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Evidence of health service waste management in primary care

Evidências do gerenciamento de resíduos dos serviços de saúde na atenção primária

Evidencia de gestión de residuos de servicios de salud en la atención primaria

ABSTRACT

Objective: To describe the state of evidence related to the management and in-service education of the interprofessional team on Health Service Waste (HSW), specifically in Primary Health Care (PHC). **Method**: Integrative review in the LILACS, BDENF, PubMed®, WOS, CINAHL and SciVerse Scopus databases between 2010 and 2020 in Portuguese, English and Spanish. **Results**: The sample consisted of 17 articles from emerging and underdeveloped countries, with a lack of knowledge and non-conformities in the management and compliance with environmental health regulations, sliding into occupational risks. The interpretation generated: (1) The management and urgency of permanent education in service: between inadequacies and adequacies and (2) Proposals to implement the correct management in Primary Care. **Conclusion:** Level VI evidence was synthesized, describing the urgency of continuing education in service to change practices and greater attention to the Health Service Waste Management Plan in PHC.
Descriptors: Primary Health Care; Environmental Health Education; Nursing; Health Service Waste Management Plan; Public Health.

RESUMO

Objetivo: Descrever o estado das evidências relacionadas ao gerenciamento e educação em serviço da equipe interprofissional sobre Resíduos dos Serviços de Saúde (RSS), especificamente na Atenção Primária à Saúde (APS). **Método**: Revisão integrativa nas bases LILACS, BDENF, PubMed®, WOS, CINAHL e SciVerse Scopus entre 2010 e 2020 nos idiomas português, inglês e espanhol. **Resultados**: A amostra foi de 17 artigos de países emergentes e subdesenvolvidos, com carência de conhecimentos e inconformidades no gerenciamento e cumprimento das normativas quanto à saúde ambiental, resvalando em riscos ocupacionais. A interpretação gerou: (1) O gerenciamento e a premência da educação permanente em serviço: entre inadequações e adequações e (2) Propostas de efetivação do gerenciamento correto na Atenção Primária. **Conclusão:** Sintetizaram-se evidências de nível VI, descrevendo a premência de educação permanente em serviço para mudança de práticas e uma maior atenção ao Plano de Gerenciamento dos Resíduos de Serviços de Saúde na APS.
Descritores: Atenção Primária à Saúde; Educação em Saúde Ambiental; Enfermagem; Plano de Gerenciamento dos Resíduos de Serviços de Saúde; Saúde Pública.

RESUMEN

Objetivo: Describir el estado de la evidencia relacionada con la gestión y educación en servicio del equipo interprofesional sobre Residuos de los Servicios de Salud (RSS), específicamente en la Atención Primaria de Salud (APS). Método: Revisión integradora en las bases de datos LILACS, BDENF, PubMed®, WOS, CINAHL y SciVerse Scopus entre 2010 y 2020 en portugués, inglés y español. **Resultados:** La muestra estuvo conformada por 17 artículos de países emergentes y subdesarrollados, con desconocimiento e inconformidades en la gestión y cumplimiento de las normas en materia de salud ambiental, incursionando en los riesgos laborales. La interpretación generó: (1) La gestión y urgencia de la educación permanente en servicio: entre insuficiencias y adaptaciones y (2) Propuestas para una gestión eficaz en Atención Primaria. **Conclusión:** Se sintetizó evidencia de nivel VI, describiendo la necesidad de educación permanente en servicio para cambiar prácticas y prestar mayor atención al Plan de Gestión de Residuos de los Servicios de Salud en la APS.
Descriptores: Atención Primaria de Salud; Educación en Salud Ambiental; Enfermería; Plan de Gestión de Residuos de los Servicios de Salud; Salud Pública.

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INTRODUCTION

Currently, the correct and sustainable management of Health Service Waste (HSW) emerges as an attribution of the interprofessional health team, especially with the municipal spheres, impacting both the environment and the health of the populations[1]. Consequently, referring to Health Service Waste, it is pointed out the current legislation that regulates the good practices of their management, covering public and private, philanthropic, civil or military services, including those that carry out teaching and research actions, and categorizing the HSW as: "Group A", which are subdivided into subgroups (A1, A2, A3, A4, A5), with the greatest characteristic their infectious potential; "Group B" that constitutes chemical waste, having as characteristics the hazardous aspects of substances such as flammability, corrosivity, reactivity, toxicity; "Group D" that are characterized as common waste that, when not sent for reuse, recovery, recycling, composting, reverse logistics or energy use, must be classified as waste; "Group E" that comprises sharps and it is noted that waste of "Group C" are those containing radionuclides, existing only in highly specialized services[2].

The growth of the volume of waste generated calls for a strict control of the packaging to the disposal, the Precautionary principle related to the environmental agenda, recommends that the return to the environment undergoes treatment, however, the lack of implementation of technical-scientific standards and inspection are aspects considered as global problems[3]. Therefore, the management of HSW is not dissociated from the solid waste of Law 12,305/2010 in Brazil – the National Solid Waste Policy (NSWP), its determinations being: reduction in waste generation, prioritization of public health, environmentally correct disposal and integrated and sustainable management between the generating spheres, training for those who handle, above all, waste pickers and the stimulus to recycling. Even so, the assessment of this policy in the national territory indicated the low commitment of the city halls, which allocate scarce investments for the realization of selective collection and training of waste pickers[4].

In terms of health, a recent systematic review with 29 studies on the repercussions associated with the proximity of landfills, incinerators, dumps and open burning sites, signaled some evidence of an increased risk of maternal adverse events (delivery-related and neonatal outcomes), risk for the development of respiratory diseases and damage to the mental health of residents in the vicinity of sanitary landfills, regardless of the differences in legislation and forms of management in each country. As gaps, it is pointed out that more epidemiological studies on disease vectors and exposure to toxins must be understood with greater clarity, and how the effects on the health of workers in the transfer and treatment of HSW occur, with hierarchical risks in the different modalities of management and disposal.[5]

In Brazil, the Resolution of the Collegiate Board (RDC) of the National Health Surveillance Agency (ANVISA)- RDC No. 222 of March 28, 2018, regulates several issues: internal and external storage, details how each category of HSW will be segregated, packaged, identified, stored, collected, transported, treated, destined and, when possible, recycled, conceptualizing that "the management of HSW must cover all stages of planning of physical resources, material resources and training of the human resources involved"[2]. In this regard, the production of knowledge on the subject is lacking when it comes to health graduations, especially nursing, subsequently generating a lack of support or interest in permanent education on the subject. The failures in the Health Service Waste Management Plan (HSWMP) and inadequate packaging in establishments have deleterious effects on what is called "Environmental Health", producing risk factors for those who work and seek these services[1]. It advocates for the importance of knowing the emerging issues of the theme in Primary Health Care (PHC), a point of the network that concentrates a high demand for users and generation of HSW of groups A, B, D and E, as well as to clarify the education in service for the interprofessional team describing how it has been occurring.

Environmental health education and learning based on problems directed at professionals are based on an overview of the assessment indicators of the stages of HSW management, establishing an interface with environmental issues on disposal and management in the municipalities - handling, separation, storage, processing, reduction, reuse, recycling; and primarily how biological treatment

occurs, composting (aerobic and anaerobic), thermal treatment via incineration, gasification and energy generation from waste or disposal to the landfill[6].

During the pandemic epidemiological crisis of the years 2020 and 2021, it is suggested that the disposal and collection was deeply impacted around the world, it is emphasized that the following must be ensured: ensuring that Personal Protective Equipment (PPE) is properly disposed of, outlining new strict policies and transition to bioplastics. In support of this new international paradigm, with regard to tool management, the optimization of decision making is foreseen, whether in treatment methods, facilities, capacity (scalability), logistics, mobilized/ automated collection and in the treatment project, aiming to mitigate biological disasters. Thus, mismanagement is seen by international organizations as a challenge and it is asserted that in developing countries the precarious infrastructure and low budget for this area make the health indicators extremely bad. The application of technology to the HSW management system is the new challenge for the organization of a network that brings together hospital and community services, and the professional categories involved in reducing environmental impacts[7].

In developing countries, the volume of waste increases every year and with it the occupational risks since the handlers of the HSW generally do not receive PPE in sufficient quantity, and the material incorrectly discarded by collectors can be contaminated due to the lack of precautions in the initial stages of management in community services. This is a growing concern for authorities in emerging and underdeveloped countries, who strive to ensure the least threat to those responsible for the collection and to those who may live near the disposal areas[7].

In this sense, considering that HSW represent a potential risk to human health, professional education actions that provide knowledge of these risks are of paramount importance. Regarding the prevention and control measures of these risks, providing an improvement in the environmental health of the work environment, the present review aimed to: describe the state of evidence related to the management and in-service education of the interprofessional team on Waste from Health Services, specifically in Primary Health Care.

METHOD

This is a descriptive Integrative Review (IR), a method of synthesizing evidence on a topic or issue in a systematic and comprehensive way. It is called integrative, because it provides broader information on a subject/problem, allowing the joint inclusion of quasi-experimental and experimental research, combining data from theoretical and empirical literature, providing integrated understanding about the synthesized theme. The variety in the composition of the sample in conjunction with the multiplicity of ways in which one can work with this method culminate in a panorama of concepts, theories, experiences, problems and propositions for nursing[8].

To achieve IR, it is necessary to go through six distinct stages: identification of the theme and selection of the hypothesis or research question; establishment of criteria for inclusion and exclusion of studies/sampling or literature search; definition of the information to be extracted from the selected studies; assessment of the quality of the included studies; interpretation of results; and synthesis of knowledge[8].

Thus, the research question was followed according to the acronym PICo[9]: What is the evidence about the management and in-service education of the interprofessional team on Health Service Waste, specifically in Primary Health Care? It is noteworthy that the interprofessional team is the population (P); management and in-service education of the interprofessional team on HSW belong to the interest domain (I); the context is Primary Health Care (Co). The data sources were recognized health context databases such as: Latin American and Caribbean Health Sciences Literature (LILACS), Nursing Database (BDENF), PubMed®, Cumulative Index to Nursing and Allied Health Literature, SciVerse Scopus (CINAHL) and Web of Science (WOS). The search was carried out in May 2021.

The Health Sciences Descriptors (DECS) used were: Health Service Waste, Waste Management, Primary Health Care, Environmental Health Education, Health Education, Human Resources Training in Health, Health Personnel and Problem-Based Learning and the Medical Subject Headings (MESH): Medical Waste Disposal; Waste Management; Primary Health Care; Health Education; Health Professional; Problem-Based Learning combined with the Boolean operator “AND” and “OR” exceptionally (Box 1).

Box 1 – Search strategy in databases.
Ribeirão Preto, SP, Brazil, 2021

"Health Service Waste" OR "Waste Management" OR "Environmental Health Education" "Primary Health Care" AND "Waste Management" "Primary Health Care" AND "Waste Management" OR "Health Service Waste" "Health Service Waste" AND "Environmental Health Education" "Training of human resources in health" AND "Health Service Waste" "Training of human resources in health" AND "Health Service Waste" OR "Waste Management" "Healthcare Waste" AND "Problem-Based Learning" "Waste Management" AND "Problem-Based Learning"	LILACS; BDENF
"Health Professional" AND "Waste Management" "Health Professional" AND "Medical Waste Disposal" "Health Professional" AND "Waste Management" OR "Medical Waste Disposal" "Primary Health Care" AND "Medical Waste Disposal" "Primary Health Care" AND "Medical Waste Disposal" OR "Waste Management" "Health Education" AND "Medical Waste Disposal" "Problem-Based Learning" AND "Waste Management" "Problem-Based Learning" AND "Waste Management" OR "Medical Waste Disposal"	PubMed®; CINAHL; SciVerse Scopus; WOS

Source: search protocol of the authors.

To establish the sampling, the time line allowed for this review was 10 years (2010 – 2020), including studies in English, Spanish and Portuguese whose scenario was PHC. The excluded articles were those that just touched on the subject, brought evidence about radioactive waste, other secondary studies, experience reports and editorials.

After the survey, the results of the searches were exported in June 2021 to the online systematized review organization application Rayyan QCRI of the Qatar Computing Research Institute, which allowed the elimination of duplicates and the selection of publications by two independent reviewers, facilitating the first phase of organization. The selection was made initially by reading the title and abstract of the articles and, when there was disagreement between the articles selected by the reviewers, a third reviewer decided to include or exclude them.

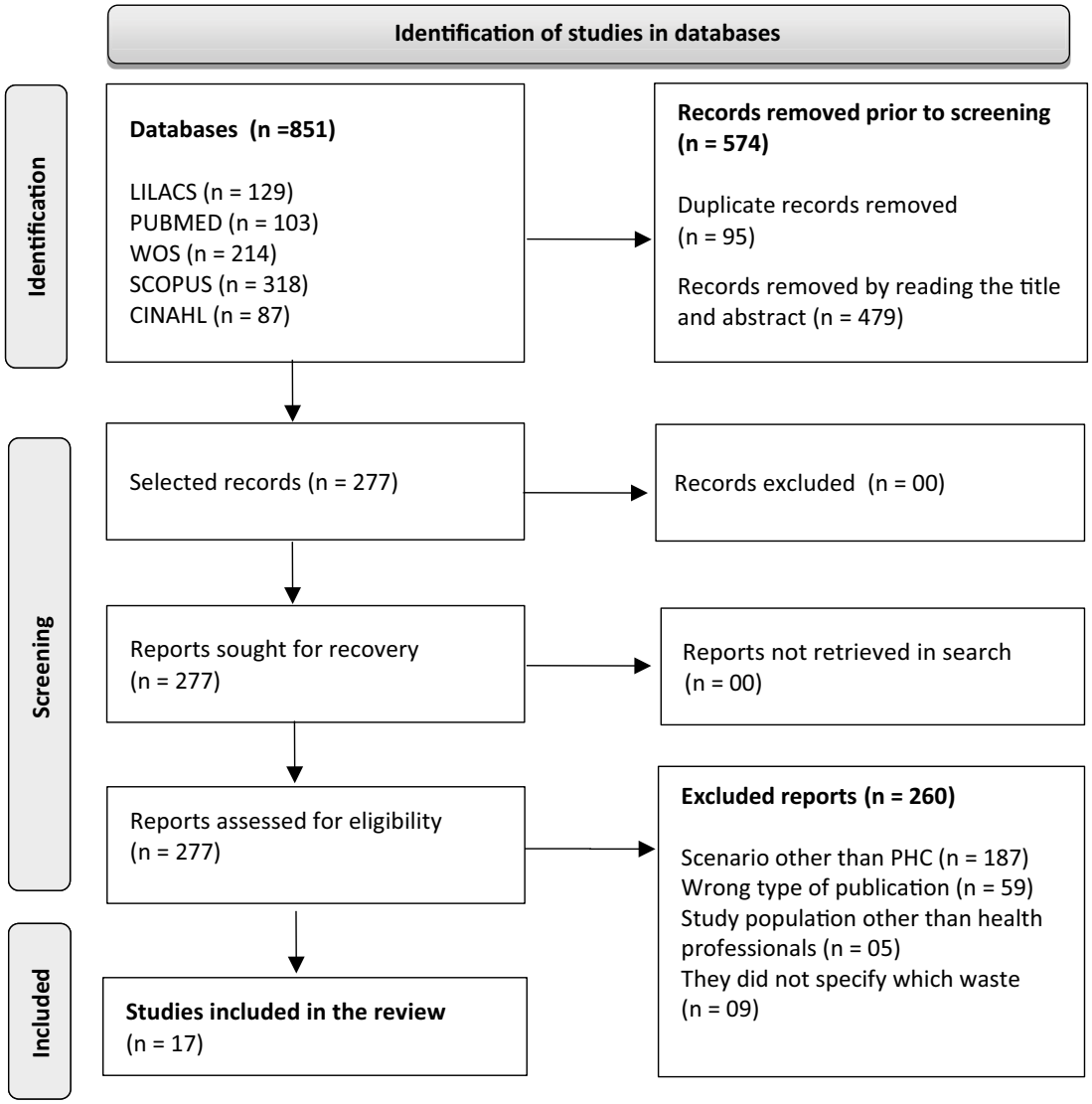
Then, the materials were read in full and, being pertinent to the review, data extraction was started using a specific adapted instrument[10], covering the items: title, journal name, authors, place of study, language and year of publication, study objective, type of study, population/sample or collection sources and main results, subsidizing the Synoptic Box.

To facilitate the organization of IR reporting, the PRISMA 2020 (Preferred Reporting Items for Systematic reviews and Meta-Analyses) writing instruction was used to verify essential items for reliable reporting of a review[11]. It is emphasized that, despite the use of automation tools, all records excluded in the Identification and Screening were analyzed by reviewers within the Rayyan organization application.

In the assessment stage to establish the Evidence-Based Practice, the reference of the seven levels[12] was adopted: level 1 – studies from a systematic review or meta-analysis of relevant randomized, controlled clinical trials or from clinical guidelines based on systematic reviews of randomized controlled clinical trials; level 2 – evidence derived from at least one well-designed randomized controlled clinical trial; level 3 – evidence obtained from well-designed clinical trials without randomization; level 4 – evidence from cohort and well-designed case-control studies; level 5 – evidence from a systematic review of descriptive and qualitative studies; level 6 – evidence derived from a single descriptive or qualitative study; level 7 – evidence from the opinion of authorities and/or report of expert committees.

The interpretation of the 17 results of primary research occurred between October 2021 and January 2022, with the formation of axes of debate in a descriptive way and for each article an alphanumeric code (P1, P2, P3, among others) was randomly assigned.

Figure 1 – Flowchart of the PRISMA 2020 checklist related to the search.



Source: PRISMA 2020[11].

RESULTS

Characterization of results

A total of 851 publications were found by applying the inclusion criteria in the databases (Figure 1). Of these, 574 were excluded in the Identification stage and 277 remained after Screening. Of these, 260 were excluded for one of the following reasons: different scenario of PHC, wrong type of publication, study population different from health professionals or did not specify the types of waste, resulting, therefore, in 17 studies for content analysis and interpretation.

The researches were considered to be descriptive of their data and, therefore, Level VI in their totality, although having several designs as shown in Box 2. Some of the evidence comes from the following regions of Brazil: Northeast Region (P8; P10; P14), Midwest Region (P3; P13), Southeast Region (P1; P5; P9; P12), South Region (P4; P16) and the North Region did not present any study.

The databases that most detained articles were WOS (n=5 / 29.41%) and CINAHL (n=5 / 29.41%), followed by LILACS (n=4 / 23.52%), SciVerse Scopus (n=2 / 11.76%) and BDENF (n=1 / 5.88%). There was a time trend of higher production in 2019 (n=4 / 23.52%), 2018 (n=4 / 23.52%) and 2017 (n=3 / 17.64%), then the years 2016 (n=1 / 5.88%), 2014 (n=2 / 11.76%), 2012 (n=2 / 11.76%) and 2013 (n=1 / 5.88%).

Box 2 – Articles included in IR. Ribeirão Preto, SP- Brazil

Code	Authors (Year)/ Journal/ Base	Country	Methodological design and Level of evidence/ Location and sample size
P1	Moreira; Günther (2013)/ Waste Management /*SciVerse Scopus*	Brazil	Descriptive assessment research, with a quantitative approach (Level VI) /Basic Health Unit in the central region of the city of São Paulo. This service employs 104 people and provides preventive and primary public assistance
P2	Al-Khatib (2014) / Eastern Mediterranean Health Journal / *SciVerse Scopus*	West Bank	Quantitative descriptive (Level VI)/190 health professionals from Primary Care health centers were interviewed
P3	Alves et al. (2012) / Rev Bras Enferm/ LILACS	Brazil	Descriptive research, with a quantitative approach (Level VI) / 28 Family Health Strategy Teams (FHS) in the city of Goiânia
P4	Bandeira et al. (2019) / Rev Fund Care Online / BDENF	Brazil	Descriptive-exploratory research with a qualitative approach (Level VI) / 16 professionals in four Family Health Units of a city in the South Region of Brazil
P5	Camargo; Melo (2017) / The World of Health / WOS	Brazil	Qualitative-quantitative case study (Level VI) / Responsible technicians, being: 1 dentist, 1 pharmacist and 13 nurses in the city of Sorocaba
P6	Win et al. (2019) / Nagoya J Med Sci / WOS	Myanmar	Cross-sectional research (Level VI) / All ten municipalities in the state of Mon
P7	Hangulu; Akintola (2017) / BMC Public Health / CINAHL	South Africa	Qualitative research with ethnographic approaches (Level VI) / 85 community health agents working in 29 communities in the Durban metropolis
P8	Matos et al. (2018) / Rev Bras Enferm / CINAHL	Brazil	Descriptive, cross-sectional and mixed approach research of the concomitant type/42 nursing professionals, 21 technicians and 21 nurses from the city of Teresina
P9	Moreira; Günther (2016) / Rev. Latino-Am. Nursing / LILACS	Brazil	Multiple case research, descriptive (Level VI) / Applied in four BHU (identified as BHU-A to BHU-D) in the city of São Paulo
P10	OLIVEIRA et al. (2014) / Rev Enferm UERJ/ LILACS	Brazil	Descriptive of qualitative approach (Level VI) / 36 units, with the participation of 55 health professionals and 23 general service assistants from the city of Campina Grande
P11	Reddy; Shammari (2017) / Eastern Mediterranean Health Journal / WOS	Saudi Arabia	Descriptive, quantitative, non-probabilistic intentional sampling (Level VI) / 135 professionals from 16 Primary Health Care centers in the city of Ha'il
P12	Sanches et al. (2018) / Rev Bras Enferm / CINAHL	Brazil	Descriptive and exploratory quantitative (Level VI) / 16 nurses from 16 Family Health Units in the city of São Carlos
P13	Santos; Souza (2012) / Rev Bras Enferm/ LILACS	Brazil	Quantitative descriptive (Level VI) / 10 professionals from the cities of Araputanga, Mirassol D'oeste and São José dos Quatro Marcos
P14	Silva et al. (2019) / J Nurs UFPE online / CINAHL	Brazil	Qualitative, descriptive, observational research (Level VI) / 9 Family Health Units of a city in the state of Bahia
P15	Tabrizi et al. (2018) / Iran J Public Health / WOS	Iran	Triangulated cross-sectional survey (quantitative-qualitative) (Level VI) / The study population consisted of all community health centers in Ta-briz (census), including 58 centers
P16	Teixeira et al. (2018) / Rev Fund Care Online / CINAHL	Brazil	Descriptive-exploratory research with quantitative approach (Level VI) / 19 professionals from the city of Pelotas
P17	Tabrizi et al. (2019) / Primary Health Care Research & Development / WOS	Iran	Intervention research using the clinical audit cycle designed and implemented in the city of Tabriz (Level VI) / 20 health centers

Source: synthesis of the authors.

The objectives were grouped by degree of similarity of the studies developed in Brazil, in relation to the HSW in the PHC: To assess the management of hospital waste in a public PHC (P1); Analyze the management (segregation, packaging, identification and transportation) of the waste generated by the home care of the primary health care units of the family (P3); Describe how the

disposal of medicines is carried out and assess the knowledge (P4); Analyze the perception of the professionals who work in the Primary Care Units and Health Outpatient Clinics (P5); Describe/ Assess/Analyze the knowledge/management of nursing professionals (P8, P12, P13 and P16); Propose an instrument to facilitate the diagnosis, elaboration and assessment of HSWMP in Basic Health Units (P9); Analyze the management of solid waste of Primary Health Care (P10, P14).

The internationally developed studies had as objectives: to investigate the aspects of medical solid waste management in centers in the provinces of Nablus and Salfit in the West Bank, Palestine (P2); assess the practice of health waste management in PHC of Mon State, Myanmar (P6); explore the management of health service waste from community-based care in Durban from the perspectives of community health agents, South Africa (P7); determine the Knowledge, Attitudes and Practices (KAP) on biomedical waste among health professionals in primary health care centers in Hail City, Saudi Arabia (P11); investigate waste management in community health centers in Tabriz, Iran (P15); and improve waste management standards in community health centers in Tabriz through clinical audit, Iran (P17). In this follow-up, Box 3 lists the main evidences found in each study.

Box 3 – Evidence ascertained by IR. Ribeirão Preto, SP- Brazil

Code	Summary of Conclusions / Recommendations
P1	Several legal non-conformities were detected, corroborating other studies involving small health establishments in developing countries. Lack of knowledge of the legislation contributes to non-conformities in practices. The tool would also provide adequate information on the subject.
P2	Most HSW were discarded in specific public containers for domestic solid waste. Hazardous waste must, of course, be transferred by the people who produce it, clearly this is not the situation in most care centers, as they have not been segregated. The waste handlers of some health units chose to load the containers with their hands uncovered or on their shoulders.
P3	All procedures generated infectious waste; however the waste of groups A and D, in 100% of the times were not segregated separately.
P4	The attention to the delivery of these medicines to the Health Department of the municipality is greater than the correct handling of waste, and the interviewees are unaware of the Brazilian legislation on the subject.
P5	The units do not have an HSW Management Plan, at the same time there is insufficient support from professionals.
P6	It was revealed that non-hospital primary care units had a worse practice in color coding for segregation, no separate designated staff, and no equipment to prevent accidental spillage. In addition, most used burning in pits as a final disposal method with insufficient use of Personal Protective Equipment.
P7	Need to incorporate community health worker capacity development in health waste management into community agent training programs in South Africa.
P8	The knowledge of professionals is far from what is necessary for proper management and focuses on the initial stages, especially disposal. Some socioeconomic variables (age) and training (training time and performance) can influence this knowledge and practice.
P9	The proposed instrument compiles: Current legal requirements for health, environment and work; Application by professionals not specialized in the subject, after a brief training; Identification of structural, operational and behavioral defects; Identification of corrective measures; Goals and deadlines; Comparison of results in consecutive assessments, in the same unit, and assessments between different units; Minimization of subjectivity; and Measurement.
P10	There is no infrastructure necessary for correct management; it lacks location for internal storage, favoring the crossing of HSW with medicines, food and users, consequently culminating in incorrect segregation.
P11	There is a positive correlation between knowledge and attitudes, knowledge and practices, and attitudes and practices. Training plays an important role in expanding the knowledge of professionals in the management of biomedical waste.
P12	Knowledge about management by nurses is unsatisfactory at all stages, which leads to the commitment of the entire process related to the management of HSW, since it does not meet the requirements of the Resolution of the Collegiate Board of the Brazilian National Health Surveillance Agency number 306/2004.

(continues)

Code	Summary of Conclusions / Recommendations
P13	Nine of the ten participants (nurses) correctly diagnosed the waste situation in their units.
P14	It appears that the management of solid waste in the PHC of the municipality in question is not in accordance with Brazilian legislation. It was found that they do not follow an HSW Management Plan for their correct management.
P15	Waste management was unfavorable in Tabriz community health centers. The observation of standards in the dimensions "management and training" and "collection and separation" were the worst dimensions.
P16	The units have significant weaknesses in management, most of them associated with lack of professional qualification, as well as ignorance of current legislation that deals with health waste. The lack of materials for correct handling and the lack of training in treatment and management were difficulties.
P17	Interventions were carried out in the 4 domains of the community centers: Management and training; Separation and collection; Transport and temporary storage; Sterilization and disposal.

Source: synthesis of the authors.

It was noted that all primary research was developed in emerging and underdeveloped countries. The state of scientific evidence, based on the initial universe of 851 publications and adherence to the theme of only 17 articles, indicated a lack of specific focus on PHC. Existing evidence mainly seeks to describe and analyze management even though the word "management" is widely used. The literature corroborates that the knowledge of professionals involved in public health reverberated directly in the management of HSW and, therefore, several studies are committed to describe and analyze such knowledge, based on quantitative and qualitative approaches, then no research was identified using the problem-based learning education strategy, one of the controlled terms used in the searches.

The fragility of knowledge and inadequacies in several community scenarios correlated directly with the possibility of occupational risks and risks in the provision of care, causing more training to be carried out in the services, problematizing their realities regarding environmental health. Faced with the invisibility of a HSWMP and the lack of infrastructure to comply with the regulations in force in each country, it was pointed out to managerial responsibilities of adequacy of these services for adequate packaging (preferably external) and disposal without occupational risks in PHC.

DISCUSSION

The management and urgency of continuing education in service: between inadequacies and adequacies

Aiming at the correct management in the sectors of a PHC is linked to the nursing procedures, and the professional category is usually in charge of the theoretical-practical knowledge about the handling, disposal and destination[13-14]. The vaccine room, the dressing room, the pharmacy and the dental office [15] and, simultaneously, Community Health Agents (CHA) in home care refer that a considerable generation occurs after essential procedures such as dressings, diaper changes, bed bath, tooth brushing and insulin administration to bedridden diabetics who are incontinent or who have suffered a cerebrovascular accident[16].

Thus, the following inadequacies were found: general waste disposed in different types of trash, use of bags of a range of colors not consistent with the criteria and also infectious waste placed in common trash cans without separation[17]; the lack of plastic bags and labeled containers, the use of common plastic bags or without any distinction between the waste were also evidenced[15,18-19]; in the shortage of gloves for handling, improvisation with plastic bags in the hands was described [16]; in home care there is disposal in the common waste of the residence with the justification that the transport of the team did not have "adaptations"[13]; expired medications with the drums to be incinerated, storage sites not covered by ceramics or washable paint; drums close to cleaning products [20]; waste belonging to classification A and D being mixed, contaminating the common waste, placed together with the infecting products and quantitatively increasing the category A[18]; more than half of the sample of professionals unaware of the legislation, classification, stages and recognizing lack of training upon entering the service[21-22] and ignorance of the type of destination of the HSW[21].

It is emphasized that the disposal of sharps (group E) is generally the most prioritized[18,22] and the safety boxes are employed for the separation of the sharp HSW [17]. However, even if type E (piercing-cutting tools) are concentrated in the boxes recommended by the National Health Surveillance Agency (ANVISA) of Brazil, they should not: be with extravasation at the edge, be in inappropriate, humid or slippery places that deteriorate them [22].

According to a study developed in Myanmar, the units were classified as "basic hospital type unit" and "basic non-hospital type unit", revealing that non-hospital health centers were more likely to have no color coding system in management. For disposal, it was found that 78.5% uses burning in shallow pits, including sharps and the minority uses incineration as the final disposal method. Another discrepancy is that only 32.4% classified as non-hospital had PPE[23].

Concerning is the situation in an Iranian study in which in only 17.5% of the units the rate of compliance with country standards was higher than 50%, residues from the laboratory such as urine, feces and blood samples were not properly discarded. It was documented the lack of a special place for temporary storage of infectious waste and their disposal under stairs, on the balcony, near the toilet or at some end of the vaccination room or obstetric room with extended storage times[17]. This scenario was also observed in the Brazilian sphere[15].

It is important to highlight in the managerial scope that the segregation of HSW becomes a parameter of suitability for the other stages, because if there is inadequate segregation at the beginning of the process, the rest of the chain is compromised in an onerous and risk-generating "cascade of actions"[13,18]. An international study also reported home care activities with handling of infectious waste, being carried out by CHA and, consequently, before the HSW generation in the households, they did not have an adequate management, being reported the absence of PPE for such procedures. The results suggest the need to structure the PHC in order to enable the environmental health agenda, developing skills of its workers and still operating consistent environmental public policies[16].

The lack of adequate physical areas for the storage of HSW was verified and, in some cases, the storage was in the access route of the users. Transportation was identified as an inadequacy since when asked to the participants of the research, they were unable to report the frequency and standardized times for this stage of management as well as the waste (except sharps), discarded in the common trash, and, finally, containers in places that allowed the users to access the HSW[19]. It is argued that the (internal→external) route and times for this collection need to be fixed, daily and the internal and external storage well known by the workers[24], emphasizing the correct transport dynamics that provides for the minimum possible manual contact, in addition to the regulations point out that the collection for final destination should be carried out in periods of lower flow of users[22].

In view of these inappropriate scenarios, a simplified example of implementation of the HSWMP includes: presentation of documents, purchase of equipment, fixing of notices and symbols in the units, conforming operational practices to give greater safety to workers and users, improvement of segregation through sequential lectures with collective training, instrumental support for cleaning staff [25]. For this support, internationally, it is possible for government agencies to allocate specific professionals for training in units and the points to be clarified would be: handling with the use of PPE, accepting responsibilities shared with the entire team and constant cleaning of storage areas [22].

Regarding general knowledge reverberating in attitudes and practices, for quantitative descriptive study, the levels of education and the profession of each component of the team are correlated. The medical category obtained a higher percentage of good attitudes towards management, compared to other categories such as nurses, managers and technicians; most of those who had a degree and were over 46 years of age had better knowledge[26]. The low percentage of professionals who verbalized in a mixed method study, some approach in relation to HSW during training (2.6%) also draws attention, as well as the lack of knowledge of 67% about the Resolution of the Collegiate Board 306 of 2004 of ANVISA that exposes about the HSWMP[21]. A quantitative study calculated that the daily generation of biological waste was 10 to 20 liters, common waste of 1 to 2 liters and 0.2 of up to 1 kg of sharps, in line with other evidence, most did not know if there was the generation of chemical waste[24].

In this context, permanent education must be fortified or initiated in several of the services assessed, instrumentalizing them[13-15,17,20,22-23-27]. Continuing education on the subject allows not only compliance with the rules, but also

a teaching-learning process that must be incorporated into the HSWMP, favoring the planning and implementation of good practices in primary health services[24].

Likewise, training programs should not be limited, discussing, for example, the management of the entire process in general without imputing responsibilities to each one[19]. When well performed and, relying on the reference of the praxis itself, it is an instrument for institutional assessment of health organizations[15], permanent education combined with the elaboration of a HSWMP refer to a context that permeates sustainability in PHC relating incorrect disposal to soil, water and environmental degradation, inquiring the prior knowledge [20,21] of those involved in learning based on service problems.

It is urgent that the units have an adequate structure, stimulating training and interactions with other levels of attention to focus primarily on worker safety, in addition to the safe care and development of a HSWMP. Within the scope of PHC, the qualification of human resources needs to discuss current health policies and the collective engagement of managers and professionals who establish connections between health and the environment and also include the community in their proposals[18,21].

Given the volume of inadequacies found, fundamentally in the organization and implementation of HSW management, combined with the structural and knowledge difficulties, the situation of PHC that these countries experience was demonstrated. Then, it is verified that among the stages of collection until the final destination of the HSW were little explored by the studies.

Proposals for the implementation of the correct management in Primary Care

Generally, the scope of direct care is the most prioritized, relegating activities aimed at environmental preservation and its interface with health promotion to a secondary plan, thus forgetting the HSWMP[21]. Such a management plan is enhanced by: addressing hazardous chemicals and objects such as fluorescent lamps, batteries and electronics, ways to monitor the quality and quantity of indicators, ways to find support for permanent education actions, how to train newly arrived employees in the service and conjecture campaigns on the subject with users[25].

An Iranian intervention (P17) was systematized with clinical audit, interprofessional participation, management commitment and evidence-based deliberations. Two workshops were held and distribution of leaflets and educational posters (in the Management and training axis); availability of yellow, blue and black trash cans for infectious HSW and plastic bags common to group D and monitoring through labels the infectious trash cans (in the separation and collection axis); in the transport and temporary storage charge for pushcarts, if the unit does not have space and dialogue about the periodicity of the transfer to the final destination (in the Transport and temporary storage axis); distribution of PPE for those working in the disposal, improvement of the facilities aiming at the best washing of floors and scheduling of sterilizations with a specialized company at the packaging site (in the Sterilization and disposal axis)[28].

In the case of sterilization, the centers need to hold documents to record the volume of sterilized waste in each shift of service and delivery to the municipality, and sufficient volume of safety boxes and, if they exist, the autoclaves need to undergo microbial tests[17], the disposal of medicines, by way of example, needs to be clarified with the description of a routine for this specific disposal. Subsequently, identify the contamination of the environment and bacterial resistance related to the consequences of improper disposal of medicines, which can be mediated by a light folder technology for professionals as in a Brazilian study[14].

Pointing out irregularities and knowing how to improve the unit goes through the recognition of flaws in the scope of care management, since waste is a direct product of care and vectors of pathologies[27]. In a study in rural areas, the authors resorted to the expression "hostile environmental practices" to report the illegal dumping of waste in streams, roads and forest areas and the danger of burning or burying waste such as diapers[16] and, finally, a broad dialogue with the municipal government on the disposal of common waste of PHC, usually being the "dumping ground" – as the popular sense calls it[20].

Inadequacies in the context of the dehospitalization of family health strategies are verified in the lack of logistics to provide the households of assigned area, with inputs for the disposal and handling of what was produced: predominantly the inputs used in dressings, sharp waste and other contaminated materials[18]. Thus, a situational diagnosis is taken as a proposition, predicting to list management

failures and operationalize processes with the available resources and being the prelude of a structured HSWMP. The instruments with objective information about the legislation help to circumvent the ignorance, giving a situational and managerial diagnosis, this would certainly monitor indicators annually allowing the staff to imbue themselves and the HSWMP[13, 25]. However, the implementation of this standard has been hindered by the lack of technical knowledge, training and protocols[21], a reality investigated in an Iranian study that reports the absence of means of intervention in 98% of the studied units [17].

It is noticed that the change of behavior and the engagement of workers of all categories is an effort that the programmatic training of permanent education predicts. In certain contexts, this paradigm shift comes as a structured proposal to reduce the degree of generation of infectious waste, since the plans, established in "small generators" as the units are considered, monitor the indicator of infectious waste by procedure and sector[25].

Intending propositions, we highlight research with a tool that systematized legal elements on the management practices attributed to nurses; the axes of this instrument are: Information on the generating and responsible establishment; Flow of the elements by original sector with characterization of the types of waste (A to E) and critical areas; Description of the external flow and generation mitigating measures; Record of generation indicators and waste minimization goals (which are a detailed mean daily generation rate per group A to E, total generation rate of waste per service in kilograms, generation rate of infectious and sharp waste A added to E, per procedure in critical areas); and Checklist of normative aspects, preventive actions of risks to health and the environment, with a comprehensive description of internal management. To be instrumentalized with a tool of this organizational nature allows, in addition to quantification, performance assessment (total and sectoral) and a goal plan[29], a risk-free care management.

In short, the synthesis performed by IR has limitations, such as not explaining the design of each study captured for the sample. It is evident that more interventional studies in PHC should start to prioritize as research objects normative assessment instruments based on ANVISA with regard to the Brazilian scenario, together with the dialogical elaborations of the HSWMP by the interprofessional team composed of professionals with higher education or not. Nevertheless, it is idealized and proposed that at this level of care, more actions of a purposeful nature are developed aiming at strengthening social control, environmental health and popular health education of users.

CONCLUSION

It was summarized in this IR that the state of evidence has a low level for clinical practice (Level VI). It is described that studies focusing on PHC belong to emerging or underdeveloped countries and are still located in a descriptive methodological panorama, lacking, except for some studies of the sample, precisely propositions and interventions for the management and in-service education of the interprofessional team on HSW. This IR corroborates the international recommendations for continuing education in service to be initiated or reinforced in units with the profile of the sample of primary studies, recognizing that the knowledge of the interprofessional team impacts on its practices in the face of HSW and on a broader scale in the environmental health of the place in which the PHC is inserted. Consequently, for services that do not yet have management awareness, perform a diagnostic-situational assessment based on reliable instruments and then dialogue within the team (with higher education professionals or not), to formulate the HSWMP, highlighting that this routine is the basis for proper management.

From now on, the following research agenda around the theme is supported: establishing the HSWMP with health sectors and organized civil society at the PHC level, establishing problem-based learning methods for HSW aimed at the interprofessional team, establish problem-based learning methods of HSW aimed at users of PHC units, research for structural improvements of PHC for external packaging of HSW, research on the harm of poor management in PHC for occupational health, including professionals internal and external to the service, such as workers transporting HSW.

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