involving 28 patients on the SUS waiting list included in a pediatric scoliosis surgery task force. We analyzed medical records, epidemiological data, and clinical and radiographic outcomes.

**Results** The data showed that the postoperative outcomes of curve correction and complications, such as infections, surgical wounds, pain, or other events, were consistent with the literature on the subject.

**Conclusion** Therefore, we believe a task force is critical for facilitating access to surgical procedures and restoring the quality of life of hundreds of patients.

**Keywords**
- scoliosis
- spine diseases
- surgery task force

**Resumo**

**Objetivo** Mostrar como o mutirão de cirurgias pode auxiliar no acesso ao procedimento cirúrgico para muitos pacientes que aguardam para realizar cirurgia na fila de espera do Sistema Único de Saúde (SUS).

**Métodos** Trata-se de um estudo retrospectivo de coorte que contou com 28 pacientes da lista de espera do SUS, incluídos em um mutirão de cirurgia de escoliose pediátrica, no qual foram realizadas revisão de prontuário, análise epidemiológica e de resultados clínicos e radiográficos.

**Palavras-chave**
- doenças da coluna vertebral
- escoliose
- mutirão de cirurgia

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**received**
May 12, 2024
**accepted**
October 14, 2024

**DOI** https://doi.org/10.1055/s-0044-1800946.
**ISSN** 0102-3616.

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**Resultados** Os dados mostraram que os resultados pós-cirúrgicos de correção das curvas e o nível de complicações observadas nos pacientes, tais como o acometimento de infecções, feridas cirúrgicas, dor ou outros tipos de eventos, são compatíveis com a literatura sobre tema.

**Conclusão** Sendo assim, entende-se que o mutirão é importante para facilitar o acesso ao procedimento cirúrgico e devolver a qualidade de vida a centenas de pacientes.

## Introduction

Although scoliosis is defined as a spinal deformity in the coronal plane greater than 10°, it consists of a rotational vertebral deformity.[1] Idiopathic scoliosis is a structural disease in children at or near puberty[2] It can have different etiologies, including genetic syndromes, congenital spinal malformations, skeletal dysplasias, connective tissue conditions, and neuromuscular diseases.[1]

Most cases present a low curvature magnitude per the Cobb angle,[3] with no significant clinical repercussions. The prevalence of curvatures with a magnitude large enough to consider surgical treatment is extremely low, ranging from 0.04 to 0.4%.[1,4]

Most scoliosis cases present non-progressive deformity and do not require surgical treatment. However, some cases present rapid curvature progression requiring surgery due to the complex deformities associated with pediatric scoliosis, leading to the idea of organizing surgical task forces.[5]

Tasks forces aim to speed up the processing of elective surgeries. Regarding the topic addressed in the present study, the Scoliosis Research Society (SRS) pioneered the development of programs to organize training actions for reference centers in the surgical treatment of pediatric scoliosis, culminating in surgical task forces, as recently described in the literature.[6,7]

In the current paper, we describe a task force for scoliosis treatment and its epidemiological, logistical, radiographic, and clinical data to encourage similar initiatives.

## Materials and Methods

This study was retrospective, with an observational cohort. Participants were selected from the Brazilian Unified Health System's (Sistema Único de Saúde [SUS], in Portuguese) waiting list in Maranhão, Brazil, who underwent outpatient reassessment by the group and outpatient anesthesia evaluation. The exclusion criteria were previous surgeries, active infection, and lack of anesthesia for surgery.

We informed all selected patients about the study and invited them to participate after signing the informed consent form and the underage assent form approved by the research ethics committee. The task force occurred at Hospital Universitário from Universidade Federal do Maranhão (HU-UFMA). Twenty-eight patients who underwent surgical procedures between February 1 and 4, 2021, participated in the study.

We collected and recorded demographic data, including gender, age, weight, etiology of the deformity, and time between inclusion on the waiting list and surgery. We calculated the mean, median, and standard deviation values for variables and the frequency of each scoliosis etiology.

We evaluated and tabulated surgical data, including intraoperative bleeding, neurophysiological changes, implant type, and number of implants. In addition, we assessed drainage volume, blood transfusions, and the presence or absence of infections in the postoperative period.

We determined the deformity magnitude per the Cobb angle from all patients in the preoperative and immediate postoperative periods using the SurgiMap (Nemaris Inc., Methuen, MA, USA) application.

Moreover, we collected data from the professionals involved in the task force, such as their area of medical specialty and the Brazilian region in which they operate, through interviews. We recorded logistical data, including the number of operating rooms and intensive care unit (ICU) bed reserves as well as specific needs subjectively observed at each process stage.

## Results

### Demographic and Preoperative Clinical Data

The participants were 10 to 17 years old, including 24 were females and 4 males. Idiopathic (childhood, adolescent, and juvenile) scoliosis was the most common condition, (observed in 20 subjects; 71%), followed by congenital (4 patients; 14%), neuromuscular (3 subjects; 11%), and diplomyelia (1 patient; 4%) etiologies (►**Table 1**).

The mean age at diagnosis/surgical indication was 10.2 years; the age at surgery was 15.1 years, and the mean time from the diagnosis to the procedure was 4.7 years.

### Intraoperative Results

Regarding surgical data (►**Table 2**), the mean blood loss was 768.61 ml, and 3 patients required blood transfusion. The mean surgical time was 200.74 minutes. Five subjects presented transient neurophysiological changes but no postoperative neurological deficits.

Seventeen patients underwent traction procedures and type 2 osteotomies; five, intraoperative traction; three,

**Table 1** Sociodemographic data

| Patient | Scoliosis etiology | Pre-procedural height (m) | Weight (kg) | Gender |
|---|---|---|---|---|
| M1 | Adolescent idiopathic | 1.65 | 46 | Female |
| M2 | Neuromuscular | 1.43 | 30 | Female |
| M3 | Congenital | 1.39 | 35 | Female |
| M4 | Adolescent idiopathic | 1.56 | 48 | Female |
| M5 | Adolescent idiopathic | 1.54 | 46 | Female |
| M6 | Adolescent idiopathic | 1.57 | 44 | Female |
| M7 | Child idiopathic | 1.48 | 60 | Female |
| M8 | Adolescent idiopathic | 1.62 | 43 | Female |
| M9 | Diplomyelia | 1.35 | 28 | Female |
| M10 | Adolescent idiopathic | 1.66 | 55 | Female |
| M11 | Adolescent idiopathic | 1.55 | 54 | Female |
| M12 | Juvenile idiopathic | 1.72 | 59 | Female |
| M13 | Child idiopathic | 1.59 | 43 | Female |
| M14 | Adolescent idiopathic | 1.65 | 52.5 | Female |
| M15 | Adolescent idiopathic | 1.59 | 47 | Female |
| M16 | Neuromuscular | 1.30 | 30 | Male |
| M17 | Juvenile idiopathic | 1.42 | 41 | Male |
| M18 | Congenital | 1.64 | 60 | Male |
| M19 | Juvenile idiopathic | 1.53 | 37.2 | Male |
| M20 | Adolescent idiopathic | 1.61 | 47 | Female |
| M21 | Neuromuscular | 1.30 | 22 | Female |
| M22 | Congenital | 1.61 | 46 | Female |
| M23 | Juvenile idiopathic | 1.68 | 55 | Male |
| M24 | Adolescent idiopathic | 1.66 | 50 | Female |
| M25 | Adolescent idiopathic | 1.62 | 56 | Female |
| M26 | Congenital | 1.27 | 23 | Female |
| M27 | Adolescent idiopathic | 1.64 | 46 | Female |
| M28 | Adolescent idiopathic | 1.52 | 38 | Female |

Note: Specification of scoliosis type, height, weight, and gender.
Source: Authors (2023).

intraoperative traction combined with the bipolar technique; three, intraoperative traction and osteotomies; one, intraoperative traction combined with costoplasty; and three patients underwent osteotomies alone.

Other surgical procedures included asymmetric pedicle subtraction osteotomy (PSO) of T10, laminectomy, and transforaminal lumbar interbody fusion (TLIF).

Regarding arthrodesis, the proximal level of screw insertion was the thoracic region, mainly in the T4 vertebra; in 1 patient, it occurred in the cervical region (C7) and, in another subject, in the lumbar region (L4). The distal level concentrated in the lumbar region; in four patients, it occurred in the thoracic region (T12), in the sacrum region (S1) in one patient, and, in three subjects, the procedure occurred in the hip region (ilium).

All patients received implants. In total, we used 457 implants, including screws, rods, hooks, and sublaminar bands.

## Clinical Postoperative Outcomes and Complications

The clinical postoperative data (►**Table 3**) show that the average time to discharge was 6.92 days. All patients presented secretions or blood in the drain on the 1st day after surgery (average volume, 370.05 mL), 27 (96%) subjects on the 2nd day (average volume, 252.59 mL), 9 (32%) on the 3rd day (average volume, 144.66 mL), and only 1 (4%) on the 4th day (280 mL).

Twelve patients (43%) required blood bags postoperatively. Six received two, three received three, two received one, and one received four bags.

Among complications, two subjects presented infection; one had urinary tract infection (UTI) by *Enterobacter cloacae*, and the other had a surgical site infection by *Klebsiella pneumoniae*. In percentage terms, by etiology, we observed 5% of surgical site infections in idiopathic cases, with no other surgical site infections. Sixteen patients (57%)

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**Table 2** Surgical data

| Patient | Blood loss (mL) | Neurophysiological abnormality | Episode description | Techniques | Proximal level included in arthrodesis | Distal level included in arthrodesis | Surgical time (min) |
|---|---|---|---|---|---|---|---|
| M1 | 790 | Yes | Motor potential drop at derotation. Signals normalized after bar removal. Surgery was completed without further complications. | NA | T8 | L3 | 180 |
| M2 | 870 | No | NA | Intraoperative traction: bipolar | T1 | Ilium | 310 |
| M3 | 110 | No | NA | Laminectomy; transforaminal lumbar interbody fusion | L4 | S1 | 180 |
| M4 | 580 | No | NA | NA | T4 | L2 | 200 |
| M5 | 1115 | No | NA | NA | T4 | T12 | 180 |
| M6 | 470 | Yes | Motor potential drop on the left side. The potential returned after mean blood pressure and room temperature increase. | Intraoperative traction | T4 | L1 | 220 |
| M7 | 970 | Yes | Potential drop on the left side with normalization after traction removal | Intraoperative traction. | T2 | L2 | 180 |
| M8 | 650 | No | NA | NA | T11 | L3 | 100 |
| M9 | 1140 | No | NA | Intraoperative traction; costoplasty | T3 | L3 | 240 |
| M10 | 550 | No | NA | Intraoperative traction | T4 | L3 | 300 |
| M11 | 960 | No | NA | NA | T4 | L4 | 200 |
| M12 | 1400 | No | NA | Osteotomies (3) | T4 | L4 | 300 |
| M13 | 1010 | No | NA | Intraoperative traction | T4 | L2 | 200 |
| M14 | 610 | No | NA | NA | T4 | T12 | 145 |
| M15 | 900 | No | NA | NA | T6 | L3 | 135 |
| M16 | 350 | No | NA | Intraoperative traction; bipolar | T1 | Ilium | 250 |
| M17 | 1500 | No | NA | Intraoperative traction; osteotomies (3) | T2 | L2 | 220 |
| M18 | 560 | No | NA | Osteotomies (3) | T2 | L2 | 280 |
| M19 | 980 | No | NA | Osteotomies (3); intraoperative traction | T4 | L3 | 120 |
| M20 | 690 | No | NA | NA | T10 | L4 | 120 |
| M21 | 840 | No | NA | Intraoperative traction; bipolar | T1 | Ilium | 220 |
| M22 | 1,250 | Yes | Motor and sensory potential drop during osteotomy. The potential normalized after decompression and osteotomy completion. | Asymmetric pedicle subtraction osteotomy in T10 | T6 | L3 | 270 |

**Table 2** (*Continued*)

| Patient | Blood loss (mL) | Neurophysiological abnormality | Episode description | Techniques | Proximal level included in arthrodesis | Distal level included in arthrodesis | Surgical time (min) |
|---|---|---|---|---|---|---|---|
| M23 | 740 | No | NA | NA | T3 | T12 | 200 |
| M24 | 950 | No | NA | Osteotomies (3) | T3 | L2 | 200 |
| M25 | 300 | No | NA | NA | T4 | T12 | 100 |
| M26 | 330 | Yes | Potential drop in the left leg with normalization after traction decrease | intraoperative traction | C7 | L1 | 240 |
| M27 | 820 | No | NA | Proximal level translation | T4 | L3 | 200 |
| M28 | 590 | No | NA | NA | T11 | L4 | 150 |

Note: Specification of intraoperative bleeding, neurophysiological abnormalities, procedures performed, arthrodesis levels, and surgical time.
Source: Authors (2023).

presented some complication, including eight with nausea and vomiting, two with intense pain, one with moderate pain, two with metabolic acidosis, one with acidosis and urinary alterations (bladder globe), one with a sacral stasis ulcer, one required surgical debridement, one presented dyspnea on moderate exertion, and one presented functional obstruction, seizures, and hypokalemia.

### Pre- and Postoperative Radiographic Results

Regarding the radiographic data, the preoperative mean Cobb angles were 29.3 degrees (range, 0–68) for the upper thoracic curve, 3.6 degrees (range, 0–120) for the lower thoracic curve, 42.2 degrees (range, 16–79) for the lumbar curve, 36.6 degrees (range, 5 to 75) of thoracic kyphosis, and 55.6 degrees (range, 8–86) of lumbar lordosis (►**Table 4**).

In the immediate postoperative period, the average correction was 28% for the upper thoracic curve, 47% for the lower thoracic curve, and 50% for the lumbar curve (postoperative mean values of 21 degrees, 34.2 degrees, and 21.5 degrees, respectively).

Addressing non-idiopathic scoliosis separately, the correction percentage of the main curve was 28% in neuromuscular scoliosis and 30% in congenital scoliosis.

### Organizational and logistical results

The hospital structure included an outpatient clinic, a radiology department, 5 dedicated surgical rooms available for 4 days, and approximately 10 to 15 ICU beds for routine postoperative care. The surgical team included volunteer doctors and doctors from the hospital staff. The implants were donated, so we could not assess their costs with precision.

Although the surgeries occurred over 4 days in February 2021, the task force organization began in 2020 (►**Fig. 1**).

## Discussion

Most patients were female, including 24 (86%) of the 28 subjects. This data is consistent with another study with 169 patients, including 121 (71.6%) females.[7] Another study on the incidence of adolescent idiopathic scoliosis (AIS) in several countries noted that the prevalence and severity of scoliosis were higher in girls.[8]

The present study also found a higher prevalence of idiopathic scoliosis, accounting for 20 cases (71%). In the current literature, the overall prevalence of AIS ranges from 0.47 to 5.2%.[8] A review from Pereira and Gomes[9] mentions studies corroborating our results: in a sample of 358 subjects, 16 had AIS (prevalence, 4.8%);[10] in a sample of 3,105 subjects, 38 had AIS (prevalence, 5.3%);[11] among 418 subjects, 18 adolescents had AIS (prevalence, 4.3%);[12] among 2,562 adolescents, 37 had AIS (prevalence, 1.5%).[13] These data demonstrate that our study is consistent with the epidemiological literature.

Regarding postoperative complications, discomforts are frequent, including nausea and vomiting in the first hours after surgery due to oral refeeding or anesthesia, dyspnea, oliguria,[14] odynophagia, pain at the intravenous injection

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**Table 3** Postoperative outcomes

| Patient | Time to discharge | Right drain 1 output (mL) | Right drain 2 output (mL) | Right drain 3 output (mL) | Right drain 4 output (mL) | Transfused blood bags | Number | Hemoglobin, PO1 | Hemoglobin, PO3 | Infections | Infection description | Other complications | Complication description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M1 | 5 days | 225 | 175 | 150 | | Yes | 2 | 8.2 | 9.8 | No | | Yes | Nausea and vomiting |
| M2 | 12 days | 680 | 350 | | | Yes | 3 | 12.6 | 12.8 | No | | No | |
| M3 | 4 days | 300 | 200 | | | No | | 11.1 | 11.0 | No | | No | |
| M4 | 4 days | 370 | 250 | | | No | | 10.6 | 10.1 | No | | No | |
| M5 | 6 days | 317 | 150 | | | No | | 10.2 | 9.9 | No | | No | |
| M6 | 8 days | 454 | 300 | | | No | | 9.4 | 9.1 | No | | No | |
| M7 | 7 days | 144 | 180 | | | Yes | 2 | 8.2 | 10.2 | No | | Yes | Nausea and vomiting |
| M8 | 5 days | 300 | 150 | 86 | | No | | 9.0 | 8.1 | No | | Yes | Nausea and vomiting |
| M9 | 5 days | 480 | 200 | | | Yes | 2 | 8.1 | 12.2 | No | | Yes | Intense pain |
| M10 | 6 days | 290 | 278 | | | No | | 10.1 | 10.7 | No | | Yes | Dyspnea at moderate exertion |
| M11 | 6 days | 450 | 140 | | | Yes | 4 | 8.4 | 12.3 | No | | Yes | Nausea and vomiting |
| M12 | 18 days | 250 | 500 | 500 | | Yes | 3 | 7.5 | 9.3 | Yes | Surgical site infection with *Klebsiella pneumoniae* | Yes | Secretive surgical wound, debridement on Feb 12 |
| M13 | 7 days | 155 | 45 | | | No | | 9.7 | 8.1 | No | | Yes | Nausea and vomiting |
| M14 | 6 days | 300 | 188 | | | Yes | 1 | 8.5 | 10.7 | No | | Yes | Moderate pain |
| M15 | 5 days | 390 | 380 | 120 | | No | | 9.5 | 9.6 | No | | No | |
| M16 | 14 days | 630 | 450 | | | No | | 11.2 | 10.3 | Yes | UTI by *Enterobacter cloacae* | Yes | Sacral stasis ulcer |
| M17 | 5 days | 550 | 190 | | | Yes | 3 | 7.6 | 10.5 | No | | Yes | Metabolic acidosis |
| M18 | 5 days | 250 | 450 | 53 | | No | | 13.6 | 11.3 | No | | No | |
| M19 | 6 days | 500 | 150 | | | Yes | 1 | 9.7 | 11.0 | No | | Yes | Metabolic acidosis |
| M20 | 18 days | 370 | 500 | 115 | 280 | Yes | 2 | 9.1 | 9.4 | No | | Yes | Functional obstruction, seizures, hypokalemia. |
| M21 | 8 days | 400 | 344 | | | No | | 10.9 | 11.1 | No | | No | |
| M22 | 5 days | 725 | 400 | 118 | | No | | 9.0 | 8.4 | No | | Yes | Intense pain |
| M23 | 5 days | 400 | 200 | | | No | | 11.4 | 11.0 | No | | No | |
| M24 | 6 days | 303 | 100 | | | No | | 9.4 | 8.4 | No | | Yes | Bladder globe, metabolic acidosis |
| M25 | 4 days | 350 | 170 | 100 | | No | | 8.9 | 8.9 | No | | No | |
| M26 | 5 days | 358 | 180 | | | Yes | 2 | 8.0 | 11.2 | No | | No | |
| M27 | 5 days | 200 | | | | Yes | 2 | 8.0 | 10.9 | No | | Yes | Nausea and vomiting |
| M28 | 4 days | 220 | 200 | 60 | | No | | 10.3 | 10.4 | No | | No | |

Abbreviations: PO, postoperative day; UTI, urinary tract infection.
Note: Specification of postoperative variables and complications.
Source: Authors (2023).

**Table 4** Radiographic outcomes

| Patient | Preoperative proximal thoracic Cobb angle (degrees) | Preoperative distal thoracic Cobb angle (degrees) | Preoperative lumbar Cobb angle (degrees) | Preoperative kyphosis Cobb angle (degrees) | Preoperative lordosis Cobb angle (degrees) | Postoperative proximal thoracic Cobb angle (degrees) | Postoperative distal thoracic Cobb angle (degrees) | Postoperative lumbar Cobb angle (degrees) | Postoperative kyphosis Cobb angle (degrees) | Postoperative lordosis Cobb angle (degrees) |
|---|---|---|---|---|---|---|---|---|---|---|
| M1 | 22 | 49 | 35 | 43 | 60 | 20 | 29 | 21 | 2 | 36 |
| M2 | 50 | 86 | 36 | 17 | 46 | 34 | 61 | 25 | 4 | 56 |
| M3 | 0 | 0 | 55 | 38 | 66 | 0 | 0 | 50 | 38 | 46 |
| M4 | 35 | 72 | 38 | 16 | 58 | 16 | 23 | 9 | 27 | 47 |
| M5 | 30 | 48 | 36 | 27 | 57 | 3 | 27 | 31 | 20 | 50 |
| M6 | 33 | 106 | 55 | 47 | 50 | 22 | 29 | 34 | 36 | 45 |
| M7 | 49 | 83 | 44 | 58 | 86 | 38 | 44 | 25 | 49 | 68 |
| M8 | 15 | 36 | 45 | 5 | 30 | 24 | 33 | 16 | 13 | 34 |
| M9 | 68 | 120 | 20 | 75 | 56 | 20 | 56 | 0 | 40 | 52 |
| M10 | 27 | 56 | 68 | 5 | 48 | 5 | 23 | 48 | 33 | 45 |
| M11 | 66 | 103 | 40 | 41 | 55 | 56 | 54 | 21 | 15 | 49 |
| M12 | 0 | 50 | 79 | 5 | 8 | 0 | 26 | 23 | 19 | 33 |
| M13 | 49 | 78 | 43 | 28 | 57 | 35 | 44 | 20 | 39 | 55 |
| M14 | 9 | 54 | 40 | 18 | 65 | 15 | 25 | 7 | 32 | 20 |
| M15 | 16 | 49 | 48 | 38 | 71 | 15 | 37 | 31 | 30 | 52 |
| M16 | 12 | 22 | 50 | 28 | 72 | 20 | 14 | 34 | 28 | 80 |
| M17 | 30 | 97 | 37 | 70 | 45 | 27 | 65 | 25 | 50 | 50 |
| M18 | 40 | 74 | 47 | 56 | 58 | 33 | 54 | 27 | 41 | 36 |
| M19 | 30 | 94 | 38 | 58 | 53 | 35 | 38 | 17 | 38 | 40 |
| M20 | 6 | 36 | 47 | 36 | 52 | 6 | 10 | 20 | 40 | 50 |
| M21 | 45 | 101 | 16 | 62 | 68 | 40 | 78 | 2 | 3 | 45 |
| M22 | 51 | 89 | 44 | 70 | 76 | 28 | 53 | 21 | 55 | 55 |
| M23 | 23 | 60 | 34 | 25 | 43 | 26 | 30 | 26 | 28 | 35 |
| M24 | 43 | 57 | 30 | 42 | 56 | 29 | 35 | 16 | 38 | 50 |
| M25 | 19 | 40 | 20 | 10 | 71 | 5 | 0 | 0 | 12 | 60 |
| M26 | 45 | 87 | 31 | 65 | 57 | 37 | 48 | 10 | 33 | 24 |
| M27 | 6 | 0 | 40 | 23 | 48 | 0 | 0 | 16 | 40 | 40 |
| M28 | 2 | 34 | 66 | 19 | 45 | 0 | 24 | 27 | 30 | 37 |
|  | 29.32142857 | 63.60714286 | 42.21428571 | 36.60714286 | 55.60714286 | 21.03571429 | 34.28571429 | 21.5 | 29.75 | 46.55555556 |
| Percentage of curve correction |  |  | High thoracic: 28% | Low thoracic: 47% | Lumbar: 50% |  |  |  |  |  |

Note: Radiographic results calculated by the Cobb method pre and postoperatively.
Source: Authors (2023).

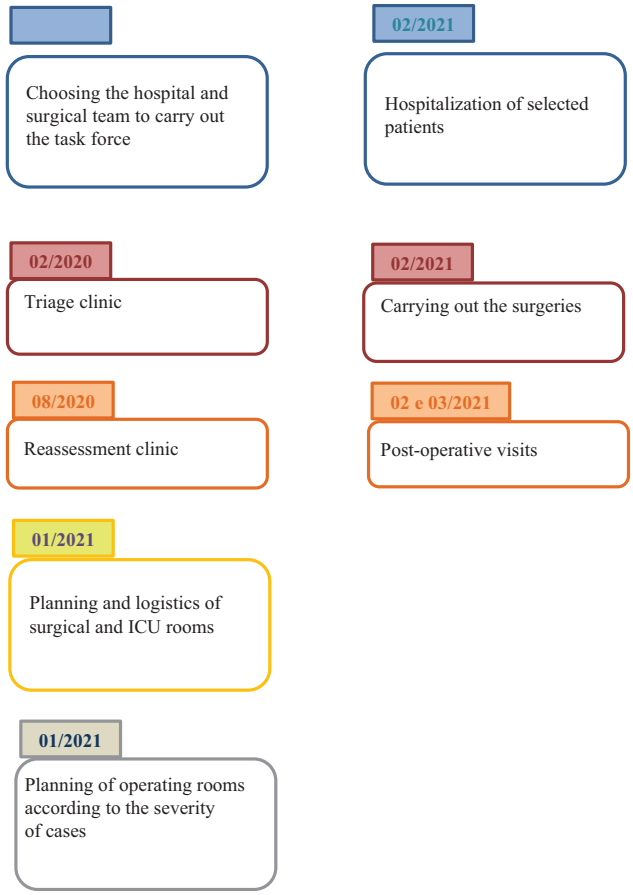


**Fig. 1** Task force schedule.

sites, insomnia, and constipation.[15,16] Eight patients presented nausea and vomiting, one had dyspnea with moderate exertion, and one had functional obstruction; these are common reactions in postoperative patients.

As for pain, a citation highlights that "[...] the surgical wound is not spontaneously painful after 48 hours of the surgical procedure"[14]. Therefore, it is critical to ascertain the pain level and perform the required procedures. Among the 28 patients, only 2 presented intense pain, while 1 had moderate pain, with no other complications.

Other more painful occurrences may occur in the postoperative period of surgical procedures in general, including bleeding, wound infection, venous thrombosis, respiratory failure, pulmonary thromboembolism, pulmonary atelectasis, and UTI.[15,16]

Other studies on postoperative infections in patients treated for spinal deformities report UTIs, sphincter control loss, contamination, wound infections, gastrointestinal disorders, and pulmonary complications[17] They also reported a higher infection risk in patients with neuromuscular scoliosis than those with AIS. In the present study, complications and infections were common in postoperative patients[18]

Sensitivity loss in the extremities may cause loss of bowel or bladder control, especially in patients with neuromuscular scoliosis.[18] The complications observed in patient M16 (with neuromuscular scoliosis) may be related to the scoliosis type as they could not walk and had a UTI and a sacral ulcer.

The most severe complication occurred in patient M12 (AIS), who developed a surgical wound infection, a complication also observed in other studies.[15–18] The treatment was surgical debridement mentioned as the usual therapy,[18] with surgical site irrigation. In the literature, the infection rate in surgery for AIS ranged from 0.9 to 3%, and, for neuromuscular scoliosis, it ranged from 4.2 to 20%. In our study, the prevalence of surgical wound infection was approximately 3.5% in the general analysis and 5% among idiopathic cases.

Regarding other complications, the data depends on the consulted databases, ranging from 5 to 23% in AIS. More recent data from the SRS database, from 2011, cited a complication rate of 6.3% for all cases of idiopathic scoliosis (IS). In our study, 16 patients (57%) presented complications; those associated with the specific type of surgery affected 6 out of the 28 patients, that is, a prevalence rate of 21%, with only one major complication (which led to reoperation), a surgical site infection.

Since the complication and infection rates are consistent with the literature, the short time of surgery has no relationship with complications.

Radiographically, the overall average correction was 28% for the high thoracic curve, 47% for the low thoracic curve, and 50% for the lumbar curve (postoperative averages of 21 degrees, 34.2 degrees, and 21.5 degrees, respectively). After stratification by non-idiopathic etiologies, the main curve correction was 28% in neuromuscular scoliosis and 30% in congenital scoliosis. In a study[19] analyzing several postoperative outcomes, an article published in 1973, with 71 participants using Harrington rods, Risser plaster, and early ambulation, reported a mean preoperative curve of 56°, with 54% correction on the day of surgery and 46% correction at follow-up. In 1989, a study with 352 patients undergoing posterior spinal fusion reported a mean preoperative curve of 54° and a mean correction of preoperative active supine tilt of 48%. The average correction at surgery was 52% and 40% at the 2-year follow-up[19]

In 2004, a comparative study of 4 different instrumentations (double rod, multi-hook systems) involving 127 patients and using the C-D Horizon, Moss-Miami, TSRH, and Isola systems showed an average correction of 63% for the C-D Horizon and Moss-Miami and 58% for the TSRH and Isola.[19]

The curve correction over the years remained similar, and the values achieved in our study are consistent with the literature. As such, although the curve correction was not complete, the outcomes were satisfactory.[19] ►**Figs. 2–5** visually demonstrate the correction level achieved in some patients.

Regarding logistics, we had some difficulties during the task force, but no similar studies addressed them. In the preoperative period, we faced challenges in publicizing the triage clinic and contacting several patients. In addition, we needed to train radiology technicians to perform spinal panoramic radiographs in orthostasis. We also required large

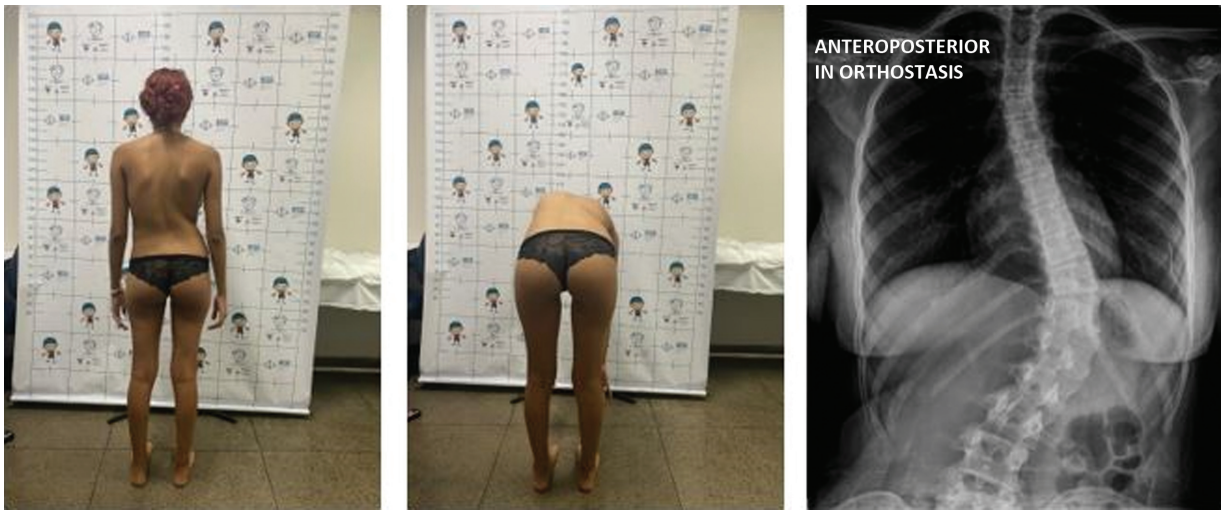


**Fig. 2** Preoperative image of patient M21. Source: Authors (2023).

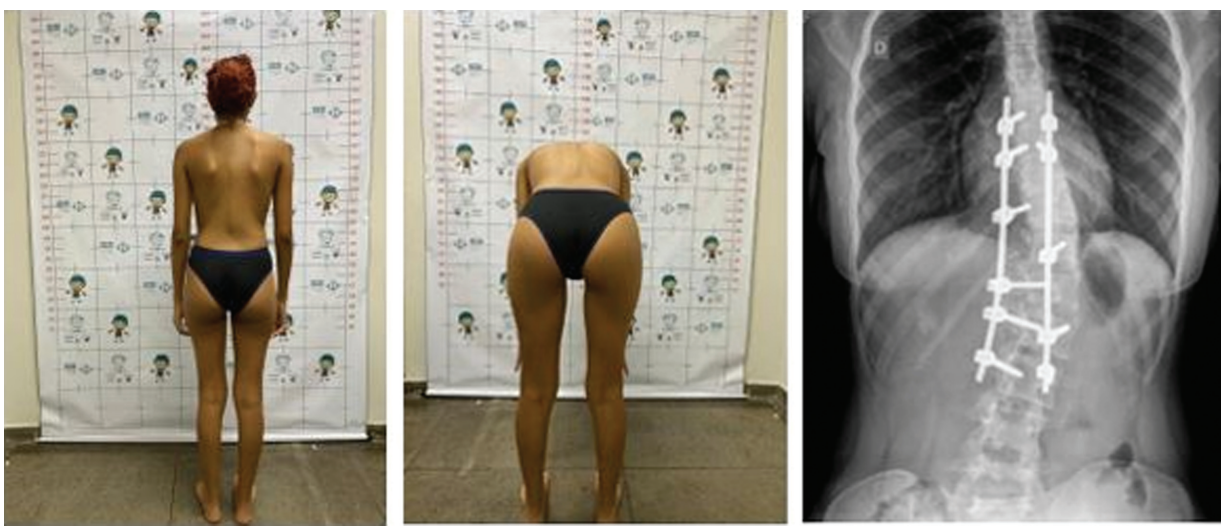

**Fig. 3** Postoperative outcomes in patient M1. Source: Authors (2023).




**Fig. 4** Preoperative image of patient M16. Source: Authors (2023).



**Fig. 5** Postoperative outcomes in patient M16. Source: Authors (2023).

treatment rooms to take photographs and clinically evaluate the patients in the triage clinic. For the preoperative evaluation, we needed an anesthesiology clinic to assess and prepare patients for the procedure.

The logistical difficulties during surgery included gathering staff and resources for the stipulated task force time. The task force required a team of professionals from various areas of expertise and different Brazilian states with experience in scoliosis surgery and availability.

In the postoperative period, the challenges included ICU room availability. We required approximately 10 to 15 beds at the same time because sometimes more severe patients could not be discharged from the ICU on the first postoperative day. In addition, we needed nursing and physical therapy teams trained in scoliosis treatment procedures to maintain drains, change dressings, or ensure early ambulation.

The literature about surgical task forces[5,7] for correcting scoliosis curves provided no data on logistical difficulties or reported complications potentially warranted by these joint efforts. However, some news reports provided data on task forces and highlighted critical points.

The Regional Medical Council of the State of Bahia (CREMEB, for its acronym in Portuguese),[20] in 2018, warned about some issues in task forces, including problems resulting from the scenarios in which these surgeries occur and complication risks from surgical procedures, especially because of the potential lack of qualified personnel for intraoperative and postoperative monitoring.

Despite the news reports on complications in task forces, none deals with scoliosis surgery, and the cases with problems are low compared to the number of benefited people.

In December 2022, Centro Estadual de Reabilitação e Readaptação Dr. Henrique Santillo (CRER), a rehabilitation center from the Health Department of Goiás, Brazil, performed elective scoliosis surgeries in patients on the SUS list. Twenty patients underwent treatment; some had been on the waiting list for about 5 years, and the surgery improved their quality of life.[21]

In Pernambuco, Brazil, the traumatology and orthopedics team at Hospital Otávio de Freitas performed a surgical series for scoliosis treatment in 18 patients to minimize the SUS waiting list. This team did 4 procedures per day in 3 dedicated surgical rooms and used 16 beds from the adult and pediatric wards, trauma surgical center, ICU, and recovery room.[22]

In our study, the average age at diagnosis was 10.2 years, and surgery occurred at 15.1 years old, with a waiting time for the procedure of 4.7 years. In Brazil, a study[23] with 51 patients, all diagnosed from ages 10 to 17 years old, and the average waiting time for surgery was 25.41 months (ranging from 2–180 months). However, some patients waited for the surgery for up to 15 years. This waiting time can compromise the patient's quality of life, self-image, satisfaction, and functionality.[24]

We did not analyze the quality of life or personal satisfaction questionnaires because of logistical issues.

## Conclusion

Despite the difficulties in organizing similar actions and some complications, it seems feasible to encourage the multiplication of these task forces in more hospitals due to the high number of patients on waiting lists for scoliosis surgery. However, it is fundamental to emphasize the need for more actions using this model to assess accurately its safety and applicability, especially in severe and non-idiopathic cases.

Financial Support
The authors declare that they did not receive financial support from agencies in the public, private, or non-profit sectors to conduct the present study.

Conflict of Interests
The authors have no conflict of interests to declare.

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