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# Socio-environmental impact with inadequate destination of chemical residues Pharmaceuticals: project with alternative of receiving and processing of residues generated by the city of Araruama in the region of lakes of Rio de Janeiro

***Impacto socioambiental con destino inadecuado de residuos químicos Farmacéuticos: proyecto con alternativa de recepción y procesamiento de residuos generados por la ciudad de Araruama en la región de los lagos de Río de Janeiro***

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## ABSTRACT

Many pharmaceutical chemical residues (PCR) have shown great potential to pollute the environment, especially in marine habitats. The conjecture stems from direct participation of human beings. Toxicological studies carried with drugs showed the possibility of appearance of physiological sexual alterations already observed in certain species of fish and other marine animals, in addition to the increase of resistant bacteria. In this way, evidence drives the reduction or interruption of exposure to CRP in the environment. The objective of this work is to propose a project to receive expired medicines and other therapeutic products, without use or leftovers from inappropriate uses by several individuals. To achieve these objectives, we will carry out the following methodologies: (i) Conduct a literature review on the subject, to consolidate the problem; (ii) present an advertising plan using social communication vehicles, such as radio, television and social networks, for information and awareness of society about the PCR disposal campaign correctly, using the motto "save the world so you don't lose anyone you love" (iii) To officially request the support of the Municipal Environment Department of Araruama and the CRF-RJ to standardize and delimit the processing of PCR collected, as a result, several studies were found that indicate and reinforce the socio-environmental impact associated with disposal of PCRs, as well as the evolutionary trend of aggravation of this socio-environmental issue. The introduction of different programs to encourage the proper and rational management and treatment of PCRs with the direct mobilization of different social ties such as the media and especially the different levels of government of the direct and/or indirect administration presents itself as an important tool to achieve of measures that can reduce the social impacts caused by PCRs.

**Keywords:** Drug. Disposal. Pharmaceutical chemical residues. Environment.

## RESUMEN

Muchos residuos químicos farmacéuticos (PCR) han mostrado un gran potencial para contaminar el medio ambiente, especialmente en los hábitats marinos. La conjetura se deriva de la participación directa de los seres humanos. Estudios toxicológicos realizados con fármacos mostraron la posibilidad de aparición de alteraciones sexuales fisiológicas ya observadas en ciertas especies de peces y otros animales marinos, además del aumento de bacterias resistentes. De esta manera, la evidencia impulsa la reducción o interrupción de la exposición a la PCR en el medio ambiente. El objetivo de este trabajo es proponer un proyecto para recibir medicamentos vencidos y otros productos terapéuticos, sin uso o sobrantes de usos inadecuados por parte de varios individuos. Para lograr estos objetivos, llevaremos a cabo las siguientes metodologías: (i) Realizar una revisión bibliográfica sobre el tema, para consolidar el problema; (ii) presentar un plan de publicidad utilizando los medios de comunicación social, como la radio, la televisión y las redes sociales, para informar y concientizar a la sociedad sobre la campaña de eliminación de PCR correctamente, utilizando el lema "salva el mundo para que no pierdas a nadie que amas". " (iii) Solicitar oficialmente el apoyo de la Secretaría Municipal de Medio Ambiente de Araruama y del CRF-RJ para estandarizar y delimitar el procesamiento de los PCR recolectados, como resultado, se encontraron varios estudios que indican y refuerzan el impacto socioambiental asociado a disposición de los RCP, así como la tendencia evolutiva de agravamiento de esta problemática socioambiental La puesta en marcha de diferentes programas para incentivar el adecuado y racional manejo y tratamiento de los RCP con la movilización directa de distintos lazos sociales como los medios de comunicación y en especial los diferentes niveles de gobierno de la administración directa y/o indirecta se presenta como una herramienta importante para el logro de medidas que pueden red uce los impactos sociales causados por los PCR.

Palabras clave: Medicamento. Disposición. Residuos químicos farmacêuticos. Medio ambiente.

## 1 INTRODUCTION

The National Health Surveillance Agency (ANVISA) reports that the drug is the pharmaceutical product technically obtained or prepared, with prophylactic, curative, palliative or diagnostic purposes. With the increase in knowledge about disease control, multiplication of similar and generic products, dissemination in the media and easy access, there was an increase in the consumption of these products by the population and, consequently, an increase in the disposal of these inputs. Random disposal of expired medicines can lead to extremely relevant environmental impacts. The existence of this type of waste can lead to adverse reactions in aquatic and terrestrial beings (SANTOS et al., 2015).

Medicines when stored must be protected from sunlight, radiation and humidity, realizing that this practice is not known to the population. It is understood that the stock of medicines in households is a very worrying factor for public health, as they are usually not stored in appropriate places and can compromise the stability and effectiveness of the drug, leading to an incorrect disposal of these medicines (SANTOS et al., 2015).

The National Council for the Environment, also known as CONA-MA, aims to identify and qualify the disposal of solid waste in the environment. In its resolution nº 358 of 04/29/2005, article 21, solid waste is considered according to the danger it offers health professionals, the environment and the population itself. Among these residues that belong to group B are cytostatic, antimicrobial, chemotherapeutic drugs, among others, and these drugs must undergo a specific treatment and final disposal (FERREIRA, et al., 2015; BRASIL, 2005).

Many PCR have presented great potential to pollute the environment, especially in marine habitats. This conjecture originates through the direct participation of human beings. Toxicological studies carried out with drugs have shown the possibility of the appearance of physiological sexual changes already observed in certain species of fish and other marine animals, in addition to the increase in resistant bacteria. In this way, evidence drives the reduction or interruption of PCR exposure in the environment (DOS SANTOS et al., 2019; DA SILVA et al., 2021).

Changes that make it impossible to use medicines such as: Expired medicines, transfigured due to inadequacies in their storage, in addition to the accumulation of medicines in homes, the known "residential pharmacies", something that is impregnated in the culture of Brazilian society. The Resolution of the Collegiate Board (RDC) nº 306 of 2004, of the National Agency of Sanitary Surveillance (ANVISA), and Resolution nº 358 of 2005 of the National Council of the Environment (CONAMA), recommend that residues of medicines be classified as: chemical residue, which may present dangerous characteristics, requiring differentiated management, as well as adequate treatment. In this way, the objective of this work is to propose a project to receive medicines and other therapeutic products expired, unused or leftovers from inappropriate uses by several individuals. Adherence to the project will be voluntary, both for citizens, for pharmacies.

## 2 MATERIALS AND METHODS

The initial stage of the present study prioritized research on legislation Brazilian society and search for information about existing educational campaigns on the official websites of the Ministry of Health and ANVISA. Farther, conduct a literature review, with an exploratory, descriptive approach. For the study, bibliographic research was used using the, Academic google, SCIELO and PubMed databases literary review on the subject, to consolidate the problem.

**Data collect**

An opinion questionnaire was applied to collect and analyze responses through a link sent on social networks, from a virtual form on the Google Forms platform, supported by RDC nº 510 of April 7, 2017, respecting all sanitary procedures in force and reason for the COVID 19 Pandemic with a view to social restriction, for individuals residing in the lake's region, developing methods of analysis of the information collected, through the use of spreadsheets / tables.

Residents of Araruama city were asked the following questions:

1) Do you have a pharmacy at home?
2) Do you usually check the expiration date of medicines?
3) Where do you usually throw your expired medicines away?

4) Have you ever heard any program from your city hall to avoid the incorrect disposal of medicines?

In addition to, present an advertising plan using social communication vehicle, such as radio, television and social networks, for information and awareness of society about the PCR disposal campaign correctly, using the motto "Save the planet, and consequently you and everyone who loves". Officially requesting the support of the Environmental Secretariat of Araruama and CRF-RJ to standardize and delimit the collected PCR processing; All PCR collected in will be collected for processing.

## 3 RESULTS

Different studies were found that indicate and reinforce the socio-environmental impact associated with the disposal of PCRs, as the evolutionary trend for the aggravation of this socio-environmental issue (DA SILVA et al., 2021; eCycle, 2019). For experts, expired PCRs must be processed and treated by thermal actions, usually burned in incineration plants, reducing volume of waste and its danger (DOS SANTOS et al., 2019; DA SILVA et al., 2021). Our results indicated the need to present this project to the City Hall of Araruama, a city in the Lagos Region of Rio de Janeiro. Many steps need to be carried out, as it is a direct administration body, however, we started the project with the proposal to systematize PCRs collections, raising the possibility and offering to the pharmaceutical market in the region the implantation of medicine reception booths and other expired or damaged pharmaceutical ingredients. Additionally, we discussed and indicated different companies in Rio de Janeiro that may have contract for collection and treatment of these PCRs.

Incineration also poses risks to environment and our health, as the gases emitted by burning and the ash produced can contain different toxic substances. This requires extreme control and modern equipment with high efficiency to filter toxic molecules with catalysts that reduce and/or eliminate molecules harmful to the environment. For now, it is the best option for the final destination of health service waste (RSS) - a method also widely used abroad (DOS SANTOS et al., 2019; DA SILVA et al., 2021).

Our questionnaire was answered by (n=52) residents of Araruama. Portraying the world reality according to statistics presented by the WHO and the UN, according to Who et al. (1995) and Aquino (2008), the data from this study indicated that 96.2% of the interviewees, that is, the vast majority, have the habit of storing medicines at home the famous "pharmacinha" Graph 1A. Therefore, reaffirming that the habit of self-medication and the irrational use of medicines are a reality for a large part of the world population, including Brazil. This result is impressive because, although they seem harmless, they represent great harm to the health of society. Factors such as self-medication, incorrect storage, among others, can cause different interactions such as medication and food, including the aggravation of the disease (FRANCESCHET, 2005).

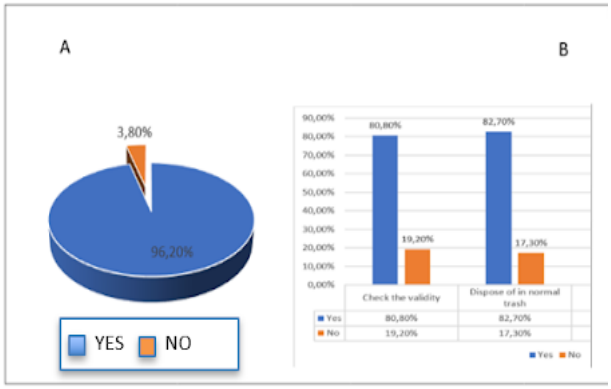
Briefly, in Graph 1B 80.80% of respondents answered that they check the validity of the medicines they have at home. Additionally, in relation to the disposal of expired medicines, interestingly, most of the individuals who answered the questions (82.70%) confirmed discarding these expired residues in the common waste and only 17.30% said they do not dispose of it this way. These results underscore the importance of this topic for society, especially with regard to the environment.

The presence of chemical agents exposed irregularly in the environment can cause several problems related to the lack of control of plant and animal biodiversity.

These data are broadly similar to those of Casanova et al. (2015), who presented compelling studies establishing a cause-effect relationship associated with environmental toxicology, associating negative effects caused by the interaction of contaminating chemical agents in the environment with living beings (CANOVA et al., 2019).

Finally, none of the interviewees claimed to know about any government program to collect expired medicines.

Figure - Illustrative graph that represents in percentage the number of individuals who claimed to have a pharmacy at home; B - Represents in percentage the number of individuals who claim to confirm and discard their medicine in common waste




Federal Law 12,305, which instituted the National Solid Waste Policy, provides that manufacturers, importers, distributors and traders of any product that may cause damage to the environment or human health must create a collection and final disposal system, regardless of the systems public urban cleaning (BRAZIL, 2010). However, these practices are not common both because the packaging of pharmacological products does not provide instructions on the proper procedure for the disposal of waste and because of the negligence of a large part of the world society (DA SILVA et al., 2021).

In full execution of the project, the aim is to consolidate information on types of PCRs discarded, quantity and financial cost, contribution to the effective implementation of the text published in the Official Gazette of the Union in which it says that pharmacies will have to make available and maintain at least one fixed point collection for every 10,000 inhabitants, in which consumers can dispose of expired or unused household medicines and their packaging (eCycle, 2019; BRASIL 2010).

## 4 CONCLUSION

Many measures are necessary to reduce and rationalize the actions associated with the disposal and processing of PCRs, however, we need to seek social movements of awareness and respect for the environment and especially future generations. The introduction of different incentive programs for the adequate and rational management and treatment of PCRs with the direct mobilization of different social ties such as the media and especially the different levels of government of the direct and/or indirect administration presents itself as an important tool for achieving of measures that can reduce the social impacts caused by the PCRs.

**Declarations:**
**Conflict of interest/Competing interest-The authors declare that they do not have conflict of interest.**

## REFERENCE


1. ANVISA – AGÊNCIA NACIONAL DE VIGILÂNCIA SANITÁRIA. Medicamentos. Descarte de Medicamentos: Responsabilidade Compartilhada. Disponível em: Acesso em: 13 nov. 2011. BILA, M.B. & DEZOTTI, M. (2003). Fármacos no meio ambiente. Química Nova, v. 26, n. 4, p. 523-530.

2. BRASIL. (2004). MINISTÉRIO DA SAÚDE. Agência Nacional de Vigilância Sanitária. Resolução da Diretoria Colegiada – RDC nº 306, de 7 de dezembro de 2004. Disponível em: Acesso em: 26 nov. 2011.

3. BRASIL. (2005). Resolução CONAMA nº 358 de 29 de abril de 2005. Dispõe sobre o tratamento e a disposição final dos resíduos dos serviços de saúde e dá outras providências. Publicação DOU, n. 084, de 04 de maio de 2005, p. 63-65. Disponível em: Acesso em: 26 nov. 2011.

4. BRASIL. (2010). Lei nº 12305, de 02 de agosto de 2010, institui a Política nacional de Resíduos Sólidos. Disponível em: Acesso em 13 nov. 2011.

5. FERREIRA, C. L et al. Análise do conhecimento da população sobre descarte de medicamentos em Belo Horizonte/MG. Interfaces Científicas-Saúde e Ambiente, v. 3, n. 2, p. 9-18, 2015.

6. eCycle (2019) Como fazer o descarte de medicamentos vencidos? https://www.ecycle.com.br/descarte-de-medicamentos/

7. DA SILVA, P, COSTA, C.; CAMPOS, C. et al. Uso irracional de medicamentos: uma perspectiva cultural. Brazilian Journal of Development, v. 7, n. 3, p. 21660-21676, 2021.

8. DOS SANTOS, F. N. S. Descarte inadequado de medicamentos vencidos ou em desuso. Revista Gestão & Sustentabilidade Ambiental, v. 8, n. 1, p. 290-300, 2019

9. World Health Organization: Report of the WHO Expert Committee on national drug policies: Contribution to updating the WHO guidelines for developing national drug policies. Geneva: WHO; 1995.

10. World Health Organization. The rational use of drugs: report of the conference of experts. Nairobi 1985 Jul 25-29. Geneva: WHO; 1987.

11. FRANCESCHET, I., FARIAS, M.R. Investigação do Perfil dos Farmacêuticos e das Atividades Desenvolvidas em Farmácias do Setor Privado no Município de Florianópolis, Santa Catarina, Brasil. Acta Farmacêutica. Bonaerense, v.24, n. 4, p. 590-597, 2005;

12. CASANOVA, T. B. S., LELIS, T. B. S. & SOARES, M. A. Ações de Educação Ambiental no Parque Natural Municipal de Marapendi. BJAER – Brazilian Journal of Animal and Environmental Research, v. 2, n. 5, p. 1736-1753, 2019.