LEARNING METHODOLOGIES IN RHEUMATOLOGY: A TUTORIAL FOR INTEGRATIVE REVIEWS IN MEDICAL EDUCATION

https://doi.org/10.56238/sevened2024.037-131

Lucimar Maria Fossatti de Carvalho[1] and Cezar Augusto Caleffi Paiva[2].

ABSTRACT

Objective: This tutorial aims to guide researchers in conducting qualitative studies and integrative reviews to interpret large volumes of textual data, showing the importance of establishing a clear research question that guides all subsequent steps. Method: The search for the selection of articles should be carried out in a systematic way, with well-defined inclusion and exclusion criteria, using guidelines to help in the preparation, planning and reporting of systematic reviews and meta-analyses, such as the "preferred reporting items for systematic reviews and meta-analyses" (PRISMA) to provide transparency and methodological rigor in the selection and organization of the included studies. Content analysis can be carried out using tools such as the IRaMuTeQ software, which organizes textual data, identifies recurring patterns and themes, uses diversified methods, such as similarity analysis and word clouds, to enrich the interpretation. Results: The results of the integrative review can be organized in the format of tables to summarize the information found, such as author, year, country, objective, methodology, and main results found, in a structured way. Discussion: The discussion stage involves interpreting the results and comparing them with other studies, including the limitations of the study and suggesting future research topics. Conclusions: In the conclusion, the most relevant contributions of the integrative review to the field of study should be highlighted, relating them to the research question initially proposed. In addition, the main practical or theoretical implications of the results should be described, reinforcing their importance.

Keywords: Integrative review. Medical education. Learning methodologies. Rheumatology.

[1] E-mail: fossatti@uffs.edu.br
[2] E-mail: cezar.paiva@uffs.edu.br

INTRODUCTION

Medical education in the twenty-first century faces major challenges, including the need to train professionals who are capable of working with the complexity of the health system. In this context, the integrative review on learning methodologies seeks to identify the most effective strategies to promote the development of skills and competencies in medical students. In a recent integrative review, the trends, challenges, and opportunities that shape this ever-evolving landscape were explored. Each aspect revealed valuable *insights* on how to adapt and improve medical educational programs through their learning methodologies. By analyzing the scientific articles, best practices and recommendations to boost the quality of medical training were highlighted. By sharing these findings, it is hoped to contribute to inspiring future innovations in 21st century medical education. To carry out an investigation regarding the current challenges and emerging opportunities in medical education in the twenty-first century, identifying the main trends and recommendations that can contribute to the improvement of learning methodologies.

In this sense, the objective of this tutorial is to present a script, describing the steps necessary to carry out an integrative review, based on a research theme. For the purpose of example, the focus of the tutorial will be on the use of learning methodologies applied in medical education in the twenty-first century, highlighting different approaches[3].

To qualify the teaching and learning process, we chose to describe the applicability of different approaches in the area of rheumatology, such as the use of the flipped classroom, mentor *x* apprentice, centered on humanized care and learning based on problem solving. Finally, a description of how to use the IraMuTeQ software, which was used in the integrative review.

METHODOLOGY

In this item, the type of research must be objectively described (whether qualitative, observational, cross-sectional, etc...); research protocols; software used; databases consulted; how content analysis will be carried out (whether manual or using specific software;); cite the bibliographic reference manager; cite whether there was access to standard qualitative research documents; cite the descriptors used in the research; describe the filters used in the research, and finally, follow the steps of PRISMA.

[3] Carvalho, L.F de; Guedes, A.L.G; Borges, D.T.; Peixoto, Y.G.; Width, C.S; Tuzin L. Challenges and opportunities in medical education in the XXI century: an integrative literature review. Federal University of the Southern Border. Medical Course, 2024. Article submitted to the *Brazilian Journal of Medical Education* (RBEM), awaiting the submission of the editorial decision.

For example, the research to be developed is characterized as an integrative review, with a qualitative and exploratory approach, conducted in accordance with the PRISMA protocol (Moher *et al.,* 2009). The process involved systematic searches carried out in databases such as Medline, SciELO, ScienceDirect, among others, ensuring methodological rigor in the selection and analysis of the evidence available in the literature. Content analysis was performed using the free software *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires* – IRaMuTeQ (Camargo; Justo, 2013). Cite a bibliographic reference manager software, such as EndNoteWeb (Clarivate, 2024). Cite the guidelines used, such as the document *Standards for Reporting Qualitative Research* – SRQR (O'Brien *et al*., 2014).

The use of the descriptors used in the search for articles should be described, such as ("medical education"; "medical education"; "technology in medical education"; "medical educational innovation" and "educational medical trends"). The first filters applied in an integrative review include: selection of articles available in databases (e.g., PubMed, Scopus, Scielo, etc...), restriction to the defined publication period (e.g., last 5 years), specific languages (e.g., English, Portuguese, or Spanish), and previously determined types of publication (e.g., original articles, excluding editorials and conference abstracts). The next step is to perform the exclusion by duplicity followed by the exclusion by reading the title and abstract. Regarding eligibility strategies, ineligible records that did not meet the question of research problem, applicability approaches in other areas, incomplete text unavailable, among others, were excluded. After this process, all eligible records must be exported to the bibliographic reference management software.

At this point, it is necessary to define what information should be extracted from the records (e.g., author, year, place of study, study objectives, methodology, main results, etc...).

Regarding content analysis, it is important to describe how it will be carried out (e.g., with IRaMuTeQ, inform the relationships between the lexical segments, enunciated by the authors of the articles made available) (Clarivate, 2024). From IraMuTeQ, the textual analyses used (e.g., descending hierarchical classification (DHC), word cloud, etc...) should be cited. Specify the characteristics of the DHC (e.g., that dendrogram recognition was used with emerging classes, where the higher the χ^2, the more associated the word is with the class, disregarding words with $\chi^2 < 3.80$ ($p < 0.05$)[4]); specify the word cloud characteristics, which makes it possible, in addition to grouping them, to organize them

[4] χ^2 = quantitatively evaluate the relationship between the results obtained and the expected distribution. It represents the degree of association of the word with the class.

graphically according to their relevance, with the largest words being those that had a greater number of occurrences (frequency), considering words with a frequency equal to or greater than 10.

The following is the description of the steps developed in the integrative review, carried out by the authors Carvalho *et al*. (2024), in the article "**Challenges and opportunities in medical education in the twenty-first century**: an integrative literature review".

TUTORIAL DEVELOPMENT

Based on the study conducted by Carvalho *et al.* (2024), this tutorial offers a detailed roadmap that guides researchers in the planning, analysis, and execution of an integrative review, describing in a practical way the topics: (1) delimitation of the research question, (2) search and selection of studies, (3) eligibility strategies, (4) content analysis, (5) synthesis of results, (6) discussions, (7) limitations and gaps found, and (8) the chapter of conclusions, related to the theme of learning methodologies, applied in medical education in the twenty-first century.

Finally, this tutorial describes three applications of the learning methodologies applied in the area of rheumatology and the steps used in the implementation in the IraMuTeQ software.

DELIMIT THE RESEARCH QUESTION

The PICO strategy was used[5] to delimit the focus of the research question, guiding the study on the effectiveness of learning methodologies in the area of rheumatology for medical students. The steps developed based on this strategy are presented below:

a) **(P):** Medical students involved in learning processes in the area of rheumatology, <characterizes the research interest group>;

b) **Intervention (I):** Implementation of learning methodologies, such as active methods (e.g., Competency-Based Learning, humanized care, etc...), <refers to the type of study that will be investigated>;

c) **Comparator (C):** Traditional teaching methods, such as lectures or self-directed study without active support, <identifies comparisons that can be made in the study>;

[5] PICO represents an acronym for Patient, Intervention, Comparison and Outcomes, fundamental elements used in the construction of the question for the bibliographic search for evidence.

d) **Outcome (O):** Assessment of effectiveness in terms of learning, development of practical skills and impact on vocational training, <specifies the outcome to be proved>.

From the application of the PICO strategy, the research problem question arises under two situations:

(1) WITH the comparison variable, the questioning question could be: "What is the effectiveness of learning methodologies in medical students, compared to traditional approaches, to improve the understanding and application of concepts in the area of rheumatology?"

(2) WITHOUT the comparison variable, the question could be: "What is the effectiveness of learning methodologies when applied to medical students with the objective of qualifying the teaching and learning process in the area of rheumatology"?

SEARCH AND SELECTION OF STUDIES

From the search and selection of studies, cite the total number of articles found and the period, for example, that the search strategies resulted in 82,647 records in the Medline (78,999), Scielo (3,141) and Science Direct (228) databases, during the months of September to October 2023, with studies published from the periods of 2021, 2022 and 2023.

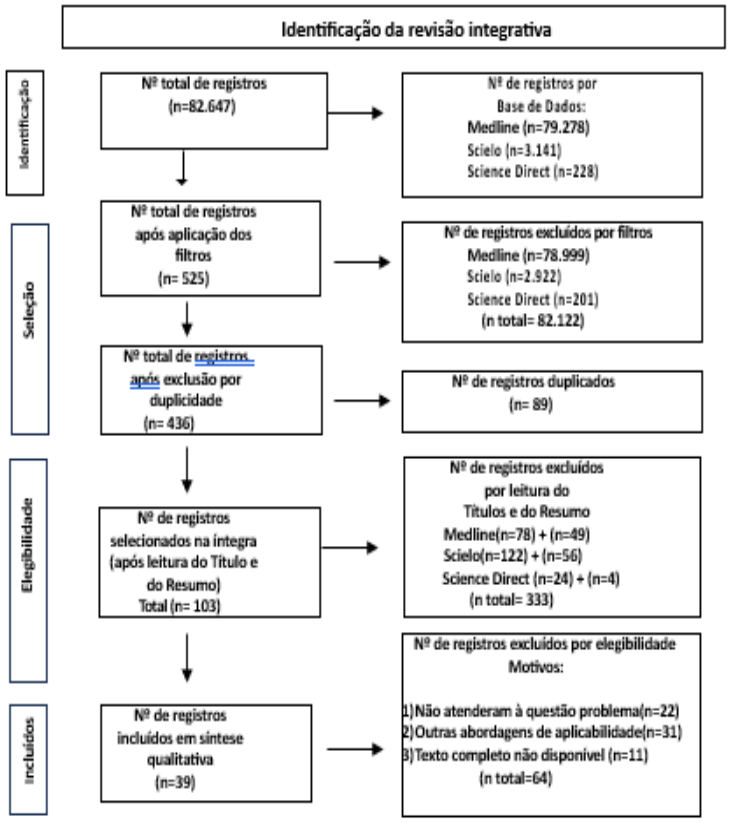
ELIGIBILITY STRATEGIES

The **eligibility strategies**, based on the **PRISMA platform**, consist of the criteria defined to select the studies that will be included or excluded in an integrative review. These criteria are essential to ensure quality in the process of screening and analyzing articles.

The inclusion criteria involve aspects such as type of study, period of publication, language, and relevance to the topic. The exclusion criteria consider factors such as lack of full text, studies outside the scope of the research, or duplicates. In addition, the PRISMA platform suggests the use of a flowchart to document each step, from identification to final inclusion, detailing the reasons for exclusions and promoting greater reliability in the results.

The Prisma platform made it possible to organize the articles based on the integrative review, as shown in Figure 1.

Figure 1 – Result of the integrative review from the Medline, Scielo, and Science Direct databases in September and October 2023.



Fonte: Adaptado do diagrama de fluxo disponibilizado por MOHER, D. *et al*[10]. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ, 2009;339: b2535.

CONTENT ANALYSIS

To mention the characteristics of how the content analysis was performed, that is, the content analysis was performed with the IRaMuTeQ software, which grouped 39 *textual corpus* into four distinct classes. To facilitate understanding, the steps taken will be described.

a) **Data prepared and imported,** the data were edited into 39 textual *corpus* in "txt" format and imported into the IRaMuTeQ software;

b) **Once the pre-processing of the texts** was carried out, the pre-processing was carried out through the following steps:

1) **elimination of common words** (*stopwords*, articles, prepositions: "the", "the", "the", "the", "the", "a", etc...*)*, as it helps to reduce noise and focus on the most important and meaningful words in the text;

2) **lemmatization** (reduction of words to their lemmatized forms, that is, transforming the word "running" into "running"), in this way the comparison and grouping will be more efficient.

c) **Analysis of the frequency of words,** to identify the most frequent words and their relationships, the word cloud and the generated dendrograms were explored;

d) **Analysis of the word classes, the** descending hierarchical classification (DHC) and the word cloud were verified;

e) **Interpretation of the results,** based on the results obtained in each stage, inferences were made to draw conclusions based on the results, relating them to the context of the study.

SUMMARY OF RESULTS

Describe the entire synthesis of the results. After processing the 39 *textual corpus, IRaMuTeQ organized the content analysis into four classes: competency-based learning (12); learning centered on humanized care (n=10);* interactive learning between mentor *x* mentee (n=12) and learning based on active methodologies (n=5). From this stage, tables were edited describing a summary of the learning methodologies, including: author/year/country; study objective; the methodology and the main results, as shown in Tables 1 - 4.

Quadro 1. Resultado da revisão integrativa nas Bases de dados Scielo, Science Direct e Medline, incluindo autor, ano, país, objetivo do estudo, a(s) metodologia(s) e os principais resultados, coletados no período de 1º de setembro de 2023 até 30 de outubro de 2023 referentes às aprendizagens baseadas em competências (n=10).

Autor, Ano, País	Objetivo do estudo	Metodologia	Principais resultados
1 - Day *et al.*, 2023, Canadá[15]	Compreender como os médicos residentes experienciam a **educação médica centrada nas habilidades dos alunos** para desenvolver intervenções futuras.	Entrevistas semiestruturadas com 16 residentes de sete programas de residência, com uma abordagem construtivista.	Os residentes demonstraram receptividade ao ensino médico centrado no aluno, mas apontaram desvantagens na avaliação e no *feedback*, como ansiedade em relação ao desempenho, falta de clareza nas avaliações e *feedbacks* genéricos.

Quadro 2. Resultado da revisão integrativa nas Bases de dados Scielo, Science Direct e Medline, incluindo autor, ano, país, objetivo do estudo, a(s) metodologia(s) e os principais resultados, coletados no período de 1º de setembro de 2023 até 30 de outubro de 2023 referentes às aprendizagens centradas no cuidado humanizado (n=10).

Autor, Ano, País	Objetivo do estudo	Metodologia	Principais resultados
1 - Blando *et al.*, 2023, Brasil[24]	Investigar como as **emoções e os sentimentos** afetam a relação entre os estudantes.	Estudo qualitativo com centros de apoio psicológico, emocional, terapia, orientação acadêmica e profissional para auxiliar os estudantes na vida acadêmica e profissional.	O estudo destacou a importância de capacitar os professores no auxílio aos alunos em seus conflitos emocionais, por meio de programas de orientação. O elemento afetivo não deve ser negligenciado no ensino superior, sublinhando sua relevância como fator motivador para fortalecer o processo de ensino e aprendizagem.

Quadro 3. Resultado da revisão integrativa nas Bases de dados Scielo, Science Direct e Medline, incluindo autor, ano, país, objetivo do estudo, a(s) metodologia(s) e os principais resultados, coletados no período de 1º de setembro de 2023 até 30 de outubro de 2023 referentes às aprendizagens interativas entre mentor *x* aprendiz (n=12).

Autor, ano, pais	Objetivo do estudo	Metodologia	Principais Resultados
1 - Acherman *et al.*, 2021, Brasil[3]	Identificar áreas fortes e frágeis no ambiente educacional através da **mentoria entre pares.**	Estudo transversal com dados coletados com 1.470 estudantes do primeiro nível. Foram utilizadas a Escala de Satisfação com o Suporte Social e a Escala Dundee Ready Education Environment Measure.	Os resultados revelaram diferenças estatisticamente significativas em relação ao ciclo de curso, orientação sexual, coleta de bolsas de auxílio e prática regular de atividade física. Isso indica que programas de mentoria entre pares podem beneficiam a

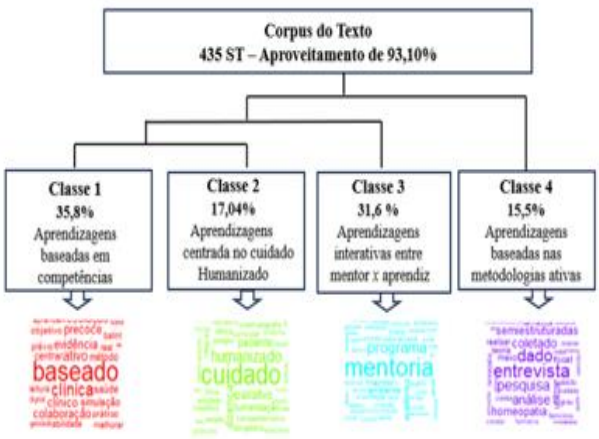
Quadro 4. Resultado da revisão integrativa nas Bases de dados Scielo, Science Direct e Medline, incluindo autor, ano, país, objetivo do estudo, a(s) metodologia(s) e os principais resultados, coletados no período de 1º de setembro de 2023 até 30 de outubro de 2023 referentes às aprendizagens baseadas nas metodologias ativas (n=7).

Autor, Ano, País,	Objetivo do estudo	Metodologia	Principais resultados
1 - Ahmad, Page e Goodsman, 2023, Londres[4]	Analisar o desempenho de uma equipe médica, apontando oportunidades de aprimoramento através da **aprendizagem médica baseada na simulação**.	Utilização da técnica *debriefing* (analisar/interrogar) num ambiente de emergência médica. Foram utilizadas palestras, *moulages*	A técnica de *debriefing* ofereceu oportunidades importantes para reflexão e aprendizagem. O estudo demonstrou que, quando bem administradas, as restrições de tempo podem aumentar a autenticidade e o aprendizado dos

Source: Own, 2024

Following the synthesis of the results, the next step is the description of the qualitative textual analyses generated by the IRaMuTeQ, applying the technique of descending hierarchical classification (DHC) where the following results were found: the *textual corpus* consisted of 39 records, separated into 435 text segments (ST), with a success rate of 93.10%, as shown in Figure 2.

Figura 2 – Dendograma das análises textuais da estrutura gramatical das metodologias de aprendizagem pesquisadas, informando as relações entre os segmentos lexicais com o uso do software IraMuTeQ.



Fonte: Própria, 2024

The next step is to describe the four classes found, from the results of the content analysis, generated by IraMuTeQ, including a small text segment (ST).

a) Class 1 - Competency-based learning:

It comprises 35.8 % (*f* = 145 ST) of the *total corpus* analyzed. Consisting of words and radicals in the interval between χ^2 = 59.12 and χ^2 = 3.87. Some words in this class are composed of "based" (χ^2 = 59.12); "evidence" (χ^2 = 22.43); "precose" (χ^2 = 22.17) and "simulation" (χ^2 = 14.63), represented by the ST:

"This program **based** on the students' competencies is based on constructivist theory through semi-structured interviews with 16 residents [...]". And, in this way, with the other classes.

b) Class 2 - Learning centered on humanized care

They comprise 17.04 % (*f* = 69 ST) of the total corpus analyzed. Consisting of words and radicals in the range between χ^2 = 188.37 and χ^2 = 4.68. Some words in this class are composed of "care" (χ^2 = 188.37); "humanized" (χ^2 = 96.09); "palliative" (χ^2 = 53.54), represented by the TS:

"Describe the use of cinematography as a tool in medical education in humanized patient care, especially in the study of the health-disease-care process [...]"[31].

c) Class 3 - Interactive learning between mentor *x* mentee

They comprise 31.6% (*f* = 128 ST) of the total corpus analyzed. Consisting of words and radicals in the interval between χ^2 = 215.47 and χ^2 = 4.87. Some words in this class are composed of "mentoring" (χ^2 = 215.47); "mentor" (χ^2 = 41.49); "pupils" (χ^2 = 22.18), represented by the TS:

"Participants in the mentoring program highlighted that the mentor played an important role as a supportive role model figure to help students overcome difficulties [...]"[34].

d) Class 4 – Learning based on active methodologies

They make up 15.5% (*f* = 63 ST) of the total corpus analyzed. Consisting of words and radicals in the interval between χ^2 = 125.16 and χ^2 = 4.66. Some words in this class are composed of "qualitative" (χ^2 = 125.16); "interviews" (χ^2 = 90.43) "research" (χ^2 = 59.35), represented by the TS:

"Descriptive research of a **qualitative** nature with focus groups [...] problem-based learning, which seeks to ensure the students' protagonism and dialogue with their previous knowledge [...]"[Death 46].

In relation to the word cloud, the words generated from its data should be analyzed to identify the most frequent keywords related to the theme of learning methodologies, describing the results obtained through the analyses involving the 39 textual *corpus*, described in charts 1, 2, 3 and 4, according to Figure 3.

Figura 3 - Nuvem de Palavras

Fonte: Própria, 2024

It was found that the most evoked words were: "student" (*f= 291), "doctor" (f* =167), "mentoring" (*f* =123), "learning" (*f= 118), "program" (f= 113), "medicine" (f= 113), "study" (f= 106), etc ...*

DISCUSSION OF THE RESULTS

In this chapter, the results are discussed from the reading of the 39 articles, analyzing the main results in relation to the research question, relating advantages and disadvantages of learning methodologies in medical education, referencing the authors. To discuss how learning methodologies are fundamental in medical education in the twenty-first century and how they can influence clinical practice, professional and personal development of medical students. Write how these ideas reflect the challenges faced by medical educators. Identify emerging themes from the research results. In this paragraph, references from other authors can be included in each class, such as, for example, learning methodologies found in the literature in the year 2024, considering that the integrative review was carried out in the periods of 2021, 2022, and 2023, if the articles are available.

LIMITATIONS AND GAPS FOUND

In this chapter, the limitations that the study may have are described, among them, (a) selection bias, i.e., the limited number of themes may introduce bias in the research and may lead to partial conclusions; (b) as the results showed very specific themes, the studies may have limited applicability in the development of broader educational policies or practices; (c) in relation to the limited search periods, allowing the inconclusiveness of the literature review, among others. Next, describe gaps found in the research, suggesting themes for future research.

CONCLUSIONS

Present the conclusions on the importance of learning methodologies, highlighting the main *insights* found from the integrative review. Present the implications of these ideas for educational practice.

For example, competency-based learning, centered on humanized care, mentor *x* apprentice and learning based on active methodologies showed that they can contribute to the qualification of health professionals. However, it is necessary to consider the limitations and potentialities of these methodologies, identifying opportunities for future research. We hope to have contributed to this tutorial so that it is useful and can serve as a guide for future researchers in the field.

Next, Appendix A **- Practical Applications in the Area of Rheumatology and** Appendix B **- Tutorial for the Use of the IRaMuteQ Software** will be described.

APPENDIX A - PRACTICAL APPLICATIONS IN THE FIELD OF RHEUMATOLOGY

Suggestions for the applicability of learning methodologies in the area of rheumatology[6].

ACTIVE LEARNING METHODOLOGY USING THE FLIPPED CLASSROOM - THEME: DIAGNOSIS AND MANAGEMENT OF RHEUMATOID ARTHRITIS

Prior preparation

Prior to the in-person class, students are provided with study material on the diagnosis and management of rheumatoid arthritis, including scientific articles, educational videos, clinical cases, and relevant online resources.

[6] The four types of learning methodologies described in these paragraphs integrate the result generated by the IraMuTeQ software, based on content analysis.

Self-study

Students are responsible for reviewing the study material before the face-to-face class. They can access the resources available online and ask questions through discussion forums or study groups.

Face-to-face classroom

During the face-to-face class, time is mainly dedicated to interactive activities and application of the knowledge acquired. Students are divided into small groups and carry out the following activities:

- ✓ Discussion of clinical cases: Students apply the concepts studied to analyze clinical cases related to rheumatoid arthritis, discussing differential diagnosis, treatment options and clinical management;
- ✓ Office simulations: Students participate in medical office simulations, where they have the opportunity to practice interviewing, physical examination, and clinical decision-making skills with simulated patients;
- ✓ Debates and presentations: Students present and discuss the scientific articles studied, sharing their interpretations and insights with the group.

Reflection and evaluation

At the end of the face-to-face class, students are encouraged to reflect on the learning process and their participation in the activities. They can also be assessed through quizzes, group discussions, or one-on-one presentations.

Benefits of the flipped classroom in rheumatology

Active engagement of students in learning, encouraging autonomy through learning itself; practical application of the theoretical knowledge acquired, preparing students for real situations of clinical practice; encouragement of collaboration and teamwork, promoting the exchange of knowledge and experiences among students.

METHODOLOGY: INTERACTIVE LEARNING BETWEEN MENTOR *X* APPRENTICE - THEME: CLINICAL CASE IN THE MANAGEMENT OF PATIENTS WITH RHEUMATOID ARTHRITIS

Role of the mentor

- ✓ The mentor, an experienced rheumatologist, guides an apprentice (undergraduate student and/or rheumatology resident) in the management of a patient with rheumatoid arthritis (RA);
- ✓ The mentor provides guidance on the diagnostic approach to RA, including the interpretation of signs and symptoms, relevant laboratory and imaging tests;
- ✓ He shares his experience in the management of RA, discussing therapeutic strategies, treatment options, and considerations about drug safety and efficacy;
- ✓ The mentor accompanies the mentee during the patient's assessment, providing real-time feedback and guidance on conducting the physical examination, interpreting clinical findings, and making clinical decisions;
- ✓ It encourages the learner to actively participate in the discussion of the clinical case, stimulating him to formulate diagnostic hypotheses and evidence-based treatment plans.

Role of the learner

- ✓ The apprentice demonstrates interest and commitment to learning from the mentor, taking the opportunity to acquire knowledge and practical skills in the field of rheumatology;
- ✓ It conducts a detailed review of the patient's medical history, investigating their clinical history, symptoms, risk factors, and the impact of the disease on quality of life;
- ✓ The mentee performs a thorough physical examination of the patient, under the supervision of the mentor, noting specific signs of arthritis, joint deformities, and extra-articular manifestations of RA;
- ✓ He collaborates with the mentor in the elaboration of an individualized treatment plan for the patient, taking into account clinical guidelines, patient preferences and therapeutic goals;
- ✓ The learner demonstrates initiative and communication skills when interacting with the patient, explaining the diagnosis, discussing treatment options, and providing emotional support during the consultation;

Benefits of Mentoring in Rheumatology

Transfer of knowledge and clinical experience from the mentor to the mentee, contributing to the professional and academic development of the resident in rheumatology; opportunity for hands-on learning and direct clinical experience, allowing the learner to gain essential clinical skills and confidence in the practice of rheumatology.

METHODOLOGY: HUMANIZED CARE-CENTERED APPROACH - THEME: CLINICAL CASE IN THE CARE OF PATIENTS WITH RHEUMATOID ARTHRITIS

Establishing an empathetic relationship

- ✓ The rheumatologist receives a patient newly diagnosed with rheumatoid arthritis in his office;
- ✓ He begins the consultation by welcoming the patient with a warm smile, showing genuine interest in hearing their story and understanding their concerns;
- ✓ The doctor adopts a welcoming and empathetic attitude, creating an environment of trust and security where the patient feels comfortable sharing their experiences and feelings.

Clear and accessible communication

- ✓ During the consultation, the doctor uses simple and accessible language when explaining the aspects of rheumatoid arthritis, including causes, symptoms, impact on quality of life; treatment options and in relation to the need for long-term follow-up;
- ✓ It avoids medical jargon and utilizes understandable analogies to help the patient better understand their condition and treatment recommendations.

Patient involvement in the decision-making process

- ✓ The physician takes a collaborative approach, actively involving the patient in the decision-making process about their treatment plan;
- ✓ It discusses different therapeutic options, explaining the benefits, risks, and possible side effects of each intervention;
- ✓ The doctor values the patient's individual preferences and needs, respecting their autonomy and ability to make informed decisions about their own health.

Emotional support and continuous monitoring

- ✓ In addition to providing treatment, the doctor offers emotional support to the patient, recognizing the psychosocial impact of rheumatoid arthritis on their life;

- ✓ It expresses empathy for the patient's suffering, validating their concerns and offering emotional support and encouragement throughout the treatment process;
- ✓ The doctor assures the patient that they are not alone in their journey of coping with rheumatoid arthritis, committing to follow them closely and provide ongoing support throughout the treatment.

Benefits of Humanized Care in Rheumatology

Strengthening the doctor-patient relationship, promoting a collaborative partnership in health care; improvement of treatment adherence and clinical outcomes, as the patient feels valued, respected, and supported in their needs and preferences, which contributes to the patient's emotional well-being and quality of life.

METHODOLOGY: PROBLEM-SOLVING-BASED LEARNING - THEME: DIAGNOSIS OF SYSTEMIC LUPUS ERYTHEMATOSUS

Prior preparation

Students receive a fictitious or real clinical case related to a specific rheumatological condition, such as the diagnosis of systemic lupus erythematosus.

Identification of key issues

Students read the clinical case and identify the key issues related to the diagnosis of the rheumatologic condition presented.

Group discussion

Students are divided into small groups and discuss the issues identified in the clinical case. They share their prior knowledge, clinical experiences, and research relevant to the diagnosis of the case.

Independent research

Following group discussion, students are encouraged to conduct independent research to deepen their understanding of the rheumatological condition in question. They may review scientific articles, clinical guidelines, and other sources of evidence to support their conclusions about the diagnosis of the pathology.

Classroom presentation and discussion

Each group presents its analyses and recommendations for the clinical case to the class. During the presentations, students are encouraged to question and debate the different diagnostic approaches proposed, promoting a rich and collaborative discussion.

Conclusions

After all the presentations, the professor summarizes the main conclusions and *insights* obtained from the discussion of the clinical case. It can highlight key points, important concepts, and areas of controversy in the diagnosis of systemic lupus erythematosus.

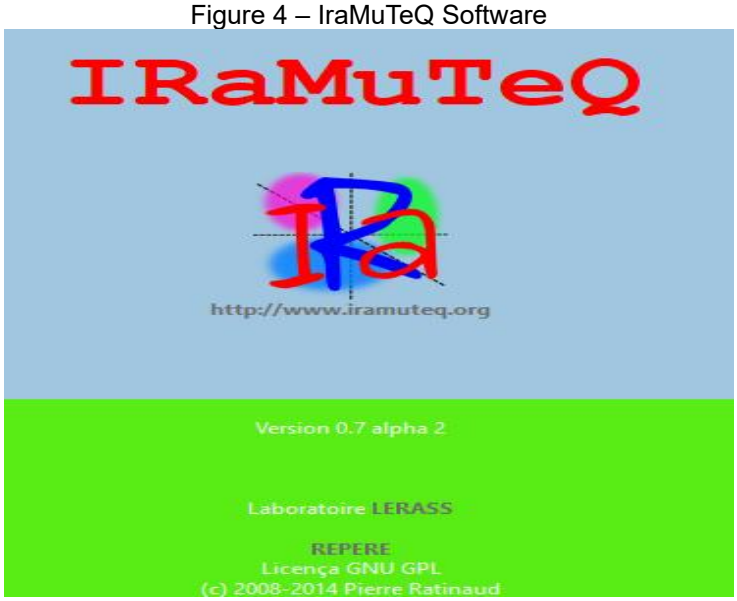
Benefits of problem-based learning in rheumatology

Encouragement of self-directed learning and independent research, developing skills in the search for evidence and analysis of information; practical application of theoretical knowledge in simulated clinical scenarios, preparing students for real medical practice situations.

APPENDIX B - IRAMUTEQ SOFTWARE USAGE TUTORIAL

The IRaMuTeQ software is a free and open source tool that uses features of the statistical software R, allows sophisticated analysis of texts, from basic analysis to more advanced methods to understand the structure and organization of discourse, developed by the French researcher Pierre Ratinaud in 2009. IRaMuTeQ allows different types of textual data analysis, from simple analyses such as word frequency calculation, to more complex analyses such as descending hierarchical classification and similarity analyses. Initially, it was used by the Laboratory of Social Psychology of Communication and Cognition of the Federal University of Santa Catarina/SC, as shown in Figure 4.

Figure 4 – IraMuTeQ Software



Source: Own, 2024

In this work, the following resources were used: descending hierarchical classification (DHC) and the word cloud. Its operation consists of preparing the data and writing *scripts* that will be analyzed by the IraMuTeQ software.

INSTALLATION OF IRAMUTEQ

To run the software, it is necessary to install the **R Statistical Software**, free software for graphing and statistical computing. The program offers a variety of graphical and statistical techniques, linear and nonlinear models, classical statistical tests, series analyses, classification, etc.

R 4.0.0 <HTTPS://CRAN. R-PROJECT.ORG/BIN/WINDOWS/BASE/>

Install R-4.0.0-win.exe file, preferably in the Program Files folder. During installation, choose whether 32-bit or 64-bit correctly. - Run **R** and install the R libraries (packages) specific to IraMuTeq, according to the following instructions: a) run R; b) choose from the main menu Packages/Install packages; c) choose the country (France/Paris2); d) choose from the list presented in alphabetical order, the first package to be installed (APE); e) click **Ok**. If the system asks to create a folder to store the library, choose to create it and let **R** choose the default folder. The system downloads the library and installs it. See the result of this operation on the operation screen (Console). After finishing the installation of the first one, install all the others (ca, gee, igraph, irlba, proxy, rgl, textometry, wordcloud) repeating steps **d** and **e**; f. Close **R**.

IRAMUTEQ <HTTPS://SOURCEFORGE.NET/PROJECTS/IRAMUTEQ/FILES/IRAMUTEQ-0.6-ALPHA3/>

Install the **setup_iramuteq-0.6-alpha3.exe file** in the same folder where R was installed. If not installed in the same folder, IraMuTeq does not recognize the R libraries, even if the path is provided in Iramuteq Preferences. Access IraMuTeq and wait for the R libraries to install automatically.

Note: If the installation of **R** as well as the libraries was correct, IRaMuTeQ will find all the libraries and be ready to proceed with the analyses. If you have any problems installing **R** or libraries, IRaMuTeQ will not be able to bring them and will continue to prompt you to update them every time you log in to IRaMuTeQ. The solution to this problem usually involves uninstalling Iramuteq and **R** and reinstalling them in the correct folders.

NOTION OF *CORPUS*,

Corpus is a set of texts constructed by the researcher and that forms the object of analysis. For example, in a documentary research in the medical area, the corpus could be a set of articles that were published in a certain period in the health section of a newspaper. Another example would be a set of 40 transcripts of interviews on a topic that is the subject of a case study. And it can also be, for example, a corpus composed of 200 responses to an open question, which is part of a questionnaire of a poll-type survey (Camargo; Justo, 2013).

a) **Stemming:** is the process, effectively, of deflecting a word to determine its lemma (inflections are called lexemes) For example, the words cat, cat, cats, cats are all forms of the same lemma: cat.

b) **Chi-square:** the **χ2** or chi-square distribution is one of the most widely used distributions in inferential statistics, especially to perform **χ2 tests**. This test serves to quantitatively evaluate the relationship between the result of an experiment and the expected distribution for the phenomenon. That is, it tells us how surely the observed values can be accepted as governed by the theory in question.

c) **UTF-8** (8-bit Unicode Transformation Format): is a type of variable-length Unicode encoding created by Ken Thompson and Rob Pike. It can represent any standard Unicode wildcard and is also compatible with ASCII.

CORPUS FORMATTING <BASIC FORMAT>

Texts are introduced by four asterisks (****) followed by a series of (illustrative variables) introduced with an * (asterisk) separated by a space.

Separation by participants

The text can be written according to the syntax below:

*autor_01

Objective to share experiences, simulated scenarios and clarification sessions on the application of the technique of analyzing and interrogating on real pre-hospital challenges, allowing the student to apply and improve their specific skills in simulation-based learning, in an air ambulance in the City of London. Through lectures given by doctors or paramedics on pre-hospital challenges, providing opportunities for reflection and simulation-based learning, based on the simulated scenarios encountered during the course.

And so on, successively with the whole text.

Separation by issues

**** *suj_001 *sex_1 *ida_21 *escol_2

Where

suj_001: subject 001 sex_1: sex as per the following table: 1 (male) and 2 (female)

ida_21: age 21 (age is placed after underscore)

escol_2: schooling according to the following table: 1 (elementary); 2 (medium); 3 (top)

ADJUSTING THE *TEXTUAL* CORPUS

a. Grammatical revision of Portuguese, correcting spelling and agreement.
b. Elimination of expressions unnecessarily, such as: Ahh, Uhmm, right, okay.
c. Elimination of sentences that are not consistent with the subject matter.

SAVING THE FILE TO THE CORRECT FORMAT (.TXT) – UTF-8 FORMATTING

Access Archive

-> Save As -> location -> Type: -> Plain Text (*.txt)

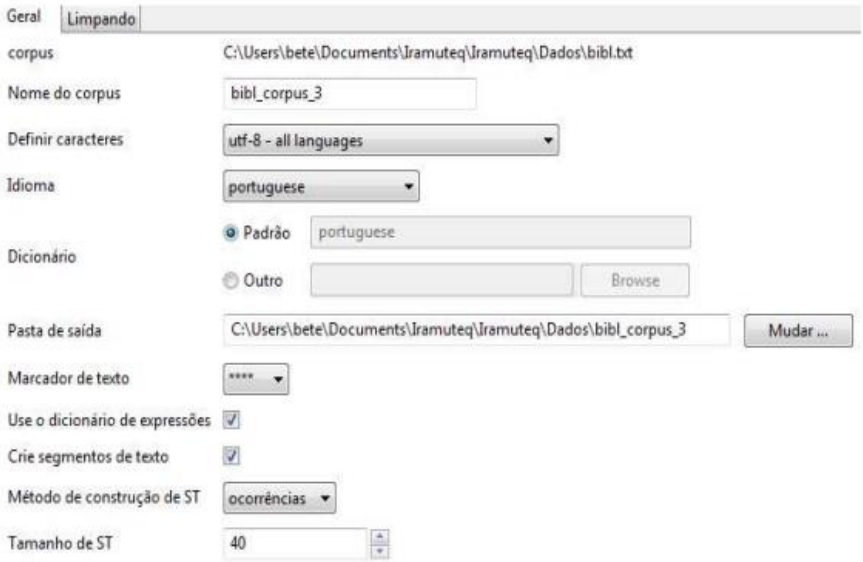
-> Save -> Other encoding: -Unicode (UTF-8)

-> **OK**

IMPORTATION OF THE *CORPUS*

To import text already structured in txt format, start IRaMuTeQ, and choose File / Open a textual *corpus* from the horizontal menu. Then choose the file and click Open. The following import parameters window will appear, as shown in Figure 5.

Figure 5 – Importing the *Corpus*



Source: Own, 2024

AFTER IMPORTING, DEFINE THE FIELDS:

Under "Corpus Name," type the name of the *analysis corpus* . Under "Define characters", choose the UTF-8 format (all languages);

In "Language" it is necessary to select the language of the text to be analyzed (Portuguese);

In "Dictionary", leave the Standard option (the system selects the dictionary that has the same language as the text);

Under "Output folder", choose the directory you want to save the folder with the scans done. The name of this folder that will be created is arquivo_corpus_X name, but it can be changed along with the save location;

In "Highlighter" leave the four asterisks, which delimit the corpus, by default;

Under "Use expression dictionaries", leave it selected to use the expression dictionary. Dictionaries of expressions allow you to treat compound words as a whole, thus avoiding division in analysis;

In "Create text segments", leave it selected for the software to separate the text into text segments (process in which the software separates the textual corpus into text segments for fractional analysis and identification of lexical environments);

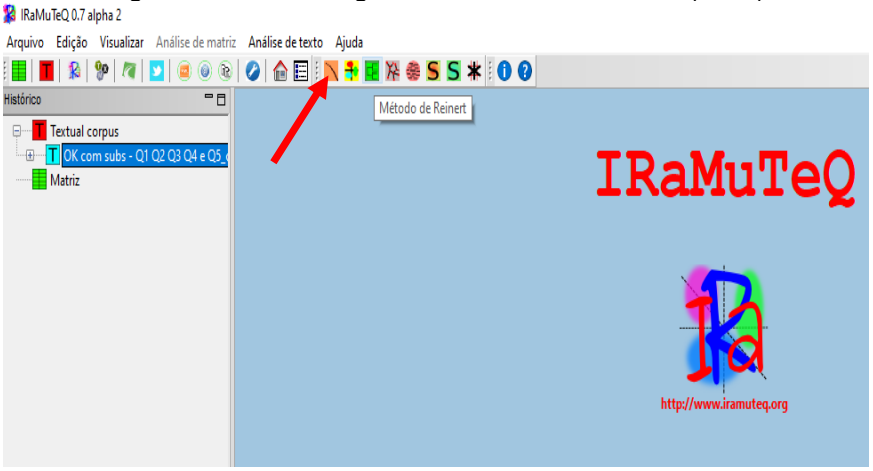
Under "Text Segment Construction Method," select "occurrences" to segment all text *corpus* by word frequency, "characters" to segment from characters, and "paragraphs" to segment by paragraphs. Use the standard (by occurrences) except if there is a requirement due to the corpus to choose the other methods;

Under "Text segment sizes," select the number that will define the character size of the text segments. By default, leave 40 (average 6-7 words). However, if you want the pieces of analysis text to be smaller or larger, increase or decrease the number respectively. The size of the text segments must be in accordance with the chosen segment type.

DESCENDING HIERARCHICAL CLASSIFICATION (CHD) – REINERT'S METHOD

CHD divides text segments into content classes by generating percentage graphs, as shown in Figure 6.

Figure 6 - Descending Hierarchical Classification (DHC)



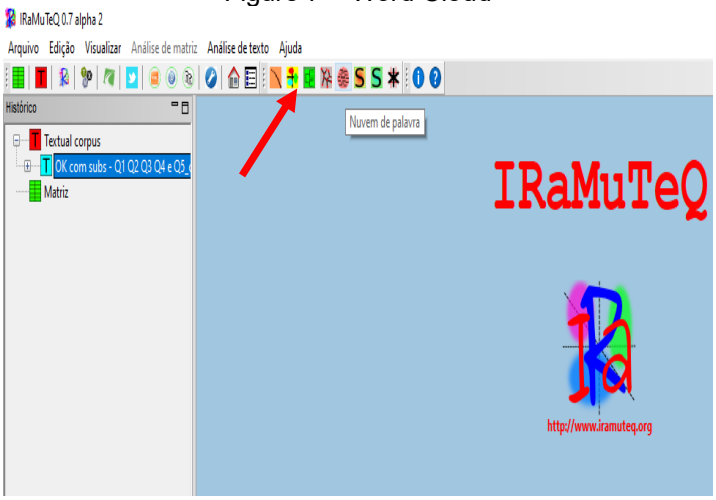
Source: Own, 2024

The DHC method proposed by Reinert (1990) classifies text segments according to their respective vocabularies, and the set of them is distributed based on the frequency of reduced forms (words already stemmed). This analysis aims to obtain classes that, at the same time, have similar vocabulary to each other, and different vocabulary from the other classes. The IRaMuTeQ also provides another way of presenting the results, through a correspondence factor analysis made from the DHC (Post-Factor Analysis) that represents in a Cartesian plane the different words and variables associated with each of the DHC classes. The interface allows the retrieval, in the original corpus, the text segments associated with each class, at which time the context of the statistically significant words is obtained, allowing a more qualitative analysis of the data.

WORD CLOUD

Excellent for studies of social representations, it allows quick identification of keywords in a *corpus*. It shows a set of words grouped, organized, and structured in the shape of a cloud, as shown in Figure 7.

Figure 7 – Word Cloud



Source: Own, 2024

INTRODUCTION TO ANALYTICS

Once the corpus *is indexed* in the left tab of the IRaMuTeQ window, the Name arquivo_corpus _X is added. The available analyses can be viewed by clicking on the Text Analysis option. Examples of the text analysis can be seen in this tutorial, starting from item 7 (Synthesis of Results).

REFERENCES

1. Camargo, B. V., & Justo, A. M. (2013). IRAMUTEQ: um software gratuito para análise de dados textuais. Temas em Psicologia, 21(2), 513-518.

2. Clarivate. (n.d.). EndNoteWeb: Software gerenciador de referências bibliográficas. Available at: https://endnote.com/downloads/free-trial?language=en. Accessed on: April 30, 2024.

3. Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). The PRISMA Group - Preferred reporting items for Systematic Reviews and Meta Analyses: The PRISMA Statement. BMJ, 339, b2535.

4. O'Brien, B., Harris, I., Beckman, T., Reed, D., & Cook, D. (2014). Standards for Reporting Qualitative Research: A synthesis of recommendations. Academic Medicine, 89(9), 1245-1251. Available at: https://doi.org/10.1097/ACM.0000000000000388. Accessed on: April 18, 2024.

5. Ratinaud, P. (2009). IRAMUTEQ: Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires [Computer software]. Available at: http://www.iramuteq.org. Accessed on: May 4, 2024.