LITERATURE REVIEW

Education in health about spotted fever: an integrative literature review

Educação em saúde sobre febre maculosa: uma revisão integrativa da literatura

Educación para la salud en fiebre maculosa: una revisión integradora de la literature

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ABSTRACT

Objective: to identify the knowledge produced about the actions/interventions of education in health related to Spotted Fever. **Method:** integrative literature review, carried out in the following databases: US National Library of Medicine/Medical Literature Analysis and Retrieval System Online, Web of Science, Science Direct, Cumulative Index to Nursing and Allied Health Literature, Scientific Electronic Library Online, Latin American and Caribbean Literature on Health Sciences and the Nursing Database. The inclusion criteria was original scientific articles and/or theoretical scientific articles, in English, Spanish and Portuguese and without time restriction. The search was conducted in January 2022. **Results:** five studies from Brazil, United States of America and Mexico were included. Changes in epidemiological indicators were observed in the two intervention studies. **Conclusion:** this study showed that health education for Spotted Fever is still a little explored field, highlighting the importance of educational actions for the prevention of the disease.
Descriptors: Rocky mountain spotted fever; Health promotion; Education in health; communicable disease control; Tick-borne diseases

RESUMO

Objetivo: *identificar as evidências científicas sobre educação em saúde em Febre Maculosa.* ***Método:*** *revisão integrativa da literatura realizada nas bases de dados: US National Library of Medicine/Medical Literature Analysis and Retrieval System Online, Web of Science, Science Direct, Cumulative Index to Nursing and Allied Health Literature, Scientific Electronic Library Online, Literatura Latino-Americana e do Caribe em Ciências da Saúde e na Base de Dados em Enfermagem. Os critérios de inclusão foram artigos científicos originais*

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e/ou artigos científicos teóricos, em inglês, espanhol e português e sem restrição de tempo. A análise dos resultados, ocorreu em janeiro de 2022. ***Resultados****: foram incluídos cinco estudos provenientes do Brasil, Estados Unidos e México. Mudanças nos indicadores epidemiológicos foram observados nos dois estudos de intervenção.* ***Conclusão****: a educação em saúde para Febre Maculosa ainda é um campo pouco explorado, evidenciando a importância das ações educativas para a prevenção da doença.*
Descritores*: Febre maculosa das montanhas rochosas; Promoção da saúde; Educação em saúde; Controle de doenças transmissíveis; Doenças transmitidas por carrapatos*

RESUMEN

Objetivo*: identificar la evidencia científica sobre educación para la salud en Fiebre Manchada.* ***Método****: revisión integrativa de la literatura, realizada en: Biblioteca Nacional de Medicina de EE. UU./Sistema de análisis y recuperación de literatura médica en línea, Web of Science, Science Direct, Cumulative Index to Nursing and Allied Health Literature, Biblioteca Científica Electrónica en Línea, Literatura Latinoamericana y del Caribe en Ciencias de la Salud y Base de Datos de Enfermería. Los criterios de inclusión fueron artículos científicos originales Y teóricos, en inglés, español y portugués. La búsqueda se realizó en enero de 2022.* ***Resultados****: incluyeron cinco estudios, de Brasil, United States of America y México. Se observaron cambios en los indicadores epidemiológicos en dos estudios de intervención.* ***Conclusión****: la educación para la salud para la Fiebre Manchada es todavía un campo poco explorado, destacando la importancia de las acciones educativas para la prevención de la enfermedad.*
Descriptores*: Fiebre manchada; Promoción de la salud; Educación para la salud; Control de enfermedades transmisibles; Enfermedades transmitidas por las garrapatas*

INTRODUCTION

Spotted Fever, also known as Rocky Mountain Spotted Fever, is a febrile disease characterized by the emergence of purple exanthema all over the skin. It is an emerging and highly lethal zoonosis, which was first reported at the end of the 19th century in Boise, the United States of America, by Edward E. Maxey.[1] In Brazil, it was reported in 1929 in the state of São Paulo; and in other countries, such as Canada, Mexico, Costa Rica, Panama, Colombia, and Argentina, it was identified in 1930.[2-3]

The etiological agent of this disease is *Rickettsia rickettsii* and its main reservoir and vector are ticks of the *Amblioma spp* species, which can infect people even in its larval and nymphal periods.[4] As they are parasites of wild and domestic animals, they can accidentally be hosted in human beings, infecting them with the bacterium; therefore, residents of rural areas are more prone to contract Spotted Fever due to the contact with these animals.[4] Among the parasitized animals, capybaras have an important role in the epidemiological chain since, in addition to being hosts, they are reservoirs of the bacterium.[5]

Some Western countries have suffered from this disease, such as the United States of America, Mexico, Argentina, Colombia, Canada, Costa Rica, and Panama.[6] The United States of America recorded 13.2 cases per million people in 2016, almost eight times more than in the 2000s.[7] Mexico, on its turn, recorded 1,394 cases and 247 deaths from 2003 to 2016 in the state of Sonora.[8] Argentina presents a high mortality rate, reaching 40%; surpassing Brazil (35%) and Mexico (30%).[9]

In Brazil, the Southeast region has the highest incidence of Spotted Fever in the country, totaling 1,072 cases confirmed from 2009 to 2019; among these, 719 were from the state of São Paulo; the region totaled 515 deaths. At the national level, 1,506 cases were accounted for in this same period, with 523 evolving to death, for a fatality rate of approximately 35%. Alarmingly, the state of São Paulo confirmed 104 cases only in 2018, of which 58 evolved to death, surpassing the estimated lethality rate of the country.[10]

These data represent the increase in incidence and in the lethality rate. They

are a major concern for the countries mentioned, especially for Brazil, due to its social inequalities and large territorial dimensions, in which there is difficulty in the effective inter-sectoral coverage of the health services.[11]

Early diagnosis and treatment can reduce these indicators; however, it is necessary to invest in training for health professionals and for the population concerning education in health. Early diagnosis is still not so effective due to the similarity of the Spotted Fever condition to symptoms of other diseases that are sometimes more prevalent, such as dengue, malaria, leptospirosis, and viral hepatitis, among others. To confirm the diagnosis, the health care professional needs to suspect the disease, request examinations specific to its detection, and prescribe antibiotic therapy immediately; however, it needs to be started before diagnosis confirmation, when there is a suspicion.[5,12-13]

It is evident that health care professionals need to know the disease since they have an important role in early identification and in the engagement of activities to promote health, providing education about Spotted Fever to the population. In an effort to improve epidemiological surveillance and prevention of the disease, the Brazilian Ministry of Health performed actions to train professionals of the Unified Health System.[14] It prepared educational materials in video format on its website and established a mandatory notification of the Spotted Fever cases with epidemiological research within 48 hours.[4,15] However, such measures are insufficient, considering that the numbers of cases and deaths have increased in the last 10 years.

The little efficacy of these actions can be explained due to the complexity involved in its prevention and, particularly, in the educational process, in which only the transmission of health information limits the transformation process of reality.[16] Education in health as a political-pedagogical process requires the development of critical, reflexive, and constructive thinking, which goes beyond changing behaviors, but enables people to be capable of changing their environment based on their empowerment and social participation.[17] Education in health from the perspective of the National Health Promotion Policy[18] understands subjects as the result of their history and time, and is guided to motivate and train them to engage in actions that improve their health and that of the Community.[17]

The educational process in health must be based on interactive actions that favor reflections in the individuals and awaken changes in their conducts and attitudes consciously.[19] For this movement to occur, the health professional, mainly the nurse, is a key figure and can use several strategies, providing information in different ways, by means of oral instructions, written materials (for consulting later), and Educational Technologies.[20]

Considering that education in health is a privileged practice for attitude changes and that it can consequently improve the public health scenario regarding Spotted Fever, the objective of this study was to identify the knowledge produced about the actions/interventions of education in health related to Spotted Fever, following the guiding question: What is the evidence available in the literature addressing education in health actions related to Spotted Fever?

METHODS

An integrative literature review was conducted, developed in six different, although inter-related, stages: 1) identification of the theme and selection of the research hypothesis or question; 2) establishment of inclusion and exclusion criteria of studies; 3) definition of the information to be extracted from the selected studies/categorization of the studies; 4) evaluation of the studies included in the review; 5) interpretation of the results; and 6) presentation of the review or synthesis of the knowledge.[21-22]

To elaborate the guiding question, the PICO strategy was used: P (Patient or Problem), I (Intervention), C (Control or Comparison), and O (Outcomes), the four fundamental components for searching studies.[23] Based on that, the PICO for this research was created as follows: (P:

education in health interventions on Spotted Fever; I: studies of preventive actions; C: does not apply; O: strategies used).

The electronic databases selected for the searches were the US National Library of Medicine/Medical Literature Analysis and Retrieval System Online (PubMed/MEDLINE), Web of Science, Science Direct, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature in Health Sciences (*Literatura Latino-Americana e do Caribe em Ciências da Saúde* - LILACS) and the Nursing Database (*Base de Dados em Enfermagem* - BDENF), this last two being indexed in the Virtual Health Library (*Biblioteca Virtual em Saúde* - BVS).

To perform the search, descriptors indexed in the Health Sciences Descriptors (Descritores em Ciências da Saúde, DeCS) were used, in Portuguese and Spanish; as well as descriptors indexed in the Medical Subject Headings (MeSH) for the English language. It is worth noting that, in the PubMed/MEDLINE, Science Direct, Web of Science and CINAHL databases, we only obtained results with descriptors in English. For the SciELO, LILACS and BDENF databases, the searches were performed with the descriptors in the three languages: Portuguese, Spanish and English. Below, in Chart 1, is the crossing of the descriptors for each database of this review.

The inclusion criteria consisted in original scientific articles and/or theoretical scientific articles (guidelines), in English, Spanish and Portuguese and without time restriction, which answered the guiding question, with any human audience, and in any context. For the delimitation of the temporal cut, it was chosen not to delimit time to actually portray the productions about the problem on screen. Literature review articles, and those that did not characterize scientific articles were excluded, such as: editorials, theses and dissertations, comments and abstracts in conference proceedings.

The search was conducted in January 2022 this stage counted on a librarian's help. To systematize the information and manage the research time, the Rayyan application was used, which is a web tool, 100% free that helps researchers in the elaboration of review articles.[24]

Data collection was conducted by a researcher and monitored by another two researchers to guarantee the study methodological rigor, and if all the search criteria were being followed. During article selection, titles and abstracts were exhaustively read to certify that they met the guiding question and the pre-established inclusion and exclusion criteria. In order to verify the level of agreement between the two authors that read the references found in the databases, the Kappa test was conducted, with a value of K=0.67, indicating substantial agreement.[25]

The search in the databases resulted in 378 publications with eligibility potential (PubMed/MEDLINE=195 CINAHL=48; Web of Science=57; LILACS=19; Science Direct=53; SciELO=6; BDENF=0). After reading the titles and abstracts, 80 duplicates were confirmed, which were also excluded. In addition, the application identified 15 articles as exact copies, also excluding them from the analysis, adding up 95 duplicates.

Of the remaining total (n=283), 258 articles were excluded after applying the selection criteria, thus having 25 eligible studies for full reading. However, due to the reduced sample and the scarcity of productions corresponding to the guiding question pointed out by the literature (including articles signaling the need for educational interventions for Spotted Fever, the authors considered necessary conducting a manual search in virtual libraries and another other eight productions were included, totaling 33 articles. Renowned researchers in the Spotted Fever field were consulted to guarantee no missing reference and to further increase rigor.

Chart 1: Crossing descriptors by database

Databases/Electronic Library	Crossing the descriptors
PubMed/MEDLINE	#1 ((Rocky Mountain Spotted Fever) AND (Health promotion)) NOT (Lyme Desease) (("rocky mountain spotted fever"[MeSH Terms] OR ("rocky"[All Fields] AND "mountain"[All Fields] AND "spotted"[All Fields] AND "fever"[All Fields]) OR "rocky mountain spotted fever"[All Fields]) AND ("health promotion"[MeSH Terms] OR ("health"[All Fields] AND "promotion"[All Fields]) OR "health promotion"[All Fields])) NOT ("Lyme"[All Fields] AND ("desease"[All Fields] OR "deseases"[All Fields])) #2 ((Rocky Mountain Spotted Fever) AND (Prevention)) NOT (Lyme Desease) (("rocky mountain spotted fever"[MeSH Terms] OR ("rocky"[All Fields] AND "mountain"[All Fields] AND "spotted"[All Fields] AND "fever"[All Fields]) OR "rocky mountain spotted fever"[All Fields]) AND ("prevent"[All Fields] OR "preventability"[All Fields] OR "preventable"[All Fields] OR "preventative"[All Fields] OR "preventatively"[All Fields] OR "preventatives"[All Fields] OR "prevented"[All Fields] OR "preventing"[All Fields] OR "prevention and control"[MeSH Subheading] OR ("prevention"[All Fields] AND "control"[All Fields]) OR "prevention and control"[All Fields] OR "prevention"[All Fields] OR "preventions"[All Fields] OR "preventions"[All Fields] OR "preventive"[All Fields] OR "preventively"[All Fields] OR "preventives"[All Fields] OR "prevents"[All Fields])) NOT ("Lyme"[All Fields] AND ("desease"[All Fields] OR "deseases"[All Fields]) #3 ((Rocky Mountain Spotted Fever) AND (Health education)) NOT (Lyme Desease) (("rocky mountain spotted fever"[MeSH Terms] OR ("rocky"[All Fields] AND "mountain"[All Fields] AND "spotted"[All Fields] AND "fever"[All Fields]) OR "rocky mountain spotted fever"[All Fields]) AND ("health education"[MeSH Terms] OR ("health"[All Fields] AND "education"[All Fields]) OR "health education"[All Fields])) NOT ("Lyme"[All Fields] AND ("desease"[All Fields] OR "deseases"[All Fields]))
Web of Science	#1 “Rocky Montain Spotted Fever” AND “ Health promotion” NOT “Lyme Desease” #2 “ Rocky Montain Spotted Fever “ AND “Prevention” NOT “Lyme Desease” #3 “ Rocky Montain Spotted Fever” AND “ Health Education” NOT “Lyme Desease”
CINAHL	#1 Rocky Montain Spotted Fever AND Health promotion NOT Lyme Desease #2 Rocky Montain Spotted Fever AND Prevention NOT Lyme Desease #3 Rocky Montain Spotted Fever AND Health Education NOT Lyme Desease
SciELO	(Rocky Mountain Spotted Fever) OR (Fiebre Maculosa de las montañas rochosas) OR (Febre maculosa das montanhas rochosas) AND (Health promotion) OR (Promoción de la salud) OR (Promoção da saúde) OR (Prevention) OR (Prevención) OR (Prevenção) OR (Health education) OR (Educación en salud) OR (Educação em saúde) AND NOT (Lyme Desease) OR (Enfermedad de Lyme) OR (Doença de Lyme)
LILACS	(("ROCKY MOUNTAIN SPOTTED FEVER") or "FIEBRE MACULOSA DE LAS MONTANAS ROCOSAS") or "FEBRE MACULOSA DAS MONTANHAS ROCHOSAS" [Palavras] and ((((((("HEALTH PROMOTION") or "PROMOCION DE LA SALUD") or "PROMOCAO DA SAUDE") or "PREVENTION") or "PREVENCION") or "PREVENCAO") or "HEALTH EDUCATION") or "EDUCACION EN SALUD") or "EDUCACAO EM SAUDE" [Palavras] and not (("LYME DISEASE") or "ENFERMEDAD DE LYME") or "DOENCA DE LYME" [words]
BDENF	(("ROCKY MOUNTAIN SPOTTED FEVER") or "FIEBRE MACULOSA DE LAS MONTANAS ROCOSAS") or "FEBRE MACULOSA DAS MONTANHAS ROCHOSAS" [Palavras] and ((((((("HEALTH PROMOTION") or "PROMOCION DE LA SALUD") or "PROMOCAO DA SAUDE") or "PREVENTION") or "PREVENCION") or "PREVENCAO") or "HEALTH EDUCATION") or "EDUCACION EN SALUD") or "EDUCACAO EM SAUDE" [Palavras] and not (("LYME DISEASE") or "ENFERMEDAD DE LYME") or "DOENCA DE LYME" [words]

Source: prepared by the authors, 2022.

The process of full reading and discussion among the authors resulted in the exclusion of 24 studies resulting from the search in the databases, namely: review articles: six studies; barrier methods (clothing and repellents): six studies; texts with an epidemiological focus: three studies; knowledge assessment: three studies; reports: two studies; pointed out health education as a

necessary measure, but it does not make this theme its main objective: two studies; magazine magazine: one study; publication in note format only: one study. Four studies were excluded from the manual search, including: duplicates: two studies; texts with an epidemiological focus: one; pointed out health education as a necessary measure, but it does not make this theme its main objective: one study.

The PRISMA 2020[26] flowchart (Figure 1) presents a summary of the steps taken to capture the studies, which in the end included five (n=5) that met the established inclusion criteria.

The final sample five articles was analyzed according to the precepts of descriptive content analysis, which consists of three phases: preparation, organization, and data presentation.[27-28] For data presentation, it was decided to systematize them in a descriptive chart, proceeding with the categorization of the data extracted from the studies selected based on the identification of the variables of interest.[28] The evaluation and analysis of the results occurred in January 2022.

The results were also interpreted by mean of the following variables: methodology, investigated subject, research setting, descriptors and theme. This was followed by interpretation and comparison between productions and elements that composed each one, finding relevant information and evidence dealing with how the literature has reported educational interventions on Spotted Fever. The instrumentalized variables were as follows: title, author, objective(s), methodology, strategy of education in health, and results. To that end, a data collection instrument was used, commonly employed in literature reviews, adapted from the recording model.[29-30]

This study was developed in in accordance with ethical standards in research, ensuring the copyright maintenance and citation of works used.

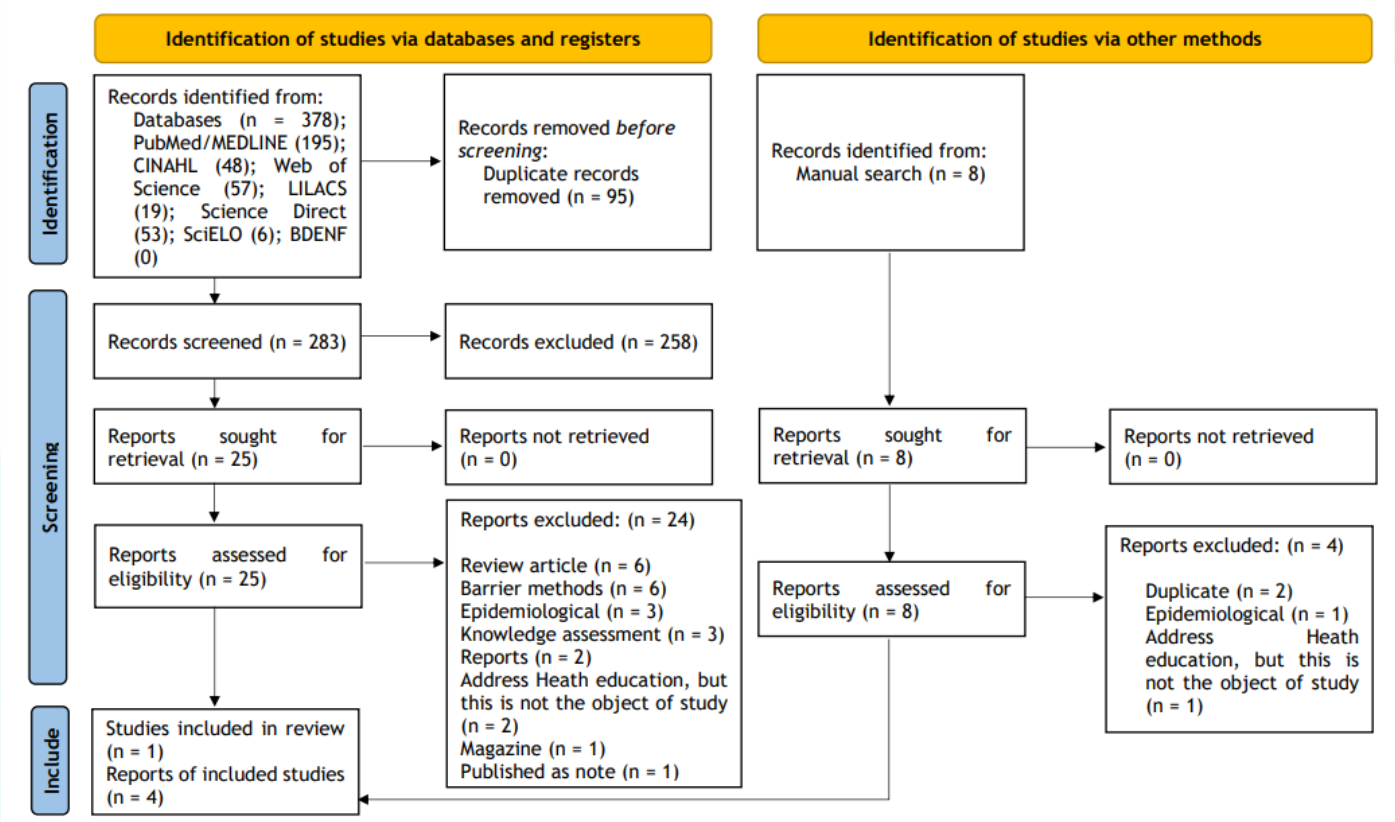

Figure 1: PRISMA 2020[26] flowchart adapted for integrative review for selection of studies in databases and manual search. Ribeirão Preto-SP, Brazil, 2022

RESULTS

To characterize the studies selected, it was decided to systematize the data and, based on that, to observe the variables regarding title/author, year, journal/study locus or country, objective(s), methodology, strategy of education in health, and main results, which was synthesized in Chart 2.

Of the five articles included, two (40%) were only available in Portuguese, two (40%) only in English and one (20%) in Portuguese, English and Spanish. Of these, two (40%) were published in 2020, one (20%) was published in 2019, one (20%) was published in 2016 and one (20%) in 2014. There is a higher prevalence of publications in the last five.

As for the titles of the articles, of those included for the analysis of the results, none of them presented similar titles. 45 authors were identified, and three authors wrote more than one article that was included.

After analyzing the authors' professional category, some gaps were observed as it was impossible to identify the training area of some. The search was carried out on different platforms such as Lattes Curriculum, Researchgate, and journals. It is highly relevant to explain these data, as they will be the foundation for understanding some processes that hinder or suppress education in health actions for Spotted Fever.

As for the institutional/professional connection of the 41 participants, 10 are from Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Atlanta, Georgia, United States of America; seven from the Arizona Department of Health and Human Services in the United States of America; four only from the Arizona Department of Health Services, United States of America; four are linked to the Department of Medicine and Health Sciences of the University of Sonora in Mexico; three are from the Indian Health Service, allocated to the Office of Environmental Health and Engineering of Arizona, United States; three from the Oswaldo Cruz Foundation, with emphasis on neglected zoonoses; three from the Federal Institute of Rio de Janeiro; four from the University of São Paulo at Ribeirão Preto College of Nursing; one from the Federal University of Alagoas; one from the University of Rio de Janeiro; one from the Federal University of Pernambuco; two are from the Ministry of Public Health Sonora-Mexico, General Directorate for Health Promotion and Disease Prevention; one Pestalozzi Association of Niterói; one is affiliated with both the Atlanta-Georgia and Phoenix-Arizona Centers for Disease Control and Prevention, United States of America.

However, it was only possible to identify the training area 11 authors: six are nurses, three veterinarians, one systems analyst, one programmer with experience in digital games. Based on these data, three articles had the contribution of nurses in their construction, the articles entitled: Development and validation of interactive educational technology on Spotted Fever, Evaluation of knowledge about Spotted Fever by users of the University of Sao Paulo Campus in Ribeirão Preto by through an educational intervention and the Community-Based Control of the Brown Dog Tick in a Region with High Rates of Rocky Mountain Spotted Fever (2012–2013).

Regarding the journals, they were diversified and did not repeat, two (40%) being national and two (40%) international and one (20%) national and international. Of the national journals, one article was published in Revista de Saúde Digital e Tecnologias Educacionais - RESDITE, which addresses the use of Digital Information and Communication Technologies and their several tools and applications in the health area, emphasizing the intersection between online Distance Learning (DL) and digital health based on a multi-, inter-, and trans-disciplinary perspective; the other article was published in the UNINGÁ Journal, which is mainly devoted to publishing articles in the health area. Concerning the international journals, one article was published in PLOS ONE, which gives visibility to multidisciplinary and interdisciplinary studies, considering science, engineering, medicine, social sciences, and humanities areas; the other

was published in Transactions of the Royal Society of Tropical Medicine and Hygiene, the official journal of the Royal Society of Tropical Medicine and Hygiene, which aims at publishing original and impactful articles on tropical medicine themes and only one article was published in a specialized journal in the field of Nursing, which is the Latin American Journal of Nursing (RLAE), which focuses on disseminating results of scientific research in nursing and other areas of health.

It is worth mentioning that, for results presentation, we decided to avail some elements involving Nursing actions, as this professional is extremely relevant in materializing health promotion, protection, recovery, and rehabilitation whether for individuals, families, and/or communities.[37.]

By analyzing the quality of the journals regarding the current Qualis Capes (Classification of journals in the 2013-2016 period) and considering the assessment area (Nursing), it was identified that three (60%) journals are classified as A2 – Transactions of the Royal Society of Tropical Medicine and Hygiene and PLOS ONE, 1 one (25%) as B4 – Revista Uningá; and it was not possible to identify the Qualis for another (25%) for this period. However, Revista de Saúde Digital e Tecnologias Educacionais presented a Qualis Capes of B2 in the provisional assessment of July 2019. The impact factor attributed by the Journal Citation Reports (JCR), which compares journals within the same area, briefly consists of the mean of citations that am article receives in a particular journal. In this case, only three journals meet this criterion, the Transactions of the Royal Society of Tropical Medicine and Hygiene, PLOS ONE and the RLAE. The first presented an impact factor of 2,820 for 2018, the second presented 2,776 for 2018-2019 and the third 1,442 for 2020.

Considering the investigated scenarios and subjects, more than half of the articles contemplated the Brazilian scenario. One developed in the city of Rio de Janeiro, for the general public and two in the city of Ribeirão Preto-São Paulo. Of the international articles, one (20%) refers to a study carried out in Sonora-Mexico and another (20%) in Arizona-United States, both dealing with Spotted Fever preventive measures focusing on its transmission by dog parasites.

Concerning the objectives, two (40%) studies sought to assess intervention programs that aimed at reducing the population of ticks, especially in dogs. Among the actions taken in these programs, education on Spotted Fever was cited as a measure adopted by the residents of the communities under study, but the pedagogical aspects of the action were not explored by any of the articles. From the rest of the sample, one study seeks to describe the steps for constructing an educational game and its applicability as an important tool for preventing Spotted Fever and promoting health, and another, as it intends to identify knowledge about Spotted Fever, also elaborates and executes strategies of education in health with the use of informative materials and interactive activities, considering three aspects: tick, capybara, and Spotted Fever and and one who developed and validated an educational technology about Spotted Fever with learning stations based on Ausubel's theory of meaningful learning.

Regarding the methodological designs, one (20%) study did not present a defined methodological strategy, thus being named as an integrated intervention study. Concerning the four (80%) publications, the design consists of constructing an educational tool, descriptive and cross-sectional study, and pilot study.

As for the strategies of education in health on Spotted Fever, two (40%) studies stand out for providing guidelines for people who live in areas infested by ticks and have dogs as hosts, and three (60%) explored educational and digital technologies, such as use of informative materials and interactive activities and digital game to promote knowledge about Spotted Fever.

By analyzing the results of the studies, it was perceived that they encouraged preventive behaviors in people who live and/or visit risk areas, as well as to guide community residents on the risks, and also report the

implementation of Spotted Fever preventive measures in these places.

Education in health focusing on Spotted Fever was mentioned as a tool for expanding knowledge, whose formulation and application could benefit people and the community, keeping them healthier and less exposed to the risks posed by the disease, in addition to encouraging self-care and strengthening the relationship between the health professionals and the local population.

Overall, the articles indicated the importance of adopting educational measures that could help in Spotted Fever prevention. It is highlighted that all the articles sought to somehow analyze the efficacy of the educational activities, whether with questionnaires to assess knowledge or with behavioral changes observed in the communities or groups assisted.

It is also noted that, even with Spotted Fever being a public health problem, the sample size shows a shortage of studies in this area. Therefore, this research promotes an important reflection and draws people's attention to encourage the production of scientific research studies that do not only bring data on occurrence, incidence, detection, epidemiology, and evidence, but that also provide, in this context, well designed proposals on education in health for Spotted Fever.

Chart 2: Characterization of the articles selected for analysis, according to title, author, journal, study locus or country, objective, methodology, strategy of education in health, and main results. Ribeirão Preto-SP, Brazil, 2021

Title	Author/ Year	Objective	Strategy of education in health	Main results
Development and validation of an interactive educational technology on spotted fever	(Bragagnollo et al., 2020)[31] 2020	To develop and validate an interactive educational technology on spotted fever, to offer an innovative teaching method.	Interactive laboratory, with learning stations,	The trajectory followed for the construction of the Interactive Laboratory on spotted fever gave academic and scientific support to the product, offering an innovative educational resource with pedagogical potential that values significant learning.
Pula Tick: the game as a communication tool in health	(Rodrigues et al., 2019)[32] 2019	To describe stages of the construction of a game applied to health and to assess it as a communication tool for prevention and health promotion.	To establish a playful narrative by means of smartphones screens, describing the journey of a friendly tick in search for completing its life cycle interacting with possible mammal hosts in different ecological scenarios and, eventually, causing Spotted Fever in human beings.	The result of the validation of the game prototype was expressed as a percentage rate of the testers' adherence by theme analyzed: individual prevention (30%), cross-species transmission (50%), game diffusion (79%), transmission mechanisms (80%), and fun (80%).
Community-based prevention of epidemic Rocky Mountain spotted fever among minority populations in Sonora, Mexico, using a One Health approach	(Alvarez-Hernandez et al., 2020)[33] 2020	To reduce the populations of ticks with the use of acaricide collars of prolonged action in dogs, environmental acaricides applied in residential areas, and educational actions on Spotted Fever.	Community education and guidance to improve awareness on Spotted Fever.	The prevalence of dogs infected by ticks in Community A was reduced from 32.5% to 8.8%. New cases of Spotted Fever were not identified in this area during the 18 subsequent months. In comparison, the percentage of dogs infected by ticks in Community B was reduced from 19% to 13.4%.

Evaluation of knowledge about Spotted Fever by users of the University of São Paulo (USP) Campus of Ribeirão Preto through an educational intervention	(Jesus, Bragagnollo, Ferreira , 2016)[35] 2016	To identify the knowledge of University of Sao Paulo Ribeirão Preto Campus attendees about Spotted Fever, to design and execute an education in health program using information materials and interactive activities.	The educational activities were based on active teaching methodologies. Microscopes with slides of ticks, stereoscopic showing ticks alive, videos, posters, life-size puppets, and scale models were used. An informative text entitled Spotted Fever: a disease transmitted by ticks" was also made available through a QR code.	The educational intervention prepared and implemented significantly contributed to improving the knowledge of the USP Ribeirão Preto Campus attendees on what Spotted Fever is, what its mean of transmission is, its direct impact on health, and ways to prevent it. On the other hand, it was possible to observe that the participants of the first stage of the study presented insufficient knowledge about the public health problem faced by the Campus.
Community-Based Control of the Brown Dog Tick in a Region with High Rates of Rocky Mountain Spotted Fever, 2012–2013	(Drexler et al., 2014)[36] 2014	To assess an intervention that aims to kill ticks hosted in dogs by applying environmental acaricides and using long-lasting collars in the community's dogs.	The activities were divided in two phases. The first, immediate control of ticks, and the second, sustainability of this control. The first phase carried out the following: registration of houses and dogs; the material was distributed so that dogs were detained; the animals also received identification collars. Application of acaricide in the backyards of all houses. Regular follow-up; the houses were visited once a month. Control of the canine population. The residents received information about free castration of animals through the program. Phase two carried out the following: reapplication of collars. Referral to treatment with acaricides in houses notified for tick activity. Regular follow-up. The houses were visited every two months to replace the collars if necessary.	The Rodeo region obtained in 2012 a percentage of 99% of dogs free of the parasite; on the other hand, areas outside Rodeo presented only 32%. The research also included the report of the families about the emergence of ticks at their homes. In 2012, 20% of the families outside Rodeo asserted not having seen ticks in their homes or backyards, against 2% of the families from the Spotted Fever Rodeo area. The incidence of human cases also suffered changes along with the project; in April 2012, the incidence rate in Reserve B (Rodeo and outside-Rodeo areas) was 1.2 cases per 1,000 inhabitants; in the two subsequent years, this rate went from 0.71 cases per 1,000 in the Rodeo area, and to 0,9 outside Rodeo.

Source: prepared by the authors, 2022.

DISCUSSION

Despite the small number of published articles that deal with the theme in question, it was possible to observe important points with the elaboration of this study, being assessed from the perspective that, although the academic society recognizes the importance of educational health actions for Spotted Fever prevention, the number of studies is still insufficient.

The analysis of the findings allowed identifying that, despite the discussions on education in health and that Spotted Fever is of global relevance for Public Health and a multidisciplinary theme, there is still shortage of papers entirely focused on this practice. Thus, it is considered necessary

to create education in health resources that propose educational measures which can empower the population to early suspect Spotted Fever so that treatment can be started promptly.

Based on the results, we elaborated two themes to discuss the findings: Health and Education: Concepts still disparate in the construction of education in health interventions; Education in health: A reflection on the teaching strategies and the potentialities of Nursing.

Health and Education: Concepts still disparate in the construction of education in health interventions

This review showed different approaches for carrying out education in health measures; therefore, it is necessary to dismember the health and education concept, since we perceived that these two dimensions have their historical construction and carry in their compositions various influences and trends experienced by society; attributing to the education in health practices results that are possibly empowering and consistent with more current policies on Health Promotion.[38]

In the social imaginary of the Western world, where the studies come from, the following predominates: the traditional model of teaching for education, in which teaching is summarized in the transmission of knowledge, placing the subjects in a passive position, reducing their participation in the learning process;[39] and the biomedical model of health, in which they do not prioritize the integrality principle in their actions, focusing on meeting the demands in the treat and street way, or on solving needs that are not configured as demands.[40]

In this study, it was verified that education in health for Spotted Fever had a preventive focus in half of the articles, in addition to not mentioning whether or not there was the active participation of the subjects involved in the research studies. The authors argue that the dissemination of information, as well as the implementation of preventive measures for the control of ticks, mainly in dogs, considerably reduced the cases of the disease in residents of communities and facilitated decision-making regarding behavior changes of these individuals, concerning protecting dogs from ticks, avoiding tick-infested areas, and adopting individual protection measures, despite the use of light clothes of light color.

However, it is emphasized that the educational activity was not analyzed separately; therefore, we infer that the behavioral changes, when verified from the set of actions performed by the professionals, do not reflect the impact of the educational and informational action separately, which may have had more or less relevance in the attitudes evidenced.

Although education in health has been mentioned as a tool for expanding knowledge through the productions included in this review, the preventive approach sheds light on the discussion about the concept of education in health, which sometimes contains hygienist and informative principles, with a focus on disease prevention and on blaming the subjects, when they do not follow the information provided.[39] Therefore, paradigmatic changes are necessary, involving the way of thinking and acting in health and education.[41] Despite the academic recognition of the importance of this transformation, there are still some impasses.[42]

Of the five articles selected, two were carried out by Brazilian researchers, and it was in these studies that most elements linked to health promotion were found, in which education in health is suggested as transformative and emancipatory. In these, playfulness was present in education in health strategies, and the researchers sought to create strategies that stimulate interaction within their areas of knowledge; two of the productions brought the term active methodologies, denoting that they used them to build their pedagogical material.

Active teaching-learning methodologies favor the construction of knowledge based on real experiences and situations, articulated by active pedagogy, untying the sovereignty of knowledge focused on professor and placing students

as protagonists of their learning process.[43-44]

In Brazil, the active methodologies are based on Paulo Freire's theoretical principles and on the progressive critical-social pedagogical tendency of the contents, which aims at autonomous training, capable of solving problems based on previous knowledge of the reality where people live.[44]

In fact, this reveals a lot, since Brazilians are integrated into a Unified Health System model that aims at Universality, Equality, and Integrality. Integrality, in particular, opposes the fragmentary and reductionist approach of the individuals. The professional's view, in this sense, is totalizing, with apprehension of the biopsychosocial subject, which provides assistance characterized by a search that goes beyond the disease and the suffering shown.[45] The Unified Health System has invested in practices that reorient its current strategies and has bet on education in health as a tactic to change the way of assisting the individual and collective health of its population.[46]

In this way, education in health along the lines of integrality has the main objective of rescuing the importance of social participation in the contexts where life is built; in the environments where the learning and teaching movements are the development of solidarity and citizenship, involved in improving quality of life and in full human development.[47] The exercise of a critical educational practice, as a specifically human experience, constitutes an intervention form committed to the principle of democracy that integrates an attitude of innovation and renewal in the belief that it is possible to change[48]. Thus, to educate in health, it is necessary to be open to the geographic, social, political, and cultural outline of people, families, and communities.

Education in health: A reflection on the teaching strategies and the potentialities of Nursing

In the article "Pula Tick: the game as a communication tool in health, a prototype of a game about Spotted Fever"[33] was developed, and the objective of this game is to provide contact with important information regarding the spread process of the disease, its pathological aspects, and the importance of an early diagnosis by the health professionals to ensure timely clinical management.[33] This study brings technological innovation and meets the interest of the digital generation, which potentially prefers to learn through technologies.[49-50]

Learning based on digital games can stimulate interest among the players, motivating them to engage in a task regularly for an extended period of time. These are qualities that are often difficult to obtain by means of traditional learning materials and approaches and, therefore, can be responsible for the difference in educational effectiveness.[51-52] In this context, educational technologies are highlighted for offering students quick access to the growing range of information, possibilities for human-computer interaction in multimedia, providing fun and enhancing the understanding about certain contents.[49]

A number of scholars have discussed the importance of innovating in strategies and resources for learning with gameplay, attributing advantages such as time flexibility and space for access, the possibility of repetition, keeping the pace of the user's learning, and students' satisfaction in learning from games and other technologies considered motivating.[53]

However, it cannot be said that the game being developed in the study will be effective in improving knowledge,[33] bringing persuasive messages, helping to change behaviors, as well as influencing health programs,[54] since the authors were not guided by a teaching and methodological framework, did not describe the target population, what the pedagogical content is, and did not carry out validation by specialists; they only carried out an opinion survey with the public to which the technology will be destined, but not the description of such public, as already emphasized. The validation process is fundamental to ensure the quality of the product developed, especially with a special look at the pedagogical and usability aspects

considering its nature as an educational technology.[55]

In the article analysis, we infer that it is a game and not a Serious Games, as these are mandatory educational games, whose entertainment aspect is optional but prevalent in their creations due to the visual and fun aspects inherent to them [49] since access to innovative technologies and teaching strategies addressing health content must be based on the best scientific evidence to achieve their educational goal and collaborate with quality training and clinical practice. Thus, it is expected that, when participating in these experiences in the teaching-learning process, the students study in the context of the scientific literature and start their practice based on it.[56] It is worth discussing that health behaviors are dynamic and change with the advances of the research studies, and it is the task of those responsible for the development of educational technologies to keep up to date and modify the game variables whenever necessary. If this effort does not happen, the game will become obsolete and will not properly contribute to education, causing it to be forgotten or misused.[49]

In addition, among the authors of the articles selected, only two were from the Nursing area, and they were carried out in Brazil. This result points us to an area little explored by nurses who have a recognized role as health educators.[47] Education in health is an activity inherent to this professional; the law of professional practice regulates in its Article 11 that it is up to the nurse, as a member of the health team, to carry out education in health aiming at improving the health of the person, the family, and the general population.[57]

In addition to that, the use of active methodologies in the health area courses has been valued due to their potential to provide students with the appropriation of practices developed in primary care with a focus on solving individual or collective problems, making them suitable to develop and implement educational actions in health that are indeed transformational.[58]

The National Curriculum Guidelines of 2014 suggest the use of active teaching-learning methodologies in the undergraduate Nursing course, so as to stimulate and promote active attitudes and competences in the students, so that knowledge integrates theoretical and practical cognitive content with a training focus, stimulating the search for knowledge, not merely informative, as it is in the traditional pedagogical practice.[44]

Based on the Law of Guidelines and Bases of National Education, the universities, especially the Nursing courses, use active methodologies believing that they are contributing significantly to the training of future nurses.[43] The active methodology is an educational concept in favor of the teaching and learning process, which can be used in real or simulated experiences, aiming to raise awareness in the face of the complexity of the social phenomena involved and, consequently, the resolution of problems.[44,59]

Thus, since graduation, Nursing students are already prepared for a professional practice focused on critical and reflective actions that encourage the autonomous participation of the subjects involved in care, committed to the well-being of society and with competences to manage, implement, and lead the resolution of health problems observed in reality, being able to propose actions for the community.[58]

Given the nurse's potential to integrate into education and research actions related to Spotte Fever, of the articles selected for the study, only the one that was developed by nurses[32,35] actually worked on education in health, empowering the population with social participation and active methodology.

In the study carried out at the USP Campus in Ribeirão Preto,[35] the participants' cognitive knowledge on Spotted Fever was assessed through a questionnaire before and after their participation in the educational activity. This activity was offered in learning stations, and there was a monitor to guide the participant and different educational resources in each station, such as: a model depicting an area at risk for the disease, a

mannequin with symptoms of the disease, live ticks, illustrative video, posters, and a booth that portrayed a risk area, where the participant had the opportunity to enter.

However, in this study, the methodological construction of the activity and the questionnaire were not detailed, nor was the theoretical framework identified, thus indicating faults regarding methodological rigor. Nevertheless, this study showed that before the subjects participated in the educational activity, they had very incorrect knowledge regarding the disease, pointing to the knowledge gap, and that after participating in the activity, this knowledge improved significantly.

The methodological study, which aimed to build and validate an educational technology about Spotted Fever, was based on the needs of people who attend an area at risk for the disease and was supported by the theoretical framework of meaningful learning, with an interactive approach.[32] The methodology used proved capable of supporting the development of an innovative educational technology, which can provide tools for the construction of other educational technologies, as well as sensitize health professionals, educators and researchers to the production and validation of new educational technologies, both in this theme and in any other that involves health education actions.This work collaborates with the health promotion policy in light of the epidemiological and environmental surveillance actions for Spotted Fever identified by the Ministry of Health in Brazil.[32]

Education in health actions do contribute to disease prevention, since Spotted Fever can be easily confused with other diseases, such as dengue and leptospirosis, being difficult to be diagnosed in the first days of the disease.[14] Thus, it is of paramount importance that the population knows the disease to prevent it and also to assist in medical diagnosis.

As a limitation of this review, the shortage of articles on education in health actions directed to Spotted Fever in national and international productions is indicated. An immense gap was observed when summarizing the knowledge produced on this theme.

It is suggested that future studies be conducted by health professionals, especially nurses, using well-designed educational strategies, focusing on the socio-environmental needs of each region and/or population involved, and that they can effectively contribute to prevention and health promotion in Spotted Fever.

From the perspective of health promotion, if education in health is actually implemented, it can help reduce the potential of risk and worsening of Spotted Fever cases, in addition to contributing to a change in the epidemiological scenario of the disease.

This study brought important findings on the education in health actions and the results derived from them in the lives of the participating subjects, with the possibility of fostering the practice of the health professionals, especially nurses who intend to develop educational activities. In addition, it is possible to pay attention to the need for Nursing education that provides reflections on education in health to help these professionals base their practices on more emancipatory and transforming theories.

The insertion of education in health activities on Spotted Fever has an important highlight in the training of Nursing students, since education in health is seen as a social practice, enabling strategic reflections in the search for health-promoting actions the desease.

Education in health is also a vital strategy for creating a bond between the population; accordingly, in the search for a better bond, Nursing must consider population customs, considering their potentialities and difficulties, in order to educate effectively and pave the way for individual and collective transformations.[60-61]

This study reveals the nurse as an important professional, with adequate training and potentialities that can be leveraged when thinking about developing educational actions to fight against Spotted Fever.

CONCLUSION

Based on the studies selected and analyzed in this review, it can be concluded that education in health for coping with Spotted Fever is still a little-explored field, even though almost all articles referring to Spotted Fever signal it as essential. The number of articles highlights that education in health for Spotted Fever is still an incipient field, and the papers selected do not really prove its effectiveness due to methodological weaknesses. It is understood that, by evidencing educational actions on Spotted Fever, this study contributes to science since there is few or no academic papers on this theme.

In this sense, it can be said that the objectives of the study were achieved, since the objective was to identify scientific evidence from the literature on health education in Spotted Fever.

In addition, this study raises the question of the importance of social participation in the prevention of diseases, since it uses the health promotion policy as framework, refuting the reproduction of the biomedical model of care that endures in many health spaces.

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