

## Medicines and their Disposing: Analyze in Three Brazilian Cooperatives and Contrast with Disposing in Spain

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### Abstract

Given the health risks involved in the management of urban solid waste, such as emission in the atmosphere of toxic gases, asphyxiation and explosives, proliferation of vectors and transmitting agents of disease, one of the most appropriate ways of handling these Waste is recycling, taking into consideration aspects of promotion and health protection. This is a complex productive orientation, which requires sharing of responsibility between society, the state and the companies, in order to maximize the reuse of solid urban waste. subsidize public policies to encourage and educate the population in general to properly clean up solid waste before disposing of them.

**Keywords:** Brazilian Cooperatives; Medicines; Disposing; Spain

### Introduction

Regulated in 2002 as a professional category and recorded in the Brazilian Occupation Classification (CBO) under N<sup>o</sup> 5192-05 [1,2] the scavenging of solid waste is a professional activity that entails health risks of different natures. However, the screening activity of the waste can cause ergonomic problems, given the body posture in which it is performed [3-5]. There may also be injuries due to the existence of glass pieces, sharp metals, hospital material and other needlestick objects in waste discarded [6]. A third source of risk to the health of scavengers is the disposal of organic material and pharmaceuticals, which can be ingested by these professionals. The fourth source of risk concerns mental health. Scavengers may be exposed to important loads of stress and sadness [3]. Finally, it is also a source of illness among scavengers the contact with atmospheric pollution in the form of fungi, bacteria and toxic metals, which can cause diseases from the airways or through dermal contact [7]. In this work, we will discuss the disposal of organic materials and pharmaceuticals, so that it can influence and pollute the soil and the worker involved with waste recycling.

The worldwide expansion of the electro-electronic equipment Industry (EEA), since the 1990s, has enlarged the concern about the health of recyclable waste collectors, especially in developing countries where recycling is carried out in a way Deregulated [8]. Usually, the residue that reaches the collectors' cooperatives is quite diversified, and may contain toxic substances, as well as organic material – leftover food and other discarded products. This is an extra factor in the health risk of scavengers who are already vulnerable. The cooperative's facilities can also exacerbate that risk. If the environment is closed, it may compromise the quality of the air, with the accumulation of fungi, bacteria and metals; If opened, there remains the risk of accidents with glass pieces and Needlestick objects [9].

According to resolution No. 306 of 7 December 2004, of the National Health Surveillance Agency, and the resolution of the National Environment Council – CONAMA No. 358, of 29 April 2005 [10], chemicals are called chemical waste That may present a risk to the health of the population or the environment, depending on their characteristics of flammability, corrosivity, reactivity and toxicity. For example, medicinal products with expired or unexpired expiration date, hormone, antimicrobials, cytostatic, Antineoplas-

tic, immunosuppressants, Digitalis, immunomodulators, antiretroviral or the residues of their products are Considered to be a potential risk to health and the environment.

The recycling of recyclable material is a growing profession among the less favoured and vulnerable strata of the Brazilian population [4,11], and considering the risk to which these professionals are exposed daily, this study was carried out with the purpose of evaluating possible sources of contamination in the environment of collectors cooperatives of recyclable material, in Special in view of the enactment, in 2010, of the National Solid Waste Policy (PNRS), which encourages the inclusion in the sustainable productive process of recyclable material collectors, mainly those organized in cooperatives.

### The study area

The three cooperatives studied are located in easily accessible areas in São Paulo. They have room for sorting of solid waste, yard for selected material storage for recycling, environment for meals and separate administrative environment of others. Cooperatives are voluntary delivery points and receive solid waste materials coming from selective collection, condominiums, commerce, industry and services, schools, charities, banks, post offices, etc.

The results of the environmental assessment in recyclable material cooperatives in the Souza GF [12] doctoral thesis, if possible to Manda the health risk in Which workers who Were exposed, related to the presence of fungi in ambient air and with little or no risk to health due to the presence of toxic metals in the environment in the Studied cooperatives. The study revealed the fragility of waste pickers in relation to their health, given Beheerder their situation of social vulnerability.

### Identification of residues of medicinal products

According to descriptive analysis of the volume of residues of medicinal products collected over a week of research in each cooperative (months of August, October and December 2013), we obtained the data shown below:

This analysis was carried out between the cooperatives who worked with medicines, with expiration date or not, and the number of cooperatives who did not know how to report on residues of medicinal products received by the cooperatives. Both information was handled with the R software, with the GGLOT2 package. The GGLOT2 is own and specific to graphics in the R system. It is worth pointing out that this study had approval from the Ethics Committee for Research Projects Analysis (CAPPESQ), with protocol number 169/13, online Registration No. 10470.

**Figure 1:** Scale for the weighing of separate medicinal products within one week.

**Figure 2:** Separation of residues of medicinal products during the period of one week in the cooperative of recyclable materials.

Discarded medications and their use in the organization of research, was reiterated among the scavengers the fate that the drugs earned. According to the pickers, according to the work routine, such residues of medications were separated as rejects and routed to the landfill. However, some have admitted a remote possibility of using the same waste, once considering the assumption that the validity of the product would be valid. Although it was a possibility, there was no confirmation of any use during the research and the scavengers stated that they did not use the medications. Although it is a subject that escapes the proposed subject, it may be the object of new studies on health risks of recyclable material scavengers, for researchers in the area.

Such studies will be able to subsidize public policies to encourage and educate the population in general to properly clean up solid waste before disposing of them, thereby contributing to the promotion of the health of recyclables, since They are in a high-risk environment.

With regard to the residues of discarded and sent to the cooperatives studied, the possibility of the cooperatives using these products for two reasons is concerned. The first is self-medication, always detrimental to health. The second is the risk of the use of medicinal products with expired expiration date or the packaging violated. In both situations the health risks of the cooperatives may be increased. In addition, there is still the risk that these wastes would contaminate soil and water when deposited in landfill.

In reality found and researched, it is constant that the volume of waste received increase or decrease in accordance with the partnerships established with the city hall or with public or private companies. When the volume of waste increases, the risk to the health of scavengers is increased, in particular considering their fragile health situation [13,14], in addition to its own aspects to its workplace, since besides the possibilities of contact with the medicines, there are also aspects of the site that can contribute to the enactment of diseases caused by fungi and metals.

In another perspective, Santos and Silva [15]. Inform about the awareness that Ceará scavengers possess in relation to the danger that solid waste can offer to their health. Such concern is no different between Federal district pickers [3] and other States in general. However, as stated by Dall'Agnol and Fernandes [4], the conception of health of recyclable material scavengers is operational. You have health to work and that is the biggest concern. The authors also identify problems associated with the proximity of the feeding area

to the site of screening of products. At the same time, they report that the conditions of vulnerability of this population contribute to habits detrimental to the health of the scavenger. Eating discarded organic waste [3] with recyclables is not necessarily considered problematic, and such fact, although not customary, may occasionally happen.

In view of this study, it was verified that there is a possibility for scavengers to collect and use food and medicine in the screening process, although this fact is not proven, and of a greater incidence in the spread of fungi, which It may be related to the proximity of the kitchen in relation to the screening area in some cases, either by land planning, or by organization of the cooperative team.

In this sense, they suggest attention to the health of the people who deal with this type of material, besides stimulating the cooperative work of recycling, where the scavengers can receive information about their health, promotion and prevention of diseases, as well as go through Immunization campaigns that place them protected from diseases associated with accidents at work and other forms of contamination, such as inhalation of toxic products and dermal contact.

Castilhos., *et al* [16]. Report diseases identified by scavengers, such as "worms, intestinal infection (diarrhea), influenza, leptospirosis, dengue, meningitis, headache, toothache, fever, allergy and nausea". Whereas urban solid waste should be characterized as a collective health problem and that the consequences of its incorrect handling and the recurrent inadequate final provision may reflect both directly and indirectly on the health of the Population exposed to the products. This exploratory study sought to offer subsidies to the discussions aimed at monitoring the work environments of recyclable material scavengers, as well as establishing levels of biological and chemical agents suitable for minimizing or eliminating Their risk to the scavengers and to the general population.

Wouters [17] combines inflammation of the upper airways and respiratory symptoms in superior household waste collectors due to high concentrations of exposure of organic dust when compared to control group. In Istanbul, for example, health problems of garbage collectors, were related to exposure to bacteria and fungi in the air of the occupational environment, being cause of respiratory diseases, gastroenteritis and dermatitis [18].

Regarding the biosecurity aspects related to the use of individual protective equipment in the prevention of fungal contamination, educational campaigns are prioritised in order to guide recyclable material pickers on the use of Masks, gloves, smock, Boots, among others [19].

On the indiscriminate disposal of medicinal products, whether home or health services, should be considered a relevant item for collective health, since they can provide environmental contamination of soil and water, and imminent risk for Population that resides in the surroundings of landfills, and for the population of cooperative workers of recyclable material.

During this study, significant quantities of residues of medicinal products mixed with other residues were observed. It was quantified, on average, 4 kg of waste of medicinal products discarded incorrectly in the cooperatives of recyclable materials within a period of one week.

However, there are initiatives in Brazil to operate, collect and carry solid waste in general, as well as drug residues. That sense, we can cite in particular: I) the Special collection program of the municipal city of Curitiba; II) The collection program of the Popular pharmacy of the Federal University of Rio Grande do Sul; III) The "Right destination programme" of the Panvel network; IV) The 'correct drug disposal' programme of the Sugar Loaf Network in partnership with Eurofarma; V) The "Safe Drug return program" of the Hospital of the clinics of the Faculty of Medicine of the University of São Paulo, and, VI) the program conscious disposal, managed by BHS [20]. It seems important that these initiatives be disseminated throughout the national territory, given the growth of recycling activity in the country and the regulation of the profession of scavenger.

In this context, there is evidence of the need to take measures in the field of biosafety, including the education of the general population, and the training of scavengers with clarification on separating waste from medicines without making use of them, because it is Hazardous waste. As Jaime Oliveira<sup>1</sup> says, "The consumer will also have to do his part, which in this case will be limited to the correct segregation of the residue or the delivery of the medicine at a collection point".

Thinking in other places Olalla, *et al.* [21] analyses the presence of 17 cytostatic agents from seven different groups, based on their different mechanisms of action, IN the effluent from a medium-sized hospital located IN Eastern Spain. Analysis of the compounds found in the effluents studied involved Solidphase extraction (SPE) coupled online to a high-performance liquid chromatograph Tandem mass spectrometer (HPLC-MS/ms).

A combined evaluation of the risk and environmental hazard show that three of the 17 compounds studied, namely, Ifosfamide, imatinib and Irinotecan, all of which exhibited HQ values higher than 10 and PBT indices of 6, indicative of a particularly high potential to Harm the environment, special attention

Samples were collected daily during the first week of June 2013 from two wastewaters of a medium-sized teaching hospital in the Community of Valencia (Spain) as a screening level study. Sampling was performed along five consecutive working days in order to study potential differences throughout the week and in June as a "normal" month after the winter period when some diseases can become potentiated and prior to the summer period when tourism Increases the background population. At each discharge point, three samples (1 L each) were collected every day (at 8 a.m., 4 p.m. and 8 p.m.) and combined to give a sample representative of the whole day. The samples obtained (10 in total) were transferred into 1-L amber glass bottles and transported to the laboratory for Subsequence analysis.

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Wastewater Sample 1 collects Wastewater from the northern part of the hospital, which is dedicated to clinical research and laboratories, consultations/techniques and hospitalisation, and general services. Wastewater Sample 2, in contrast, collects Wastewater from the southern part, and radiology, for example, discharge half its Wastewater into this flow. The Day Hospital generates all into wastewater 1, whereas nuclear medicine generates in wastewater 2.

This hospital has a total surface area of 260.000 m<sup>2</sup> and offers a wide range of medical specialties. It has a total of 1000 beds, 311 rooms and 39 operating theatres and serves a population of around 200,000 inhabitants. It is also a reference hospital for other Spanish regions.

The mean daily discharge rate in June 2013 was 370 m<sup>3</sup>/day and the mean water consumption was 500 L per bed per day. Hospital Wastewaters are charged into a WWTP that treated a mean of 102.674 m<sup>3</sup>/day in 2013 and served a population of 335.825 inhabitants [22].

As such, the hospital contributes approximately 0.5% by volume of all the wastewater treated at the plant. The treatment technologies used at The WWTP include removal of sand and fats, primarily clarification, activated sludges, clotting/flocculation, filtration and ultraviolet (UV) disinfection.

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In this study, undressing not being the most widely detected compound (only present in wastewater 2), methotrexate was the second-highest concentration. This compound was found at a concentration of between 394 and 4756 ng/L, with a mean of 1905 ng/L. Methotrexate concentrations reported previously in Spain were as high as 19 ng/L in hospital wastewaters [23]. The same study reported similar methotrexate concentrations in the inflow to the matching wastewater treatment plant, with the slight variation probably being due to the residential contribution. In agreement with these values, Negreira, *et al.* [24] found methotrexate in six WWTP inflows in north-eastern Spain, with values ranging from 2.6 to 18.1 ng/L. This compound was found to be reduced to below the MDL once the water had been treated in the plant in both these studies. As such, methotrexate appears to be removed upon passage through WWTPs.

## Conclusion

We could point that a huge quantity of residues of medicinal products mixed with other residues were observed when there are collected. The residues usually were discarded incorrectly in the cooperatives of recyclable materials, because the difficulty that the workers have to separate and designate them to a better place to them.

It also revealed the fragility that waste pickers have in relation to their health. The most important factor is their situation of social vulnerability that doesn't give them access to education and a higher social level.

But the waste isn't the only problem when we talk about the environment. The waste we discarded on land could get to water too. In this case, the danger to population could be greater, because it could infect other vulnerable classes of peoples, like babies and older.

It's important we take care of our waste, and develop a sense of protection with our planet, if we like to live there.

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