Cogitare Enfermagem

ORIGINAL ARTICLE

RESTRICTED MOVEMENT OF THE SPINE: AN ANALYSIS OF THE KNOWLEDGE OF NURSING PROFESSIONALS

HIGHLIGHTS

1. The current evidence on SMR is poorly understood.
2. There was a lack of standardization in how the victims were treated.
3. The transition of care proved necessary between services.
4. The importance of updating technical and scientific knowledge is highlighted.

Gabriela Brigolini[1]
Rosane Mortari Ciconet[1]

ABSTRACT

Objective: To analyze nursing professionals' knowledge about restricting spinal movement in trauma victims and describe their decision-making. **Method:** An exploratory, descriptive, qualitative-quantitative study. A semi-structured interview was conducted with 27 nursing professionals from hospital and pre-hospital emergency services in São Leopoldo, Brazil, in March 2022. The data was analyzed using descriptive statistics and content analysis. **Results:** 48% of the professionals knew the current recommendations; most worked in pre-hospital care. Cervicalgia/lumbago was the predominant indication. In the category "decision making and the transition of care", a lack of standardization in in-hospital conduct was identified, emphasizing the importance of sequence in care and trust between professionals. **Final considerations:** It was found that in-hospital teams had little knowledge of the current evidence, a lack of standardization in procedures, and difficulties in the transition of care between services.

DESCRIPTORS: Nursing; Knowledge; Immobilization; Spinal manipulation; Hospital Emergency Service.

HOW TO REFERENCE THIS ARTICLE:
Brigolini G, Ciconet RM. Restricted movement of the spine: an analysis of the knowledge of nursing professionals. Cogitare Enferm. [Internet]. 2023 [cited in "insert year, month, day"]; 28. Available in: https://dx.doi.org/10.1590/ce.v28i0.92395.

[1]Universidade do Vale do Rio dos Sinos, Graduação em Enfermagem, São Leopoldo, RS, Brasil.

INTRODUCTION

Spinal motion restriction (SMR) in trauma consists of keeping the victim's spine in a neutral position and minimizing the range of movement to reduce the likelihood of injury or cause a secondary injury. This technique must be carried out at the event scene and traditionally involves using a rigid board, cervical collar, head immobilizers, and straps[1].

RMC aims to reduce the risk of neurological deterioration or injury complications during the patient's transportation to the hospital. However, restraint techniques are being reviewed; as studies have shown that not all trauma victims need the same management, and if used improperly, they can lead to complications[2-3].

A study in Brazil concluded that the mechanisms that most often lead to spinal injuries are falls from a height and car accidents. As for the region of the spine most affected, the cervical region stands out[4].

In emergency departments in the United States of America (USA), an average of one million patients are assessed annually for spinal injuries. However, only 2% to 3% of these have a lesion. Despite this, the study points out that emergency professionals report feeling insecure when they choose not to treat an injury that could later lead to a disability[3].

The *National Emergency X-Radiography Utilization Study* (NEXUS) and the *Canadian C-Spine Rule Study* (CCR) are the protocols used in the area of spinal movement restriction, showing a sensitivity of 99.4% and 90.7% and specificity of 45.1% and 36.8%, respectively. Both methods provide various criteria for clinical evaluation and their indications and can reliably delineate which patients are candidates for imaging exams to rule out cervical lesions[5-6].

The authors point out that nursing professionals are often the first to provide initial care in trauma situations, as they are present at different points in the emergency network[7]. In this context, professionals must be prepared to provide adequate care.

When assessing the knowledge of nurses working in a pre-hospital service regarding the initial assessment of polytraumatized patients and care in restricting the movement of the spine, it was found that 32% of these professionals did not know the maneuvers for controlling the cervical spine[8]. In addition, the literature shows that many trauma victims progress to neurological deterioration and tetraplegia if they are not managed correctly when they are first aid[9]. Findings indicate that 3% to 25% of spinal injuries occur after the initial traumatic event, whether during transportation or first aid[10].

Therefore, considering the changes on the subject, the aim of this study is to analyze nursing professionals' knowledge about restricting spinal movement in trauma patients in the context of mobile in-hospital and pre-hospital services and to describe how decisions are made about restricting spinal movement.

METHOD

This is an exploratory, descriptive study with a qualitative-quantitative approach. A semi-structured interview was conducted with nursing staff from the emergency unit of a public hospital and the Mobile Emergency Care Service (SAMU), both located in a municipality in the metropolitan region of Porto Alegre/RS.

The sample was recruited by verbally inviting the professionals at the service during the collection period, all of whom agreed to participate. The study included 27 nursing professionals, 14 working in the in-hospital service (nine nursing technicians and five nurses)

and 13 in the pre-hospital service (seven nursing technicians and six nurses). The inclusion criteria were: working for at least a year in one of the emergency services and being present on the collection date. As an exclusion criterion, professionals on vacation, on leave, or away for any reason during the data collection period did not participate in the study.

Data was collected in March 2022 through semi-structured face-to-face interviews. For each location, a script was used, consisting of 13 questions. To cover all the teams day and night, the interviews were scheduled according to each work shift and recorded on the interviewer's cell phone, taking around five minutes. The participants were duly informed about the aims and objectives of the research at the beginning of the interview. They signed the Free and Informed Consent Form (FICF) in two copies, one belonging to the participant and the other to the researcher.

A private, distraction-free place was requested for the interview at each location. There was an initial agreement that the interview would be postponed if the professional was called away for an appointment. However, there was no need to interrupt any interviews.

The interview script began with sociodemographic questions, followed by questions about SMR, such as knowledge of the up-to-date concept, indications, the reason for its use and when it should be withdrawn, the need for imaging tests, care when transferring the victim between services and the influence of this care on the patient's prognosis.

Once the interviews were completed, they were transcribed into a *Word®* document for organization and analysis. Thematic analysis was used according to Minayo, who divides it into three phases: the pre-analysis phase, the exploration phase, and the results treatment phase[11]. Quantitative data was evaluated using descriptive statistics using the *Excel®* program.

The study was approved by the Research Ethics Committee of the University of Vale do Rio dos Sinos (Unisinos) under opinion no. 5.272.380. To guarantee the confidentiality of the information, the professionals were identified by letters: nursing technician (TE) and nurse (ENF), accompanied by the letters IH for those working in the hospital and PH for SAMU workers, followed by numbers in Arabic numerals.

RESULTS

Of the 27 participants in the study, the predominant age was between 40 and 50 (41%; n=11). As for years of training, 7% (n=02) had one to five years, 26% (n=07) had six to 10 years, 7% (n=02) had 11 to 15 years, 26% (n=07) 16 to 20 years, 26% (n=07) 21 to 25 years and 7% (n=02) more than 25 years. The work shift was predominantly daytime (44%; n=12). The time they had worked in an emergency service prevailed between 11 and 15 years (26%; n=07), and 81% (n=22) of the professionals currently worked or had worked in another emergency service. Concerning academic training, 56% (n=15) had a specialization degree; of these, 53% (n=08) were in Urgency and Emergency.

It was found that 48% (n=13) of the professionals were aware of the current recommendations on SMR, almost all of whom (n=12; 92%) work in the pre-hospital service. Around 30% (n=08) showed no knowledge, and 22% (n=06), although they claimed to know the topic, had difficulty contextualizing it.

When asked about the indications for SMR, the professionals mentioned signs and symptoms, the mechanism of the trauma, and other general characteristics, as shown in Chart 1.

Table 1 - Indications for the SMR pointed out by the interviewees (n=27). Metropolitan Region of Porto Alegre, RS, Brazil, 2022

Indications for SMR	No. of times cited
Cervicalgia/lumbago (pain)	17
Accident	12
Fall	11
Kinematics	9
Level of consciousness	8
Decreased or absent movement	5
TCE	5
Anatomical deformity	3
Alcohol or drug intoxication	3
Fracture	2
Outbreak	2
Paresthesia	2
Distractive injury	2
Aggression	1
Hit-and-run	1
Language barrier	1
Elderly	1

Source: The authors, 2022.

Neck/back pain was the most common indication, reported by 17 professionals (63%; n=17), followed by car accidents and falls. The least cited indications were aggression, being run over, language barriers, and the elderly population (4%; n=01).

Regarding continuity of care, questions were raised about when the restraint should be removed from the patient and the need for imaging tests. Of the total sample, 74% (n=20) of the professionals reported that the restraint should only be removed after imaging tests have been carried out; 15% (n=four) said that the restraint could be removed after the doctor's physical examination in the in-hospital environment and 11% (n=three) said that the restraint can be removed while still in the pre-hospital environment.

Based on the analysis of the interviews, a thematic category was identified called: Decision-making regarding SMR and the transition of care.

There was a lack of standardization in the conduct carried out by professionals in the in-hospital environment, as shown in the statements by ENF - IH 2 and TE - IH 1:

Some doctors examine the patient and remove them in the trauma room, and others do the physical examination first, then send them for an x-ray, and when they come back, they tell them to remove them or not. (ENF – IH 2)

The immobilization is removed after a medical assessment. Sometimes, the doctor releases the immobilization during the physical assessment, but some doctors only release it after an imaging assessment. (TE – IH 1)

A proportion of pre-hospital care professionals, when talking about what conduct they would take, report that, with proper training or the presence of a medical professional at the scene, it is possible to reassess the need for restraint and de-characterize it even before arriving at the hospital, as shown below:

It used to be after the tests, but now the doctor in the advanced support ambulance is already assessing whether or not it's necessary. (ENF - PH 1)

With training, we can release at the scene, not least because we're always with the doctor. (ENF – PH 3)

Other professionals reported that the assessment carried out at the scene is no different from the assessment carried out by the medical professional in the in-hospital environment, as TE - PH 3 said:

What we do on stage is what the doctor does there. (TE - PH 3)

In addition, some interviewees stated the need to submit patients to imaging tests to rule out the possibility of injury in situations where the pre-hospital department opted for restriction, as mentioned by ENF - PH 4:

The restriction should only be removed inside the hospital after the imaging tests and the physical examination I've already done, so what counts is the imaging test. (ENF – PH 4)

In addition, it was clear that pre-hospital professionals expect in-hospital professionals to provide continuity of care based on what was assessed at the scene, following on from the care, as shown in the following statements:

We hope there will be a sequence, that the patient will be assessed similarly, and that they won't spend so much time on a stretcher. (TE - PH 2)

First of all, trust our assessment of the scene. Of course, they will reassess; the patient always needs to be reassessed, but we really want to follow up on our first visit. (TE - PH 3)

If the patient is to be removed from the board, remove the patient en bloc with all due care. (ENF – PH 1)

The professionals were asked whether imaging tests influence the prognosis. Some professionals agree that imaging exams will influence the patient's prognosis since spinal injuries are better assessed in the presence of these exams, as shown by TE - IH 2:

Sometimes yes, because a spine fracture, for example, is not common to see, but when you do it only with an imaging test, otherwise there's no way of knowing. (TE - IH 2)

On the other hand, other professionals reported that, in many cases, imaging tests are carried out unnecessarily, which implies risks for the patient and costs for the health service, according to ENF - IH 1:

When it's unnecessary, and you subject the patient to an imaging test, I think it's a risk for the patient with a ray load and an unnecessary cost for the institution. (ENF – IH 1)

However, reports stated that care is provided sequentially, considering teamwork and trust between professionals from different health institutions. Thus, if there is continuity of care, this will have a positive influence on the patient's prognosis, according to the following statements:

Health is a sequence of service; there's no point; we do our part and deliver, we go through the details, and it's a sequence. (ENF – PH 1)

It's a compliment; one complements the other's service. (TE - PH 2)

DISCUSSION

Most of the professionals interviewed referred to the term "immobilization", which was used until 2018 when the literature was renamed "Restriction of Movement of the Spine" [2].

The name "immobilization" was used because it was believed that it was possible to immobilize the spine completely. The reason for changing the concept comes from studies showing that it is impossible to provide true immobilization but only to limit and reduce movement. Current protocols and the routine use of standard immobilization in all cases are possibly justified by evidence based on historical practices rather than scientific evidence[2-3, 13].

Current studies reinforce these findings. A retrospective study that sought to determine whether changing the immobilization protocol affected the incidence of spinal injuries found no increase in disabling spinal injuries after changing the protocol from "spinal immobilization" to "spinal movement restriction"[14]. Other authors have found that the longboard has been used adequately for patients with more severe trauma, as indicated by current protocols[15]. Another retrospective study, covering the years 2009 to 2020, highlighted that the rate of immobilization/restriction of movement of the spine decreased its implementation from 31.2 to 12.7 per 100 trauma calls per month. It also demonstrated a more selective use of protocols, with the adoption of a longboard for patients with signs of severity, while for less severe patients, only the use of a cervical collar, after updating the assessment criteria[16].

Considering these changes, it was found that more than half of the study participants were unaware of the current concept of SMR, which supports the hypothesis that evidence has been repeatedly adopted without proper conceptual evolution for the management of the spine. More than half of the professionals have not received training on the subject since the new updates were published, which may be the reason for maintaining standard immobilization in all cases.

A study carried out with paramedics in Northern California between September and December 2022 showed that in a team that received training on clinical assessment and indication of restriction of spinal movement, there was a 58% reduction in the use of the rigid board, thus demonstrating that it is possible to limit its use and only use it when necessary[17]. In addition, the authors emphasize the need for continuous training for professionals working in emergency services since current literature is increasingly seeking to individualize conduct[18].

A literature review from 1990 to March 2019 showed that pre-hospital professionals' early and adequate identification of possible traumatic spinal injuries tends to improve patient outcomes significantly and can help reduce unnecessary immobilization[19]. That said, it is clear that teams need to be constantly updated based on scientific literature.

NEXUS and CCR are protocols developed to guide pre-hospital care professionals in restricting spinal movement. Both provide proven criteria for when to restrict and what type of restriction to use, intending to define which patients are candidates for imaging tests to rule out spinal injury[20].

The indications cited by the professionals in this study agree with the scientific literature on SMR. However, they do not relate to just one protocol but mix the indications from both studies.

NEXUS includes five low-risk criteria in its assessment to rule out the possibility of injury: no neurological deficit, no signs of intoxication, no distracting injury, unchanged level of consciousness, and no tenderness or pain in the midline of the spine. The CCR uses low- and high-risk factors, such as age 65 or over, dangerous mechanism, paresthesias in the

extremities (high-risk factors); late onset of neck pain, absence of sensation in the cervical spine, patient sitting in the emergency room, ability to ambulate at any time, simple rear-end car collision (low-risk factors); and finally, ability to turn the head 45° to either side[5-6].

Authors have pointed out problems that limit professionals' use of the new SMR indications. One refers to the divergence of terminology, compliance with the guidelines, and implementation by the teams[21]. Another study carried out in a pre-hospital service in Canada showed that teams are skeptical about various elements of the SMR protocol but use some strategies to balance adherence to the protocol with optimizing care during visits[22].

The evaluation and treatment of patients with potential spinal cord injury continue as soon as they are admitted to the emergency room, where they are assessed by the in-hospital team, including, among other things, imaging tests[23]. Imaging tests are carried out, when indicated, as soon as life-threatening injuries have been managed[24].

Based on these definitions, it is understood that the results of this study, where 74% of professionals reported that the restriction should only be removed after imaging tests have been carried out, are in line with the established criteria. Although most nursing professionals agreed with these studies, those working in the in-hospital area reported that there is no standardized approach to obtaining an image, which is defined by each professional individually, and differs between those working in the medical area.

The interviewees expressed concern about unnecessary imaging tests' high cost to health institutions and the risks of exposure to imaging tests. This result is corroborated by a study that found that most trauma victims are transferred to the hospital using all the equipment available to restrict spine movement, even if no symptoms indicate the need to use it. The authors state that most trauma centers subject these patients to unnecessary imaging tests, increasing costs for the health network[6].

A survey carried out in 2020 proved that if the patient enters the health service with all the restraint equipment, this will directly influence the decision to obtain imaging tests, even if there is no indication from the clinical assessment[20].

Most of the reports from in-hospital professionals show that nurses are not involved in decisions regarding restraint, which is different from other studies. The authors compared the level of agreement between nurses and doctors regarding removing the cervical collar in trauma patients after both professional categories had received the same training. The level of agreement was 94.3%[25]. Other authors have also reported that agreement between the nursing assessment and the medical assessment was 95%, of which 82% of nurses showed confidence in applying the CCR protocol, and there was a reduction in the use of immobilization in 25% of cases[26]. With this in mind, it is possible to affirm that with the proper theoretical and practical training, nursing contributes to the qualification of care with SMR. This statement is supported by other studies that have identified that this measure prevents prolonged use of immobilization, avoids patient discomfort, and improves care flow in overcrowded emergency rooms[27-28].

In this study, the concern with continuity of care was evident, with pre-hospital professionals expecting trust from the emergency room team to maintain care since it is a sequence of care. In this sense, the literature shows that communication between teams is an essential tool for the in-hospital team to provide continuity to the pre-hospital team's care and comprehensive care to the patient[29].

The limitations found in the study involve the small sample of nursing professionals, who do not represent the diversity of the profession within the country, and the difficulty in finding national scientific literature that addresses nursing in this context. There is a need for future studies looking at the profession, aiming to change the care paradigm for trauma victims, given that nursing is present at all points in the emergency care network.

FINAL CONSIDERATION

This study explored the knowledge of nursing professionals working in emergency services about SMR. In-hospital teams had little knowledge of the current evidence on the subject and a lack of standardization in the conduct taken when dealing with trauma victims, diverging between the moment of removal and the decision to obtain imaging for follow-up.

The transition of care has proved necessary between the institutions. However, professionals still face difficulties, such as a lack of trust, which can lead to discontinuity of care. It also made it possible to recognize the importance of updating technical and scientific knowledge to work in these services and experience in the field to ensure the quality of care provided to patients.

Thus, there is a need to train nursing professionals on the subject since adopting standardized procedures for performing SMR limits its use to only when necessary. This measure can avoid additional costs for health institutions and reduce overcrowding in emergency services.

REFERENCES

1. National Association of Emergentcy Medical Technicians (NAEMT). Atendimento pré-hospitalar ao traumatizado - PHTLS. 9ed. Burlington: Jones & Bartlett Learning; 2020.

2. Fischer PE, Perina DG, Delbridge TR, Fallat ME, Salomone JP, Dodd J, *et al*. Spinal Motion Restriction in the Trauma Patient – A join Position Statement. Prehospital Emergency Care. [Internet]. 2018 [cited in 2022 Apr 15]; 0(0). Available in: https://doi.org/10.1080/10903127.2018.1481476.

3. Hauswald M. A re-conceptualization of acute spinal care. Emerg Med J. [Internet]. 2013 [cited in 2022 Mar. 26]; 30(9). Available in: https://doi.org/10.1136/emermed-2012-201847.

4. Botelho RV, Albuquerque LDG, Bastianello Junior R, Arantes Junior AA. Epidemiology of traumatic spinal injuries in Brazil: systematic review. Arq. Bras. Neurocir. [Internet]. 2014 [cited in 2022 Mar. 16]; 33(2). Available in: https://pesquisa.bvsalud.org/portal/resource/pt/lil-721666.

5. Hoffman JR, Mower WR, Wolfson AB, Todd KH, Zucker MI. Validity of a set of clinical criteria to rule out injury to the cervical spine in patients with blunt trauma. N. Engl. J. Med. [Internet]. 2000 [cited in 2022 Apr. 17]; 343(2). Available in: https://doi.org/10.1056/NEJM200007133430203.

6. Stiell IG, Wells GA, McKnight RD, Brison R, Lesiuk H, Clement CM, *et al*. Canadian C-Spine Rule study for alert and stable trauma patients: I. Background and rationale. CJEM. [Internet]. 2002 [cited in 2022 Apr. 17]; 4(2). Available in: https://doi.org/10.1017/S1481803500006175.

7. Santana LF, Paris M da C, Gabriel K de OF, Ros GF, Petry IL, Alves JNB, *et al*. Invenção AS. A atuação do enfermeiro no atendimento de urgência e emergência. UNILUS Ensino Pesqui. [Internet]. 2018 [cited in 2022 Mar. 03]; 15(39). Available in: https://doi.org/10.34117/bjdv7n4-184.

8. Castillo JRD. Conocimientos de las enfermeras(os) del programa SAMU sobre la evaluación inicial al paciente politraumatizado por accidente de tránsito. Lima. Monografia (Especialização) - Facultad de Medicina Humana, Universidad Nacional Mayor de San Marcos. [Internet]. 2015 [cited in 2022 Apr. 20]. Available in: https://pesquisa.bvsalud.org/portal/resource/pt/lil-790265.

9. Li HL, Xu H, Li YL, Sun SW, Song WY, Wu Q, *et al*. Epidemiology of traumatic spinal cord injury in Tianjin, China: an 18-year retrospective study of 735 cases. J Spinal Cord Med. [Internet]. 2019 [cited in 2022 Apr 18]; 42(6). Available in: https://doi.org/10.1080/10790268.2017.1415418.

10. Hadley MN, Walters BC, Grabb PA, Oyesiku NM, Przybylski GJ, Resnick DK, *et al*. Cervical spine immobilization before admission to the hospital. Neurosurgery. [Internet]. 2002 [cited in 2022 Apr. 03]; 50(3). Available in: https://doi.org/10.1097/00006123-200203001-00005.

11. Minayo, MCS. O desafio do conhecimento: pesquisa qualitativa em saúde. 14. ed. São Paulo: HUCITEC; 2014.

12. Ministério da Saúde (BR). Conselho Nacional de Saúde. Resolução 466/12. Estabelece critérios sobre pesquisas envolvendo seres humanos. Brasília: Ministério da Saúde; 2012. Available in: https://bvsms.saude.gov.br/bvs/saudelegis/cns/2013/res0466_12_12_2012.html.

13. White CC, Domeier RM, Millin MG, Standards and Clinical Practice Committee, National Association of EMS Physician. EMS Spinal Precautions and the Use of the Long Backboard – Resource Document to the National Association of EMS Physicians Position Statement and the American College of Surgeons Committee on Trauma. Pre Hospital Emergency Care. [Internet]. 2014 [cited in: 2022 abr 04]; 18(2). Available in: https://doi.org/10.3109/10903127.2014.884197.

14. Clemency BM, Natalzia PI, Johanna GS, Welch JV, Haghdel A, Noyes E, et al. A Change from a Spinal Immobilization to a Spinal Motion Restriction Protocol was Not Associated with an Increase in Disabling Spinal Cord Injuries. Prehosp Disaster Med. [Internet]. 2021 [cited in 2023 May 28]; 36(6). Available in: https://doi.org/10.1017/S1049023X21001187.

15. Nilhas A, Helmer SD, Drake RM, Reyes J, Morriss M, Haan JM. Pre-Hospital Spinal Immobilization: neurological outcomes for spinal motion restriction versus spinal immobilization. Kans. J. Med. [Internet]. 2022 [cited in 2023 May 28]; 15. Available in: https://doi.org/10.17161/kjm.vol15.16036.

16. McDonald N, Kriellaars D, Pryce RT. Patterns of change in prehospital spinal motion restriction: a retrospective database review. Academic Emergency Medicine. [Internet]. 2023 [cited in 2023 May 28]. Available in: https://doi.org/10.1111/acem.14678.

17. Morrissey JF, Kusel ER, Sporer KA. Spinal motion restriction: an educational and implementation program to redefine prehospital spinal assessment and care. Prehosp. Emerg. Care. [Internet]. 2014 [cited in 2022 Apr 17]; 3(18). Available in: https://doi.org/10.3109/10903127.2013.869643.

18. Monte RRL do, Santos NCF, Cardoso BB, Tavares F de AF, Oliveira BG, Couto JJV do, *et al*. Necessidade de imobilização em pacientes vítimas de lesão cervical. Rev. Ciênc. Estud. Acad. Med. [Internet]. 2019 [cited in 2022 May 12]; 1(11). Available in: https://periodicos.unemat.br/index.php/revistamedicina/article/view/3382.

19. Arejan RH, Asgardoon MH, Shabany M, Ghodosi Z, Dehghan HR, Asl MS, *et al*. Evaluating prehospital care of patients with potential traumatic spinal cord injury: scoping review. Eur Spine J [Internet]. 2022 [cited in 2023 May 28]; 31(5). Available in: http://dx.doi.org/10.1007/s00586-022-07164-4.

20. Drain J, Wilson ES, Moore TA, Vallier HA. Does prehospital spinal immobilization influence in hospital decision to obtain imaging after trauma? Injury. [Internet]. 2020 [cited in 2022 Apr. 07]; 51(4). Available in: https://doi.org/10.1016/j.injury.2020.02.097.

21. Geduld C, Muller H, Saunders CJ. Factors which affect the application and implementation of a spinal motion restriction protocol by prehospital providers in a low resource setting: a scoping review. Afr J Emerg Med. [Internet]. 2022 [cited in 2023 May 28]; 12. Available in: https://doi.org/10.1016/j.afjem.2022.08.005.

22. McDonald N, Kriellaars D, Pryce RT. Paramedic attitudes towards prehospital spinal care: a cross-sectional survey. BMC Emerg. Med. [Internet]. 2022 [cited in: 2023 May 28]; 162(22). Available in: https://doi.org/10.1186/s12873-022-00717-2.

23. Connor D, Greaves I, Porter K, Bloch M. Pre hospital spinal immobilisation: an initial consensus statement. Emerg. Med. J. [Internet]. 2013 [cited in 2022 Apr. 17]; 30(2). Available in: http://dx.doi.org/10.1136/emermed-2013-203207.

24. American College Of Surgeons Committee On Trauma (ACSCT). Advanced Trauma Life Suport - ATLS.

10 ed. Chicago; 2018.

25. Meek R, Mcgannon D, Edwards L. The safety of nurse clearance of the cervical spine using the National Emergency X-radiography Utilization Study low-risk criteria. EMA. [Internet]. 2007 [cited in 2022 May 04]; 19(0). Available in: https://doi.org/10.1111/j.1742-6723.2007.00995.x.

26. Miller P, Coffey F, Reid AM, Stevenson K. Can emergency nurses use the Canadian cervical spine rule to reduce unnecessary patient immobilisation? Accid Emerg Nurs. [Internet]. 2006 [cited in 2022 May 04]; 14(3). Available in: https://doi.org/10.1016/j.aaen.2006.03.003.

27. Gonçales PC, Antunes LSS, Morais DA, Moraes CMG de, Fernandes ACBC, Souza KM de. Construção de um protocolo de restrição de movimento de coluna (RMC) vertebral: relato de experiência. REAS. [Internet]. 2021 [cited in 2022 May 17]; 13(18). Available in: https://doi.org/10.25248/reas.e8021.2021.

28. Larson S, Delnat AU, Moore J. The use of clinical cervical spine clearance in trauma patients: a literature review. J Emerg Nurs. [Internet]. 2018 [cited in 2022 May 10]; 44(4). Available in: https://doi.org/10.1016/j.jen.2017.10.013.

29. Mello TS de, Miorin JD, Camponogara S, Paula CC de, Pinno C, Freitas E de O. Fatores que influenciam para transferência do cuidado intra-hospitalar efetiva: revisão integrativa. RSD. [Internet]. 2021 [cited in: 2022 May 04]; 10(9). Available in: https://doi.org/10.33448/rsd-v10i9.18153.

Received: 04/10/2022
Approved: 25/06/2023

Associate editor: Dra. Luciana Nogueira

Corresponding author:
Gabriela Brigolini
Universidade do Vale do Rio dos Sinos
Santo Antônio, 98, São Francisco, Garibaldi RS
E-mail: gabrielabrigolini@hotmail.com

Role of Authors:
Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **Brigolini G, Ciconet RM**. Drafting the work or revising it critically for important intellectual content - **Brigolini G, Ciconet RM.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Brigolini G, Ciconet RM**. All authors approved the final version of the text.

ISSN 2176-9133