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RESEARCH

MANAGEMENT OF WASTE FROM HEALTH SERVICES IN THE ROUTINE OF PRIMARY HEALTH CARE NURSES

GERENCIAMENTO DE RESÍDUOS DE SERVIÇOS DE SAÚDE NA ROTINA DOS ENFERMEIROS DA ATENÇÃO BÁSICA À SAÚDE

GESTIÓN DE RESIDUOS DE SERVICIOS DE SALUD EN LA RUTINA DE ENFERMEROS DE ATENCIÓN BÁSICA DE SALUD

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ABSTRACT

Objective: to assess the generation and management of waste from health services (WHS) in the services included in Primary Health Care. **Method:** a descriptive study with a quantitative approach. This research was conducted with the people in charge of managing WHS from 27 health care facilities. The data were collected by means of self-administered questionnaires, as well as the WHS weigh, and were analyzed through descriptive statistics. The research was approved by UFSCar's Research Ethics Committee. **Results:** the 27 health care facilities generated 719.665 kg of WHS, with 300.140 kg generated by the Family Health teams (FHts) and 419.525 kg by the Basic Health Units (BHUs). It is noteworthy that 66.6% (14) of the FHt participants were unable to describe how the chemical waste was segregated; and that 50.0% (6) of the BHU respondents were unable to report the type of final disposal for the WHS. **Conclusion:** the high generation of WHS and the gaps presented in management can be minimized through the implementation of measures aimed at training those responsible for the management and the health care workers, in addition to the implementation of selective collection in order to contribute to sustainable development.

Keywords: Medical Waste; Waste Management; Primary Health Care; Nursing; Environmental Health.

RESUMO

Objetivo: *avaliar a geração e o gerenciamento de resíduos de serviços de saúde (RSS) nos serviços inseridos na atenção básica à saúde.* ***Método:*** *estudo descritivo e de abordagem quantitativa. Esta pesquisa foi realizada com os responsáveis pelo gerenciamento de RSS de 27 estabelecimentos de saúde. Os dados foram coletados por meio de questionários autorrespondidos e pesagem dos RSS e foram analisados por meio da estatística descritiva. A pesquisa foi aprovada pelo Comitê de Ética em Pesquisa da Universidade Federal de São Carlos - UFSCar.* ***Resultados:*** *os 27 estabelecimentos de saúde geraram 719,665 kg de RSS, sendo 300,140 kg de RSS gerados pelas Equipes de Saúde da Família (EqSF) e 419,525 kg de RSS oriundos das Unidades Básicas de Saúde (UBS). Destaca-se que 66,6% (14) dos participantes de EqSF não souberam descrever como era realizada a segregação dos resíduos químicos; e 50,0% (6) dos respondentes de UBS não souberam informar o tipo de disposição final oferecida aos RSS.* ***Conclusão:*** *a elevada geração de RSS e as lacunas apresentadas no gerenciamento podem ser minimizadas por meio da implementação de medidas que visem à capacitação dos responsáveis pelo manejo e trabalhadores dos serviços de saúde, além da implantação da coleta seletiva a fim de contribuir para um desenvolvimento sustentável.*

Palavras-chave: *Resíduos de Serviços de Saúde; Gerenciamento de Resíduos; Atenção Básica à Saúde; Enfermagem; Saúde Ambiental.*

RESUMEN

Objetivo: *evaluar la generación y gestión de residuos de servicios de salud (RSS) en servicios incluidos en la atención primaria de salud.* ***Método:*** *estudio descriptivo con enfoque cuantitativo. Esta encuesta se realizó con los responsables de la gestión del RSS de 27 establecimientos de salud. Los datos fueron recolectados a través de cuestionarios auto respondidos y pesaje RSS y fueron analizados usando estadística descriptiva. La investigación fue aprobada por el Comité de Ética en Investigación de Universidade Federal de São Carlos - UFSCar.* ***Resultados:*** *los 27 establecimientos de salud generaron 719.665 kg de RSS, con 300.140 kg de RSS generados por los Equipos de Salud de la Familia (EqSF) y 419.525 kg de RSS de las Unidades Básicas de Salud (UBS). Cabe señalar que el 66,6% (14) de los participantes de EqSF no pudieron describir cómo se realizó la segregación de desechos químicos; y el 50,0% (6) de los encuestados de UBS no pudieron informar el tipo de disposición final ofrecida al RSS.* ***Conclusión:*** *la alta generación de RSS y las brechas en la gestión se pueden minimizar mediante la implementación de medidas dirigidas a capacitar a los responsables de la gerencia y trabajadores de los servicios de salud, además de la implementación de la recolección selectiva con el fin de contribuir al desarrollo sustentable.*

Palabras clave: *Residuos Sanitarios; Administración de Residuos; Atención Primaria de Salud; Enfermería; Salud Ambiental.*

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INTRODUCTION

Political mobilization in the face of the problems related to the growing generation and final disposal of solid waste intrinsic to human development resulted in the enactment of the National Policy on Solid Waste (*Política Nacional de Resíduos Sólidos*, PNRS) in 2010, defining actions aimed at minimizing the volume of waste generated in the country and at mitigating the risks to health and to the environment.[1]

Among the groups of solid waste, there is waste from health services (WHS), classified by Collegiate Board Resolution (*Resolução da Diretoria Colegiada*, RDC) No. 222/2018 of the National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária*, ANVISA) in the following five groups: Group A, biological waste; Group B, chemical waste; Group C, radioactive waste; Group D, regular waste; and Group E, sharps.[2]

WHS management must comply with the rules defined in Resolution No. 358/2005 of the National Council for the Environment (*Conselho Nacional do Meio Ambiente*, CONAMA) and RDC No. 222/2018 of ANVISA, which define the legal techniques for waste management and require that every WHS generator prepares a Waste from Health Services Management Plan (WHSMP). This plan consists of a document describing the WHS management stages, namely: segregation, packaging, identification, collection, storage, treatment, collection and external transportation, and final disposal, as well as actions to protect public health and the environment.[2,3]

Currently, in several developing countries, WHS management is still considered a problem due to population growth and to the growing demand for health services, associated with gaps found in the WHS management stages, mainly with regard to segregation and proper final disposal.[4]

In this scenario, studies on WHS were carried out in several countries, especially in the hospital context.[4,5] Studies developed in the mobile pre-hospital care service[6], in drugstores and compounding pharmacies[7] and in Primary Health Care (PHC) units are also highlighted.[8,9]

The studies reveal that deficiencies in WHS management, such as lack of training of the professionals involved in WHS generation and management, failure to quantify the waste and lack of organization and systematization of management, increase the risks to public health and to the environment.[6,8,9]

In relation to international studies, a number of authors highlight that adequate WHS management involves the prevention of diseases related to handling. Others point out that not all professionals involved in WHS management are vaccinated against Hepatitis B; in addition to that, they indicate the need to carry out adequate segregation, as the amount of biological, sharps and chemical waste found in their studies is higher than what is recommended by the guidelines, requiring more attention from the handlers and the managers, in addition to the development of actions aimed at management adequacy.[10,11]

Studies that address WHS management in PHC are fewer in numbers when compared to those developed in hospitals; however, the risks arising from management of this waste are the same, regardless of the type of facility, and even with less WHS generation in these services.[8,12]

Among the services that comprise PHC are the Family Health Strategy (FHS) and the Basic Health Units (BHUs).[13] It is noteworthy that the FHS and BHUs are services that offer low-complexity care, directly implying less waste generation, when compared to hospitals.

WHS management is worthy of attention of the actors involved, whether managers, technicians responsible for managing the WHS and health and cleaning professionals and in all scenarios that generate WHS. For WHS management to be carried out effectively and properly, it is essential to carry out studies on the situation of waste management in order to present new indicators and an updated overview.

Studies on the management of WHS generated in PHC present gaps in the literature, as they emphasize waste generation and segregation and do not explore the other stages of WHS management. In this sense, this research aims at analyzing this knowledge gap that refers to the evaluation of WHS management, as well as the quantification of the daily generation of this waste in PHC services.

METHOD

This is a cross-sectional and descriptive research study with a quantitative approach. It was conducted in 27 PHC health care facilities from the municipality of *São Carlos*-SP, which consist of 22 Family Health teams (FHts) and 12 BHUs. It is noted that the physical space of six health institutions house two FHts and that one health facility divides the space between 1 FHt and 1 BHU. The other 20 health care facilities house one health team each, totaling 27 health institutions.

A Family Health Unit (FHU) may consist of more than one FHt, that is, the physical space can be divided into two teams, each one working with its own population attached. Thus, it is possible that any given health institution consists of one FHt and one BHU housed in the same place.

Due to the common spaces of the teams that share the same health unit, it was not possible to weigh the WHS separately by team; consequently, the generation of the set, that is, of both health teams, was presented. The data were collected from October 23rd, 2017, to August 3rd, 2018.

The study population consisted of 33 participants, responsible for the WHS management, namely: 21 FHt professionals and 12 from BHU teams; all were nurses and had been working in this position for more than two months; however, the participants who were on vacation and/or leave were excluded. In this context, one nurse refused to participate in the study.

Resolution No. 303/2005 of the Federal Nursing Council (*Conselho Federal de Enfermagem*, COFEN) highlights nurses among other health workers as professionals qualified to work in WHS management, as they are responsible for coordinating the health team and are considered able to assume the role of waste managers.[14]

The data were collected through a self-answered questionnaire called Health Care Waste Management-Rapid Assessment Tool - HCWM-RAT - of the World Health Organization validated by Silva.[15] HCWM-RAT consists of 12 sections; however, for this study, the section called "Questionnaires to collect data from Health Care Facilities (HCF) personnel" was used.

It is stated that the FHts and BHUs do not generate radioactive waste (Group C) and that, for this reason, handling of this type of waste was not investigated. Weighing of the WHS was performed for five consecutive days to quantify WHS generation in the institutions. The methodology suggested by the Pan American Health Organization (PAHO) proposes eight days of weighing; however, due to the operating rules of the health units, that is, the working period from Monday to Friday, it became necessary to adapt this methodology.[16]

To weigh the WHS, a DIGIPESO, model DP-15 plus, digital scale with a maximum capacity of 15 kg and a minimum of 100 g and graduated every 5 g, was used, which was verified and approved by the National Institute of Metrology, Standardization and Industrial Quality (*Instituto Nacional de Metrologia, Quantidade e Tecnologia*, INMETRO).

The data obtained from applying the questionnaires and WHS weighing were double-typed into a database in the *Excel* program, aiming at minimizing typing errors, and were analyzed using descriptive statistics.

Of these data obtained with WHS weighing, the total generation, daily mean, median, standard deviation, total volume and daily mean volume of the WHS were calculated. The study was conducted after approval by the Research Ethics Committee of *Universidade Federal de São Carlos*, CAAE No. 68957717.3.0000.5504. Due to the ethical issues, the health units were numbered as follows: the FHTs from 1 to 22 and the BHUs, from 1 to 12.

This article is the result of the master's dissertation entitled "Evaluation of the management of waste from health services in Primary Health Care facilities", institutionally linked to the Graduate Program in Nursing of *Universidade Federal de São Carlos*.

RESULTS

Total WHS generation was 719.665 kg, with 300.140 kg generated by the FHts and 419.525 kg by the BHUs. The health facility consisting of FHt 22 and one BHU generated 142.485 kg of WHS and a daily mean of 8.497 kg, which corresponds to the highest WHS generation; and FHt 13 was identified as the smallest WHS generator, with a total of 5.860 kg and a daily mean of 1.172 kg (Table 1).

According to the data obtained from weighing the waste, BHU 10 was the largest WHS generator, with 63.735 kg and a daily mean of 12.747 kg; and BHU 6 generated 14.490 kg of WHS and a daily mean of 2.898 kg, which corresponds to the lowest generation of waste among the BHUs (Table 2).

The daily mean of WHS generated in 36.4% (4) of the BHUs varied from 3 kg to 6 kg, and it was above 6 kg in 63.6% (7). WHS generation in the BHUs presented a median that varied from 2.068 kg to 15.705 kg.

All the participants in charge of managing WHS, both from the FHts and BHUs, stated that the WHS was segregated according to its group.

WHS packaging in the FHts was done as follows: 61.8% (13) of the nurses reported that biological waste was stored in trash cans with pedals and lids, and 71.3% (15) were unable to report how chemical waste was packaged.

In addition, 43.8% (5) stated that common waste was placed in open trash cans without a lid or pedal; and 95.2% (20) answered that the sharps were packaged in specific boxes.

In the BHUs, 66.8% (8) of the nurses reported that the biological waste was packaged in white bags; 66.8% (8) were unable to report how chemical waste was packaged; 58.3% (7) reported that regular waste was packaged in black bags; and, for 83.3% (10), the sharps were packaged in specific boxes (Table 3).

Table 1 - Total generation, daily mean, median, standard deviation, total volume and daily mean volume of the WHS generated by the FHts and by a health institution consisting in one FHt and one BHU. *São Carlos* - SP, 2018

Health Facility	Total generation (kg)*	Daily mean (kg)	Median (kg)	Standard deviation (kg)*	Total volume (m^3)*	Mean daily volume (m^3)
FHt 1 + FHt 2	14.270	2.854	2.990	0.549	0.048	0.010
FHt 3	15.020	3.004	2.640	0.516	0.050	0.010
FHt 4	13.510	2.702	2.850	0.428	0.045	0.009
FHt 5	11.700	2.340	2.440	0.226	0.039	0.008
FHt 6 + FHt 7	26.415	5.283	5.005	1.382	0.088	0.018
FHt 8	16.140	3.228	3.115	1.452	0.054	0.011
FHt 9 + FHt 10	21.675	4.335	3.690	1.280	0.072	0.014
FHt 11 + FHt 12	16.620	3.324	3.195	0.862	0.055	0.011
FHt 13	5.860	1.172	1.065	0.293	0.020	0.004
FHt 14	14.140	2.828	3.395	0.911	0.047	0.009
FHt 15 + FHt 16	18.545	3.709	3.585	1.146	0.062	0.012
FHt 17	8.770	1.754	1.650	0.400	0.029	0.006
FHt 18	20.305	4.061	4.135	0.879	0.079	0.016
FHt 19 + FHt 20	39.215	7.843	7.605	1.010	0.131	0.026
FHt 21	15.470	3.094	3.250	0.601	0.052	0.010
FHt 22 + BHU 1	42.485	8.497	8.045	1.062	0.142	0.028
TOTAL	**300.140**	**60.028**	**3.225**	**2.130**	**1.013**	**0.202**

*Data referring to the total WHS weighing in five days.

Table 2 - Total and daily mean WHS generation in BHUs. *São Carlos* - SP, 2018

Health Facility	Total generation (kg)*	Daily mean (kg)	Median (kg)	Standard deviation (kg)*	Total volume (m^3)*	Mean daily volume (m^3)
BHU 2	26.340	5.268	4.235	2.402	0.088	0.018
BHU 3	24.460	4.892	4.610	1.332	0.082	0.016
BHU 4	31.835	6.367	6.455	0.706	0.106	0.021
BHU 5	45.340	9.068	11.550	1.113	0.186	0.037
BHU 6	14.490	2.898	2.680	0.678	0.048	0.010
BHU 7	59.945	11.989	11.605	1.428	0.200	0.040
BHU 8	44.675	8.935	8.615	1.205	0.149	0.030
BHU 9	41.520	8.304	8.000	1.085	0.138	0.028
BHU 10	63.735	12.747	15.705	3.392	0.244	0.049
BHU 11	26.120	5.224	5.150	0.522	0.087	0.017
BHU 12	41.065	8.213	8.850	1.904	0.154	0.031
TOTAL	**419.525**	**83.905**	**7.360**	**3.316**	**1.482**	**0.297**

*Data referring to the total WHS weighing in five days.
**BHU 1 is included in the previous table.

Table 3 - Packaging and identification of the WHS generated in the FHts and BHUs from *São Carlos* - SP, according to those responsible for WHS management. *São Carlos*, 2018

Group	Packaging modality	FHt		BHU	
		N*	%	N*	%
GA	Trash can with white bag	1	4.8	1	8.3
	Trash can with a pedal	0	0	1	8.3
	Trash cans with a pedal and lid	13	61.8	0	0
	White bags	5	23.8	8	66.8
	Trash can	1	4.8	1	8.3
	Cardboard boxes	1	4.8	0	0
	Could not report	0	0	1	8.3
	Total	**21**	**100**	**12**	**100**
GB	White bag	0	0	1	8.3
	Drugs in containers for sharps and liquids in the sewage system	0	0	1	8,3
	Regular trash can	2	9.5	0	0
	Thrown into sewage	1	4.8	0	0
	Box for sharps	1	4.8	2	16.7
	Unspecific plastic packaging	1	4.8	0	0
	Specific collecting gallons	1	4.8	0	0
	Could not report	15	71.3	8	66.7
	Total	**21**	**100**	**12**	**100**
GC	Black bag	0	0	1	8.3
	Identified plastic gallons	0	4.8	0	0
	Does not generate radioactive waste	0	4.8	0	0
	Could not report	19	90.4	11	91.7
	Total	**21**	**100**	**12**	**100**
GD	Open trash cans, with no pedal and with black bag	5	23.8	0	0
	Trash can with a pedal	0	0	1	8.3
	Trash cans with a pedal and lid	8	38.1	0	0
	Black bags	5	23.8	7	58.3
	Trash can with black bag	2	9.5	2	16.7
	Cardboard box	1	4.8	0	0
	Could not report	0	0	2	16.7
	Total	**21**	**100**	**12**	**100**
GE	Box for sharps	20	95.2	10	83.3
	Could not report	1	4.8	2	16.7
	Total	**21**	**100**	**12**	**100**
Group	**Identification**	**N***	**%**	**N***	**%**
GA	White packaging	19	90.5	6	50.0
	White packaging and biohazard symbol	2	9.5	3	25.0
	Could not report	0	0	3	25.0
	Total	**21**	**100**	**12**	**100**
GB	Black bag	0	0	1	8.3
	Black packaging	2	9.5	0	0
	Transparent gallon	1	4.8	0	0
	Blue gallon	1	4.8	0	0
	Box for sharps	1	4.8	1	8.3
	Could not report	16	76.1	10	83.4
	Total	**21**	**100**	**12**	**100**

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Table 3 - Packaging and identification of the WHS generated in the FHts and BHUs from *São Carlos* - SP, according to those responsible for WHS management. *São Carlos*, 2018

Group	Identification	N*	%	N*	%
GC	Does not generate	1	7.8	0	0
	Could not report	20	95.2	12	100
	Total	**21**	**100**	**12**	**100**
GD	Has no identification	0	0	1	8.3
	Black packaging	19	90.4	7	58.3
	Black packaging and symbol	1	4.8	0	0
	Cardboard box	1	4.8	0	0
	Could not report	0	0	4	33.4
	Total	**21**	**100**	**12**	**100**
GE	Own packaging	19	90.4	6	50.0
	Yellow box	1	4.8	1	8.3
	Yellow packaging with infectious substance written on it	0	0	1	8.3
	White trash	0	0	1	8.3
	Could not report	1	4.8	3	25.1
	Total	**21**	**100**	**12**	**100**

*Number of participants.
GA = Group A; GB = Group B; GC = Group C; GD = Group D; GE = Group E.
Source: Elaborated by the author.

In relation to the identification of the WHS generated in the FHts, 90.5% (19) of the nurses stated that the containers used for the disposal of biological waste were identified only by the white packaging; and 76.1% (16) were unable to inform about the identification of chemical waste. For 90.4% (19) of the participants, the black packaging used for the disposal of regular waste was the way to identify this type of waste; and, for 90.4% (19), the box used to dispose of sharps was already identified.

According to 50.0% (6) of the nurses, the containers used by the BHUs for the disposal of biological waste were identified by the white packaging; 83.4% (10) were unable to report about the identification of the containers used for the disposal of chemical waste; 8.3% (7) stated that the containers used for the disposal of regular waste were identified by the black packaging; and, for 50.0% (6), identification of the sharps collector consists of the collecting box itself (Table 3).

Regarding the WHS collection and internal transportation carried out in the FHts, it is highlighted that 61.9% (13) of the nurses reported that internal WHS collection had defined routes and times; and 38.0% (8) reported that internal collection was performed twice a day (Table 4). In the BHUs, 75.0% (9) reported that the internal WHS collection did not have defined routes and times; and 25.0% (3) stated that the frequency of internal WHS collection was twice a day (Table 4).

Regarding the internal storage of the WHS generated by the FHts, 76.2% (16) of the nurses stated that the service did not have an appropriate place, being led directly to external storage; and 100% (21) reported that the WHS was transported manually to the external shelter (Table 5). For 58.3% (7) of the nurses, the BHUs had a place for internal WHS storage and, for 100% (12), the waste was manually transported to the external shelter (Table 5).

The service had a routine for hygiene and cleaning in WHS packaging and external collection in the FHts, according to 55.5% (14) of the nurses; lack of containers was reported by 47.6% (10); and 38.0% (8) reported that infectious waste (Groups A and E) was collected once a week and regular waste (Group D), three times a week (Table 5). As an external shelter for storing and externally collecting the WHS in the BHUs, 41.7% (5) stated that there are no containers for storing the WHS; and 50.0% (6) were unable to report about the external shelter conditions. In addition, for 33.4% (4) of the nurses, the infectious waste (Groups A and E) was collected once a week (Table 5).

All the nurses (21) reported that the WHS was not subjected to any other treatment in the BHU; and 66.7% (14) did not identify any recycling system in the service (Table 5). In the BHU, 100% (12) stated that the WHS was not subjected to any type of treatment in the unit itself, and 8.3% (1) acknowledged the existence of a recycling system (Table 5).

Table 4 - Internal collection and transportation of the WHS generated in the FHts and BHUs from *São Carlos* - SP, according to those responsible for WHS management. *São Carlos*, 2018

Characteristic	Information obtained	FHt		BHU	
		N*	%	N*	%
Internal collection (routine)	It has defined routes and times	13	61.9	1	8.3
	It does not have defined routes and times	7	33.3	9	75.0
	Could not report	1	4.8	2	16.7
	Total	**21**	**100**	**12**	**100**
Defined routes and times	Conducted at the end of the day or when necessary	1	7.7	0	0
	From the least to the most contaminated area	1	7.7	0	0
	3 times a day	2	15.3	0	0
	2 times a day	4	30.8	0	0
	Once a day	3	23.1	0	0
	Infectious waste: 2 times a week; regular waste: 3 times a week	1	7.7	1	100
	Could not report	1	7.7	0	0
	Total	****13**	**100**	****1**	**100**
Internal collection (frequency)	Once a day	8	38.0	0	0
	2 times a day	8	38.0	3	25.0
	2-3 times a day	0	0	1	8.3
	3 times a day	2	9.6	0	0
	3-4 times a day	0	0	1	8.3
	As needed	2	9.6	2	16.7
	Could not report	1	4.8	5	41.7
	Total	**20**	**100**	**12**	**100**

*Number of participants.
**Number of participants who reported that internal collection has defined routes and times.
Source: Elaborated by the author.

Table 5 - Internal storage, transportation of WHS to the external shelter, external collection frequency, treatment and final disposal of the WHS generated by the FHts and BHUs from *São Carlos* - SP, according to those responsible for WHS management. *São Carlos*, 2018

Storage	Information obtained	FHU		BHU	
		N	%	N	%
Place for internal WHS storage	Yes	4	19.0	7	58.3
	No	16	76.2	5	41.7
	Could not report	1	4.8	0	0
	Total	**21**	**100**	**12**	**100**
Transportation to external shelter	Manually performed	21	100	12	100
	Total	**21**	**100**	**12**	**100**
Existence of containers	Yes	4	19.0	1	8.3
	No	10	47.6	5	41.7
	Could not report	7	33.4	6	50.0
	Total	**21**	**100**	**12**	**100**
External collection (frequency)	1 x/week (all the waste groups)	3	14.3	0	0
	3 x/week (all the waste groups)	1	4.8	0	0
	Every day (GA/GE); 3 x/week (GD)	1	4.8	0	0
	1 x/week (GA/GE) and 3 x/week (GD)	8	38.0	1	8.3
	1 x/week (GA/GE) and 2 x/week (GD)	4	19.0	1	8.3
	2 x/week (GA/GE) and 3 x/week (GD)	3	14.3	0	0
	Every day (GD)	0	0	1	8.3
	2 x/week (GD)	0	0	1	8.3
	3 x/week (GD)	0	0	1	8.3
	1 x/week (GA/GE)	0	0	4	33.4
	2 x/week (GA/GE)	0	0	2	16.8
	Could not report	1	4.8	1	8.3
	Total	**21**	**10**	**12**	**10**

Continue...

...Continuation

Table 5 - Internal storage, transportation of WHS to the external shelter, external collection frequency, treatment and final disposal of the WHS generated by the FHts and BHUs from *São Carlos* - SP, according to those responsible for WHS management. *São Carlos*, 2018

Treatment	Information obtained	N	%	N	%
Recycling system in the service	Yes	7	33.3	1	8.3
	No	14	66.7	7	58.3
	Could not report	0	0	4	33.4
	Total	**21**	**100**	**12**	**100**
Treatment	Autoclave	1	4.8	2	16.7
GA	Incineration	13	61.9	4	33.3
	Could not report	7	33.3	6	50.0
	Total	**20**	**100**	**12**	**100**
GB	Chemical neutralization	0	0	2	16.7
	Incineration	0	0	1	8.3
	Autoclave	0	0	1	8.3
	Could not report	21	100	8	66.7
	Total	**21**	**100**	**12**	**100**
GD	Recycling	2	9.5	1	8.3
	Composting	2	9.5	4	33.3
	Incineration	1	4.8	0	0
	Landfill	1	4.8	0	0
	Dump	2	9.5	0	0
	Could not report	13	61.8	7	58.4
	Total	**21**	**100**	**12**	**100**
GE	Incineration	12	57.1	4	33.3
	Not subjected to any treatment	1	4.8	0	0
	Autoclave	0	0	1	8.3
	Could not report	8	38.1	7	58.4
	Total	**21**	**100**	**12**	**100**
Final disposal of the WHS	Landfills	6	28.6	6	50.0
	Controlled landfill	1	4.8	0	0
	Non-biodegradable waste	1	4.8	0	0
	Could not report	13	61.8	6	50.0
	Total	**20**	**100**	**12**	**100**

GA = Group A; GD = Group D; GE = Group E.

In the FHUs, 61.8% (13) of the nurses were unable to report the type of final disposal for the WHS; and 28.6% (6) commented that the WHS was sent to sanitary landfills. For 50.0% (6) of the BHU nurses, the WHS was sent to landfills and 50.0% (6) were unable to report the type of final disposal available for the waste.

DISCUSSION

To ensure safe and adequate management, knowledge about the type of waste and the amount generated in each health service, whether public or private, is considered an extremely important factor for management, given that it is necessary to have accurate information about WHS generation.

A study conducted in Paraná, Curitiba, identified gaps in WHS management in nine FHS units. Situations such as lack of knowledge of those responsible for the management regarding WHS generation, organization of internal collection according to the WHS group, type of transportation and final disposal of the WHS suggest lack of training of the professionals involved in WHS management.[17]

In addition, it was verified that those responsible for managing the waste from the FHS units did not have records on WHS generation, despite the importance of weighing the WHS.[18] Absence of these records makes it impossible to evaluate and implement measures for management adequacy, as there are no parameters to assess the impacts on WHS generation, in addition to making it difficult to identify and correct gaps in management.[19]

In this context, it is necessary to find out if those responsible for waste management and health and cleaning workers at PHC understand that the WHS generated in these places is not as dangerous as that generated in a more complex service and if the reduced WHS generation presented may imply the minimization of risks to environmental and/or human health.[17] However, the risks arising from WHS management are the same and require adequate and efficient management, regardless of the complexity in the services.

In line with the higher number of consultations and professionals that comprise the team, health facilities that include more than one health team tend to generate more WHS. However, it is necessary to consider that, in addition to the type of WHS management, the social and health vulnerability of the territory can exert a direct influence on waste generation, due to the greater use of health services by the target population. Thus, even though the FHts consist of a limited number of professionals and are responsible for a similar number of people varying from 2,000 to 3,500[13], WHS generation can differ, as the vulnerability of the territory can directly influence the frequency with which users resort to the health services.

The following stand outs among the factors that can influence WHS generation in BHUs: the high number of procedures, such as application of intravenous and intramuscular drugs, vaccines, heel prick test, Pap smear and collection of exams, which are important WHS generators, in particular biological and sharps. In addition to that, this type of service serves a higher number of people when compared to the FHS units.

A study carried out in four BHUs from the municipality of *São Paulo*-SP verified the generation of waste from Groups A, D and E, varying from 0.06 kg/service to 0.17 kg/service.[9] Along the same lines, a research study in non-hospital emergency units addressed WHS generation, showing that it varied from 0.087 to 0.138 kg/user/day.[18]

Unlike the urgency and emergency non-hospital units, which offer intermediate complexity care, the assistance provided in the BHUs is of low complexity. It is considered that the level of assistance provided by the health services can exert an impact on WHS generation. Thus, it is expected that more complex health services generate more waste; in addition to that, the vulnerabilities presented by the coverage area of a BHU should be known.

The results found in this study evidenced gaps in all the WHS management stages in BHUs and FHts. Regarding segregation, RDC No. 222/2018 determines that WHS must be segregated at the time and place of its generation, according to the physical, chemical and biological characteristics, physical state and risks involved.[2] If proper segregation is carried out at the time of WHS generation, a reduction of nearly 80% in expenses with treatment and final disposal can be obtained.[5]

The lack of knowledge of the nurses responsible for WHS management in relation to the packaging of chemical waste and the lack of adequate infrastructure, a situation verified by the absence of packaging identifications and the use of inappropriate materials for the packaging of certain groups of waste, can compromise all stages of the management process.

A study carried out on WHS management in PHC services in Brazil showed that identification of the containers for waste storage is a determining factor for errors and successes in the segregation stage.[20] Absence of identification and inadequacy of the containers used for storing the WHS compromise the management stages; thus, in addition to the implementation of a WHSMP, a person responsible for WHS management and a trained team, the need for infrastructure and availability of materials in sufficient numbers to ensure safe handling stands out.

Regarding the identification of WHS disposal containers by means of the symbols, the least acknowledged are related to sharps and biological waste. Lack of knowledge about the symbols recommended by the current legislation raises a concern, although it cannot be asserted that improper disposal occurs, as it can increase the risks of occupational accidents due to erroneous disposal.[21]

For internal WHS collection, RDC No. 222/2018 recommends that sharps be collected every 24 hours, except in cases where 2/3 of the capacity of the waste packaging container is reached.[2] It is also be noted that, for greater effectiveness, internal transportation of WHS in BHUs and FHUs must have defined times and routes for collection and, even in periods of less flow of people, although RDC No. 222/2018 does not define how collection and internal transportation of WHS in FHUs and BHUs should be done, in order to assist in the safety related to the risks imposed by WHS.

Internal WHS storage can be waived in places where the distance between the generation point and the external storage, as well as the amount of waste, justifies so.[2]

In the case of FHUs and BHUs, the distance between the generation points and the external shelter, as well as the reduced amount of WHS, justifies the non-existence of a specific place for internal waste storage.

According to NBR No. 12,809/2013, internal transportation of WHS through manual displacement is allowed; however, the volume should not exceed 20 liters.[22] In this way, transportation of WHS to the external shelter can be done manually in FHUs and BHUs, as long as the load limit for transportation by the professionals who carry out WHS transportation to the external shelter is respected.

Absence of a routine to clean and sanitize the external shelter can contribute to the proliferation of diseases, rodents and odors. In addition to that, the lack of containers, in which the bags with waste are placed directly on the floor, can cause perforation of the bags, causing waste leaks and contaminating the entire external shelter.

Intending to assist in waste reduction in landfills, controlled landfills and dumps, CONAMA Resolution No. 358/2005 determines that recycling should be included in the WHSMP among the management actions.[3]

In the study carried out in services included in PHC[20], regular waste corresponded to 82.7% of the total and, of the regular waste, 63% was considered suitable for recycling, and this percentage largely consists of packaging.

In a Primary Health Care Center, an 11% reduction in regular waste was detected after implementing the WHSMP. Regular waste generation was reduced from 14.6 kg/day in 2008 to 13.3 kg/day in 2009, even with the increase in the number of outpatients treated. This fact can be explained by the implementation of a selective collection program for the recycling of materials, which increased from 3.1 kg/day in 2008 to 4.3 kg/day in 2009, representing 17% of the WHS.[23]

Respecting the specific characteristics of each group of waste, in order to comply with current regulations, the WHS must be subjected to treatment before final disposal.[24] In Brazil, some technologies such as incineration, microwaving and autoclaving are used to treat sharps and biological waste before final disposal. It is also noticed that waste classified as chemicals that pose a risk to the environment or to health must follow the risk characteristics contained in the Safety Datasheets of the Chemical Products (*Ficha de Informações de Segurança de Produtos Químicos*, FISPQ) for treatment or final disposal.[2]

Understood as a problem for facilities where it is generated, management of chemical waste has been highlighted due to the lack of knowledge on the part of the professionals regarding the specificities of chemical products and the risks they are exposed to.

Management of chemical waste can be understood as a problem for the generating facilities, as the professionals involved in WHS management are unaware of the specificities of chemical products, as well as of the risks to which they are exposed.[25]

In relation to the final disposal of the WHS, most of the nurses were not able to report on the final destination of each group of waste products, even in relation to regular waste. In view of this, it can be inferred that the participants of this study understand that the extra-facility stages are not responsibility of the WHS generating unit, not complying with RDC No. 222/2018, which determines that the health services are responsible for managing the WHS from generation to final disposal.[2]

Inadequate WHS management exposes both the population's and the environment's health to a number of risks. Adequate waste management is necessary and depends on the involvement of each professional, on the effective implementation of the WHSMP and on the support of public managers with regard to providing adequate conditions related to WHS management, including physical structure and continuous training of all professionals.

Any and all research studies present some limitation. In this study, it is highlighted that the main limitation was the fact that the same physical space was shared by two health teams, which, for using common areas, made it impossible to know the exact waste generation by each team.

It is noted that this study contributes significantly by presenting indicators on WHS generation and an evaluation of WHS management in PHC, as research studies are not frequent on this topic at this assistance level.

CONCLUSIONS

The reality found in the current study reveals the need for a reflection on WHS management, as not all those responsible for waste management are able to perform the due processes. Proper WHS management constitutes a challenge for the health teams and especially for the nurses designated as responsible for WHS management, who, in the face of so many duties and responsibilities, fail to pay the necessary attention to WHS management.

In view of the information provided by the nurses, it was possible to verify that WHS management is not being performed properly in the health units, showing that it is far from what is recommended by the current regulations on WHS. In this context, all health team professionals, including those responsible for WHS management, need continuous and effective training on the management of this type of waste, with the support of municipal health and environment managers being fundamental to seek the elaboration and effective implementation of the WHSMP with the WHS managers and teams.

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