# EDUCATIONAL INTERVENTION ON MEDICAL WASTE IN THE INTENSIVE CARE UNIT

## *Estratégia educativa sobre manejo de resíduos sólidos de saúde na Unidade de Terapia Intensiva*

## *Estrategia educativa para el manejo de residuos sólidos sanitarios de la Unidad de Cuidados Intensivos*

**Original Article**

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**ABSTRACT**

**Objective:** To assess the effect of an educational intervention on the knowledge of Intensive Care Unit professionals regarding medical waste. **Methods:** Experimental study conducted in 2015 at a public hospital of Fortaleza, Ceará, Brazil, with 41 healthcare professionals who were submitted to an educational strategy that used a flipchart on solid waste, comparing their knowledge before and after a test using a formulary adapted from the literature. The t test and binominal test were used for statistical analysis with $p<0.05$. **Results:** After the educational intervention, there was a statistically significant difference in the mean score between pre-test ($19.6 \pm 3.2$) and post-test ($24.1 \pm 2.8$), p=0,001.The category on common waste was the one with the highest number of errors among healthcare professionals. **Conclusion:** The educational strategy enhanced healthcare professionals' knowledge on the medical waste, which may favor the reduction of occupational accidents in health care and material expenses.

**Descriptors:** Medical Waste; Inservice Training; Intensive Care Units.

***RESUMO***

**Objetivo:** *Avaliar a ação de estratégia educativa sobre o conhecimento de profissionais que atuam em Unidade de Terapia Intensiva quanto à segregação de resíduos sólidos de saúde.* **Métodos:** *Estudo experimental desenvolvido em 2015, em um hospital público de Fortaleza, Ceará, Brasil, com 41 profissionais de saúde submetidos à estratégia educativa, com álbum seriado sobre resíduos sólidos de saúde, comparando-se seu conhecimento com a realização de pré e pós-teste em formulário adaptado da literatura. Para a análise estatística, utilizou-se teste t, binomial e p<0,05.* **Resultados:** *Com a realização da estratégia educativa, observou-se diferença estatisticamente significante na média de acertos entre o pré-teste (19,6 ± 3,2) e pós-teste (24,1 ± 2,8), p=0,001. A categoria sobre os resíduos comuns foi a que teve um maior número de erros entre os profissionais de saúde.* **Conclusão:** *A estratégia educativa proporcionou o aumento do conhecimento dos profissionais sobre a segregação dos resíduos, o que poderá favorecer a redução de acidentes ocupacionais de saúde e a redução dos gastos com materiais.*

**Descritores:** *Resíduos de Serviços de Saúde; Capacitação em Serviço; Unidades de Terapia Intensiva.*

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***RESUMEN***

**Objetivo:** *Valorar la acción de estrategia educativa sobre el conocimiento de los profesionales de la Unidad de Cuidados Intensivos respecto la segregación de residuos sólidos sanitarios.* **Métodos:** *Estudio experimental desarrollado en 2015 en un hospital público de Fortaleza, Ceará, Brasil, con 41 profesionales sanitarios que participaron de la estrategia educativa con álbum ilustrativo sobre residuos sólidos sanitarios comparándose su conocimiento a través de pre y pos teste con un formulario adaptado de la literatura. Se utilizó la prueba t, binomial y p<0,05 para el análisis estadístico.* **Resultados:** *De la realización de la estrategia educativa se observó una diferencia estadísticamente significativa de la media de aciertos entre el pre (19,6 ± 3,2) y el pos teste (24,1 ± 2,8), p=0,001. Hubo más errores entre los profesionales sanitarios para la categoría de los residuos comunes.* **Conclusión:** *La estrategia educativa proporcionó más conocimientos a los profesionales sobre la segregación de los residuos lo que puede llevar a una reducción de accidentes ocupacionales de salud y de los gastos con materiales.*

**Descriptores:** *Residuos Sanitarios; Capacitación en Servicio; Unidades de Cuidados Intensivos.*

## INTRODUCTION

Health promotion actions aim to act on the determinants of health such as social, economic, cultural and environmental factors in order to implement changes in the dimensions that affect society as a whole and undermine the quality of life of the population[1,2]. In this perspective, the rapid technological and industrial growth has led to significant consequences for contemporary society and the environment. The increase in waste production is a direct consequence of rapid urbanization and population growth, requiring specialized treatment and management. The indiscriminate production of waste causes serious environmental imbalance, and the improper disposal of these materials endangers natural resources and the quality of life of society and future generations[3,4].

Among the various types of waste, Medical Waste (MW) stands out; it includes all the waste produced by health services, research centers and laboratories, in addition to the waste produced in the home environment due to health care, such as insulin self-administration, recuperative care and dialysis[5]. In the hospital environment, the production of MW is an inevitable result from patient care, and the increase in the number of institutions to meet the social demand increases the concern about the destination given to these materials, particularly the increasing use of disposables, which requires a proper management of MW to reduce risks[6,7].

Mismanagement of medical waste poses a great risk to the population as inadequate and improper handling can lead to serious consequences for public health with significant impact on environmental degradation[6,8]. It is believed that 75% to 90% of the waste produced by health professionals do not pose a direct risk to the population, and only 10% to 25% of this waste is hazardous and can cause health problems[6,8]. Health professionals' lack of knowledge and hospital mismanagement of the waste are the main factors that contribute to inadequate segregation of materials[6,9].

Thus, considering the risk of occupational accidents, occupational diseases and increased hospital infection that can be caused by incorrect handling of MW, it is believed health professionals should receive training on waste management at the time of their admission and be kept under supervision in service with the aim to ensure the successful management of this waste in addition to promoting the reduction of expenses with the disposal of these materials[10].

Such observations gave rise to the interest in assessing the knowledge of health professionals working in the Intensive Care Unit (ICU) regarding to waste segregation, since this sector is a place where there is a great amount of waste but the segregation often occurs erroneously. Knowledge and attitude of these professionals regarding the importance of the proper management influences the way the process is carried out in the institution. If they are not aware of the correct management of MW, there is an increased imminent risk to society in relation to these materials[9].

Given the above, the following question arose: can an educational action on segregation of solid waste carried out with health professionals working in the Intensive Care Unit favor knowledge enhancement? It is believed that this study may support intervention proposals and greater awareness among health professionals regarding the subject, given that the lack of knowledge and information on the subject leads to a disregard for and/or inadequate treatment of the waste.

Thus, the present study aimed to assess the effect of an educational intervention on the knowledge of Intensive Care Unit professionals regarding medical waste.

## METHODS

This is an experimental study with application of pre- and post-test in a single group conducted between February and March 2015 in an Intensive Care Unit of a large public hospital located in the city of Fortaleza, Ceará, Brazil.

The sample consisted of health professionals on duty during the data collection period who were selected

by convenience according to the following inclusion criteria: health professional employed by the institution who should be on duty at the time of data collection and during the proposed training. Exclusion criteria were: professionals who occupied exclusively management and/or administrative jobs and workers on vacation or leave.

The operationalization of the educational strategy took place in three phases: 1) application of the pre-test; 2) educational strategy mediated by a flipchart; 3) application of the post-test 15 days after the strategy.

The pre- and post-tests were similar and consisted of a form with 33 items correlated to the five existing types of waste bins (chemicals, infectious, sharps, common and recyclable); the form was developed by the authors based on the theoretical framework of the Resolution of the Collegiate Board of Directors (*Resolução da Diretoria Colegiada – RDC*) No. 306/2004 and the resolution of the National Environment Council (*Conselho Nacional do Meio Ambiente – CONAMA*) No. 358/2005[11,12] and with the help from three ICU nurse specialists.

The second phase of the study consisted of the implementation of the educational strategy, which was carried out using a flipchart about segregation of medical waste that was designed for the present study based on the professional experience of the researchers and the literature on the subject. The intervention was carried out only once during the working shift in a private room in the ICU, with an average duration of 30 minutes. The aforementioned flipchart consists of color images and definitions of types of waste, the appropriate place for disposal and the main existing resolutions in the country.

During data collection, the main researcher attended the ICU in the three periods of the day (morning, afternoon and evening) and invited the health professionals to participate in the study and then sign the Free Informed Consent Form, ensuring their anonymity and confidentiality of information. After acceptance to participate, the pre-test was applied and then the educational intervention was carried out individually. The researcher showed the flipchart to each professional and explained all types of waste. After the presentation, the researcher was available to clarify any doubts and reminded participants of the post-test after 15 days.

Excel version 8.0 was used for data tabulation and the Statistical Package for the Social Sciences – SPSS version 17.0 was used for statistical analysis with a significance level of $p<0.05$. Measures of central tendency (mean) and dispersion (standard deviation) were used in addition to the analysis of absolute (n) and relative (%) frequencies. Student's t-test was used to compare the means between the total of correct answers in the pre- and post-tests. The binomial test was used to check for the quantity of correct answers for each type of waste among professionals, where p values greater than 0.05 indicated a percentage of right answers not below 70% and were considered statistically significant.

The present study is in compliance with the ethical aspects in the Guidelines and Standards for Research with Human Beings recommended in Resolution No. 466/12 of the National Health Council and was approved by the Research Ethics Committee of the Institution where the study took place under Opinion No. 950.795.

## RESULTS

In all, 41 health professionals participated in the pre-test; however, there was sample loss during the application of the post-test due to professionals' absence on the scheduled day or refusal to participate because of the time available during the shift; thus, the final sample comprised 28 professionals.

In both pre-test and post-test groups there was a predominance of women, with frequencies of 75.6% (n=31) and 89.3% (n=25), respectively. Professionals were: physical therapists, nurses, physicians, pharmacists, psychologists, and nursing technicians and assistants.

Table I shows the minimum and maximum scores and the means obtained by health professionals in the pre- and post-tests in relation to the total of right answers on medical waste.

After the educational intervention there was a positive difference between the means of the total of right answers in the pre- and post-tests, both in absolute (p=0.001) and relative (p=0.001) values.

Tables II and III show the frequency of right answers for each type of waste assessed in the pre- and post-tests.

According to Table II, the main errors related to sorting of infectious waste in the pre-test are associated with materials such as sterile surgical gloves and CIP, macrodrip or photosensitive sets. However, in the post-test, professionals still showed a low level of knowledge about the sorting of these infectious materials, particularly with regard to anatomical parts, ostomy pouches, drains, catheters and probes, sterile surgical gloves and CIP, macrodrip or photosensitive sets.

The category on common waste was the one with the highest number of errors among health professionals; the errors were related to diaper containing feces or urine; gauzes used in the patient antisepsis; pads containing menstrual blood; cotton used in bed bath; gauzes with organic matter; masks, examination gloves, shoe covers and cap; and electrodes (Table II).

Table I - Comparison of the total of right answers before and after the educational intervention. Fortaleza, Ceará, 2015.

| Right answers | Group | n | Minimum | Maximum | Mean | Standard Deviation | p-value |
|---|---|---|---|---|---|---|---|
| Total of right answers in the questionnaire (n) | Pre-test | 41 | 13 | 26 | 19.6 | 3.2 | 0.001* |
| | Post-test | 28 | 18 | 29 | 24.1 | 2.8 | |
| Total of right answers in the questionnaire (%) | Pre-test | 41 | 39.4 | 78.8 | 59.5 | 9.7 | 0.001* |
| | Post-test | 28 | 54.5 | 87.9 | 73.0 | 8.5 | |

* Student's t-test for independent samples, significance at 1%.

Table II - Comparison of right answers in the pre- and post-tests on infectious and common waste. Fortaleza, Ceará, 2015.

| Variables | Pre-test | | Post-test | |
|---|---|---|---|---|
| | n (%) | p† | n (%) | p† |
| **Infectious waste** | | | | |
| CIP, macrodrip and photosensitive sets | 15 (36.6) | <0.000 | 4 (14.3) | <0.000 |
| Blood bag and hemoderivatives | 36 (87.8) | 0.998 | 24 (82.2) | 0.984 |
| Diapers of patients placed in isolation | 39 (95.1) | 1 | 26 (92.9) | 0.999 |
| Waste produced in the care of patients placed in isolation | 38 (92.7) | 0.999 | 28 (100) | 1 |
| Anatomical parts | 30 (73.2) | 0.725 | 18 (64.3) | 0.317 |
| PPE used in the care of patients placed in isolation | 39 (95.1) | 1 | 27 (96.4) | 1 |
| Ostomy bags | 15 (36.6) | 0.998 | 17 (60.7) | 0.191 |
| Drains, catheters and probes | 34 (82.9) | 0.980 | 16 (57.1) | 0.102 |
| Sterile surgical glove | 26 (63.4) | 0.223 | 12 (42.9) | 0.002 |
| **Common waste** | | | | |
| Diaper containing feces | 6 (14.6) | <0.000 | 25 (89.3) | 0.996 |
| Diaper containing urine | 8 (19.5) | <0.000 | 27 (96.4) | 1 |
| Gauzes used in patient antisepsis | 10 (24.4) | <0.000 | 25 (89.3) | 0.996 |
| Food leftovers | 36 (87.8) | 0.998 | 26 (92.9) | 0.999 |
| Napkins | 34 (82.9) | 0.980 | 22 (78.6) | 0.887 |
| Pads containing menstrual blood | 6 (14.6) | <0.000 | 22 (78.6) | 0.887 |
| Cotton used for bed baths | 19 (46.3) | 0.001 | 27 (96.4) | 1 |
| Gauzes with organic matter | - | - | 17 (60.7) | 0.191 |
| Mask, examination gloves, shoe covers and caps | 25 (61) | 0.138 | 24 (82.2) | 0.984 |
| Paper towel sheets | 32 (78) | 0.905 | 22 (78.6) | 0.887 |
| Electrodes | 26 (63.4) | 0.223 | 26 (92.9) | 0.999 |

* Frequency and percentage of total right answers of the health professionals assessed before and after intervention;
†Binomial test. CIP = Continuous Infusion Pump; PPE = Personal Protective Equipment.

The health professionals interviewed also showed a low level of knowledge (<70%) on chemical waste. Regarding sharps waste, the errors were related to the correct sorting of catheter guidewires and vaccine vials, with 58.5% and 31.7% of right answers, respectively. Regarding recyclable waste, there was no significant improvement in the level of knowledge of professionals regarding materials such as plastic cups, cutlery and bowls used by the patient; empty bottles of distilled water and saline solution; packs of CIP and macrodrip sets; and packs of syringes and needles (Table III).

Table III - Comparison of right answers in the pre- and post-tests on chemical, sharps and recyclable waste. Fortaleza, Ceará, 2015.

| Variables | Pre-test | | Post-test | |
|---|---|---|---|---|
| | n (%) | p† | n (%) | p† |
| **Chemical waste** | | | | |
| Syringe + needle used in medication preparation | - | - | 1 (3.6) | <0.000 |
| Medication vials and ampoules | 15 (36.6) | <0.000 | 15 (53.6) | 0.049 |
| **Sharps waste** | | | | |
| Lancets to check glucose levels | 41 (100) | 1 | 27 (96.4) | 1 |
| Syringe + needle used for intramuscular injection | 38 (92.7) | 0.999 | 26 (92.9) | 0.999 |
| Syringe + needle used for subcutaneous injection | 39 (95.1) | 1 | 28 (100) | 1 |
| Scalpel blades | 40 (97.6) | 1 | 28 (100) | 1 |
| Razors | 36 (87.8) | 0.998 | 26 (92.9) | 0.999 |
| Catheter guidewire | 24 (58.5) | 0.078 | 25 (89.3) | 0.996 |
| Vaccine vial | 13 (31.7) | <0.000 | 7 (25) | <0.000 |
| **Recyclable waste** | | | | |
| Plastic cups, cutlery and bowels used by the patient | 15 (36.6) | <0.000 | 11 (39.3) | 0.000 |
| Empty bottles of distilled water and saline | 25 (61) | 0.138 | 20 (71.4) | 0.635 |
| Packs of CIP and macrodrip sets | 14 (34.1) | <0.000 | 13 (46.4) | 0.007 |
| Packs of syringe and needle | 13 (31.7) | <0.000 | 16 (57.1) | 0.102 |

* Frequency and percentage of total right answers of the health professionals assessed before and after intervention;
†Binomial test. CIP = Continuous Infusion Pump.

## DISCUSSION

Public health and health promotion are intertwined in terms of the approach and understanding of the major health problems of the population. Public health is seen as the science and art of preventing disease, promoting health and prolonging life through collective efforts organized between societies that establish conditions for individuals and groups to experience a healthy life through actions involving education, housing, working conditions and public policies, among other determinants[13].

The field of health promotion constitutes a promising new paradigm in health given the depth of its theoretical and methodological approaches. For the World Health Organization (WHO), health promotion can be defined as a strategy that aims to empower individuals, groups and communities to control and improve the factors that affect their health and hence improve the quality of life[14].

It is ironic to think that health institutions, which are responsible for the restoration and maintenance of the community's health, can also threaten the population's well-being[6,8]. Waste threatens the survival of humans and other living beings as well as all the natural resources that are necessary for human existence[15].

The concern about MW sorting is relatively recent and has received greater attention in health services due to the emergence of specific laws[7]. The instrument used in the present research to assess the level of health professionals' knowledge was based on Brazilian resolutions such as the resolution of the Collegiate Board of Directors (*Resolução da Diretoria Colegiada – RDC*) No. 306/2004 and the resolution of the National Environment Council (*Conselho Nacional do Meio Ambiente – CONAMA*) No. 358/2005[11,12]. And even though it is based on important documents, it was observed a high number of errors regarding the classification of waste in the pre-test.

It is important that all health professionals are aware of the norms and laws governing the collection, handling and sorting of MW[16]. In Brazil, resolutions No. 306/2004 of the National Health Surveillance Agency (*Agência Nacional de Vigilância Sanitária*) and No. 358/2005 of CONAMA, as well as the Federal Law No. 12.305/2010, represent an important benchmark for the way of managing this type of waste[11,12].

Thus, MW management is a set of procedures planned and implemented based on scientific and technical evidence aimed at minimizing waste production as well as providing a safe and efficient method for the disposal of the waste generated. That is, it does not only aim at the protection of patients and health professionals, but also the preservation of public health, natural resources and the environment[7].

Such management varies in each country according to several factors such as socioeconomic status, education level, available resources, treatment technologies and systems for monitoring inadequate handling[17]. The aim of MW management is to provide adequate sorting, collection,

transportation, handling and disposal in order to ensure the safety of patients, professionals and the environment[9] and reduce the impact on public health, leading to the improved environmental and economic sustainability of the health care system[17].

Waste sorting is the most important step to the adequate management of MW, and the correct sorting in appropriate locations should be a constant concern of health professionals[16,18]. The lack of knowledge on the management of solid waste found in the present study may be one of the causes of improper disposal of hospital waste. Health professionals should be provided with access to continuing education sessions on the various problems and dangers found in their workplace, including the adequate handling of MW.

The improper disposal of MW is related to two major problems: environmental impact due to a variety of dangerous products and the potential risk of infection while handling such materials[16]. Thus, the materials must be allocated in several containers with different colors and there should be a sufficient number of bins in appropriate places and colors so that health professionals can properly dispose of the material[18]. Therefore, health services should provide appropriate containers for each type of waste, ensure the satisfactory identification of the material, facilitate cleaning activities and transportation and also provide specific plastic bags for each type of waste[19]. In the present study, there were still a few errors regarding the disposal of sharps and infectious waste even after the educational intervention.

Medical waste is divided into five categories, and the most common method of sorting is the use of bags with color coding. Thus, health professionals should ensure that containers with adequate bags are used for the collection of medical waste considering that waste mismanagement can generate environmental, biological and radiological risks for the population[6,8,20].

An intervention study conducted in Pakistan with 275 health professionals and aimed at assessing the management of waste in two tertiary hospitals demonstrated that training is an effective intervention, which was confirmed by a statistically significant difference between pre- and post-tests on knowledge, attitude and practice[21]. The same was also observed in the present study, in which participants enhanced their knowledge after the educational intervention.

Another study used a self-administered questionnaire to identify knowledge, attitude and practice regarding MW among health professionals and highlighted the importance of including this subject in undergraduate curricula. The development of short courses and/or seminars improves adherence to vaccination, the use of Personal Protective Equipment (PPE) and the handling of medical waste[22].

The present study also showed a significant change in the level of knowledge of the participants involved. The enhanced knowledge of these professionals after the training shows that the implementation of continuing education represents the opportunity for professionals to update their knowledge and improve the care practice in health services.

It is known that the effective management of waste is not only a legal requirement of the hospital environment, but also a social responsibility. Thus, there is a need for material resources and continuing education to assist managers and health professionals in this task. Therefore, the institution should implement a continuing education program for all employees in order to clarify the definitions and sorting of waste as well as a system for the monitoring and surveillance of MW management[18]. This allows the team to get qualified and improve the efficacy and efficiency of the care provided to patients and the community[23].

MW includes all the materials resulting from activities carried out in health care services and that – given their characteristics – need different handling processes, requiring or not pretreatment prior to final disposal. MW is subdivided into five groups: A- infectious; B- chemicals; C- radioactive; D- common; and E- sharps[12].

Improper sorting may be the main factor responsible for the high costs of transportation and disposal of waste. The improper sorting of waste, especially the mixed storage of Groups A and D, highlights health professionals' lack of knowledge regarding the management of MW, generating a substantial increase in the cost of waste treatment[24,25].

The lack of financial and human resources and the lack of control in the sorting of waste are the main problems encountered in the management of these materials[16]. A recent study conducted in a Brazilian municipality[25] showed that the correct sorting of MW in Groups D and A would reduce the amount of waste in Group A, reducing the cost of incineration by up to 57%. The study also suggests that improving the Medical Waste Management Plan (*Plano de Gerenciamento de Resíduos de Serviços de Saúde – PGRSS*) requires professional training, physical structure and material for proper storage of MW so that there is compliance with RDC No. 306/2004 and Resolution No. 358/2005 of the CONAMA.

A successful waste management is a challenge for countries due to insufficient financial investment, professionals' low knowledge and unawareness, and lack of effective control of the waste[15]. Continuing education is a key tool in changing the paradigm of health professionals in addition to contributing to service excellence, reduced costs and reduced environmental impact. It is the responsibility of health institutions to carry out classes and actions to raise awareness on medical in order to minimize unnecessary expenses for incineration and reduce the costs of final

disposal as recommended by the current legislation in the country.

It was found in the present study that the highest percentage of errors was related to infectious, chemical, common and recyclable waste. It is known that in the MW sorting phase, there may be confusion and misconceptions about the classification of each material, which can be solved through educational actions and training on the subject[26]. Common waste containing secretions such as diapers containing feces, diapers containing urine, gauze used in the patient antisepsis, pads containing menstrual blood, cotton used for bed bath and gauze with organic matter had the highest error rates in the pre-test. This may be related to professionals' lack of knowledge about the classification of these materials, which can be confused with infectious waste.

The main concern with MW is due to the presence of pathogenic organisms and organic substances that have adverse effect on health. Some residues may contain a significant number of organisms, including virulent strains of viruses or pathogenic bacteria[8]. Thus, infectious waste is considered the second leading risky group worldwide and deserve attention from the health team during its sorting as its improper handling can cause infections to healthcare workers, such as hepatitis B and C, typhoid fever, cholera, tuberculosis, skin infections, respiratory infections and HIV/AIDS[21]. In the present study, the infectious waste that had the highest number of errors regarding their classification by health professionals were: intravenous infusion sets, ostomy pouches and sterile surgical gloves.

Chemical waste is represented by materials containing chemicals that may pose a risk to public health or the environment depending on their hazardous characteristics[27]. The Brazilian law on MW discriminates that Group B waste (chemicals), when segregated and stored correctly, can be returned to the manufacturer/supplier[11,12].

It was found that most professionals interviewed in the present study had low knowledge about chemical waste as just a few classified materials like "syringe and needle used in medication preparation" and "medication vials and ampoules" as chemical waste. It can also be inferred that even after the educational intervention there was no significant enhancement in professionals' knowledge regarding such materials.

Of all the occupational hazards related to MW mismanagement, there is a special concern with the occurrence of accidents with biological material containing HIV and hepatitis B and C viruses given the strong evidence of transmission through medical waste[8]. The safe sorting of sharps is a key priority given their classification as highly hazardous waste; additionally, the proper management of these materials has a direct impact on the reduction of occupational accidents[17].

The handling of sharps such as needles, venous catheter and scalpel blades used during patient care is seen as the main cause of occupational accidents among health professionals[28]. The proper disposal of sharps waste occurs when the object is disposed in a container with protection and rigid walls[26]. Of the materials listed on the knowledge test, only catheter guidewire and vaccine vial had low rates of right answers given by the professionals assessed in the present study.

In any health care service or level, the quality of care provided to the community depends on the proper management of the waste generated, which requires the presence of trained professionals committed to this activity[29]. It should be noted that medical waste can become serious problems for society when handled improperly, contributing to environmental degradation and health risks to the community. It is essential that health professionals, managers and institutions are sensitized to take individual and collective responsibility over the proper management of MW[29].

The training carried out during work shift with professionals working in the ICU favored the enhancement of professionals' knowledge about MW sorting, which may favor the reduction of occupational accidents and expenses for materials.

One limitation of the present study was the impossibility to carry out an intervention in the PGRSS of the University Hospital for the adequacy of bins according to the Brazilian legislation on MW due to lack of time; in the present study, it was only possible to carry out the assessment of knowledge about MW in order to sensitize the health team to the effective management of waste, especially during sorting.

It is known that waste management encompasses a set of management, planning and implementation procedures based on regulatory and legal scientific and technical evidence with the aim to minimize the production of waste and provide its safe disposal. Thus, the ICU health professionals are responsible for one of the most important phases of waste management, which is the sorting; therefore, it is essential that training courses are carried out periodically with these professionals in order to enhance their knowledge about the correct classification of each material.

Further studies should be carried out to track for a longer period the effects obtained with the educational intervention and to associate the enhancement of professionals' knowledge with the reduction of medical waste.

## CONCLUSION

It was observed that the educational intervention led to an enhancement of professionals' knowledge about waste sorting, especially in relation to common, recyclable and infectious materials. This result may favor the reduction of occupational accidents and the expenses for materials.

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