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Helton Luiz Aparecido Defino and Kai-Uwe Lewandrowski

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Spinal Disease Burden and Priorities of Community Spine Care in the Brazilian Public Health System vs the United States

HELTON LUIZ APARECIDO DEFINO, MD[1] AND KAI-UWE LEWANDROWSKI, MD[2,3,4]

[1]*Departamento de Ortopedia e Anestesiologia, Faculdade de Medicina de Ribeirao Preto, Universidade de Sao Paulo, Ribeirao Preto, SP, Brazil;* [2]*Center for Advanced Spine Care of Southern Arizona and Surgical Institute of Tucson, Tucson, AZ, USA;* [3]*Department of Orthopaedic Surgery, Department of Neurosurgery in the Video-Endoscopic Postgraduate Program, Universidade Federal do Estado do Rio de Janeiro — UNIRIO, Rio de Janeiro, Brazil;* [4]*Department of Orthopaedics, Fundación Universitaria Sanitas, Bogotá, DC, Colombia*

DISEASE BURDEN AND HEALTH SERVICE DELIVERY

Brazil is the largest country in South America. It is more than 8,515,767 km² (3,287,086 mi²) and is the world's fifth largest country. With a population of over 214 million, it is also the seventh most populous country, the largest Portuguese-speaking country in the world, and the only Portuguese-speaking country in South America. It is also one of the most multicultural and ethnically diverse Roman Catholic–majority (64.6%) nations due to mass immigration. One-fifth (21.9%) of the Brazilian population lives in São Paulo (SP) state (48 million), which also produces one-third (33.9%) of Brazil's gross domestic product. SP also has the second-highest Human Development Index and gross domestic product per capita globally and is wealthier than Argentina, Uruguay, Paraguay, and Bolivia combined.[1] Despite these riches, the public health care system in SP is strained by the high disease burden from low back and neck pain–related conditions. A comparison with data from the United States for all genders and ages shows a disease burden in Brazil related to musculoskeletal diseases and low back pain typical of industrialized countries (Figures 1 and 2). Despite lower numbers due to a diverse sociodemographic makeup of a younger population,[2–5] the Brazilian public health system is overwhelmed with the strong patient demand for costly modern and complex spine care. Waiting lists are standard, making delivery of current sophisticated treatments to many patients in need a day-to-day challenge for spine surgeons. The situation in less industrialized, more rural Brazilian states is not much better, and many patients with complex spinal deformity problems may have to be referred out of state to highly specialized tertiary university-based centers such as the University of São Paulo (USP) at Ribeirão Preto.

THE USP MODEL

The Medical School of USP at Ribeirão Preto (Faculdade de Medicina Ribeirão Preto—FMRP) is just 1 such regional medical center serving all of SP state and some municipalities in the surrounding states of Minas Gerais, Mato Grosso do Sul, and Parana. Since 1948, FMRP has had strong supporters in the Congress of SP state and government, which also encouraged the interiorization of higher education. Initially, there was a competition regarding faculty and resources with USP. In 1951, the first curriculum was finalized, and in December of that year, the government of SP approved the establishment of FMRP. Prof Zeferino Vaz was appointed as the first director, and he began to build a health service with dedicated faculty following the American Flexnerian model, which emphasized innovation, research, technology, subspecialization, and the separation of medical education from full-time clinical work.[6] This model was recommended by the Rockefeller Foundation—one of the principal financial backers at the time. The Pan American Congress of Medical Education called for integrating departments with full-time basic and clinical disciplines into a university hospital and limiting the number of highly qualified students.[7] This led to the formation of several departments that did not exist in other Brazilian medical schools, setting the stage for FMRP becoming one of the premier schools beyond the horizon of the USP system. Science and technology advances, improving diagnosis and treatment as well as economic, political, and social changes, led to several modifications to the Brazilian health system with a greater appreciation

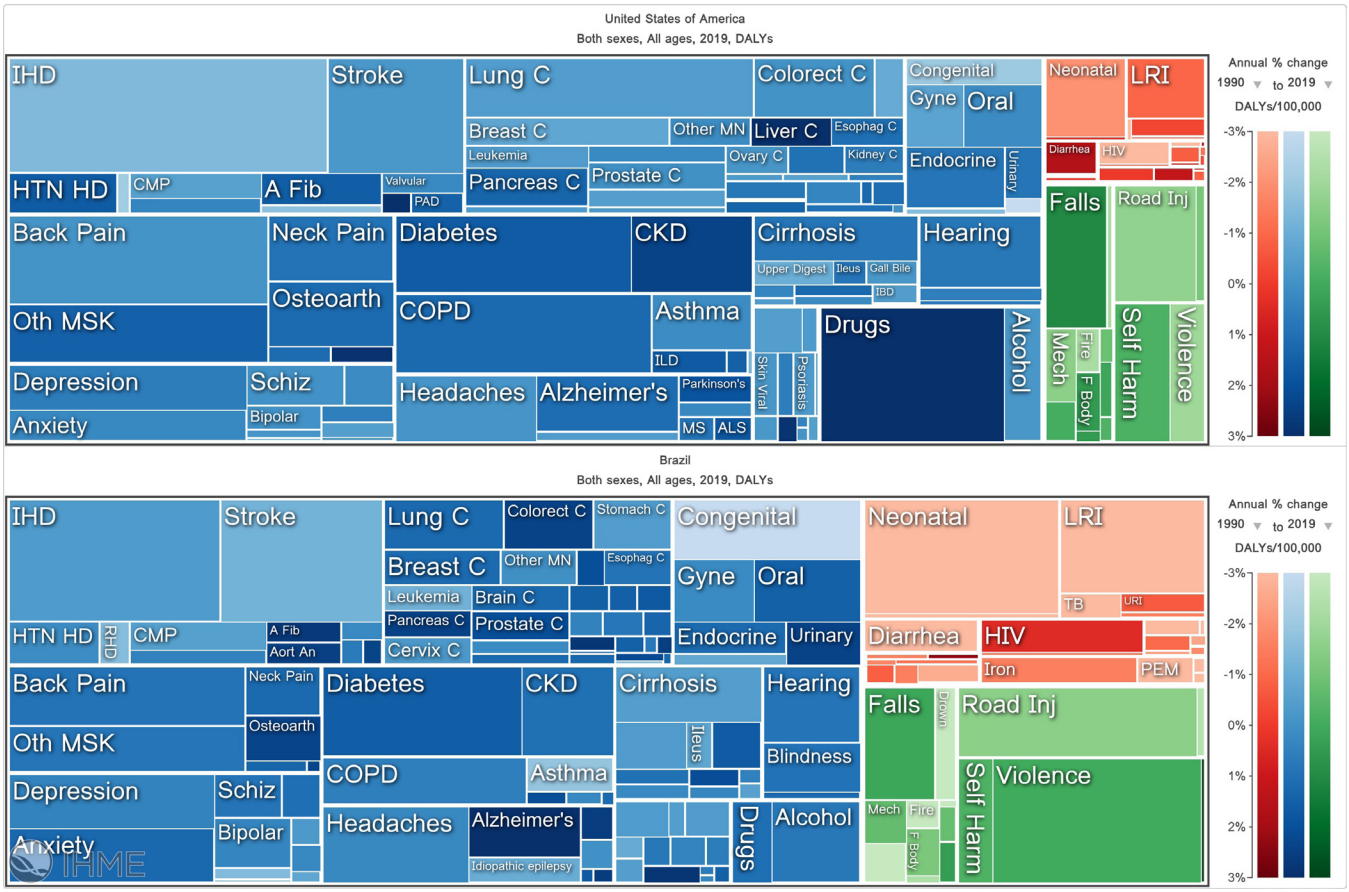

Figure 1. Illustrative tree map of causes and disease burden expressed in disability-adjusted life years (DALYs) and years lived with disability (YDLs) comparing 2019 data from Brazil and the United States for all genders and ages. DALYs for low back pain were 5.11% of total DALYs (4.11%–6.08%) with an annual change rate of –0.077%. The Brazilian 2019 low back pain was 3.11% of total DALYs (2.39%–3.89%) with an annual change rate of 0.095%. The 2019 YDLs numbers for the United States were 5,697,152.11 (7,474,689.77–4,114,138.91) and 2,044,102.33 (2,715,670.05–1,441,813.54) for Brazil. The YDLs data also show a higher percentage of disease burden due to low back pain in the United States (10.68%; 12.1%–9.38%) compared with Brazil (7.81%; 9.25%–6.51%). CKD, chronic kidney disease; CMP, cardiomyopathy; COPD, chronic obstructive pulmonary disease; HIV, human immunodeficiency virus; HTN HD, hypertension heart disease; IHD, ischemic heart disease; LRI, lower respiratory infection; MSK, musculoskeletal; RHD, rheumatic heart disease; TB, tuberculosis; PEM, postexertional malaise. *Source:* Institute for Health Metrics Evaluation. Used with permission. All rights reserved.

for the need for disease prevention and drug discovery. The construction of the new university hospital buildings in 1978 and 1979 provided the foundation for the infrastructure developments[8] with many extramural expansions that turned FMRP into what it is today—a center of excellence and a tertiary referral center for many departments, including the orthopedic spine unit (Figure 3). Since its foundation more than 60 years ago, many changes were made, including departmental and administrative restructuring, establishment of foundations,[9] and the addition of new postgraduate courses in physical, occupational, and speech therapy; nutrition; biological sciences; medical informatics; and the school of philosophy, sciences, and languages.[10]

Today, FMRP trains health professionals qualified to work within the hierarchy of the Brazilian health system. Formal training and credentialing guidelines have been established to ensure that FMRP graduates of medical, surgical, and multiprofessional residency programs provide an excellent level of health care. Many programs are not only competitive on a national level but also on an international level, particularly in Latin America. Through the university's extension courses, several of which contribute to the continuing education of professionals, FMRP is training students and researchers in earning their master's, doctorate, and postdoctorate degrees in several areas. FMRP also develops important research, thus contributing to the evolution of scientific knowledge. Through its cultural and extension activities, FMRP renews its social commitments with countless private and state organizations.[11]

FMRP SPINE EDUCATION

One of many continuing education courses offered at FMRP is the Endoscopic Spine Surgery Course, organized by the Department of Orthopedics and

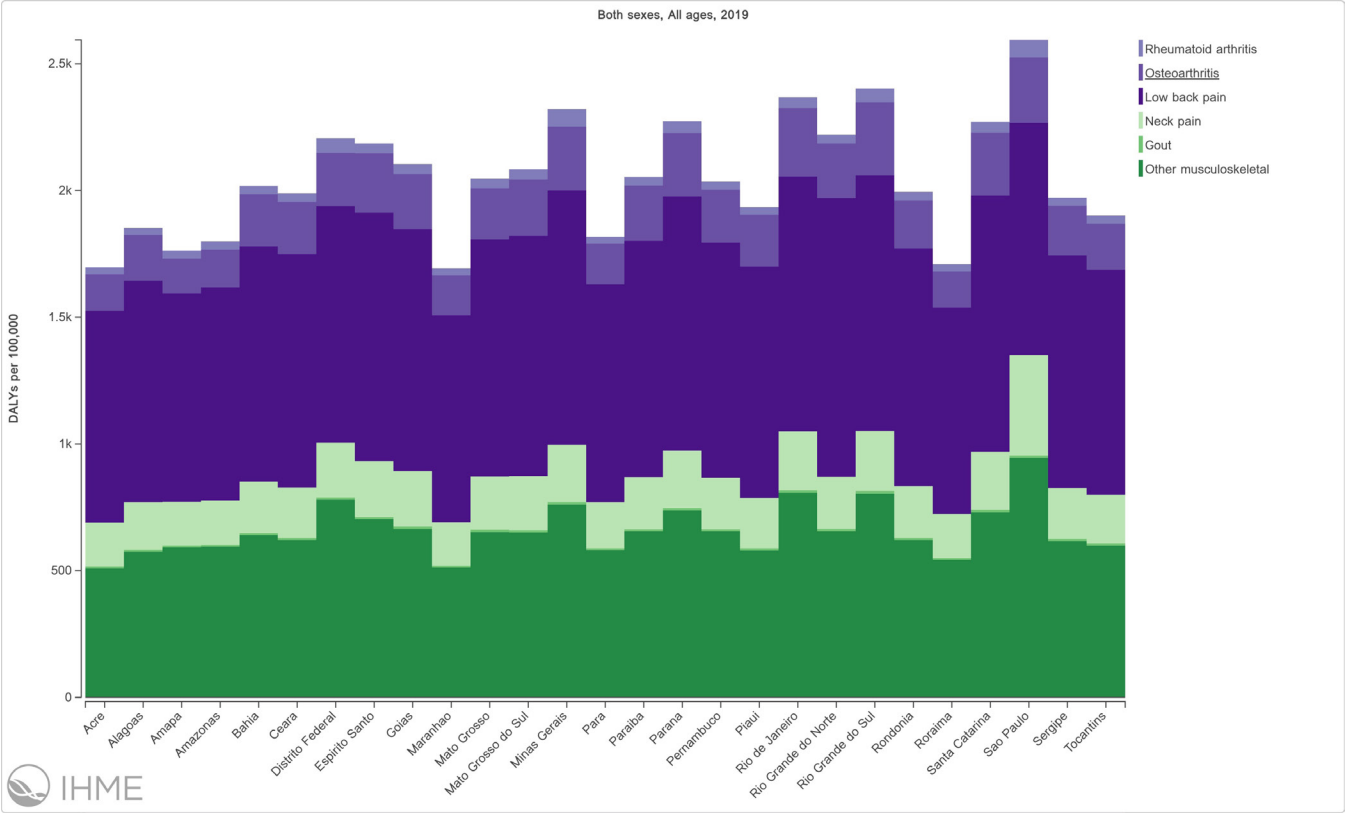

Figure 2. Illustrative cumulative box plot of causes and disease burden expressed in disability-adjusted life years (DALYs) comparing 2019 data from Brazil and the United States for all genders and ages. Across the board, the DALY rates for musculoskeletal diseases were higher in the state of São Paulo (SP) than in any other Brazilian state. By disease entity, the SP DALYs for low back pain were 905.44 DALYs per 100,000 persons (651.56–1236.67), neck pain 397.13 DALYs per 100,000 persons (260.16–582.01), osteoarthritis 256.97 DALYs per 100,000 persons (128.77–505.34), rheumatoid arthritis 70.66 DALYs per 100,000 persons (50.15–92.58), gout 9.97 DALYs per 100,000 persons (6.21–14.55), and all other musculoskeletal diseases 944.38 DALYs per 100,000 persons (651.25–1286.38). *Source:* Institute for Health Metrics Evaluation. Used with permission. All rights reserved.

Anesthesiology. This training pathway was organized with the objective of qualifying and credentialing spine surgeons to carry out this procedure. We recognized that it is challenging for practicing spine surgeons who graduated many years ago to satisfy the credentialing requirements at many hospitals and secure reimbursement by the Brazilian Public Health Service. A formalized university-based postgraduate training course was recognized to be the solution. The course consists of theoretical, practical modules and a discussion of clinical cases, and the course takes place over a 12-month period. Hands-on cadaver training, anatomical dissection, and live surgery observations are integral to the course . The course participants come from different regions of Brazil and, after completing their training, are presented with a graduation certificate that they can show to the credentialing bodies in their local communities. The FMRP Endoscopic Spine Surgery Course is very popular in Brazil, allowing graduating spine surgeons to implement this simplified spinal decompression procedure at a much higher and certified proficiency level in different regions of Brazil.

CLINICAL FOCUS AND SPINE RESEARCH AT FMRP

The Brazilian Unified Health System has limited resources to deal with the increasing number of patients seeking help with common degenerative conditions of the cervical and lumbar spine. Patients with complex spinal deformities are rarely treated in the community setting. They are referred to specialized tertiary care centers in universities, such as FMRP, which have more resources to receive complex treatments but also understand the process of managing the front-end process to meet medical necessity criteria for surgery prescribed by the Brazilian Unified Health System. However, long surgical waiting lines exist in spine surgery, which are still comparatively small compared with other specialties.[12] Therefore, simplified treatment strategies, such as endoscopic spine surgery, are attractive to our department as they allow us to treat many patients coming through our clinic with common degenerative lumbar and cervical spine conditions. Our basic biomechanics and clinical research focus on solving problems with the

Figure 3. Shown is an aerial view of the central campus of Faculdade de Medicina de Ribeirão Preto—Prédio Central, University of São Paulo (bottom), the original historic medical school buildings (Faculdade de Medicina) (top right), and the main entrance to the university hospital (top left).

surgeries that we are performing for the more complex spinal deformities to improve confounding factors that we can control as a surgical team so that the characteristics of these types of cases do not interfere with the dynamics and flow of treatment. One such article from our team was recently published in the *International Journal of Spine Surgery*.[13] It illustrates our efforts to perform these long surgeries by deploying our experienced surgeons with specialized deformity surgery training with good stewardship concepts in mind so that our university deformity program can continue despite the high costs of implants and technical resources, frequent readmissions, and reoperations due to the high percentage of complications. Orchestrating the many moving parts within a university hospital setting is essential for sustaining our program since the public health system does not fully reimburses all surgeries.

CONCLUSIONS

The timely delivery of modern spine care is challenging in Brazil. Chronic underfunding within the Brazilian Public Health Service delays care for common yet straightforward degenerative spine conditions and the surgical treatment of complex spinal deformities. In the face of substantial disease burden due to musculoskeletal and spine conditions, waiting times for deformity correction and degenerative spine care have been associated with clinical and radiological worsening; reduced corrective or healing potential, which create the need for more complex procedures, increased morbidity, and complication rates; increased anxiety of patients and parents; and lower scores on health-related quality-of-life questionnaires. Our university-based team's strategies to manage patients in this challenging environment are simplified spine care, problem-solving–oriented basic and clinical research, advanced surgical technique training, and good stewardship of the limited resources.

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Corresponding Author: Helton Luiz Aparecido Defino, Departamento de Ortoepedia e Anestesiologia, Faculdade de Medicina de Ribeirao Preto, Universidade de Sao Paulo, Ribeirao Preto, SP, Brazil; hladefin@fmrp.usp.br