

Hip fracture care—Latin America

Luis Gerardo Padilla Rojas, MD^{a,*}, Sergio Quintero Hernández, MD^b, José María Jiménez Ávila, MD^c, Roberto Enrique López Cervantes, MD^d, Rafael Amadei Enghelmayer, MD^e, Cesar Pesciallo, MD^f, German Garabano, MD^f, Madeline C. Mackechnie, MA^g, José Eduardo Quintero, MD^h, Kodi E. Kojima, MDⁱ

Abstract

Incidence rates of hip fractures in Latin America continue to rise. These fractures are associated with factors such as health, education, and socioeconomic status. Although there are many well-developed public and private healthcare systems available, the quality and consistency in the management of patients with hip fractures varies substantially.

This article provides a summary review of national hip fracture care guidelines in 4 of the largest countries in Latin America (Mexico, Colombia, Brazil, and Argentina), describing national guidelines, audits, standard treatment approaches in each country and regional policies; with the goal of understanding and comparing the different guidelines, identifying the main problems in each country, learning from the policies of the other countries, and developing improvement projects.

Keywords: fragility fracture, hip fracture, hip national guidelines, orthogeriatric fracture care, osteoporosis

1. Introduction

A rise in population and life expectancy has led to a growth in the elderly population worldwide. This has substantially increased the burden of noncommunicable diseases, such as osteoporosis, in individuals past the age of 65.^[1,2] This has led to a higher incidence of fragility fractures, particularly of the hip, which has had a significant economic impact on healthcare systems. Diagnostic interventions, treatment, and rehabilitation care are serious considerations that have contributed to the financial burden.^[3] With millions suffering from hip fractures annually, this epidemic has become a major public health problem.^[1,3] While the incidence of hip fractures, particularly in North American and European trauma care systems, has reportedly decreased, in contrast, incidence rates have significantly increased in parts of Latin America, linking fracture occurrences to

indicators such as health, education, and socioeconomic status.^[4] Despite the status of Argentina, Brazil, Colombia, and Mexico as middle- to upper-middle income countries, there is still an unequal distribution of wealth in these countries; and this has predisposed a significant proportion of their populations to conditions normally found in countries with lower GDPs.^[5] The lower the socioeconomic status of a country, the higher the morbidity and mortality rates, signifying the urgency of countries in Latin America to improve their healthcare systems to lower the burden of incidence.^[6,7] In addition, limited literature exists on the current state of hip fracture assessment guidelines across Latin America. Although there are generally many well-developed public and private healthcare systems available, fracture care assessments and management guidelines vary widely across countries and even across medical sectors. This article reviews national hip fracture care guidelines in 4 Latin American countries: Mexico, Argentina, Colombia, and Brazil to understand the existing healthcare systems with the goal to implement a uniform, official standard that can ultimately be adopted to improve patient outcomes.^[8]

2. Mexico

Life expectancy in Mexico has more than doubled over the last 7 decades, increasing from 36.2 years to 75 years of age, leading to a population of more than 10 million people aged 60 years or older.^[9] By 2050, this estimate will grow to an astounding 36.4 million, with a continued increase in life expectancy to 82 years of age.^[9] The increase in osteoporosis and fragility fractures has caused the number of hip fractures to rise from 29,373 cases in 2005 to an estimated 155,874 in 2050.^[9] Similarly, the estimated \$411 million USD cost for fragility fracture and osteoporosis treatment is projected to increase by 41.7% by 2020.^[10] At this rate, with an average cost of \$4365 USD per hip fracture, the burden of cost to the Mexican healthcare system will total just under \$100 million USD for acute treatment alone.^[11] Therefore, addressing hip fracture treatment is important and relevant in Mexico. Factors such as high costs, an increasing rate of incidence, a lack of prevention protocols, and long surgical wait times, are all factors that have led to hip fractures being named as a major public health problem in Mexico.

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^a Hospital Puerta de Hierro, Zapopan, ^b University of Guadalajara, ^c Centro Medico de Occidente, Instituto Mexicano del Seguro Social, ^d San Francisco de Asis Hospital, Guadalajara, Jalisco, Mexico, ^e Hospital Higa San Martín, La Plata, ^f Hospital Británico de Buenos Aires, Buenos Aires, Argentina, ^g Department of Orthopaedic Surgery, Orthopaedic Trauma Institute, Institute for Global Orthopaedics and Traumatology, University of California, San Francisco, CA, ^h Clínica de fracturas y fracturas Pereira, Pereira, Colombia, ⁱ Universidad de Sao Paulo, Sao Paulo, Brazil.

* Corresponding author. Address: Hospital Puerta de Hierro, Av Empresarios 150-903, Zapopan, Jalisco 45116, Mexico. Tel: +52 1 333 1064388. E-mail address: lupadilla@gmail.com (L. G. P. Rojas).

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2.1. Healthcare model

The healthcare system in Mexico is comprised of 2 medical sectors: the public health sector, composed of Secretaria de Salud (SSA) and Instituto Mexicano del Seguro Social (IMSS), and the private health sector. The public health sector is supported through government funding; however, only 2.5% of the Gross National Income is dedicated toward public health. On the private health sector side, treatment costs tend to be absorbed by various private insurance companies or high-income patients. According to Clark et al,^[10] in 2008, 54% of hip fractures were operated on at IMSS, 28% at SSA, and only 18% in the private sector.

2.2. Economic impact

On average, costs from the IMSS and SSA public health sector averaged between \$1612.70 and \$3921.10 USD, whereas the private health sector costs were significantly more, averaging between \$6206.30 and \$13777.70 USD.^[11] Despite the cost differences between the public and private medical sectors, there are national guidelines in place for hip fracture treatment across the Mexican National Health System. These guidelines were last updated in 2014 and imply that implementation of a regulated standard is theoretically in effect across public and private medical organizations. Yet, factors that are not regulated between public vs private health care still remain. Some examples include the following differences: surgery wait times average 5 to 15 days in a public hospital compared with a 12 to 48-hour window which is more commonly found at private hospitals; implant selections vary with quality and price due to budgetary constraints at public hospitals; and rehabilitation protocols are affected due to deficiencies in availability and strains on common resources in public hospitals.

2.3. National guidelines

According to the Mexican National Guidelines for hip fracture treatment, pre- and perioperative care includes the following: an average of 24 to 36 hours of surgery wait time after the trauma has occurred; oxygen levels should be kept stable; anesthesia should be administered for the patient; early removal of surgical drain; and the use of combined thromboprophylaxis with an intermittent compression pneumatic device and an antithrombotic low molecular-weight heparin for a 10 to 14-day minimum time period and for 35 days after the hospital discharge. If the surgery is delayed after the recommended 24 to 36 hours after the trauma, then the low molecular-weight heparin is recommended after admission and is to be suspended 12 hours before surgery. Currently, there is no recommendation in the guidelines to use thrombin inhibitors and factor Xa inhibitors on patients suffering hip fractures.^[12] In terms of postoperative care, treatment has been divided into 5 main stages: postoperative pain management; prevention of secondary fractures; depression assessment and treatment; fall prevention and rehabilitation protocols; and multidisciplinary patient management.

2.4. Trochanteric hip fractures

Trochanteric hip fractures have several prehospital guidelines outlined. This includes fluid replacement through venous peripheral access, before and during transportation to the hospital, with strict fluid control after arrival in the emergency room. Preoperative evaluation includes the following: evaluation

and treatment of comorbidities and using intermittent pressure or elastic socks to avoid venous thrombosis. Additionally, all patients with trochanteric fractures should be treated with surgery unless a contra-indication cannot be avoided. Surgery is recommended within the first 24 hours after the traumatic event. Surgically, for intertrochanteric fractures (31 A1 or 31 A2), the recommendation is to use a dynamic hip screw, and for more unstable fractures (31 A3), it is recommended to use second-generation trochanteric nails. A postoperative suction drain for 24 to 48 hours is also recommended. Regular surveillance and strict fluid control and electrolytes is advised, and in case of urine retention, a urinary catheter should be inserted.^[13]

2.5. Femoral neck fractures

Surgical treatment for femoral neck fractures involves total hip arthroplasty in patients 65 and older with a displaced intracapsular neck fracture (Garden type III or IV). Total hip arthroplasty is one method to promote improved functional outcome in this age group. Nonsurgical treatment is advised in patients greater than 80 years old with comorbidities and likely negative outcomes. Internal fixation with cannulated screws can be used in nondisplaced fractures and with good bone quality.^[14] The use of Spotorno y Romagnoli^[15] criteria is recommended to define use of the cemented or noncemented implant besides the comorbidity status. Additionally, it is recommended to perform total hip arthroplasty with a cemented stem in patients older than 65 years. This is an individualized decision determined by the physical status and comorbidities of the patient.^[15] A noncemented implant selection is made upon proximal femur anatomy confirmation established by a hip anterior-posterior radiograph. The acetabular implant recommendation is most often noncemented, unless the patient has poor bone quality; and in that case, a cemented cup with polyethylene is used. The use of cemented acetabular cups of ultra-high molecular weight polyethylene and cross-linked ultra-high molecular weight polyethylene are recommended.

2.6. Follow-up protocols

In general, there is no standard follow-up protocol; however, in the public health service, it is typical for follow-up to occur at 2-weeks, 4-weeks, and up to 3 months if complications are detected. In the case of a complication, the patient is referred to a family physician for the continuation of treatment. In contrast, in the private health sector, follow-up usually continues up to 12 months, and in some cases, follow-up may be recommended beyond the 1-year mark. However, in Mexico, only about 20% of patients have some type of secondary fracture prevention.^[9]

2.7. Hip fracture audits in Mexico

Currently, there are no provisions in the guidelines for national regulated audits; however, the National College of Geriatric Medicine and the Mexican Federation of Colleges of Orthopedics and Trauma are working on this initiative. Up to now, the large level 1 trauma hospitals are among the few institutions that have statistical and epidemiological data available. Since the last update to the hip fracture guidelines, which occurred in 2014, new major changes have been put in place, including a recommendation for early surgery, the use of regional anesthesia, secondary fracture prevention, early mobilization, weight-bearing ambulation, and increased benefits from interdisciplinary team management.

3. Argentina

Hip fractures are a very frequent result of osteoporosis in elderly patients. The number of osteoporotic fractures has increased in developing countries and is expected to double in Latin America in the next 50 years.^[16] As in the rest of the world, Argentina's population is increasing, due to an increase in life expectancy from 76.6 years of age in 2018 to 82 in 2050. Argentina's population is currently 45 million, and 52% are women. The percentage of older adults has increased from 3.9% in 1947 to 10% in 2018. This population increase is due to several factors: a sustained decline in fertility rates, which fell from 7 children per woman at the end of the 19th century to 2.2 children in 2008; a decrease in mortality rates, which changed from 17 per 1000 inhabitants in 1947 to 7.6 in 2008; and an increase in life expectancy from 40 years of age in 1947 to 76.6 years in 2018.

3.1. Epidemiology

In relation to population growth and current life expectancies, both the incidence of osteoporosis and the number of hip fractures treated has increased each year.^[17–21] Currently, the Argentinian health system treats 34,000 hip fractures per year (approximately 90 per day). Given the projected growth of older adults in the Argentinian population, these numbers are expected to double by 2050. In Argentina, the average annual rate of hip fractures is 298 per 100,000 women and 118 per 100,000 men 50 or older, with a female-to-male ratio of 2.5 to 1.

Another factor contributing to Argentina's higher prevalence of osteoporosis and hip fractures is its ethnic composition. Hip fractures are genetically predisposed because the population is predominantly white. The average duration of an admission for an uncomplicated hip fracture is 4 to 5 days in the private sector, and 5 to 7 days in the public sector. The total costs of treating 1 hip fracture in Argentina were calculated at \$5500 USD in 2014.

The progressive increase of the elderly population and the decrease in the fertility rate reported in Argentina will mean that by 2050, the number of economically active people will not be able to subsidize the health and retirement systems. Consequently, it is reasonable to assume that osteoporosis and hip fractures will have a significant economic impact for Argentina in the years to come. The best way to intervene in this future problem would be to take significant preventive measures against undiagnosed and untreated osteoporosis.

Through the Argentinian Ministry of Health, a series of actions to deal with this future problem have been outlined. Activities include education to the medical community, access to bone densitometry, educational campaigns in the mass media, specific nutrition campaigns, and the diffusion of physical exercise programs. But, what is most relevant is the creation of a comprehensive national health system for osteoporosis and hip fractures that will take into account the promotion, prevention, registration, and planning for hip fractures, and will set up protocol measures to ensure adequate treatment of these pathologies.

3.2. Healthcare model

The National Health System in Argentina is highly segmented and fragmented, and health indices vary enormously even where 2 geographical locations are compared within the same territory. The health system of Argentina is composed of 3 sectors that are not well integrated, and include: the Public Sector, composed of health centers that provide free care; the Social Security Sector,

which covers salaried workers and includes Programa de Atención Médica Integral, a program that is similar to Medicare in the United States; and the Private Sector, which includes Prepaid Medicine and Insurance for work accidents. These 3 sectors have many differences between them and, therefore, it is difficult to organize an integrated health system in Argentina that will be able to provide reliable statistical data.

3.3. National guidelines

Argentina is currently in the midst of providing training through the National Ministry of Health regarding hip fracture protocols. The general objectives of the training program are the following: to form a national network among professionals from different public and private centers; to generate multidisciplinary meetings among the following specialties that include traumatology, internal medicine, geriatrics, nutrition, endocrinology, anesthesiology, nursing, kinesiology, and others; to establish hip fracture quality-of-care indicators (for example, time to surgery, hospital stay, mortality, complications, postoperative care, etc); and to describe care protocols. If Argentina develops a national survey on preferences to treat hip fractures, they may find that it varies enormously according to the subspecialty of the surgeon and geographical location (including the variation in the availability of implants). The protocol of care suggested by the Argentinian Orthopedic Trauma Association for hip fractures would be the following: in cases of femoral neck fractures, treatment depends on whether the fracture is displaced or not; in Garden type 1 and 2 fractures, regardless of the age of the patient, the majority preference is to perform an osteosynthesis, either with cannulated screws or with a hip sliding system; in displaced neck fractures, where the chances of complications after osteosynthesis increase, the choice depends directly on the biological age of the patient (in young patients, osteosynthesis is preferred; in middle-aged patients, total arthroplasty; and in elderly patients, with little functional demand, partial arthroplasty is the preference); and in patients with trochanteric hip fractures, osteosynthesis is chosen in most cases, using the hip sliding system in stable fractures and cephalomedullary nails in patients with unstable or osteoporotic fractures.

In conclusion, supported by the considerable literature attesting to the health and economic benefits that would occur from a National Health System with nationwide protocols, Argentina would benefit from such standardized protocols for hip fractures.

4. Brazil

4.1. Healthcare model

There are 3 models of the Social Protection System in Brazil: Social Assistance, or the Residual System, in which care is determined by the purchasing power of individuals; thus there is the need for coverage for the dispossessed by the state, by philanthropy, or by charity; the Social Security or Meritocratic System, in which care is supported by the contributions of employees, employers, and the State and Social Security, and where the State seeks to guarantee the minimum vital service to all as a principle of social justice;^[22,23] and Brazil's Unified Health System (the SUS—Sistema Único de Saúde) which falls into the third and final medical sector and is characterized by universal coverage, with full coverage for the promotion of health and disease preventable patient rehabilitation. The Unified Health System is regionalized and hierarchically structured (i.e.,

organized at increasing levels of complexity) and uses decentralized management (i.e., political and administrative decentralization, with a single direction in each sphere of government).^[24]

4.2. National guidelines

The first guideline created was for proximal femoral fractures, published by the Federal Government in April 2018 and was implemented in all public hospitals under the SUS system.^[25] In 2011, the National Committee for Health Technology Incorporation, created by the Brazilian Government through a Federal Law and regulated by Presidential Decree, established new rules for the incorporation of technology and for the creation of guidelines in Brazil. Committee for Health Technology Incorporation's law requires studies on efficacy, safety, economic evaluation, and budget impact for new technologies and guidelines for specific procedures, diseases, and injuries. The Committee is responsible for advising the Ministry of Health in the incorporation or disinvestment of health technologies and guidelines for Brazil's unified health system. The Clinical Protocols and Therapeutic Guidelines aim to guarantee the best health care and resources available for the unified health system. The Clinical Protocols and Therapeutic Guidelines are the official guidelines in place that establish criteria for the diagnosis of diseases or health problems, recommend treatment including medicine and dosages, set recommendations for patient safety and care, act as the mechanism for clinical control, and monitor and verify therapeutic results from health professionals and SUS managers.^[25] Currently, the National Audit System is not at a level high enough to monitor performance adequately.

4.3. Preoperative and perioperative care

According to the Brazilian National Guidelines set up for occult fractures not diagnosed by simple hip radiographs on 3 views, MRI is the diagnostic method indicated to diagnose occult hip fracture.^[25] Analgesia is recommended initially with simple analgesics, such as paracetamol or dipyron, with regional nerve blocks for pain control after evaluation. The use of preoperative traction in patients with femoral neck fractures is not indicated. The creatinine test should be requested as a preoperative routine for all patients, and albumin should be requested after clinical evaluation.

4.4. Protocols for patients taking anticoagulation

The National Guidelines have not defined this protocol.

4.5. Timing of surgery

It is recommended that surgical treatment of proximal femoral fractures be performed as soon as possible, provided that the patient is clinically fit for the proposed surgery (either osteosynthesis or arthroplasty). It is recommended to avoid exceeding a period of 48 hours after the occurrence of the fracture.

4.6. Protocols for anesthesia

Scientific evidence collected did not show a significant difference in the outcomes for general or spinal anesthesia. Regional anesthesia is preferred since it presents a lower incidence of pulmonary complications and in-hospital mortality.

4.7. Implant choice

Nondisplaced femoral neck fractures are indicated for surgical treatment. Situations where surgeries are not indicated should be clearly defined and discussed by at least 2 orthopaedic surgeons. Displaced fractures of the femoral neck in patients over the age of 60 show better functional results and lower rates of reoperation when treated through arthroplasty compared with reduction with internal fixation. Unipolar and bipolar prostheses do not present significant differences in the patients' functional outcomes. Unipolar prostheses are recommended because they are more cost-effective.

For elderly patients with displaced femoral neck fractures in patients with coxarthrosis (hip arthrosis) and good cognitive ability (e.g., normal attention, judgment, reasoning, memory, and language) and favorable medical conditions, total hip arthroplasty should be indicated. For patients who have a partial community demand, that is, those who do not have good cognitive ability, but with favorable clinical conditions, partial hip arthroplasty should be indicated. The studies reviewed in the 2 guidelines did not present statistical and clinical differences between cemented and noncemented techniques. As the risk of causing fractures with uncemented implants is greater in the elderly population, cemented total hip arthroplasty is the best option for the treatment of elderly patients with displaced fractures of the femoral neck. No guideline was defined for trochanteric and subtrochanteric fractures.

4.8. Protocols for mobilization and rehabilitation

Early physiotherapy that occurs within 48 hours is recommended during the postoperative period, with continuity and supervision continuing from a physiotherapist. The recommendation is to start weight bearing as soon after the operation as can be tolerated.

4.9. Protocols for fall prevention and bone health screening

For the care and prevention of fractures, especially femoral fractures, in elderly patients, it is essential to apply nutritional status assessments with reliable tools, to assess patient food intake to monitor that the recommended nutritional requirements (DRI) are being fulfilled. To reduce the loss of bone mineral density and to reduce the risk of osteoporotic bone fractures, it is advised that the nutritional supplementation of Ca (1200 mg) and Vitamin D (600 IU) are prescribed. Considerations should be based on patient dietary intake, age, sex, skin pigmentation, and sun exposure, and it is recommended that patients without dermatological contraindications spend 15 minutes daily twice a week outside to contribute to adequate vitamin D production. Further, prophylactic measures should be considered for all patients who are already taking medication, or who potentially have a disease which can contribute to osteoporosis. Patients with femoral neck fractures due to bone fragility should be given bisphosphonates. These are contraindicated for patients with chronic renal insufficiency with creatine clearance ≤ 30 mL/min. Zoledronic acid is not indicated by the Brazilian Osteoporosis PDCT due to the lack of evidence of superiority to other bisphosphonates.

4.10. Protocols for follow-up of patients

In total and partial hip arthroplasty and osteosynthesis, DVT prophylaxis should be performed. Mechanical prophylaxis

should be used whenever there is contraindication to the use of anticoagulants. Prolonged drug prophylaxis is indicated after hospital discharge for a period of 28 to 30 days.

4.11. Key improvements

The preparation and approval of the National Guidelines is an improvement for Brazilian medicine, as it requires all hospitals providing treatment for SUS patients to follow uniform treatment guidelines. Another improvement is that there has been a decrease in waiting time for surgery, with surgeries performed closer to the recommended 48-hour window. In addition, the inclusion of new implants on the list of approved implants to be used in the SUS system has been influential in improving the quality of surgery. More hospitals are following the recommendations to start early mobilization and adhere to weight-bearing guidelines. More surgeons are aware of these recommendations and have begun taking proper precautions to avoid the risk of second hip fractures.

5. Colombia

Osteoporosis is a disease that reduces the density and quality of bones and increases the risk of fractures, especially among the elderly population.^[26,27] In Colombia, there is limited information and inadequate use of resources to estimate the costs of osteoporosis diagnoses, of hip fracture treatments, and for other associated fractures across the country. Although there are some universal ideal standards to treat hip fractures, such as wait times for surgeries to occur in the first 24 hours after hip fracture incidents, in actuality, there are no regulations or guidelines on how to manage hip fractures by the Colombian Ministry. Nor are there any multidisciplinary management groups in place, even though hip fractures are the most frequent pathologies found in Colombian public hospitals. The results are that varied forms of treatment and outside factors affect managing hip fractures and are decided on a case-by-case basis. Some contributing factors to the differences in surgery include: wait times that are affected by patients' health care providers (EPS) to authorize surgery and osteosynthesis materials, which can take from 5 to 15 days depending on the individual case; commercial implant availabilities; and different dependencies on anesthesiology teams to confirm the patient has no comorbidities.

5.1. Economic impact

Few studies have been conducted in Colombia to evaluate the economic impact on national treatments for hip fractures.^[28] One study conducted in 2015 by a team of 11 experts estimated that the national economic cost of diagnosing and adequately monitoring a patient with osteoporosis for 1 year was approximately \$186.00 USD.^[29] The cost at the time of a fracture of the hip that required surgical management was estimated to be \$2604.69 USD. Furthermore, the cost of surgically operating on a vertebral and distal radius fracture was estimated at \$3402.35 and \$695.29 USD respectively. Therefore, in 2015, the economic impact of treating hip fractures in Colombia was estimated to cost around \$61,641,706.00 USD.^[29]

5.2. Fixation methods

Because Colombia does not use the dynamic hip screw, all patients who suffer hip fractures are treated with trochanteric

nails. However, this method of treatment has gradually been decreasing due to complications and the need for multiple reoperations.

5.3. Hip fracture treatment

A general accepted treatment norm in Columbia is to repair intertrochanteric fractures with femoral trochanteric nails; however, a different treatment is utilized when the patient is suffering from coxarthrosis and a total hip replacement is performed. For femoral neck fractures, osteosynthesis is performed in patients under 60 years of age, and a total hip replacement is performed in patients over 60 years of age. Postoperative support begins within the next 24 hours, and the patient is sent to physical therapy after 8 days.

In Colombia, there is limited literature on the economic impact of osteoporosis and hip fracture treatment. Guidelines are needed for national hip fracture treatments and for osteoporosis management. Hip fractures are a serious problem for health systems, so it is important that recommendations be set in place under the supervision of a multidisciplinary team to reduce morbidity and mortality rates.

6. Conclusion

Osteoporotic fractures are a major epidemic worldwide, and hip fractures in particular are often associated with the worst outcomes.^[4,30] A progressively high number of osteoporotic fractures in Latin America, due to an increase in the elderly population, has resulted in an increase in morbidity and mortality rates and in higher costs for healthcare systems.^[1,30] Currently, because of limited treatment standards and incomplete literature and epidemiological data in Latin America, a few national guidelines exist within individual countries. Although there is no universal guideline that can address all the needs of each country, there are general methods that have proven to be effective across regions. Improving knowledge of existing treatment infrastructures, refining injury prevention strategies, and regulating quality assurance audits are 3 approaches that can help greatly mitigate negative incidence rates.^[31] In addition, a multidisciplinary team approach to hip fracture management during preoperative, perioperative, and postoperative stages has been shown to lead to more successful patient outcomes, such as faster patient recoveries and fewer surgical complications.^[6,8] There is a need for collaborative efforts among Latin American countries to establish and abide by standardized and effective diagnoses and treatment strategies.^[8] To that end, this paper outlines the individual healthcare systems found in Mexico, Argentina, Colombia, and Brazil and highlights the use for future infrastructure and treatment strategies and standardized recommendations throughout Latin America to strengthen national healthcare guidelines and improve osteoporotic care.

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