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Sophia Luiz Calegaretti

5ª JORNADA DE INICIAÇÃO CIENTÍFICA FICSAE

5ª **Jornada de Iniciação Científica** FICSAE

📅 **7 de outubro, 2025**
8:30-18:00

📍 Formato presencial
Centro de Ensino e Pesquisa Albert Einstein

ALBERT EINSTEIN
INSTITUTO ISRAELITA DE
ENSINO E PESQUISA
CENTRO DE EDUCAÇÃO EM SAÚDE
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5th Scientific Initiation Journey

▍ABOUT THIS JOURNAL

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Contents

Welcome Address

We are proud to welcome you to the 5th Scientific Initiation Journey, a long-awaited and meaningful moment for our academic community. This event stands as a landmark in our academic and scientific journey, the result of collective dedication and perseverance shown by both students and mentors throughout the past months. This edition not only upholds a valuable tradition, but also strengthens our ongoing commitment to research, innovation, and interdisciplinary collaboration.

This year, we are especially proud to witness the active participation of students from a wide range of undergraduate programs across our institution. The diversity of academic backgrounds – including Medicine, Nursing, Dentistry, Biomedical Engineering, Physiotherapy, Nutrition, Administration and Psychology – enriches this event, fostering a truly integrative environment for the production and dissemination of knowledge.

Held at the Albert Einstein Teaching and Research Center - Cecília and Abram Szajman Campus, this edition symbolizes the growing maturity of our academic community, as well as our collective resilience in the face of recent global challenges. The works presented in this journey are the result of months – and often years - of rigorous investigation, critical mentorship, and academic perseverance. They reflect the relentless pursuit of understanding and the unwavering dedication of both students and faculty. Each abstract is an invitation to explore, to question, and to contribute to the ever-evolving landscape of science.

As we immerse ourselves in this celebration of science, may each idea shared here spark curiosity, dialogue, and future collaborations. We hope the 5th Scientific Initiation Journey becomes not only a memorable experience, but a source of inspiration for all – students, mentors, and the entire academic community.

Sophia Luiz Calegaretti
Student - Class 15, Medicine

Editorial

The role and importance of scientific training in medical school and other healthcare specialties

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The issue of scientific training – scientific initiation (SI) in Brazil – for medical students is as old as evidence-based medicine. It goes far beyond training a new generation of physician-scientists needed for the continuous advancement of human health care. Advancements that throughout the 20th century led to doubling the average life expectancy, by saving lives in childhood and prolonging life in adults and the elderly through prophylaxis and treatment of deadly diseases. Science training is crucial for medical students, as it equips them with fundamental skills for their careers. It fosters an inquisitive mindset that urges questions about the validity and appropriateness of any health intervention and enhances their ability to critically evaluate medical information. Scientific training helps them become better physicians by enhancing their critical thinking, problem-solving ability, and analytical skills. Furthermore, it prepares them for the constant need to stay up-to-date with advances in knowledge.[1,2]

Research training involves identifying gaps in medical knowledge compared to what is available in the scientific literature, formulating research questions, defining a working hypothesis and methodology, experimenting and analyzing the data generated, and critically interpreting results against the literature. Experience with all of these steps directly enhances critical thinking and problem-solving skills. Furthermore, the exchanges between undergraduate students, their advisors, and peers working on other aspects of the same scientific problem, and the presentation of their work at scientific conferences ultimately foster a more holistic mindset, enabling them to view the scientific problem in question within the context of the "big picture." An undergraduate research experience in the early years of school will equip students with tools for their clinical careers. By becoming proficient in research, medical students will better understand the scientific basis of diagnosis and treatment and will be trained to stay current with scientific discoveries, resulting in better patient care.[3-5]

The skills developed doing research are vital for medical practice, where physicians must constantly evaluate information, diagnose and make informed decisions about patients' lifes. Research training introduces students to the principles of evidence-based medicine, teaching them to critically evaluate the scientific literature, quality and rigor of studies, and the extent to which conclusions are supported by the results presented. It also teaches them how to incorporate research findings into their clinical practice. This is crucial in an era where medical information is constantly evolving and patients are increasingly exposed to online information, often of dubious quality. Exposure to research can spark a passion for discovery and encourage students to think critically about the "why" of medical practices. This can lead to innovative ideas and a desire to contribute to the advancement of medical knowledge, but most importantly, to the understanding that evidence-based medicine is the only way to ensure patients receive the best care.[6]

Research experience can make medical students more attractive to residency programs and improve their competitiveness for fellowships and jobs, both academic and in clinical practice. It also suggests a commitment to lifelong learning and professional development, which are highly valued by employers these days. Integrating research training into medical education can foster a culture of scientific inquiry and continuous improvement in the medical field. Research experience is not just an academic pursuit; it is an essential component of medical education that prepares students to be competent, curious, and innovative clinicians, ultimately benefiting both themselves and their patients.[7]

In summary, scientific training during Medical School is not a necessity only for those physicians who intend to pursue academic careers or to pursue research in industry, but is a fundamental factor in the training of all medical students and students in all healthcare in general.

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❚ **REFERENCES**

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Editorial

Jornada de Iniciação Científica: promoting research experience among undergraduates

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Scientific initiation is a term used in Brazil to refer to Undergraduate Research Experiences (UREs). Students join a research group and develop an individual project under the guidance of a mentor, typically a faculty member, researcher or other healthcare professional with a PhD. While these experiences are intended to cultivate critical skills in data collection, analysis, and interpretation, evidence suggests that students often devote most of their time to data collection and analysis, with limited engagement in understanding the broader context of the investigation or interpreting their findings.[1] Activities that foster deeper learning, such as discussion with mentors and peers about their research, engagement with relevant literature, as well as synthesis and presentation of their projects through poster, are highly recommended to enhance students' research experience.[1] In this context, participation in scientific events plays a crucial role by allowing students to formally present and discuss their research projects with peers and professionals, thereby enriching their educational and research process.

The *Jornada de Iniciação Científica* (JIC) – or Scientific Initiation Journey – is an institutional scientific symposium designed to undergraduate students at the *Faculdade Israelita de Ciências da Saúde Albert Einstein* (FICSAE). Since its inception, the JIC has been a cornerstone of the academic calendar, with its five impactful editions held in 2018, 2019, 2021, 2023 and 2025. Each edition provides students with an event to engage in research and to share their findings.

Organized by a committee composed of students and faculty, the JIC encourages undergraduates to submit abstracts of their research projects, regardless of whether results have already been obtained. This approach emphasizes the value of the scientific process itself, from its earliest stages. All submissions undergo a meticulous evaluation by at least two institutional

reviewers with research experience. Only abstracts receiving a mean score of 7.0 or higher are accepted for poster presentation. Additionally, the top 10 or 12 abstracts (depending on the edition) are selected for oral presentation, offering students an opportunity to public speaking experience. During the event, all posters and oral presentations are also evaluated by at least two institutional professionals, and awards are given for the best posters and oral presentations, celebrating excellence in research. Students not currently engaged in scientific initiation are also invited to attend the JIC as non-presenting participants, promoting a culture of scientific engagement across the institution. The program also features keynote lectures on emerging topics in health research, enriching attendees' academic and scientific knowledge.

With the expansion of FICSAE undergraduate programs, the JIC has seen a remarkable increase in the number of participants. The inaugural edition in 2018 included only students from Medicine and Nursing programs, who submitted 76 abstracts, 27 of which presented results. On the other hand, the 5th edition, held in October of 2025, received a record 236 abstracts, 96 of which presented results, from students across seven programs: Biomedical Engineering, Dentistry, Physiotherapy, Medicine, Nursing, and Nutrition. The 5th edition also featured multidisciplinary speakers, fostering dialogue on innovation and artificial intelligence, and enhancing collaboration skills essential for translating research into practice.

Since the 3rd edition in 2021, a significant milestone was introduced: the publication of accepted abstracts in a supplement of the einstein (São Paulo) journal.[2,3] This initiative provides students with valuable experience in academic publishing, reinforcing their participation in all phases of the research process. In 2021, the supplement included 2 editorials and 72 abstracts, regardless of whether they reported results.[2] In 2023, only abstracts containing results were accepted, resulting in a supplement with 55 abstracts and 2 editorials.[3] In both editions, one of the editorials was authored exclusively by students from the organizing committee.[2,3]

Feedback from JIC participants has been overwhelmingly positive, emphasizing the event role in enhancing student learning, particularly in poster design and communication skills. The program fosters scientific vocation, encourages emerging talent, and promotes critical thinking. It also provides a comprehensive understanding of their research projects, while preparing themselves for presentation, as well as discussing ideas and results with peers and experts.

In summary, the JIC plays a vital role in shaping the academic and scientific journey of undergraduate students. It underscores the importance of scientific research in professional training and celebrates the development of future leaders committed to scientific advancement and societal well-being.

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1. Linn MC, Palmer E, Baranger A, Gerard E, Stone E. Education. Undergraduate research experiences: impacts and opportunities. Science. 2015; 347(6222):1261757.

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Editorial

From student organizer to leader: the role of event planning in management skill development

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In common parlance, the term "event" often evokes images of celebrations, ceremonies, or large gatherings meant primarily for leisure. However, when considered in the academic environment, event planning can be understood as a pedagogical tool that fosters organizational, interpersonal, and leadership skills among students. Far from being limited to logistical tasks such as scheduling rooms, event planning becomes a formative process in which students learn to manage resources, coordinate teams, and handle unforeseen challenges. In this sense, organizing an academic or institutional event represents much more than an extracurricular activity: it is an opportunity to cultivate essential management skills that can shape future leaders.

The organization of events can be understood as a training ground for what Pierre Bourdieu[1] describes as a "managerial habitus." Just as the scientific habitus is gradually internalized through research practice, the managerial habitus is formed when students repeatedly engage in planning, negotiation, and leadership within real social contexts. This set of implicit dispositions begins to guide behavior and decisions in leadership situations – often unconsciously – while equipping students to act with greater confidence in professional environments.

This dynamic aligns with Alexander Astin's Theory of Involvement,[2] which highlights that student development depends not only on the promotion of extracurricular activities by institutions, but also on the degree of active participation of students themselves. The investment of time, cognitive effort, emotional energy, and physical presence fosters deeper learning, more solid skill acquisition, and significant personal growth. By engaging in such activities, students shift from a passive stance toward knowledge to becoming active agents of their own learning, building stronger connections with academic life, peers, professors, and professional networks.

The skills developed through this active involvement are diverse. They include the capacity to manage organizational demands – such as planning activities, setting priorities, and balancing time – as well as the ability to communicate and collaborate effectively, in which empathy and flexibility are central to handling interpersonal dynamics and resolving conflicts. Students also cultivate resilience and adaptability, essential for coping with pressure, overcoming setbacks, and maintaining motivation in challenging circumstances. Consequently, they conclude their academic journey with greater responsibility, self-confidence, and an internalization of values such as commitment – attributes that enhance their preparation for professional life.

Max Weber's distinction between the ethics of conviction (Gesinnungsethik) and the ethics of responsibility (Verantwortungsethik)[3] further illuminates the ethical dimension of student leadership. While conviction motivates students to act in accordance with ideals of collaboration and academic commitment, responsibility demands reflection on the concrete consequences of their decisions for peers, institutions, and communities. The interplay between these ethical orientations strengthens the formative character of event planning, requiring critical reflection and prudent judgment in the exercise of leadership.

Thus, the transition "from student organizer to leader" is not merely metaphorical, but a tangible process through which young professionals internalize values of responsibility, resilience, and collaboration. Event planning enables them to envision themselves not only as students, but as active agents capable of leading teams, managing complexity, and promoting transformation. In doing so, they contribute both to their personal development and to the consolidation of stronger academic communities and professional networks.

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▍ **REFERENCES**

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2. Astin AW. What matters in college? Four critical years revisited. San Francisco: Jossey-Bass; 1993.
3. Weber M. Ciência e política: duas vocações. São Paulo: Cultrix; 2004.

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Fernando Bacal

Physician with a medical degree obtained in 1989. Completed residency in Internal Medicine and Cardiology at the *Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo* (HC-FMUSP) and *Instituto do Coração, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo* (InCor-HC-FMUSP). Holds a PhD in Cardiology (1999) and a *Livre-Docente* from FMUSP (2005). Director of the Heart Transplant Unit at InCor and Vice President of Research and Innovation at *Hospital Israelita Albert Einstein* (since 2023). Former Professor of Internal Medicine at the *Faculdade Israelita de Ciências da Saúde Albert Einstein* (FICSAE) (2017–2022), and currently Associate Professor in the Department of Cardiopneumology at the *Faculdade de Medicina, Universidade de São Paulo* (FMUSP). His work focuses on heart failure, cardiomyopathies, myocarditis, heart transplantation, and immunosuppression. Served as Scientific Director (2020–2021) and Editor-in-Chief of the *Sociedade Brasileira de Cardiologia* (SBC). Member of technical committees at *Conselho Regional de Medicina do Estado de São Paulo* (CREMESP), *Sistema Nacional de Transplantes* (SNT), and *Coordenação de Aperfeiçoamento de Pessoal de Nível* Superior (CAPES) (2021–2023 term).

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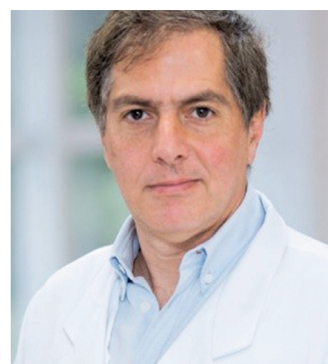
Nelson Wolosker

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Thomaz Rocha e Silva

Professor and researcher in the field of pharmaceuticals and biochemistry, with 17 years of experience in higher education. Currently affiliated with the *Faculdade Israelita de Ciências da Saúde Albert Einstein* (FICSAE) and the *Instituto Israelita de Ensino e Pesquisa Albert Einstein* (IIEPAE). His research focuses on xenobiotic metabolism, pharmacodynamics, and bioprospecting, with an emphasis on basic and translational research. His work aims at the discovery of new drugs — he is the holder of a patent — and the development of solutions for accidents involving venomous animals. He worked for 14 years in regulatory affairs for clinical research within the Research Ethics Committee/ National Research Ethics Commission (CONEP - *Comissão Nacional de Ética em Pesquisa*) system. He currently coordinates the *Comissão Própria de Avaliação* (CPA) at FICSAE. He has approximately 200 citations and is the author of a textbook. Holds a Bachelor's degree in Biology, a Master's in Biochemical Physiology from the *Universidade Federal de São Carlos* (UFSCar), a PhD in Cell Biology/Pharmacology, and a postdoctoral degree in Pharmacology from the *Universidade Estadual de Campinas* (UNICAMP).

Scientific Program

5th Scientific Initiation Journey
October 7, 2025

08:30 – 09:00 | Opening session

- Chairs: *Nelson Wolosker, Fernando Bacal*

09:00 – 09:30 | Keynote Lecture

Data Initiative for Analytics (DIAna): standardization models for interoperability in healthcare services

- Speaker: *Birajara Soares Machado*

09:30 – 10:00 | Invited lecture

Artificial intelligence and academic writing: challenges and opportunities

- Speaker: *José Belém de Oliveira Neto*

10:00 – 11:20 | Poster presentations & coffee break

11:20 – 12:50 | Oral presentation session

12:50 – 13:50 | Lunch break

13:50 – 14:20 | Invited lecture

Development of a digital design and 3D printing technique for occlusal splints and its applicability in the management of temporomandibular disorders

- Speaker: *Mayra Torres Vasques*

14:20 – 14:50 | Invited lecture

Bioprospecting and biotechnology: from the field to the bench, from the bench to the bedside

- Speaker: *Thomaz Rocha e Silva*

14:50 – 16:10 | Poster presentations & coffee break

16:10 – 17:40 | Oral presentation session

17:40 – 18:00 | Closing lecture

Precision health in the Brazilian Public Health System (SUS): how data and artificial intelligence can transform clinical practice

- Speaker: *Helder I. Nakaya*

18:00 | Awards ceremony
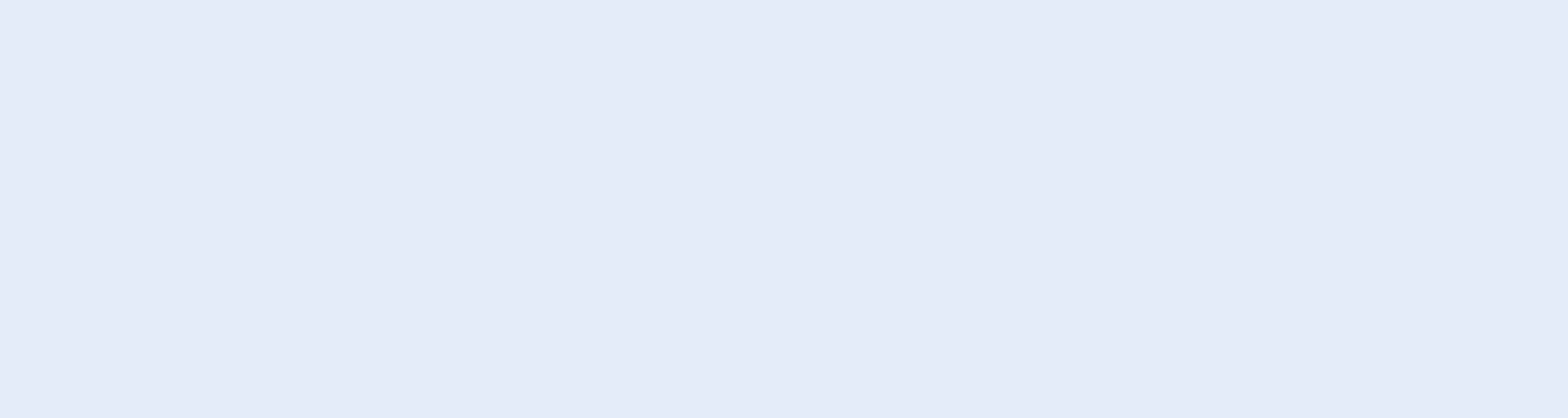
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Influence of physical activity on the association between musculoskeletal pain and sleep quality

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Introduction: Musculoskeletal conditions are the leading cause of global disability and have a high prevalence in the general population, especially among older adults. Patients with musculoskeletal pain are more likely to experience poor sleep quality, which can compromise quality of life. Regular physical activity provides numerous health benefits and is considered a protective factor against the development of various diseases. However, the influence of physical activity on the association between musculoskeletal pain and sleep quality remains poorly investigated.

Objectives: To investigate the influence of physical activity on the association between musculoskeletal pain and sleep quality in primary care patients.

Methods: This cross-sectional study was conducted with primary care patients from the Unified Health System (SUS - *Sistema Único de Saúde*) in the city of Bauru, São Paulo, Brazil. Musculoskeletal pain was defined as the presence of chronic low back pain or osteoarthritis. Physical activity was assessed using the Baecke questionnaire, with participants scoring at or above the 75th percentile classified as "Active." Sleep quality was measured using the Mini-Sleep Questionnaire. The association between musculoskeletal pain and sleep quality was analyzed with binary logistic regression, generating estimates of odds ratios (OR) and their respective 95% confidence intervals (95%CI). A significance level of 5% was adopted.

Results: A total of 557 participants were included (mean age: 70.0 ± 8.4 years). The prevalence of musculoskeletal pain was 72.2% (n=402). Among inactive participants, those with musculoskeletal pain were 2.3 times more likely to have poor sleep quality (OR=2.29 [95%CI=1.73 - 4.86]), in comparison to those without musculoskeletal pain. No significant association was found between musculoskeletal pain and sleep quality in physically active participants (OR: 1.85 [95%CI=0.88 - 3.93]).

Conclusion: The presence of musculoskeletal pain is associated with poor sleep quality in physically inactive individuals. This association was not observed in active participants, suggesting a potential protective role of physical activity. These findings highlight the importance of physical activity in the treatment of patients with chronic musculoskeletal conditions.

Keywords: Musculoskeletal pain; Sleep quality; Exercise

002

Judicial demands for prostate cancer treatment in Brazil: androgen receptor pathway inhibitors are an urgent public health problem

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Introduction: Brazil's public health system faces challenges in providing comprehensive care, particularly for patients with prostate cancer. Disparities persist due to economic constraints and delayed adoption of new treatment modalities. Consequently, patients often resort to legal action to secure access to essential medications and procedures, leading to a significant burden on the healthcare system. The pursuit of legal action has become so common, that it culminated in the creation of the NAT-Jus system, responsible for providing technical notes, medical documents which support judges' decision-making on the potential benefits of a particular technology for individual healthcare. Understanding the dynamics behind this judicial pursuit for oncologic care, through the analysis of said technical notes, is crucial for informing effective public health policies aimed at improving access to cutting-edge treatments and mitigating the financial strain on the government, therefore, enhancing quality and expectancy of life for patients struggling with prostate cancer.

Objectives: The study aimed at determining and quantifying the most common medical demands for prostate cancer treatment in Brazil, - and each of it's regions - as to identify gaps in services offered by the health system. A financial examination was conducted, to determinate the economic burden of judicialization in Oncology.

Methods: This cross-sectional study evaluated the technical notes corresponding to the lawsuits filed against Brazil's public health system from 2019 to 2023, regarding prostate cancer treatment. These demands were issued by the NAT-Jus, a division of the Brazilian Ministry of Justice, which aims at providing technical responses grounded in scientific knowledge to guide legal cases involving medical expenses. Data from the judiciary system was also obtained for further analysis. To better understand the implications of the data uncovered, medication costs were determined based on the CMED list of the Health Ministry, factoring in an 18% tax (PMVG - average government sales price). For currency conversion, a rate of US$ 1 to R$ 5.29 was applied within the manuscript. The quantitative and financial analysis of the information gathered was done both in a Nacional context, as well as individual assessments for each one the Brazilian regions. The same can be said for the modalities of treatment requested, as each category was discussed in detailed examples throughout the research. Since only anonymous public intel was considered for the writing of this essay, Institutional Review Board approval was not necessary for this study, following National Health Council (CNS - *Cartão Nacional de Saúde*) Resolution No. 510/2016, Article 2.

Results: A total of 3.136 technical notes were issued in legal cases involving prostate cancer patients, averaging to 70,4 years old. The majority (88,6%) sought access to medications, primarily Androgen Receptor Pathway Inhibitors (ARPIs), with abiraterone, enzalutamide, and apalutamide being the most requested. Abiraterone alone represented over half of all technical notes. Other drugs, like traditional hormonal therapies, chemotherapy, and theranostics were less common, but had higher approval rates, particularly the latter two. Procedural demands (10.2%) included diagnostic exams, surgeries (especially prostatectomies) and radiotherapy. Patients requesting procedures saw high success rates, second only to those seeking bone-protective agents. A small portion (1.2%) requested health products such as diapers and supplements, which were generally approved due to their simplicity and low cost. Total costs from successful claims during

the studied period reached BRL 267 million, with projected annual federal expenses exceeding BRL 783 million. As most of these medications are not included in RENAME (National List of Essential Medications), and are therefore not routinely distributed, the per-unit cost when obtained through litigation is increased, amplifying the economic burden of legal action. Geographically, most TNs came from Brazil's South and Northeast regions. Medication requests dominated all regions except the North, which had fewer cases overall. The South led in ARPI demands, while the Southeast and South showed greater interest in high-cost treatments like immunotherapy. Procedural requests were more frequent in the Northeast and Central-west. Disparities in access and spending reflect broader socioeconomic inequalities across regions and may also stem from differences in population distribution and diagnostic infrastructure.

Conclusion: Growing legal demands for prostate cancer treatment exposes gaps in Brazil's public health policies and drives unsustainable spending, reflecting regional disparities. Therefore, the pressing need for strategic interventions is clear: collaboration among government entities, the scientific community, the judiciary system, and patient advocacy groups is essential to formulate effective solutions.

Keywords: Judicialization; Prostatic neoplasms; Brazil; Androgen receptor antagonists

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003

Patient satisfaction with gynecologic oncology consultations: in-person visits or telemedicine?

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Introduction: The COVID-19 pandemic accelerated the adoption of telemedicine, underscoring its potential to improve access to healthcare. In general, telemedicine may reduce travel burdens and costs, benefiting patients in resource-limited settings. However, understanding patient satisfaction and identifying barriers to its implementation remain critical, particularly within Brazil's public healthcare system.

Objectives: The objective was to assess and compare the satisfaction of gynecologic oncology patients attending telemedicine and in-person visits, identify barriers to telemedicine use, and understand healthcare professionals' perceptions on the topic.

Methods: A pilot study was conducted at the gynecologic oncology outpatient clinic of *Hospital Municipal Gilson de Cássia Marques de Carvalho*, in São Paulo, Brazil. Patients aged ≥ 18 years with gynecologic cancer were recruited. The Patient Satisfaction Questionnaire-18 (PSQ-18) was translated and adapted to the Brazilian public health context. Data collection involved REDCap and semi-structured telephone interviews with patients and physicians. Satisfaction levels between telemedicine and in-person consultations were analyzed using descriptive and inferential statistics. Due to the limited sample size, we performed comparisons between in-person and telemedicine consultations regarding satisfaction questionnaire responses using Fisher's exact test. Statistical analyses were conducted using SPSS and R software, with a significance level set at 5%.

Results: Endometrial cancer was the most common diagnosis, especially among in-person patients (55.6%), while cervical cancer predominated in the telemedicine group (50%). Most consultations involved delivering sensitive information, with "bad news" more frequent in-person (22.2%). Consultation duration was comparable (3h in-person vs. 4h telemedicine), though telemedicine reduced additional costs (14.3% *versus* 77.8%).

Physicians reported that consultation objectives were achieved in 100% of telemedicine cases and 75% of in-person ones. Patient understanding was also higher in telemedicine (100% *versus* 75%). PSQ-18 responses favored telemedicine, with less agreement on negative statements. Qualitative interviews highlighted convenience, reduced travel, and perceived autonomy. Some patients preferred video over audio to enhance

connection; concerns included lack of physical exams and emotional cues. Professionals endorsed telemedicine for appropriate cases, particularly for patients with limited mobility. Video was preferred over audio for clinical assessment. Limitations included the inability to perform physical exams and challenges in delivering bad news remotely. Remuneration parity with in-person care was also supported.

Conclusion: These findings highlight telemedicine's potential to improve healthcare access and without sacrificing patient satisfaction within Brazil's public system. Identifying barriers and optimizing service delivery are crucial for its successful implementation. This study provides insights for policymakers, supporting the integration of telemedicine into gynecologic oncology care in settings with socioeconomic disparities.

Keywords: Gynecological cancer; Gynecologic surgical procedures; Telemedicine; Patient satisfaction

004

Radiological profile of 18,430 vascular anomalies: incidence and demographic distribution in an adult population

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Introduction: Most studies on focusing on the prevalence of vascular anomalies are either aimed to determine the individual occurrence of a specific type among known bearers of abnormalities or propose an estimation of prevalence for the general population by extrapolating from the paediatric population.

Objectives: In this scenario, we intended to assess the profile of vascular anomalies in a group of patients subjected to imaging studies, throughout a long period of time, to evaluate the frequency of abnormal findings in a consecutive, nonselected population.

Methods: This is a retrospective review of 996,569 computed tomography and magnetic resonance studies between 2009 and 2019. Findings were grouped as vascular tumours (hemangiomas; vascular tumours), cavernomas, and vascular malformations. Positive findings were evaluated with regard to patients' demographic characteristics and anatomic distribution and the subset of vascular malformations was also evaluated with regard to size, classification in accordance to flow pattern, and Hamburg Classification.

Results: Eighteen thousand four hundred thirty positive examinations were evaluated (mean age, 55.82 ± 15.43 years; 8,188 men). Vascular anomalies were present in 18.49 per 1,000 examinations (17.41 hemangiomas; 0.69 cavernomas and 0.39 vascular malformations per 1,000 examinations). Hemangiomas and cavernomas were homogeneous in anatomic location between sexes throughout the age groups. Complex malformations were heterogeneous in anatomic distribution between the sexes in each age group, with intracranial findings decreasing for female patients in older groups.

Conclusion: Vascular anomalies were found in 18.49 per 1,000 examinations. Hemangiomas and cavernomas were homogenously distributed, whereas complex malformations displayed a heterogeneous anatomic distribution pattern between sexes in each age group.

Keywords: Hemangioma; Vascular malformations; Prevalence

005

Does continuous erector spinae plane block combined with PCA reduce opioid use and pain after robotic thoracic surgery?

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Introduction: Lung cancer is the second leading cause of death worldwide, accounting for 13% of all cancer cases. Pulmonary resection remains the standard surgical treatment, and robotic-assisted thoracic surgery (RATS) has gained popularity due to its minimally invasive nature, improved visualization, and better postoperative outcomes. Postoperative thoracic pain is often intense and linked to nerve damage and inflammation, leading to complications like hypoxia and arrhythmias. Traditionally, opioids have been the mainstay of postoperative pain control, but their use is associated with serious adverse effects and the risk of dependence, especially amid the current opioid crisis. Enhanced Recovery After Surgery (ERAS) protocols advocate for multimodal, opioid-sparing analgesia. One promising technique is the erector spinae plane (ESP) block, which will be explored in the following study.

Objectives: The present study aims to compare different ESP blocks and multimodal anesthesia seeking less use of opioids and better postoperative pain management in patients undergoing anatomical lung ressections.

Methods: This prospective study is an amendment to the main project entitled: 'Can robotic surgery reduce the disparity in outcomes of pulmonary resections observed between public and private healthcare?' (Main researcher: Dr. Ricardo Mingarini Terra; Executing researcher: Dra. Bruna Brandão de Rezende). Therefore, this study includes patients who underwent robotic anatomic lung resections due to early-stage lung cancer in two settings: RATS in the public hospital (*Hospital Municipal Gilson de Cássia Marques de Carvalho*) and RATS in private hospital (*Hospital Israelita Albert Einstein*). Patients either received a continuous spinal block with ropivacaine and intravenous patient-controlled anesthesia (PCA) with morphine on demand (CSB-PCA) in the private hospital, or a single-shot spinal block with ropivacaine and intravenous morphine (SSSP-ODM), if necessary, in the public hospital. Pain was assessed using the Numerical Pain Scale (NPS) at 12, 24 and 48 hours postoperatively. Morphine dosages were recorded at the same intervals. This study had perioperative and postoperative data gathered and analyzed with Mann-Whitney test and Backwise multivariable linear regression model.

Results: This preliminary analysis included 37 patients: 67.6% in the CSB-PCA group and 32.4% in the SSSP-ODM group. The SSSP-ODM group presented higher NPS scores in the first 12h (p=0.0147) and 24h (p=0.0107), not showing significant difference at 48h. In our multivariable linear regression analysis (R^2=48.2%), both the type of anesthesia and early postoperative pain were independent predictors of total morphine consumption at 48h. Meanwhile, the CSB-PCA group used, on average, 9.8mg more morphine than those who received single-shot anesthesia (p=0.013), regardless of their pain intensity at 12h. Additionally, each point of pain at 12h increased morphine consumption by 2.9mg (p<0.001).

Conclusion: The CSB-PCA protocol improved early postoperative pain control but required higher morphine doses, suggesting more precise opioid titration. Pain may have been undertreated in the SSSP-ODM group due to limited opioid use and population differences. These preliminary results need further investigation with larger sample sizes to validate findings.

Keywords: Anesthesia; Spinal; Pain management; Robotical surgical procedures; Lung neoplasms

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006

Health-related quality of life over five years following liver transplantation in Brazil: a retrospective cohort analysis

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Introduction: Liver transplantation (LT) is the standard therapeutic approach for patients with end-stage liver disease, providing significant gains in both survival and health-related quality of life (HRQoL). In Brazil, the Unified Health System (SUS - *Sistema Único de Saúde*) manages the largest public transplantation program globally, ensuring broad access to this complex intervention. Liver transplantation is a multifaceted process that includes patient referral, clinical evaluation, waiting list management, surgical intervention, and lifelong follow-up. Given the high clinical and economic burden associated with LT, assessing long-term outcomes-particularly those reported by patients-is essential. Among these, HRQoL has emerged as a crucial indicator of post-transplant recovery, reflecting not only clinical stability but also functional status and psychosocial well-being. This study aimed to evaluate HRQoL before and after liver transplantation in a cohort of patients followed from 2018 to 2022 at a referral center in São Paulo, Brazil.

Objectives: To assess HRQoL at different time points during the follow-up of patients undergoing liver transplantation, from the pre-transplant period up to five years post-transplant, using the EQ-5D-3L instrument.

Methods: This was a retrospective cohort study conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. It included adult patients (≥18 years) who underwent elective liver transplantation between January 2018 and December 2022 at the *Hospital Israelita Albert Einstein* (HIAE), São Paulo, Brazil. Patients with acute liver failure, multivisceral transplants, early mortality (within six months), extended loss to follow-up, or incomplete records were excluded. A total of 256 patients were analyzed. Data included sociodemographics, clinical history, and quality of life (QoL), assessed pre- and post-transplant using the EQ-5D-3L instrument. Annual reassessments were performed over a five-year follow-up. Statistical analyses were conducted using SPSS and STATA software. Mixed-effects linear regression models evaluated factors influencing QoL. The study was approved by the ethics committees, adhering to Brazilian national research ethics guidelines.

Results: This retrospective cohort study analyzed 256 liver transplant recipients from a Brazilian referral center, with follow-up up to five years. Health-related quality of life was assessed using the EQ-5D-3L instrument at multiple time points. At baseline (pre-transplant), the mean utility score was 0.631 (±0.213), indicating moderate perceived health. Post-transplant, HRQoL scores improved significantly, especially in the first two years. However, by the fifth year, a slight decline was observed, though scores remained higher than baseline. Men reported higher HRQoL scores than women (mean difference = +0.056), and patients with hepatocellular carcinoma had better HRQoL outcomes compared to those with non-alcoholic steatohepatitis or familial amyloid polyneuropathy. Time, gender, and underlying diagnosis were statistically significant predictors of HRQoL. The results demonstrate a clear positive impact of liver transplantation on patients' quality of life, particularly in the early post-transplant period, with sustained though slightly reduced benefits up to five years. These findings highlight the importance of long-term monitoring and tailored interventions to support sustained HRQoL improvements in transplant recipients.

Conclusion: Liver transplantation significantly improved patients' health-related quality of life, with the greatest gains observed in the first two years post-transplant. Despite a slight decline over time, HRQoL remained

higher than pre-transplant levels throughout the five-year follow-up, confirming the long-term benefit of transplantation from a patient-centered perspective.

007

Use of mesenchymal stem cells in facial bone tissue regeneration: an overview of the present

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Introduction: Tissue engineering and regenerative medicine aim to restore damaged structures using stem cells, scaffolds, and growth factors. Mesenchymal stem cells (MSCs) stand out due to therapeutic potential and fewer ethical concerns than embryonic cells. Mesenchymal stem cells are multipotent, capable of differentiating into bone, cartilage, and adipose tissue, with self-renewal and responsiveness to biological signals-key features for regeneration. In craniofacial and maxillofacial repair, MSCs offer alternatives to autografts and allografts, still standard despite limitations. Studies highlight their chondrogenic potential, supporting application in temporomandibular joint (TMJ) disorders and promoting structural recovery. In congenital defects like cleft lip and palate, where the alveolar process and palate are underdeveloped, MSC-based therapies outperform bone grafts or BMPs. This review discusses MSC use in craniofacial bone regeneration, with emphasis on TMJ conditions and congenital anomalies. It also examines regenerative mechanisms, including Wnt signaling, that underpin MSC efficacy and support future clinical translation.

Objectives: This review aims to map the current state of evidence on the use of MSCs in craniofacial rehabilitation surgeries by assessing the available evidence regarding their effectiveness and highlighting existing gaps in the literature that may guide future research.

Methods: This systematic review followed PRISMA guidelines to evaluate the use of MSCs in craniofacial rehabilitation surgeries. The research question was: What is the quality and quantity of bone regeneration following the use of mesenchymal stem cells during surgical rehabilitation procedures in patients with craniofacial anomalies? The PICO framework guided the study design. The population consisted of patients with craniofacial anomalies; the intervention involved MSC use; the comparator included conventional surgeries without MSCs; and the outcomes assessed were bone regeneration quality and quantity. Searches were conducted in PubMed, Cochrane Library, and BVS databases using Boolean operators to combine relevant descriptors. Gray literature was also included. Only full-text studies in English, Portuguese, or Spanish were considered. Inclusion criteria comprised studies applying MSCs in surgical bone regeneration with at least one objective assessment. Exclusion criteria included insufficient data, unclear methodology, inaccessible full texts, and reviews.From the records retrieved, 10 were selected for full-text review. After screening, three studies met all inclusion criteria. Two reviewers screened independently, with a third resolving disagreements. Data extraction focused on study design, patient details, MSC source, delivery method, evaluation tools, and outcomes. The structured approach ensured transparency and reliability.

Results: Three clinical case studies met the inclusion criteria and were analyzed. Each explored the application of MSCs in craniofacial bone regeneration using different MSC sources and scaffold materials, compared with conventional grafting techniques. The first case study investigated deciduous dental pulp stem cells (DDPSCs) combined with hydroxyapatite-collagen scaffolds for alveolar cleft repair in six pediatric patients. Bone formation reached 75.6% after six months and was comparable to iliac crest graft

outcomes at 12 months. Deciduous dental pulp stem cells -treated patients experienced fewer complications, reduced morbidity, and successful dental eruption in 66.7% of cases. The second case study applied nasal septum-derived chondroprogenitor cells via intra-articular injection to treat mandibular condylar resorption. Over a 12-month follow-up, patients showed significant pain reduction, improved mandibular function, and structural regeneration confirmed by imaging. No adverse effects were reported, indicating the procedure's safety and regenerative efficacy. The third case study evaluated bone marrow-derived MSCs (BMSCs) seeded on resorbable collagen sponges in 21 cleft patients. Regenerative outcomes were comparable to iliac crest bone grafts, but the MSC approach resulted in significantly lower donor site pain, less scarring, shorter hospitalization, and reduced procedural costs. Most procedures were completed in outpatient settings. Overall, the three case studies demonstrated that MSC-based therapies yield bone regeneration outcomes equivalent or superior to conventional methods. Benefits included decreased invasiveness, fewer postoperative complications, and enhanced patient recovery. These findings support the clinical viability of MSCs as an alternative for craniofacial bone reconstruction, particularly in conditions such as alveolar clefts and temporomandibular joint degeneration, offering biologically integrative and patient-centered therapeutic options.

Conclusion: MSC-based therapies demonstrated effective, safe, and minimally invasive alternatives for craniofacial bone regeneration. The reviewed case studies highlight their potential to replace conventional grafts, reducing morbidity and improving outcomes in alveolar clefts and TMJ conditions, while supporting future personalized regenerative protocols.

Keywords: Mesenchymal stem cells, Tissue engineering, Bone regeneration, Craniofacial rehabilitation

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008

Passive use of alternative tobacco products and health risks

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Introduction: Electronic nicotine delivery systems (ENDS), hookah, and bidis pose known harm to users, but the health risks of their secondhand exposure are still poorly understood.

Objectives: To evaluate existing evidence on the health impacts of passive exposure to these products.

Methods: We systematically reviewed original human studies on clinical or biologic effects of secondhand exposure to ENDS, hookah, and bidis (inception-December 2024) in Cinahl, Web of Science, Scopus, PubMed, Cochrane, and Embase. Randomized Controlled Trials, cohort, case-control, cross-sectional, and experimental designs were eligible. Two authors independently assessed risk of bias using an adapted Newcastle-Ottawa scale. Study quality was rated as good, fair, or poor based on risk of bias, study design, and methodological rigor.

Results: Of 8,810 articles, 20 were included (10 cross-sectional, 2 case-control, 7 experimental, 1 cohort). Twelve studied secondhand e-cigarette exposure (5 good quality, 4 fair, 3 poor), showing increased ear infections, mental health issues, asthma diagnoses

and exacerbations, as well as nose/throat symptoms and heightened inflammatory markers. Six examined hookah (3 good, 3 fair), finding higher urinary levels of benzene, toluene, and other toxicants/carcinogens, as well as increased risk of childhood cancer and COPD in women. One study (poor quality) linked passive bidis to lung cancer; another (poor quality) linked heat-not-burn products to elevated volatile organic compounds and particulate matter.

Conclusion: Due to heterogeneity, meta-analysis was not feasible. However, the aggregated evidence suggests secondhand exposure to these products is hazardous and should be considered when devising public health policies.

Keywords: Electronic nicotine delivery systems; Tobacco smoke pollution; Water pipe smoking; Health effects; Tobacco products

SGPP Number: Not applicable.

CAAE Number: Not applicable.

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009

Machine learning model selection for predicting movement intention related to gait in users simulating post-stroke rehabilitation patients using inertial sensors

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Introduction: Stroke can lead to gait impairments and increased risk of falls, making effective rehabilitation essential. Although traditional methods exist for assessing motor recovery, many are exhausting, require controlled environments, and are costly. Assistive technologies have been explored as viable alternatives, with Inertial Measurement Unit (IMU) sensors standing out for enabling the collection of acceleration and angular position data in an accessible and portable way. This project proposes the use of wearable devices equipped with IMUs to monitor and predict movement intention during gait in individuals simulating post-stroke conditions. The collected data feeds artificial intelligence models, focusing on reducing the number of input variables required for accurate predictions. This approach aims to support more efficient, accessible, and personalized rehabilitation, benefiting both healthcare professionals and patients throughout the recovery process.

Objectives: The main objective of this work is to use machine learning to assess the user's movement intention during gait to predict intention to move and select the minimum number of sensors that can detect the intent, focusing on users simulating post-stroke patients.

Methods: A 3D model was developed integrating an MPU-9250 sensor, a TP4056 battery controller, a 250 mAh battery, and an ESP32. With the hardware finalized, the data from the sensor was validated using information collected with the robot UR20, which performed an experiment where the device rotated along different axes with the robot. The data collection was carried out with the sensor fixed to the end of the robot arm, which varied its angle along a defined axis in 10-degree increments, ranging from 0 to 90 degrees. The interval between movements was 7 seconds.

With the sensor validated, the next step was to conduct a preliminary data collection simulating the paretic gait of post-stroke patients. Four positions were tested: the two front pockets and the two back pockets. To enhance the variability and representativeness of the movement, four IMUs were used simultaneously, positioned in the pockets, and the walking path was designed to include a straight segment, an obstacle avoidance maneuver to the right, and another to the left. Finally, the collected data were used to train Machine Learning models, with the input being the raw data from the accelerometers and gyroscopes from the IMU.

Results: Using the data collected from the sensor and the robot, tests were conducted to evaluate the error between measurements and the reproducibility of the experiment. To this end, box plot graphs based on the average of three repetitions of the experiment were generated, which showed an error lower than half a degree when compared to the information collected from the robot. Additionally, a Student's t-test analysis was performed to compare the error between windows,

aiming to determine whether excessive collection time could impair the accuracy of the results. The test revealed a statistically nonsignificant difference ($p < 0.01$) between the lowest and highest errors.

The data collected from the post-stroke gait experiment were used to train a Random Forest model with a hyperparameter of 100 estimators. The overall accuracy for both subjects remained at 0.4, which is low; however, it is essential to note that this is a multi-class classification task, and accuracies are typically interpreted differently. Specifically, it is more important to examine class-specific metrics, such as the F1-score. Results for subject 1 showed an F1-score of 0.63 for the turning left task, 0.35 for turning right, and 0.11 for going straight. Meanwhile, subject 2 achieved the F1-scores of 0.47, 0.39, and 0.27 for the tasks of turning, going straight, turning right, and turning left. These results indicate that turning maneuvers-especially turning left-were easier to distinguish for the collected subjects, but additional data are needed to improve generalization. To address these issues, future work will focus on increasing the dataset size by adding more samples per subject and more subjects, applying techniques to balance class distribution, and exploring feature engineering strategies or more complex architectures (e.g., deep learning models) to enhance classification performance.

Conclusion: With the sensor validated and preliminary models trained, the next steps include conducting a larger data collection with multiple subjects, applying machine learning techniques to improve the prediction of movement intention during gait, and selecting the minimum number of sensors that reproduce the same as with all four devices.

Keywords: Gait analysis; Machine learning; Stroke; Rehabilitation

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010

Effect of SiO$_2$ film deposited via PVD-plasma on the coefficient of friction between polycrystalline alumina brackets and NiTi archwires

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Introduction: The search for a bracket with lower friction against the orthodontic wire and greater treatment efficiency is not new. Aiming to reduce the orthodontist's working time, science has been exploring ways to apply smoother materials, such as silica, to bracket slots. Among the various possible techniques for growing a silica film on another material, physical vapor deposition (PVD) is one of the most relevant methods.

Objectives: The aim of this study was to evaluate the effect of physical vapor deposition (PVD-plasma) of a silica film in the slots of polycrystalline alumina self-ligating brackets on the coefficient of friction with nickel-titanium archwires.

Methods: Twenty-four Roth 0.022" brackets were tested, divided into two groups (n=12): 1) AlumiSilica, with silica film deposition ($\sim$50 nm), and 2) Alumi (control), without treatment. Each bracket/archwire assembly was subjected to a traction test of the wire through the slot

using a universal testing machine at a speed of 10 mm/min, recording static and kinetic friction forces (N), with coefficients calculated based on the normal force obtained by analytical weighing of the archwires. In three brackets from each group, average roughness (Ra) was measured using digital optical profilometry. After verifying normality and homoscedasticity (Kolmogorov-Smirnov and Levene tests), friction coefficients were compared using one-way ANOVA, and roughness was analyzed using the Student's t-test (global; $\alpha = 0.05$).

Results: A statistically significant reduction in static friction was observed: 11.37 ± 5.65 (Alumi) *versus* 7.49 ± 2.12 (AlumiSilica; $p = 0.036$); whereas kinetic friction (6.77 ± 6.00 *versus* 4.84 ± 2.34; $p = 0.310$) and average roughness ($5.29 \pm 0.73 \mu m$ *versus* $4.90 \pm 0.31 \mu m$; $p = 0.444$) did not differ significantly.

Conclusion: It was concluded that the silica film deposited via PVD-plasma did not affect kinetic friction or average roughness, but reduced static friction, which is responsible for overcoming the initial resistance to movement between surfaces.

Keywords: Orthodontic brackets; Friction; Orthodontics

011

Unraveling the role of tRNA methyltransferase TRMT9L in thyroid cancer progression

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Introduction: Transfer RNAs (tRNAs) play a fundamental role in the translation of genetic information by ensuring precise codon and amino acid pairing, a process regulated by post-transcriptional modifications such as methylation. TRMT9L is a tRNA methyltransferase involved in the methylation of the wobble base of specific tRNAs, particularly those for arginine and glutamine, directly impacting translation fidelity and the response to oxidative stress. Recent evidence suggests that reduced TRMT9L expression is associated with tumor progression and poorer prognosis in various types of cancer. However, its role in thyroid cancer remains unexplored.

Objectives: This study aimed to investigate the expression profile of the TRMT9L mRNA in thyroid gland carcinomas, in order to assess its association with clinicopathological characteristics and histological subtypes of the neoplasm, with the aim of elucidating the potential functional role of this tRNA methyltransferase in thyroid tumor biology.

Methods: The data used in this study was obtained from The Cancer Genome Atlas (TCGA), through the TCGAbiolinks package, and from the Human Protein Atlas. This study included patients aged 20 years or older and the statistical analyses were conducted using the R software. Given the rejection of the normality assumption for the TRMT9L gene expression variable, a logarithmic transformation was applied. The normality of the transformed data was then assessed using a QQ-plot, which justified the application of parametric tests in the subsequent analyses. Accordingly, one-way ANOVA, two-way ANOVA, and Student's t-test were employed. When the assumption of homogeneity of variances was not met, Welch's ANOVA and Welch's t-test were used. A significant level of 0.05 was adopted for all analyses.

Results: The expression of the TRMT9L mRNA showed a statistically significant difference between thyroid cancer patients and healthy individuals, with lower expression observed in those affected by the disease. Within the oncological cohort, variables such as stage, AJCC pathological T, AJCC pathological N, and histological type were also significantly associated

with TRMT9L mRNA expression. On the other hand, age, gender, race, outcome, prior treatment, and AJCC pathological M did not show a significant association with mRNA expression in cancer patients. Regarding the variables with statistical significance, lower TRMT9L mRNA expression was expected in advanced thyroid cancer stages (IV, IVA, and IVC), however, higher mean and median values were observed in stages II and IV compared to stage I, likely due to limited sample sizes in these groups. Moreover, as for AJCC pathological T, expression levels peaked in the early T stage (T1a) and declined progressively, supporting TRMT9L's potential role as a tumor suppressor. Nevertheless, expression in T1b was lower than in T2, possibly reflecting an imbalance in sample sizes (76 individuals in T1b vs. 156 in T2). Additionally, a downward trend in TRMT9L mRNA expression was observed in cases with lymph node involvement (N1, N1a, N1b), aligning with expectations. Nonetheless, the NX group, which lacked lymph node evaluation, exhibited higher expression levels, likely influenced by sample heterogeneity or limited representation. Regarding histology subtypes, the follicular variant of papillary carcinoma demonstrated the highest TRMT9L mRNA expression, with notably elevated mean and median values, even though the standard deviation is considerably more pronounced in this variant. In an analysis of 6 individuals, with 4 thyroid cancer patients, lower expression of TRMT9L was identified through immunohistochemical assays, corroborating the data obtained on mRNA expression, and reinforcing the participation of this protein as a tumor protector.

Conclusion: The findings of this study may enhance the understanding of the molecular mechanisms involved in thyroid tumorigenesis and suggest TRMT9L as a potential prognostic and/or therapeutic biomarker.

Keywords: TRMT9L; tRNA methyltransferases; Thyroid neoplasms

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Research funding: Not applicable.

012

Bond strength to resin cement of a feldspathic porcelain conditioned with ammonium polyfluoride solution and silane

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Introduction: Hydrofluoric acid is widely used in dentistry to improve the bonding of resin cement to ceramic restorations. It acts by etching the ceramic surface, selectively removing its glassy matrix and generating micro-porosities that enhance mechanical retention. However, due to its high toxicity and potential health hazards, safer alternatives are being explored. Currently, a new ammonium polyfluoride solution is available on the market for conditioning the surface of glass ceramics.

Objectives: The purpose of this study was to evaluate and compare the effect of conditioning the surface of a feldspathic porcelain using: (1) ammonium polyfluoride + silane, or (2) hydrofluoric acid, on the shear bond strength to a resin cement.

Methods: Cube-shaped specimens were obtained from sintered feldspathic porcelain blocks sectioned to approximate dimensions of 6.0 x 6.0 x 3 mm. The application of ammonium polyfluoride + silane was performed according to the manufacturer's instructions, forming the experimental group G1. Experimental group G2 consisted of specimens treated with 10%

hydrofluoric acid, while G3 included specimens that received no surface treatment (negative control). After surface treatments, resin cement cylinders were manufactured on the surfaces of specimens from all experimental groups (n=10). Groups G2 and G3 received a silane layer application. All specimens underwent thermal cycling, with 6,000 cycles between 5°C (±1) and 55°C (±1) in deionized water. The shear bond strength test was conducted at a loading speed of 1 mm/min. The data obtained were analyzed using one-way ANOVA followed by Tukey's test (α=0.05).

Results: ANOVA revealed no statistically significant difference between the groups (p=0.211). The mean bond strength values were 13.29±4.36 MPa for G1, 15.34±3.88 MPa for G2, and 11.72±5.11 MPa for G3.

Conclusion: Treatment with ammonium polyfluoride + silane proved to be as effective as hydrofluoric acid, providing adequate surface conditioning for feldspathic porcelain.

Keywords: Ceramics; Ceramics; Resin cements; Dental porcelain; Ammonium polyfluoride

SGPP Number: Not applicable.

CAAE Number: Not applicable.

013

Development of advanced cellular geometry modeling for proton therapy dose calculations

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Introduction: Proton therapy is a form of radiotherapy that uses proton beams to treat tumors with high precision, concentrating the dose on the target while minimizing damage to healthy tissue. However, despite its clinical potential, significant gaps remain in understanding the biological effects of proton radiation at the cellular and subcellular scales. Monte Carlo simulations with tools like TOPAS-nBio enable detailed modeling of physical, chemical, and biological interactions. Yet, the accuracy of these simulations heavily depends on the geometric realism of the modeled structures. Simplified representations may compromise the reliability of key outcomes, such as DNA strand break estimations or LET distributions. Enhancing spatial realism through advanced cell placement algorithms is therefore essential for more precise simulations. One promising approach involves the use of Hilbert curves to achieve realistic, non-overlapping cell distributions within defined volumes, contributing to more reliable simulations and, ultimately, advancing proton effect analysis and treatment selection.

Objectives: This study aims to estimate proton-induced biological damage at the cellular level using low-energy beams. To achieve this, a realistic geometric modeling algorithm is developed to simulate cell cultures, enabling detailed analysis of LET and RBE for improved assessment of proton therapy effectiveness.

Methods: This study uses Monte Carlo simulations to model proton interactions with biological matter, focusing on cellular and subcellular structures. The TOPAS-nBio toolkit, built on GEANT4 and TOPAS, is employed for its ability to simulate physical, chemical, and biological processes in radiobiology with precision. DNA damage and repair dynamics will be modeled using a mechanistic framework capable of simulating double-strand break repair and predicting cell survival based on radiation-induced damage patterns. Validation will be conducted using reference data from the literature. To improve the geometric realism of simulated cell environments, we developed a spatial placement algorithm based on Hilbert curves. This method ensures non-overlapping distribution of ellipsoidal cell geometries inside a cylindrical volume, enhancing the biological and geometric realism of the simulated microenvironment. The Hilbert curve is a space-filling curve that maps 3D coordinates into a one-dimensional array, enabling efficient indexing of placement regions. This approach eliminates the need for overlap checks for each placed ellipsoid, which would become computationally impractical in large-scale geometric configurations. Instead, it restricts placement to prefiltered spatial regions, ensuring new ellipsoids are added only in non-conflicting volumes. Each cell is assigned randomized dimensions and geometric orientation, introducing realistic variability in size and spatial arrangement.

Results: We evaluated the performance of the developed software in generating different geometric

configurations. For comparison, we implemented a reference algorithm, named Algorithm C, which does not use Hilbert curves and instead performs overlap checks for each newly generated ellipsoid. The geometric configurations are defined by two parameters: the Packing Factor (PF), calculated as the ratio between the total volume occupied by the cells and the volume of the cylinder, and the number of cells (n). Simulations were performed using an equilateral cylinder, varying both its volume and the number of cells. Results show that Algorithm C performs well for configurations with low n, regardless of the PF. However, its efficiency drops significantly as n increases, and higher PF values further degrade its performance. The Hilbert-based algorithm (Algorithm H), on the other hand, is less efficient than algorithm C at low n and high PF but is more robust to increases in n. Overall, Algorithm H can handle high-cell-count configurations, while Algorithm C is only practical for small n. For instance, Algorithm H completed a simulation with over 100,000 cells and extremely low PF in about 20 minutes, whereas extrapolations suggest Algorithm C would require approximately 31 days for the same task. This would represent an efficiency gain of approximately 2200. These results highlight the practical scalability of Algorithm H, making it more suitable for modeling large-scale cell cultures, which are common in radiobiological studies. Algorithm C, due to its pairwise overlap checking, becomes infeasible in realistic high-resolution geometries, limiting its applicability in advanced simulations. This becomes a crucial advantage for complex biological modeling in TOPAS and TOPAS-nBIO, as spatial realism plays an important role in determining the results of the simulation. Consequently, dosimetric predictions regarding RBE and DNA damage become more accurate and representative of real biological conditions.

Conclusion: This study improves the conditions for simulations using Monte Carlo codes to analyse complex biological microenvironments, promoting greater spatial realism and consequently refining dosimetric calculations. The proposed algorithm proved efficient across a wide range of scenarios, standing out for its scalability and enabling simulations that were previously computationally unfeasible.

Keywords: Monte Carlo Method; Proton therapy; DNA damage; Relative biological effectiveness

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014

Evaluation of the impact of institutional volume of rectosigmoidectomies on the treatment of rectal cancer: a short-term outcome analysis within the Brazilian Unified Health System

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Introduction: Colorectal cancer is the second most common cancer in men and the third in women, with a high incidence and mortality rate, predominantly due to adenocarcinoma. Curative treatment is surgical and may include chemotherapy and radiotherapy. Brazil's Unified Health System (SUS - *Sistema Único de Saúde*) is the largest public healthcare program in the world, serving approximately 80% of the population and providing crucial data for public health analysis. The centralization of surgical procedures has been associated with more favorable outcomes due to increased specialization and institutional expertise. Although there is no consensus on the exact number of procedures required to define a high-volume center, evidence suggests that institutions with higher surgical volumes tend to achieve better outcomes.

Objectives: This study aims to evaluate the impact of institutional volume of rectosigmoidectomies on short-term outcomes in patients with rectal cancer treated within SUS, in order to assess the effectiveness of centralizing these procedures for managing this condition.

Methods: The study utilized data from the DATASUS platform and included patients with rectal cancer who underwent surgery in Brazilian public hospitals between January 2008 and November 2023. Categorical variables were presented as percentages, and continuous variables as means and standard deviations. Hospitals were classified as either low- or high-volume centers, using

a threshold of 12 surgeries per year, which represented the top 5% in national case volume. Comparisons between groups were made using Student's t-test for means and the chi-square test for categorical variables, with statistical significance set at p<0.05. The study was approved by the Ethics Committee of *Hospital Israelita Albert Einstein*, and informed consent was waived due to the use of anonymized administrative data.

Results: During the study period, a total of 24,827 surgical procedures were performed across 650 hospitals. The Southeast region accounted for 55.6% of the procedures, while the North accounted for only 3.1%. The total investment was BRL 161,299,274.60, with an average cost of BRL 6,641.66 per patient. Applying the 12-procedures-per-year criterion, 29 hospitals were classified as high-volume centers, accounting for 9,079 procedures. Of these, 64.2% were located in the Southeast, 28.5% in the South, and 3.5% each in the North and Center-West regions. Hospitals performing a higher number of rectosigmoidectomies showed a reduced in-hospital mortality rate, although this was associated with a substantial increase in treatment costs. Centralizing surgical procedures appears to provide more favorable surgical outcomes for the population treated within SUS.

Conclusion: Surgical outcomes vary according to hospital infrastructure, physician experience, and characteristics of the patient population. Multicenter data analysis contributes to understanding the treatment and prognosis of the disease in relation to surgical institutional volume across hospitals within the Brazilian SUS.

Keywords: Colorectal neoplasms; Rectal neoplasms; Treatment outcome

Short term outcomes; Institutional volume; Brazil

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Research funding: Not applicable.

015

Evaluation of manual versus automated support settings in resin 3D printing: a comparative experimental study

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Introduction: The quality and dimensional accuracy of resin 3D-printed models are heavily influenced by the design and placement of the support structures during the slicing process. Support-generated contact points are known to affect surface smoothness, while factors like orientation, model geometry, and support density directly affect accuracy. Although modern slicers offer automated support generation based on algorithmic calculations, many users continue to rely on manual support placement to optimize the surface finish and minimize post-processing artifacts. This is especially relevant in healthcare and dental applications, where precision is critical. While previous studies have evaluated the influence of print parameters on accuracy and surface quality, there is limited research directly comparing the effectiveness of manual and automated support generation under controlled conditions. This study aimed to determine whether manually generated supports offer comparable outcomes to automated solutions in resin 3D printing, focusing on dimensional accuracy, surface integrity, and ease of post-processing.

Objectives: To evaluate whether manual support settings achieve dimensional accuracy, surface integrity, and post-processing quality comparable to those of automated support algorithms in resin 3D printing.

Methods: A custom-designed solid cube featuring geometric details intended for dimensional analysis, including embossed letters ("A" and "E") on one face and hexagonal cavities or protrusions on the other faces.

These features were designed to assess the precision and fit of implant-like components. The model was angled at -35° on both the X and Y axes, positioning it on a single vertex with two cavities facing downward. A total of 30 models were printed: 15 with manually placed supports(MS) and 15 with automatically generated supports (AS) using Chitubox and Chitubox Pro software, respectively. The groups were divided into three subgroups of five models each based on the support density: light, medium, and heavy. In all cases, supports were added to the downward-facing edges and island-prone areas with raft bases for stability. The specimens were printed using a Halot Sky (Creality) printer and TR25LV (Phrozen) resin. After printing, all models were assessed for their support integrity. The supports were manually removed following standard post-processing procedures. Subsequently, the models were evaluated for dimensional accuracy, structural integrity, and surface irregularities at the support contact points to determine whether manual or automated support generation produced superior print quality.

Results: In the AS group, the cubes printed correctly on the heavy and medium supports but not on the light ones (100% failure). Although the latter formed the support rods, they were not strong enough to support the parts during printing. Medium and heavy supports resulted in successful prints, with differences in post-processing quality: heavy supports generated stable parts but with more evident surface defects at the removal points, whereas medium supports presented a better balance between structural integrity and less surface irregularity. In the MS group, the surface characteristics varied according to support density. Light supports provided relatively clean separation and low edge roughness, whereas medium and heavy supports showed a slight increase in contact healing. Support density directly influenced the surface finish, indicating a relationship between the distribution of contact points and the complexity of post-processing. Dimensional measurements across all samples remained close to 10.00mm per side, generally within the typical mSLA printing tolerance ($\pm100\mu$m), as recommended by industry manufacturers. Support removability was also affected by density and positioning. Denser supports, especially when concentrated in corners or narrow edges, left more persistent artifacts that required sanding to remove. Conversely, less dense patterns reduced the damage but increased the risk of structural failure during printing. These observations highlight the practical trade-offs involved in choosing a support strategy.

Conclusion: Automated support generation with medium-density settings proved the most effective in balancing print success, dimensional accuracy, and post-processing quality. While manual supports showed potential under certain configurations, their inconsistency limits reliability. Support strategy remains a critical determinant of print quality, and optimizing density is key to achieving repeatable outcomes.

Keywords: Printing; Printing, three-dimensional; Models, anatomic; Computer-aided design; Surface properties; Dentistry

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Printing, Three-Dimensional Printing, Three-Dimensional

016

LMWPTP is a new ally revolutionizing liver tumor prognostic

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Introduction: Cancer remains one of the leading causes of morbidity and mortality worldwide, with gastrointestinal cancers showing a rising incidence. Cellular signaling, by post-translational modifications

such as phosphorylation and dephosphorylation, plays a crucial role in the regulation of various cellular processes. Dysregulation of kinase and phosphatase activity is implicated in the pathogenesis of several diseases, including cancer. Protein tyrosine phosphatases constitute a large family of enzymes involved in this regulatory network. Among them, the low molecular weight protein tyrosine phosphatase (LMWPTP), also known as ACP1, has been associated with tumor progression. Previous studies have demonstrated that increased LMWPTP expression is linked to cellular transformation and unfavorable prognosis across various cancer types, including prostate cancer, colorectal cancer and leukemias. In colorectal cancer, LMWPTP supports tumor malignancy. Higher LMWPTP expression in colorectal cancer has been associated with liver metastasis. However, the role of LMWPTP in liver cancer represent an unexplored domain.

Objectives: To evaluate the mRNA and protein expression levels of LMWPTP in liver cancer (hepatocellular carcinoma and cholangiocarcinoma), and to correlate these levels with clinicopathological features, including tumor staging, metastatic status, and overall survival, in order to assess its potential as a diagnostic or prognostic biomarker.

Methods: The data used in this study were obtained from The Cancer Genome Atlas (TCGA), through the TCGAbiolinks package, and from the Human Protein Atlas. In this regard, assessing LMWPTP expression across various gastrointestinal and adnexal gland tumors is essential to validate, in a new cohort, the findings derived from analyses conducted on the Dutch population. This study included patients aged 20 years or older and the statistical analyses were conducted using the R software. Given the rejection of the normality assumption for the ACP1 gene expression variable, a logarithmic transformation was applied. The normality of the transformed data was then assessed using a QQ-plot, which justified the application of parametric tests in the subsequent analyses. Accordingly, one-way ANOVA, two-way ANOVA, and Student's t-test were employed. When the assumption of normality was not met, even with the transformation data, Kruskal test was used. When the assumption of homogeneity of variances was not met, Welch's ANOVA and Welch's t-test were used. A significant level of 0.05 was adopted for all analyses.

Results: In liver cancer samples, LMWPTP mRNA expression was significantly higher in hepatocellular carcinoma (HCC) compared to normal hepatocytes

and cholangiocytes. Combined hepatocellular-cholangiocarcinoma also exhibited higher expression levels of LMWPTP mRNA than normal tissues, while isolated cholangiocarcinoma showed lower expression compared to non-tumoral counterparts. Interestingly, protein expression analysis via immunohistochemistry revealed increased LMWPTP levels in HCC compared to normal hepatocytes, with no significant differences between cholangiocarcinoma and cholangiocytes. Survival analysis in liver cancer indicated that higher LMWPTP mRNA expression was significantly associated with reduced overall survival. LMWPTP mRNA expression levels varied across tumor stages, with higher expression observed in stage III. No significant differences in expression were observed in relation to patient age or fibrosis status. For cholangiocarcinoma, no associations were found between LMWPTP expression and survival, staging, fibrosis, or age.

Conclusion: Our findings suggest that LMWPTP expression may serve as a prognostic biomarker in hepatocellular carcinoma, given its association with reduced overall survival and advanced tumor stage. These results reinforce the potential role of LMWPTP in gastrointestinal tumorigenesis and highlight its context-dependent expression across different tumor types.

Keywords: Molecular weight; Protein tyrosine phosphatases; Liver neoplasms

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Introduction: Endometriosis is a chronic, benign, and inflammatory gynecological disorder that affects approximately 10% of women of reproductive age. It is characterized by the ectopic implantation of functional endometrial tissue and is associated with pelvic pain, infertility, and systemic inflammation. Although the etiology remains unclear, immunological dysregulation plays a key role in the persistence and progression of lesions. Inflammasomes are multiprotein complexes that respond to cellular stress and damage by promoting pro-inflammatory cytokine release. The NLRC4 inflammasome and the SCAF11 protein have been identified as potential mediators of innate immune activation in chronic inflammatory diseases. However, their specific role in endometriosis remains poorly understood. Investigating these molecules may provide insights into the molecular mechanisms underlying the inflammatory profile of endometriotic lesions and contribute to the identification of new diagnostic or therapeutic targets.

Objectives: To quantify the expression of NLRC4 and SCAF11 proteins in control endometrium, eutopic endometrium, and deep endometriotic lesions using immunofluorescence, aiming to assess whether these markers are upregulated in endometriosis.

Methods: Tissue samples were obtained from 20 women undergoing laparoscopic surgery at *Hospital Israelita Albert Einstein*. Ten participants had histologically confirmed deep infiltrating endometriosis, and ten were control patients without endometriotic lesions. Endometrial tissue and lesions were collected during surgery, cryopreserved in OCT compound, and sectioned at 5 μm in a cryostat. Samples were incubated with primary antibodies against NLRC4 and SCAF11 (dilution 1:200) and secondary fluorescent antibodies (dilution 1:400). Immunofluorescence analysis was performed using a confocal microscope, with representative images captured at 20x magnification. Quantification was done using Zen Blue software, calculating the fluorescence ratio of the target protein to DAPI to normalize for nuclear content and cellular density. Statistical comparison of protein expression levels was performed between control, eutopic, and lesion groups.

Results: The expression of NLRC4, quantified by the NLRC4/DAPI ratio, showed a progressive reduction from the control endometrium to the eutopic endometrium and, finally, to endometriotic lesions. The control group had the highest median expression and the widest data dispersion, including outliers. The eutopic endometrium presented a slight decrease in median expression, while lesions exhibited the lowest median values and the narrowest interquartile range, indicating lower variability and a potentially suppressed NLRC4 pathway in affected areas. Despite this descending trend, statistical analysis revealed no significant difference among the groups. Regarding SCAF11, no statistically significant differences were found in the SCAF11/DAPI ratio across the groups. Median values were similar among the control, eutopic, and lesion groups. High intra-group variability and overlapping quartiles were observed, suggesting an absence of a consistent regulatory pattern. These findings do not support the hypothesis of increased NLRC4 and SCAF11 activation in deep infiltrating endometriosis. However, the data indicate that NLRC4 expression may be selectively downregulated in lesions, potentially contributing to immune evasion mechanisms in the ectopic environment. The lack of differential expression of SCAF11 suggests that other immunological factors may be more relevant in the inflammatory profile of endometriosis.

Conclusion: The results do not confirm increased NLRC4 or SCAF11 activation in deep endometriosis. However, the observed NLRC4 downregulation suggests an altered immune environment. Broader analyses of inflammatory pathways are needed to clarify the disease's pathogenesis and identify potential therapeutic targets.

Keywords: Endometriosis; Inflammasomes; NLRC4; SCAF11; Fluorescent antibody technique

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018

Educational impact of the Academic Medical Olympiad (OMED) on Brazilian medical students

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Introduction: Over the past decades, Brazil has witnessed a rapid expansion in the number of medical schools, with a 125% increase in available spots between 2014 and 2022. In this context, the development of national educational initiatives plays a key role in promoting knowledge exchange across institutions. Inspired by the well-established model of scientific Olympiads in Brazil's primary and secondary education, the Academic Medical Olympiad (OMED - *Olimpíada Médica Acadêmica*) was launched in 2021. Held annually and organized by medical students with faculty support, the competition comprises two phases: a group-based first phase and an individual second phase. Participants may register in one of two categories: pre-clinical (up to the fourth semester) or clinical (from the fifth semester onwards). Regardless of phase or category, the exam consists of questions requiring higher-order thinking, often structured around clinical cases. Therefore, OMED aims to foster student collaboration, enhance clinical reasoning skills, and promote deeper engagement with medical studies.

Objectives: To evaluate the impact of OMED on medical learning and motivation to study according to participants' perceptions, and to analyze the influence of demographic variables on these perceptions.

Methods: An observational study was conducted following the first phase of the fourth edition of OMED, in 2024. Participants were invited to voluntarily complete a questionnaire after providing informed consent. Initially, demographic variables were collected, including sex, type of medical school (public or private), previous participation in OMED, group size (pair or trio), and participation category (pre-clinical or clinical).

Next, a section of the questionnaire, adapted from the Post-Experimental Intrinsic Motivation Inventory and based on the Self-Determination Theory, assessed participants' perceived educational value of the event. This section included five items evaluating the impact of OMED on medical knowledge and clinical reasoning, using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Finally, two additional items assessed students' motivation to study before and after the first phase of OMED. Comparisons of mean scores across demographic subgroups were performed using the Mann-Whitney test, with statistical significance set at $p<0.05$.

Results: Of the 2723 competitors in the fourth edition of OMED, 678 agreed to participate in the study. Among these respondents, the majority were female (51.6%), enrolled in private universities (52.4%), participated in trios (57.5%), competed in the clinical category (51%), and only 9.4% had participated in a previous edition of the event. Overall, students recognized OMED's educational value. Most of the participants agreed or strongly agreed that OMED was useful for: 1) acquiring new medical knowledge (62.9%); 2) consolidating prior knowledge (78.1%); 3) identifying their strengths and weaknesses (87.3%); 4) stimulating clinical thinking (88.0%); and 5) contributing to the development of clinical reasoning (82.3%). The mean scores for all items, except the first, were significantly higher among students from private universities compared to those from public ones: 2) 4.23 vs 4.05 (p=0.004); 3) 4.46 vs 4.34 (p=0.041); 4) 4.48 vs 4.34 (p=0.013); 5) 4.39 vs 4.21 (p=0.004). Additionally, students in the clinical category reported a greater impact of OMED on both the stimulation of clinical thinking (4.52 vs. 4.28; p<0.001) and the development of clinical reasoning (4.41 vs. 4.18; p<0.001), compared to those in the pre-clinical category. Regarding motivation, 71.3% of participants agreed or strongly agreed that they felt more motivated to study after the first phase of OMED, while only 39.5% reported the same level of motivation before the event. No significant differences in motivation were observed between subgroups.

Conclusion: Participation in OMED was widely recognized by students as a valuable educational experience that contributed to medical learning, clinical reasoning and motivation to study. Although the overall impact was consistent across groups, it was more pronounced among students from private institutions and those in their clinical years.

Keywords: Education, medical; Students, medical; Motivation; Learning

019

Calibration of EBT3 radiochromic films with machine learning: development of a dose predictive model

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Introduction: Radiochromic films have been widely used in radiation therapy for nearly 30 years, valued for their high spatial resolution, self-developing nature, and tissue-equivalent composition. Among them, the Gafchromic EBT series, especially the EBT3 model, is commonly employed for quality assurance and dose verification. Despite these advantages, accurate dosimetry still demands careful calibration and control of variables such as film uniformity, scan quality, and environmental conditions. To address these limitations, a Python-based software was developed, integrating artificial intelligence to automate key steps-optical density reading, calibration curve creation, and dose prediction-using polynomial regression and machine learning. This solution reduces human error, increases reproducibility, and streamlines workflows. Compared to other dosimeters, such as ion chambers and diodes, radiochromic films uniquely offer 2D dose mapping without electrical connections, minimizing interference. Their growing clinical and research adoption has been supported by recommendations from institutions like the AAPM, reinforcing their role in modern radiotherapy.

Objectives: The objective of this project is to develop software in Python with artificial intelligence algorithms to automate the calibration and analysis of radiochromic films, increasing accuracy, reducing manual errors and optimizing time in the dosimetry process in clinical and research applications.

Methods: This project presents an advanced Python software for calibrating EBT3 radiochromic films, integrating image processing, data analysis and dose prediction using conventional and machine learning (ML) methods. The graphical interface, developed with Tkinter, organizes functionalities in intuitive menus, allowing image upload, calculation of optical density (OD), generation of calibration curves and dose distribution, as well as dose simulations and predictions.

The conventional method applies filters (median and Gaussian) for noise reduction and uses the Lambert-Beer Law to calculate the OD, based on the average of the RGB channels of the image. The calibration curve is adjusted by polynomial regression and used to simulate doses. The spatial dose distribution is displayed with colored maps, facilitating qualitative and quantitative analysis.

In the ML method, images with labeled dose in the name are processed with PCA for dimensionality reduction and modeled with polynomial regression. The model is evaluated with metrics such as MAE, MSE and R^2, in addition to cross-validation. A margin of error of 0.05 Gy is used to reflect the accuracy of the system. The code also includes resource monitoring to ensure stability during intensive tasks.

Results: Radiochromic film images irradiated with a Co-60 beam across 0-2 Gy were analyzed to assess dose estimation in a challenging low-dose region. The conventional method, using the mean of RGB channels for optical density (OD) estimation, achieved an R^2 of 0.94162 through second-degree polynomial regression. The largest relative errors (REs) occurred at the lowest doses (e.g., >350% at 0.05 Gy and >100% at 0.1 Gy), reflecting minimal OD changes and high noise influence. Errors decreased and stabilized below 25% from 0.15 Gy to 2 Gy, indicating a more reliable estimate in the mid-to-high dose range. A predictive model using PCA (Principal Component Analysis) and polynomial regression significantly improved performance. Using three principal components, the model reached an R^2 of 0.99871 over 1250 images (125 per dose level), demonstrating excellent accuracy and generalization. REs were consistently low above 0.2 Gy, often under 5%. The elbow plot analysis indicated that three components captured over 96%

of the variance, optimizing the tradeoff between performance and dimensionality. Fewer than three components led to underfitting, while more than three introduced noise and overfitting. Empirical elbow plots confirmed consistent performance across all test and cross-validation sets, with maximum accuracy in three components. Errors remained higher (between 10 and 40%) at very low doses (0.05-0.15 Gy), where the film response is weaker, but were significantly reduced compared to the conventional method. From 0.2 Gy onwards, predictions were robust and accurate, suitable for clinical applications. These results underscore the advantage of multichannel analysis combined with PCA, offering a reliable, generalizable model for dose prediction, especially in the intermediate to high dose ranges where clinical precision is crucial.

Conclusion: A predictive model using second-degree polynomial regression and PCA was developed to estimate Co-60 absorbed doses (0-2Gy) from EBT3 film images. By treating RGB channels independently and reducing dimensionality, the model achieved high accuracy, outperforming traditional methods, especially in clinically relevant low-dose regions (≥ 0.2Gy).

Keywords: Dosimetry, Calibration, Radiotherapy Dosage, Principal Component Analysis, Machine Learning

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020

Assessment of regional pulmonary aeration by electrical impedance tomography in infants with bronchiolitis using high-flow nasal cannula

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Introduction: High-flow nasal cannula is a relatively recent therapy that has been changing outcomes in the treatment of respiratory failure in infants with bronchiolitis. However, the absence of clinical improvement reflects the need to escalate care, such as the use of non-invasive ventilation and orotracheal intubation, which impacts Intensive Care Unit length of stay, overall hospitalization time, and, consequently, costs. Currently, there is a growing need to understand the mechanisms by which HFNC reduces the work of breathing and improves gas exchange. The use of electrical impedance tomography allows for real-time mapping of changes in ventilation distribution and lung aeration. Recently, studies using EIT have evaluated functional residual capacity through end-expiratory lung impedance (EELZ) at different flow rates in an attempt to support the hypothesis that HFNC therapy contributes to an increase in functional residual capacity.

Objectives: The aim of this study is to analyze the variations in anterior and posterior end-expiratory lung impedance (EELZ) values in patients with bronchiolitis, in order to investigate potential regional differences in ventilation distribution according to the applied flow rate.

Methods: A prospective clinical study is being carried out in the Pediatric ICU of Hospital Israelita Albert Einstein, from January 2024 to December 2025. Infants

under 2 years of age diagnosed with bronchiolitis and using HFNC for a period of less than 18 hours are eligible for the study. Data acquisition will be performed using an Electrical Impedance Tomography (Enlight 1800 - Timpel®, São Paulo, Brazil). The belt will be installed around the chest and EIT monitoring will be initiated. Patients will be positioned in a supine position of 10 to 20 degrees and monitoring will be performed continuously during all variations in flow rates. For evaluation, four different randomized flow rates will be used: 2.0; 1.5; 1.0 and 0.5 liters.Kg-1.min-1. All signals from EIT will be recorded in the equipment›s internal memory and later exported to a mobile unit. The data will be processed by software Offline Analysis. The TIE parameters will be evaluated, discarding the first minute and analyzing the remaining minutes due to the great variability. For regional analysis, the generated image will be divided into 2 regions of interest (ROIs), with ROI1 being the anterior region, in this case, non-dependent, and R2 being the posterior, dependent region.

Results: A total of 24 infants were evaluated. Among them, 11 patients (46%) showed an increase in EELZ, 9 (37.5%) showed a decrease, and 4 (17%) demonstrated divergent responses depending on the applied flow rate.

Focusing on the anterior and posterior regional distribution of EELZ, it was observed that among the 11 patients who showed an increase in EELZ, 5 (45%) had a more pronounced increase in the anterior region compared to the posterior, while 4 (36%) showed a greater increase in the posterior region. One patient (9%) presented equivalent values between the anterior and posterior regions, and another showed an increase in the posterior region at flow rates of 1.0 and $1.5 L \cdot kg^{-1} \cdot min^{-1}$, with a predominance in the anterior region at the $2.0 L \cdot kg^{-1} \cdot min^{-1}$ flow rate. Among the 9 patients who showed a decrease in EELZ, 3 (33%) had a more significant decrease in the posterior region, while 4 (44%) showed a greater decrease in the anterior region. One patient (11%) presented higher values in the posterior region at flow rates of 1.0 and $1.5 L \cdot kg^{-1} \cdot min^{-1}$, and higher values in the anterior region at the $2.0 L \cdot kg^{-1} \cdot min^{-1}$ flow rate. One patient presented divergent responses between the regions.

Conclusion: Our findings demonstrate that the change in EELZ at different flow rates is variable, with approximately 40% of infants decrease in EELZ with increasing flow rate. Anteroposterior regional analysis also demonstrated heterogeneity in the response. These results provide new evidence on the mechanisms of action of HFNC.

021

Prevalence of Premenstrual Syndrome (PMS) in women with irregular cycles and its relationship with quality of life and sleep in the population of Itaparica Island (Bahia) - preliminary results

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Introduction: Itaparica Island, particularly the municipality of Vera Cruz (Bahia), faces significant public health challenges marked by socioeconomic disparities and limited coverage of the Brazilian Unified Health System (SUS). The predominance of women in the adult and elderly population highlights the urgent need for targeted women's health policies. In 2024, the Maria Felipa Expedition, organized by Projeto Travessia, delivered multidisciplinary healthcare services and conducted research on gynecological health in the region. Among the primary concerns is Premenstrual Syndrome (PMS), a prevalent condition in women of reproductive age, characterized by emotional, behavioral, and physical symptoms such as irritability, anxiety, and fatigue during the luteal phase. In more severe cases, Premenstrual Dysphoric Disorder (PMDD) may cause significant functional impairment and often requires clinical treatment. Emerging

evidence suggests that poor sleep quality worsens PMS symptoms, contributing to emotional instability and reduced cognitive function.

Objectives: To analyze the prevalence of Premenstrual Syndrome (PMS) among women with irregular menstrual cycles in Vera Cruz (BA) and investigate its relationship with quality of life, sleep, and overall well-being.

Methods: This cross-sectional observational study, approved by the Ethics Committee of Sociedade Beneficente Israelita Brasileira Albert Einstein, analyzed sociodemographic, gynecological, nutritional, quality of life, and sleep data from women aged 15 years or older residing in Vera Cruz (BA). Data collection occurred during the Maria Felipa Expedition (December 14 and 21, 2024) via structured interviews following ethical approval. Validated instruments included the Pittsburgh Sleep Quality Index (PSQI), assessing seven sleep components; Episono (2007), comprising 19 questions about menstrual cycle, menopause, premenstrual syndrome (PMS), and obstetric history; and WHOQOL-Bref, evaluating quality of life across four domains (physical, psychological, social, and environmental). The initial sample included 223 women, categorized as pre- or postmenopausal based on the clinical criterion of 12 months of amenorrhea. Selection considered age groups and socioeconomic status (data from IBGE and Vera Cruz City Hall). Only participants who signed the Informed Consent Form (ICF) were included. Exclusions encompassed women who declined or did not sign the ICF and those in postmenopause (n=76), resulting in 147 women of reproductive age. For this study, the final analyzed sample comprised 51 women who responded "no" to the question "Do you have normal menstrual cycles?".

Results: Among the 51 women with irregular menstrual cycles, 38 (74.5%) reported symptoms consistent with premenstrual syndrome (PMS), comprising the analyzed sample for this phase. The mean age of this group was 32.7 years. Of these, 15 (39.5%) were using hormonal contraceptive methods, such as oral contraceptives or injections, whereas 23 (60.5%) did not utilize these methods. Regarding sleep quality, 24 women (63.2%) rated their sleep as inadequate or very inadequate, while 14 (36.8%) reported adequate or optimal sleep quality. The association between sleep satisfaction and self-perceived concentration revealed that among the 16 participants reporting low sleep satisfaction, there was a predominance of reduced concentration levels, with responses ranging from "none" to "moderate." Among the 15 participants with high sleep satisfaction,

elevated levels of concentration were reported, with no reports of minimal concentration. Concerning fatigue, approximately 65.7% of participants rated their daily energy levels between "none" and "moderate," indicating a prevalent perception of insufficient energy to meet daily demands. Furthermore, 23 women (60.5%) reported frequent negative affective states, including sadness, anger, and irritability, ranging in frequency from "frequently" to "always." Only one participant reported an absence of such emotional experiences.

Conclusion: Preliminary findings show high Premenstrual Syndrome (PMS) prevalence among women with irregular cycles on Itaparica Island, linked to poor sleep satisfaction, reduced concentration, and frequent negative emotional states. These results highlight the need for targeted health policies and further research to improve women's well-being in vulnerable regions.

Keywords: Women's health; Premenstrual syndrome; Quality of life; Sleep

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022

Effects of photobiomodulation and platelet-rich plasma application in rats with knee osteoarthritis

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Introduction: Knee osteoarthritis (OA) is a degenerative condition that affects the articular cartilage and the underlying bone, often accompanied by pain, morning stiffness, and limited mobility. Experimental studies suggest that both photobiomodulation (PBM) therapy and the use of platelet-rich plasma (PRP) have the

potential to slow the progression of the disease. However, despite promising results, the biological mechanisms underlying these therapeutic approaches are not yet fully understood.

Objectives: To evaluate and compare the effects of PBM and PRP, either alone or in combination, in an experimental rat model of knee osteoarthritis.

Methods: Twelve rats were divided into three experimental groups: Control, Photobiomodulation (PBM), and PBM combined with Platelet-Rich Plasma (PRP), with approval from the Animal Experimentation Ethics Committee. Osteoarthritis was induced by two injections of methylated bovine serum albumin (mBSA), administered seven days apart. Treatment started three days after induction, depending on the group, with PBM applied three times per week on alternate days. The experimental period lasted 21 days, during which histological evaluations and measurements of joint swelling diameter were performed at the beginning and end of the study.

Results: At the time of induction, there was no significant difference between the groups, with average joint diameters around 9.3 mm. On day 3, both groups showed a marked increase in joint diameter, indicating inflammation. By the end of the experiment, edema was reduced in both groups; however, the GC maintained a significantly larger diameter than the GLP group. In morphological analysis, a marked difference was observed in the morphological aspect of the articular cartilage between the control group (CG) and the GLP-treated group. In the CG, pronounced signs of tissue degradation were evident, characterized by intense fibrillation and marked irregularity of the articular surface. In contrast, the GLP group exhibited a notably better-preserved articular surface, with a smoother appearance, reduced evidence of fibrillation, and less surface irregularity. The chondrocytes showed a rounded morphology and columnar cellular organization.

Conclusion: The results indicate that the combined treatment of photobiomodulation (PBM) with platelet-rich plasma (PRP) was effective in reducing joint edema in an experimental model of knee osteoarthritis, showing less residual inflammation compared to the control group. This trend suggests that the combination of these therapies may represent a promising approach.

Keywords: Osteoarthritis; Photobiomodulation; Platelet-rich plasma

023

Effectiveness of red and infrared wavelength laser phototherapy in preventing recurrences of herpes labialis: a systematic review

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Introduction: Herpes simplex virus (HSV) is highly prevalent worldwide, affecting billions of people. HSV type 1 (HSV-1) is a neurotropic virus that primarily infects epithelial cells in orofacial region. Upon initial infection, the virus travels retrogradely along sensory neurons to establish latency in the trigeminal ganglia. Reactivation of HSV-1 can occur due to various stimuli such as stress, immunosuppression, UV light exposure, between others. This leads to anterograde transport of the virus back to the peripheral site, resulting in recurrent lesions. Photobiomodulation (PBM) with low power laser have been suggested in literature as an effective therapy of HSV-1 recurrences prevention. However, it can be find in literature variations of parameters applied for this purpose, especially laser wavelength. Red (660 nm) and infrared (803-830 nm) wavelengths, though differing in tissue penetration, are complementary and show promise in reducing recurrence rates. However, uncertainties remain regarding the most effective depth of light penetration.

Objectives: This study aims to evaluate the level of evidence supporting the use of PBM for the prevention of herpes labialis, as well as to identify the most effective.

Methods: The acronym PICOS was used to develop the focused review question "Is photobiomodulation effective for herpes labialis prevention?" and the eligibility criteria. Pico framework is: Participants/

Populations are patients with herpes labialis, Intervention is photobiomodulation/low level laser therapy for preventive purposes, Outcome is the effectiveness of photobiomodulation in prevention of herpes labiallis, and the included Studies are Randomized Controled Trials (RCT), Randomized Double Blind Placebo Control (RDBPC). The search was conducted in the following databases: PubMed, EMBASE, Scopus, Cochrane Library, Portal Regional da Biblioteca Virtual em Saúde, and Gray Literature (Google Scholar). The selection of eligible articles and data extraction was performed independently by two reviewers, and risk of bias will be assessed using the Cochrane Risk of Bias 2.0 tool.

Results: A total of 797 articles were retrieved, 8 were selected for screening based on the elegibility criteria, and 3 RCT were included in the systematic review. Risk of bias is being evaluated through Cochrane Risk of Bias 2.0 tool, showing at the present moment, preliminary moderate to high risk of bias.

Conclusion: The study will contribute to describing the current level of evidence available in the literature regarding the use of photobiomodulation (PBM) for the prevention of herpes labialis recurrences and may also help guide the clinical design of future studies in this field.

Keywords: Herpes labialis; Low-level light therapy; Treatment outcome

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024

Swelling and enzymatic hydrolytic degradation study of chitosan-based scaffolds with the addition of graphene derivatives

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Introduction: Cleft lip and palate is a congenital bone malformation with significant impact on child development, affecting 1 in every 650 live births worldwide. Surgical reconstruction is often required, which is an invasive and complex procedure. Biomaterial-based scaffolds has gained attention as a promising alternative to traditional approaches. These materials are capable of mimicking the extracellular matrix, providing support for cell growth and promoting tissue regeneration, while avoiding many of the complications associated with conventional methods. Under context, scaffolds composed of natural polymers such as chitosan, reinforced with carbon derivatives and graphene, have shown favorable properties for bone regeneration. However, once implanted in the body, these materials are subject to degradation processes that may compromise their integrity and functionality.

Based on that, this project aims to characterize the behavior of such scaffolds in a physiological environment, aiming to understand the factors that influence their performance and to optmize their clinical application.

Objectives: To characterize the swelling and degradation behavior of carbon-based scaffolds composed of chitosan/xanthan reinforced with different graphene derivatives (nanographite, graphene, and graphene oxide) when immersed in buffer solution and in buffer solution with lysozyme, simulating blood plasma conditions.

Methods: Initially, the samples were divided into four groups, each corresponding to a different biomaterial composition: Chitosan/Xanthan + activated carbon + 0.1% graphene, CAGO 1% (Chitosan/Xanthan + activated carbon + 1% graphene oxide), Carbon + Nanographite, and Activated Carbon. In triplicate, samples from each group were immersed in two distinct solutions: buffer solution (PBS only) and buffer solution with added lysozyme (PBS + lysozyme), in order to analyze swelling-defined as the increase in polymer volume due to liquid absorption-and biomaterial degradation caused by enzymatic activity. The results are based on the percentage variation in sample mass

over time, measured during a 720-hour period. The swelling assay was conducted over the first 24 hours, while the degradation assay covered the remaining time. Data were processed in Excel and plotted using OriginLab for improved visualization. The samples were subjected to scanning electron microscopy (SEM) and Fourier-transform infrared spectroscopy (FTIR) analysis to identify the structural differences introduced by the various graphene derivatives and the effects on the sample structure resulting from hydrolytic and enzymatic degradation.

Results: Regarding the study involving only the buffer solution, statistical analysis indicated that only the CAGO 1% group degraded significantly more than the pure activated carbon group. However, at the end of the experiment involving the "buffer + lysozyme" solution, despite the graph showing a similar behavior to that observed with the buffer solution alone, no statistically significant differences were found among the studied groups. This phenomenon may be explained by the greater susceptibility of carbon to enzymatic degradation, which mitigates the previously observed difference between the pure activated carbon and CAGO 1% groups. Furthermore, graphical analysis reveals a correlation between swelling and degradation, as the materials that degraded the most were also those that swelled the most. This relationship can be explained by the addition of hydroxyl groups (as evidenced by FTIR results) in the CAGO 1% composition compared to pure carbon. These functional groups confer a hydrophilic and polar character to the polymer, promoting greater water absorption and increased solubility in aqueous solution. Regarding enzymatic activity, quantitative SEM analysis shows that the presence of lysozyme intensified the degradation of the composites, leading to increased porosity, cracking, and surface roughness. This aligns with the FTIR results, which reveal that specifically for samples degraded in PBS + lysozyme, spectral modifications were identified, including a shift to lower wavelengths in the CN stretching band (from 1311 to 1300 cm^{-1}) and suppression of the NH (amide II) band. As for the differences among the studied groups, it is worth noting that CAGO 1% exhibited greater porosity and cracking than the others, especially in the presence of lysozyme, indicating a matrix more susceptible to enzymatic degradation. This may be attributed to its higher hydrophilicity and consequent susceptibility to pore formation.

Conclusion: Based on the swelling and enzymatic degradation experiments, as well as the physicochemical analyses, it was observed that the addition of graphene derivatives, particularly graphene oxide, alters the structure and behavior of the scaffolds under physiological conditions. Moreover, the presence of lysozyme significantly intensifies the degradation process.

Keywords: Tissue scaffolds; Polymers; Graphite; Tissue engineering; Bone and bones

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Effect of toothbrushing without chlorhexidine on oral hygiene indices and risk of systemic complications in orotracheally intubated patients

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Introduction: The gold standard for oral hygiene in intubated patients (IOT) is toothbrushing combined with 0.12% chlorhexidine digluconate (CHX). However, recent evidence suggests potential risks associated with the routine use of CHX, including increased mortality, prompting a reassessment of its indication. This study investigates the effects of an oral hygiene protocol using only filtered water and toothbrushes-excluding CHX-on the oral health of intubated ICU patients. By evaluating key domains of the Beckside Oral Exam (BOE), such as swallowing function, mucosal and dental conditions, and salivary characteristics, the study aims to determine

whether mechanical oral hygiene alone can maintain or improve oral health status, potentially reducing the need for antiseptics while preserving safety.

Objectives: This pilot, randomized, double-blind clinical study aimed to compare the effect of toothbrushing with chlorhexidine versus toothbrushing with filtered water on the oral health condition of orotracheally intubated patients, as assessed by the qualitative index of the Bedside Oral Exam (BOE).

Methods: This was a longitudinal, controlled, and blinded study conducted in a hospital ICU, involving 70 orotracheally intubated patients divided equally into intervention (W - 0.12% chlorhexidine) and control (Y - water and toothbrush only) groups. Oral health was assessed at three time points (T0, T1, T2) using the BOE, which includes the domains: teeth, gingiva, lips, tongue, mucosa, saliva, and swallowing. Data were treated as ordinal and analyzed with non-parametric tests. Between-group comparisons were conducted using the Mann-Whitney U test. Intragroup comparisons over time used the Wilcoxon signed-rank test. Due to the absence of score variability in the halitosis domain, this item was excluded from statistical comparisons. Statistical significance was set at 5%. The study followed ethical research standards and anonymized all patient data.

Results: No statistically significant differences were found between groups W and Y across the BOE items at any time point ($p > 0.05$), with the exception of a near-significant trend in the "saliva" domain at T2 ($p = 0.057$). In the intervention group (W), oral health indices remained stable throughout the observation period. In the control group (Y), which did not receive CHX, significant improvements were found in the "teeth" domain between T0 and T1 ($p = 0.0246$), and in "saliva" between T0 and T2 ($p = 0.0401$), with a trend between T1 and T2 ($p = 0.0564$), suggesting a cumulative effect of mechanical hygiene. No significant changes were noted in gingiva, lips, mucosa, or tongue in either group. Uniform halitosis scores prevented statistical testing for that domain. Overall, the data suggest comparable effectiveness between mechanical oral hygiene and chlorhexidine-based protocols in preserving oral health during ICU stay.

Conclusion: Toothbrushing without chlorhexidine maintained oral health in intubated ICU patients, supporting its use as a safe alternative to antiseptic-based protocols.

Keywords: Cross infection; Hospital dentistry Critical care; Interprofessional practice; Oral hygiene

026

Nurses' experience in caring for families of children on extracorporeal circulation: links and challenges

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Introduction: Extracorporeal membrane oxygenation (ECMO), introduced in the 1970s, became a common intervention for complex congenital heart disease, with significant expansion of its clinical applications. In the 1990s, it was used as a life-saving measure during cardiopulmonary resuscitation, contributing to advances in cardiac surgical outcomes. ECMO is a mechanical cardiopulmonary support that promotes blood oxygenation, carbon dioxide removal, and circulatory support, allowing protective mechanical ventilation. Nurses are crucial professionals in the team caring for patients using ECMO, promoting coordinated and uninterrupted care through monitoring, observation, prevention of complications, and care management. ECMO requires a specialized team adequate physical and material resources. In the context of critical care of pediatric and neonatal care, other needs emerge, especially regarding family care, where there is still a gap in spite of research on nurses' roles in ECMO care. This study aims to understand nurses' perspectives on caring for families of pediatric patients undergoing ECMO.

Objectives: This study seeks to explore how nurses perceive their role in providing support to the families of pediatric patients receiving extracorporeal membrane oxygenation.

Methods: This qualitative, descriptive, and exploratory study was conducted with nurses working primarily in public healthcare institutions in São Paulo, Brazil. Data collection took place through semi-structured interviews with 14 nurses, each having at least six months of professional experience. The interviews were conducted and completed in the first half of 2024. Thematic content analysis was employed to examine the data systematically. This method allowed the identification of recurring patterns and relevant themes, providing a comprehensive understanding of the participants' experiences and perspectives. The choice of a qualitative approach was essential to explore in depth the meanings and interpretations attributed by nurses to their professional practices and contexts. Additionally, the use of semi-structured interviews ensured flexibility during data collection, enabling participants to express their views freely while maintaining consistency in the topics addressed. Overall, the methodological strategy adopted in this research facilitated the generation of rich and detailed data, contributing to the understanding of the phenomenon under investigation.

Results: Fourteen nurses participated in the study, 12 (87.5%) female, average age 33.3 years, with 2 to 20 years of training, mostly from public hospitals in São Paulo. All had graduate degrees; some had residency or professional master's degrees.

Nurses reported that caring for a child and their family during extracorporeal membrane oxygenation (ECMO) treatment is challenging, requiring a balance between patients' technical needs and families' emotional support. Clear communication and empathy are essential to build trust, reduce family anxiety, and ensure their involvement in care. However, nurses also highlighted emotional overload, the need for continuous training, and managing conflicts with difficult families as key challenges.

Two thematic categories emerged from their narratives:

1) Proximity, knowledge, and challenges: Nurses consider caring for children and families on ECMO "challenging." Besides the therapy's complexity, families experience insecurity and doubts. Nurses feel initial compassion, especially witnessing situations like cannulation and the use of technological devices due to the child's severity. They emphasize guiding families and building good relationships to reduce impact, promote safety, and strengthen family as allies in care. Nurses are the closest professionals and main translators of information about equipment, procedures, and clinical status. Despite the difficulty, they feel fulfilled caring for critically ill patients but stress the urgent need for continuous training and institutional support.

2) Trust, partnership, and conflicts: Building bonds with families relies on nurses' technical knowledge and confidence. Lack of training can damage credibility and relationships. Nurses balance scientific care with families' expectations, using communication to involve families while managing their participation carefully. Some families are seen as difficult due to noncompliance with safety rules, which nurses find challenging. Nurses acknowledge the emotional toll of close bonds and adopt coping strategies like therapy or setting personal limits to maintain professional boundaries while providing compassionate care.

Conclusion: The study highlights nurses' need for technical expertise and emotional readiness to provide effective care in intensive settings. In ECMO contexts, nurses play a pivotal role in patient care and family support, helping to reduce distress and navigate complex challenges within the healthcare team.

Keywords: Pediatric nursing; Intensive care units, pediatric; Extracorporeal membrane oxygenation; Family

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027

Validation of respiratory rate estimation algorithm based on photoplethysmography compared to the gold standard

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Introduction: Continuous monitoring of vital signs, such as respiratory rate (RR), is fundamental for early detection of clinical deterioration in hospitalized patients. Wearable sensors using photoplethysmography (PPG) represent a promising approach for continuous, non-invasive RR monitoring. However, the accuracy and reliability of RR extraction algorithms derived from PPG signals require rigorous evaluation. This study is part of a broader project focused on validating wearable devices for use in clinical settings, emphasizing the prediction of clinical deterioration. The current stage evaluates and characterizes RR measurements estimated by a PPG-based algorithm and compares them with reference measurements from gold standard equipment. The algorithm's performance was analyzed using data from the public MIMIC II database, containing physiological signals from critically ill patients treated at Beth Israel Deaconess Medical Center (Boston, USA). The results contribute to assessing the algorithm's accuracy in real clinical contexts, advancing the validation of wearable technologies for continuous vital sign monitoring.

Objectives: To evaluate the accuracy of a respiratory rate (RR) estimation algorithm based on photoplethysmography (PPG) signals, comparing its results with reference measurements obtained from gold standard equipment.

Methods: To assess the performance of the RR estimation algorithm, data from public databases (MIMIC II) were used, containing PPG signals, RR reference values, as well as records of manual respiration annotations made by two specialists based on the impedance respiratory signal. The raw PPG signals were sampled for 8 minutes at 125 Hz and processed by an executable file running the algorithm under analysis, using a window size of 120 seconds and a window step of 15 seconds to estimate RR values for each patient recording.

Subsequently, a comparative analysis was performed between the estimated RR values and the reference values, using descriptive statistical metrics and dispersion metrics to characterize and quantify the algorithm's accuracy. Bland-Altman plots were generated to visualize the agreement between the estimated and reference measurements. Finally, we assessed the normality of the distributions of both datasets using the Shapiro-Wilk test. Subsequently, the Wilcoxon statistical test ($p<0.001$) was performed for sample comparison. All this analysis was conducted using scripts developed in Python.

Results: Preliminary results showed a mean squared error of 8.99. The variance of the estimated respiratory rates was 8.14, while that of the reference RR was 11.31. The observed medians were 18.12 for the estimated RR and 18.00 for the reference RR. These values indicate that, in terms of central tendency, the algorithm provides an estimate close to that obtained by standard clinical equipment. The results indicated violations of normality for both the estimated RR ($p<0.001$) and the reference RR ($p<0.001$). Therefore, we performed the non-parametric Wilcoxon test. The test resulted in a p-value of 0.622, indicating no statistically significant difference between the values obtained by the algorithm and the standard device. These findings suggest that the PPG-based estimation method produces results comparable to the gold standard when considering the median, highlighting its potential for clinical applications. However, the dispersion metrics and the mean squared error reveal limitations in the variability and precision of the measurements, indicating the need for further improvements to the algorithm. Complementary analyses with different window sizes and window steps should be conducted to increase the accuracy of the measurements estimated by the algorithm.

Conclusion: Overall, findings suggest that the PPG-based estimation method produces results comparable to the gold standard in terms of the median, underscoring its potential for clinical applications. Furthermore, methodological and technical improvements are

required to enable its implementation in the wearable device, ensuring reliability and safety in RR monitoring.

Keywords: Wearable electronic devices; Photoplethysmography; Signal processing, computer-assisted; Respiratory rate; Clinical deterioration

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028

Discharge before eleven: does early discharge contribute to shorter waiting times forward beds and shorter hospital length of stay?

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Introduction: The early discharge policy is a well-established practice in hospitals in Brazil and around the world. In an effort to address the issue of overcrowding, morning discharges have emerged as a potential solution to this complex problem. Some institutions target discharges by noon or before 11 am as markers of quality. It is believed that early discharge improves patient flow throughout the hospital, resulting in shorter overall hospital stays, reduced time in the post-anesthesia care unit, shorter emergency department stays, and decreased emergency department boarding. In private hospitals, this is further incentivized by billing structures, where daily charges typically begin at midday.

This study aims to conduct a systematic review and meta-analysis on early discharge and its associated benefits.

We will evaluate whether these efforts are justified, assess their impact on hospital length of stay, time spent in the post-anesthesia care unit and emergency department, and their effect on patient readmission.

Objectives: The objective of the present study is to review the available evidence on the impact of an early discharge policy on bed wait times in the emergency department (ED), post-anesthesia care unit (PACU), and patient length of hospital stay compared with no early discharge policy.

Methods: We registered our study in the PROSPERO platform (CRD42024560526). The study consists of a meta-analysis of existing literature regarding the effect of morning discharges on hospital readmissions and length of stay within emergency rooms, surgical, and non-surgical adult wards. The literature was compiled using PubMed's database MeSH terms. Three independent reviewers screened the retrieved articles. Studies meeting eligibility criteria and reporting outcomes of interest underwent risk of bias assessment before inclusion in the meta-analysis. Two studies did not report dispersion measures for length of stay (LOS). To allow for their inclusion, standard deviations were imputed based on the mean and standard deviations observed in the other included studies, assuming similar relative variability across studies. This approach follows recommendations in the literature (Wan et al., 2014; Cochrane Handbook, Chapter 6.5.2.7).

Results: Our initial search of the PubMed database yielded 2,353 articles. We also included 12 pre-selected articles based on prior identification. After applying eligibility criteria, we identified 10 articles. We assessed these 10 articles for risk of bias, using the Cochrane Robins I V2 and Rob2 tools.

Among the 6 studies that implemented strategies to increase early discharges, all reported a higher percentage of early discharges with a pooled odds ratio of 2.44 favoring the intervention and a 95% confidence interval (95%CI) of 1.64 to 3.64. However, the calculated heterogeneity I2=98.67%) was high. We found data on length of stay at PACU and ED in only one study, precluding a meta-analysis for these outcomes. Five studies assessed the total length of hospital stay. Although two studies reported a longer stay in the intervention group, the overall effect was not significant (Hedges's g of 0.03 with a 95%CI=of -0.04 to 0.1) with high heterogeneity (I2=85.90 %). Four studies analyzed readmission rates, with no significant difference between intervention and control groups (OR=0.97; 95%CI=0.89 – 1.06; I2=64.33%.

Conclusion: The results indicate that increasing the number of early discharges does not reduce hospital

LOS and could lead to longer stays. Furthermore, there was no effect on readmission rates for the patients. Thus, this strategy does not appear to have the expected result in reducing hospital occupancy rates.

Keywords: Patient discharge; Patient readmission; Early discharge Length of stay; Readmission rates

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Research funding: Not applicable.

029

Dispensation of drugs for multiple sclerosis in Brazil after the implementation of the 2021 PCDT

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Introduction: Multiple sclerosis (MS) is the most common non-traumatic disabling neurological disease in young adults. Disease-modifying drugs (DMDs) are essential for reducing relapse rates and delaying disability progression. Despite Brazil's universal healthcare coverage through the Unified Health System (SUS - *Sistema Único de Saúde*), disparities in MS treatment access persist. In 2021, the Brazilian Clinical Protocols and Therapeutic Guidelines (PCDT) for MS were updated, impacting DMD dispensation.

Objectives: To analyze regional and temporal variations in DMD dispensation across Brazil between 2019 and 2023, assess changes following the 2021 PCDT update, and evaluate trends in the adoption of high-efficacy (HE) therapies.

Methods: MS DMD dispensation data were extracted from the Authorization for Ambulatory Procedures (APAC) records in DATASUS (ICD G35) from January 2019 to December 2023. Patients were categorized based on DMD efficacy levels: high (natalizumab, alemtuzumab), moderate (fingolimod), and low (interferons, glatiramer acetate, azathioprine, teriflunomide, dimethyl fumarate). Regional and national dispensation trends were analyzed pre- (2019-2021) and post-PCDT (2023). Statistical analyses included Student's t-test and chi-square tests ($p < 0.05$).

Results: The number of MS patients receiving treatment increased by 25.91% from 22,651 (2019) to 28,521 (2023). The highest prevalence rates were observed in the South (19.96/100,000) and Southeast (18.71/100,000) regions, but the North (44.74%) and Northeast (31.17%) had the greatest proportional increases. Following the PCDT update, natalizumab dispensation rose significantly (12.7% to 20.07%, $p < 0.05$), while interferon (-29.60% to 16.07%, $p < 0.05$) and glatiramer acetate (-15.92% to 10.60%, $p < 0.05$) declined. The North and Central-West regions exhibited the highest increases in HE DMDs (13.12% and 9.70%, respectively) and the largest reductions in low-efficacy drugs. Treatment switching to HE therapies increased from 18.05% to 33.67% ($p < 0.05$), though most switches remained within low- and moderate-efficacy categories.

Conclusion: The 2021 PCDT update influenced national DMD dispensation patterns, promoting increased use of HE therapies. However, regional disparities remain, warranting further investigation to optimize treatment access and public health policy in Brazil.

Keywords: Multiple sclerosis; Immunologic factors; Drug utilization; Health policy; Brazil

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Research funding: Not applicable.

030

Relationship between anthropometric measures before and after menopause and cardiovascular risk factors in women living in the municipality of Vera Cruz, Bahia - preliminary results

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Introduction: The municipality of Vera Cruz (BA), located on Itaparica Island, faces significant challenges in access to healthcare, especially among adult women who represent a large portion of the population. This scenario contributes to the high prevalence of non-communicable chronic diseases, such as obesity, hypertension, and diabetes. Considering this, in December 2024, the Travessia Project carried out the Maria Felipa Expedition, aimed at providing healthcare assistance, education, and conducting research focused on women's health. In this context, the climacteric period plays an important role in the changes experienced by women. Hormonal changes during this phase, particularly hypoestrogenism, contribute to an increased cardiometabolic risk and to alterations in body composition, which directly influence the development of cardiovascular and metabolic diseases. Thus, understanding these changes in the pre- and postmenopausal stages is essential for guiding preventive strategies and health promotion efforts targeted at this vulnerable population.

Objectives: The study aims to describe the prevalence of overweight and obesity, assess anthropometric measures in the female population, and compare blood pressure, Body Mass Index (BMI), and abdominal circumference values between pre and postmenopausal women, investigating possible associations with cardiometabolic risk factors.

Methods: This is a retrospective, cross-sectional observational study with a mixed-methods approach. The sample was selected by convenience and consisted of women who attended Basic Health Units during the Maria Felipa Expedition, held from December 14 to 21, 2024. The study was approved by the Research Ethics Committee. All women who signed the Informed Consent Form (ICF) and all girls aged 15 to 18 who signed the Assent Form (AF) were included. Adolescents under 15 years old, pregnant women, and those who declined to participate were excluded. A total of 240 women were invited to participate; 17 refused and 1 was pregnant, resulting in a final sample of 222 women for data analysis. These women were later categorized into two groups: premenopausal and postmenopausal. Data collection was performed by medical and nutrition students from FICSAE using the Epicollect 5 app, and included anthropometric assessments (weight, height, BMI, and abdominal circumference), blood pressure measurement, and gynecological evaluation. The data were entered and anonymized in the REDCap platform and later exported to Jamovi software (version 2.4) for statistical analysis. Descriptive analysis was conducted for both quantitative and categorical variables, and Student's t-tests were used to compare the two groups.

Results: The sample consisted of 222 women: 143 were in the premenopausal group, 76 in the postmenopausal group, and 3 did not know how to answer the question. These 3 participants were not included in the descriptive statistics. Regarding weight status, 50 women had an ideal weight (22.5%), 80 were overweight (36%), 55 had grade 1 obesity (24.77%), 24 had grade 2 obesity (10.8%), and 13 had grade 3 obesity (5.85%). In total, 77.4% of the women were above the ideal weight. The mean systolic blood pressure was 122.2 mmHg in premenopausal women and 134.5 mmHg in postmenopausal women. The mean arterial pressure was 94.0 mmHg in premenopausal women and 99.3 mmHg in postmenopausal women. The mean BMI was 29.5kg/m^2 in the premenopausal group and 29.8kg/m^2 in the postmenopausal group, while the mean abdominal circumference was 95.7 cm and 98.1 cm, in the premenopausal and postmenopausal group, respectively. When comparing the groups, it was observed that systolic blood pressure was significantly higher in the postmenopausal group than in the premenopausal group, with a statistically significant difference (t=4.15; p<0.001). In this analysis, the Levene's test was significant, indicating a violation of the homogeneity of variances; however, the corrected Welch test was applied, ensuring the reliability of the result. Mean arterial pressure followed a similar pattern,

being significantly higher in the postmenopausal group, with a statistically significant difference (t=2.65; p=0.009). On the other hand, there were no statistically significant differences between the groups in terms of BMI (t=0.381; p=0.704) or abdominal circumference (t=1.07; p=0.285), although the postmenopausal group showed slightly higher mean values.

Conclusion: Most women were above the ideal weight, either overweight or obese, and no significant differences were found between the groups regarding BMI and abdominal circumference. However, postmenopausal women presented higher systolic and mean arterial pressure values, suggesting a possible influence of hypoestrogenism on the increased cardiovascular risk.

Keywords: Menopause; Women's health; Antthropometry; Heart disease risk factors

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031

Study of craniocervical arterial dissections: clinical comparison between patients with and without stroke

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Introduction: Craniocervical arterial dissections (CADs) are a leading cause of stroke in young and middle-aged adults. They are characterized by a tear in the arterial wall, typically beginning in the intimal layer, leading to the formation of a mural hematoma that can cause stenosis, occlusion, or pseudoaneurysm. Although CADs most commonly affect the cervical internal carotid arteries, they can also involve vertebral and intracranial arteries - the latter being more prone to hemorrhagic events due to their histological fragility. CADs are classified as either spontaneous or traumatic, with the spontaneous category ranging from minor trauma to significant alterations. Despite their relatively low incidence in the general population, CADs are clinically significant because of their potential for severe complications and diagnostic challenges, especially when ischemic signs are initially absent. Treatment focuses on preventing secondary ischemic and hemorrhagic events, although the optimal therapeutic approach remains under debate in the literature.

Objectives: The objective of this study is to describe the frequency of patients diagnosed with CAD, both with and without cerebral ischemia, and to compare the clinical characteristics of consecutive patients admitted to a tertiary hospital according to the presence or absence of stroke or transient ischemic attack at initial evaluation.

Methods: This case-control study included data from 176 patients diagnosed with CAD treated at Hospital Israelita Albert Einstein, São Paulo, between 2012 and 2018. Patients without stroke or transient ischemic attack (TIA) comprised the control group, while those with stroke or TIA formed the case group. The study adhered to the ethics committee guidelines of IIEP and the Declaration of Helsinki. Inclusion criteria were patients aged over 18 years, admitted to the emergency department between 2012 and 2018, with diagnosis confirmed by computed tomography angiography (CTA) and/or magnetic resonance imaging/angiography (MRI/MRA). Cases with evident traumatic etiology were excluded. Stroke was defined as focal neurological deficits lasting more than 24 hours, with or without ischemic lesions on MRI. Transient ischemic attack was defined by deficits lasting less than 24 hours without ischemic lesions on MRI. For statistical analysis, categorical variables were presented as frequencies and percentages, and continuous variables as means and standard deviations. Group comparisons utilized the chi-square test for categorical variables, independent samples t-test for parametric continuous variables, and Mann-Whitney test for non-parametric continuous variables. A significance level of $p<0.05$ was established. Variables associated with ischemic lesion occurrence were initially evaluated by univariate analysis, followed by multivariate regression.

Results: The initial descriptive analysis included 176 patients with craniocervical artery dissection, with 54 in the case group and 122 in the control group. The ischemic group showed a higher prevalence of males, hypertension (28.57%), obesity (59.37%), and smoking (15.09%). Most dissections were spontaneous

(93.10%), predominantly affecting the vertebral artery (75.9%). Mural hematoma was present in 93% of cases, with more severe arterial stenosis in the ischemic group (60.86% severe vs. 35.77% in controls). The time to seek medical care was shorter in the ischemic group (mean 4.69 days). Invasive mechanical ventilation was required in 47.87% of cases, and 40.9% required ICU or step-down unit admission. Chi-square tests revealed significant associations between ischemic events and male sex (p<0.001), severe stenosis (p=0.007), lower incidence of prior headache (p<0.001), inconclusive CT scans (p=0.028), and increased need and type of hospitalization (p=0.021 and p<0.001, respectively). Recurrent dissection was more frequent in the non-ischemic group (p=0.015).

Normality tests indicated non-normal distribution of continuous variables, supporting the use of the Mann-Whitney test instead of the t-test for group comparisons. Only symptom duration differed significantly between groups (p=0.006), while other continuous variables showed no significant differences.

Univariate logistic regression identified female sex, hospitalization, severe stenosis, and ICU admission as associated with ischemic events secondary to CAD. In multivariate analysis, only female sex (OR=0.247; 95%CI=-2.168, -0.629; p<0.001) and severe stenosis (OR=5.470; 95%CI=0.499, 2.899; p=0.006) remained independently associated. Female patients had a lower risk, whereas severe stenosis significantly increased the likelihood of stroke or transient ischemic attack.

Conclusion: Craniocervical artery dissection (CAD) is an underrecognized condition that can lead to severe ischemic events. This study identified that male patients and those with severe stenosis are at higher risk, emphasizing the importance of early diagnosis and timely intervention to prevent complications and improve outcomes.

Keywords: Nervous system; Dissection; Stroke; Ischemic attack, transient; Case-control studies

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032

HPV vaccination prevalence in the female population of Vera Cruz, Bahia - preliminary results

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Introduction: Vaccination against the Human Papillomavirus (HPV) is associated with a 90% prevention of cervical cancers resulting from genital warts caused by the virus. However, immunization of girls between the ages of 9 and 14 remains a national challenge, with annual rates recording below the 90% target. This difficulty is evident in the Northeastern region, where Bahia has the lowest immunization rates, at 60.73% and 53.65% in 2024, respectively.

Given this scenario, there is a need for further studies on the subject to illustrate the sociobiological parameters that determine women's immunization in Brazil.

The municipality of Vera Cruz, located on the island of Itaparica, Bahia, despite its proximity to the state capital, represents a population facing sociodemographic vulnerabilities and challenges related to access to healthcare. Thus, epidemiological data from the female population of Vera Cruz, along with social circumstances, can help illustrate the extent of immunization in segregated areas.

Objectives: Evaluate vaccination coverage against human papillomavirus in a convenience sample of the female population aged over 15 years in the municipality of Vera Cruz, Bahia, (and study the social factors that contribute to effective immunization in the region and the associated health implications).

Methods: This was a cross-sectional observational study, approved by the Research Ethics Committee of the *Sociedade Beneficente Israelita Brasileira Albert Einstein*. Sociodemographic, gynecological, nutritional, quality of life and sleep data were collected from

women aged 15 and over living in Vera Cruz (BA), who received care during the Maria Felipa Expedition, between December 14 and 21, 2024. After approval from the Research Ethics Committee, the Expedition's volunteers collected data on women's gynecological and nutritional health, access to health care itself, and quality of life and sleep through structured interviews. The Epicollet app was used to record the data. The sample was convenient and included 223 women who signed the Informed Consent Form (ICF) provided during the presentation of the study to the patients. To record their vaccination status, the 223 women were categorized as vaccinated, unvaccinated and preferred not to answer or did not remember. The women's vaccination status was included in the "Episono Questionnaire for Women 2007" which composed the structured interviews, along with questions involving patients' cervical and breast cancer screening.

Results: Within the 223 interviewed women - with an age average of 44 years - 99 (44,4%) were vaccinated, 91 (40,8%) were unvaccinated, and 33 (14,8%) preferred not to answer or did not remember.

Conclusion: The preliminary results indicate a balanced prevalence of vaccinated and unvaccinated women. Such outcomes are below the average coverage for HPV vaccination recorded in Bahia, with a 53,65% index registered in 2024.

Keywords: HPV; Vaccination; Prevalence; Social

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033

Nutritional status and consumption of ultra-processed foods among women in Vera Cruz, Bahia

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Introduction: The municipality of Vera Cruz, located on Itaparica Island (Bahia), presents socioeconomic inequalities and faces challenges in accessing healthcare, which compromises the development of a healthy dietary pattern, considered the foundation for the prevention and treatment of cardiometabolic diseases. According to the World Health Organization (WHO), noncommunicable diseases (NCDs) are among the top ten causes of death worldwide, with cardiovascular disease being the leading cause of mortality worldwide and in Brazil. In this context, higher consumption of ultra-processed foods is associated with a deterioration in diet quality, as these products contain added preservatives, flavorings, and colorings, and are generally high in added sugars, saturated fats, and/or sodium. In Brazil, the consumption of ultra-processed foods has increased significantly, accounting for approximately 20% of daily caloric intake. Therefore, assessing the consumption of ultra-processed foods among the population, especially among individuals living in vulnerable situations, is essential.

Objectives: To investigate the nutritional status and the consumption of ultra-processed foods among women residing in the municipality of Vera Cruz, Bahia.

Methods: This is a cross-sectional observational study with data collected following approval by the Research Ethics Committee of the *Sociedade Beneficente Israelita Brasileira Albert Einstein*, during the Maria Felipa Expedition (December 14-21, 2024). The initial sample consisted of 223 women (>15 years). For the present analysis, only non-pregnant women aged >18 years were included (n=217). Sociodemographic data (age, self-reported skin color, education level, and satisfaction with household income) were obtained using structured questionnaires. Nutritional status was assessed based on weight (kg) and height (cm) measurements, taken using a digital scale and a stadiometer, respectively. Body mass index (BMI -kg/m^2) was calculated to classify nutritional status, using WHO cut-off points, with values ≥30kg/m^2 considered indicative of obesity. The food frequency questionnaire from the Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL) was used to assess the regular consumption of soft drinks (≥5 times/

week) and the consumption of ultra-processed foods on the previous day (≥5 out of 13 food groups, including sweetened beverages, cookies, snacks, desserts, breads, processed meats, sauces, and ready-to-eat meals). Data analysis was conducted using Stata statistical software, version 17.0, p-value<0.05 was considered statistically significant.

Results: Among the 217 women evaluated, the prevalence of obesity was 44.2%. The prevalence of regular soft drink consumption was 12.9%, regardless of age, skin color, or income. However, women with higher educational levels showed a trend toward greater regular soft drink consumption (p=0.068). The consumption of five or more groups of ultra-processed foods on the day prior to the interview was reported by 20.8% of the participants, regardless of age, skin color, or educational level.

Conclusion: The prevalence of obesity among the women studied exceeded the national average (24.8%). The consumption of ultra-processed foods on the day prior to the interview was higher than the national rate (14.1%). Only the prevalence of regular soft drink consumption was lower than the national average (13.2%).

Keywords: Food, processed; Nutritional status; Obesity

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Research funding: *Projeto Travessia*.

034

Nutritional status and consumption of healthy eating markers in a convenience sample of the female population of Vera Cruz (BA), Brazil

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Introduction: Obesity is a chronic disease closely linked to inadequate eating habits, which contribute to the development of insulin resistance, increased visceral fat, and dyslipidemia-features characteristic of metabolic syndrome. This condition is associated with a higher risk of total and cardiovascular mortality. According to the World Obesity Foundation, 68% of the Brazilian adult population is overweight, and 31% is obese. The importance of diet quality and adherence to a healthy dietary pattern in combating obesity has already been demonstrated, being more relevant than approaches that focus solely on macronutrient distribution. In this context, consumption of beans and other fresh or minimally processed foods is positively associated with improved diet quality and serves as a marker of healthier eating patterns.

Objectives: This study assessed the consumption of markers of healthy eating in a convenience sample of the female population in the municipality of Vera Cruz, Bahia, Brazil.

Methods: Data were collected at Vera Cruz, Itaparica Island (BA), during the Maria Felipa Expedition (December 14 and 21, 2024), after approval by the Research Ethics Committee of the *Sociedade Beneficente Israelita Brasileira Albert Einstein*. The initial sample comprised 223 women aged >15 years. For the present analysis, only women aged >18 years who agreed to sign the informed consent form and who were not pregnant at the time of data collection were considered (n=217). Nutritional status was assessed using weight (kg) and height (cm) to calculate body mass index (BMI -kg/m^2). BMI values ≥25 and ≥30kg/m^2 were used to classify overweight and obesity, respectively. The questionnaire from the Telephone-Based Surveillance of Risk and Protective Factors for Chronic Diseases (VIGITEL) was used to assess the frequency of regular bean consumption (≥5x/week) and the consumption of fresh or minimally processed foods considered protective against non-communicable chronic diseases (NCDs) on the day before the interview (≥5 out of 12 food groups including legumes, fruits, vegetables, roots, whole grains, nuts, and seeds).

Results: The prevalences of overweight and obesity were 36.0% and 44.2%, respectively, totaling 80.2%

of the sample with excess weight. The prevalence of regular bean consumption was 51.6%. The consumption of five or more groups of NCD-protective foods on the day before the interview was 36.4%. Furthermore, the consumption of both dietary quality indicators occurred regardless of age, skin color, education level, or income.

Conclusion: The prevalence of overweight and obesity among the women studied was higher than both the figures for Salvador and the national average from VIGITEL 2023. While the consumption of protective foods was higher in both comparisons, bean consumption exceeded Salvador's rate but remained below the national average.

Keywords: Protective foods; Nutritive value; Cardiometabolic risk factors; Obesity; Surveys and questionnaires

035

Preliminary analysis of healthy and unhealthy dietary pattern markers and nutritional status of women residing in the municipality of Vera Cruz, Bahia

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Introduction: Inadequate eating habits, characterized by low consumption of fresh and minimally processed foods and high consumption of ultra-processed products, are associated with the development of noncommunicable diseases (NCDs), such as obesity, type 2 diabetes, and cardiovascular diseases. Studies indicate an increased risk of overweight and obesity among vulnerable populations. The municipality of Vera Cruz (Bahia, Brazil) faces limited health infrastructure and barriers to adequate food access, contributing to a high prevalence of NCDs. In this context, understanding the dietary patterns and nutritional status of socially and nutritionally vulnerable groups in this municipality is essential to inform the development of public policies aimed at promoting adequate nutrition and addressing NCDs.

Objectives: This study aims to investigate markers of healthy and unhealthy eating habits and the nutritional status of women (≥18 yr) in the municipality of Vera Cruz, Bahia.

Methods: Cross-sectional observational study. Data collected during Maria Felipa Expedition (December 14 to 21, 2024) after approval by Research Ethics Committee of SBIBAE. Initial sample consisted of 223 non-pregnant women (>15yr) who agreed to participate and signed informed consent/assent forms. For this preliminary descriptive analysis, 217 women aged ≥18yr were included. Sociodemographic data (age, self-reported skin color, education level, and satisfaction with household income) collected using structured questionnaires. Nutritional status was assessed via weight (digital scale), height (stadiometer), and BMI (kg/m^2). Overweight (BMI $\geq 25 kg/m^2$) and obesity ($\geq 30 kg/m^2$) were defined according to World Health Organization criteria. Food frequency questionnaire from VIGITEL survey (Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey) was used to assess markers of healthy and unhealthy eating. Adherence score to "golden rule" of Dietary Guidelines for Brazilian Population (DGBP) ranged from -13 to +12, calculated based on reported consumption frequencies of 13 ultra-processed food groups (negative score, -1) and 12 fresh-minimally processed food groups (positive score, +1) on the day before interview. Higher scores indicated greater adherence to fresh-food consumption. Scores were categorized into tertiles (low, moderate, or high adherence). Data analyzed using Stata 17.0, ($p < 0.05$).

Results: The mean BMI in the studied population was $29.7 \pm 6.6 kg/m^2$. The prevalence of excess weight (BMI $>25 kg/m^2$) was 80%, and obesity (BMI $>30 kg/m^2$) was 44%. Regarding dietary pattern adherence, assessed

via the golden rule score of the DGBP, the mean score was 3.6 (range: -9 to +10). Among adult women, 46% had low adherence, 27% moderate adherence, and 26% high adherence. Among older women, 34% had low adherence, 39% moderate, and 26% high. No statistical association was found between adherence to the golden rule and age, skin color, education, or household income.

Conclusion: in this study, prevalence of obesity exceeded the national mean estimated for female population (24.8%). Golden rule adherence score mean (3.6) indicates that, in this population, consumption of fresh or minimally processed foods is proportional to that of ultra-processed products, highlighting the need to improve dietary patterns in this community.

Keywords: Women; Nutritional status; Dietary patterns; Noncommunicable diseases; Food, processed

036

Impact of adjunctive therapies on quality of life after periodontitis treatment in patients with type 2 diabetes

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Introduction: Individuals with type 2 diabetes and periodontitis may experience additional complications due to chronic hyperglycemia, which impairs the resolution of inflammation and accelerates periodontal disease progression. These factors can compromise the effectiveness of non-surgical periodontal treatment, even over the long term. Therefore, adjunctive therapies such as immunomodulators and antibiotics may offer a promising therapeutic strategy.

Objectives: This study aimed to evaluate the impact of adjunctive omega-3 (ω-3) and aspirin (ASA), with or without systemic antibiotics [metronidazole (MTZ) and amoxicillin (AMX)], combined with subgingival instrumentation (SI), on oral health-related quality of life in patients with type 2 diabetes undergoing treatment for periodontitis.

Methods: Patients with type 2 diabetes and periodontitis were randomly assigned to one of three treatment groups: SI + ω-3, ASA, and antibiotics (n=10); SI + antibiotics only (n=10); or SI + placebo (n=10). Oral health-related quality of life was assessed at baseline and the 6-month follow-up using the Oral Health Impact Profile (OHIP-14) questionnaire.

Results: Thirty patients meeting the inclusion and exclusion criteria completed the study. After 6 months, all groups demonstrated significant improvements in clinical periodontal parameters ($p < 0.05$). Comparative analysis between baseline and follow-up revealed significant reductions in the OHIP-14 domains of physical pain and psychological disability. However, no statistically significant differences were observed between the treatment groups at 6 months.

Conclusion: Preliminary findings suggest that periodontal therapy, regardless of the adjunctive regimen used, improves oral health-related quality of life in individuals with type 2 diabetes and periodontitis.

Keywords: Diabetes mellitus, type 2; Periodontal diseases; Periodontitis; Patient reported outcome measures; Quality of life

037

Analysis of HIV clinical indicators according to sociodemographic and geopolitical characteristics of Brazilian municipalities

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Introduction: Since the first AIDS cases were reported in 1981 and HIV was identified as its etiologic agent in 1983, the infection has become manageable with antiretroviral therapy. Today, people living with HIV (PLHIV) who undergo treatment maintain good immunity and a life expectancy close to that of the general population. However, the success of these interventions depends on the availability of healthcare services, medication supply, professional training, and strategies to overcome access barriers, factors strongly influenced by structural, socioeconomic, and political conditions. Political ideology may also impact the effectiveness of HIV programs, especially in countries like Brazil, where the epidemic is concentrated in socially vulnerable and stigmatized populations. Although Brazil is a global reference in HIV policy, the country still faces challenges, particularly disparities in clinical indicators across municipalities. This ecological study aims to analyze how political and socioeconomic characteristics of Brazilian municipalities relate to HIV clinical outcomes.

Objectives: To evaluate associations between social and geopolitical factors (macro-region and state, municipal Human Development Index, availability of public health services, and political ideology) and the AIDS-related mortality rate as the underlying cause (per 100,000 inhabitants) across different Brazilian municipalities from 2006 to 2022.

Methods: This study used publicly available data from Brazilian municipalities spanning 2006 to 2022, obtained from the following sources:

- HDI (2000 and 2010): Atlas of Human Development
- Primary Health Care coverage (2007-2020): e-Gestor Atenção Básica
- Percentage of votes by party in the second round of federal elections (2006-2022): Superior Electoral Court
- AIDS mortality rate as underlying cause (2010-2022): Ministry of Health

Of the 5,570 municipalities, 5,298 had complete data on healthcare coverage, election results, and AIDS mortality; 5,286 had HDI data. Municipalities were grouped by Brazil's five geographic regions. HDI evolution was calculated as the absolute and percentage difference between 2000 and 2010. Classification followed national HDI categories. Health coverage was dichotomized as >90% or ≤90%. Political orientation was classified as left or center-right based on party self-identification. According to Resolution 510/2016 of the Brazilian National Health Council, our local Ethics Committee waived the requirement for informed consent, as the study used only publicly available and non-identifiable information.

Results: In the univariate analysis, statistically significant associations were identified between mortality rate and the following independent variables: geographic region, Human Development Index (HDI), percentage coverage of Primary Health Care (PHC), and the predominant political orientation of the municipalities. Compared to the North region, municipalities in the Northeast region showed a lower relative risk of mortality (RR=0.710; 95% CI: 0.562-0.896; p=0.004). The South, Southeast, and Central-West regions did not show statistically significant differences compared to the North.

Regarding HDI, municipalities classified as high or very high had a higher mortality risk (RR=9.575; 95% CI: 3.668-24.998; p<0.001) compared to municipalities with very low HDI. Medium and low HDI categories were also associated with elevated risks (RR=5.333; p=0.001 and RR=3.700; p=0.008, respectively). Positive HDI variation between 2000 and 2010 was associated with reduced mortality rate (RR=0.911; 95% CI: 0.896-0.926; p<0.001). The percentage coverage of Primary Health Care showed an inverse association with mortality: coverage above 90% was related to significantly lower risk (RR=0.401; 95% CI: 0.354-0.455; p<0.001) and, when analyzed as continuous

variable, increases in coverage percentage were also associated with mortality reduction (RR=0.986; 95% CI: 0.984-0.988; p<0.001).

Predominant political orientation revealed a significant association, with municipalities electing conservative parties showing a higher risk of HIV mortality compared to those electing left-wing parties (RR=1.458; 95% CI: 1.293-1.645; p<0.001). This association remained consistent in stratified analyses by primary care coverage (<90% or ≥90%) and Human Development Index levels (medium or high).

Conclusion: HIV mortality in Brazilian municipalities is significantly associated with geographic region, human development level, primary health care coverage, and political orientation. Higher HDI correlates with increased mortality, while improved development and greater primary care coverage reduce it. Conservative political predominance is linked to higher HIV mortality risk.

Keywords: HIV infections; Mortality; Human development; Primary health care; Health status indicators

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038

Analysis of dose-equivalence of antipsychotics: a scoping review on methodological variations and their implications for research and clinical practice

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Introduction: Schizophrenia is a chronic psychiatric disorder affecting approximately 0.4% of the population, typically manifesting in late adolescence or early adulthood. It significantly impairs functionality, with symptoms categorized as positive (e.g., delusions, hallucinations) and negative (e.g., apathy, reduced motivation). Antipsychotic medications, targeting dopamine D2 receptors, are the mainstay of treatment, divided into first-generation, which have higher extrapyramidal side effects, and second-generation, associated with metabolic risks but favored clinically. With over 30 antipsychotics available, understanding dose equivalence is critical for clinical and research applications. Several methods exist to estimate dose equivalence, including Chlorpromazine Equivalents, Defined Daily Dose (DDD), Minimum Effective Dose, and Mean Dose. Each method has distinct advantages and limitations, yet empirical validation and comparative analysis remain scarce. This gap hinders optimal therapeutic decision-making and complicates study comparisons, underscoring the need for systematic evaluation of these methodologies in psychiatric research and practice.

Objectives: The primary objective of this study is to conduct a comprehensive review of dose equivalence methodologies for antipsychotic medications, coupled with a qualitative and quantitative analysis of their principal methodological disparities, aiming to critically evaluate and compare their respective advantages and limitations

Methods: This study is a scoping literature review aimed at exploring established theories and concepts related to antipsychotic dose equivalence. The primary research question was: "What are the differences between dose equivalence methods for antipsychotics?" Secondary objectives included descriptive and visual analyses of each method, qualitative and quantitative comparisons, and investigation of their impact on study outcomes. A systematic search strategy was employed using relevant keywords and MeSH terms such as "Dose Equivalence," "Antipsychotic Agents," and their synonyms, combined with Boolean operators across databases including PubMed, Web of Knowledge and InBase. Inclusion criteria encompassed peer-reviewed clinical trials, systematic reviews, and meta-analyses in

English, Portuguese, or Spanish. Studies not directly addressing dose equivalence were excluded.

Screening and selection were conducted using the Rayyan platform with dual independent reviewers to ensure unbiased evaluation. Data extraction was focused on method descriptions, validation, and dose equivalence tables. Comparative analyses assessed quantitative differences, as well as their influence on research results. Findings were synthesized following the PRISMA-ScR protocol, aiming to identify knowledge gaps and support future psychiatric research.

Results: A comparative analysis of four antipsychotic dose-equivalence methods highlights their respective strengths and limitations. The chlorpromazine equivalence approach translates each drug dose into a chlorpromazine equivalent based on direct clinical comparisons, making it well-accepted for first-generation drugs but less reliable for newer, receptor-complex agents. The Defined Daily Dose (DDD) system standardizes dosing around a 70 kg adult and is globally recognized, though it lacks pharmacodynamic nuance and varies by region. The minimum effective dose method derives conservative benchmarks from placebo-controlled trials, offering clinical relevance but suffering from limited data and low statistical power in head-to-head comparisons. The mean dose technique calculates an average from flexible-dose studies, providing cross-drug flexibility but potentially introducing bias when trials use narrow dosage ranges. Using 1mg of olanzapine as a reference, the four methods yield markedly different equivalences for haloperidol, risperidone, and clozapine. Under DDD, haloperidol equals 0.8mg, risperidone 0.5mg, and clozapine 30mg. The minimum effective dose method assigns 0.53mg, 0.27mg, and 40mg, respectively. Mean dose produces 0.74mg, 0.38mg, and 30.62mg, while chlorpromazine equivalence yields 0.4mg for haloperidol and risperidone and 0.15mg for clozapine. Accordingly, haloperidol-to-clozapine ratios range from 0.13 (minimum effective dose) to 1.0 (chlorpromazine), and risperidone-to-olanzapine ratios span 0.27 to 0.5. These variations-up to fourfold-underscore the need to select an equivalence method aligned with specific research or clinical goals. Future work will extend this evaluation to other antipsychotics and examine the real-world impact on prescribing and comparative studies.

Conclusion: This scoping review highlights significant differences among antipsychotic dose equivalence methods, revealing a lack of consensus that may affect treatment efficacy and research comparability. Greater standardization, empirical validation, and clinical impact studies are urgently needed to improve precision and application in psychiatric practice.

Keywords: Dose-response relationship, drug; Drug dosage calculations; Antipsychotic agents; Neuroleptics; Antipsychotic agents

039

Community-acquired methicillin-resistant staphylococcus aureus infections: prevalence, resistance profile, sites of infection and risk factors in the pediatric population in Brazil

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Introduction: Community-acquired methicillin-resistant Staphylococcus aureus represents an emerging challenge in Brazilian pediatric clinical practice, particularly due to the increasing prevalence and lack of information on the topic. In Brazil, the literature remains scarce and heterogeneous regarding the epidemiological characterization of these infections in children and adolescents.

Objectives: To systematically review the available literature and synthesize the evidence on the prevalence, risk factors, infection sites, and resistance profiles of community-acquired methicillin-resistant Staphylococcus aureus infections in the Brazilian pediatric population.

Methods: This systematic review was conducted following the PRISMA guidelines, with evidence quality

assessed using the GRADE system, and was registered on the PROSPERO platform. The research question was structured according to the PECO model. Brazilian observational studies conducted between 1994 and 2022 that addressed community-acquired methicillin-resistant Staphylococcus aureus infections in the population aged 28 days to 20 years were included. The search was performed between November 2024 and March 2025 across six electronic databases by two main reviewers, with results discussed by a third reviewer. A total of 6 articles were included.

Results: A progressive increase in CA-MRSA prevalence was observed over time: early studies in Salvador (1994-2005) reported low prevalence (4.9-6.7%), while more recent studies in São Paulo, Ribeirão Preto, Porto Alegre, and Rio de Janeiro (2011-2022) showed prevalence between 17.2% and 46.1%. The definition of CA-MRSA varied significantly across studies, with only two using standardized CDC criteria, while others applied local or modified definitions, introducing potential misclassification bias. Risk factors were inconsistently analyzed. One study linked CA-MRSA to prior antibiotic use, comorbidities, ICU admission, and invasive device use, factors typically associated with healthcare-associated MRSA. Another identified chronic cardiopathy as protective. Overall, risk factors specific to CA-MRSA in Brazilian children remain unclear. Regarding infection sites, CA-MRSA was associated with skin and soft tissue infections, osteomyelitis, and, in some studies, respiratory and intra-abdominal infections. Resistance patterns showed high rates of erythromycin resistance (33.3% - 78.5%), limiting macrolide use. In contrast, sulfamethoxazole-trimethoprim (SMX-TMP) and clindamycin exhibited low resistance rates, supporting their empirical use when guided by local susceptibility profiles.

Conclusion: This review highlights CA-MRSA as an emerging pathogen in Brazilian children, with variable prevalence and resistance profiles. Despite methodological limitations, the findings emphasize the need for standardized diagnostic criteria and multicenter studies with robust methods to guide clinical decisions and inform effective public health policies against this infection.

Keywords: Methicillin-resistant staphylococcus aureus; Methicillin resistance; Child, preschool; Brazil

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040

Use of evidence-based practice by nurses in a private hospital

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Introduction: Evidence-Based Practice (EBP) combines scientific evidence, clinical expertise, and patient preferences, and is currently recognized internationally as a standard of quality in healthcare. Despite being widely disseminated, its effective application still faces challenges such as the gap between knowledge and practice, workload, lack of time, and difficulty accessing updated information. This discrepancy can compromise patient safety and the efficiency of services. To address these barriers, organizations such as Cochrane, the Joanna Briggs Institute, and Johns Hopkins have proposed methodologies for synthesizing and applying evidence. The incorporation of EBP depends on factors such as organizational culture, leadership support, and professional training, with nursing playing a key role in this process. Strengthening EBP contributes to improving care quality, reducing practice variation, and promoting better clinical outcomes.

Objectives: To analyze the beliefs, attitudes, practices, barriers, and facilitators related to the use of Evidence-Based Practice in Health Sciences by nurses working in the inpatient units of a private hospital.

Methods: This is a cross-sectional, descriptive study with a quantitative approach. Data collection was conducted between February and May 2025 in a large private hospital located in São Paulo, Brazil. The convenience sample consisted of 101 nurses working in inpatient units. The inclusion criteria were: being a nurse at the institution, of either sex, over 18 years old, and having worked for at least three months in inpatient units.

Data were collected using a questionnaire for sample characterization and the Health Sciences Evidence Based Practice Questionnaire (HS-EBP), which was translated and adapted into Brazilian Portuguese. The instruments were completed autonomously in the workplace using the RedCap® platform. Informed consent was obtained electronically, ensuring the confidentiality of responses. The study was approved by the Research Ethics Committee of *Hospital Israelita Albert Einstein*. Data were analyzed using descriptive and inferential statistics, including means, standard deviations, frequencies, percentages, hypothesis tests, and correlation analysis.

Results: The study included 101 nurses from a large private hospital in São Paulo. Most participants were female (83.2%), with a mean age of 34.3 years. The majority had 1-5 years of experience (43.6%) and held the position of full nurse (63.4%). Most professionals had a specialization degree (82.2%), and 52.5% reported reading proficiency in English, although with varying levels. The instrument used (HS-EBP) showed excellent internal consistency in its three dimensions: Beliefs and Attitudes, Professional Practice, and Barriers and Facilitators, with Cronbach's alpha and total omega above 0.88. The highest mean score was observed in the Professional Practice dimension (298.7±36.5). Statistical analyses revealed negative skewness, with higher score concentration in all dimensions. English reading proficiency was significantly associated with Professional Practice (p=0.0325), suggesting that reading skills in English may influence the application of evidence-based practice. The "position" variable also showed a significant association with Beliefs and Attitudes (p=0.0316), with higher scores among nurses in senior roles. Correlations between length of service and perceived barriers showed a negative trend, although not statistically significant, indicating that more experienced professionals perceive fewer barriers to implementing EBP. These findings suggest a strong appreciation of evidence-based practice among participants, highlighting the role of English proficiency and professional seniority in strengthening beliefs and practical application of EBP.

Conclusion: The results indicate a positive perception of evidence-based practice among participating nurses, influenced by English proficiency and job position. These findings may support educational and organizational strategies aimed at strengthening EBP and improving the quality of care.

Keywords: Evidence-based practice; Evidence-based nursing; Nursing, Nursing homes; Quality of health care

041

Clinical approach of vascular surgeons, radiologists, cardiologists and neurologists in managing hypersensitivity reactions to iodinated contrast media

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Introduction: Iodinated contrast media (ICM) are widely used in computed tomography and angiographic procedures, with approximately 75 million doses administered globally each year. ICM are classified based on ionic properties and osmolarity. Adverse reactions include toxic effects and hypersensitivity reactions (HRs). The former may be immediate or delayed, and can involve immunologic or non-immunologic mechanisms. Clinical manifestations range from mild cutaneous symptoms to anaphylactic shock. Vascular surgeons, radiologists, cardiologists and neurologists are responsible for administering ICM. However, studies suggest that many have limited knowledge regarding the management of HRs. Additionally, misconceptions persist about the association between allergies to seafood or iodine-containing substances (such as amiodarone and povidone-iodine) and an increased risk of HRs to ICM, leading to unnecessary premedication, increased healthcare costs, and diagnostic delays. Given the widespread use of ICM, physicians must understand the pathophysiology and appropriate management of HRs. Nonetheless, updated national data on physician clinical approaches remain scarce.

Objectives: To evaluate the clinical approach of vascular surgeons, radiologists, cardiologists and neurologists in managing hypersensitivity reactions to iodinated

contrast media in patients undergoing imaging studies who present with allergic reactions or report a prior history of iodine allergy.

Methods: This was a prospective cross-sectional study. Data were collected from vascular surgeons, radiologists, cardiologists, and neurologists through a digital questionnaire on Google Forms. All participants were required to sign an electronic Informed Consent Form (ICF) before completing the survey. Physicians who withdrew after signing or did not use contrast-enhanced radiological exams in their clinical practice were excluded from the study. The questionnaire gathered information on participants' clinical experience with HRs to iodinated contrast media, their approach to patients reporting contrast media allergy or "iodine allergy" prior to imaging exams, and case management strategies. Data collected underwent descriptive analysis to summarize the results. Access to responses was restricted to the authors, and all data were anonymized and analyzed blindly to ensure participant confidentiality.

Results: The study comprised 193 respondents, 68.4% male and 31.6% female. Most participants were radiologists (n=69), cardiologists (n=60) and vascular surgeons (n=35). Overall, 90.7% had performed or requested imaging examinations involving ICM within the last year. Among those who conducted such procedures, 77.1% had already observed HRs to ICM - of those, 42.9% had managed at least one HR with epinephrine. Regarding the clinical approach to patients who reported a presumed allergy, 60.6% of participants inquired about prior allergic reactions to ICM, 37.1% about "iodine allergy" and 2.3% did not address either aspect. Among those assessing for iodine allergy, 56.9% specifically investigated whether the reaction was related to iodine-containing foods, such as seafood. Only 33.9% asked whether symptoms occurred more than 60 minutes after ICM exposure. Clinical manifestations most frequently assessed were cutaneous lesions (91.2%), glottic edema (86.5%) and anaphylactic shock (79.5%). When ICM allergy was reported, 74.3% of respondents neither asked about consultation with an allergy/immunology specialist nor did they refer patients. Additionally, 71.3% did not require a specialist's evaluation prior to a new procedure. In cases of suspected allergic reactions, 30.4% of professionals did not contraindicate the use of ICM. Premedication protocols (corticosteroids and antihistamines) were prescribed by 63.2% of physicians in all individuals who reported previous ICM-related HRs. Furthermore, prior to ICM administration, 38.6% inquired about seafood allergies, based on the

assumption of cross-reactivity. Finally, in cases where patients reported such allergies, 29.8% proceeded with premedication, 16.4% required specialist evaluation and 4.7% contraindicated the use of ICM.

Conclusion: Even though physicians have clinical experience with hypersensitivity reactions to iodinated contrast media, most fail to classify these reactions, overuse pre-medication, and assume there is cross-reactivity between seafood and iodinated-allergy. This emphasizes the need for evidence-based protocols and continuous medical education.

Keywords: Contrast media; Hypersensitivity; Practice patterns, physicians'

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042

Impact of polymerization methods on the tensile strength of resins for 3D printed dental models - a pilot study

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Introduction: The combination of cost-effectiveness and the ability to customize unique and complex solutions has firmly established 3D printing technology in modern dentistry. This technology allows the creation of precise dental models, surgical guides, aligners, and temporary crowns with a high degree of accuracy. Among the different printing methods, the polymerization of liquid

resin, layer by layer, followed by a postcuring stage, is the most commonly used process. This ensures the complete conversion of the resin's chemical bonds, enhancing the material's mechanical strength, biocompatibility, and stability, which are critical factors for the clinical success, durability, and long-term performance of printed dental devices. However, the ideal curing parameters, such as time, light intensity, and wavelength, remain unclear. Therefore, the choice of curing method and light source for photopolymerization remains largely empirical. Further research is essential to understand these effects and develop reliable, evidence-based protocols.

Objectives: This pilot study compared the mechanical performance of dental model's resin specimens with and without postcuring, using different light-curing methods. The aim of this study was to evaluate the influence of curing techniques on the properties of the materials and provide insights into optimizing the postcuring process.

Methods: Twenty resin specimens for dental models (Grey Resin V4.1; Formlabs) were fabricated using a 3D printer Form3 (Formlabs). The specimens were divided into four groups: G1, non-polymerized; G2, post-cured using a laboratory light-curing chamber (FormCure); G3, cured using the Quazar multiwave light-curing unit (FGM); and G4, cured using the BluePhase multiwave light-curing unit (Ivoclar-Vivadent). Two distinct postcuring protocols were employed: a laboratory ultraviolet (UV)-light-curing chamber and an intraoral multiwave light-curing device. The influence of different postcuring methods on the mechanical properties of 3D-printed resins was evaluated. Mechanical testing included measurements of tensile strength (kN), displacement at the maximum tensile force (mm), time to failure (s), and breaking force (kN). All tests were conducted using a universal testing machine (Instron ElectroPuls E3000), allowing for a precise assessment of the mechanical performance.

Results: A one-way ANOVA was conducted to evaluate differences in tensile strength among four experimental groups of composite resin specimens: non-polymerized, polymerized in a curing chamber, and polymerized using Quazar and BluePhase devices. Assumptions of normality (Shapiro-Wilk test, $p > 0.05$) and homogeneity of variances (Levene's test, $p = 0.386$) were confirmed. ANOVA revealed a statistically significant difference among the groups ($F = 59.12$, $p < 0.0001$).

Post-hoc analysis using Tukey's HSD test showed that the curing chamber group exhibited significantly higher tensile strength compared to all other groups ($p < 0.05$). The mean tensile strength in the curing chamber group was 1.794 kN, representing a 61.3% increase relative to the non-polymerized group (1.112 kN). No statistically significant differences were observed among the Quazar, BluePhase, and non-polymerized groups ($p > 0.05$). Although tensile strength values were statistically similar between the Quazar and Bluephase groups, differences in fracture behavior were observed. The Quazar group demonstrated ductile fracture patterns, characterized by gradual deformation and energy absorption before failure. In contrast, the BluePhase group exhibited brittle fractures, with abrupt material failure and little to no plastic deformation.

Conclusion: Tensile strength was significantly higher only in G1. Despite that, the interaction of the light source with the resin may differ between devices, influencing the internal structure and failure mode of the material. Light-material interaction warrants further investigation to optimize polymerization protocols and enhance the clinical performance of resin composites.

Keywords: Oral health; Resin; 3D impression; Tensile strength

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Research funding: Not applicable.

043

Application of manual, semi-automatic, and automatic segmentation techniques in CT images with bone lesions for 3D model generation for academic purposes

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Introduction: The advancement of technology enables improvements in diagnosis and rapid prototyping in dentistry, using tridimensional imaging exams such as computed tomography (CT). Computed tomography image segmentation consists of identifying and separating different anatomical structures through different tomographic densities and creating three-dimensional (3D) models, reproducing the patient's exact anatomy. Advances in neural network architectures have made it possible to achieve the use of computational techniques, allowing the development of different approaches for segmentation, whether manual, semi-automatic, or automatic. This study highlights the application of these three segmentation techniques in CT images containing bone lesions, making it possible to evaluate the feasibility of generating three-dimensional models for academic and research purposes.

Objectives: This study aimed to present the differences in generating three-dimensional models from computed tomography images containing bone lesions through the application of three segmentation techniques: manual, semi-automatic, and automatic.

Methods: Computed tomography images (DICOM format) from bone models presenting a single osteolytic lesion were selected. The images were processed and segmented in the 3D Slicer software, where the three distinct techniques were applied: manual, semi-automatic, and automatic, according to strict protocols for each method. For the manual process, segmentation based on threshold was applied, defining intensity ranges corresponding to the bone and lesion structures. For the semi-automatic segmentation the module "grow from seeds" was applied requiring the user to define initial regions of interest (seeds) for both lesion and surrounding bone, followed by algorithm-driven propagation of the segmentation. For the automation segmentation, an additional module developed in Python and integrated into 3D Slicer was used, employing predefined parameters and computational routines to perform the task without manual intervention. Each segmentation method was performed independently and repeated ten times (n=10) using the same CT dataset and software configuration to evaluate intra-method reproducibility and assess consistency across trials.

Results: The application of different segmentation approaches was proven to be viable using the proposed workflows. The automated segmentation module was efficiently integrated into the software, allowing the generation of three-dimensional models from anatomical structures despite human interaction. Success was defined as both technical execution and integration of the methods with the available tools. The automated process was able to accurately recognize and segment complex structures, significantly reducing the time required to obtain 3D models, although occasional manual corrections or adjustments were still required. The semi-automated method provides the benefits of accelerating the process of selecting different structures. The module optimizes the recognition of structures, reducing the manual effort and time required for complex segmentations, such as internal cavities or bone-tissue interfaces. The manual manipulation of the obtained models and their preparation for analysis demonstrated the compatibility between the tools used and the proposed methodology. Manual mesh editing, smoothing, and correction tools are essential for integrating the analysis flow, ensuring that the models are ready for subsequent steps, such as simulations, measurements, or 3D printing. This study also found that the combination of methods is another possibility for obtaining high-quality, reproducible models.

Conclusion: It was possible to apply manual, semi-automatic, and automatic segmentation techniques to CT images, demonstrating the feasibility and potential for automating this process for study, planning, and analysis purposes in the dental field. The combination of segmentation methods offers flexibility and applicability in different academic, clinical, and research contexts.

Keywords: Methods; Automation; Tomography; Software; Three-Dimensional

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044

Multiple sclerosis drug access across Brazil's public health system between 2019 and 2023: a study using distance traveled by patients and dispensing centers

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Introduction: Multiple sclerosis (MS) patients often have motor and cognitive impairments that are barriers to treatment. Disease-modifying drugs (DMDs) are provided by the Unified Health System (SUS); however, analysis of geographic distribution of dispensing centers (DCs) and distance traveled by patients to access them are unknown.

Objectives: To analyze the number of DCs and MS patients between 2019 and 2023, the geographic distribution of DCs and its correlation with distance traveled by patients in 2023.

Methods: We analyzed the APACs (High-Cost Procedure Authorizations) (2019-2023) for DMD dispensation and identified MS patients (ICD G35). We extracted home cities, and DC's locations. Then, DCs/100,000 km² were calculated by region. Distance traveled by patients was estimated via OSRM API using distances between city centroids and DCs; patients living in the same city as the DC were excluded from this analysis. Kruskal-Wallis compared distance traveled by patients between regions. Spearman correlation between DCs/100,000km² and distance traveled by patients was calculated.

Results: From 2019 to 2023, the number of MS patients treated by SUS increased by 25.9% (22,651 to 28,521), while the number of DCs rose only 4.8% (187 to 196). In 2023, Brazil had 2.30 DCs/100,000km² and a mean distance traveled by patients of 76.5 55.6km. The distance traveled by patients differed across regions (North 128.5 71.8km; Midwest 119.2 78.8km; Northeast 103.9 67.0km; South 83.6 59.4 km; Southeast 64.7 43.6km; p<0.001). DCs/100,000km² by region were: Midwest 0.31; North 0.62; Northeast 3.15; South 7.11; Southeast 8.33. There was a negative correlation between DC density and distance traveled by patients (ρ=-0.90, p=0.037).

Conclusion: In Brazil, the number of DCs did not match the growth of MS patients. There were regional differences, and long distances traveled by patients were correlated with low DC densities. A way to improve distance traveled by patients would be to increase DCs for MS patients served by SUS.

Keywords: Multiple sclerosis; Health services accessibility; Geographic information Systems

SGPP: 5716-23

CAAE: Not applicable.

Research funding: Not applicable.

045

Brain activity during working memory and inhibitory control task in patients with multiple sclerosis able to walk independently

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Introduction: Multiple sclerosis (MS) is a degenerative, inflammatory, autoimmune neurological disease that affects and causes disability in young adults. In addition to neurodegenerative impairment, more than 20% of individuals with MS also present with depression and anxiety, which is associated with poorer quality of life. Most clinical complaints related to cognitive loss due to MS are associated with slower information processing speed and reduced working memory capacity. One of the most widely used tests to assess the severity and progression of MS is the EDSS (Expanded Disability Status Scale), in which higher scores indicate greater severity. In order to study brain functioning, techniques such as functional magnetic resonance imaging (fMRI) can be used. One way to assess cognition and localize brain activity through fMRI is by using paradigms such as the n-back task, which evaluates working memory, and the stroop task, which evaluates inhibitory control.

Objectives: Main: to assess whether there are differences in brain activity and behavior during a working memory and inhibitory control tasks between patients with multiple sclerosis who are able to walk independently (EDSS up to 4) and healthy individuals. Secondary: analyze whether there were differences in neuropsychological tests between the groups.

Methods: The data used in this study were already collected under a previously approved project by FAPESP and approved by the ethics and research committee. Among the study participants, there were no statistically relevant differences regarding age, biological sex, or education level. Data from 36 participants were selected for use in the current study, with 20 belonging to the control group and 16 to the MS group. The methods employed included analysis of Structural Magnetic Resonance Imaging, Functional Magnetic Resonance Imaging (using the n-back task as the working memory paradigm and the stroop task as the inhibitory control paradigm), questionnaires, and neuropsychological tests, namely: International Brief Cognitive Assessment Battery for MS (BICAMS); Expanded Disability Status Scale (EDSS); Lipp's Adult Stress Symptom Inventory; Beck Depression Inventory (BDI); Beck Anxiety Inventory (BAI); Mindfulness Attention Awareness Scale; Multiple Sclerosis Self-Efficacy Scale (MSSE); Multiple Sclerosis Impact Scale-29 (MSIS-29); Modified Fatigue Impact Scale (MFIS); and socio-demographic and clinical data collected from participants' medical records. Group data were compared using Student's t-test or Wilcoxon test if normality assumptions were not met, with a significance level of 0.05.

Results: The comparative analyses conducted between the groups on the working memory task did not show statistically significant differences ($P>0.05$) for performance, activated brain regions, and connectivity between brain regions during the n-back task. However, regarding the analyses between groups on the inhibitory control task, despite the lack of statistically significant difference ($p>0.05$) in performance and connectivity between brain regions, there was a statistically significant difference ($p<0.05$) in the activation of 4 brain regions, being more activated in the multiple sclerosis group. Among these, 2 were more activated in the "Congruent>Incongruent" contrast, namely: the right Lateral Occipital Cortex and the right Frontal Pole (middle frontal gyrus). The other 2 regions were more activated in the "Incongruent" contrast, namely: right Frontal Pole and right Precentral Gyrus. Thus, although there are no significant differences between the MS group and the control group regarding cognitive task performance, it is already possible to notice changes in neural activation in regions of visual processing, executive control, and motor control. Finally, there were significant differences between groups in some neuropsychological tests, namely: the Beck Anxiety Inventory - BAI (control=5+/-(5); patient=13+/-(12); $P=0.0175$), the Lipp Stress Inventory (control=6+/-(6); patient=13+/-(11); $P=0.04163$) and the Beck Depression Inventory - BDI, (control=8+/-(9); patient=14+/-(10); $P=0.01683$).

Conclusion: In patients with multiple sclerosis who are able to walk independently, significant differences in working memory are not observed compared to healthy controls. Nevertheless, increased anxiety, stress, and depression scores, as well as distinct patterns of brain activation during inhibitory control tasks, are already evident in the multiple sclerosis group.

Keywords: Multiple sclerosis; Cognitive training; Functional magnetic resonance imaging; Magnetic resonance Imaging; Neuropsychological tests

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046

Prevalence of regular and adequate consumption of fruits and vegetables in the female population of Vera Cruz, Bahia

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Introduction: Dietary patterns significantly influence health, well-being, and mortality, as they are key risk factors for chronic non-communicable diseases (CNCDs). According to data from the Global Burden of Disease Study, over half of diet-related deaths in 2017 were caused by low consumption of fruits, whole grains and vegetables, foods that are rich in fiber, vitamins, minerals and bioactive compounds. In addition, around 11 million deaths, caused mainly by cardiovascular diseases, type 2 diabetes mellitus and cancer, were attributed to dietary risk factors. In Brazil, this scenario is no different. National data show that only 21.4% of Brazilians meet the World Health Organization's recommendation of consuming five daily servings of fruits and vegetables. Vera Cruz-BA has socio-economic inequalities and faces crucial problems of access to healthcare. Thus, studies on food security, especially in vulnerable populations, are essential to guide strategies that improve diet quality and contribute to the reduction of CNCDs.

Objectives: This study assessed fruit and vegetable (FV) consumption and nutritional status of women>18 years of age in the municipality of Vera Cruz, Itaparica island (Bahia).

Methods: Cross-sectional observational study. Data collection took place during the Maria Felipa Expedition (December 14-21, 2024), after approval by the Research Ethics Committee of the Albert Einstein Brazilian Israelite Beneficent Society and was conducted by FICSAE students supervised by the study coordinators. Data was collected with the aid of Epicollect5 app and transferred anonymously to the REDCap platform. The initial sample consisted of 223 women>15 years old, who agreed to take part and sign an informed consent form. In this preliminary descriptive analysis, non-pregnant women>18 years were included (n=217). Sociodemographic data (age, self-declared skin color, schooling and satisfaction with family income) were obtained using structured questionnaires. Nutritional status was assessed using BMI (kg/m²) and overweight (BMI ≥25kg/m²) or obesity (≥30kg/m²) were defined according to WHO criteria. The food frequency questionnaire from the Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL) was used to assess the regular and the adequate consumption of fruit and vegetables, which were considered when their frequency of intake were ≥5x/week and when ≥5 servings/day, respectively. Data was analyzed with Stata 17.0. Chi-squared tests assumed a 5% level of significance.

Results: Among the women studied, 80.2% were overweight and 44.2% were classified as obese, exceeding the national average, that is 24.8%. Prevalences of regular and adequate consumption of fruit and vegetables were 36.4% and 23.0% respectively, regardless of education, skin color and family income. Furthermore, the regular and adequate consumption of fruit and vegetables among the participants were similar to the women's national averages (35.3% and 23.2%, respectively). However, compared to adults, elderly women showed approximately 56% higher prevalence of regular consumption (p=0.025) and 90% higher prevalence of adequate consumption of these foods (p=0.014).

Conclusion: The regular and adequate consumption of fruit and vegetables among the participants were similar to the women's national averages, but higher among elderly in comparison to adults. Meanwhile, the observed prevalence of obesity exceeded the national average. Data point to the need for measures to improve dietary patterns.

Keywords: Noncommunicable diseases; Women's health; Nutrition; Fruit; Vegetables

047

Checklist of duties of the nursing team in robotic surgery: applicability in the use of the Hugo TM RAS System

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Introduction: Robotic surgeries have evolved significantly in the last decade, which has further increased the theoretical and practical knowledge load and the responsibilities of the nursing team working in the Surgical Center (SC). Due to the rapid advancement and the lack of publications related to the attributions of nursing professionals, a Checklist of Attributions of the Nursing Team in Robotic Surgery was created and validated, which was applied, in the present study, with professionals working in the SC with the HugoTM HAS system in a private hospital in São Paulo.

Objectives: Apply a Checklist of nursing team assignments to nursing team members working in the SC during robotic surgeries performed using the HugoTM system

Methods: Observational, descriptive-exploratory field research, with quantitative data analysis, carried out based on direct non-participant observation. The sample consisted of the monitoring of seven robotic surgical procedures, from beginning to end, with the participation of six nurses and 23 nursing technicians from a private hospital in São Paulo, duly trained and able to handle the HugoTM HAS robot. The Checklist was applied in seven robotic surgical procedures, between March and September 2024, through observation and analysis of the activities carried out by the nursing team from the preparation of the robot to its disassembly. The data underwent pertinent statistical treatment and the project was carried out following the ethical-legal precepts of Resolution 466/2012, of the National Health Council.

Results: The data related to the surgeries were filled out in the three stages of Safe Surgery (Sign in, Time out and Sign out) and some items were not included, such as the side of the table where the robot is available, surgical table compatible with the robot and safety key. The most performed procedures were urological and gynecological, in the Trendelenburg and Proclive positions. At the end of most procedures, the pre-cleaning of the clamps was not performed in the operating room but in the materials center; the docking (approaching) and undocking (moving away) of the robot were performed by nurses and technicians from the manufacturer. All items on the Checklist that were not specific to robotic surgeries were duly applied and checked in all anesthetic-surgical procedures.

Conclusion: The Robotic Surgery Nursing Team Assignment Checklist proved to be reliable and applicable in surgeries using the HugoTM HAS robotic platform, providing valuable assistance indicators that can help ensure the safety of the patient, the team and the institution.

Keywords: Checklist; Patient safety; Robotic surgical procedures; Nursing staff
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048

Development of a phantom model for validation of AI algorithms in intraoral scanning of cleft palate

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Introduction: Three-dimensional scanning is widely used in digital dentistry; however, it still has limitations in acquiring accurate images of cleft palates, mainly due to the lack of scanning light in obstructed areas when

capturing cleft regions. Technologies such as artificial intelligence (AI) have been employed to enable the use of intraoral scanning even in complex conditions, achieving new levels of effectiveness, automating analyses, and reducing the processing time. Consistency testing is essential for assessing the performance and reliability of different AI models. However, exposing real patients to testing or training raises ethical issues. In this context, the use of anatomically accurate physical replicas (phantom models) offers a safe, reproducible, and controlled environment for validating scanning techniques and training AI systems. Phantoms eliminate the need to involve patients in experimental phases and allow standardized comparisons across different devices and algorithms while advancing research and development in digital dentistry.

Objectives: This study aimed to present a technique to create an accessible digital workflow for designing and manufacturing a maxillary phantom using free computer-aided design software and a low-cost 3D printer.

Methods: Initially, a common dental mannequin was scanned using the Trios3 scanner (3Shape), and the generated digital model was imported in STL (standard tessellation) format into the Meshmixer software (Autodesk), where, using digital design tools, modifications were made to simulate the conditions of a cleft palate, with different anatomical depths in the palate, edentulous areas in the region of the union between the posterior part of the maxilla and the premaxilla, and changes in the positioning of the premaxilla. After the model was designed, the file was prepared for 3D printing, which was performed on a Halot Sky printer (Creality) using Grey - TR250LV resin (Phrozen), thus producing the phantom model.

Results: Using the methodology described, it was possible to successfully obtain a physical model (phantom) representing an anatomical condition compatible with cleft palates. The final model demonstrated structural stability, anatomical fidelity, and sufficient contrast between regions of interest, allowing its use in intraoral scanning tests. The cleft palate simulation was built based on real case studies and incorporated into the phantom with adequate dimensional precision for training and validating the artificial intelligence algorithms. The cleft margins, palate topography, and adjacent tissues were reproduced with a high degree of realism, providing the intraoral scanner with a challenge comparable to that found in real patients. In addition, the model is reusable and resistant to repeated handling, making it viable for use in standardized test series, clinical simulations, or calibration and adjustment routines of machine learning-based systems.

Conclusion: The development was possible and the phantom model demonstrated anatomical fidelity and viability for testing with intraoral scanners in cleft palate cases, offering a safe and reproducible alternative for validating artificial intelligence algorithms, without the need to involve patients in the initial phases of development and training.

Keywords: Palate; Imaging, three-dimensional; Scientists for health and research for development dental arch; Models, dental; Cleft palate

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Research funding: Not applicable.

049

Exploring the instability of regression models: impact of sample and methodological variations

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Introduction: Medical studies often aim to identify factors associated with specific health conditions and clinical outcomes. For this purpose, the most common statistical methods are regression models, which allow for the statistical analysis of the relationship between the observed variables and outcomes of interest. Despite their widespread application, regression model results are often interpreted in an absolute manner, without considering that estimates may be unstable when subjected to sample and methodological variations. Therefore, before drawing conclusions from research findings, it is crucial to assess the quality and robustness of the results.

Objectives: Objective: Using a real-world dataset, this study aims to reflect on the vulnerability of regression models results in the face of changes in sample composition, variable selection, methodological variations and failures to verify model assumptions.

Methods: The data analyzed in this work comes from a study that investigated 411 patients undergoing cardiac surgery, with the aim of analyzing the effect of neutrophil-lymphocyte ratio (NLR) on mortality after 30 days. Initially, simple and multiple logistic regression models were fitted to assess the relationship between predictor variables and the outcome. Next, a regression diagnosis was performed to verify the assumptions, including multicollinearity, linearity, presence of outliers, goodness-of-fit, and predictive accuracy. To evaluate estimates instability, three types of sensitivity analysis were employed: (1) systematic exclusion of predictor variables; (2) 10-fold cross-validation; and (3) Bootstrap method with 1,000 resamplings.

Results: When performing the initial stage of adjustment of simple and multiple logistic regression models, the variable NLR was initially not significant in the multiple analysis ($p=0.740$). However, when retained in the model due to its relevance to the study, NLR became significant in the reduced model ($p=0.016$). The variables NLR and creatinine showed a statistically significant association with 30-day mortality across all applied statistical analysis methods. Neutrophil-lymphocyte ratio, the primary variable of interest for the study, consistently presented an odds ratio above 1, with $p<0.05$ in all approaches, including cross-validation ($p=0.001$) and Bootstrap ($p<0.0001$), indicating a strong association with the outcome and robustness of the findings through the sample variations conducted during the sensitivity analysis. The creatinine variable, which underwent logarithmic transformation after linearity assessment, also maintained statistical significance and had a considerable impact on the outcome. In contrast, the variable "type of procedure" presented unstable estimates - statistically significant in some analyses but not in others, especially after the exclusion of outliers and in validation procedures. Regarding cross-validation performance, the model demonstrated strong predictive ability with an area under the curve (AUC) of 0.846, with high accuracy, precision, and sensitivity. However, resampling revealed wide confidence intervals for the AUC (0.651 to 0.967), revealing substantial performance variation depending on the sample and possible overestimation of the discrimination power due to the limited number of events.

Conclusion: These findings showed that statistical analysis strategies have a great influence on the results obtained and subsequent conclusions. They underscore the importance of incorporating diagnostic techniques and sensibility tests into statistical analyses, increasing the reliability of clinical decisions with a solid clinical and statistical foundation.

050

Burnout syndrome in organ transplant nurses

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Introduction: Burnout Syndrome is situated within a multidimensional context and is characterized by emotional exhaustion, depersonalization, and a lack of personal accomplishment at work. Nurses working in transplant care are exposed to stressful situations in their daily routines, placing them at risk for developing occupational diseases such as Burnout Syndrome. Despite international research on the topic, there is a knowledge gap regarding burnout levels among transplant nurses in Brazil. This study is justified by its pioneering approach in analyzing burnout levels among nurses involved in different stages of the transplant process.

Objectives: To measure the prevalence of Burnout Syndrome among nurses working in the Solid Organ Transplant Program.

Methods: This is an exploratory, descriptive, and cross-sectional study conducted with nurses working in units dedicated to the care of patients undergoing solid organ transplants at a transplant center for liver, kidney, intestine, heart, and lung, affiliated with a large private hospital in São Paulo, Brazil. The study included nurses from solid organ transplant programs and excluded those working in Bone Marrow Transplant units. Data

collection took place after approval from the Research Ethics Committee. Two instruments were used: a sociodemographic questionnaire to characterize the sample and the Maslach Burnout Inventory - Human Services Survey (MBI-HSS). Data were collected in the first half of 2024.

Results: Most nurses in the Solid Organ Transplant Program work in outpatient settings, with 37.5% holding management positions. Among those in managerial roles, four nurses showed high scores in emotional exhaustion and depersonalization, coupled with low levels of personal accomplishment. These results indicate that 66.6% of nurses in leadership positions exhibit signs suggestive of Burnout Syndrome. Analysis using the MBI-HSS instrument revealed that the highest-scoring items were related to emotional exhaustion-such as the statement "I feel emotionally drained at the end of the workday"-and personal accomplishment-"I can easily understand how my patients feel about things." These findings suggest that nurses working in outpatient settings experience greater job satisfaction due to direct patient contact. In contrast, nurses in managerial roles face more complex and demanding organizational responsibilities, contributing to increased occupational stress and the emergence of burnout symptoms.

Conclusion: This study identified signs of Burnout Syndrome among transplant nurses, especially in management roles. Despite preserved personal accomplishment, emotional strain was evident. Findings highlight the urgency of mental health initiatives, emotional support, and professional recognition, and call for further research to inform public policies and improve transplant nurse retention.

Keywords: Burnout, professional; Nursing; Public health surveillance; Organ transplantation

051

Gene expression analysis in mesenchymal stem cells reveals the role of integrins and the PI3K-AKT pathway in non-syndromic cleft lip and palate

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Introduction: Non-syndromic cleft lip and palate (NSCL/P) is a multifactorial congenital anomaly caused by genetic and environmental factors that interfere with lip and/or palate closure during embryogenesis. It represents about 70% of CLP cases and significantly affects the quality of life and healthcare costs. Palate formation occurs between the 5th and 12th weeks of gestation, relying on epithelial-mesenchymal transition (EMT), which enables palatal shelf fusion. Disruption in EMT, often due to genetic alterations, can lead to NSCL/P. The PI3K-AKT signaling pathway, essential for cell survival, migration, autophagy, and angiogenesis, may play a role in palatal development. The ITGA8 gene, encoding an integrin involved in ECM interactions, activates PI3K-AKT, influencing EMT and cell behavior. Dysregulation of ECM-related genes like ITGA8 may impair palate fusion.

Objectives: This study revisits NSCL/P microarray data, focusing on PI3K-AKT involvement, aiming to clarify how ECM and intracellular signaling contribute to cleft pathogenesis and uncover novel molecular mechanisms.

Methods: This study reanalyzed gene expression profiles GSE42589 derived from RNA of dental pulp stem cells DPSCs collected from 13 patients with non-syndromic cleft lip and palate NSCL-P and 12 healthy controls. The data, originally published by Bueno et al. 2011 and Kobayashi et al. 2013, were generated using the Affymetrix Human Gene 1.0 ST array. All ethical

procedures were followed, and informed consent was obtained. Sample characteristics, including gender and clinical status, were extracted from the original studies. RNA was isolated following standardized protocols ensuring high-quality input for microarray analysis. Raw data were downloaded using the GEOquery package in R v4.4.2 and normalized using the robust multi-array average -RMA- method with log2 transformation. Differentially expressed genes -DEGs- related to the PI3K-AKT pathway were identified using the KEGG database -hsa04151-. Gene Ontology -GO- and KEGG pathway enrichment analyses were conducted with the clusterProfiler and KEGGREST packages. Adjusted p-values - Benjamini-Hochberg method-<0.05 were considered significant. Protein-protein interaction -PPI- networks were analyzed using the STRING platform - v11.0, applying a confidence score $\geq$ 0.7 and clustering algorithms to identify functional modules. Statistical analyses were performed using R Studio.

Results: Microarray analysis from Bueno et al. 2011 identified 87 differentially expressed genes - DEGs in NSCL/P patients, with 58 upregulated and 29 downregulated. Functional enrichment highlighted genes related to collagen-containing extracellular matrix and integrin binding. Protein-protein interaction networks revealed four major clusters among upregulated genes, notably involving integrins ITGA1, ITGA2, ITGA8 and collagen-related genes COL1A1, COL1A2, COL5A1, suggesting coordinated dysregulation in ECM structure and cell adhesion. Downregulated genes included MMP1 and MMP3, indicating reduced matrix remodeling capacity. The PI3K-AKT pathway emerged as significantly enriched. Genes such as COL4A1, COL4A2, PDGFA, and GDF15 were upregulated, suggesting altered signaling in ECM remodeling. PDGFA modulates PI3K-AKT activity and migration, while COL4A1 and COL4A2 contribute to ECM integrity. These findings suggest that dysregulation in ECM-related genes impacts PI3K-AKT signaling, disrupting cellular adhesion and migration.Analysis of Kobayashi et al. 2013 data confirmed these results. Volcano plot and PCA demonstrated distinct gene expression patterns between NSCL/P and control groups. ITGA8, PIK3R5, and PIK3R6 were significantly overexpressed in NSCL/P samples. These genes regulate integrin signaling and PI3K activity. Expression plots confirmed significant differences |P<0.05| for ITGA8, ITGB4, PIK3R5, and PIK3R6. Collectively, these results support a model in which altered integrin and collagen gene expression impacts PI3K-AKT signaling. This disruption affects epithelial-mesenchymal transition and ECM remodeling-critical

processes for palate development. ITGA8 and PI3K regulatory subunits emerge as potential therapeutic targets.

Conclusion: Our study reveals that ECM remodeling, integrin signaling, and PI3K-AKT pathway activation contribute to NSCL/P. We identify ITGA8, PIK3R5, and PIK3R6 as key regulators, suggesting integrin-PI3K-AKT interactions as potential therapeutic targets for preventing and treating craniofacial developmental disorders.

Keywords: cleft lip; PI3K-AKT pathway; Integrins; Extracellular matrix

SGPP Number: 10459.

CAAE Number: Not applicable.

052

Development and phenotypic characterization of fibroblasts from individuals with recessive dystrophic epidermolysis bullosa

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Introduction: Recessive dystrophic epidermolysis bullosa (RDEB) is a genetic skin disorder characterized by fragile skin that easily forms blisters and erosions

after minor or major friction. It is caused by a mutation in the COL7A1 gene, located on chromosome 3, and inherited in an autosomal recessive manner. As a result, fibroblasts and keratinocytes from RDEB patients are morphologically different from those of healthy individuals. For experimental studies, most pathophysiological parameters-such as tissue architecture, cell-cell and cell-matrix interactions, and mechanical and biochemical properties-would be lost in simplified two-dimensional cultures. Therefore, this project aims to characterize fibroblasts carrying the c.5047C>T RDEB mutation and to develop new 3D culture models for gene therapy research.

Objectives: Development and phenotypic characterization of primary and immortalized fibroblast cell lines from individuals with RDEB homozygous for the c.5047C>T variant.

Characterization of intracellular and extracellular type VII collagen expression by western blot and immunocytochemistry;

Evaluation of type VII collagen expression and localization in 3D skin equivalents.

Methods: The BJ-hTERTc.5047C>T cell line (immortalized human neonatal foreskin fibroblasts with homozygous c.5047C>T mutation inserted via CRISPR/Cas9 and homologous recombination using ssODN) and primary fibroblasts were obtained from skin biopsies of patients with RDEB carrying the homozygous c.5047C<T mutation (SBEB02), and were cultured for morphological and protein expression characterization. As a healthy C7 control, the immortalized BJ-hTERT cell line was used. Cells were thawed and maintained at 37°C with 5% CO_2 in DMEM medium supplemented with 10% fetal bovine serum and 1% penicillin/streptomycin. Replication occurred after incubation with 0.25% trypsin at a 1:4 dilution every three days. For collagen VII (C7) detection, cells were fixed, blocked, and incubated with specific antibodies, with nuclear staining using DAPI for visualization under a fluorescence microscope. C7 production was stimulated with ascorbic acid (50mg/ml), and samples of supernatant and lysate were analyzed by western blot using Anti-COL7 NC1 and NC2, and Anti-ACTB antibodies, with chemiluminescent detection. For intracellular C7 detection, cells were cultured and fixed on histological slides, and endogenous C7 expression was evaluated by immunofluorescence using Anti-Col7 NC1 antibody and DAPI.

Results: In this study, we developed a cellular model containing the pathogenic variant c.5047C>T in the COL7A1 gene, associated with Recessive Dystrophic Epidermolysis Bullosa (RDEB). BJ-hTERT cells were nucleofected with a Cas9/gRNA complex targeting exon 54 of COL7A1, along with a single-stranded oligonucleotide containing the desired variant. Following gene editing, cells were subjected to single-cell sorting into 96-well plates. The clone named BJ-hTERTc.5047C>T was isolated, expanded, and its editing confirmed by genotyping and Sanger sequencing. Master and working cell banks were established for phenotypic characterization. Type VII collagen (C7) expression was assessed by intracellular immunofluorescence using the NC1 anti-C7 antibody. Control BJ-hTERT cells exhibited the expected expression pattern, with strong and diffuse cytoplasmic signal. In contrast, BJ-hTERTc.5047C>T cells showed significantly reduced intracellular C7 expression, reflecting the phenotype associated with the mutation. Similar results were also observed in immortalized SBEB02 cells. Considering that extracellular secretion of C7 is essential for anchoring fibril formation, we performed stimulation with ascorbic acid to promote protein secretion. Initial western blot (WB) analyses of cell lysates showed faint bands with high protein degradation. Replacement with specific antibodies provided by researcher Alexander Nyström enabled robust detection of full-length C7 protein (~290 kDa) in BJ-hTERT samples, validating the methodology. However, standardization of protein detection in the supernatant, representing secreted C7, is still under development. This cellular model is a valuable tool for functional studies and the validation of therapeutic strategies targeting correction of the c.5047C>T mutation in COL7A1.

Conclusion: The developed cellular model reproduces the molecular phenotype of RDEB associated with the c.5047C>T mutation, evidenced by reduced type VII collagen expression. It represents a robust tool for investigating pathological mechanisms and validating therapeutic approaches. Next steps include validation of the BJ-hTERTc.5047C>T culture in 3D skin models.

Keywords: Epidermolysis bullosa; Fibroblasts; COL7A1 protein, human; Cell culture techniques

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Checklist of duties for the nursing team in robotic surgery: applicability in the use of the Da Vinci® System

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Category: Nursing

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Introduction: Recent years have been marked by numerous technological advances in all fields, including healthcare, with robotic surgery being an example of such advancement. Given the rapid changes, it is essential to implement new protocols and checklists to ensure organized and safe patient care. Therefore, a checklist was created and validated specifically for employees working in the Surgical Center (SC), covering the duties of the nursing team in robotic surgeries.

Objectives: Apply a checklist of nursing team assignments in robotic surgery to employees working in a private hospital in São Paulo, using the Da Vinci® robotic system.

Methods: This is an observational, descriptive-exploratory field study with quantitative data analysis, conducted through direct non-participant observation. The sample consisted of applying the checklist in 50 surgeries, among nurses and nursing technicians working in the surgical center of a private hospital in São Paulo, who were properly trained and qualified to handle the Da Vinci® robot. The checklist was applied by observing the activities performed by the nursing team, from assembling the robot before the start of the surgery to disassembling it after the procedure was completed. The data underwent pertinent statistical treatment and the study was conducted in accordance with the ethical and legal precepts of Resolution 466/2012 of the National Health Council.

Results: The most frequently performed surgeries were prostatectomy, in the Trendelenburg lithotomy position, and patients were referred for anesthetic recovery. During the application of the Safe Surgery Checklist, although the steps (Sign in, Time out and Sign out) were performed in all surgeries, some specific points of robotic surgery still show low adherence, such as pre-cleaning of the clamps and cleaning of the robotic system, items that deserve greater attention from the medical and nursing teams. Most of the robots were handled (draping, docking and undocking) by nursing technicians, specifically trained to perform these activities.

Conclusion: The Checklist of Responsibilities of the Nursing Team in Robotic Surgeries is a strong ally in the goal of ensuring safety, both for nursing and medical team professionals and for patients undergoing robot-assisted procedures, in addition to greater safety for the institution.

Keywords: Checklist; Patient safety; Robotic surgical procedures; Nursing staff

054

Factors related to the choice of medical specialty among medical students - a national survey

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Introduction: The choice of medical specialty is a complex process influenced by factors such as autonomy, financial return, residency duration, and family planning. These factors vary over time and across generations, playing a key role in public policy planning. In Brazil, research shows that specialty selection usually occurs at the end of medical school, while rejection of certain specialties happens early on. A strong patient bond and job stability influence the choice of generalist

fields, whereas hospital environments tend to attract those interested in surgical specialties-more commonly chosen by men. Internationally, the topic is more widely studied, with key factors including personal interest, work-life balance, personality traits, and internship experiences. Studies in Iran and Japan confirm that personal experiences and frequent communication with patients significantly influence specialty selection.

Objectives: The aim of this study is to identify the main factors that influence the choice of medical specialty among medical students in Brazil.

Methods: A nationwide survey will be conducted among medical students from the 1st to the 6th year using an anonymous, self-administered electronic questionnaire via the REDCap platform. Access will be provided through a link shared via social media and other digital channels, allowing only one response per participant. Data will be exported to an Excel spreadsheet. Statistical analysis will be performed using SPSS® software (version 27.0). The normality of continuous variables will be assessed using the Kolmogorov-Smirnov test. Parametric variables will be described using mean and standard deviation; non-parametric variables using median and interquartile range. Categorical variables will be presented as absolute and relative frequencies.

Group comparisons will follow appropriate statistical tests based on data distribution: Student's t-test and ANOVA with Tukey's post hoc test for parametric data; Mann-Whitney and Kruskal-Wallis with Dunn's test for non-parametric data. Chi-square and Fisher's exact test will be used for categorical variables. Multivariate analysis will include linear and logistic regression. Correlations will be analyzed using Pearson's test (parametric) and Spearman's test (non-parametric). Additionally, ROC curves will be used for diagnostic test evaluation, and survival analysis will be performed using the Kaplan-Meier method with Log-Rank test and Cox regression.

Results: More than 600 responses were analyzed and studied by statistical tests showing that there are factors that affect more than others the choice of residence (P value less than 0.05). Subdivisions were made for subgroup analyses to analyze factors such as sex, age and year of graduation affect the responses.

Conclusion: Factors such as quality of life, quick financial return, interaction with exemplary professionals, variety in practice, the prospect of starting a family, research opportunities, and regular working hours show different effects depending on gender, age, and year of medical school.

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Empathy and its associated factors among Brazilian medical students: a cross-sectional study

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Introduction: Empathy is a key element of the physician-patient relationship and has been associated with better treatment adherence, improved clinical outcomes, and increased patient satisfaction. Empathy is a multidimensional construct involving both cognitive aspects-such as the ability to adopt another›s perspective-and affective components, such as emotional reactivity. Patients rarely express emotions directly during medical consultations; therefore, physicians must rely on empathic communication to interpret their indirect cues. The development of these skills begins in medical school, but several international studies have reported a decline in empathy throughout medical training, possibly due to emotional desensitization and high academic pressure. Exploring empathy in different cultural and institutional

settings, and identifying associated factors, is essential for advancing medical education.

Objectives: To identify sociodemographic, academic, and mental health factors associated with empathy in Brazilian medical students from two distinct institutions using the Interpersonal Reactivity Index (IRI).

Methods: This cross-sectional study was conducted between March and April 2024 with 580 medical students from all years of medical education at two universities in São Paulo, Brazil-one private institution with an active learning methodology (FICSAE) and one public university with a traditional curriculum (EPM). Data were collected through an online, self-administered questionnaire that included sociodemographic information, academic variables, mental health measures (GAD-2, PHQ-2, TICS), use of psychological services, and self-perceived empathy. Empathy was assessed using the Interpersonal Reactivity Index (IRI), which evaluates four dimensions: Perspective Taking, Fantasy, Empathic Concern, and Personal Distress. Descriptive analyses were performed, followed by univariate and multivariate linear regression models to identify factors associated with the total empathy score. Interaction terms between key variables were also tested. Data analysis was conducted using R and Jamovi.

Results: The final sample included 580 Brazilian medical students from all years of medical training, with 57% from FICSAE (private) and 42% from EPM (public). Most participants were in the early stages of their medical education, with first- and second-year students representing 54% of the sample. The majority were female (62%), aged between 19 and 25 years (65%), and reported having a religion or some form of spirituality (83%). Most participants (80%) were not engaged in paid work, and 22% reported receiving financial aid. Regarding mental health, 37% screened positive for anxiety symptoms (GAD-2 ≥3), 21% for depressive symptoms (PHQ-2 ≥3), and 34% for potential substance use issues (TICS positive). Half of the sample (50%) had used some form of mental health service or psychiatric medication in the previous six months. The average Interpersonal Reactivity Index (IRI) total score was 99.6 (SD=11.9), indicating relatively high levels of empathy. Among the four subscales, Perspective Taking, Fantasy, and Empathic Concern showed consistently higher scores, while Personal Distress presented the greatest variability. Multivariate linear regression analysis revealed that higher empathy scores were independently associated with female sex ($\beta = +6.1$, $p < 0.001$), presence of religion or spirituality ($\beta = +3.1$ to $+3.8$, $p < 0.05$), clinical specialty preference ($\beta = +4.2$ to $+9.3$ depending on degree of preference, $p < 0.001$), and anxiety symptoms ($\beta = +4.0$, $p < 0.001$). Notably, interaction analyses showed that anxiety had a stronger positive effect on empathy among male students and those with religiosity or spirituality. In contrast, variables such as institution, academic year, age at admission, family income, financial aid, paid work, depressive symptoms, substance use, and satisfaction with various life domains were not significantly associated with empathy.

Conclusion: Empathy among Brazilian medical students is positively associated with female sex, religion/spirituality, clinical interest, and anxiety symptoms. These findings highlight the need to integrate structured empathy training into medical curricula, considering psychological support, reflective practice, and cultural-spiritual dimensions as potential strategies to sustain and enhance empathic capacity throughout medical education.

Keywords: Empathy; Students, medical; Mental health; Spirituality; Risk factors

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Books
Ritchie S. Science fictions: how fraud, bias, negligence, and hype undermine the search for trusth. New York: Metropolitan Books; 2020.

Chapters of books
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Rivarola E, Dimuro CA, Scandolo MC, Quintero Florez A. Design of gourmet menus high in fiber for diabetic patients of the French sanatorium: evaluation of the nutritional content, acceptability, organoleptic characteristics and glycemic control. Clinical Nutrition ESPEN. 2021;46:S690. [ESPEN 2021 Virtual Congress; 2021 Sep 9-14].
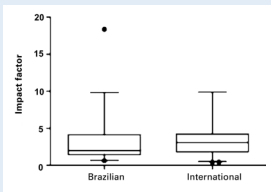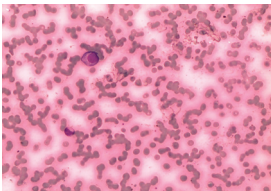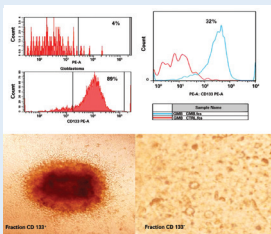
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Pinheiro LL. Avaliação da aorta torácica de brasileiros tabagistas por tomografia de tórax de baixa dose: diâmetros e prevalência de aneurismas [tese]. São Paulo: Faculdade Israelita de Ciências da Saúde Albert Einstein; 2021.

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