Health Care Without Harm

ADDRESSING PHARMACEUTICAL POLLUTION IN EUROPE

The role of pharmacists championing the green transition

CONTENTS

INTRODUCTION

In 2008, global medicine consumption had already reached a staggering one million tonnes, with Europe accounting for a substantial 24% of this total.[1,2]

Only in Germany, pharmaceutical use is projected to increase by around 43-67% by 2045.[3] This surge is largely attributed to the demographic shift in Europe, where an increasing share of the ageing population has created a higher demand for medicines and an increase in days of hospital stay.[4]

Simultaneously, climate change can also have an impact on medicine intake globally. As the effects of climate change intensify, non-communicable diseases (e.g., cardiovascular diseases and mental illnesses), as well as respiratory, water-borne, vector-borne, and food-borne toxicants and infections, will increase. Consequently, there will be an increased need for medications to treat these health conditions and their impacts.[5]

As global pharmaceutical consumption increases, there is growing concern about the presence of active pharmaceutical ingredients (APIs) in our natural ecosystems. A 2022 study found APIs in 86.6% of 1,052 river sites in 104 countries[6]. The effects of APIs have been linked to disruptive ecological consequences, including the feminisation of fish and population collapses due to synthetic hormones and behavioural changes in organisms due to antidepressants.[7,8] Moreover, the presence of antibiotics in our soil and water is also contributing to a global health crisis - antibiotic resistance.

If no further action is taken antimicrobial resistance (AMR) is projected to cause ten million deaths per year worldwide by 2050.[9] This serves as a stark reminder of the significant threat that pharmaceutical pollution poses to the delicate balance of our natural world.

Pharmacists, as trusted community members, play a unique role in addressing this pharmaceutical pollution. Their crucial involvement in both the distribution and disposal of medicines, often within independent businesses, positions them as powerful agents for change.

This report showcases pioneering initiatives involving European pharmacists, highlighting their pivotal role in promoting responsible medicine use, reducing waste, and actively contributing to environmental protection.

PHARMACEUTICAL POLLUTION AND ANTIMICROBIAL RESISTANCE: THREATS TO ECOSYSTEMS AND HUMAN HEALTH

The increasing presence of pharmaceuticals in our natural environment is a growing concern that parallels the rise in global pharmaceutical consumption.

This problem goes far beyond mere traces of these substances; it affects entire ecosystems, with consequences both known and yet to be understood.

Pharmaceuticals can enter the environment at all stages of their life cycle; production, use, and disposal. Pharmaceutical residues have been globally detected in surface water, sewage effluents, groundwater, drinking water, manure, soil, and other environmental matrices.[10,11] In a recent study, APIs were found in 86.6% of the thousand sites used for data collection in various rivers around the world, indicating widespread environmental contamination.[12] Several kinds of pharmaceutical products (including antibiotics or antidepressants) have been found in the Antarctic waters, even in areas with no apparent human or animal presence.[13]

The presence of APIs in the environment is particularly alarming because these compounds are designed to be biologically active even at low concentrations. Their unintended effects in natural habitats can be profound and diverse.[14] Studies have shown that these substances can significantly alter the behaviour and physiology of aquatic organisms.[15,16]

For example, concentrations of certain APIs in water have led to the feminisation of fish populations and in the scenario studied, to the near collapse of the population.[17,18] This phenomenon disrupts not only the reproductive systems of these species but also the wider aquatic food chain and the balance of the ecosystem.

In addition to the cumulative impact of active pharmaceutical ingredients (APIs) in the environment, the manufacture, use, and disposal of antimicrobials have a major impact on the development of AMR. AMR is recognised to be one of the top ten threats to human health and is predicted to be responsible for over 10 million annual deaths by 2050.[19] The United Nations Environment Programme (UNEP) suggests that the response to AMR has been dominated by a focus on human and animal health, despite the growing evidence that environmental factors play a key role in driving resistance formation.[20]

The growing burden of AMR in the environment plays a key role in the loss of successful antimicrobial treatments, threatening many advancements in modern medicine, such as surgical interventions, chemotherapies, and immune-suppressing treatments.

PHARMACEUTICALS AND CLIMATE CHANGE

The pharmaceutical industry has played a significant role in exacerbating the climate crisis. Pharmaceuticals contribute to greenhouse gas emissions at various stages of their lifecycle, including manufacturing, sourcing materials, transportation, packaging, incineration, disposal, and drug usage. Studies show that the overall emissions from pharmaceutical production exceeded those of other sectors known for their intensive emissions, such as the automotive sector.[21]

All pharmaceutical products, from painkillers to antibiotics, have a carbon footprint. The National Health Service (NHS) estimates that around ¼ of the healthcare sector's emissions come from the use of medicines, with anaesthetic gases and inhalers contributing substantially to this figure, accounting for around 6% of total emissions from medicines production. Beyond greenhouse emissions, the excess release of pollutants during the production stage of pharmaceuticals comes with significant environmental risks such as water pollution.[22]

Urgent measures should be adopted to minimise the impact of pharmaceuticals on the environment. As frontline healthcare professionals, pharmacists are uniquely positioned to champion sustainable practices in medication use, from promoting eco-friendly options to educating patients and reducing waste. Their expertise and influence are vital for mitigating the environmental impact of pharmaceuticals. Other actors can also promote sustainability in pharmaceuticals. Healthcare facilities and professionals can focus on reducing unnecessary prescriptions and prioritising eco-friendly alternatives. Engaging patients in sustainable healthcare practices, such as proper medication disposal, is also crucial. Furthermore, manufacturers can be encouraged to adopt greener production practices and comply with sustainability standards.

The next section will delve deeper into specific actions pharmacists can take, building on the points introduced here.

PHARMACISTS ARE AMONG THE BEST-POSITIONED ACTORS TO TACKLE PHARMACEUTICAL POLLUTION IN EUROPE

Pharmaceutical pollution can be an important driver of major environmental and health challenges such as climate change, biodiversity loss, and the acceleration of antimicrobial resistance. But how can pharmacists drive change and minimise pharmaceutical pollution? Water is key to understanding the importance of their role.

Contrary to common belief, hospitals are not the main point of entry for pharmaceuticals in municipal wastewater in Europe. Only around 20% of APIs that are found in municipal wastewater come from healthcare facilities.[23] Medicines are mostly consumed in households; therefore, the pharmaceutical residues that can be found in European sewage largely come from private households.[24]

The residues of pharmaceuticals present in water are treated in wastewater treatment plants. However, these plants are designed to eliminate biodegradable substances and they are not able to remove pharmaceutical substances completely.[25] The treated wastewater is discharged into surface water sources, such as rivers, and enters the water cycle.

PHARMACISTS CAN GUIDE PATIENTS ON HOW TO TAKE MEDICINES CORRECTLY AND SELECT SUSTAINABLE ENVIRONMENTAL CHOICES

Pharmacists are trusted healthcare professionals and often serve as an accessible and reliable source of healthcare services, particularly in rural areas. Their involvement in critical healthcare activities, including vaccination campaigns, emergency drug dispensing, health screening, and their key role during the COVID-19 pandemic, has further strengthened this trust. Pharmacists can therefore advise patients on safe disposal options, such as take-back programmes offered by pharmacies or municipalities.

Additionally, pharmacists could inform and raise awareness about the existence of environmentally friendly alternatives to their prescribed medications, potentially reducing pollution at its source.

For instance, pharmacists can raise awareness of the environmental impact of different types of inhalers, such as the significantly lower carbon footprint of dry powder inhalers compared to pressurised metered dose inhalers.[26,27] This information empowers patients to engage in informed discussions with their doctors about the potential for switching to more environmentally friendly options, if clinically appropriate.

To support this, accessible resources on the environmental impact of over-the-counter (OTC) medicines should be made available to both pharmacists and patients. However, it is important to note that data on the environmental impact of medicines, such as Life Cycle Assessments (LCAs), may have limitations that pharmacists should be made aware of. They should also stay informed about new and evolving assessment methodologies (e.g. The Product Environmental Footprint (PEF).

MAIN CONTACT POINT FOR THE DISPOSAL OF MEDICATIONS

In Europe, the consumption phase emerges as the primary contributor to pharmaceutical emissions into the environment. Improper disposal of unused medications, often through sinks and toilets, leads to pharmaceutical residues entering wastewater systems. While wastewater treatment can remove some of these residues, traces persist in effluents and water sources, posing risks to aquatic organisms and human health.[28]

Here, pharmacists can have a central role in reducing the impact of pharmaceuticals on the environment and preventing unnecessary waste. At the same time, they hold the leverage to make a meaningful difference in contributing to a healthier planet through integrating sustainable policies within their daily practice. This commitment to environmental stewardship is demonstrated by their active participation in medication take-back programmes. One best practice for disposing of medicines is “Drug Take Back Programmes”. This allows patients to safely dispose of unused or expired drugs, with pharmacies often being the main collection point.

PROCURE PRODUCTS WITH A LOWER ENVIRONMENTAL FOOTPRINT

As mentioned above, every product leaves an environmental footprint due to the resources used in its production, delivery, use, and disposal. However, the role of procurement has been widely recognised in holding potential for substantially reducing greenhouse gas emissions generators in this sector. In sustainable procurement, organisations obtain goods and services while benefiting themselves, society, and the economy, and minimising harm to health and the environment.[29]

For example, by complying with sustainability standards and regulatory frameworks, the supplier’s environmental performance at the manufacturing stage can be regulated through sustainable procurement processes.

EDUCATIONAL BACKGROUND

Pharmacists have a unique and robust educational background that makes them ideally placed to address the pressing issue of pharmaceutical pollution. Their extensive training, spanning an average of five to six years, provides them with an in-depth understanding of pharmaceuticals, including knowledge of active pharmaceutical ingredients (APIs). This extensive knowledge base enables them to readily absorb additional information on the subject and positions them as strong advocates for engaging patients and other healthcare professionals in discussions about the adverse effects of pharmaceutical residues in our environment.

In addition, pharmacists are already engaged in activities closely related to the task of reducing pharmaceutical pollution, particularly in their role as stewards of antimicrobial medicines. As highlighted in the WHO toolkit on antimicrobial stewardship, pharmacists play a key role in antimicrobial stewardship (AMS) programmes, promoting the responsible use of antibiotics and other antimicrobial agents. Their ongoing efforts in AMS initiatives, such as advising patients on the proper disposal of antibiotics, provide a seamless transition into general medication management.

PREVENTING PHARMACEUTICAL POLLUTION AT THE POINT OF DISTRIBUTION

In Europe, large amounts of medicines are discarded annually by consumers and pharmacies, primarily due to medication expiration or changes in the patients' treatments. According to a survey conducted by HCWH in 2013, which involved 600 individuals in 6 capital cities, many patients stopped their treatment upon observing improvements in their symptoms before finishing the dose. Others frequently cited leaving blister packs untouched, particularly in Germany.

Reducing this figure is one of the most effective ways of tackling the widespread problem of pharmaceutical pollution in our communities and minimising the possibility of inappropriate disposal practices.

By looking at best practices from different European regions, we can gain valuable insights that highlight effective strategies to reduce the flow of unnecessary medicines into circulation.

CASE STUDIES: BELGIUM, GERMANY, UNITED KINGDOM, DENMARK, SPAIN AND THE NETHERLANDS

Best practices from different parts of Europe highlight how pharmacists can be a powerful force for good in addressing this pressing issue.

In this report, we present pioneering initiatives by pharmacists across Europe, demonstrating their key role in promoting the responsible use of medicines, reducing pharmaceutical waste and actively contributing to environmental protection.

By recognising the environmental impact of medicines and the role pharmacists can play in reducing it, we are taking an important step towards a more sustainable and healthier future.

BELGIUM: NATIONAL PHARMACIST MEDICATION PLAN PROGRAMME

Belgium has implemented a comprehensive healthcare strategy aligned with international best practices to combat pharmaceutical pollution. The Pharmacist Medication Plan Programme, initiated in April 2013, allows patients with five or more concurrent prescriptions to consult pharmacists about medication usage and interactions. The primary goal is reducing medication consumption, minimising waste, and addressing pharmaceutical pollution. Within this programme, patients can request a medication assessment from pharmacists, who review prescribed medications and provide customised advice to optimise regimens. The collaboration with attending physicians ensures changes align with medical needs and safety. The Belgian government supports this initiative with approximately €3 million in financial compensation for pharmacists, acknowledging their role in reducing pharmaceutical pollution.

Combining pharmacist-led medication reviews, collaboration with physicians, and financial incentives is an exemplary best practice. It reduces pharmaceutical pollution and enhances patient care, offering valuable insights for healthcare systems globally.

GERMANY: THE INNOVATIVE MEDICATION MANAGEMENT SERVICE OF A LOCAL PHARMACY

In Mugler, a German town, the Markt Apotheke Mugler has introduced an innovative medication management service. Launched in 2023, this service addresses the complexities patients face when managing multiple medications. The Programme provides patients with personalised, weekly medicine. Medications are organised in transparent blister packs labelled with the date, ensuring easy identification and dosage tracking. The pharmacy ensures timely medication reorders, contributing to better adherence and minimising the disposal of expired or unused medications. Despite challenges such as patient adaptation and additional costs, the service remains dedicated to promoting its advantages regarding convenience, sustainability, and patient medication management.

The service simplifies medication management for patients and aligns with environmental considerations, promoting responsible medication disposal. Patients receive only the needed medications, reducing the likelihood of stockpiling and incorrect disposal practices.

UNITED KINGDOM: ONLINE MEDICINES MARKETPLACE (OMM) – AN APPROACH TO SUSTAINABLE INVENTORY MANAGEMENT

Recognising the urgency of the problem, the NHS has set an ambitious goal to become the world's first net-zero healthcare system. This means eliminating its carbon footprint by 2040, with the broader goal of achieving net zero for the entire healthcare supply chain by 2045.[30]

As a result, an approach to addressing medicine waste is through a government-regulated OMM, such as Medicycle. Medicycle is a UK-based, government-regulated OMM designed specifically for pharmacies and wholesalers. It is a certified carbon-neutral company, meaning it offsets its carbon emissions to minimise its environmental impact.

Medicycle connects pharmacies across the country, allowing them to buy and sell surplus medications. This means pharmacies with excess stock can list their unused medicines, while pharmacies needing specific medications can purchase them at a reduced cost. Also, by facilitating the redistribution of unused medicines, Medicycle helps prevent these medications from expiring and being wasted. This is a major step towards reducing the environmental burden of pharmaceutical waste.

THE NETHERLANDS: GOVERNMENT-LED INITIATIVE TO CURB PHARMACEUTICAL POLLUTION WITH PHARMACIST COLLABORATION

In the Netherlands, pharmaceutical contamination of surface water became a growing concern in the early 2010s as pharmaceuticals exceeded environmental risk limits near wastewater treatment plants. To address this issue, the Dutch government initiated a collaborative approach with key stakeholders in the health and water sectors. This initiative, launched in 2016 and led by the Dutch Ministry of Infrastructure and Water Management, actively involved pharmacists.[31]

As part of this initiative, a successful campaign targeted general practitioners (GPs) and pharmacists, encouraging them to reduce the disposal of leftover medicines in sinks. In addition, recognising the need for environmental education in medical schools, a special module was introduced for GPs and pharmacists during their Pharmacotherapy Audit Meetings. These regular meetings have enabled local groups of GPs and pharmacists to discuss relevant issues and share best practices.

Pharmacists can play a crucial role by actively lobbying their governments to implement similar comprehensive programmes, advocating for increased environmental awareness within the profession, and even taking the initiative to launch local educational campaigns or disposal programmes in their communities.

SWEDEN: VÄLVALD AS A GUIDE TO SUSTAINABLE PHARMACEUTICALS

In Sweden, the Välvald guide serves as a valuable resource within the pharmacy sector guiding pharmaceutical companies that demonstrate transparency in their sustainability efforts and adhere to responsible manufacturing practices from 2020.

At pharmacies, a Välvald symbol appears alongside products of over-the-counter (OTC) products that meet the standards outlined in the guide. For instance, companies must report their sustainability efforts using frameworks such as the Global Reporting Initiative (GRI) Standards, with audits conducted by independent parties. Also, they must enforce compliance with the Pharmaceutical Supply Chain Initiative (PSCI) sector organisation, ensuring compliance with transparency and sustainability standards. However, some products containing diclofenac are exempt from the symbol due to sector agreements warning about their potential negative impact on the environment.

SPAIN: ECOFARMACIA, AN INITIATIVE FOR PHARMACIES

The EcoFarmacia initiative, launched in 2001 through collaboration between the pharmaceutical industry, pharmacies, and pharmaceutical distribution companies, aims to ensure the proper environmental management of medicine packaging and residues generated in households. The initiative strives to prevent improper disposal of pharmaceutical waste and packaging, reducing the risk of soil and water contamination, as well as preventing medicine accumulation in households.

The website, launched by SIGRE in 2019, offers 77 sustainable initiatives for pharmacies to adopt fostering sustainability and environmental care in their daily professional activities. Recognised as an exemplary environmental action against climate change, the initiative was showcased at the United Nations Climate Change Conference (COP 25) in Madrid, reflecting growing pharmacists' interest in environmental stewardship, evidenced by high website traffic and a SIGRE survey indicating that three out of every four Spanish pharmacists have already implemented some of these initiatives in their pharmacies.

FRANCE: THE COMMITMENT OF PHARMACIES TO SUSTAINABILITY

Since 2015, the Pharmacie de la Lèze in France has committed to a sustainable development approach, aiming to integrate corporate responsibility and environmental concerns into their operations. This commitment extends across various themes such as health promotion, purchasing, waste management, building energy, air quality, water, and transport. Taking a holistic approach to assessing their impact, Pharmacie de la Lèze emphasised the importance of decarbonising the health sector in their 2021 financial report. They advocate for optimising all aspects of operations, such as opting for domestic purchasing and reducing carbon-intensive activities such as travel.

As part of its sustainability approach, the pharmacy actively promotes responsible purchasing by selecting sustainable options and advocating for developing a sustainable development partnership charter with its main suppliers. Additionally, they prioritise staff awareness and training on understanding the environmental impacts of pharmaceuticals and the significance of labels and certifications.

PHARMACISTS FOR GREENER HEALTHCARE NETWORK

Pharmacists for Greener Healthcare is a network that brings together pharmacists from across Europe to share their best practices and coordinates advocacy activities to tackle pharmaceutical pollution and its contribution to AMR.

This network was launched by Health Care Without Harm Europe (HCWH) in 2023 and has over 120 members from all around the WHO European region. The coordinators of the network organise meetings and workshops to highlight best practices in sustainable pharmacy and serve as a contact point for its different members. Members might get in touch with their peers in other countries and learn sustainable practices that could be implemented in their practice.

The topics discussed by the network are very diverse and range from medicine use and storage in extreme heat conditions, to guidelines to reduce household pharmaceutical pollution and green procurement of pharmaceuticals.

TAKE BACK PROGRAMMES: A CLOSER LOOK

In addition to reducing the amount of dispensed medicines, the disposal of expired or unused medication is also a key element in successfully preventing pharmaceutical pollution. Again, pharmacies are at the forefront of such programmes and are often closely involved in take-back schemes.

The European Union's (EU) obligation to set up appropriate collection systems for unused or expired pharmaceuticals arises from Article 127b of Directive 2004/27/EC. Collection systems within the EU often involve either the return of medicines to pharmacies or the use of designated waste collection points. The specific obligations of pharmacies to provide take-back programmes vary between countries and regions, with some pharmacies participating voluntarily and others legally obliged to do so. Below are some examples of the variations found across the EU.

PORTUGAL

VALORMED is responsible for managing packaging waste from medicines for both human and veterinary use across Portugal, including the continental territory and islands. This includes waste from medicines containing residues, as well as veterinary products for domestic animals sold in pharmacies and non-prescription medicine sales locations. The company is backed by key stakeholders in the medicine supply chain and operates under supervision from the Portuguese Environment Agency (APA) and General Directorate of Economic Activities (DGAE), with licensing from the Ministries of Economy and Environment to manage the Integrated Medicine Packaging Waste Management System (SIGREM).

The main aim is to help Portuguese citizens safely dispose of empty medicine packages and expired medications through containers in community pharmacies and places for non-prescription medicine sales. This waste then undergoes selective collection and controlled processing in inappropriate treatment facilities. Increasing waste collection rates over the years indicate growing citizen awareness and adherence to Valormed's disposal system, driven by environmental consciousness and public health preservation efforts.

CROATIA

In Croatia, pharmacies are legally obliged to take back unused or expired medicines from patients. By law, pharmacies are classified as producers and custodians of drugs, thus they are required (as per the 'polluter pays' principle) to accept drugs from patients and cover associated costs.[32]

FRANCE

Similar to Croatia, France enacted Law No. 2007-248 in 2007, which requires pharmacies to accept unwanted medicines from patients. Cyclamed, a non-profit organisation that has been operating since 1993, manages the collection of unused medicines.[33] Cyclamed's approach involves cooperation between dispensing pharmacists, wholesalers, and pharmaceutical companies. It aims to collect expired and non-expired unused medicines returned by patients to pharmacies for proper disposal.[34] Wholesalers deliver empty containers to pharmacies and collect filled containers, while pharmacies facilitate the free collection of unused medicines from patients. Unlike Croatia, the programme's cost is funded by contributions from pharmaceutical companies rather than the community pharmacies themselves. The project has resulted in the successful collection of 62% of unused medicines.

GERMANY

Germany presents a different approach to pharmaceutical waste management. Unlike in some other countries, pharmacies in Germany are not legally obliged to accept returned medicines. Instead, the official recommendation advises individuals to dispose of medicines along with general household waste, as waste is thermally treated.[34] This approach is controversial and considered a sub-optimal disposal practice, and at a similar level as pouring liquid medicines down the sink. Therefore, some experts still encourage pharmacies to set up collection points and advise patients on correct disposal.

THE NETHERLANDS

For years, pharmacists in the Netherlands have participated in sustainability initiatives. For example, the Royal Dutch Pharmacists Association (KNMP) has joined forces as a signatory of the Dutch Green Deal for Sustainable Care, aligning with the government's commitment to enhance green growth.

Additionally, facilitating exchanges between pharmacies can help prevent the disposal of medications with low distribution rates. In the Netherlands, the implementation of the online platform PharmaSwap serves this purpose, leading to the prevention of the wastage of 175 medication packages so far.[35] PharmaSwap is an online platform where pharmacies and wholesalers can share surplus or near-expiry medications. It helps save costs and promotes sustainability by preventing wastage.

SPAIN

In Spain, SIGRE Points (or Punto SIGRE) in pharmacies provide a simple solution for disposing of containers and leftover medications. Accessible during any pharmacy visit, they help prevent accidents at home from expired medicines while contributing to environmental conservation.

SIGRE is a non-profit organisation established in 2001 through a collaborative effort involving the pharmaceutical industry, pharmacies, and pharmaceutical distribution companies. Through the implementation of SIGRE Points, pharmacists have expanded their traditional role in healthcare to include that of an essential environmental advisor. They now guide citizens on the appropriate disposal of various items, thereby enhancing their contribution to public health and environmental stewardship.

KEY LEARNINGS

Pharmaceutical pollution is a multifaceted challenge that demands the collaboration of various stakeholders across the entire lifecycle to combat pollution effectively. Pharmacists play a central role in this collective effort.

Successful practices across Europe demonstrate that combining strategies —such as pharmacist training, patient awareness campaigns, innovative medication management services and continuous funding of take-back programmes— leads to significant positive outcomes. These initiatives foster a cleaner environment and promote responsible medication usage, aligning with a sustainable and ecologically aware approach.

As the global community faces new challenges posed by pharmaceutical pollution, the measures highlighted in this report underscore the importance of proactive engagement and the potential for meaningful change in safeguarding our planet's health.

Pharmacists are pivotal in shaping a greener future for healthcare. If you're passionate about reducing environmental impact and tackling pharmaceutical pollution, join HCWH Europe's Pharmacists for Greener Healthcare Network and become an agent for change.

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