ABSTRACT

Objective: To verify the disposal of pharmaceutical waste performed in pediatric units. Method: A descriptive and observational study conducted in a university hospital. The convenience sample consisted of pharmaceuticals discarded during the study period. Handling and disposal during preparation and administration were observed. Data collection took place at pre-established times and was performed using a pre-validated instrument. Results: 356 drugs disposals were identified (35.1% in the clinic, 31.8% in the intensive care unit, 23.8% in the surgical unit and 9.3% in the infectious diseases unit). The most discarded pharmacological classes were: 22.7% antimicrobials, 14.8% electrolytes, 14.6% analgesics/pain killers, 9.5% diuretics and 6.7% antiulcer agents. The most used means for disposal were: sharps’ disposable box with a yellow bag (30.8%), sink drain (28.9%), sharps’ box with orange bag (14.3%), and infectious waste/bin with a white bag (10.1%). No disposal was identified after drug administration. Conclusion: A discussion of measures that can contribute to reducing (healthcare) waste volume with the intention of engaging reflective team performance and proper disposal is necessary.

DESCRIPTORS
Medical Waste; Pharmaceutical Preparations; Pediatric Nursing.
The ecological issue has been widely discussed by society in recent decades, aiming at concepts such as environmental preservation, improving quality of life and sustainability. According to the Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics – IBGE) in its National Survey of Basic Sanitation (Pesquisa Nacional de Saneamento Básico – PNSB, 2008), 259,547 tons of waste are collected daily, of which 8,909 are waste generated by health services. Among the 4,469 municipalities studied, 41.5% did not have any type of treatment for such waste.

Healthcare Waste (HCW) (RSS in Brazil – Resíduos de Serviços de Saúde) is any material that poses a risk to public health due to the presence of biological materials that are capable of causing infections; hazardous chemicals; sharps and radioactive waste materials. HCW is classified into five groups according to their characteristics, according to the Resolutions of the National Environmental Council (Conselho Nacional do Meio Ambiente – CONAMA) number 358/2005 and the Collegiate Board (RDC) of the National Sanitary Surveillance Agency (Agência Nacional de Vigilância Sanitária – ANVISA) number 306/2004. According to federal legislation, pharmaceutical waste is classified as Group B waste which poses risks to public health and to the environment due to its chemical characteristics, including all classes of pharmaceuticals, chemotherapeutic drugs, and all others considered dangerous, in accordance with the Brazilian Regulatory Standard (Norma Brasileira Regulamentadora – NBR) 10004 of the Brazilian Association of Technical Standards (Associação Brasileira de Normas Técnicas – ABNT).

In the State of São Paulo, the Sanitary Surveillance Center ordinance (CVS-21) regulates techniques on the management of Pharmaceutical Hazardous Waste (RPM in Brazil – Resíduos Perigosos de Medicamentos), classifying it as chemical waste that presents a risk to human health and the environment. They are separated into two types according to the quantity and concentration of pharmaceuticals, namely RPM type 1 and RPM type 2.

Within the hospital setting, pediatric units can be highlighted as waste producers, including vaccines and drug residues that exceed therapeutic demand or that are past their expiration date. Due to a lack of products available which are compatible with pediatric patients, professionals are obliged to manipulate the drugs in an attempt to achieve the required dosage, often discarding surplus product. In conjunction with pharmaceutical disposal, there is a lack of preparation on behalf of professionals in relation to the different types of waste and the correct way to dispose of it. Studies carried out seeking to identify nursing team knowledge about HCW report that the nurses declared having some knowledge about the subject and that they consider the nurses’ participation in managing this waste fundamentally important.

Thus, the present study aimed to verify pharmaceutical waste disposal by professionals in pediatric units of a university hospital in the city of São Paulo.
RESULTS

Twenty-eight (28) data collection periods were performed in each studied unit, totaling 112 moments in 224 hours of observation, identifying 356 pharmaceutical disposals in the four units, of which 125 (35.1%) occurred in the clinical unit, 113 (31.8%) in the ICU, 85 (23.8%) in the surgical unit and 33 (9.3%) in the infectious diseases unit.

The results concerning the most disposed pharmacological classes are presented in Table 1.

The category ‘Others’ was comprised of the following pharmacological classes: immunosuppressive, hepatoprotective, antacids, antianginal, antiepileptic, systemic antifungal, \textit{H1} antihistamines, vitamins, anticoagulants, antiemetics, hypnotics, phosphodiesterase inhibitors and laxatives.

Regarding the commercially available physical form of all the study pharmaceuticals, it is possible to verify that 188 (52.8%) were liquids, 111 (31.2%) were tablets and 57 (16.0%) were powder/lyophilized powder. It is worth noting that no drug disposal was observed in the forms of paste, oil, cream, dragée/sugar-coated tablet, gel or capsule during the data collection period.

Figure 1 shows the main types of primary packaging identified. Drug disposal with tube packaging was not observed.

Table 1 – Pharmacological class of the pharmaceuticals disposed of, according to the hospital unit – São Paulo, SP, Brazil, 2012.

<table>
<thead>
<tr>
<th>Pharmacological Class</th>
<th>Surgical unit (n = 85)</th>
<th>Clinical (n = 125)</th>
<th>ICU (n = 113)</th>
<th>Infectious Diseases (n = 33)</th>
<th>Total (n = 356)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f (%)</td>
<td>f (%)</td>
<td>f (%)</td>
<td>f (%)</td>
<td>f (%)</td>
</tr>
<tr>
<td>Antimicrobial</td>
<td>32 (37.6)</td>
<td>18 (14.4)</td>
<td>22 (19.5)</td>
<td>9 (27.3)</td>
<td>81 (22.8)</td>
</tr>
<tr>
<td>Electrolyte, Thinner</td>
<td>5 (5.9)</td>
<td>19 (15.2)</td>
<td>22 (19.5)</td>
<td>7 (21.2)</td>
<td>53 (14.9)</td>
</tr>
<tr>
<td>Painkiller</td>
<td>18 (21.2)</td>
<td>14 (11.2)</td>
<td>14 (12.4)</td>
<td>6 (18.2)</td>
<td>52 (14.6)</td>
</tr>
<tr>
<td>Diuretic</td>
<td>– (–)</td>
<td>22 (17.6)</td>
<td>10 (8.8)</td>
<td>2 (6.1)</td>
<td>34 (9.5)</td>
</tr>
<tr>
<td>Antilucre</td>
<td>10 (11.8)</td>
<td>5 (4)</td>
<td>9 (8)</td>
<td>– (–)</td>
<td>24 (6.7)</td>
</tr>
<tr>
<td>Anticonvulsant</td>
<td>6 (7.1)</td>
<td>6 (4.8)</td>
<td>7 (6.2)</td>
<td>1 (3)</td>
<td>20 (5.6)</td>
</tr>
<tr>
<td>Anti-inflammatory</td>
<td>5 (5.9)</td>
<td>2 (1.6)</td>
<td>6 (5.3)</td>
<td>4 (12.1)</td>
<td>17 (4.8)</td>
</tr>
<tr>
<td>Anti-hypertensive</td>
<td>1 (1.2)</td>
<td>13 (10.4)</td>
<td>2 (1.8)</td>
<td>– (–)</td>
<td>16 (4.5)</td>
</tr>
<tr>
<td>Anti-anemic</td>
<td>3 (3.5)</td>
<td>8 (6.4)</td>
<td>– (–)</td>
<td>– (–)</td>
<td>– (–)</td>
</tr>
<tr>
<td>Muscle Relaxant</td>
<td>– (–)</td>
<td>8 (6.4)</td>
<td>– (–)</td>
<td>– (–)</td>
<td>– (–)</td>
</tr>
<tr>
<td>Anxiolytic</td>
<td>3 (3.5)</td>
<td>1 (0.8)</td>
<td>3 (2.6)</td>
<td>– (–)</td>
<td>7 (2)</td>
</tr>
<tr>
<td>Antidepressant</td>
<td>– (–)</td>
<td>– (–)</td>
<td>6 (5.3)</td>
<td>– (–)</td>
<td>6 (1.7)</td>
</tr>
<tr>
<td>Others</td>
<td>2 (2.3)</td>
<td>9 (7.2)</td>
<td>12 (10.6)</td>
<td>4 (12.1)</td>
<td>27 (7.6)</td>
</tr>
</tbody>
</table>

Legend: ICU = Intensive Care Unit.

Figure 1 – Primary packaging type of disposed drugs – São Paulo, SP, Brazil, 2012.

Regarding the physical form of the drug when it was disposed, 51.7% was disposed in its original physical form and the remaining (48.3%) in solution after handling/manipulation. Regarding the place of drug disposal, it was possible to observe that the entire amount (100.0%) was discarded at the place of preparation and always after handling/manipulation. No disposal was found after drug administration.

Results regarding the means used for disposal after preparation are presented in Table 2. This is followed by Figure 2, in which samples were classified into hazardous or non-hazardous substances according to the disposal means, in accordance with the RDC resolution number 306/2004\textsuperscript{3} and CONAMA number 358/2005\textsuperscript{2}.

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\textsuperscript{1} \textsuperscript{2} \textsuperscript{3}

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DISCUSSION

In the present investigation, pharmaceutical disposal in four different pediatric hospitalization units was verified. The number of beds, type of care provided to the patients, characteristics of drug therapy and the complexity of the children differed from one unit to another, therefore waste disposal generation was different among the units. According to the CONAMA Resolution number 358/2005 (2), the instant when the waste is generated is the mandatory moment to perform its correct separation in relation to its characteristics, in order to reduce the disposal volume and in order to guarantee health and environment protection, in addition to promoting cost reduction (3).

According to current legislation, pharmaceutical waste belongs to group B – Chemicals (2-3,12). Of the variables belonging to this group, pharmaceuticals that pose a risk to health or the environment when not submitted to the ‘3R’s’ process (reduce, reuse or recycle) must be disposed of according to their hazard characteristics, and forwarded for treatment in specific landfills for hazardous waste (Class I), or if they do not present any characteristic which poses a degree of danger, they can be sent to licensed landfills (2-3).

Chemical waste in a liquid state must be subjected to specific treatment in accordance with the contaminating substance, and final disposal in landfills is prohibited. If the waste does not present hazardous characteristics, it can be released into the sewage network, provided that the guidelines established by the competent environmental agencies, water managers and sanitation are obeyed (2). Thus, there is a need for information about which substances are allowed, since doubts can lead to errors in separating these materials, leading to disposing substances that pose a risk to the population and the environment (13).

In evaluating the pharmaceuticals analyzed in the present study in relation to the means chosen for disposal, we observed non-compliance with the recommendations backed by legislation (2-4). There is a lack of proper disposal sites for these drugs, with no availability of proper containers with identification of the associated risk symbols suitable for each type of substance according to its physicochemical characteristics (4).

According to CVS 21/08 (4), a considerable quantity of the waste, including hazardous waste is inadequately disposed, leading to environmental contamination and resulting in risks.

| Table 2 – Disposal means of pharmaceutical/medication, according to the hospitalization unit – São Paulo, BB, Brazil, 2012. |
|---|---|---|---|---|---|
| Disposal means | ICU (n = 113) | Surgical (n = 85) | Infectious Diseases (n = 33) | Clinical (n = 125) | Total (n = 356) |
| | f (%) | f (%) | f (%) | f (%) | f (%) |
| Sharps disposable box with YB | 37 32.8 | 15 17.7 | 23 69.7 | 35 28 | 110 30.9 |
| Sink drain | 39 34.5 | 4 4.7 | 2 6.1 | 58 46.4 | 103 28.9 |
| Sharps box with OB | – – | 51 60 | – – | – – | 51 14.3 |
| Infectious waste/bin with WB | 4 3.5 | 2 2.3 | 8 24.2 | 22 17.6 | 36 10.1 |
| Recyclable waste/bin with TB | 33 29.2 | – – | – – | – – | 33 9.2 |
| Hazardous chemicals waste/bin with OB | – 13 15.3 | – – | – – | 7 5.6 | 13 3.6 |
| Regular bin with BB | – – | – – | – – | 7 5.6 | 7 2 |
| Regular bin with TB | – – | – – | – – | 3 2.4 | 3 1 |

Legend: ICU – Intensive Care Unit; YB (yellow bag); OB (orange bag); WB (white bag); TB (transparent bag); BB (black bag).

Figure 2 – Environmental hazard classification according to disposal means – São Paulo, SP, Brazil, 2012.
RESUMO

Objetivo: Verificar o descarte dos resíduos de medicamentos realizado em unidades pediátricas. Método: Estudo descritivo e observacional, realizado em um hospital universitário. A amostra de conveniência foi constituída pelos medicamentos descartados durante o período de estudo. Observaram-se a manipulação e o descarte durante o preparo e a administração. A coleta dos dados ocorreu em horários preestabelecidos e realizada por meio de instrumento pré-validado. Resultados: Identificaram-se 356 descartes de medicamentos (35,1% na clínica, 31,8% na unidade de cuidados intensivos, 23,8% na cirúrgica e 9,3% na infectologia). As classesšecondaria dos resíduos de medicamentos descartados foram: 22,7% antimicrobianos, 14,8% eletrólitos, 14,6% analgésicos, 9,5% diuréticos e 6,7% antiulcerosos. Vias mais utilizadas: caixa descartável para perfurocortante com saco amarelo (30,8%), ralo da pia (28,9%), caixa de perfurocortante farmacológicas mais descartadas foram: 22,7% antimicrobianos, 14,8% eletrólitos, 14,6% analgésicos, 9,5% diuréticos e 6,7% antiulcerosos.

CONCLUSÃO

The results allowed for verifying that the characteristics of drug therapy and the complexity of the children differed from one place to the other, consequently directly reflecting waste disposal production.

Regarding the drug disposal site, the most frequently adopted was the sharps disposable box with a yellow garbage bag, however a relevant finding was identifying that 28.9% of the disposals were performed via sink drain, demonstrating an important factor regarding the environmental impact of healthcare waste, as 48.2% of the total primary sample corresponded to medicines that pose a risk to human health and the environment.

In all the national legislations available on healthcare waste, there are gaps in means of pharmaceutical disposal used in hospital institutions, making it difficult for managers and even those in direct care.

It is necessary to discuss measures that contribute to reducing pharmaceutical disposal volume, such as instituting individualized dosing and health team training relating to managing healthcare waste, with the intention to engage in reflexive action on waste generation and its adequate disposal and with a consequent impact on nursing practice and environmental health.
com saco laranja (14,3%) y lixeira infectante con saco blanco (10,1%). No fue identificado descarte después de la administração de los medicamentos.

Conclusión: Se hace necesaria la discusión de medidas que contribuyan a la reducción del volumen de resíduos, con el intuito de engajar a la actuación reflexiva del equipo y el descarte adecuado.

DESCRIPTORES
Resíduos de Servicios de Salud; Preparaciones Farmacéuticas; Enfermería Pediátrica.

RESUMEN
Objetivo: Verificar el descarte de los residuos de fármacos realizado en unidades pediátricas. M étodo: Estudio descriptivo y observacional, realizado en un hospital universitario. La muestra de conveniencia estuvo constituida de los fármacos descartados durante el período de estudio. Se observaron la manipulación y el descarte durante la preparación y la administración. La recolección de datos ocurrió en horarios pre establecidos y fue llevada a cabo mediante instrumento pre validado. Resultados: Se identificaron 356 descartes de fármacos (el 35,1% en la clínica, el 31,8% en la unidad de cuidados intensivos, el 23,8% en la quirúrgica y el 9,3% en la infectología). Las clases farmacológicas más descartadas fueron: el 22,7% de antimicrobianos, el 14,8% de electrolitos, el 14,6% de analgésicos, el 9,5% de disúrticos y el 6,7% de antivertigos. Medios más utilizados: caja desechable para punzocortante con bolsa amarilla (30,8%), rebosadero del lavabo (28,9%), caja de punzocortante con bolsa naranja (14,3%) y basurero infectante con bolsa blanca (10,1%). No se identificó descarte tras la administración de los medicamentos. Conclusión: Se hace necesaria la discusión de medidas que contribuyan a la reducción del volumen de residuos a fin de involucrar la actuación reflexiva del equipo y el descarte adecuado.

DESCRIPTORES
Residuos Sanitarios; Preparaciones Farmacêuticas; Enfermagem Pediátrica.

REFERENCES


