Difficulties in the Initial Management of Spinal Trauma: A Survey of On-Call Trauma Surgeons in Argentina

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ABSTRACT

Introduction: This study aims to assess the difficulties encountered during the initial management of patients with spinal trauma, based on the experiences of on-call trauma surgeons in Argentina. **Materials and Methods:** We conducted a cross-sectional observational study of traumatologists working in emergency departments across Argentina. The objective was to identify challenges in the initial management of spinal trauma as perceived by these professionals. Data were collected using an online questionnaire distributed between March 1 and May 1, 2024. **Results:** A total of 261 professionals responded, the majority of whom were male (n = 210; 80.5%), with a mean age of 39.3 years (SD = 8.4; range: 26–68 years). Of the respondents, 67.4% were board-certified specialists. Responses were received from 22 of Argentina's 23 provinces, with the majority coming from the province of Buenos Aires (n = 171; 65.5%), particularly the metropolitan area (n = 134; 51.3%). Over 70% of respondents reported encountering difficulties in various aspects of managing patients with spinal trauma. **Conclusions:** The experience reported by traumatologists working in emergency departments throughout Argentina reveals that more than 70% face significant and recurrent challenges in the care of patients with spinal trauma. Most respondents reported multiple difficulties, particularly regarding initial assessment, diagnostic evaluation, treatment, and timely referral.

Keywords: Spinal trauma; traumatologist; emergency care; challenges; spine.
Level of Evidence: IV

Dificultades en la atención inicial del paciente con trauma vertebromedular: encuesta a traumatólogos de Guardia de la Argentina

RESUMEN

Introducción: Nuestro objetivo es estimar las dificultades en la atención inicial del paciente con trauma vertebromedular según la experiencia de médicos traumatólogos de la Argentina. **Materiales y Métodos:** Se realizó un estudio observacional y transversal de médicos que se desempeñan en Guardias de Ortopedia y Traumatología de la Argentina, con el fin de estimar las dificultades en la atención inicial del trauma vertebromedular, según su experiencia. Los médicos fueron evaluados mediante un cuestionario digital entre el 1 de marzo y el 1 de mayo de 2024. **Resultados:** Se obtuvo una muestra de 261 médicos, en la que predominaron los hombres (n = 210; 80,5%), la edad promedio fue de 39.3 años (DE = 8.4; rango 26-68), el 67,4% eran médicos especialistas certificados. Se recibieron respuestas de médicos de 22 de las 23 provincias de la Argentina. Predominaron las respuestas de la provincia de Buenos Aires (n = 171; 65,5%), en especial, del área metropolitana (n = 134; 51,3%). Más del 70% de la muestra experimentó dificultades con la atención de este grupo de pacientes en diferentes áreas. **Conclusiones:** La experiencia docu-

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mentada de traumatólogos que se desempeñan en Guardias de Ortopedia y Traumatología de la Argentina describe dificultades frecuentes en la atención del trauma vertebromedular en más del 70% de los médicos encuestados, quienes, en su mayoría, manifestaron individualmente tener múltiples dificultades relacionadas con la atención inicial, la evaluación diagnóstica, el tratamiento y la derivación oportuna.
Palabras clave: Trauma vertebromedular; traumatólogo; guardia; dificultades; columna vertebral.
Nivel de Evidencia: IV

INTRODUCTION

Spinal trauma (ST) is a sudden and critical event that can disrupt neuraxial function and threaten the physical, psychological, and social well-being of the patient.[1-3] The global incidence of traumatic spinal injury is variable, and there are no formal records in our country or in Latin America.[4,5] In the United States, the annual incidence is 54 cases per million inhabitants.[6,7] Motor vehicle accidents and falls from height are the two most common causes, followed by violent incidents such as gunshot wounds and sports or recreational activities.[7]

International guidelines recommend early decompression and stabilization within the first 24 hours after ST. Our actions are guided by the principle that "time is spine."[8] However, applying these clinical guideline recommendations is a complex process that depends on each region's resources and the organization of its healthcare system.

Trauma physicians play a key role in the interdisciplinary team responsible for the initial care of patients with ST in emergency departments.[9] ST is an essential component of the clinical expertise required in our training.[10] We are involved in both diagnostic evaluation and treatment, including initial and definitive management.

The aim of this study was to assess the difficulties encountered in the initial care of patients with ST, based on the experiences of trauma physicians in Argentina.

MATERIALS AND METHODS

An observational, cross-sectional study was conducted among physicians working in Orthopedics and Traumatology Emergency Departments across Argentina to estimate the challenges encountered during the initial care of patients with ST. Physicians were surveyed using a digital questionnaire administered between March 1 and May 1, 2024.

A non-probabilistic sample was obtained using a snowball sampling method. The questionnaire was initially distributed via email and messaging applications to members of the Argentine Association of Orthopedics and Traumatology (AAOT) and the Argentine Society of Spine Pathology (SAPCV).

A desired sample size of 362 participants was calculated from a finite population of 6,136 AAOT member traumatologists, using a 95% confidence interval and a 5% margin of error.

Inclusion criteria were physicians of any sex and age working in Orthopedics and Traumatology Emergency Departments in Argentina, including certified specialists and those in training (residents, fellows, or concurrent physicians). Blank or incomplete questionnaires (defined as those with fewer than 50% of responses completed) were excluded.

The primary outcome measure was the identification of difficulties in the care of patients with acute traumatic spinal injury, defined as patients with a presumptive or confirmed diagnosis (clinical and imaging correlation) of acute traumatic spinal cord injury, with or without associated vertebral fractures.

Acute spinal cord injury is defined as sudden-onset damage or trauma to the spinal cord, resulting in loss of tissue integrity and potentially leading to functional impairment, reduced mobility, or sensory deficits.[11,12] A "difficulty" was defined as any abnormal situation that creates a barrier or obstacle to the timely diagnosis and treatment of such patients.

A self-administered digital questionnaire was developed using Google Forms. The content was generated through interactive consensus among the research group members, who are experienced ST specialists and members of various scientific societies and institutions. Relevant clinical practice guidelines were used as reference documents during the design of the survey.[11,12] A pre-test was conducted to assess item clarity and response rate.

The questionnaire was divided into six sections: A) Sociodemographic variables; B) Initial care; C) Imaging studies; D) Treatment; E) Referral; F) Human resources training. The questionnaire included closed and semi-closed questions. Questions aimed at measuring frequency used Likert-type scales to assess the respondents' level of agreement or disagreement. The survey is available at: https://drive.google.com/file/d/1P2V_Tqa9PL-rqUJ6NXyMYosSj43rrw6h/view?usp=sharing

This study was conducted in accordance with the principles of the Declaration of Helsinki, ensuring the anonymity and confidentiality of data. All participants gave their consent to complete the questionnaire.

RESULTS

A total of 313 questionnaires were received. Of these, 48 were from physicians not working on call, and 2 were from foreign respondents; all were excluded. Additionally, 2 blank questionnaires were discarded, resulting in a 99% response rate. The final sample consisted of 261 physicians, predominantly male [male sex: 210 (80.5%), female sex: 48 (18.4%), prefer not to answer: 3 (1.1%)], with a mean age of 39.3 years (SD = 8.4; range 26–68). A total of 176 participants (67.4%) were certified specialist physicians. Respondents represented 22 of the 23 provinces of Argentina (Figure 1).

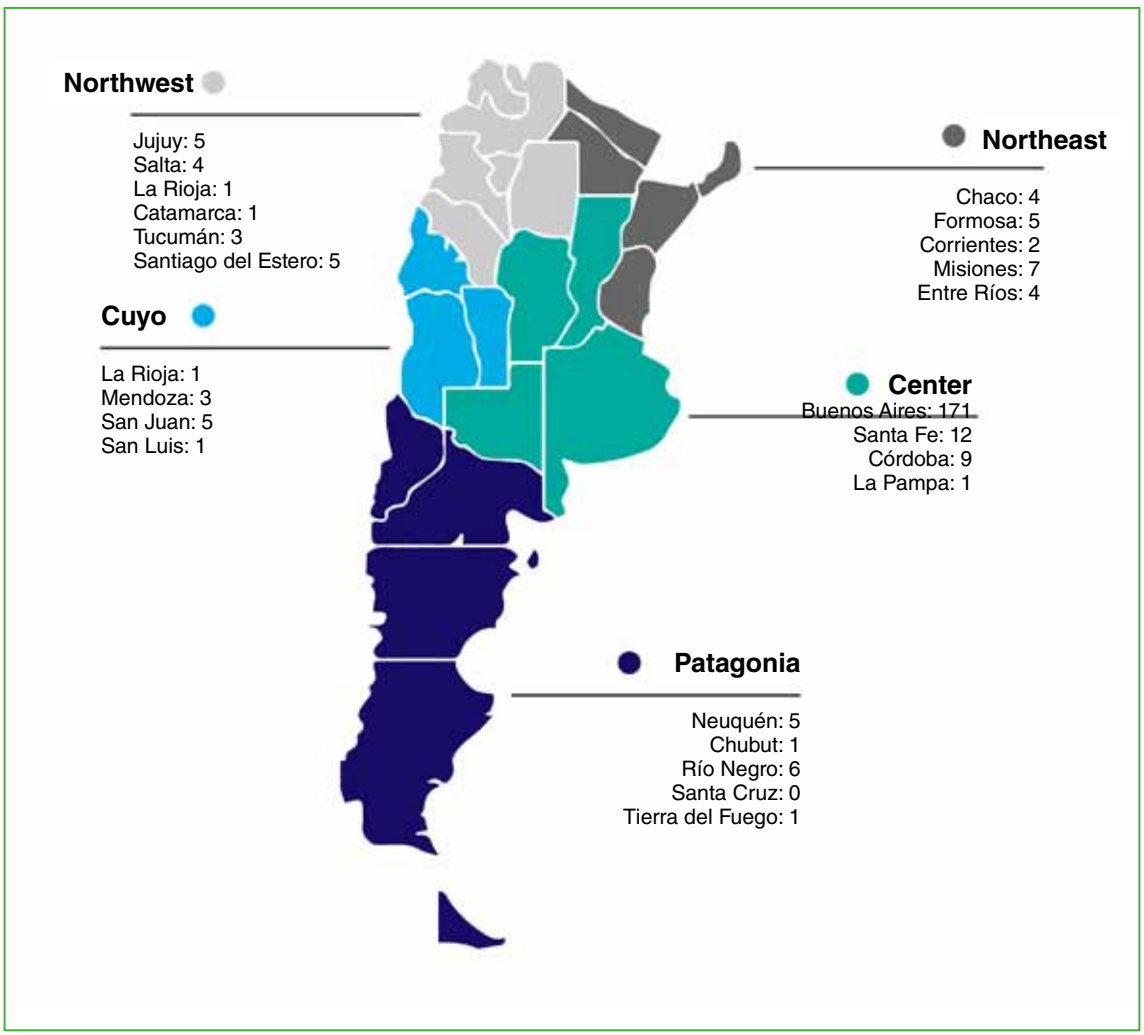

Figure 1. Distribution of respondents by region and province in Argentina (n = 261; missing data, n = 5).

Responses from the Province of Buenos Aires (n = 171; 65.5%) and its metropolitan area (n = 134; 51.3%) predominated. Sociodemographic characteristics are presented in Tables 1 and 2.

Table 1. Characteristics of the sample.

Variable	Results (n= 262)	
Age; mean (SD; range)	39.3	(8.4; 26-68)
Sex; n (%)		
Male	210	(80.5)
Female	48	(18.4)
Prefer not to say	3	(1.1)
Position; n (%)		
Specialist	176	(67.4)
Resident	80	(30.7)
Other	5	(1.9)
Experience; n (%)		
0 to 5 years	140	(54.7)
5 to 10 years	42	(16.4)
10 to 20 years	44	(17.2)
>20 years	30	(11.7)
Type of institution; n (%)		
Public	197	(75.5)
Private	64	(24.5)
On-call hours; n (%)		
12 hours	39	(15.0)
24 hours	221	(85.0)
On-call day; n (%)		
Monday-Friday	154	(59.0)
Saturday-Sunday	107	(41.0)
Frequency ST/year; n (%)		
<10 cases	157	(60.4)
10 to 30 cases	77	(29.6)
30 to 50 cases	17	(6.5)
>50 cases	9	(3.5%)

SD = standard deviation; ST/year = spinal trauma cases per year.

Table 2. Comparison between traumatologists according to difficulties in the care of patients with spinal trauma in the Metropolitan Area of Buenos Aires.

Variables		Difficulties in the care of patients with ST			
		No (n= 35)		Yes (n =99)	
Age; mean (SD)		39,7	(9.7)	38.8	(7.7)
Sex; n (%)	Male	32	(91.4)	79	(79.8)
	Female	3	(8.6)	18	(18.2)
	Prefer not to say	0	(0.0)	2	(2.0)
Position; n (%)	Specialist	24	(68.6)	62	(62.6)
	Resident	11	(31.4)	33	(33.3)
	Other	0	(0.0)	4	(4.0)
Years of experience; n (%)	0-5 years	20	(58.8)	58	(59.8)
	5-10 years	5	(14.7)	15	(15.5)
	10-20 years	3	(8.8)	15	(15.5)
	>20 years	6	(17.6)	9	(9.3)
Type of institution; n (%)	Public	22	(62.9)	79	(79.8)
	Private	13	(37.1)	20	(20.2)
City; n (%)	CABA	26	(74.3)	64	(64.6)
	AMBA	9	(25.7)	35	(35.4)
ST/year; n (%)	<10 cases/year	21	(60.0)	56	(56.6)
	>10 cases/year	14	(40.0)	43	(43.4)
Surgical delay <24 h; n (%)		13	(37.1)	15	(15.1)

SD= standard deviation; ST/year = spinal trauma cases per year; CABA = Autonomous City of Buenos Aires; AMBA = Buenos Aires Metropolitan Area.

Difficulties in the Care of Patients with ST

A total of 72.4% (n = 189) of surveyed physicians reported difficulties in the care of patients with ST. Among them, more than 80% (n = 152) cited multiple difficulties. Specific challenges were most frequently related to imaging evaluation (n = 130; 49.8%), followed by definitive treatment (n = 118; 45.2%), patient referral (n = 93; 35.6%), initial care (n = 87; 33.3%), and human resource training (n = 87; 33.3%) (Figure 2).

Initial Care

The initial care of patients with ST is guided by on-call trauma physicians in the majority of surveyed institutions (n = 165; 63.2%). Fewer than 5% of respondents indicated that emergency medicine physicians (n = 5; 1.9%) or on-call general clinicians (n = 6; 2.3%) are responsible for the care of these patients in their institutions (Figure 3).

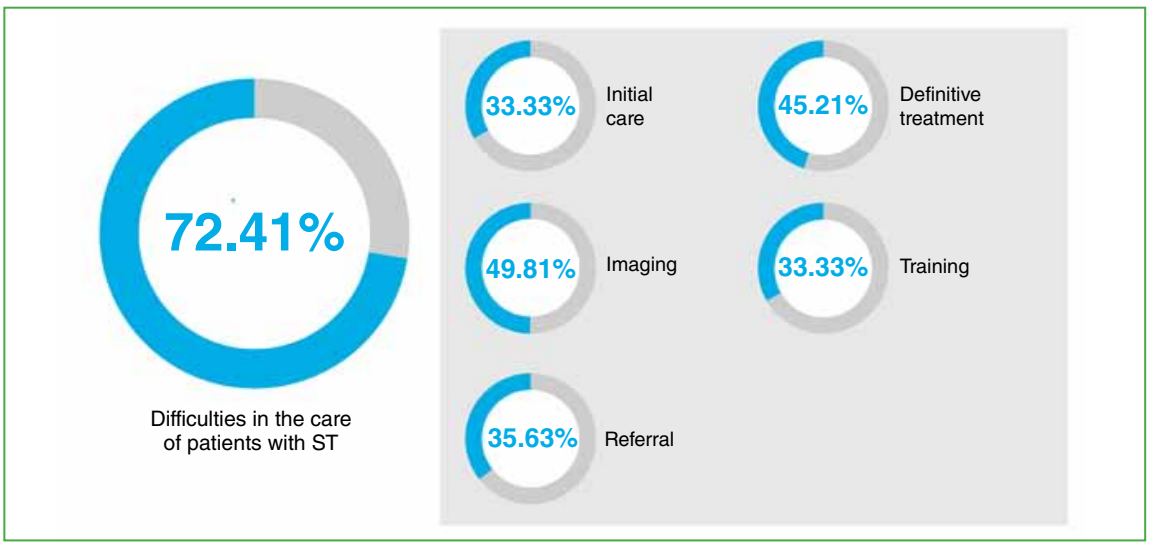

Figure 2. Pie charts showing the distribution of difficulties in the initial care of patients with spinal trauma. Specific types of difficulties are detailed in the gray box.

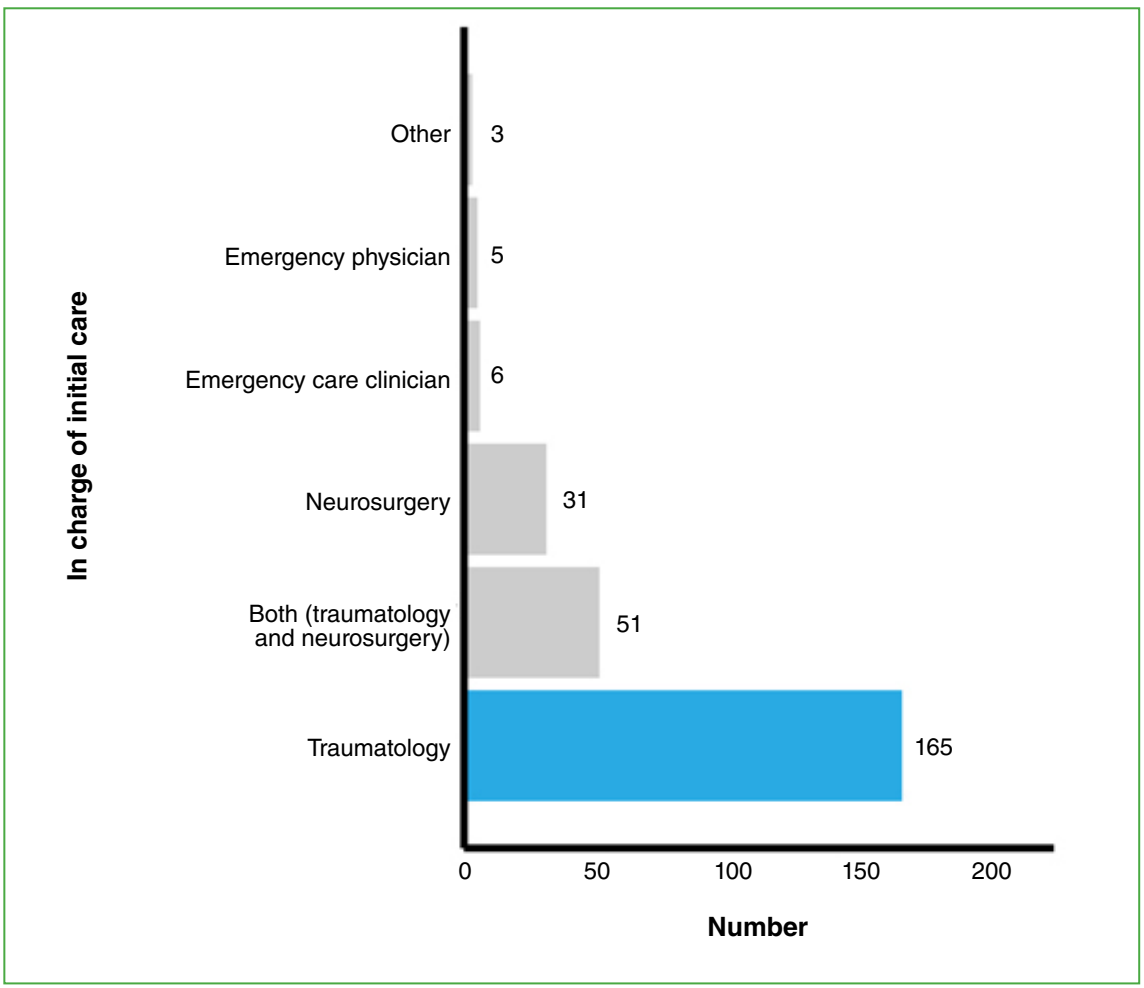

Figure 3. Bar graph illustrating the distribution of medical specialties responsible for guiding the care of patients with spinal trauma.

Most respondents work in institutions with an active spine team (n = 173; 63.3%), allowing for effective interconsultation during on-call shifts (n = 151; 87%). Interconsultation within 12 hours was significantly more frequent among physicians working in institutions with an internal spine team compared to those relying on external consultants [delay < 12 h with institutional spine team: n = 138 (80%); delay < 12 h with extra-institutional spine team: n = 42 (48%); $p < 0.001$].

A total of 54.8% (n = 143) reported that their institutions do not have a formal protocol for the management of ST patients in the emergency department. However, 59.4% (n = 155) indicated that they use classification systems to document these cases. The American Spinal Injury Association (ASIA) Impairment Scale was the most commonly used classification tool (n = 164; 62.8%), followed by the AOSpine classification system (n = 115; 44.1%).

Imaging Studies

More than 90% of respondents reported the availability of radiographs (n = 259; 99.6%; missing data = 1) and computed tomography (CT) (n = 239; 91.6%) at their institutions. In contrast, only 36% (n = 96) indicated access to magnetic resonance imaging (MRI). Most reported challenges related to the quality of radiographs (n = 185; 70.9%), incomplete imaging (n = 129; 49.4%), suboptimal technique (n = 129; 49.4%), and delays in obtaining timely radiographs in the shock room setting (n = 111; 42.5%). Nearly 90% of respondents reported that a spinal CT scan was obtained within 6 hours of admission, whereas fewer than one-third reported obtaining spinal MRI within the same timeframe (Figure 4).

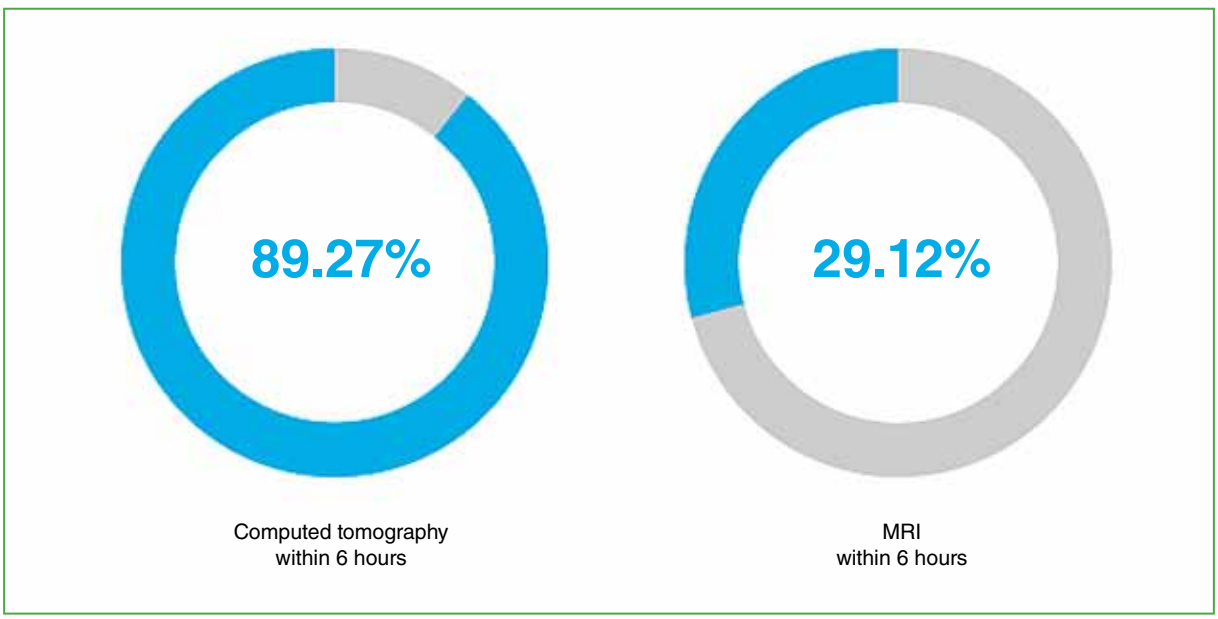

Figure 4. Pie chart: access to CT and MRI within 6 hours of patient admission.

Treatment

According to respondents, patients with ST are admitted directly to the intensive care unit (ICU) (n = 127; 48.7%) or to the emergency area of the general ward (n = 86; 33%). Approximately half reported experiencing difficulties with patient admission at least occasionally (cumulative percentage of the categories Occasionally/Frequently/Very frequently: 47.4%; n = 123), and similar difficulties were noted for initial clinical management (cumulative percentage of the categories Occasionally/Frequently/Very frequently: 61.6%; n = 161). A total of 51.3% (n = 134) reported administering methylprednisolone to patients with neurological injury, and more than 50% reported frequent or very frequent issues with its availability in the emergency department (cumulative percentage of the categories Frequently/Very frequently: 53.6%; n = 140).

Eighty-one percent of respondents included cervical traction in their therapeutic algorithm; however, only 32.6% (n = 85) reported having the necessary equipment to perform it in the Emergency Department. Most respondents indicated that definitive treatment is provided at their own institution (n = 190; 72.8%) and is carried out either exclusively by traumatology (n = 105; 40.2%) or in collaboration with neurosurgery (n = 61; 23.4%). Only 18.8% (n = 49) reported neurosurgery as the primary specialty responsible for managing spinal trauma (ST). The majority reported a typical delay of more than 24 hours from admission to spinal decompression and stabilization (n = 206; 78.9%). Additionally, 12% (n = 32) considered laminectomy without instrumentation as part of their management strategy (Figure 5).

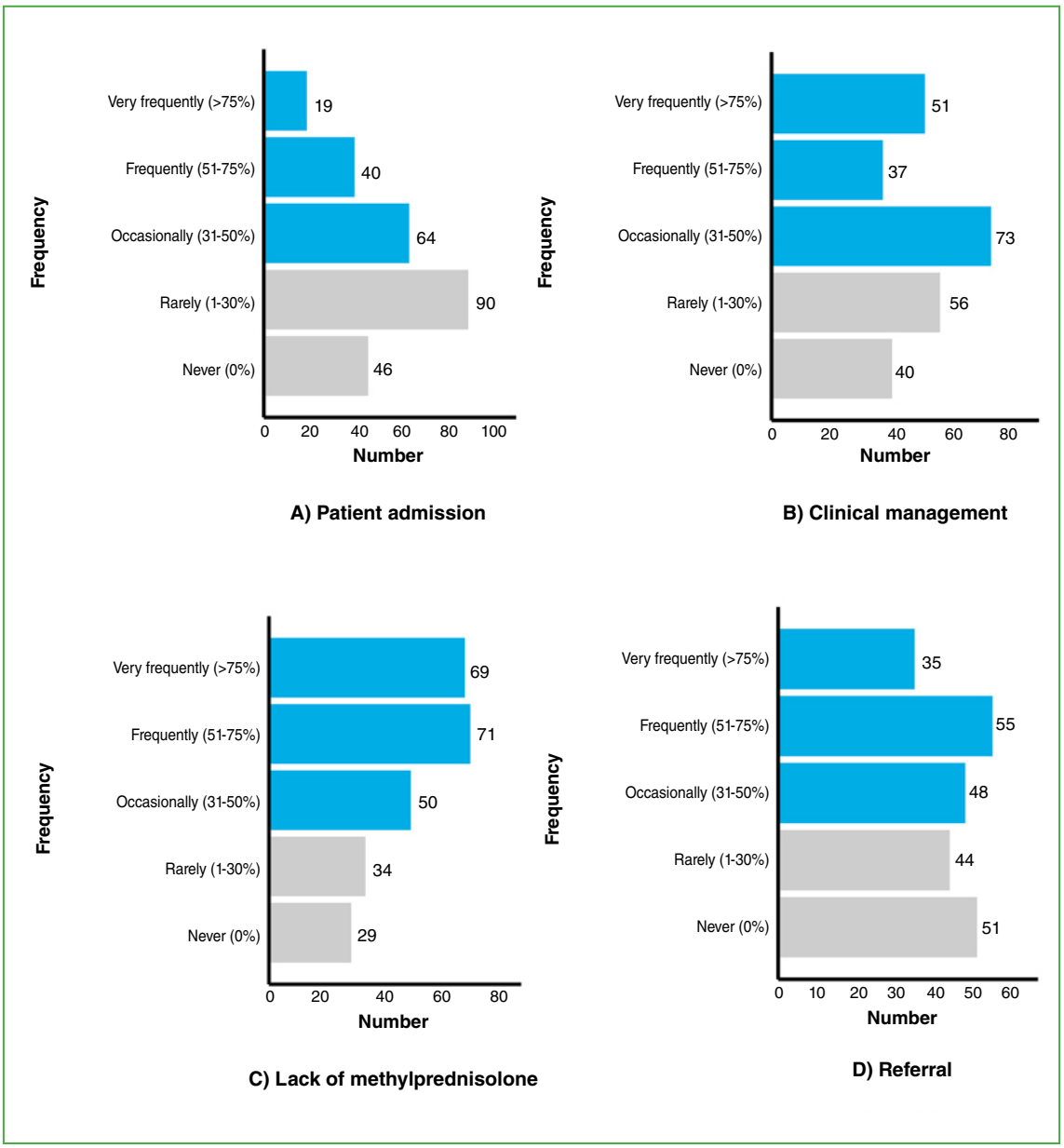

Figure 5. Bar graphs: A) Frequency of reported difficulties upon admission of patients with spinal trauma B) Frequency of reported difficulties upon initial clinical management C) Frequency of reported difficulties regarding vailability of methylprednisolone in the ward D) Frequency of reported difficulties regarding patient referral.

Referral

More than 50% of traumatologists reported experiencing difficulties with patient referral at least occasionally (cumulative percentage for the categories Occasionally/Frequently/Very frequently: 52.8%; n = 138). According to 46.7% (n = 122), the usual referral delay was greater than 12 hours, and according to 30% (n = 78), it exceeded 24 hours. The most commonly reported barriers were issues related to the patient's type of medical coverage (n = 138; 52.9%) and transfer delays (n = 114; 43.7%), followed by poor communication with the receiving center (n = 87; 33.3%), delays in obtaining imaging (n = 32; 12.3%), and other causes (n = 2; 0.8%) (Figure 5).

Training and Quality of Training During Residency

When assessing the perceived level of training of the on-call physicians included in the survey, the categories grouped as "Moderately" or "Highly" trained accounted for 67.4% (n = 115).

Finally, regarding training in spinal trauma (ST) care during residency, only 25% of respondents rated its quality as "incomplete" or "very incomplete" (n = 66; 25.3%).

Comparison Between Traumatologists According to Difficulties in the Care of Patients With ST

This comparison was conducted exclusively among traumatologists from the Buenos Aires Metropolitan Area, who comprised 51.3% (n = 134) of the respondents, in order to avoid bias from underrepresented cities or provinces.

When comparing the characteristics of surveyed physicians in relation to difficulties encountered in the care of ST patients, the variables "type of institution (private vs. public)" and "surgical delay <24 h" showed statistically significant differences. A higher proportion of private institutions (37% vs. 20%; p = 0.046) and a greater frequency of early surgical intervention (37% vs. 15%; p = 0.003) were observed among traumatologists who reported no difficulties in the care of ST patients (Table 2).

DISCUSSION

In recent decades, multiple efforts and scientific advances have been made to optimize the initial care and limit the sequelae in patients with spinal trauma (ST).[11] Early surgical decompression and adequate hemodynamic management play a crucial role in improving outcomes.[11,12] The growing body of available evidence has led to an increase in both the level of evidence (from low to moderate) and the strength of recommendation (now strong) in support of surgical decompression within the first 24 hours following injury.[12] However, the effective implementation of clinical guideline recommendations faces "real-life" challenges, where the gap between the ideal and the possible varies geographically.[11,13-17]

Our study describes a cross-sectional cohort of physicians working in emergency departments across the country. More than 70% of the sample reported difficulties in the care of this patient group across various domains.

There is general consensus that patients with acute ST should be admitted to the intensive care unit (ICU), or at least to an area where continuous hemodynamic monitoring is possible.[18] In our survey, most physicians reported that patients with ST are admitted directly to the ICU (n = 127; 48.7%) or to the emergency area of the ward (n = 86; 33%). Approximately half of the respondents reported challenges related to patient admission and initial clinical management. Notably, fewer than 5% indicated that emergency medicine physicians (n = 5; 1.9%) or on-call clinicians (n = 6; 2.3%) are in charge of guiding care for ST patients.

Our cohort reported relatively easy access to radiography and computed tomography. However, over 70% noted difficulties in radiographic evaluation due to incomplete studies or suboptimal technique. Importantly, most surgeons indicated that their institutions lack access to magnetic resonance imaging (MRI), and only one-third reported access to spinal MRI within 6 hours.

Previous studies have assessed surgical delays in spinal trauma patients in our region. Guiroy et al. retrospectively evaluated time to surgery in patients with unstable thoracolumbar fractures and found that more than half of the cases experienced delays exceeding 72 hours, and in approximately one-quarter, surgery was delayed more than a week.[17] The main reasons for surgical delay reported in previous studies were clinical instability and lack of financial resources. In our study, only 21% of traumatologists indicated that spine decompression and stabilization procedures are usually performed within the first 24 hours at their institutions. Notably, when comparing physicians from the Buenos Aires Metropolitan Area based on reported difficulties in ST patient care, the variable "type of institution" showed statistically significant differences, with a higher proportion of traumatologists from private institutions in the group that reported no difficulties.

Additional factors associated with limited resources for the initial management of ST patients were also documented. These include the availability of skeletal traction equipment, the presence of methylprednisolone in the emergency department, delays in transfers for referral, and limited or delayed access to a specialized spine team.

The timely referral of ST patients to centers with adequate infrastructure and specialized personnel is essential.[11,12] However, 46.7% of respondents reported referral delays greater than 12 hours. For those working in institutions without an active spine team, this delay is compounded by the time required for external consultations. The complexity of our healthcare system undermines the promptness that this condition demands. Contributing factors include heterogeneous insurance coverage, delays in patient transfers, and prolonged intervals from injury to definitive diagnosis using appropriate imaging modalities—all of which were cited as challenges by the surveyed orthopedic surgeons.

This study has several limitations, such as its cross-sectional design, potential recall bias among respondents, and underrepresentation of some provinces. Nevertheless, the findings provide valuable local insight and highlight a critical issue due to its clinical relevance and associated morbidity and mortality in our specialty. These results may serve as a foundation for the future development of local protocols aimed at aligning with the recommendations of international guidelines and current scientific evidence.

CONCLUSIONS

The experience reported by orthopedic surgeons in Argentina reveals that more than 70% face frequent challenges in the care of patients with spinal trauma (ST). These difficulties span across initial clinical management, diagnostic evaluation, treatment, and timely referral.

There is a clear need for prospective, multicenter studies at the national level to establish a reliable registry that reflects our current clinical reality. Such data are essential to inform decision-making and guide the development of strategies aimed at improving the effectiveness and timeliness of spinal trauma care in Argentina.

Conflict of interest: The authors declare no conflicts of interest.

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