

Editorial

When access to medicines meets sustainability: the role of ecopharmacovigilance in hospitals

Ecofarmacovigilância: uma ponte entre o acesso a medicamentos e a sustentabilidade

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Currently, pharmaceuticals are classified as emerging contaminants because their presence in the environment had been unknown or overlooked due to a lack of monitoring and regulation. However, as their detection and investigation began, they have attracted increased attention due to their potential impacts on human health and the ecosystem.

It was at the end of the last century that awareness started to grow regarding the presence of pharmaceutical products as environmental contaminants, particularly in water. Environmental chemist Christian G. Daughton was one of the pioneers in highlighting the problem, working from the United States Environmental Protection Agency (EPA)¹. Back in the 1970s, the presence of clofibric acid, an active clofibrate metabolite, had already been reported in treated wastewater in Germany. Subsequent studies continued to detect this and other pharmaceuticals, even in drinking water, adding to the evidence of the presence and persistence of various compounds as their therapeutic use increased².

Over time, pharmaceuticals from various groups have been quantified as water contaminants. Among the main categories are non-steroidal anti-inflammatory drugs (NSAIDs), antimicrobials, hormones, psychotropic drugs, beta-blockers, hypolipidemics, antacids, antidiabetics, and antineoplastics. The harmful effects of these pharmaceuticals became evident in ecotoxicity experiments involving various aquatic organisms, despite the low toxicity of many of these drugs in mammal species and their trace levels in the environment. NSAIDs, for example, due to their widespread use, have been detected in both untreated and treated anthropogenic effluents, as well as in aquatic ecosystems ranging from groundwater to surface waters such as rivers, lakes, and oceans. Their ecotoxicity manifests from enzymatic induction and oxidative stress to organic necrosis and teratogenic damage³⁻⁵.

Due to the above, it became necessary to formalize the ecopharmacovigilance discipline to ensure that the benefits of medications are not overshadowed by their risks to environmental health and to promote a more sustainable pharmaceutical products management. From their design, development, and production, to their administration and disposal, ecopharmacovigilance deals with the assessment of the environmental impact of medicines.

In the context of the global "One Health" initiative, which recognizes the human, animal, and environmental health interconnectedness, ecopharmacovigilance focuses on the detection and monitoring of drug residues in water, soil, and other environmental components, as well as the assessment of potential adverse effects on wildlife and flora. Ecopharmacovigilance also includes monitoring antimicrobial resistance since it has been demonstrated that this is caused not only by the excessive use and mismanagement of anti-infective drugs but also by the presence of non-antimicrobial drugs in water, inducing bacterial mutation frequency and gene transfer leading to resistance^{6,7}.

From health care systems, and particularly from hospitals, a comprehensive approach to ecopharmacovigilance can help expand the concept of rational drug use to reduce the ecological footprint left by current pharmacological treatments.

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Hospitals contribute significantly to water consumption, generating a substantial water footprint. Up to 80% of this consumption translates into the production of wastewater, which can contribute between 0.2% and 65% of the total discharges reaching municipal wastewater treatment plants. Moreover, hospitals are major medications consumers, and their activities can have a significant impact on the environment as they generate a large amount of biological and pharmaceutical waste⁸⁻¹⁰.

As a result, hospitals worldwide have joined initiatives of great importance in terms of environmental health. To name a few, there is the Global Green and Healthy Hospitals Network by the non-governmental organization Health Care Without Harm (<https://www.greenhospitals.net/>), the +Sustainable 2023 Project by the Spanish Society of Hospital Pharmacy (<https://www.sefh.es/sostenible-proyecto.php>), and the Ibero-American Network of Post-Consumer Medication Programs (<https://www.redippm.org/>), whose agendas converge on promoting greater sustainability in hospitals.

In light of the above, it is imperative to implement a comprehensive ecopharmacovigilance program in every hospital, particularly in Latin America, where only 15 to 20% of wastewater is treated properly. Additionally, various water bodies are contaminated not only with pharmaceuticals but also with metals, pesticides, hydrocarbons, and plastics. These pollutants have demonstrated the ability to cause toxic, acute, and chronic effects of varying severity on aquatic organisms^{11,12}.

Ecopharmacovigilance programs should be spearheaded by hospital pharmacies to promote sustainable practices and the reduction of pharmaceutical pollution. Hospital pharmacists are in a unique position to lead its implementation because they have access to a wide range of data on medication usage and are familiar with the principles of sustainability. Moreover, ecopharmacovigilance programs implementation can help hospitals become more efficient and safer.

Figure 1 outlines five axes of action with implementable proposals in the short and medium term to enhance drug management from hospital pharmacies with an environmental perspective. It is suggested that, to design an ecopharmacovigilance action plan, each hospital should prioritize medications with the highest environmental impact based on the latest available version of the “Pharmaceuticals in the Environment” (PHARMS-UBA) database published by the German Federal Environment Agency (<https://www.umweltbundesamt.de/en/database-pharmaceuticals-in-the-environment-0>) and in accordance with its institutional drug formulary or catalog. Alzola-Andrés et al. (2023) recently published a comprehensive analysis of the PHARMS-UBA database, which is also worth reviewing¹³.

Figure 1. Key actions and recommendations for sustainable medication management in hospitals



Sustainability of health care systems is an important issue that requires all stakeholders' attention involved in the health sector. Building health systems that are healthy for both people and the planet is possible.

Ecopharmacovigilance is an emerging discipline with the potential to transform the way medications are used and guide hospitals toward more sustainable and responsible decision-making.

Furthermore, ecopharmacovigilance offers a new opportunity for hospital pharmacists to make a difference and contribute to creating a more sustainable future for health care. By educating themselves about ecopharmacovigilance, forming alliances with other professionals, and developing an action plan, hospital pharmacists can bridge the gap between access to medications and ecologically responsible management. It will also be important to share and publish experiences and results from hospitals, as these would significantly contribute to scientific knowledge, standards and best practices establishment, and the generation of innovative solutions to more effectively address the challenge of mitigating the environmental impact of medication use.

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