



Translation and Transcultural Adaptation of the Milestones Instrument to Assess Teaching in Medical Residency Services on Orthopedics and Traumatology*

Tradução e adaptação transcultural do instrumento Milestones de avaliação do ensino dos serviços de residência médica em ortopedia e traumatologia

Ubiratan Brum de Castro¹ Gustavo Remigio Gomes² Kalil Francisco Restivo Simão³
Liev José Cahino do Egito⁴ Sávio Daniel Freire de Albuquerque Figueiredo⁴
Rosálvo Zósimo Bispo Júnior⁵

¹ Department of Locomotor System, Faculdade de Medicina, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil

² Hospital das Clínicas, Orthopaedic Service, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil

³ Faculdade de Medicina, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil

⁴ Universidade Federal da Paraíba (UFPB), João Pessoa, PB, Brazil

⁵ Surgery Department, Universidade Federal da Paraíba (UFPB), João Pessoa, PB, Brazil

Address for correspondence Ubiratan Brum de Castro, Associate professor, Avenida Prof. Alfredo Balena, 190 - sala 193 / Belo Horizonte, MG, 30130-100, Brazil (e-mail: ubrum@terra.com.br).

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Abstract

Keywords

- ▶ translating
- ▶ transcultural adaptation
- ▶ medical education
- ▶ surveys and questionnaires

Objective Orthopedics is not very common in many Brazilian medical schools, and there is no questionnaire to assess the teaching of musculoskeletal disorders during medical training. The Orthopedic Surgery Milestone Project is an assessment tool for orthopedic residents in programs or fellowships recognized by the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Orthopedic Surgery (ABOS). This study aims to translate the Orthopedic Surgery Milestone Project into Portuguese and to perform its transcultural adaptation.

Methods The translation and transcultural adaptation consisted of the initial translation into Portuguese, back-translation into English, preparation of a pretest consensual text, and the subsequent elaboration of a final text.

* Study developed at Hospital das Clínicas, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil, and Centro de Ciências Médicas, Universidade Federal da Paraíba, João Pessoa, PB, Brazil.

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Resumo

Palavras-chave

- ▶ tradução
- ▶ adaptação transcultural
- ▶ ensino médico
- ▶ pesquisas e questionários

Results The final text was deemed adequate and equivalent to the original one for the evaluation of orthopedics residents throughout their program.

Conclusions Given the lack of instruments for the assessment of orthopedic residents, the translation and transcultural adaptation of the Orthopedic Surgery Milestone Project were compatible; this can be an instrument for improved medical education.

Objetivo A ortopedia é uma especialidade pouco presente na formação de muitas escolas médicas brasileiras, sendo que não foi identificado nenhum questionário que avalie o ensino das desordens musculoesqueléticas durante a formação médica. O *Orthopedic Surgery Milestone Project* constitui um instrumento de avaliação de residentes de ortopedia nos programas de residência ou bolsas credenciados pela ACGME (The Accreditation Council for Graduate Medical Education) e pelo ABOS (The American Board of Orthopedic Surgery). O objetivo é realizar a tradução para a língua portuguesa e adaptação transcultural do *Orthopedic Surgery Milestone Project*.

Métodos A tradução e adaptação transcultural consistiram na tradução inicial para o português, retro tradução para o inglês, análise para a obtenção de uma versão consensual pré-teste e posterior versão final.

Resultados A versão final foi considerada adequada e equivalente à original para a avaliação dos residentes de ortopedia ao longo do programa de residência médica.

Conclusões Diante da falta de instrumentos para a avaliação dos residentes em ortopedia, a tradução e a adaptação transcultural do *Orthopedic Surgery Milestone Project* foi compatível, podendo ser um instrumento para uma formação médica mais adequada.

Introduction

Musculoskeletal disorders, including lumbalgia, lumbosciatalgia, and arthrosis, are frequent complaints in primary clinics, accounting for up to 25% of the reasons to seek medical care. The World Health Organization declared the period from 2000 to 2010 as the *Bone and Joints Decade*, thus confirming the importance of this topic in medicine.

Therefore, it is essential to train adequately the professionals who will meet this high demand. The development of skills in multiple care dimensions during the training of orthopedists and traumatologists is paramount to assure the proper treatment of patients. To do so, tools assessing the development of these skills are protagonists both to encourage individuals to acquire abilities they still do not possess and to provide data to improve the educational quality of residency programs.¹

No instrument in Portuguese evaluates the teaching of musculoskeletal disorders throughout medical training. However, similar questionnaires, available for several medical specialties, have been created in other countries, including the Orthopedic Surgery Milestone Project. This instrument evaluates physicians from residency or fellowship programs recognized by the Accreditation Council for Graduate Medical Education (ACGME), a non-profit private institution that assesses and endorses all graduate medical training programs, including internships, residencies, fellowships, and subspecialty programs, in the United States.²

The Orthopedic Surgery Milestone Project started in 2013 to evaluate the skills and knowledge of residents from a specialty within the same set of competencies. It does not replace existing assessments in residency programs but provides a common framework to analyze acquired skills.³ The Milestones instrument generates detailed information on the strengths and weaknesses of each residency service and identifies syllabus gaps to be addressed, improving the educational quality of residency programs.

The ACGME requires an annual evaluation, including systematic analysis of curriculum, resident performance, faculty development, and program quality. It also suggests that assessment instruments include written examinations, global ratings, and case/procedure records. The teaching analysis model recommended by the ACGME is based on the skills deemed fundamental for professional practice.

Residents are evaluated through milestones, that is, medical knowledge, patient care, professionalism, communication skills, and system practice, in addition to learning based on such practices and improvements. During the assessment, a preceptor selects the milestone that best describes the resident's current performance, from levels 1 to 5. Level 1 represents the milestones expected from a 1st-year resident, and level 5 refers to the performance goals defined for the residency, potentially describing the performance of a professional practicing for several years.⁴ However, it is worth mentioning that these levels do not correspond to the year of

residency; moreover, the selection of a certain level implies that the resident substantially demonstrates the characteristics related to it, as well as those from lower levels. All residents, from the 1st to the last year of medical residency, will be evaluated using the Milestones instrument.

Thus, the translation and transcultural adaptation of the Orthopedic Surgery Milestone Project will help in the evaluation and, consequently, training of professionals specializing in orthopedics.

Methods

After the ACGME authorized the translation of the questionnaire, two Brazilian translators fluent in English performed the first translation into Portuguese, and both texts were compared to formulate a consensus text. This text was back translated into English by two bilingual translators whose main language is English and who had no knowledge of the original text of the instrument. This translation was evaluated and compared to the original text by a review committee to correct potential discrepancies and enable the preparation of a pretest version of the questionnaire.

The last step consisted of evaluating the clarity and understanding of the questionnaire regarding its intended use. Since the pretest version had the desired characteristics, it was confirmed as the final text.

Results

► **Figures 1 to 5** describe the translation into Portuguese and transcultural adaptation of the Milestones 2.0 instrument. It is noteworthy that the back translation process showed that the initial Portuguese text corresponded to the English text, with no semantic divergence between translators.

The first two texts were the initial translations into Portuguese. Both presented semantic similarity, with no modification of the analyzed proposition. However, sometimes, different words with similar meanings were used to translate the same term (e.g., basic imaging exams versus basic imaging studies). A specialized committee reviewed the two translations and reconciled them into a single, easier-to-understand text. The final text consisted of the back translation of the reviewed versions.

The original Milestones instrument has 54 pages and 20 clinical situations from different areas of orthopedics; its questions encompass the doctor-patient relationship, in addition to theoretical and practical medical knowledge (► **Table 1** and ► **Figures 1–2**).

Discussion

There are no instruments to assess medical skills regarding musculoskeletal disorders in Portuguese, but the Orthopedic Surgery Milestone Project fulfills this purpose in English. The method of translation and transcultural adaptation used here was recommended by Guillemin et al.⁴ It consists of four stages: initial translation, back translation, elaboration

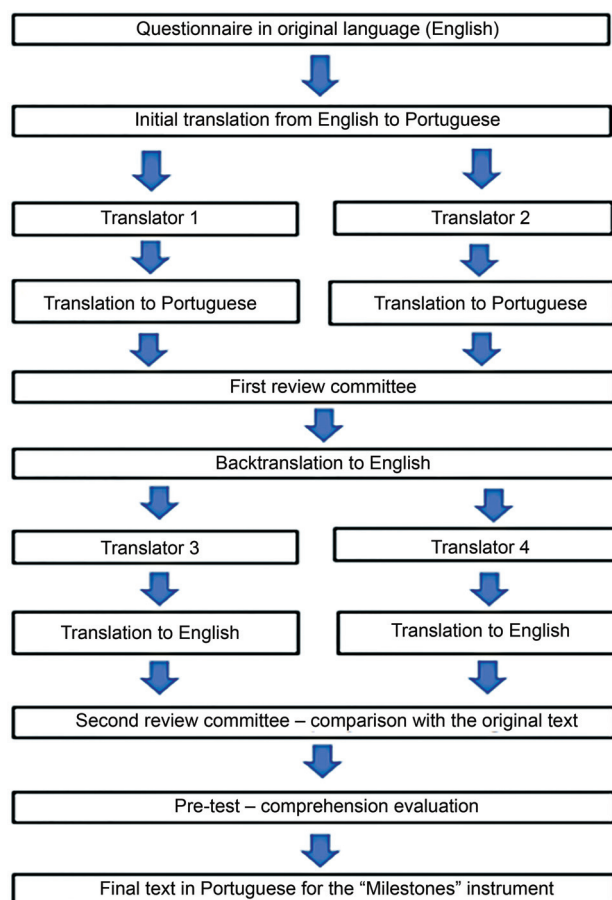


Fig. 1. Diagram of the protocol used for translation and transcultural adaptation of the Milestones evaluation instrument.

of a consensus text, and preparation of a commented pretest version and the final text.

The present study followed the guidelines recommended by Guillemin et al.⁴ to minimize bias and biased results. This methodology makes the translated Milestones questionnaire suitable for application in Brazilian orthopedic residency services to assess the skills and abilities of these professionals.

Translation and adaptation of this instrument occurred after ACGME approval. The entire process was carried out properly, following the standards of cultural adaptation, and there were no difficulties in understanding any question. The Milestones instrument is widely recognized and used in the United States in different medical services and subspecialties, including clinical and surgical areas (e.g., Milestones for Plastic Surgery, Internal Medicine, Urology). It is applied easily through clinical situations that assess professionalism, communication skills, and medical knowledge. Residents are analyzed and graded on competency scales and developmental milestones throughout the year. It is a way for the student to recognize their limitations and deficiencies and improve them. The goal is to make specialist training programs more adequate to the current demand so that the specialized physician can work in public and private sectors, either in large or small centers.⁵

Pediatric Septic Hip – Medical Knowledge				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Demonstrates knowledge of common presentation of hip septic arthritis • Demonstrates knowledge of basic hip anatomy • Demonstrates knowledge of basic imaging studies • Demonstrates knowledge of appropriate laboratory studies 	<ul style="list-style-type: none"> • Demonstrates knowledge of pathophysiology of joint damage related to septic arthritis • Demonstrates knowledge of basic surgical approach • Demonstrates knowledge of the differential diagnosis of the irritable hip • Understands natural history and the effects of intervention • Demonstrates knowledge of advanced imaging studies 	<ul style="list-style-type: none"> • Demonstrates knowledge of the vascular supply in the skeletally immature hip • Demonstrates knowledge of microbiology and antibiotic choices • Demonstrates knowledge of potential complications • Demonstrates knowledge of clinical and laboratory data relevant to differential diagnosis 	<ul style="list-style-type: none"> • Demonstrates knowledge of options and anatomy for surgical approaches • Demonstrates knowledge of atypical infecting organisms and management options 	<ul style="list-style-type: none"> • Author/presenter in published work
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 5px; width: 30%;">Comments:</div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: right;">Not yet rotated <input type="checkbox"/></div> </div>				
<p>Selecting a response box in the middle of a level implies that milestones in that level and in lower levels have been substantially demonstrated.</p>		<p>Selecting a response box on the line in between levels indicates that milestones in lower levels have been substantially demonstrated as well as some milestones in the higher level(s).</p>		

Fig. 2 Translation of the Milestones instrument. Clinical case 1-original text.

Anterior Cruciate Ligament - Medical Knowledge				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Demonstrates knowledge of pathophysiology related to anterior cruciate ligament (ACL) injury (e.g., mechanisms of injury) • Correlates anatomic knowledge to imaging findings on basic imaging studies • Has knowledge of natural history of ACL injury • Demonstrates knowledge of ACL injury anatomy and basic surgical approaches (e.g., ACL bundles) 	<ul style="list-style-type: none"> • Understands pathophysiology of concomitant injuries (e.g., secondary restraints of knee [posterior lateral corner {PCL}]) • Correlates anatomic knowledge to imaging findings on advanced imaging studies • Ability to grade instability • Understands the effects of intervention on natural history of ACL injury • Understands alternative surgical approaches (e.g., miniopen, 2 incisions) • Understands basic pre-surgical planning and templating • Understands advantages and disadvantages of graft types 	<ul style="list-style-type: none"> • Demonstrates knowledge of current literature and alternative treatments • Understands rehabilitation mechanics (e.g., phases of rehabilitation, closed versus open chain exercises) • Understands biomechanics of the knee and biomechanics of implant choices 	<ul style="list-style-type: none"> • Understands controversies within the field (e.g., graft type, brace treatment, surgical technique and fixation, surgical technique to include skeletally immature knee) • Applies understanding of natural history to clinical decision-making • Understands how to prevent/avoid potential complications 	<ul style="list-style-type: none"> • Primary author/presenter of original work within the field
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Fig. 3 Translation of the Milestones instrument. Clinical case 2-original text.

Carpal Tunnel – Medical Knowledge				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Understands the anatomy of carpal tunnel/median nerve • Understands the normal physiology of the median nerve 	<ul style="list-style-type: none"> • Demonstrates knowledge of the differential diagnosis of neuropathic surgery (e.g., pronator syndrome, cubital tunnel, thoracic outlet, cervical radiculopathy, peripheral neuropathy) • Understands risk factors associated with Carpal Tunnel Syndrome (CTS) (e.g., diabetes, inflammatory arthritis, pregnancy, hypothyroidism) • Demonstrates knowledge of median nerve motor/sensory distribution, thumb abduction, thenar numbness, anterior interosseous nerve (AIN) weakness, cervical radiculopathy • Understands the natural history of • CTS Understands the pathophysiology of nerve compression (e.g., increased carpal tunnel pressure, nerve ischemia) • Understands surgical options (e.g., open, endoscopic) 	<ul style="list-style-type: none"> • Demonstrates knowledge of current literature and alternatives to surgery • Understands the capabilities and limitations of electrodiagnostic studies • Understands influence of comorbidities • Demonstrates knowledge of complications of surgical management (e.g., location of median nerve with respect to superficial arch, recurrent motor branch, palmar cutaneous branch, Guyon's canal) 	<ul style="list-style-type: none"> • Understands controversies within field (e.g., endoscopic versus open, use of electrodiagnosis) 	<ul style="list-style-type: none"> • Primary author/presenter of original work within the field
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Carpal Tunnel – Patient Care				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Obtains basic history and performs basic physical exam • Lists potential surgical complications (e.g., infection, scar sensitivity, neurovascular injury) 	<ul style="list-style-type: none"> • Obtains focused history, including identifying night pain, paresthesias • Performs median nerve motor/sensory evaluation (e.g., median nerve [MN] numbness, thumb abduction) • Performs provocative maneuvers (e.g., Tinel, Phalen, MN compression test) • Appropriately considers electrodiagnostic test • Prescribes non-operative treatments (e.g., night splints, steroid injection when appropriate) • Capable of diagnosing surgical complications (e.g., injury to the median nerve or its branches and vascular injury) • Provides simple post-operative management and rehabilitation 	<ul style="list-style-type: none"> • Evaluates other sites of MN compression (e.g., pronator syndrome, cervical radiculopathy) • Interprets electrodiagnostic tests 	<ul style="list-style-type: none"> • Performs Carpal Tunnel Release (CTR) (e.g., open or endoscopic) • Capable of treating simple complication (e.g., infection, wound healing) • Capable of performing complex postoperative management (e.g., worsening numbness, worsening pain, additional radiating symptoms) 	<ul style="list-style-type: none"> • Capable of surgical management of major complications (e.g., injury to superficial arch, ulnar artery, branches of median nerve, or median nerve) • Capable of opposition transfer (e.g., palmaris longus, extensor indicis pollicis [EIP], or flexor digitorum superficialis [FDS]) • Capable of performing revision carpal tunnel surgery
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Fig. 4 Translation of the Milestones instrument. Clinical case 3-original text.

A study based on competencies and milestones aims to identify and analyze any deficiency in the training process of resident physicians, allowing preceptors to reinforce the teaching/learning of that competency.⁶ In addition, competency-based training allows for more uniform curricular development in medical residency schools.

The adaptation of this assessment instrument to the Brazilian context required minor grammatical and cultural adjustments. In preparing the pretest version and the final text, we tried to maintain the form that most closely resembled the original to achieve equivalent semantics between them.

It is also worth mentioning that no items from the original questionnaire were included or excluded throughout the development of the final text, preventing further changes in psychometric properties to allow texts comparison.

The potential use of Milestones as a method for evaluation and improvement of the quality of teaching in medical residency services will result in physicians better prepared to exercise their profession. The translation of this instrument and its application will allow the assessment of the main deficiencies in Brazilian Orthopedic Services, which may improve medical education.

Diabetic Foot – Medical Knowledge				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Demonstrates knowledge of pathophysiology related to Diabetes mellitus (e.g., neuropathy, renal disease, peripheral vascular disease) • Knowledge of medical management of Diabetes mellitus (e.g., glycemic control, diabetic diet) • Demonstrates some knowledge of natural history of Diabetes mellitus • Demonstrates knowledge of foot anatomy 	<ul style="list-style-type: none"> • Understands diabetic foot conditions and staging systems (e.g., infection vs. Charcot, Eichenholz classification) • Correlates anatomic knowledge to imaging findings on basic imaging studies (e.g., x-ray signs of osteomyelitis, Charcot changes) • Demonstrates some knowledge of diabetic foot conditions (neuropathic ulcer risk factors) and the effects of intervention (e.g., offloading and immobilization for Charcot, debridement and antibiotics for infection) • Demonstrates some knowledge of gait mechanics (e.g., phases of gait and normal limb alignment) • Demonstrates knowledge of basic surgical approaches (e.g., dorsomedial and dorsolateral approaches, amputations of the foot) • Understands basic pre-surgical planning • Demonstrates knowledge of non-operative treatment options and surgical indications • Understands basic science of wound healing 	<ul style="list-style-type: none"> • Demonstrates knowledge of current literature and alternative treatments (e.g., debridement, offloading, immobilization) • Correlates anatomic knowledge to imaging findings on advanced imaging studies (e.g., computed tomography and magnetic resonance imaging signs of osteomyelitis) • Demonstrates some knowledge of abnormal gait mechanics and limb alignment and adjacent joint function, diabetic shoe wear and orthotics (e.g., propulsive gait, loss of proprioception and balance) 	<ul style="list-style-type: none"> • Understands controversies within the field (e.g., non-operative vs. operative management of osteomyelitis) • Applies understanding of natural history to patient-specific clinical decision-making • Understands alternative surgical approaches (e.g., plantar approach, complex amputations of the foot) 	<ul style="list-style-type: none"> • Primary author/presenter of original work within the field
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Diabetic Foot – Patient Care				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Obtains history and performs basic physical exam • Appropriately orders basic imaging studies • Provides basic perioperative management (e.g., pre- and post-operative orders, labs, consults) • Provides basic perioperative management (e.g., pre- and post-operative orders, labs, consults) • Lists potential complications 	<ul style="list-style-type: none"> • Obtains focused history and performs focused exam • Appropriately interprets basic imaging studies • Prescribes and manages non-operative treatment (e.g., wound care, antibiotics, offloading, immobilization, depth shoes, accommodative orthotics) • Performs one basic surgical approach to the Diabetic foot (e.g., medial or lateral) • Performs one basic surgical approach to the Diabetic foot (e.g., medial or lateral) • Provides post-operative management and rehabilitation (physical therapist orders with goals and restrictions) • Capable of diagnosis and early management of complications (e.g., wound healing problems, infection, deep vein thrombosis) 	<ul style="list-style-type: none"> • Appropriately orders and interprets advanced imaging studies (e.g., computed tomography or magnetic resonance imaging with or without contrast) • Completes comprehensive pre-operative planning with alternatives for limb salvage (e.g., revascularization combined with reconstruction) • Modifies and adjusts post-operative treatment plan as needed 	<ul style="list-style-type: none"> • Provides complex non-operative treatment (e.g., multiple comorbidities, non-compliant, etc.) • Capable of performing alternative surgical approaches to the diabetic foot (e.g., multiple or plantar approaches) • Capable of treating complications, both intra- and post-operatively 	<ul style="list-style-type: none"> • Develops unique, complex post-operative management plans • Surgically treats complex complications
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Fig. 5 Translation of the Milestones instrument. Clinical case 4-original text.

The Portuguese version of the Milestones instrument, adapted to the Brazilian culture, is applied easily.

This instrument should be used once a year in residents of the 3 years, similar to the Assessment Test of Residents in Orthopedics (TARO) by the Brazilian Society of Orthopedics (SBOT). We initially propose the assessment of competency 1 in the 1st year of residency, competencies 2 and 3 in the 2nd year, and competencies 4 and 5 in the 3rd year of residency.

However, instrument application will eventually determine the equivalence. The final text of this questionnaire was the result of the corrections made by all translators and review teams involved. Although there is no evidence against the adequate translation and transcultural adaptation of the Milestones instrument to Brazil, future studies will establish the accuracy and reliability of this tool in Brazilian orthopedic and traumatology residency programs.

Table 1 Consensus for final text in Brazilian Portuguese

Original text	Initial text	Consensual text	Final text
Appropriately orders basic imaging studies	Solicita adequadamente os exames básicos de imagem	Solicita adequadamente os estudos básicos de imagem	Solicita adequadamente os estudos básicos de imagem
Provides procedure and patient specific postoperative management and rehabilitation	Fornece gerenciamento pós-operatório e reabilitação específicos para cada procedimento e paciente	Fornece procedimentos e gerenciamento pós-operatório e reabilitação paciente – específicos	Fornece gerenciamento pós-operatório e reabilitação específicos para cada procedimento e paciente
Prescribes and manages nonoperative treatment (e.g., nonsteroidal anti-inflammatory drugs [NSAIDs], steroid injections, brace, rocker bottom shoes)	Prescreve e gerencia o tratamento não cirúrgico (por exemplo, anti-inflamatórios não-esteroides [AINEs], injeções de corticosteroides, imobilizadores, sapatos com a entressola curva)	Prescreve e gere o tratamento não cirúrgico (por exemplo, anti-inflamatórios não-esteroides [AINEs], injeções de corticosteroides, órteses, calçado ortopédico com sola curva (do inglês <i>rocker bottom shoes</i>))	Prescreve e gere o tratamento não cirúrgico (por exemplo, anti-inflamatórios não-esteroides [AINEs], injeções de corticosteroides, órteses, calçado ortopédico com sola curva (do inglês <i>rocker bottom shoes</i>))
Capable of surgical reduction and fixation of a full range of fractures and dislocations	Capaz de reduzir e fixar cirurgicamente uma gama completa de fraturas e luxações	Capaz de reduzir e fixar cirurgicamente uma série completa de fraturas e luxações	Capaz de reduzir e fixar cirurgicamente uma gama completa de fraturas e luxações
Performs surgical reduction and fixation of a simple fracture	Reduz cirurgicamente e fixa uma fratura simples	Realiza a redução cirúrgica e a fixação de uma fratura simples	Realiza a redução cirúrgica e a fixação de uma fratura simples

Conclusion

The translation into Portuguese and the transcultural adaptation of The Orthopedic Surgery Milestone Project provide an instrument for assessing competencies suited to the Brazilian reality. This instrument can evaluate different aspects of knowledge and practice over the 3 years of specialization, seeking a better medical education. The translation of the Milestones assessment instrument into Portuguese was consistent with the original texts.

Authors' Contribution

Each author contributed individually and significantly to the development of this article. Castro, U. B.: review and intellectual concept of the article. Simão, K. F. R.: data analysis and interpretation and data writing. Gomes, G. R.: data analysis and interpretation as well as data writing. Egito, L. J. C.: translation and data writing. Figueiredo, S. D. F. A.: translation and data writing. Bispo Júnior, R. Z.: translation and article review.

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Conflict of Interests

The authors declare no conflict of interests.

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