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DEVELOPMENT OF A COMPETENCY MATRIX IN A FRAMEWORK FOR THE PRACTICE OF RATIONAL MEDICINE USE IN THE TREATMENT OF SYSTEMIC ARTERIAL HYPERTENSION

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ABSTRACT

Background: The use of medicines plays an important therapeutic role in the care of hypertension. Nonetheless, the inadequacies related to pharmacotherapy are still a major challenge to health, and the lack of systematisation of the competencies to be acquired during the training of health professionals undermines practices involving rational medicine use in the treatment of hypertension. This study was intended to develop and validate a competency matrix that can be used in the education and training of health professionals, contributing to the practice of rational medicine use (RMU) in the treatment of systemic arterial hypertension (SAH). Methods: This is applied research containing an integrative review and exploratory research with the presence of a systematic search, following guidelines proposed by the Cochrane Database of Systematic Reviews and the PRISMA

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group, and the building of the competency matrix was carried out through a focus group with researchers who work in the area registered in two research groups certified by an agency linked to the Brazilian Ministry of Education. The matrix was validated using the Delphi method by expert judges selected using Fehring's technique and scoring criteria. Results: The panel of experts reached a consensus on the relevance of four intrinsic dimensions containing seven competencies and 31 knowledge, skills and attitudes of the RMU in SAH and three extrinsic dimensions that encompassed nine competencies and 22 knowledge, skills and attitudes of the RMU in SAH, with a frequency of agreement greater than 80%.

Keywords: Competencies. Education. Delphi Study. Rational Medicine Use. Systemic Arterial Hypertension.

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INTRODUCTION

Chronic Non-Communicable Diseases – CNCDs constitute a global health problem and drive global initiatives focused on their control and reduction. Among CNCDs, Systemic Arterial Hypertension – SAH stands out due to its high prevalence, as well as its association with increased cardiovascular risk, in order to impact morbidity and mortality rates in several countries [1]. Just to give you an idea, the European Health Survey with Physical Examination estimated a prevalence of SAH, among individuals between 25 and 64 years old, of 33.1% in males and 22.8% in females [2], with this disease being implicated in the mortality of at least 47% of heart disease and 54% of deaths from stroke [3].

Among the strategies that aim to reverse the repercussions of SAH on health, one can find the use of medicines, considered by the World Health Organization – WHO an essential component to achieving this goal [4]. Medicines are one of the fundamental tools in current medical therapies for those who use them in response to a specific and adequate diagnosis, allowing for prevention, cure, mitigation and treatment of different diseases and their symptoms. Nonetheless, when these are misused, they become a threat to individual and collective health, due to the absence of effects, toxicity or unforeseen effects that go far beyond an adequate risk/benefit ratio [5].

However, despite changes in lifestyle and pharmacological treatments, whose association can define the reduction of blood pressure (BP), cardiovascular complications in hypertensive patients continue to occur, which points to the need to improve the effectiveness of actions that involve care, presupposing the non-exclusive, but direct, participation of health professionals [6].

In this sense, the practice of Rational Medicine Use (RMU) in SAH is a relevant dimension of care, and it implies the development of competencies of professionals working in the area, regarding the activities of health promotion and recovery and damage prevention, with changes in lifestyle and medicines as essential inputs. The WHO defines that there is a rational medicine use when patients receive medicines suitable for their clinical situation, with appropriate doses for their specific demands, for a convenient time and without a high cost to themselves and society [7,8].

In the context of health professionals, the teaching and learning process established by competencies, either during training or through updating, implies the development of the ability to mobilise knowledge, skills and attitudes to deal with real-life situations, problems and dilemmas. Its certification expresses the social legitimacy of people who are now

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recognised as capable of acting effectively and contributing significantly to the RMU in the treatment of SAH.

The irrational use of antihypertensive drugs is established considerably by the lack of adherence to therapy and inappropriate dosage regimens, reinforced by the difficulties in accessing medicines and health professionals, as well as monitoring the evolution of the disease.

Furthermore, the lack of adherence to the use of medicines worsens the clinical condition of hypertensive patients, and it was found that patients who did not adhere to the use of medication for the management of hypertension were nine times more likely to have uncontrolled blood pressure [9].

Educational strategies that motivate the practice of Rational Medicine Use in Arterial Hypertension, whether at the undergraduate level or in refresher courses, are essential for the training of health professionals because they represent the possibility of developing competencies in the appropriate care of the health demands of hypertensive patients, according to standards of knowledge, skills, and attitudes.

This study was intended to develop and validate a competency matrix that can be used in the education and training of health professionals, contributing to the practice of Rational Medicine Use in the treatment of Systemic Arterial Hypertension.

METHODS

EXPERIMENTAL DESIGN

The current study is applied research, which presents the proposal and validation of structuring elements for the training of individuals with the ability to develop competencies aimed at promoting rational medicine use in the face of Systemic Arterial Hypertension. In order to develop the research, the three steps presented in Figure 1 were rigorously used.

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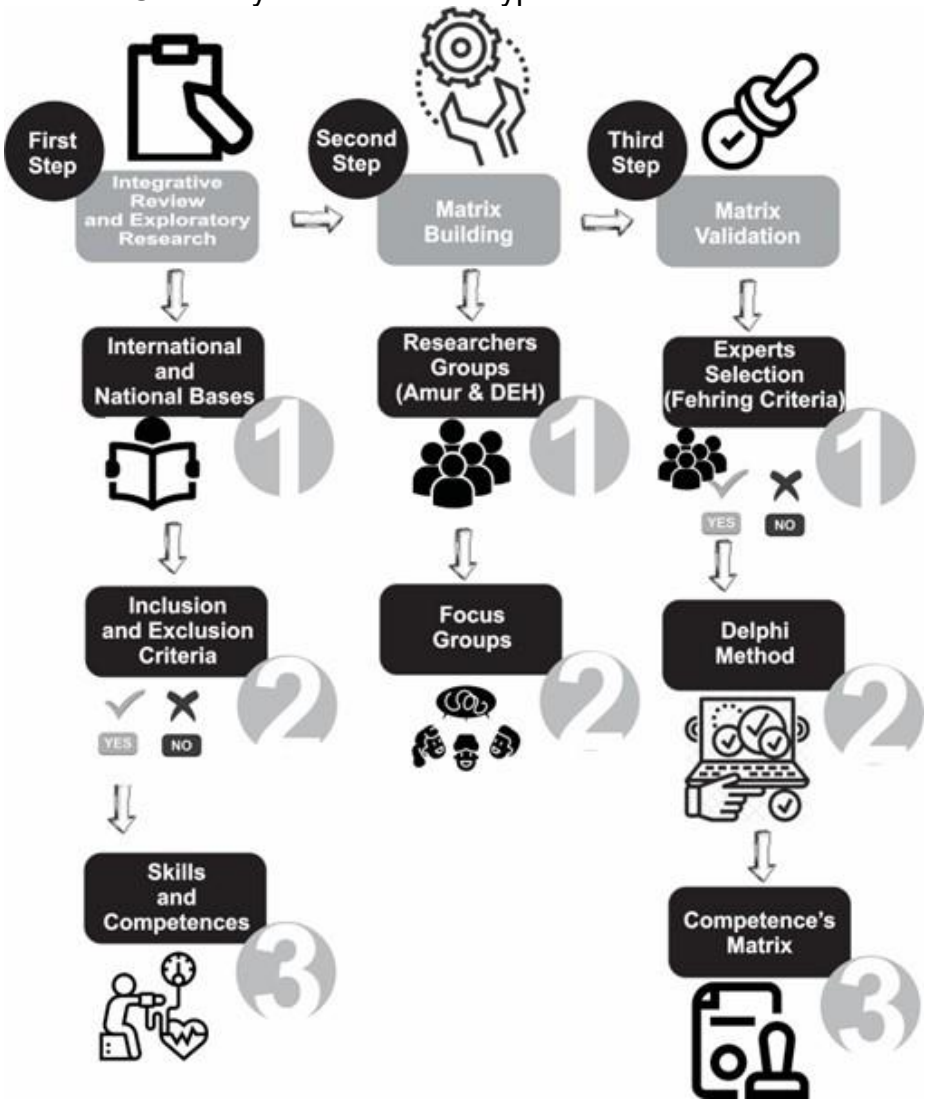
Figure 1. Methodological path for the building and validation of the competency matrix for the Rational Medicine Use in Systemic Arterial Hypertension.



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First Step consists of Integrative Review and Exploratory Research. In order to carry out the integrative review with the presence of a systematic search, guidelines proposed by the Cochrane Database of Systematic Reviews and the PRISMA group (*Preferred Reporting Items for Systematic reviews and Meta-Analyses*) were followed. The design of this review was based on the following guiding question: "What competencies, knowledge, skills and attitudes are necessary for health professionals to practice the Rational Medicine Use in the control of Systemic Arterial Hypertension?" In order to perform the review, descriptors (Medical Subject Headings – MeSH) that composed the algorithm *(("Arterial Hypertension" OR Hypertension OR "Blood Pressure") AND (("Rational Use" AND Drug) OR "Drug Utilization") AND (Framework OR "Competency-Based Education" OR*

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(Competency AND Education) OR Formation OR Teaching OR "Education Continuing")) in the SCOPUS and PubMED databases were initially used. After identifying the articles, three researchers independently read the titles and abstracts and checked whether or not they were included in the study. The inclusion criteria for the articles were: original studies in Portuguese and English, with the central theme referring to systemic arterial hypertension, published between 1985 and 2021. This period was defined according to the Experts Conference in Nairobi, Kenya, in 1985, where the Rational Medicine Use was conceptualised [8]. Duplicated articles were not included. Articles that were not available in the full text were excluded. Cases of divergence regarding the inclusion of these articles were dealt with in a discussion session for deliberation, and the reading was carried out in full.

Moreover, in order to search for the references with the greatest impact on RMU and SAH, exploratory research was carried out by manual search, using contemporary or retrospective references considered scientifically authentic. The documents were obtained by exploratory search using the "hypertension" descriptor in the SCOPUS database. Those that dealt directly with the theme and with the highest number of citations were included, aiming to expand and select articles with greater relevance. Additionally, were included documents on the theme available on the World Health Organization's website.

After reading the articles in their entirety, scientific evidence was extracted from the articles included in this review to justify the dimensions, competencies, knowledge, attitudes, and skills defined in the development of the Competency Matrix proposal.

The Second Step consists of Building the Competency Matrix for Rational Medicine Use in the treatment of Systemic Arterial Hypertension. For this step, two groups of researchers certified by the National Council for Scientific and Technological Development (CNPq, as per its Portuguese acronym), linked to the Brazilian Ministry of Education, were invited, five from the "Access to Responsible Medicine Use"/ARMU group and five from the "Determinants of Human Aging"/DHA. The ARMU was created in 2014 and is constituted by renowned doctors in the field of Pharmacy. ARMU focus is the development of strategies to promote responsible medicine use in different population groups, aiming to contribute to social transformation and qualification of professionals and health services. The DHA Group, also certified in 2014, is made up of doctors in the field of health, working with a focus on the biopsychosocial aspects of human ageing, with emphasis on health promotion, prevention and intervention in Chronic Non-Communicable Diseases such as SAH.

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Based on the analysis of the articles and documents selected in the bibliographic review (step 1), performed by the researchers, the Focus Group Technique was carried out [10], with three remote meetings using appropriate software for the participation of all, that occurred at different times, with the participation of 1 moderator and ten researchers, a number defined following Pizzol's conception [11]. In the first meeting, dimensions of RMU for SAH were identified; in the second, competencies; and in the third, knowledge, skills, and attitudes on the theme. Participants expressed their opinions, thoughts and experiences, and the consensus aspects were then included in the matrix. During the meetings, the coordinator/moderator encouraged the researchers to participate, making it possible to retrieve the information they might not remember or even bring up themes related to the central subject. Interaction among people to obtain the data necessary for the research was carefully encouraged and created a favourable environment for discussion, which allowed participants to express their perceptions and viewpoints [12].

The Third Step consists of the Validation of the Competency Matrix on Rational Medicine Use for Systemic Arterial Hypertension. Initially, a semi-structured questionnaire was prepared to contain three distinct parts in order to analyse the degree of agreement of the expert judges regarding the inclusion in the matrix of dimensions (part 1), competencies (part 2) and knowledge, skills and attitudes (part 3), referring to Rational Medicine Use in Systemic Arterial Hypertension. This instrument was applied through an interactive process in *Microsoft Forms*, which contained, in addition to the semi-structured questionnaire, the Free and Informed Consent Form and according to the modified Delphi method [13], electronically, whose access link was sent by individual e-mail to the experts. This technique advocates obtaining the greatest consensus in a group of professionals effectively experienced in the field and carefully selected on a given topic and can occur in several rounds [14]. In our study, two rounds were carried out, the first using the Likert scale containing scores from 1 to 5 [15], in order to consult the experts to what extent there was an agreement or not to include the dimensions, competencies, knowledge, skills and attitudes as suggested by the focus group researchers (step 2) in the competency matrix. In second round, experts were invited to justify the answers that obtained neutrality or scores below three on the scale. With the justifications in hand, a content analysis was performed according to Rocha [16] to provide an opportunity to understand the reasons for such scores. The articulation of these elements, which characterise the content analysis approach [17], generated the production of meaning that refers to a deduction, reaching a

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significance on the non-inclusion of some of the parameters in the matrix. To that end, categorisations of the answers given by the specialists were performed, and their repetitions were counted.

In order to achieve the selection of experts, a curricular analysis was carried out on the CNPq website, aiming at the participation of researchers from different regions of Brazil. Those who reached a score of >5, according to Fehring's adapted criteria, and who voluntarily agreed to participate and answered the form referring to the research were eligible. The adaptation of Fehring's (1994) criteria consisted solely of replacing the term "nursing" with "health professionals". The exclusion criterion for this group was failing to answer any question on the form.

ETHICAL ASPECTS

This study was approved by a Research Ethics Committee in Brazil under the project ethics submission certificate nº 68190217.2.0000.8093.

STATISTICAL ANALYSIS

The SPSS 26.0 for Windows software was used for the statistical analyses. The evaluations results performed by experts were expressed using absolute and/or relative frequency of events. In order to achieve the characterisation of the sample of expert judges, quantitative data were presented by utilising average and standard deviation. In contrast, the categorical variables were presented by absolute frequency. In order to check possible differences between the degrees of agreement of the Expert Judges, the chi-square test was used. The current study assumed $p \leq 0.05$. Items that obtained an agreement rate above 80% were considered for inclusion in the competency matrix.

RESULTS

IDENTIFICATION OF DIMENSIONS, COMPETENCIES, KNOWLEDGE, ABILITIES AND ATTITUDES OF THE RMU IN SAH

After searching for Mesh descriptors in the chosen databases, 305 articles were identified in the integrative review. Additionally, 26 articles and documents arising from the exploratory research were added, which composed the articles analysed in the next phase. Subsequently, duplicate articles that did not represent parameters of the RMU were excluded, and the articles were filtered for reading of the titles and abstracts of each one by

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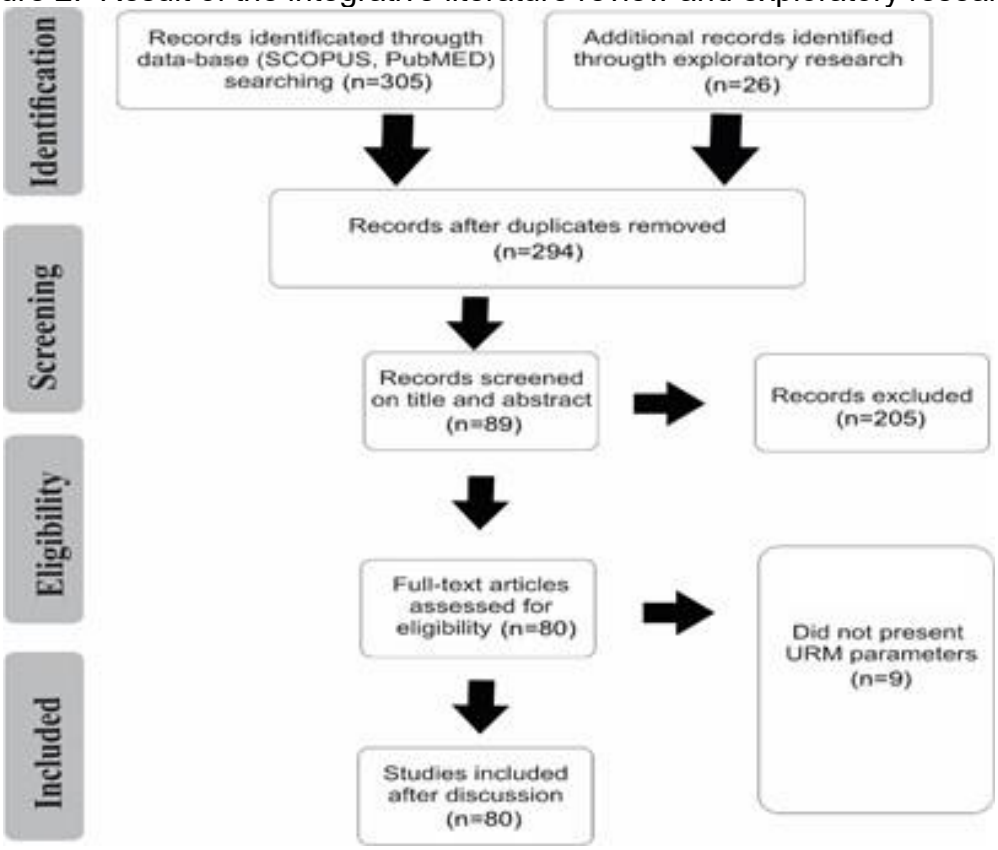
three researchers, as explained in Figure 2. Thus, 89 articles were selected for reading in full and discussion, resulting in 80 articles that took part in the study (Figure 2).

Figure 2. Result of the integrative literature review and exploratory research.



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During the focus group meeting, the researchers identified two categories of dimensions in meeting 1 (Table 01) and the items that gave rise to the competencies referring to each dimension (Table 02) in meeting 2. In the third meeting, the items that subsidised knowledge, skills and attitudes as described in Table 03. It should be highlighted that the justifications presented in these three tables were taken from the articles selected in the integrative review.

Table 01. Scientific evidence and justifications used by researchers participating in focus groups to identify the intrinsic and extrinsic dimensions of the RMU in SAH

Justification / Research Evidence	INTRINSIC DIMENSIONS OF THE RMU IN SAH
The use of medicines appropriate to the clinical situation, as well as the dosage regimen and the lowest cost of drug therapy are dimensions that are foreseen in the concept of RMU defined in Nairobi and its relevance in the RMU was largely reinforced by scientific evidence identified in the integrative	D1. Medicines appropriate to the clinical situation.
	D2. Dosage regimen (dose appropriate to

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review carried out in this study (Borrescio-Higa, 2015; Jafar et al., 2005)* and by articles and reference documents found in the exploratory research [8,18]**.	individual needs and treatment time). D3. Lower cost of drug therapy.
Justification / Research Evidence	EXTRINSIC DIMENSIONS OF THE RMU IN SAH
A treatment plan for hypertension must include addressing risk factors, such as an unhealthy diet, physical inactivity, consumption of tobacco and alcohol, being overweight or obese, in order to invest in health prevention and promotion actions that can help to avoid the establishment of the disease and, consequently, reduce the high worldwide prevalence of the disease[19,20]*, [21]**.	D4. Risk factors for triggering SAH.
Inadequate therapy for SAH can have consequences and worsen the patient's health status, and the literature states that the lack of control of SAH increases the risk of heart, brain and kidney diseases, among others, as well as the involvement of other associated pathologies, thus reflecting a necessary topic of inclusion as a dimension of the RMU in SAH [20,22,23]*, [18,21,24]**.	D5. Consequences of SAH.
The use of non-drug therapies is an important therapeutic resource, whether or not it is associated with the use of antihypertensive drugs to control blood pressure levels [25]*, [8,26]**.	D6. Non-Drug Treatment for SAH.

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Caption: D1 - Dimension 1; D2 - Dimension 2; D3 - Dimension 3; D4 - Dimension 4; D5 - Dimension 5; D6 - Dimension 6; RMU – rational medicine use; SAH – systemic arterial hypertension; BP – blood pressure
*scientific evidence identified in the integrative review carried out in this study reinforces the relevance of including the item in the matrix of RMU of SAH.
**articles and reference documents found in the exploratory research reinforce the relevance of including the item in the matrix of RMU of SAH.

Table 02. Scientific evidence and justifications used by researchers participating in focus groups to identify competencies for the RMU in SAH.

Justification / Research Evidence	COMPETENCIES OF THE RMU IN SAH
The definition of the diagnosis is a determining factor for the adequate prescription of medicines so as not to incur in undiagnosed or untreated SAH [27]*, [23,24,28,29]**.	D1CA. Perform the Diagnosis (appropriately defined clinical situation).
First-choice therapies do not necessarily involve pharmacotherapy since the drug must have its prescription carefully evaluated [27], [26,30]**.	D1CB. Evaluate the need for drugs.
It is necessary to follow a clinical protocol based on scientific evidence to ensure the effectiveness of the pharmacotherapy, considering aspects of drug effectiveness and cost-effectiveness [25]*, [31,32]**.	D1CC. Select the drug based on effectiveness.
The safety of the drug must be evaluated so that the benefit outweighs the risk, and the professional must know that the assumptions for the safe use of the drug involve the quality of the product and the appropriate prescription [25]*, [33]**.	D1CD. Evaluate drug safety.
The dosage regimen is a determining factor for pharmacotherapy's safety and effectiveness of [34]*, [33]**.	D2CE. Select the dosage regimen to ensure the effectiveness and safety of the drug.
Non-adherence to treatment has an unfavourable impact on the patient's health, resulting in a lack of control over the maintenance of blood pressure levels [22,23,35]*, [29]**.	D2CF. Monitor adherence to Antihypertensive Treatment.

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In addition to the effectiveness of the treatment, the cost to the individual and society must be considered in the therapeutic alternatives [23,35–37]*, [38,39]**	D3CG. Apply the principles of pharmacoeconomics.
The immutable risk factors related to the triggering of SAH must be considered in the prevention, diagnosis and treatment of the disease since they can influence the prognosis [40]*, [29,41]**.	D4CH. Evaluate the immutable risk factors for triggering SAH.
Behavioural risk factors directly influence the manifestation and/or worsening of signs and symptoms of the pathology [19,25,35]*, [26,41]**.	D4CI. Evaluate the mutable risk factors for triggering SAH.
The consequences of SAH directly infer the morbidity and mortality rates [22]*, [42]**.	D5CJ. Evaluate the possible consequences of SAH.
Conducts related to weight reduction are effective measures to control blood pressure levels [25]*, [26,29,41]**	D6CK. Apply weight control behaviours based on scientific evidence.
Diet therapy is considered by the literature to be effective in helping to control blood pressure [25]*, [26,29,41]**	D6CL. Apply conducts based on scientific evidence on a healthy diet.
Regular physical activity can reduce blood pressure [25]*, [26,41,43]**.	D6CM. Apply physical activity practices based on scientific evidence for hypertensive patients.
It is necessary to know the strategies to reduce alcohol intake in patients at risk of triggering SAH or who has it since exacerbated intake compromises blood pressure levels [25]*, [26,41]**.	D6CN. Conducts on the control of alcohol consumption based on scientific evidence.
Stress and psychosocial factors are proven determining factors in the elevation of blood pressure levels and are directly related to comorbidities [26,41,44]**.	D6CO. Conducts based on scientific evidence on stress management.
It is necessary to know the strategies to reduce the consumption of cigarettes and similar products in patients at risk of triggering SAH or who have it since the habit of smoking contributes to the increase in peripheral blood resistance and undermines oxygenation, interfering with the control of SAH and, consequently, increasing cardiovascular risk [29,45]**.	D6CP. Conducts based on scientific evidence on tobacco control.

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Caption: D – Dimensions from 1 to 6; C – Competencies from A to P; RMU – rational medicine use; SAH – systemic arterial hypertension; BP – blood pressure

*scientific evidence identified in the integrative review carried out in this study reinforces the relevance of including the item in the matrix of RMU of SAH.

**articles and reference documents found in the exploratory research reinforce the relevance of including the item in the matrix of RMU of SAH.

Table 03. Scientific evidence used by researchers participating in focus groups to identify knowledge, skills and attitudes for the RMU in SAH.

Justification / Research Evidence	KNOWLEDGE / SKILL / ATTITUDE
It is necessary for the professional to recognise the physiology of the systems to be able to identify the changes arising from the manifestation of SAH [46]**.	D1CA1. Know the physiological process of blood pressure.
In order to perform the diagnosis and monitoring of SAH, it is necessary to know the signs and symptoms of the disease [29]**.	D1CA2. Recognise signs and symptoms of SAH.
Patients diagnosed with SAH must be treated with adequate interventions and appropriate multidisciplinary treatment to control the disease [40]*, [29]**.	D1CA3. Perform appropriate intervention/referral in the face of signs and symptoms of SAH.
Identifying risks arising from high blood pressure levels enables appropriate intervention [22,40,47]*, [29]**.	D1CA4. Recognise risks of complications arising from high blood pressure.
Knowing the staging of SAH makes it possible to establish goals and the appropriate treatment strategy [40]*, [29]**.	D1CA5. Check the stage of SAH according to pressure levels.

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The definition of goals implies the choice, maintenance or change of the treatment strategy for SAH [25,40]*, [41]**.	D1CA6. Define the therapeutic goal.
The good use of methods and devices for measuring blood pressure are essential for the adequate determination of blood pressure levels [25]*, [29]**.	D1CA7. Methods and devices for measuring blood pressure.
The knowledge of pharmacological and non-pharmacological measures are necessary to control blood pressure, as the literature indicates that the association of both is more effective in the treatment of SAH [25]*, [26]**.	D1CB8. Know the pharmacological and non-pharmacological therapeutic alternatives.
Consider the staging of the disease for the prescription in order to adequately use the therapeutic resources [25]*, [29]**.	D1CB9. To analyse the need to use medicines in view of the stage of SAH.
The mastery of available therapeutic tools is essential for prescribing and monitoring pharmacotherapy, considering efficacy, drug interactions, adverse reactions, side effects, availability and access to the drug, among others [19,27,47,48]*, [29]**.	D1CC10. Know the pharmacological classes of effective drugs for the treatment of SAH, such as: Diuretics, Calcium Channel Blockers, Angiotensin II AT1 Receptor Blockers, Angiotensin-Converting Enzyme Inhibitors (ACEI), beta-blockers, Alpha-blockers, sympatholytic drugs of Central Action, Direct Vasodilators, Direct Renin Inhibitors.
It is necessary for the professional to define the best possible therapy with the best cost-benefit for the patient, based on scientific studies to define the appropriate drug for the clinical situation and to consider its impact on the general health context of the patient in the short, medium and long term [23,49]*, [33]**.	D1CC11. Define, based on the efficacy/effectiveness data, the possible drugs for the treatment of SAH.
The treatment of SAH considers the use of monotherapy or associations, and it is necessary to identify and manage the use of these drugs in an adequate way [37]*, [41]**.	D1CC12. Identify and manage (Clinical indication) drug treatment for SAH Situations with monotherapy, and the association of antihypertensive drugs.
The drug's contraindications must be known so that the drug is not misused in patients with contraindicated conditions, as this can lead to health complications and even death [41]**.	D1CD13. Know drug contraindications of antihypertensive drugs.
Adverse reactions must be monitored for having the potential to cause an unintended, harmful or undesirable response to a drug [19,27,50]*, [29,41]**.	D1CD14. Know adverse reactions to antihypertensive drugs.
Interactions may interfere with desired pharmacological effects and/or cause toxicity [19,27]*, [29,41]**.	D1CD15. Know the clinically significant drug interactions of antihypertensive drugs.
Safety data must be compared so that the safest and most adequate drug for the patient's treatment is used [25,50]*, [33]**.	D1CD16. Compare drug safety data for the selection of treatment for SAH.
The treatment applied must be the first choice whenever possible, but it must consider the patient's needs and the context to use the best therapy for the case [49]*, [41]**.	D2CE17. Evaluate drug therapy options for the treatment of SAH.
Adequate dosage ensures the effectiveness of treatment. Inadequate dosage can result in harm to the patient and toxicity [41,51]**.	D2CE18. Know the dosage regimen of antihypertensive drugs.
The dosage regimen must be in accordance with the specifics of the patient's clinical profile [41,51]**.	D2CE19. Evaluate the patient's clinical profile to choose the dosage regimen.
The evaluation of the effectiveness of the prescribed dose must be evaluated according to the patient's clinical response [35,36]*, [33]**	D2CE20. Evaluate the patient's clinical response to the prescribed dose.

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Toxicity generated by overdoses must be promptly identified to avoid pronounced deleterious effects [52]**.	D2CE21. Identify signs and symptoms of toxicity from an overdose.
The clinical results of drug treatment must be evaluated to define whether or not to maintain the therapeutic regimen as part of the pharmacotherapy monitoring [22]*.	D2CE22. Evaluate the clinical results of pharmacotherapy in order to establish the duration of use of prescribed drugs (maintenance/adequacy/drug switch).
The evaluation of pharmacotherapy, especially for drugs of continuous use, must occur periodically and systematically [24,53].	D2CE23. Establish the frequency of pharmacotherapy evaluations.
Adherence to antihypertensive treatment must be monitored as non-adherence compromises the RMU and the implemented therapy [35,54]*.	D2CF24. Evaluate Adherence to Antihypertensive Treatment.
Factors that interfere with adherence to antihypertensive drugs may be susceptible to intervention and must be identified and monitored [22,23,35,54]*.	D2CF25. Identify and manage the factors that interfere with adherence to antihypertensive treatment.
Strategies to promote adherence to antihypertensive therapy can ensure treatment success [19]*, [29,55].	D2CF26. Apply strategies to promote adherence to antihypertensive treatment. Self-measurement of BP, more convenient dosage regimens, implementation of multidisciplinary teams in the care of hypertensive patients, differentiating myths and truths about the therapy for SAH, etc.).
Access to antihypertensive treatment is an essential condition for treatment adherence [23,35]*, [29]**.	D2CF27. Monitor access to treatment as an adherence strategy.
The cost of antihypertensive treatment is critical for prescription and adherence [23,35,36]*.	D3CG28. Know the cost of possible treatments for systemic arterial hypertension.
The availability of medicines in the public health system is a fundamental requirement for the treatment of hypertension. It must be observed even at the time of prescription [35]*.	D3CG29. Check the free availability of medicines in health systems.
When prescribing antihypertensive drugs, knowledge of the patient's socioeconomic conditions must be signalized [35]*.	D3CG30. Evaluate the patient's socioeconomic conditions in relation to the cost of the medication in use.
In order to maintain the best therapeutic option, it is essential to know the efficacy data of the drug combined with the safety and convenience of the dosage in relation to the cost. That is, it is essential to know the effectiveness of the drug in use. [35,36]*, [33]**	D3CG31. Compare the cost of drugs with data on effectiveness, efficacy, safety and dosage convenience.
Immutable risk factors must be considered for the decision and evaluation of the pharmacotherapy to be used [35]*, [29]**	D4CH32. Know the immutable risk factors for SAH (gender, age, ethnicity, genetic factors).
Risk factors must be informed to the hypertensive patient so that they can understand them and thus contribute to treatment adherence [19]*, [29].	D4CH33. Include risk factors in patient counselling.
Identifying mutable risk factors can guide the adoption of non-pharmacological and pharmacological measures [19]*, [26,29]**	D4CI34. Identify changeable risk factors for SAH (overweight, diet, physical inactivity, alcohol consumption, smoking, stress, etc.).
The intervention of risk factors for SAH constitutes an important measure for the treatment of SAH, influencing the decision-making of pharmacotherapy [19]*, [26,29]**	D4CI35. Intervene in the risk factors for SAH (overweight, diet, sedentary lifestyle, alcohol consumption, smoking, stress, etc.).

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The staging of SAH influences the establishment of cardiovascular risk, and the therapy to be implemented must consider this risk [29]**	D5CJ36. Stratify overall cardiovascular risk. (Low Risk, Moderate Risk, High Risk).
The monitoring of target organ functional parameters must be performed periodically for hypertensive patients [29]**	D5CJ37. Evaluate function/involvement in target organs.
The evaluation of body composition is an elucidative factor mainly concerning the percentage of fat, especially visceral fat [26]**	D6CK38. Identify the patient's body composition.
Nutritional status is directly related to cardiovascular risk resulting from blood pressure levels [26]**	D6CK39. Identify the patient's nutritional status.
Weight control measures can help to reduce blood pressure levels [26]**	D6CK40. Apply weight control measures.
Knowing healthy eating habits for hypertensive patients allows for better counselling and monitoring [26]**	D6CL41. Know healthy eating habits for hypertensive patients.
Healthy eating habits must be encouraged as they can influence blood pressure levels and must be held by a nutritionist whenever necessary [26]**	D6CL42. Encourage healthy eating habits and/or refer to a nutritionist.
Foods high in sodium must be avoided by hypertensive patients, and therefore professionals must identify them [26]**	D6CL43. Identify foods high in sodium.
Sodium control measures are important to reduce blood pressure levels, and their application must be suggested to hypertensive patients by health professionals [26]**	D6CL44. Apply sodium control measures.
Potassium supplementation may decrease the risk of arrhythmia and help to decrease the overall cardiovascular risk in hypertensive patients [56,57].	D6CL45. Indicate potassium supplementation in recommended cases.
The knowledge of the parameters of changes in blood pressure induced by physical activity will contribute to decision making regarding the possible therapies to be adopted [26,29,43]**	D6CM46. Know the parameters of changes in blood pressure levels through physical activity.
The practice of regular physical activity significantly reduces blood pressure levels in hypertensive patients, and its prescription must be used [26,29,43]**	D6CM47. Encourage the practice of physical activity and/or refer to a physical education professional.
Alcohol consumption habits in hypertensive patients must be known due to their high interactive potential and their ability to change blood pressure levels [26,29,45]**	D6CN48. Apply protocol to identify alcohol consumption habits.
The reduction or non-intake of alcohol by hypertensive patients can reduce blood pressure levels [26,29,45]**	D6CN49. Encourage reduced/no alcohol intake.
Stressful factors must be identified since stress can contribute to maintaining high blood pressure levels, influencing the dosage schedule [26,29,44]**	D6CO50. Identify stressful factors.
Clinical indications reveal a strong tendency to reduce BP when techniques to combat stress are used alone or in combination [26,29,44]**	D6CO51. Intervene in stressful factors.
The identification of smoking habits must be known to better conduct counselling for hypertensive patients, as this habit can make it difficult to control BP and impact the results of pharmacotherapy [29,45]**	D6CP52. Apply protocol to identify smoking habits.
Although there is no evidence that smoking cessation reduces BP, its reduction implies a reduction in cardiovascular risks and other associated diseases, avoiding polymedication [29,45]**	D6CP53. Encourage smoking reduction.

Own authorship.

Caption: D – Dimensions from 1 to 6; C – Competencies from A to P; Numbers from 1 to 53; RMU – rational medicine use; SAH – systemic arterial hypertension; BP – blood pressure.
*scientific evidence identified in the integrative review carried out in this study reinforces the relevance of including the item in the matrix of RMU of SAH.
**articles and reference documents found in the exploratory research reinforce the relevance of including the item in the matrix of RMU of SAH.

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VALIDATION OF THE COMPETENCY MATRIX FOR THE RMU IN SAH

A prevalence of agreement among the expert judges was found to be greater than 80% (Table 4) regarding the inclusion of dimensions, competencies, knowledge, skills, and attitudes proposed by the researchers who developed the ARMU and DHA, in the matrix for the RMU in SAH.

Eleven expert judges participated in the validation of the competency matrix, six males and five females, with an average age of 38±5.2 years, all of them with a degree in *Stricto sensu* Graduate Programs, with clinical expertise greater than two years, higher education professors, with training in pharmacy (n=3), nursing (n=2), public health (n=1) and medicine (n=6). Of the medical professionals, three had residency in cardiology, two were general practitioners, and one worked in geriatrics.

Table 4. Frequency of agreement of experts regarding the inclusion of dimensions, competencies, knowledge, skills and attitudes in the competency matrix for the RMU in SAH.

Dimensions of the RMU in SAH	CI (%)	CI 95%	*p*
Intrinsic Dimensions (n=3)	87.88	[0.056;0.66]	0.035
Extrinsic Dimensions (n=3)	90.91	[0.001;0.238]	0.007
Competencies of the RMU in SAH	CI (%)	CI 95%	*p*
Competencies of Intrinsic Dimensions (n=7)	83.45	[0.001;0.261]	0.035
Competencies of Extrinsic Dimensions (n=9)	95.45	[0.001;0.238]	0.007
Knowledge / Skills / Attitudes of the RMU in SAH - Intrinsic Dimensions	CI (%)	CI 95%	*p*
Perform the Diagnosis (n=7)	84.09	[0.001;0.261]	0.035
Evaluate the need for drugs (n=2)	100	[0.001;0,238]	0.007
Select drug based on effectiveness (n=3)	100	[0.001;0.238]	0.007
Evaluate drug safety (n=4)	100	[0.001;0.238]	0.007
Select the dosage regimen to ensure the effectiveness and safety of the drug (n=7)	97.4	[0.001;0.648]	0.037
Monitor adherence to Antihypertensive Treatment (n=4)	90.91	[0.001;0.641]	0.009
Apply the principles of pharmacoeconomics (n=4)	88.64	[0.001;0.238]	0.007
Knowledge / Skills / Attitudes of the RMU in SAH - Extrinsic Dimensions	CI (%)	CI 95%	*p*
Evaluate the immutable risk factors for triggering SAH (n=2)	95.45	[0.001;0.238]	0.007
Evaluate the mutable risk factors for triggering SAH (n=2)	86.36	[0.001;0.261]	0.035
Evaluate the possible consequences of SAH (n=2)	95.45	[0.001;0.238]	0.007
Apply weight control behaviors based on scientific evidence (n=3)	93.94	[0.001;0.229]	0.006
Apply conducts based on scientific evidence on healthy diet (n=5)	92.73	[0.001;0.235]	0.005
Apply physical activity practices based on scientific evidence for hypertensive patients (n=2)	90.91	[0.001;0.641]	0.009
Conducts on the control of alcohol consumption based on scientific evidence (n=2)	95.45	[0.001;0.238]	0.007
Conducts based on scientific evidence on stress management (n=2)	95.45	[0.001;0.238]	0.007

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Conducts based on scientific evidence on tobacco control (n=2)	90.91	[0.001;0.641]	0.009

Own authorship.

Caption: CI% - Concordance Index Percentage; RMU – rational medicine use; SAH – systemic arterial hypertension.

CONTENT ANALYSIS OF JUSTIFICATIONS AND PROPOSALS FOR CHANGES IN THE COMPETENCY MATRIX ITEMS

In the content analysis, it was possible to stratify two categories of different justifications cited for the non-agreement to include the item as proposed in the structure of the Competency Matrix, namely: i. change from intrinsic to extrinsic dimension (n=4), and ii. competencies need more detail (n=3). It should be underlined that the suggestion of new inclusion or exclusion of items proposed for the matrix was not presented by any expert judge.

Regarding the category “change from the intrinsic to extrinsic dimension”, it was suggested that the competencies in terms of performing the diagnosis (n=1), evaluating the need for drugs (n=1), selecting the drug based on effectiveness (n=1) and monitoring adherence to antihypertensive treatment (n=1) were considered competencies of the extrinsic dimension.

Regarding the category “competencies need more detail”, it was suggested to specify the competencies to evaluate the immutable risk factors (n=1), evaluate the mutable risk factors for triggering SAH (n=1) and to evaluate the possible consequences of SAH (n=1).

PREPARED COMPETENCY MATRIX FOR THE RMU IN SAH AND ITS VALIDITY

The matrix was structured in order to distribute competencies, knowledge, skills and attitudes in intrinsic or extrinsic dimensions. The researchers in the focus group defined which intrinsic dimension would encompass those competencies, knowledge, skills, and attitudes explained in the concept of RMU, as defined at the Conference of Experts convened by the WHO in Nairobi in 1985 [8], which states: “The rational medicine use (RMU) requires that patients receive the drugs adequate to their clinical needs, in a dose that meets their individual needs, for an appropriate period of time at the least cost to them and their community”.

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The group determined that the extrinsic dimension includes competencies, knowledge, skills, and attitudes directly related to the definition of RMU but are not explained in the context.

Chart 1. Competency Matrix validated by experts for the Rational Medicine Use in Systemic Arterial Hypertension.

COMPETENCY MATRIX FOR RATIONAL MEDICINE USE IN SYSTEMIC ARTERIAL HYPERTENSION		
INTRINSIC DIMENSIONS OF THE RMU IN SAH	COMPETENCIES OF INTRINSIC DIMENSIONS	KNOWLEDGE / SKILL / ATTITUDE
Medicines appropriate to the clinical situation.	A. Perform the Diagnosis (adequately defined clinical situation).	Know the physiological process of blood pressure.
		Recognise signs and symptoms of SAH.
		Perform appropriate intervention/referral in the face of signs and symptoms of SAH.
		Recognise risks of complications arising from high blood pressure.
		Check the stage of SAH according to pressure levels.
		Define the therapeutic goal.
		Methods and devices for measuring blood pressure.
	B. Evaluate the need for drugs.	Know the pharmacological and non-pharmacological therapeutic alternatives.
		To analyse the need to use medicines in view of the stage of SAH.
	C. Select the drug based on effectiveness.	Know the pharmacological classes of effective drugs for the treatment of SAH, such as: Diuretics, Calcium Channel Blockers, Angiotensin II AT1 Receptor Blockers, Angiotensin-Converting Enzyme Inhibitors (ACEI), beta-blockers, Alpha-blockers, sympatholytic drugs of Central Action, Direct Vasodilators, Direct Renin Inhibitors.
		Define, based on the efficacy/effectiveness data, the possible drugs for the treatment of SAH.
		Identify and manage (Clinical indication) drug treatment for SAH. Situations with monotherapy and the association of antihypertensive drugs.
	D. Evaluate drug safety.	Know drug contraindications of antihypertensive drugs.
		Know adverse reactions to antihypertensive drugs.
		Know the clinically significant drug interactions of antihypertensive drugs.
		To compare drug safety data for the selection of treatment for SAH.
Dosage regimen (dose appropriate to individual needs and treatment time).	E. Select the dosage regimen to ensure the effectiveness and safety of the drug.	To evaluate drug therapy options for the treatment of SAH.
		Know the dosage regimen of antihypertensive drugs.
		Evaluate the patient's clinical profile to choose the dosage regimen.
		Evaluate the patient's clinical response to the prescribed dose.
		Identify signs and symptoms of toxicity from an overdose.
		Evaluate the clinical results of pharmacotherapy in order to establish the duration of use of prescribed drugs (maintenance/adequacy/drug switch).

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		Establish the frequency of pharmacotherapy evaluations.
	F. Monitor adherence to Antihypertensive Treatment.	Evaluate adherence to antihypertensive treatment.
		Identify and manage the factors that interfere with adherence to antihypertensive treatment.
		Apply strategies to promote adherence to antihypertensive treatment. Self-measurement of BP, more convenient dosage schedules, implementation of multidisciplinary teams in the care of hypertensive patients, differentiating myths and truths about therapy for SAH, etc.).
		Monitor access to treatment as an adherence strategy.
Lower cost of drug therapy.	G. Apply the principles of pharmacoeconomics.	Know the cost of possible treatments for systemic arterial hypertension.
		Check the free availability of drugs in health systems.
		Evaluate the patient's socioeconomic conditions in relation to the cost of the medication in use.
		Compare the cost of drugs, with data on effectiveness, efficacy, safety and dosage convenience.
EXTRINSIC DIMENSIONS OF THE RMU IN SAH	COMPETENCIES OF EXTRINSIC DIMENSIONS	KNOWLEDGE / SKILL / ATTITUDE
Risk factors for triggering SAH.	H. Evaluate the immutable risk factors for triggering SAH.	Know the immutable risk factors for SAH (gender, age, ethnicity, genetic factors).
		Include risk factors in patient counselling.
	I. Evaluate the mutable risk factors for triggering SAH.	Identify changeable risk factors for SAH (overweight, diet, physical inactivity, alcohol consumption, smoking, stress, etc.).
		Intervene in the risk factors for SAH (overweight, diet, sedentary lifestyle, alcohol consumption, smoking, stress, etc.).
Consequences of SAH.	J. Evaluate the possible consequences of SAH.	Stratify overall cardiovascular risk (Low Risk, Moderate Risk, High Risk).
		Assess function/involvement in target organs.
Non-Drug Treatment for SAH.	K. Apply weight control behaviours based on scientific evidence.	Identify the patient's body composition.
		Identify the nutritional status of the patient.
		Apply weight control measures.
	L. Apply conducts based on scientific evidence on a healthy diet.	Knowing healthy eating habits for hypertensive patients.
		Encourage healthy eating habits and/or refer to a nutritionist.
		Identify foods high in sodium.
		Apply sodium control measures.
		Indicate potassium supplementation in recommended cases.
	M. Apply physical activity practices based on scientific evidence for hypertensive patients.	Know the parameters of changes in blood pressure levels through physical activity.
		Encourage the practice of physical activity and/or refer to a physical education professional.
	N. Conducts on the control of alcohol consumption based on scientific evidence.	Apply protocol to identify alcohol consumption habits.
		Encourage reduced/no alcohol intake.
	O. Conducts based on scientific evidence on stress management.	Identify stressful factors.
		Intervene in stressful factors.
		Apply protocol to identify smoking habits.

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	P. Conducts based on scientific evidence on tobacco control.	Encourage smoking reduction.

Own authorship.
Caption: RMU – rational medicine use; SAH – systemic arterial hypertension; BP – blood pressure.

DISCUSSION

Thinking about the teaching and learning process from the interactionist and dialogic perspective requires an expanded notion of competency. The idea of competency is usually associated with the ability to mobilise the various cognitive resources, such as personal, private, academic, professional, common sense and experiential information and knowledge [58]. Nonetheless, it is essential that the individual can invest their knowledge with discernment and relate it to situations, transpose it and enrich it to possess the necessary skills to solve life's problems [59]. Moreover, the current curricular matrices of health courses do not have difficulties clearly presenting the priority contents in the professional training process with many of these being dispersed in the teaching plans of teachers [58]. In this context, the competency matrix developed and validated in the current study constitutes an instrument to be applied to facilitate actions in the practices of the RMU for SAH.

Inserting the knowledge, skills and attitudes involved for the best use of the therapies used in the treatment of SAH in the training of health professionals [60] seems appropriate, as it is during training that the competencies must be acquired, which can result in effective health actions [61].

In this research, 80 articles and documents (Tables 1, 2 and 3) addressing the treatment of SAH were detected, but without directly referring to the competencies necessary for the RMU in the training of health professionals. A possible explanation for the absence of clearly defined competencies for RMU in our review leads us to believe that these competencies have been more associated with the diagnosis and management of SAH in general than with the RMU specifically. Even in those articles that addressed essential competencies for the training of health professionals, they did not explain specific competencies for the promotion of RMU [62]. Despite this fact, it was possible to identify aspects related to the practice of RMU, which allowed us to create the justifications for the initial proposal of the competency matrix. It should be underlined that the application of aspects of the RMU in the treatment of SAH in an isolated and pulverised way does not

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guarantee the adequate implementation of pharmacotherapy [63], reinforcing the need for the matrix.

The structure of a curricular matrix must respect the changing conditions regarding the interventional practice of the health professional. This construct is directly dependent on the analysis of the demands presented by society. The result of its effect is related not only to the teaching and learning process of its contents but also to the conditions that the actors involved in this process have to reflect and make the appropriate decision, given the presented problem [64], characteristics considered by this study in the preparation of the matrix.

Accordingly, the presented matrix considered the intrinsic and extrinsic dimensions for the RMU in SAH and from there defined the competencies inserted in each dimension. As competencies of the intrinsic dimension, the drugs appropriate to the clinical situation, the dosage regimen (dose appropriate to individual needs and treatment time) and non-drug treatment for SAH, as well as the knowledge, skills and attitudes corresponding to each competency (Figure 3). The analysis of the items contained in the competency matrix structure can lead to clinical thinking and contribute to the resolution of a relevant global health problem, which is the non-rational medicine use [65], insofar as many of these items are directly related to the performance of health professionals [66]. It is these professionals who recommend drugs when the health problem could be treated without them [67], prescribe drugs that are inadequate for the clinical situation (active ingredient, pharmaceutical form, high cost) [68], establish a period of inadequate use [68,69], recommend mistaken drug replacement, provide low-quality drugs [70] and do not adequately inform the patient about the use of the product [71]. Therefore, in possession of the competency matrix developed in the research, protocols that contemplate the RMU in SAH can be created and applied in the clinical routine of prescribers and other health professionals.

Regards to extrinsic dimensions, competencies defined as risk factors for triggering, consequences and non-drug treatment for SAH were included. This dimension creates guidelines that are not presented in the Brazilian [72] and international Guidelines for RMU in the treatment of hypertension [73] but are identified as determining factors for the development of RMU in the Scientific Literature (Table 2). The notion of how to address the risk factors for the development of SAH or adopt non-pharmacological measures to reduce

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blood pressure levels is essential to modify the high prevalence of the disease and its complications and indirectly contribute to rational medicine use.

The consensus-based on this research by the opinions issued by geographically separated specialists demonstrated the acceptance regarding the structure of the matrix and the items that composed it. The justifications presented by the experts and categorised as the few changes proposed did not include the insertion of new dimensions or items, and they stopped to suggest the displacement of some competencies from the intrinsic to the extrinsic dimension.

Regarding the implications for education and educational policies, the competency matrix can be useful as it predisposes to generate critical thinking regarding the implementation of professional curricula in the field of health, proposing the checking of social demands [58], as well as professional conduct, based on current paradigms. The success of the treatment is intrinsically involved in the principle that the interaction of the health professional with the patient will be efficient and will result in the patient's compliance with the therapeutic recommendations, as reported in several studies [74–76].

It should be underlined that the therapeutic approaches adopted by the recommendations of reference entities [24,29] converge with the premise proposed by the guidelines of RMU, where there is the predictability of non-drug adjuvant therapeutic alternatives, such as physical exercise and psychotherapy [77]. These assumptions are reinforced with the propositions presented by this competency matrix since the RMU may imply the associated adoption of non-pharmacological measures that must be in the practice exercised by health professionals. Therefore, the listed competencies are considered essential for training in the field of health.

Future research may highlight the impact of the use of the competency matrix in the health routine with regard to the RMU for therapies focused on hypertension, especially in resistant SAH, which is defined in patients who do not reach the target values of BP despite the triple antihypertensive drug therapy, which includes a diuretic administered at the maximum tolerated dose [29].

CONCLUSION

This study gave rise to a Competency Matrix validated by experts containing knowledge, skills and attitudes designed for health professionals to perform Rational Medicine Use in the care of patients with Systemic Arterial Hypertension. The framework fits

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into the clinical practices of health professionals and can be used for competency-based education by health professionals and students. In addition, the Matrix presented can be adopted as a basis for teaching the process of rational medicine use aimed at other health problems.

STUDY LIMITATION

The digital meeting to build the matrix during the focus group may have interfered with the proposal's preparation due to the reduction in time, which was 4 hours per meeting. Nonetheless, it provided the opportunity to conduct research during the COVID-19 pandemic.

A strong point of our study was the involvement of a panel of expert evaluators with significant experience in clinical practice and education from different states of Brazil. Their expertise allowed for a profound reflection on the relevance of the competencies of RMU in SAH.

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