Review articles

Teaching strategies for developing speech-language-hearing clinical reasoning: A scoping review

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ABSTRACT

Purpose: to map and describe the main teaching strategies related to clinical reasoning in undergraduate and postgraduate Speech-Language Pathology courses.

Methods: a scoping review based on the research question: «What are the main teaching strategies used to develop clinical reasoning in undergraduate and postgraduate speech-language-hearing programs?». The search was conducted in the MEDLINE, Cochrane Library, Scopus, Web of Science, and BVS databases. The selection of studies was carried out in three stages: reading of titles, abstracts, and full texts, applying the eligibility criteria. The extracted data included author, year, country, type of study, sample type, teaching strategy, and main results. These data were systematized and presented in a table.

Literature Review: eleven articles were selected from 1,032 mapped studies. The teaching strategies identified were virtual clinical cases, reflective learning journals, clinical supervision during curricular internships, conceptual maps, Gallery Walk-like active methodology, simulation, and gamification.

Conclusion: the most used teaching strategies for the development of clinical reasoning in speech-language pathology students were virtual clinical cases, followed by clinical supervision, during internships.

Keywords: Speech, Language and Hearing Sciences; Clinical Reasoning; Teaching; Clinical Decision-Making; Learning

INTRODUCTION

Healthcare professionals face increasing demands, due to changes in care delivery and the complexity of health problems[1]. This requires them to master intellectual, interpersonal, and technical skills to make safe and effective clinical decisions[1]. Although research has advanced in studies on clinical reasoning and decision-making, there is still little evidence in education aimed at developing clinical reasoning in future healthcare professionals, including speech-language-hearing (SLH) pathologists. Hence, it is essential to invest in teaching methods that integrate theory and practice, facilitating the learning of clinical reasoning in patient care in SLH clinics.

Clinical reasoning is used in scientific literature to prescribe an intellectual process that must be developed by students and health professionals, allowing diagnoses and procedures for users of the public and private health systems[2]. This reasoning is acquired through teaching theory, practice, and repeated exposure to clinical SLH cases.

However, even if undergraduate SLH students go through these learning stages, they still have difficulty developing clinical reasoning[3], especially in establishing the evaluation hierarchy and alignment between evaluation and therapeutic planning[4]. Similarly, several theories try to define the construction of clinical reasoning during academic training and the training of young clinicians.

The Procedural Theory proposes the simultaneous use of the hypothetical-deductive (or analytical) model and the intuitive (or non-analytical) model of clinical reasoning[5]. Thus, when the student is exposed to a clinical case, different diagnostic hypotheses are developed, and as new information about the case is collected through the patient's evaluation, the student can exclude or affirm the hypotheses deduced, until they can conclude the case. This clinical reasoning is the analytical model, much in demand in atypical and complex cases[5]. Meanwhile, the non-analytical model is often used to solve clinical cases in daily therapeutic practice, since it is through repetitive exposure to cases that students develop scripts – i.e., the mental formation of the outline of health conditions[5]. Thus, the diagnosis is established by identifying the prevalent semiology in the manifestation of a given disease, disorder, or functional changes[6]. It is assumed that the simultaneous use of these two clinical reasoning models makes the diagnostic process more accurate and safer for the patient, since diagnostic errors can result in inadequate therapeutic approaches and prolong treatment[5].

Studies on clinical reasoning in SLH teaching are still scarce in the literature[3], and few offer specific strategies for developing this skill among students[3]. Although research conducted in Medicine[5] and Nursing[1] can contribute to the foundation of teaching SLH strategies, more studies are needed in the context of this professional training. This would personalize the teaching process, considering the particularities of each health area[4].

This scoping review is justified by providing SLH pathologists and professors with a comprehensive analysis of the literature on the teaching of clinical reasoning in SLH education. The purpose of this review is to deepen the understanding of this crucial area in SLH education, particularly in the context of clinical competence development, which encompasses the development of clinical reasoning. In this sense, the aim is to strengthen teacher training, encourage research in SLH education, and provide technical support for the development of instructional strategies based on the principles of learning clinical reasoning.

This article aimed to carry out a scoping review to map and describe the main teaching strategies related to clinical reasoning in undergraduate and postgraduate SLH programs.

METHODS

Study design

The proposed scoping review followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, extension for Scoping Reviews (PRISMA-ScR), guided by the Joanna Briggs Institute (JBI) manual[7]. The protocol was registered on the Open Science Framework (OSF) (DOI: 10.17605/OSF.IO/U3QD6). PCC, the acronym for Population, Concept, and Context, was used to construct the research question, as follows: P - SLH students and pathologists; C - clinical reasoning; and C - teaching. The term «SLH pathologist» was chosen as the population to also include young professionals already involved in clinical practice, allowing a comprehensive analysis of teaching strategies throughout undergraduate and postgraduate studies. Based on these definitions, the following research question was established: «What are the main teaching strategies used to develop clinical reasoning in undergraduate and postgraduate SLH programs?».

Search strategies

The articles were surveyed between February 1 and 27, 2024.

The words identified in the titles and abstracts of relevant articles and the keywords used to describe the articles were selected to develop the complete search strategies for the selected databases: Virtual Health Library (VHL), Medline via PubMed, The Cochrane Library, Scopus, and Web of Science, both via the CAPES Portal. The following keywords were used for the bibliographic survey: Speech Therapy, Speech Therapist, Clinical Reasoning, Teaching, Diagnostic Reasoning, Clinical Diagnosis, Cognitive Processes, Clinical Decision Making, Critical Thinking, Students, Learning, Cognition, and Mental Process, without restrictions on language or publication date. The search strategy, including all strategies, was adapted for each database and/or information source. The Boolean terms AND, OR, and NOT[8] were used to compose the search keys (Chart 1).

Chart 1. Bibliographic search strategies per database

Databases	Search strategies
VIRTUAL HEALTH LIBRARY	("Fonoaudiologia" OR "Language and Hearing Sciences" OR "Phonoaudiologie" OR "Ciência da Fala e Audição" OR "Ciência da Fonação e Audição" OR "Ciências da Fala, Linguagem e Audição" OR "Estudo da Fala e Audição" OR "Estudo da Fala e da Audição" OR "Estudo da Fala, Linguagem e Audição" OR "Estudo da Fonação e Audição" OR "Estudos da Fala e Audição" OR "Estudos da Fala e da Audição" OR "Estudos da Fala, Linguagem e Audição" OR "Estudos da Fonação e Audição" OR "Estudos da Fonação e da Audição" OR "Patologia da Fala e Linguagem e Audiologia" OR "Patologia da Fala, Linguagem e Audição" OR Fonoterapia OR "Speech Therapy" OR Logopedia OR Orthophonie OR Fonoaudiólogo OR "Speech Therapist") AND ("Raciocínio Clínico" OR "Clinical Reasoning" OR "Razonamiento Clínico" OR "Raisonnement clinique" OR "Julgamento Clínico" OR "Diagnóstico Clínico" OR "Clinical Diagnosis" OR "Diagnostic Clinique" OR Cognição OR Cognition OR Cognición OR "Tomada de Decisão Clínica" OR "Clinical Decision-Making" OR "Toma de Decisiones Clínicas" OR "Prise de décision clinique" OR "Raciocínio Diagnóstico" OR "Processo Cognitivo" OR "Pensamento Crítico" OR "Processo Mental" OR "Diagnostic Reasoning" OR "Cognitive Process" OR "Critical Thinking" OR "Mental Process" OR "Clinical Judgement") AND (Ensino OR Teaching OR Enseñanza OR Enseignement OR Aprendizagem OR Learning OR Aprendizaje OR Apprentissage OR Estudantes OR Students OR Estudiantes OR Étudiants OR Alunos)
MEDLINE VIA PUBMED	("Language and Hearing Sciences" OR "Speech Therapy" OR "Speech Therapist") AND ("Clinical Reasoning" OR "Clinical Diagnosis" OR Cognition OR "Clinical Decision-Making" OR "Diagnostic Reasoning" OR "Cognitive Process" OR "Critical Thinking" OR "Mental Process" OR "Clinical Judgement") AND (Teaching OR Learning OR Students)
COCHRANE	("Language and Hearing Sciences" OR "Speech Therapy" OR "Speech Therapist") AND ("Clinical Reasoning" OR "Clinical Diagnosis" OR Cognition OR "Clinical Decision-Making" OR "Diagnostic Reasoning" OR "Cognitive Process" OR "Critical Thinking" OR "Mental Process" OR "Clinical Judgement") AND (Teaching OR Learning OR Students)
SCOPUS (Via Portal Capes)	("Language and Hearing Sciences" OR "Speech Therapy" OR "Speech Therapist") AND ("Clinical Reasoning" OR "Clinical Diagnosis" OR Cognition OR "Clinical Decision-Making" OR "Diagnostic Reasoning" OR "Cognitive Process" OR "Critical Thinking" OR "Mental Process" OR "Clinical Judgement") AND (Teaching OR Learning OR Students)
WEB OF SCIENCE (Via Portal Capes)	("Language and Hearing Sciences" OR "Speech Therapy" OR "Speech Therapist") AND ("Clinical Reasoning" OR "Clinical Diagnosis" OR Cognition OR "Clinical Decision-Making" OR "Diagnostic Reasoning" OR "Cognitive Process" OR "Critical Thinking" OR "Mental Process" OR "Clinical Judgement") AND (Teaching OR Learning OR Students)

Source: Developed by the authors

Inclusion and exclusion criteria

The review included studies that evaluated, discussed, tested, or described strategies used by SLH programs to teach clinical reasoning, without restrictions on date or language. Literature reviews and articles that only addressed theories and concepts of clinical reasoning were excluded.

Database formation

The articles identified in the databases were imported into the EndNote reference manager and grouped by origin , then, duplicates were excluded.

Data analysis

Three researchers independently read and analyzed the titles and abstracts of the articles retrieved in the search to identify potentially eligible studies, based on the defined criteria. When at least two researchers selected the article, it was included in the review.

The selected articles were arranged in an Excel spreadsheet, which also included the name of the database from which they were identified. They were then read in full by one of the researchers to see if they actually met the inclusion criteria for the study. In cases of doubt about their eligibility, the decision was made by consensus among the three researchers.

The extracted data included production characteristics (author, year, and country), type of empirical study and sample, teaching strategy, and main results. The data synthesis was organized and presented in tables.

LITERATURE REVIEW

The initial stage of the research collected 1,032 articles, 493 from PubMed, 174 from BVS, 61 from the Cochrane Library, 265 from Scopus, and 39 from Web of Science. Duplicates and studies unavailable for access were excluded, representing a total of 187 duplicates and one unavailable article. Then, an independent evaluation by three authors selected 17 articles. Six of these were excluded after being read in full, as they did not answer the research question or meet the eligibility criteria. Thus, 11 articles represented the final sample.

The databases contributed the following numbers of articles: one (9.09%) from PubMed, eight (72.72%) from BVS, and two (18.18%) from Web of Science. The search and selection stage of the articles is shown in the flowchart (Figure 1), respecting the recommendations of the JBI manual, according to the PRISMA checklist[7].

The 11 articles included in this scoping review were published between 2007 and 2024 – one publication each in 2007, 2012, 2013, 2014, 2018, 2019, 2023, and 2024, and three publications in 2023. Three of the articles considered eligible (27.27%) were developed in Brazil, two (18.18%) in Chile, and one (9.09%) each in the United Kingdom, Australia, Spain, Argentina, Iran, and South Africa.

The reviewed articles presented the following teaching strategies: virtual clinical cases, reflective learning journals, clinical supervision of the curricular internship, conceptual maps, active methodology such as Gallery Walk, simulation and gamification, mental scripts, theoretical facilitating factors (videos on instrumental assessment measures, peer collaboration to solve clinical cases, PowerPoint presentations, exposure to case studies, written explanations, and visual illustrations), and clinical facilitating factors (observation of experts conducting bedside assessments, observations of experts conducting instrumental assessments, peer observations, augmented clinical supervision, individual clinical feedback, and group tutorials). These results are shown in Chart 2. Of these strategies, the ones that appeared most frequently were virtual clinical cases, in three articles, and clinical supervision of the curricular internship, in two articles. The other strategies appeared only once.
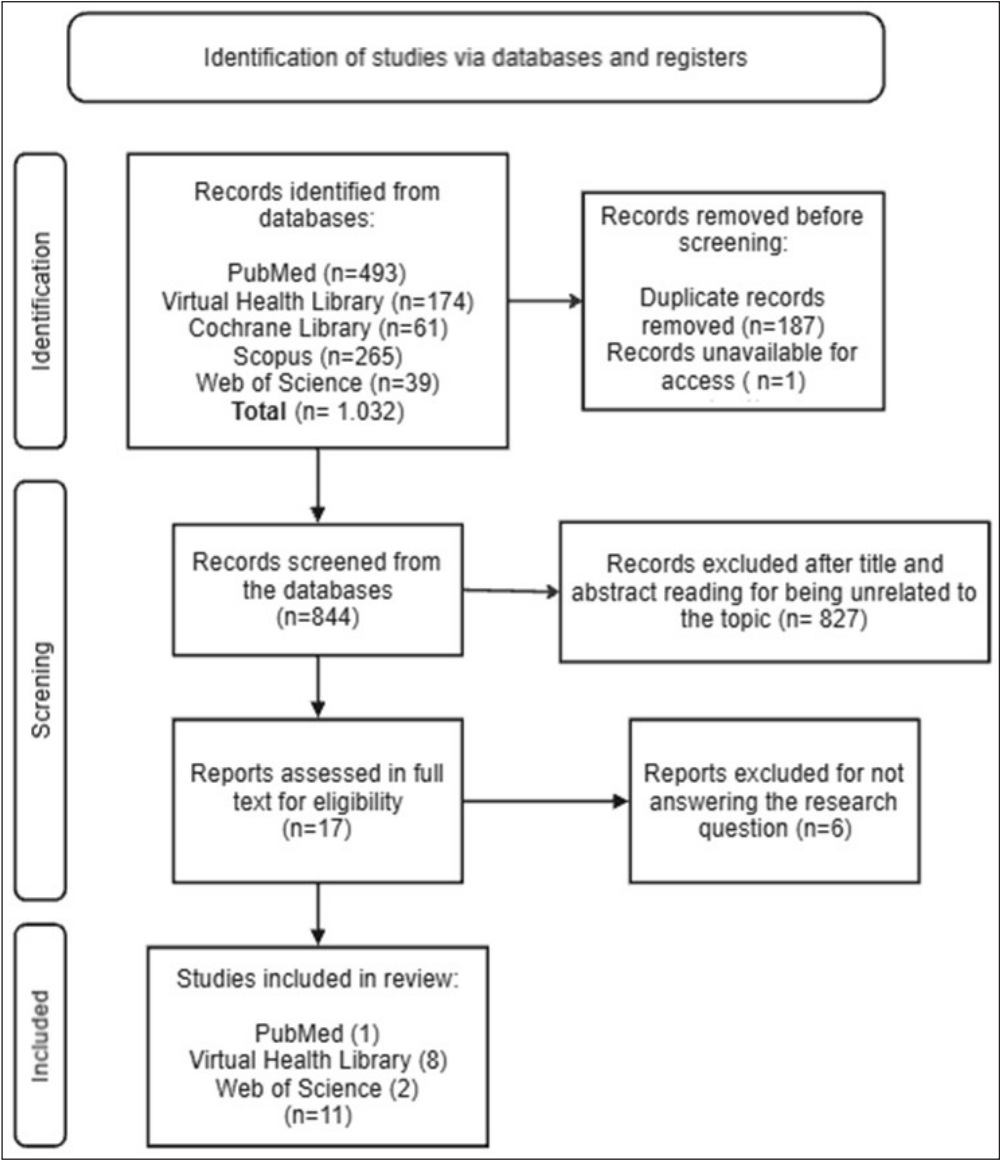
Source: Prisma 2020 flowchart, adapted for scoping review. Natal, RN, Brazil, 2021.

Figure 1. Flowchart of results

Chart 2. Main results of the articles included in the review

Author	Year/ Country	Type of study and sample	Teaching strategy	Main results
Hoben et al.[3]	2007/United Kingdom	Qualitative-quantitative research with comparative analysis (students vs. experienced clinicians). Sample with 36 participants (eight final-year master's students, 26 penultimate-year undergraduate students and two speech-language pathologists who were not part of the project team)	Database with virtual clinical cases of speech and language in SLH Therapy - Patient Assessment and Training System (PATSy)	It promotes clinical reasoning of SLH students by providing them with feedback on their performance. It can also be used as a training assessment tool for teachers.
Hill et al.[9]	2012/ Australia	Qualitative-quantitative research with content analysis of the reflections of 52 students, second-year SLH students	Reflective learning journals	Learning journals have proven effective in identifying the reflective capacity of SLH students, measuring the capacity for reflection from a more superficial to a deeper level, in addition to generating feedback on reflection during clinical experiences.
Queiroz et al.[10]	2013/ Brazil	Qualitative research with analysis of reflective journals and field notes of seven interns, last-term SLH students	Clinical supervision of curricular internship	Clinical supervision provides self-confidence in students, even if there are negative feelings such as fear and anxiety, contributing to critical reflection.
Campos et al.[11]	2014/ Brazil	Qualitative-quantitative research with 40 SLH students	Concept maps	It proved to be an effective teaching tool in assessing students' line of reasoning and knowledge.
Calleja-Reina et al.[12]	2018/ Spain	Experimental study with intra-subject design with 60 fourth-year SLH students	Computational tool for developing diagnostic skills through virtual clinical cases - Language Assessment Training System (LATS).	The LATS proved to be satisfactory for the development of clinical diagnostic reasoning in SLH students, being valid for different levels of delimitations and information from virtual clinical cases.
Mandrá et al.[13]	2019/ Brazil	Quantitative cross-sectional research using a structured questionnaire applied to 44 students who took professional practice courses in the 3rd and 4th years of the program.	Clinical supervision of SLH interns	It contributes to the acquisition and improvement of skills and competencies for SLH work. Students reported that they are encouraged to theorize the case and perform clinical reasoning, in addition to triggering initiative and autonomy for clinical study and solving clinical problems. It allows undergraduates to acquire technical-practical knowledge, which provides critical reflection leading to self-confidence.
Miranda et al.[14]	2022/ Argentina	Quantitative cross-sectional research using structured questionnaires applied to 89 fourth-year students of the Otoneurological Clinic and Labyrinthology discipline of the SLH program.	Simulation-based learning, such as eye movement simulators, and gamification, such as Kahoot!	Gamification was found to be effective in retaining knowledge and improving test-taking skills, providing feedback and motivation to students. Simulation correlated with positive perceptions of learning skills and abilities, but students believed they should be exposed to more simulation time.
Taheri et al.[15]	2023/ Iran	Quasi-experimental research with a sample of thirty 4th year audiology students distributed non-randomly to the traditional learning group and the Gallery Walk learning group.	Gallery Walk Learning (active method)	It showed that the Gallery Walk learning strategy is significant, and when associated with traditional learning strategies, it contributed to the diagnosis and critical thinking of students.
Del Campo Rivas et al.[16]	2023/ Chile	Development of a VLP instrument for clinical reasoning training in Speech Therapy undergraduates	Virtual learning platform with clinical cases (VLP)	The VLP used together with the scripts provided by teachers contributed to the training of clinical reasoning in SLH undergraduates, despite the limitations.

Author	Year/ Country	Type of study and sample	Teaching strategy	Main results
Del Campo Rivas et al.[17]	2023/ Chile	Development of a VLP instrument based on the theory of agreement of clinical scripts with 193 students of the 8th SLH semester	Resolution of scripts for the development of clinical reasoning associated with the professor's feedback.	Students' clinical reasoning performance increased with the use of scripts, with or without the professor's feedback, as studies indicate that the latter does not have a direct influence on clinical reasoning skills.
Catânia et al.[18]	2024/ South Africa	Qualitative research with a focus group with fifteen 4th-year SLH students	Multimodal approach with theoretical and clinical strategies	It was shown that the approach to theoretical and clinical factors increases the ability to develop clinical reasoning, as students feel more confident and prepared when exposed to this multimodal learning approach.

Captions: SLH: speech-language-hearing; VLP: virtual learning platform
Source: Developed by the authors

Teaching strategies aimed at developing clinical reasoning in SLH students are listed and described in Chart 3.

Chart 3. Teaching strategies aimed at developing clinical reasoning

Type of strategy	Description
Virtual clinical cases[3,12,16]	Teaching strategy based on the simulation of clinical scenarios in a digital environment to develop clinical reasoning through the analysis of information, formulation of diagnostic hypotheses, and therapeutic decision-making.
Clinical supervision of curricular internship[10,13]	Teaching strategy involving systematic monitoring of the student by a teacher/mentor to guide, evaluate, and promote the development of practical skills in real contexts of action.
Reflective learning journals[9]	Teaching strategy that encourages students to record and critically analyze their experiences during clinical care to promote self-reflection and meaningful learning.
Conceptual maps[11]	Teaching strategy that visually organizes concepts and their interrelationships, facilitating the integration of knowledge and the development of clinical reasoning by representing, in a structured way, the student's thought process.
Script Agreement Test[17]	Teaching and assessment strategy that presents clinical situations followed by diagnostic hypotheses or procedures, asking the student to judge the degree of agreement based on their experience and prior knowledge. This approach aims to stimulate clinical reasoning, bringing it closer to the thinking of experts.
Gallery Walk[15]	An active teaching strategy in which students move through different thematic stations organized in the classroom, where they discuss, analyze, and reflect on content proposed by their peers or the professor, promoting collaborative learning.
Gamification[14]	Teaching strategy that uses game elements in educational contexts to increase student engagement, promote active learning, and stimulate the development of skills.
Clinical simulation[14]	Teaching strategy that reproduces realistic clinical scenarios in a controlled environment, allowing students to develop technical and behavioral skills in a safe and guided manner.
Multimodal learning (theoretical and clinical)[18]	An educational approach that integrates different teaching modalities, such as theory and clinical practice, to construct knowledge in an articulated manner and apply theoretical knowledge in real contexts.

Source: Developed by the authors

The virtual clinical case strategy[3,12,16] proved to be an effective tool for promoting critical thinking and clinical reasoning. Another method highlighted was clinical supervision of the curricular internship[10,13], identified as fundamental for the safety and confidence of students during clinical practice. Other teaching strategies include reflective learning journals[9], which encourage continuous reflection on clinical practice, concept maps[11], script resolution[17], the active Gallery Walk methodology[15], and simulators and gamification[14]. The combination of multimodal learning[18], integrating theoretical and clinical aspects, also proved to be a promising strategy for strengthening clinical reasoning skills.

The articles that addressed virtual clinical cases[3,12,16] as a learning strategy reached the same conclusion in favor of its use, indicating that they facilitate the development of clinical reasoning skills and can be used as a training assessment.

The Assessment Training System (LATS)[12] was created to test and monitor the development of clinical reasoning in sixty 4th-year SLH students at a Spanish university. As users progress through the system, the complexity of the virtual clinical cases also increases, in line with their educational level. The results showed that students improved their performance in the cases, indicating that the use of LATS improves the clinical reasoning of beginner SLH students[12].

The Patient Assessment and Training System (PATSy)[3] includes a database of virtual SLH clinical cases, with videos, medical histories, and assessment results, allowing students to manage cases and record hypotheses and conclusions. The system was tested with 34 students from two UK universities (eight master's and 26 undergraduate students), organized in pairs. Two SLH pathologists specializing in aphasia also participated as a comparison group. The authors observed that there may be common clinical reasoning patterns between undergraduates and specialists, although students have difficulty formulating deeper and more abstract hypotheses, planning diagnoses, organizing information, evaluating progress, and interpreting results. Furthermore, the results suggest that PATSy can assist in the development of clinical reasoning, based on theory and hypotheses formulated during the assessment process[3]. As a limitation of this study, it is worth highlighting that it focused mainly on the students' difficulties in clinical reasoning, without exploring in depth the specific interventions that

could be implemented to improve these skills in clinical practice.

The FonoScript virtual learning platform (VLP)[16] was created to improve the clinical reasoning of SLH students through the presentation of clinical cases and was tested on students at a university in Chile. The VLP uses a methodology based on scripts, which can be edited, created, or deleted, allowing management by both teachers and students. This platform has proven to be an effective tool, promoting student autonomy and enriching their learning experiences[16]. As a limitation, this research did not analyze the longitudinal impact of clinical practice with FonoScript[16].

Clinical supervision of the curricular internship is one of the most effective teaching-learning strategies for students to develop clinical skills. Thus, two studies addressed the perception of SLH interns regarding clinical supervision. The first study included 44 students from the Ribeirão Preto School of Medicine (HCFMRP-USP), Brazil, of whom 26 were enrolled in the 6th term, and 18 in the 8th term. A questionnaire was used to assess the participants' perception, consisting of three blocks: perception of supervision of professional practice, perception of the supervisor's role, and perception of the intern's role[10].

The second study was conducted among students in their final SLH semester at the University of Fortaleza (UNIFOR), Brazil[13], based on reports about the interns' insertion and bedside experience. The interns associated the curricular internship with a strong emotional impact, manifested by anxiety, frustration, insecurity, incapacity, anguish, sadness, and fear, but also by experiences of professional empowerment, empathy, and remembrance. These findings reinforce the importance of qualified teaching supervision, capable of embracing and understanding the experiences of the interns[13]. One limitation of the studies is that they were based exclusively on the students' perception of clinical supervision, without including objective performance analyses or supervisors' evaluations, which may restrict the full understanding of the real effects of this teaching model.

Reflective learning journals aim for students to record clinical reasoning during clinical practice, exposing their actions and understanding[19]. It is considered an important basis for the development of reflective practice in SLH undergraduates[9].

To support this claim, a study was conducted with 52 second-year SLH students who were beginning clinical practice[9], using the Plack Coding System[2].

This instrument is used to categorize and analyze the behaviors of clinical supervisors during the guidance of students in professional practice[2]. In the study in question[9], the authors evaluated the scope and depth of the students' reflective skills through a two-level coding: the first represents the breadth of reflection, composed of nine elements, and the second classifies the depth of reflection into three categories – no reflection, reflection, and critical reflection. This analysis identified that most students presented a "reflective" profile when developing the content related to clinical findings, based on the records made in their learning journals[9]. The main limitations observed were the way the reflection activity was structured, which compromises the students' ability to explore their actions and feelings more deeply during the reflective process. Asking participants to write down reflections immediately after interviews may hinder the real analysis of events and the planning of actions in new clinical scenarios. Despite these limitations, this teaching strategy contributes to the development of reflective skills, as it provides continuous feedback throughout clinical practices[9].

Concept maps relate concepts or words to characterize content in the form of diagrams[21]. This strategy contributes to the understanding of theory and the appropriation of concepts and can be used before and after evaluations in the teaching-learning process[11]. A study with 40 SLH students at the Federal University of Minas Gerais (UFMG), Brazil, who were taking voice courses in the 4th and 5th terms, observed that concept maps are satisfactory teaching-learning tools to be used as a way of evaluating the clinical reasoning and knowledge acquired by students. This study had limitations because it was used in only one area of SLH knowledge, the area of voice, and because it was inserted at the end of the courses, not observing the students' progress throughout the semester[11].

The teaching method based on resolving mental scripts organizes blocks of signs and symptoms that may or may not be present in a clinical case[17]. These blocks provide different diagnostic hypotheses that guide the student in the search for relevant information, promoting the development of clinical reasoning. A study with 4th-year SLH students in Chile used the Script Concordance Test (SCT) to evaluate this strategy[17]. The results showed that, throughout the semester, students who used the scripts performed significantly better in clinical reasoning skills training than those who did not use the method[17]. This approach stands out for stimulating critical thinking and decision-making

based on clinical scenarios, bringing learning closer to professional reality. The authors indicate that the main limitation of research on SCT use to train clinical reasoning in SLH students is the potential weakness of the test itself. The SCT may be weakened by the fact that simply avoiding extreme responses can significantly increase students' scores, which may not accurately reflect their clinical reasoning skills[17].

Teaching strategies that incorporate active methodologies play an essential role in the educational process, as they encourage students to take a central role in their learning[15]. These approaches stimulate autonomy, promoting control and responsibility over the development of their skills and knowledge[15]. Gallery Walk is an active method in which students move through different stations organized by groups of peers, who research, build knowledge, discuss, and reflect on a specific topic[15]. The topic is previously defined by the teacher, who also monitors the students' progress between stations, intervening when necessary to prevent deviations from the focus[22]. This strategy was tested on thirty 4th-year students of the audiology postgraduate program. They were divided into two groups (lectures and Gallery Walk). A questionnaire was administered to measure the knowledge acquired through traditional learning and Gallery Walk[15]. It demonstrated that students developed more significant clinical skills after applying this active method than with the traditional one, demonstrating its potential to favor the teaching-learning process of students' clinical reasoning. The authors indicate that this active method has the advantage of being used together with traditional strategies, assisting in class discussions, cooperative learning, and team building[15]. Despite the promising results, further research with larger samples and more rigorous experimental designs is needed to confirm the benefits of the Gallery Walk strategy in teaching audiology.

Simulation and gamification are teaching strategies that have been gaining increasing space in the learning process[14]. Simulation can be carried out using actors, virtual reality devices, or mannequins, which present problems and information for students to solve in scenarios that simulate real situations[14]. Gamification, in turn, uses game elements to motivate and engage students and is based on the theory of self-determination[14].

A study with 89 SLH students at the National University of Córdoba[14] used a nystagmus and eye movement simulator as a simulation tool, while Kahoot!

was used for gamification. The results showed that the simulation provided students with favorable learning experiences of clinical reasoning skills and abilities, contributing to their development in the discipline. Also, an improvement in knowledge was observed with the gamification, in addition to providing problem-solving feedback[14].

A study with 4th-year SLH undergraduates from three South African universities[18] using multimodal learning (theoretical and clinical) observed that theoretical factors, such as videos on instrumental assessment measures, peer collaboration to solve clinical cases, PowerPoint presentations, clinical case studies, written explanations and illustrations, together with clinical factors, such as observation of experts in bedside assessments, instrumental assessments, peer observations, clinical supervision, individual clinical feedback, and group tutorials, facilitate the development of clinical reasoning[18].

Currently, lecturing is the predominant method in university education, representing up to 70% of the total teaching hours[23]. Although effective for the rapid transmission of knowledge, this approach places the teacher at the center of the process, while students assume a passive role, which can lead to loss of attention over time[23]. In recent years, new methodologies have been introduced to prepare health professionals, such as the use of simulations[23-25]. These create clinical environments for the development of practical skills, favoring safe and reflective learning. Studies[23-25] show that this method can replace hours of clinical internship and provide varied and complex experiences not always possible in real scenarios. Despite widely recognized benefits, such as increased confidence and practical skills, its implementation faces challenges related to resources, specialized training, and costs[24,25]. Nonetheless, simulated learning environments have proven to be a promising solution for integrating theory and practice in areas such as SLH therapy.

The various studies reviewed indicate that a wide range of teaching strategies, including simulation[14], gamification[14], and multimodal learning[14], contribute significantly to the development of clinical reasoning in SLH students. Tools such as virtual clinical case platforms[3,12,16], reflective journals[9], and concept maps[11] have proven effective in promoting critical thinking and clinical practice. In addition, clinical supervision of the curricular internship[10,13] and the use of active methodologies, such as the Gallery Walk[15], play a fundamental role in reducing students' anxiety and improving their

clinical skills, favoring deeper and more autonomous learning. This evidence reinforces the importance of integrating diverse and dynamic approaches into SLH curricula to optimize the development of clinical reasoning.

Despite the advances indicated by this review, there is a clear need for more research on teaching strategies in SLH programs to develop clinical reasoning in Brazil and worldwide. In the Brazilian context, specifically, only three studies were found, which highlights a significant lack of research in the national literature, with an emphasis on clinical supervisions[10,13] and the development of conceptual maps[11].

Two literature reviews on teaching strategies for developing clinical reasoning in nursing[26] and medical[27] students highlight simulation teaching strategies and active methods such as case studies, collaborative learning, and clinical case discussions[26,27]. Active methods also include Problem-Based Learning, Team-Based Learning, and Case-Based Learning[27], which overlap or complement the other approaches. The authors[26,27] highlight that most of the reviewed studies evaluated the effectiveness of teaching methods through tests and observations, while some use surveys to measure student satisfaction and engagement. Both literature reviews[26,27] emphasize the need to develop innovative and effective teaching strategies, as well as instruments that can accurately assess these strategies to improve the quality of health care throughout professional training.

It is worth noting that the articles included in this scoping review did not monitor the evolution of clinical reasoning throughout the students' educational trajectory. To advance this area of research, further investigations must focus on adapting teaching strategies to local realities, including the development and validation of instruments that develop and evaluate the evolution of clinical reasoning during undergraduate studies.

It is also essential to conduct longitudinal studies that help understand the development of this reasoning at different stages of the training of future SLH pathologists. These actions not only contribute to more solid and effective training but also ensure more well-founded clinical practice and more efficient health promotion and treatment in SLH clinics.

As a limitation, one of the articles was unavailable, even after searching the CAPES Periodicals collection and attempting to contact the authors by email and through the ResearchGate platform. This access

restriction made it impossible to include it and reduced the number of studies in the final sample.

Another limitation is that most studies on teaching SLH clinical reasoning strategies were based on international experiences, making it difficult to measure their applicability to Brazilian students. In addition, the fact that different clinical contexts were studied, such as hospitals, audiology, language, voice, and dysphagia, may make it difficult to generalize the findings on teaching strategies for all SLH areas.

Mapping teaching strategies for the development of clinical reasoning in SLH teaching has important practical implications, such as improving student learning, developing clinical skills, training more reflective and critical professionals, promoting more effective assimilation of theory and practice, incorporating technologies into the teaching process, and improving the quality of SLH care.

CONCLUSION

The most used teaching strategies for developing clinical reasoning in SLH students were virtual clinical cases, followed by clinical supervision of the curricular internship. Other important approaches included reflective learning journals, concept maps, script resolution, Gallery Walk, clinical simulation, and gamification. Multimodal learning also stood out for effectively integrating theory and practice. All these strategies proved to be adequate for strengthening clinical reasoning, more fully preparing SLH students for professional practice.

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Data Sharing Statement:

This research is a scoping review based on data from publicly accessible scientific literature and does not involve individual participant data or unpublished data to be shared.