

Waste from Health Services: Situation and Actions in a Public Hospital from Manaus (Amazonas, Brazil)

Jacqueline Cabral Macedo¹, Edivaldo Herculano C. de Oliveira²

¹ Student of the Professional Master's Degree in Sciences and Environment of the Federal University of Pará- UFPA, Brazil

² Professor of the Professional Master's Degree in Sciences and Environment of the Federal University of Pará; Researcher in Public Health; Tissue Culture and Cytogenetic Laboratory -SAMAM - IEC; Associate Professor IVFaculdade de Ciências Naturais -ICEN – UFPA, Brazil

Abstract— *The amount of solid waste is a serious environmental problem. We highlight among these wastes those that can be highly contaminating, such as health services wastes, called "hospital waste". There are several reports of victims of occupational accidents, especially with puncture wounds, and contamination by pathogenic agents such as HIV-1 may even occur. Thus, it is necessary to sensitize users and professionals to the risk of contamination by serious pathologies, including those that have no cure. Thus, the main objective of this study was to analyze the situation of health service waste disposal in a public hospital in the city of Manaus (AM), and, based on the results, to propose improvements in the process. After the detection of many inconsistencies and the need for better knowledge on the part of its employees, it was proposed to write and distribute a booklet as a precursor, didactic, illustrative tool for employees and users of this hospital. The material was distributed and accompanied by informative lectures on the risks and rules regarding the correct handling and disposal of hospital waste. Considering the good reception and participation of the employees, we concluded that education and clarification are important tools for the implementation of improvements in the handling of the issue of waste generated at the unit, prevention of drilling accidents aiming at improvements in the management and responsible disposal of health service waste, and thus contribute to the Environment and Public Health.*

Keywords— *health service waste, educational technology, waste disposal, public health.*

I. INTRODUCTION

The production of waste is inevitable, from human activities solid waste is generated in two ways: as an inherent part of the production process and also when the useful life of the products ends¹. Unfortunately, this does not happen only with what we call garbage or household waste. There are also wastes that can be highly contaminating, such as Health Services Waste (HSW), commonly referred to as "hospital waste".

Faced with increased waste production, one of the most serious problems is the disposal and treatment of hospital waste, as responsible investments in educational and logistical technologies for the management of RSS in health services are still rare. Corroborating this research is the study from Braga (2013)², carried out at Hospital Universitário Osvaldo Cruz - HUOC, in the city of Recife/PE, which evidenced the lack of logistics and other appropriate

technologies aimed specifically at various types of hospital waste.

The Ministry of Health (2006)³, in the discussions of the guidelines that composed the Pacts for Life and in defense of the Single Health System (SUS), as well as the responsible management, attributes relevance in the questions of understanding that unfavorable environmental conditions of most health services are potential generators of negative impacts to the environment, with serious implications for the health of individuals. They represent incalculable risks (chemical, physical, and biological) to public health, whose sources of pollution are distinct: high production of health service waste and poor management, emission of hazardous gases, inadequate treatment of water for human consumption, improper final destination for effluents and waste, pest control, among others. Therefore, the environmental issue assumes fundamental relevance, especially for health workers, since working and living healthily depend intrinsically on the quality of human and

environmental life. These professionals must incorporate health and environmental education into their daily practices. The handling, disposal and correct destination of RSS are the responsibility of the management of institutions and of all professionals who work in these establishments. Thus, learning the basic concepts of solid waste management and being aware of the possible consequences generates a qualified and committed professional with the environment⁴.

As the main fact of this study and the relevance of the theme, we bring the experience of 21 years of working activities of one of the researchers as a servant of the Amazonas State Health Secretariat (SUSAM). Of these 21 years, 18 were dedicated to the Emergency and Trauma Sector and Medical Clinic of a public hospital in the city of Manaus, capital of the state. It was during logos of years of toil in these sectors that the researcher observed flaws in the processes of Health Services Waste Management (RSS), and Environmental Education for employees in that unit. From the inconsequence's observed, and after 02 meetings held in July and August of the year 2019 with the management, then arose the idea of the researchers to produce an Educational Technology for Environmental Health for employees with coverage to the users of the unit.

Still this issue of RSS, we have opened gaps for the following questions: in what way could health professionals

contribute to addressing this Public Health problem? Do the health units' management train their teams for Environmental Education? In what way? The main objective of this study is to disseminate an Educational Booklet, as an educational tool suggested to a public hospital in the city of Manaus (AM).

THE RESEARCH LANDSCAPE

The researchers experience the sad reality of the lack of management and correct final destination of health services waste generated in the unit they have chosen to describe in this study. With full freedom granted by the unit's management, accompanied by the administrative manager, the researchers visited the unit's external area, which caused perplexity when they saw the scenes in Figures 1A, B and C. In addition to the worrying situation of the management of waste generated at the unit, we detected another situation distinct from the context of our study, the social one. When we entered the woods surrounding the unit, we found that resident and non-resident chemical dependents near the hospital collect the boxes of perforators left in the hospital trash, open them, and reuse the syringes already discarded in them, subject to contamination by infectious diseases such as AIDS and Hepatitis C. They also use the rest of the drugs present in the ampoules and in the discarded bottles.

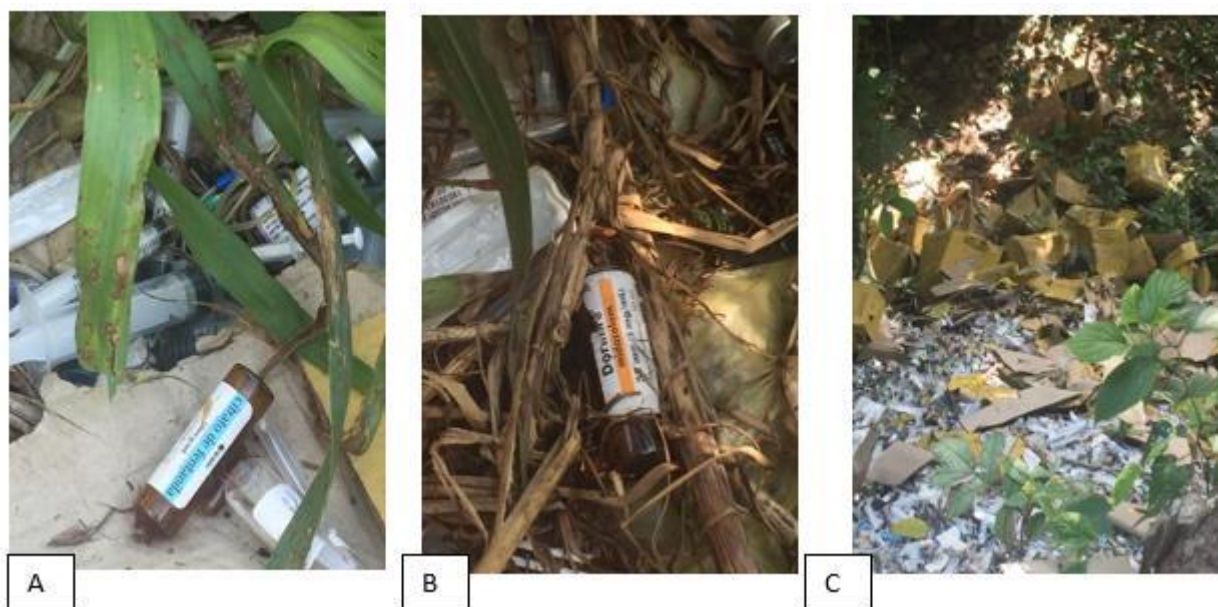


Fig.1 A, B and C: Open-air hospital waste. A: Empty ampoule of Fentanyl; B-Ampoule of Midazolam; C: Open hole boxes.

Source: authors' collection

As the images show, there is a frightening diversity of drug vials and syringes. The extensive area of land that

belongs to a private entity neighboring the unit, which, according to the administrative management, has filed

lawsuits involving the issues of Health Services Waste (RSS), against the unit due to the serious situation proven in the images. Thus, we justify our suggestion of Educational Technology elaborated for the employees and users of this public hospital in the city of Manaus in Amazonas in the format of a booklet. Coinciding with the opinion of Reis (2005), the integration of reduction and management in waste generation is related to the promotion of educational attitudes and practical environmental education actions, which are rare in places that provide health care. The author also complements that it is necessary to educate in order to preserve the environment where we live. The development of the interface between health and environment, with the purpose of implementing an environmental health policy, emerges from the need to improve the current model of the Single Health System (BRAZIL, 2007).

Thus, this study has as main objective to disseminate in a public hospital, educational technology for Environmental Health, from the production a didactic precursor instrument, illustrative in the form of a booklet for employees and users of this hospital. The target of the construction of this material was to work collaboratively with the Center for Permanent Health Education (NEPS), helping in the implementation of improvements in the bundling of the issue of waste generated at the unit. At the end of the work, we aimed at disseminating this material to other health institutions in the capital. With positive results of our study, in the future we would have health professionals more aware of environmental issues.

HEALTH SERVICE WASTE: THE SITUATION IN BRAZIL

Waste from Health Services (RSS), for the Brazilian standards of terminology, classification, handling and collection of waste and health services, are defined as waste resulting from the activities performed by establishments providing health services. It covers the residues from the most diverse sources potentially generating, such as hospitals, medical, veterinary and dental clinics, pharmacies, outpatient clinics, health posts, clinical analysis laboratories, food analysis laboratories, research laboratories, medical and dental offices, biotechnology companies, retirement homes and funeral homes⁵. The National Health Surveillance Agency (ANVISA), broadens this understanding from the RDC ANVISA 306 of 2004 and CONAMA Resolution 358 of 2005⁶, which defines as Waste from Health Services (RSS), all waste generated in service activities related to human or animal health care, analytical laboratories of health products, mortuaries, funeral homes and services where embalming activities are performed, legal medicine services, drugstores and pharmacies, among many others.

In all health facilities, integrated RSS management should advocate not to generate, minimize and reuse waste where possible in order to avoid negative effects on the environment and public health. As for RSS, it is important to note that of the 149,000 tons of residential and commercial waste generated daily, only a fraction below 2% is composed of RSS and, of these, only 10 to 25% need special care⁷. In any case, the implementation of segregation processes of the different types of waste is unquestionable, especially in those that predominate biological risks, and the concept of the disease transmissibility chain, which involves characteristics of the aggressor agent, such as survival capacity, virulence⁸ should be considered.

NATIONAL SOLID WASTE POLICY - PNRS

Brazil has tirelessly created a mechanism for Environmental Sustainability. In 2010 it established the National Policy for Solid Waste (PNRS). This is an integrated management that articulates the management of solid waste in the social, environmental and economic spheres. Under Federal Law No. 12,305/2010, the PNRS recognizes the work of cooperatives and associations of collectors, and defines that they are prioritized in hiring for the execution of urban cleaning services. The establishment of a regulatory framework in this area should be understood as an instrument inducing social, economic and environmental development⁹.

Among the objectives of Law 12305/2010, the "protection of public health and environmental quality" (art. 7, item I) and guidance on the order of priority in the management and handling of solid waste, understood as the "non-generation, reduction, reuse, recycling and treatment of solid waste, as well as the final environmentally appropriate disposal of the waste" (art. 7, item II), are contemplated, and are legally correct behaviors in the management of solid waste and, therefore, the violation of these general obligations entails the incidence of financial charges to polluters¹⁰.

The constant dumping of garbage in unprotected environments associated with the continuous dumping of waste and objects of the most varied species in rivers, public roads, lands and in many places that should be protected, has brought generalized disorders to the Brazilian people¹¹. This statement is based on the disposal of unserviceable materials of various types, attracting vectors of diseases such as dengue, leptospirosis, dermatitis, accidents with perforating materials.

THE INADEQUATE SEGREGATION

On March 28, 2018, the health surveillance launches the Resolution of the Collegiate Directorate - RDC No. 222, which in its Chapter III, Article 11, provides the rules for segregation, packaging and identification. According to the article, the RSS must be segregated at the time of their generation, according to classification by groups. In its article 12, it guides that at the moment of RSS generation, if segregation according to different groups is not possible, the collectors and bags should be handled in compliance with the classification rules described in the annex to the resolution, with important details.

Inadequate segregation contributes to an increase in the amount of contaminated waste and occupational accident risks for workers. Wrong segregation can result in contact with the contaminated, making them also infected, thus increasing the risks of contamination for the population. RSS is a challenge for hospital managers since, in addition to environmental issues, it has also become a public health issue. Added to this challenge, says the researchers, is the high cost to hospitals in subsidizing outsourced companies for segregation activities and other activities for the correct disposal of these RSS.

In a more specific approach to professionals handling RSS, health professionals, especially those in Nursing, are constantly exposed to risks of accidents at work¹². One of the characteristics of the work process of Nursing, especially in hospital environments, is the physical proximity to the users and the performance of invasive procedures. Therefore, contact, even if indirect, with organic fluids is common¹³. In this process, workers are susceptible to infections by blood-borne pathogens, such as the HIV virus and the HVB and HCV viruses.

In a survey conducted at the Ambulatory de DST e AIDS ad Foundation de Medicine Tropical do Amazonas (FMT), located in the city of Manaus (AM), the experience of a collaborator who was the victim of an occupational accident was reported. A 56 year old female nursing professional worked in the nursing area for many years. The patient was the victim of an occupational accident in 1999 when, immediately after the end of a venous puncture in a patient known to be HIV-1 positive, she had contact with her blood in the ocular mucosa after sudden movement of the patient.

The fact triggered its follow-up with the finding of seroconversion to HIV-1 positive status, during the follow-up recommended by the Ministry of Health. A serological test (HIV- ELISA) was carried out soon after the accident, on the same date, which resulted negative. The same test was repeated approximately eight weeks later with a positive result. The authors emphasize in the study that it is not

enough to have responsible disposal plans, RSS management and permanent education technology for people and environment health. It is necessary to sensitize users and professionals to the risk of contamination by serious pathologies, including those that have no cure¹³.

ENVIRONMENTAL EDUCATION FOR NURSING PROFESSIONALS

The Health Sciences area is composed of specialties unique to human care, among them Nursing, as a profession that composes the field of health, also needs to be involved in the discussions of environmental issues. Establishing action proposals that are compatible with two aspects in particular: one of them is related to the development of actions aimed at the preservation of the environment, facing the impact resulting from human actions, sometimes harmful to the natural environment^{4,14}. In the issue of Health Services Waste (RSS), its management and responsible disposal have the nursing team as one of the main responsible¹⁴.

The concept of Environmental Education can be understood as a process where the main individual must be involved in the teaching-learning link to be applied. In the team, each one must be a participative agent in the analysis of each environmental complaint previously diagnosed, especially with the RSS¹⁵. In this way, it is easier to seek solutions to achieve results and prepare disseminators of skills, through ethical behaviors to exercise the office of educators in the process whose are inserted. It is impossible not to agree with the mentioned author, because especially health professionals who work in large reference health units, regarding the correct management of the RSS, need by the management of the units, training activities to proceed correctly in the disposal of waste generated.

ENVIRONMENTAL EDUCATION IN BRAZIL AND ITS PRACTICES IN THE AMAZONS

The Amazon with all its wealth of biodiversity faces in the last decades disastrous situations in the questions related to what to do with the waste generated. In research carried out in the city of Parintins, in Amazonas with the objective of researching on Environmental Education in that city and the management of solid waste in the small city considered by the Amazonians, capital of Brazilian Folklore¹⁶. According to researches, in the Folkloric Festival of Parintins - which takes place annually in the last weekend of June, carnival period and in the end of year festivities, it is verified that the generation of solid residues in the city grows vertiginously and reaches peaks above 75 tons/day. This phenomenon shows the relationship between the increase in consumption and the production of waste in the city, its subsequent disposal of rejects and even

recyclable materials in the city's public dump. The study found that the municipality of Parintins still does not operate a system of selective collection, in the year of the study it was being implemented. There is no Environmental Education project for the local population^{17,18}.

In that city, the domestic waste collected daily is composed of the most diverse types of materials such as: organic, glass, bottles, aluminum cans, cardboard, plastic cups, paper, all with final destination to the city's public garbage dump. It is a little more than 4 km away from the city's airport, which means that due to the large number of vultures and other birds associated with garbage, there are no day flights available in the municipality, due to the imminent risk of collision of birds with the aircraft turbines¹⁸.

ENVIRONMENTAL EDUCATION IN HEALTH FACILITIES

In the hospital sphere, when the subject is Environmental Education and [Health Services Waste](#) Management (RSS), we consider that all professionals in the multidisciplinary team have great importance in the process of Educating to Prevent. However, of all the categories that make up the team, one is essential in the implementation of permanent education activities, the nurse. Our statement is in agreement with the placement that nursing as a science reaches areas such as care, management and education.

The desired result of the teaching-learning process of health education is health promotion, with the nurse being the main agent in this process. In addition, Law 7498/1986¹⁹, which regulates the exercise of the profession, art. II, defines as nursing activity exercised by the nurse, as part of the health team, the education aimed at improving the health of the population and its team.

Still on the health units, it is believed that Environmental Education is essential to prepare new mentalities and values, that creative, integrative and interactive minds are needed for the new Educational Technologies for public health, and that it is not only with modern software that we will achieve this, but also opening doors for a sustainable, equitable and democratic future²⁰. Camponogara (2011)²¹, on its turn, analyzes the ecological problem from the perspective of health workers a unique situation, taking into account that a hospital has a huge amount of activities with environmental impact, which generates countless waste and consumes a large amount of environmental resources. Unfortunately, in these environments, according to the author, there are no spaces for reflection and in this way the automatism and mechanization of conducts, many times wrong, is perpetuated. In these conditions, professionals remain on the

sidelines of participative management, conforming themselves to the reality set and the lack of perspectives that are already so common to them, in the hope that one day the situation may change for the better.

EXPERIENCES OF EDUCATIONAL PRIMERS ALREADY DEvised FOR ENVIRONMENTAL EDUCATION IN DEALING WITH WASTE FROM HEALTH SERVICES (RSS)

It is recommended that any idea about an Education process and its developments, when proposed in non-formal educational environments, such as the work environment, for example, need theoretical and methodological support capable of dealing with different daily demands^{22, 23}. Based on this statement, concomitant with information collected, supported by the current trajectory of non-conformities in the issues of the activities aimed at the correct management of RSS in the target institution of this study, we aimed to prepare an educational primer as a theoretical-methodological support, as an action to clarify these topics.

The working space of most health service professionals is the same as that of the reception and care of patients and their careers. The environment, the way they work, the way they are trained to perform their activities, can interfere with and compromise their work activities and the health of those who experience the same environment, that is, the patients²³. Before bringing experiences lived in health care establishments, in the implementation of educational technologies for environmental health, we emphasize what the federal autarchies recommend that in Brazil, Law no. 12.305/2010, RDC no. 306/2004 of ANVISA and the CONAMA Resolution, bring legal norms related to the management of health service residues. Law No. 12305/2010 establishes the National Policy on Solid Waste, providing on its principles, objectives and instruments, as well as on the guidelines for integrated management and management of solid waste - including hazardous waste -, the responsibilities of generators and public authorities and applicable economic instruments^{24,25}.

II. METHODOLOGY

The study was exploratory and descriptive, and in addition to the bibliographic research, field research on the management of health service waste at a public hospital in Manaus (AM, Brazil) was performed, aiming at the knowledge of the real situation at the chosen hospital. In MEDLINE, LILACS, COCHRANE; BIREME; BDENF and BDTD databases, bases chosen for search, we obtained as results a total of 73 scientific articles.

We have chosen to thoroughly review 41 of these, following some criteria for choice such as: availability of full texts released for consultation, emphasis on the disposal and management of solid waste in health and discussions on Environmental Education in public health units. At the end, in response to the request of the hospital management, we listed the information for the elaboration of an educational and illustrative booklet, which was presented to the unit's Nucleus of Permanent Education.

III. RESULTS AND DISCUSSION

THE EDUCATION AND CLARIFICATION TOOL: INFORMATION BOOKLET

The results achieved with the "HEALTH SERVICE WASTE MANAGEMENT GUIDE CART", the educational technology for Environmental Health, built for the employees of H.P.S. "Dr. João Lúcio Pereira Machado" exceeded expectations. In addition to the printed material, were held on 30 and 31/10/2019, 04 Workshops for the presentation and delivery of the guidance booklet to employees and some users during the day and night shifts. We emphasized the delivery of the instrument in the sectors of Politrauma and Medical Clinic, having been requested by

some collaborators that such actions were also performed in other sectors of the institution, and so we did.

During the presentation and delivery workshops of the Booklet for those interested, we asked 2 to 4 questions informally to some of those present if they had knowledge related to the content of the material. We obtained as a response the dissatisfaction of the majority of the employees questioned, alleging that the management of the unit does not show interest in training them for this issue. The knowledge of the risk potential of these residues was contradictory, but they showed interest in deepening their knowledge. Thus, we saw that the degree of orientation on the employees' RSS is still limited, as to the professional practice. It was observed that the legislation is not very well known by the professionals, and it was reported that there are no future projects committed to the issue of residues generated at the unit. This perception leads us to reflect that the motives are the critical financial issue, which crosses the whole state of Amazonas. We know that our educational material, Figure 2A and B, will contribute a lot to Environmental Education and Public Health. However, throughout all this work we have come to the conclusion through bibliographical research that investments are needed especially in infrastructure and permanent education in health units for the efficient management of RSS.

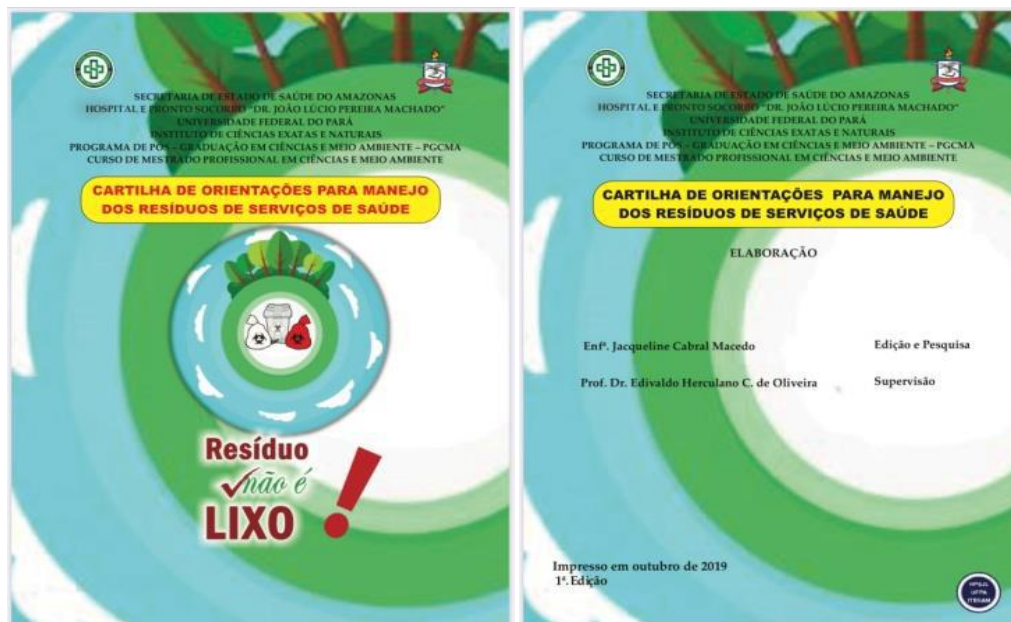


Fig.2: A and B: Cover and summary of edited material as an information and clarification tool.

Source: authors' collection

IV. FINAL CONSIDERATIONS

The development of informative material in the form of a booklet, accompanied by lectures and workshops during its distribution, highlighted not only the lack of knowledge on this topic by a good portion of employees,

especially outsourced companies, but also showed that this type of action can have a great importance for information, awareness and improvement in the process of management and disposal of RSS.

The inadequate management of RSS can cause diseases, contaminate workers through accidents that can occur in the generating source where they are manipulated. This may happen due to waste, especially perforating, containing pathogenic organisms such as hepatitis B and C viruses and HIV, AIDS viruses. Improper handling may allow uncontaminated material to come into contact with contaminated material, including the volume of health care waste and common waste. For this reason, it is indispensable for educational guidance for correct management.

Most health units in the city of Manaus in Amazonas, especially the public ones, face great financial difficulties, which directly impacts the process of RSS disposal, among other problems. Let us admit that the topic of Health Service Waste is not clearly discussed, lacking a better clarification of the norms. The subject has great impact in the current times, it is important to bear in mind that the lack of knowledge can cause serious damage, from contamination of health employees, public cleaning professionals and environmental pollution.

With this study we conclude that the implementation of a Health Services Waste Management Plan is necessary and urgent. However, for this action to be outlined and planned, health professionals must be informed, informed and trained in relation to RSS, its generation, its adequate disposal, and the dangers related to this type of disposal. Actions of clarification and information can be a first step for the viability of larger interventions, with the intention of getting closer to the appropriate ways of dealing with this type of disposal, bringing benefits to society and the environment.

REFERENCES

- [1] CALDERONI, S. The billions lost in the garbage. São Paulo: Humanitas Publications - FFLCH/ USP, 2003.
- [2] BRAGA, L. O. Diagnostic of the process of disposal of Hospital waste. Universidade Osvaldo Cruz/PE (Dissertation on Development and Environment)
- [3] - Universidade Federal de Sergipe / Federal University of Pernambuco, p. 69 and 92. 2013.
- [4] BRAZIL. Ministry of Health. Pacts for life, in defense of SUS and Management - operational guidelines. Pactos pela saúde series 2006. Vol. 1. Departamento de Apoio a Descentralização/Secretaria Executiva, Brasília.
- [5] VARGAS, L.A.; OLIVEIRA, T.F.V. de. Saúde, Meio Ambiente e Risco Ambiental: Um desafio para a prática profissional do enfermeiro. Magazine Enfermagem UERJ. Rio de Janeiro. v.15 n.2.p.451-455. Apr/jun, 2007.
- [6] SCHNEIDER, V. E. et al. Manual of solid waste management in health services. 2. ed. rev. and ampl. Caxias do Sul, RS: EDUCS, 2004.
- [7] BRAZIL. Ministry of Environment. National Environment Council. Re-Resolution Conama No. 358, April 29, 2005: provides on the treatment and disposal of waste from health services and makes other provisions. Official Gazette of the Federative Republic of Brazil, Brasília, n. 84, Section 1, 4 May 2005, p. 63-65.
- [8] BRAZIL. Ministry of Health. Pacts for life, in defense of SUS and Management - operational guidelines. Pactos pela saúde series 2006. Vol. 1. Departamento de Apoio a Descentralização/Secretaria Executiva, Brasília.
- [9] BRAZIL. National Policy on Solid Waste. - 3. ed., reimpr. - Brasília: Câmara dos Deputados, Edições Câmara, 2010. 80 p. - (Legislation series; n. 229 PDF). Available: file:///C:/Users/Jack/Downloads/politica_residuos_solidos_3ed.reimp.pdf.
- [10] BRAZIL. National Policy on Solid Waste. - 3. ed., reimpr. - Brasília: Câmara dos Deputados, Edições Câmara, 2010. 80 p. - (Legislation series; n. 229 PDF). Available: file:///C:/Users/Jack/Downloads/politica_residuos_solidos_3ed.reimp.pdf.
- [11] MACHADO, Paulo Affonso Leme. Principles of the national policy on social waste. In: JARDIM, Arnaldo et al (Org). National policy, management and solid waste management. São Paulo: Manole, 2012. p. 39 - 56.
- [12] VENTURE, Waldir. Brief Comments on the National Policy on Solid Waste: Law No. 12,305/2010. Available: <https://www.unaerp.br/revista-cientifica-integrated/edicoes-anteriores/volume-2-edicao-1/1555--24/file>. Access: 21/02/2019.
- [13] SOARES, LG, Labronici LM, Maftum MA, Sarquis LMM, Kirchhof AL. Biological risk in nursing workers: promoting reflection and prevention. Cogitare Enferm. Internet 2011 cited 2015 Oct 20; 16(2):261-7. Available from: <http://revistas.ufpr.br/cogitare/article/viewFile/21815/14225>.
- [14] LUCENA, Noaldo Oliveira de et al. HIV-1 infection after occupational accident, in the State of Amazonas: first documented case. Rev. Soc. Bras. Med. Trop. [online]. 2011, vol.44, n.5, pp.646-647. ISSN 0037-8682. Available: <http://dx.doi.org/10.1590/S0037-86822011000500027>.
- [15] CAMPONOGARA S, Ramos FR, Kirchhof ALC. The ecological problem in the vision of hospital workers. Ciência Saúde Coletiva. 2011; 16(8):3561-70.
- [16] PHILIPPI JR, Arlindo; ALVES, Alaôr Caffé; ROMÉRO, Marcelo de Andrade; BRUNA, Gilda Collet (ed.). Environment, law and citizenship. São Paulo: Signus Editora, 2002.
- [17] SON, G.T.C. The management of solid waste in Parintins/AM in the light of the national solid waste policy. Master's Degree in Environmental Sciences and Sustainability in the Amazon. PPGCASA/UFAM. Professor of the Subsequent Technical Course on Administration at IFAM - Parintins/AM Campus. 12, n. 1, jan./jun. 2012. Available: www.periodicos.ufam.edu.br/somanlu/article/view. Access on 26/08/2019 14:17.
- [18] BRAZIL. Law No. 7498 of 25 JUNE 1986. Deals with the regulation of the exercise of Nursing.

- [19] LEFF, E. The environmental complexity. São Paulo (SP): Cortez; 2003.
- [20] Camponogara S, Ramos FR, Kirchhof ALC. The ecological problem in the vision of hospital workers. *Ciência Saúde Coletiva*. 2011; 16(8):3561-70.
- [21] ALVES, Sergiane Bisinoto. Health Services Waste Management in Basic Care [manuscript] /Sergiane Bisinoto Alves. -2010. 148 f.: il. figs.
- [22] ALVES, M. L. (2008). Environmental health and health service waste in the three levels of complexity of the Single Health System - SUS. [Dissertation of Mes- Trado]. Natal: Programa Regional de Pós-Graduação em Desenvolvimento e Meio Ambiente/PRODEMA. Federal University of Rio Grande do Norte.
- [23] BRAZIL. Ministry of Environment. National Environment Council. Conama Resolution No. 358, of April 29, 2005: provides on the treatment and disposal of waste from health services and makes other provisions. Official Gazette of the Federative Republic of Brazil, Brasília, n. 84, Section 1, 4 May 2005, p. 63-65.
- [24] BRAZIL. National Policy on Solid Waste. - 3. ed., reimpr. - Brasília: Câmara dos Deputados, Edições Câmara, 2012. 80 p. - (Series legislation; n. 229 PDF). Available:file:///C:/Users/Jack/Downloads/politica_residuos_solidos_3ed.reimp.pdf.