
EUROPEAN ASSOCIATION OF HOSPITAL PHARMACISTS (EAHP) ENVIRONMENTAL SUSTAINABILITY WORKING GROUP

REPORT FOR EAHP GENERAL ASSEMBLY
JUNE 2024



EXECUTIVE SUMMARY

- European temperatures are warming at twice the rate of the global average. Tackling climate change represents an opportunity to improve the health of our patients, communities and nations.
 - The EU is striving to become the world's first climate-neutral continent by 2050 and the healthcare systems play a relevant part in achieving this.
 - Concerted actions are required across all sectors of pharmacy including hospital pharmacists to minimise carbon impacts of pharmaceuticals and medical devices as well as limiting environmental pollution and loss of biodiversity.
 - The EAHP represents more than 27,000 hospital pharmacists in 36 European countries and is the only national organisation representing hospital pharmacists at European and international levels. It is thus uniquely positioned to influence policy at national, regional and local level to reach climate neutrality goals.
 - The published national climate healthcare strategies so far reveal three prevalent themes: fostering sustainability through education and cultural integration; promoting innovative practices; and swiftly expanding the implementation of sustainable changes.
 - Given the rapid pace of change in the climate-health field, a multidisciplinary nature of climate actions is required. A working group on environmental sustainability was established, comprised of hospital pharmacists from across the European region and other member states associated with EAHP.
 - The working group found that not all EAHP member associations have a published sustainability plan or are engaged in the roadmap towards climate neutrality. The lack of engagement risks leaving them behind when international and national policies start implementing mandates for climate action.
 - This working group brings together expertise from many areas of clinical practice providing not only clinical insight, but highlighting good local sustainable practices as outlined in this report that can be up-scaled and shared with other countries.
 - This paper outlines the current challenges in delivering climate neutrality by 2050 and the roles which EAHP, through the Environmental Sustainability Working Group, can support.
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BACKGROUND

The prescribing and supply of medicines is the most common health intervention. The ever-increasing number and variety of medicines available to our health systems allows us to reduce both the morbidity and mortality of many diseases. With the arrival of new and effective therapies to improve patient outcomes, coupled with reductions in infant mortality, education and lifestyle changes, the average life expectancy of Europeans has increased by more than two decades since the 1960s. However, concerns have been raised not only about the impact of pollution and climate change on biodiversity loss, but also the unprecedented climate patterns experienced globally in recent times. These changes represent fundamental challenges not only to human health, but also to our economic and social wellbeing.

This report will discuss how healthcare activities, including medicines and pharmaceutical care our hospital pharmacy teams provide every day, contribute to the challenges of climate change, environmental pollution, and biodiversity loss. As healthcare professionals, we must look at how we can balance the need to provide the best possible care to our patients whilst minimising the negative effects of healthcare delivery. Against a backdrop of seemingly overwhelming challenges, we know that most hospital pharmacists want to make a positive contribution but may struggle to know how they can best support this effort. This is evident from the [EAHP 2022/23 Investigation of the Hospital Pharmacy Profession](#) in Figure 1:

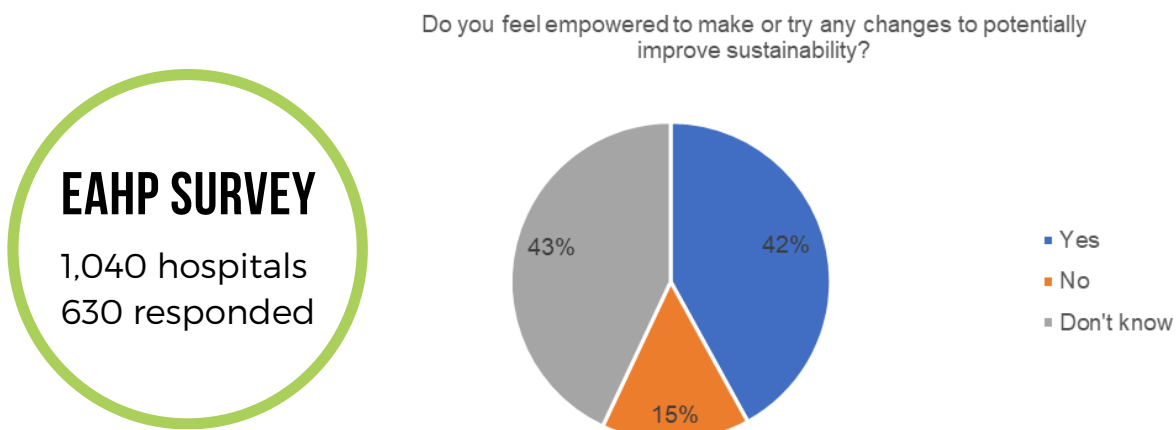


FIGURE 1: EAHP SUSTAINABILITY SURVEY 2022/23

Human activities, whether they involve natural, artificial, cultural, or work-related have progressively disrupted the planet's balance, leading to environmental degradation. This action has been a consequence of the exponential growth of the world population, due to accelerated economic growth, science and technology and global social transformation. On the one hand, there is an exhaustive use of natural resources resulting in deforestation, loss of biodiversity, desertification and on the other hand, the constant contamination of the natural environment (aquatic, terrestrial, atmospheric, fauna and flora). Any further delay in concerted global action will miss a brief and rapidly closing window to secure a liveable future, impacting generations to come.

BACKGROUND

Healthcare, encompassing the artificial environment that all humans recognise as being an asset for maintaining or recovering health, is also one of the most polluting. Medicines, useful for the diagnosis, prevention, and treatment of various diseases, when eliminated in their unchanged form or through degradation products or when unused pharmaceuticals are discarded improperly become an environmental concern. Although detection methods are not available for all pharmaceuticals in ecosystems, certain groups have been proven to cause adverse effects, namely increased mortality in aquatic species, changes in physiology, behaviour or reproduction [1,2].

Pharmaceuticals can enter the environment at all the stages of their life cycle as shown in Figure 2. Measures to reduce the risk of drug pollution can be implemented at all stages of the life cycle [3]. Hospital pharmacists are key stakeholders in managing the use of medicines to ensure a high standard of care, whilst making practices more sustainable.

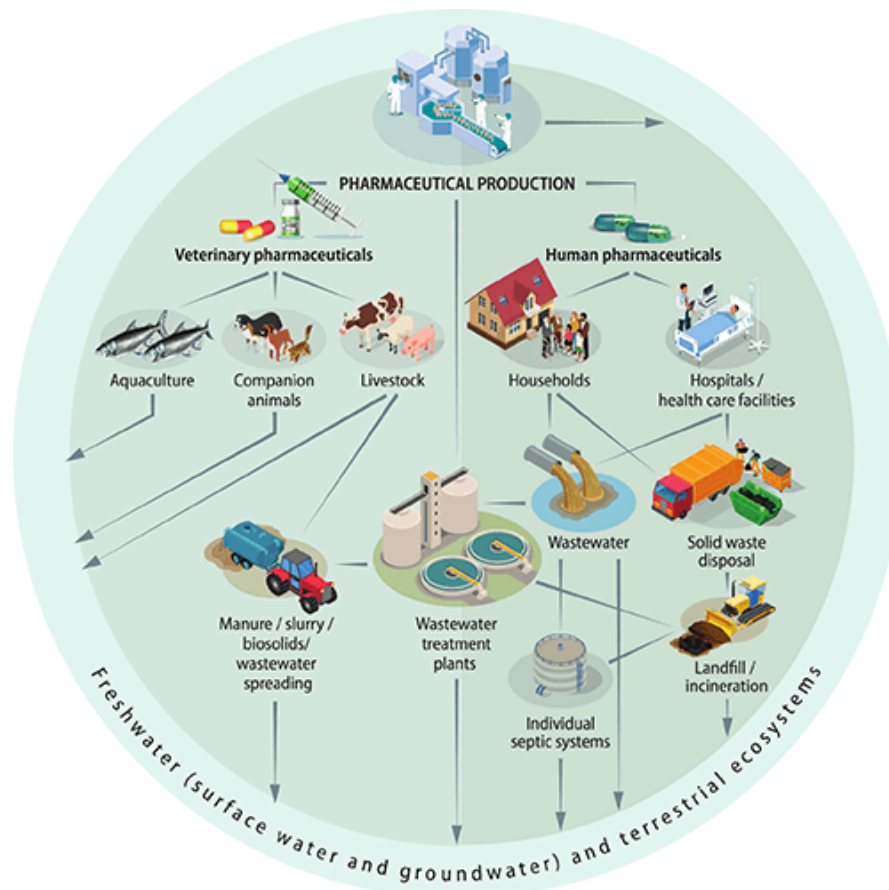


FIGURE 2: HOW PHARMACEUTICALS CAUSE ENVIRONMENTAL CONCERNS [4]

[1] Paut Kusturica M, Jevtic M and Ristovski JT (2022), Minimizing the environmental impact of unused pharmaceuticals: Review focused on prevention. *Front. Environ. Sci.* 10:1077974. doi:10.3389/fenvs.2022.1077974

[2] Masanabo, Ntombenhle & Orimolade, Benjamin & Idris, Azeez & Nkambule, Thabo & Mamba, Bhekie & Feleni, Usisipho. (2022). Advances in polymer-based detection of environmental ibuprofen in wastewater. *Environmental Science and Pollution Research*. 30. 10.1007/s11356-022-24858-w.

[3] Orive G, Lertxundi U, Brodin T, Manning P. Greening the pharmacy. *Science*. 2022 Jul 15;377(6603):259-260. doi:10.1126/science.abp9554. Epub 2022 Jul 14

[4] Image source: <https://www.unep.org/topics/chemicals-and-pollution-action/pollution-and-health/environmentally-persistent>

BACKGROUND

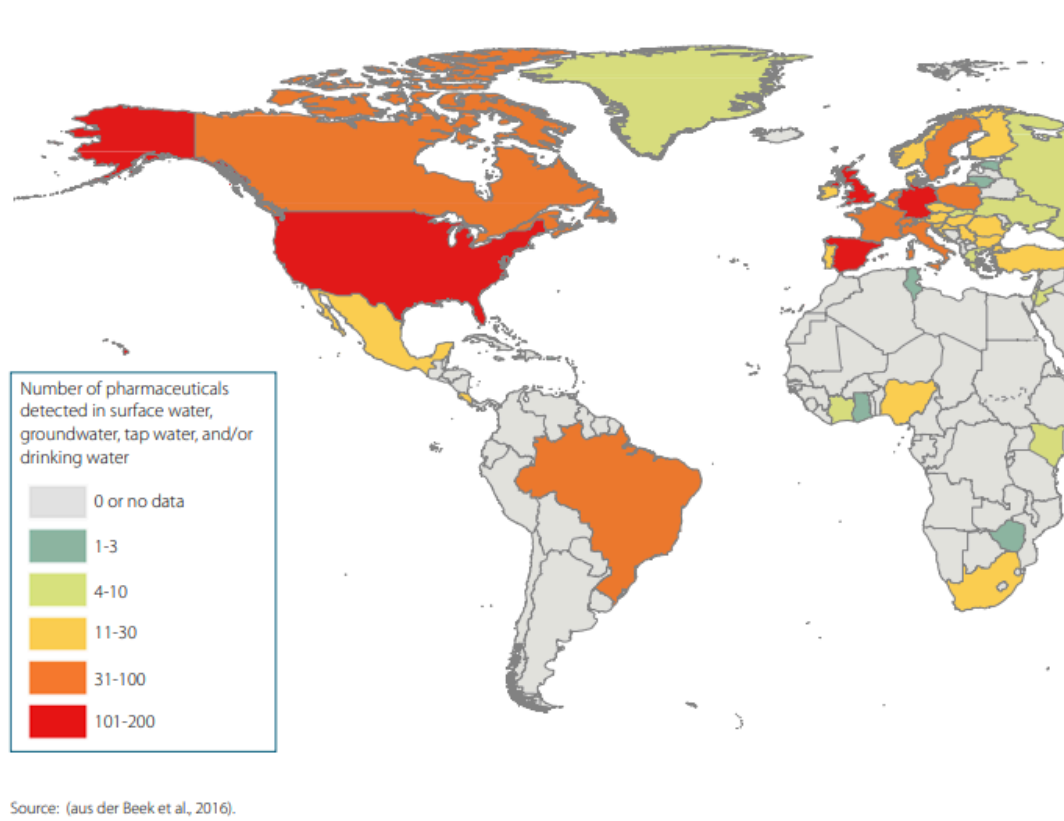


FIGURE 3: NUMBER OF PHARMACEUTICALS DETECTED IN SURFACE WATER, GROUNDWATER, TAP WATER, AND/OR DRINKING WATER [4]

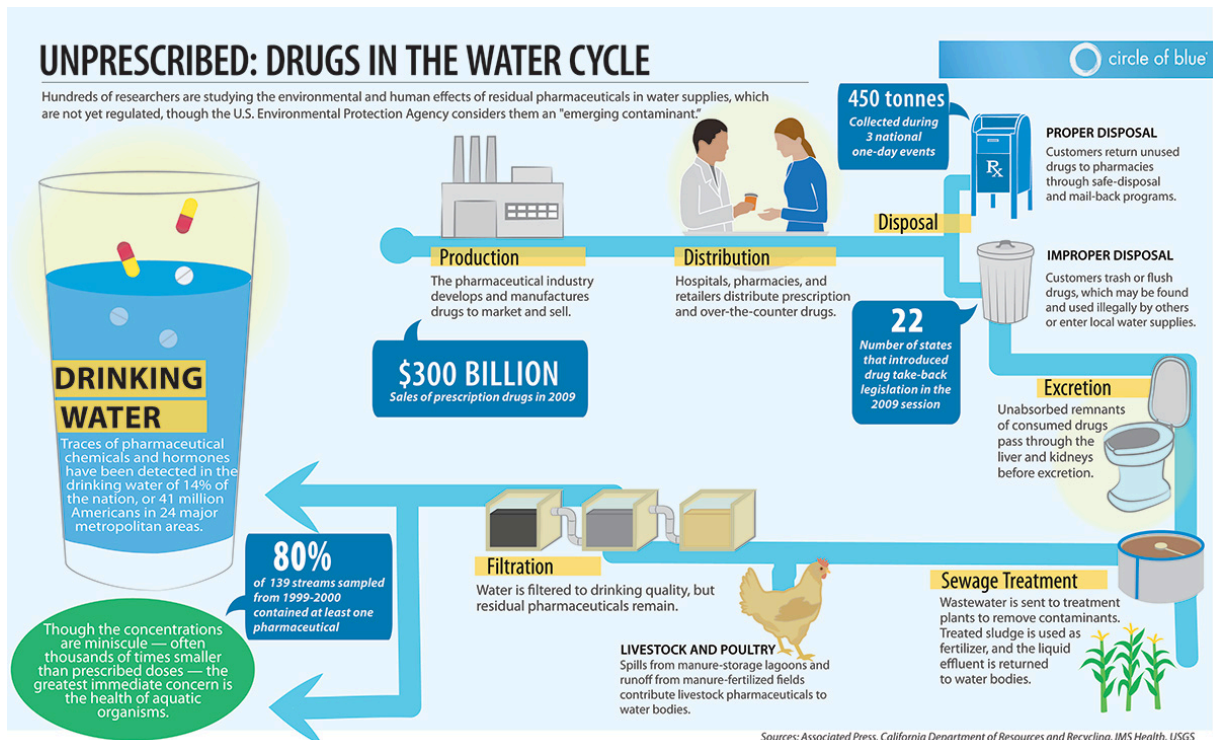


FIGURE 4: DRUGS IN THE WATER CYCLE

[4] OECD. Pharmaceutical Residues in Freshwater Hazards and Policy Responses. p.2 Available from: <https://www.oecd.org/environment/resources/Pharmaceuticals-residues-in-freshwater-policy-highlights-preliminary-version.pdf>

CLIMATE CHANGE AND HOSPITAL PHARMACY

Climate change has undeniably reached us. Its consequences are not only evident in various impacts on the environment, but also affecting our health. It is estimated that during the summer of 2022, there were more than 60,000 excess deaths due to heat in Europe alone [5]. Heat can cause serious health problems in several ways. Thermoregulation can be impaired by extreme temperatures, leading to cardiovascular problems or even heatstroke. Exacerbations of asthma and COPD can occur and dehydration, which can lead to impairment of renal function. Elderly people (especially those who live alone), people living with chronically diseases, those in need of care as well as children, pregnant women and homeless people are particularly vulnerable to the negative health effects of heat waves.

With record breaking temperatures reached in recent years due to global warming caused by anthropogenic climate change, hospitals will need to adapt to support resilient and energy-efficient buildings to prevent worsening working conditions for hospital staff, and care conditions for inpatients. Hospital pharmacies should have a risk management policy in place to adapt medication storage to extreme temperatures in all clinical areas. Hospital pharmacy fridges should also be regularly maintained to ensure they do not malfunction in extreme heat, compromising all cold-chain supplies. Ideally, they should be linked to centralised control. The operating efficiency of equipment such as information and communication technology infrastructure can malfunction in heatwaves and cause delays or disruption in hospital care delivery that have undergone digital transformation (e.g. electronic prescribing systems).

MEDICINES IN HEATWAVES

Heatwaves can also accelerate degradation of medicines especially when they are kept outside pharmacies e.g. in patient homes, hospital ward lockers, or outpatient clinical rooms. General pharmaceutical products are licensed for storage up to 25°C at room temperature [6] and conditions exceeding these might compromise their shelf-lives and hospital staff are obligated to treat patients with 'off-label' therapy from areas that are not thermoregulated.

Increasing temperatures are not only problematic for the correct storage of medicines, heat can also lead to problems and increase undesirable effects for patients taking certain medications. Particularly critical drugs include those influencing fluid balance, which can lead to dehydration (e.g. diuretics and laxatives) but also ACE inhibitors, which can reduce the feeling of thirst. The Department of Clinical Pharmacology and Pharmacoepidemiology at the University Clinic of Heidelberg has developed recommendations for drugs which can be critical during heatwaves [7]. There is also a drug bulletin in North of Spain that describes how to handle drugs associated with increased risk of heat-related illness [8].

[5] Ballester, Joan, et al. "Heat-related mortality in Europe during the summer of 2022.

[6] WHO Expert Committee on Specifications for Pharmaceutical Preparations: fifty-fourth report. Geneva: World Health Organization; 2020 (WHO technical report series; no. 1025). Licence: CC BY-NC-SA 3.0 IGO. p. 188

[7] Haefeli, W. and Czock, D. (no date) Heidelberger Hitze-Tabelle. Available at: https://dosing.de/Hitze/Medikamentenmanagement_bei_Hitzewellen.pdf

[8] Calor, salud y medicamentos. INFAC. 2023;31(2):10-20. FARMACOTERAPÉUTICA [Internet]. Available from: https://www.euskadi.eus/contenidos/informacion/cevime_infac_2023/es_def/adjuntos/Boleti-n-INFAC_Vol_31_2_MEDICAMENTOS-Y-CALOR_ES.pdf

HEALTHCARE IMPACT ON CLIMATE CHANGE

Considering the impact the healthcare sector has on global greenhouse gas emissions and on the other hand, the multiple negative implications climate change has on our health, it becomes clear that the healthcare sector has an undeniable responsibility to strive towards carbon neutrality. The healthcare sector is a leading polluter of greenhouse gases where its climate footprint increased from 4.4% of net global emissions in 2014 to 5.2% in 2019. Without urgent actions, healthcare emissions are expected to triple by 2050 [9], further accelerating climate change.

The Netherlands have established a Green Deal on Sustainable Health Care to achieve carbon neutrality by 2050 and reduce its emissions by 49% in 2030 [10]. In the United Kingdom, NHS England has become the first health system to embed net zero into legislation where all healthcare workers are legally required to work towards meeting net zero targets set by 2040-2045. In 2023, France released a Road Map for Sustainability in Health Care that aims to provide credits for energy efficiency, subsidise electric vehicle fleets, and establish a sustainable procurement platform among other initiatives [11].

POLICIES AND STRATEGIES

At the United Nations (UN) Climate Change Conference (COP26) in Glasgow 2021, over 50 countries have committed to developing sustainable resilient healthcare systems by joining the COP26 Health Programme including Belgium, Finland, Portugal, Germany, Iceland, Norway, Spain, the Netherlands and United Kingdom [12]. At COP28, more than 40 million healthcare professionals around the world joined WHO's call to action to prioritize health in climate negotiations [13]. This aligns with multiple UN Sustainable Development Goals (SDG) such as SDG 3 in promoting good health and wellbeing for all ages and SDG 13 in taking urgent actions in combating impacts of climate change.

In Europe, the European Green Deal set the blueprint for this transformational change. All 27 EU Member States have committed to turning the EU into the first climate neutral continent by 2050. To get there, they pledged to reduce emissions by at least 55% by 2030, compared to 1990 levels.

[9] Momentum builds for health-care climate action. [https://doi.org/10.1016/S0140-6736\(23\)01079-6](https://doi.org/10.1016/S0140-6736(23)01079-6)

[10] Government of the Netherlands. More sustainability in the care sector. 2023. <https://www.government.nl/topics/sustainable-healthcare/moresustainability-in-the-care-sector> (accessed May 30, 2023).

[11] Government of France. Feuille de route planification écologique du système de santé. May 2023.

<https://sante.gouv.fr/IMG/pdf/planificationecologique-du-systeme-de-sante-feuille-de-route-mai-2023.pdf> (accessed May 30, 2023)

[12] World Health Organization. Country commitments to climate change and health (no date) www.who.int. Available at: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/country-commitments>

[13] World Health Organization. Over 40 million health professionals demand bold health and climate action at COP28 (no date) www.who.int. Available at: <https://www.who.int/news/item/02-12-2023-over-40-million-health-professionals-demand-bold-health-and-climate-action-at-cop28>

EXAMPLES OF CLIMATE-HEALTH POLICIES

The Netherlands



In recent years, the Green Deal 'Working together towards sustainable healthcare' has extended the industry signatories to the pharmaceutical sector and set out more ambitious sustainability goals for public bodies, private companies and non-profit organisations in the healthcare sectors. They have committed to five main goals – focusing more on the health of patients and employees; increasing the awareness and knowledge of the healthcare sector's environmental impact; reducing CO2 emissions by 55% by 2030 with the goal of becoming carbon neutral by 2050; reducing the use of raw materials by 50% in 2030 compared to 2016; and reducing the environmental impact through medication usage.

A wide range of initiatives have been launched to make healthcare more sustainable and to raise awareness of sustainability within the healthcare sector. The setting up of large numbers of 'green teams', for example, and various green network organisations, and the organising of conferences and webinars.

Spain



The "Strategic Health and Environment Plan (PESMA) 2022-2026" is part of the General Public Health Law 33/2011 of 4th October. The main objective of the strategic plan is to reduce the risks to human health derived from environmental factors and their determinants; decreasing the burden of diseases caused by them, identifying new threats and facilitating the development of environmental health policies. This objective is to be achieved through the promotion of healthy environments that help to reduce the risks arising from environmental factors and their determinants, reducing the burden of disease and identifying new threats.

In the first Action Programme 2022-2023, there are actions evaluating the health sector's carbon footprint. As a final result of the study, a guide of recommendations for the reduction of the carbon footprint in the health sector will be created.

Spanish versions:

- https://www.sanidad.gob.es/ciudadanos/pesma/docs/1er_PA_PESMA.pdf
- https://www.sanidad.gob.es/ciudadanos/pesma/docs/241121_PESMA.pdf



CLIMATE-HEALTH POLICIES

Wales, UK



The [NHS Wales Decarbonisation Strategic Delivery Plan 2021 – 2030](#) report outlines approaches to tackle pharmaceutical waste through engaging pharmacists and prescribers to encourage appropriate disposal of inhalers through communication with patients, better reviewing and prescribing of medicines, and moving away from procuring bundles of pharmaceuticals. It aims to undertake an analysis activity to understand the supplier emissions breakdown for pharmacy, which is >30% of total procurement emissions.

England, UK



The [Delivering a 'Net Zero' National Health Service](#) report identifies the carbon footprint of NHS with 20% attributable to medicines, 3% inhalers and 2% anaesthetic gases use. It calls upon all healthcare professionals to use all measures possible to reduce these greenhouse gas emissions by 2040 – 2045.

Scotland, UK



The [NHS Scotland Climate Emergency & Sustainability Strategy 2022-2026](#) report highlights some hospitals sites are sources of pharmaceutical and micro plastic pollution entering wastewater systems thus calls upon actions to mitigate this. Other actions include reducing pharmaceutical waste through improved prescribing, promoting regular medication reviews, deprescribing where appropriate, dispensing, education and patient support. It also calls to support healthcare professionals to consider environmental impacts when making prescribing decisions by providing them with the information they need.

CLIMATE-HEALTH POLICIES

Other policies to note:

- The Reform of the EU pharmaceutical legislation 2023 proposed revisions to make medicines more environmentally sustainable and address antimicrobial resistance (AMR) and the presence of pharmaceuticals in the environment through a One Health approach.
- EAHP statement 3.5 from section 3 Production and compounding: Hazardous medicines should be prepared under appropriate conditions to minimise the risk of contaminating the product and exposing hospital personnel, patients and the environment to harm.
- In 2023, the International Pharmaceutical Federation (FIP) has passed a statement of policy regarding environmental sustainability within pharmacy including recommendations for hospital pharmacies [14]. This is supplementary to the first published 2016 document Environmentally sustainable pharmacy practice: Green pharmacy.
- The Royal Pharmaceutical Society (UK) has also published a set of sustainability policies recommended for the pharmacy teams [15].
- The European Health Management Association (EHMA) has also made suggestions with case studies published on how to reduce the environmental impact of medicines from procurement to disposal [16].
- Healthcare without Harm Europe's Safer Pharma resources [17] include ways to procure for greener pharma.

[14] FIP STATEMENT OF POLICY. Environmental sustainability within pharmacy Background [Internet]. [cited 2023 Dec 28]. Available from: <https://www.fip.org/file/5618>

[15] Royal Pharmaceutical Society (2021) RPS Sustainability Policies, www.rpharms.com. Available at: <https://www.rpharms.com/recognition/all-our-campaigns/policy-a-z/sustainability-policy/policies>

[16] European Health Management Association (2022) Reducing the environmental impact of medicines from procurement to disposal. Available at: <https://ehma.org/reducing-the-environmental-impact-of-medicines-from-procurement-to-disposal/>.

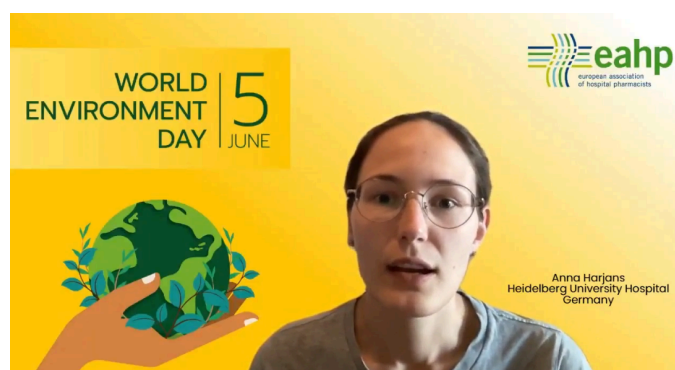
[17] Safer Pharma (2016) Health Care Without Harm. Available at: <https://noharm-europe.org/issues/europe/safer-pharma>.

EAHP ENVIRONMENT SUSTAINABILITY WORKING GROUP

When the EAHP reviewed the European Statements of Hospital Pharmacy, some of the EAHP members, in particular the Guild of Healthcare Pharmacists (UK), advocated for including a Statement on environmental sustainability. Given the fact that adding a new Statement will involve a laborious new Delphi process, the EAHP team and the Board decided to set up a Working Group (WG) instead, to study what hospital pharmacists and all relevant stakeholders could do to reduce environmental burden of the hospital pharmacy services.

The WG convened in Feb 2023 where the project plan and deliverables were decided by the Co-Chairs and the WG. The objective of the WG is to increase awareness of environmental sustainability within the pharmacy profession in Europe and to identify areas where the EAHP could support its members, authorities, and other professionals to improve environmental sustainability of the hospitals.

In June 2023, the WG has promoted [two videos on World Environment Day](#) to raise awareness of pharmaceutical pollution and pharmacy's role in healthcare environmental sustainability.



RAISING AWARENESS AND EDUCATION

Raising awareness for sustainability among healthcare professionals doesn't necessarily have to be a high-end task. Even simple efforts can contribute to raising awareness. A WG member's hospital pharmacy has included a sustainability column into the hospital pharmacy periodical that is distributed to the wards twice yearly for the communication of changes in the hospital formulary. In the articles, they have addressed the correct disposal of medical products (that is NOT via wastewater), the impact of extreme heat on people's health, and the environmental impact of metered dose inhalers vs. dry powder inhalers. Correct disposal of medicines or other sustainability topics can also be a worthwhile subject for the increasingly popular education format of one-minute-wonders.

In Jan 2022, the Spanish Society of Hospital Pharmacists (SEFH) joined the Global Impact spearheading the [2023+SOStenible Project](#) which involves 12 specific actions, one per month, aligned with the Sustainable Development Goals. The simple activities can be easily undertaken by all Spanish hospital pharmacy departments, and will be designed to raise awareness about SEFH's work and about its impact on society.

SUSTAINABLE HOSPITAL PHARMACY

The EHP 2022/23 Investigation of the Hospital Pharmacy Profession in Figure 5 demonstrated a desire for increased focus on sustainability from organisational and management levels:



FIGURE 5: EHP SUSTAINABILITY SURVEY 2022/23

Early pharmacist education & training

Pharmacy institutions should consider embedding sustainability into pharmacists' education and training programmes. The Sustainability in Pharmacy Education group in the UK has mapped environmental sustainability against the pharmacy regulatory body's Learning Outcomes for initial education and training for pharmacists. The document has been officially endorsed by Pharmacy Schools Council UK where pharmacy schools are teaching undergraduate pharmacy students the links between climate change and health .

Pharmacy events & research

Pharmacy conferences and educational webinars should feature environmental sustainability. The EHP Congress 2024 in Bordeaux (France) had keynote speeches, workshops and research posters that focused on promoting environmental sustainable healthcare among its delegates. There are resources to help hospital pharmacists reduce risks of antimicrobial resistance (AMR) from antimicrobial pollution in the environment such as the India-UK program [18] and the BMJ published articles on tangible actions for sustainable healthcare [19]. A small survey can be conducted among pharmacy colleagues on what they already know about environmental sustainability or their ideas for improving it in hospital pharmacies.

Sustainability Leads

Pharmacy organisations should elect sustainability leads to champion the agenda. The Guild of Healthcare Pharmacists (UK) has also elected a Chair and Vice Chair of sustainability to consult on environmental sustainability issues in pharmacy.

[18] Antimicrobial Resistance in the Environment [Internet]. [www.youtube.com](https://www.youtube.com/watch?v=llhaPvdMOGg). [cited 2023 Dec 28]. Available from: <https://www.youtube.com/watch?v=llhaPvdMOGg>

[19] Tangible actions [Internet]. sandpit.bmj.com. [cited 2023 Dec 28]. Available from: <https://sandpit.bmj.com/graphics/2023/tangibleActions-v8/>

RECOMMENDATIONS

Based on the four principles of sustainable healthcare by the Centre for Sustainable Healthcare [20], the EAHP WG has recommended the following actions to reduce environmental impacts by hospital pharmacy staff and pharmacy settings:

1. DISEASE PREVENTION AND HEALTH PROMOTION

With the ever-expanding number of medicines available to treat most diseases, the mantra of “a pill for every ill” has become established in healthcare. However, for many of our patients, the medicines they receive can be associated with harm, particularly for patients with significant polypharmacy. The current medicalised model is not sustainable, not only because of the environmental impacts discussed in this report, but due to demographic changes in Europe. As our population gets older, the pressures on our health and social care systems including hospital pharmacies will be overwhelming. We need to work collectively across society to maximise the health and wellbeing of our populations. We must educate ourselves as a profession before we can educate our patients and colleagues. Advocating for healthier diets, increasing physical activity, stopping smoking, supporting vaccination, and considering non-pharmacological interventions where clinically appropriate e.g. reducing harmful drinking and illicit drug taking, our populations will be healthier, happier and the environmental impact of medicines and the care we currently provide will be minimised. This also aims to reduce the health inequalities that exist in our societies where the vulnerable and marginalised communities will be most impacted by the health impacts of climate change.

One of the best possibilities of reducing the carbon footprint in the healthcare sector is prevention. Reducing disease burden and preventing hospital admissions reduces carbon emissions and costs by reducing the need for carbon intensive treatment and facilities [21]. Prevention is needed for non-communicable as well as communicable diseases.

Getting vaccinated for influenza is a good example as it is associated with significant morbidity and results in a high number of hospital admissions every winter.



Vaccination can protect against infections and hospital admissions especially for people over 60 years, certain immunodeficient risk groups and frontline medical staff. Many hospitals in Europe offer free vaccination to their staff every year at the beginning of the flu season. Immunisation of medical staff offers double benefit: it prevents infections in the vaccinated personnel, thereby also protecting the patients they care for from contracting the flu.

[20] Mortimer F. The sustainable physician. *Clinical Medicine*. 2010 Apr;10(2):110-1.

[21] Health care's Climate Footprint: How the health sector contributes to the global climate crisis and opportunities for action. *Health Care Without Harm*. Climate-smart health care series Green Paper Number One Produced in collaboration with Arup [Internet]. 2019. Available from: https://noharm-global.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf

Case Study 1: Impact of multi-disciplinary team involvement on smoking cessation in Admissions Unit (UK)

The hospital quality improvement project between Jan-Mar 2019 established champions to promote smoking cessation in the Acute Medicines Unit. The multidisciplinary team including hospital pharmacists launched a newly developed visual prescribing guide and conducted monthly training to educate clinicians how to prescribe and advise on nicotine replacement therapies (NRT). It has successfully increased smoking cessation referrals by 325%, increased the number of NRT prescriptions by 205% and number of engaged patients in therapy by 208%. This will reduce future risks of developing chronic diseases as a result of smoking that is associated with larger carbon footprints like healthcare needs from COPD patients.

2. PATIENT EDUCATION AND EMPOWERMENT

Deprescribing

Hospital pharmacists and their teams have a key role to play in supporting patients and their families with whom we interact daily. Through shared decision making, hospital pharmacists can support patients in tapering, stopping, discontinuing, or withdrawing medicines to manage problematic polypharmacy and improve patient outcomes [22]. Stopping drugs with little or no benefit which may improve the patient's quality of life, reducing adverse events. There are existing tools and patient facing materials to help hospital pharmacists reduce or stop drugs with patients [23,24].

Case Study 2: Dispensing and use of patient's own medication in hospital (The Netherlands)

In the Netherlands, patients currently use medications dispensed by the hospital pharmacy during their inpatient stay. With the view of both sustainability and patient empowerment, some pilots have been done so that patient use their own medication while in the hospital. The goal is to empower patients and coach them on the use of their medications with help of the nurses if needed. At the same time, this reduces medicine waste by not dispensing medications patients already have at home.



[22] Thompson W, Farrell B. Deprescribing: What Is It and What Does the Evidence Tell Us? The Canadian Journal of Hospital Pharmacy [Internet]. 2013;66(3):201-2. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3694945/>

[23] What is Deprescribing? [Internet]. Deprescribing.org. Available from: <https://deprescribing.org/what-is-deprescribing/>

[24] Deprescribing resources [Internet]. Primary Health Tasmania. Available from: <https://www.primaryhealthtas.com.au/resources/deprescribing-resources/>

3. LEAN SERVICE DELIVERY

Safety-I and **Safety-II** concepts can be applied to environment sustainability in healthcare by integrating principles of safety management with a focus on resilience and learning.

Safety-I: Understanding the current state of practices and learning from incidents (e.g. waste generation, energy consumption, chemical use, and resource inefficiencies).

Safety-II: Understand how healthcare systems cope and adapt to environmental challenges.

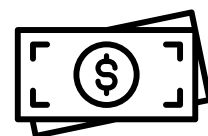
Use systems thinking approaches to build adaptive capacity and assess the interconnectedness of environmental sustainability and patient safety. (See Case Study 9)

Case Study 3: Repackaging hospital medicines to reduce waste and achieve cost savings (Germany)

A recent study showed that unit dose medication management in hospitals is actually more sustainable and produces less waste than the supply of blister packages of solid oral forms to the wards. However, in the setting of conventional medication supply of the wards with blister packs of tablets, there are also possibilities for the hospital pharmacies to reduce waste and additionally save costs. When supplying wards with whole packs of medications which are not routinely used in the hospital, there is the risk that the remainder of the packet will remain on the ward unused for a long time and eventually expire after the patient is discharged.

In the pharmacy of the University Hospital rechts der Isar (Technical University Munich), a portioning service was established for expensive medications which are not used routinely but ordered specifically for single patients [25]. Hospital pharmacy staff unpacks the often-big packages and re-packed them with the number of tablets or capsules to cover a therapy length of 5 days. Through this, several wards can be supplied with the quantity of the medication approximately needed for one patient instead of sending a whole packet every time, which could get lost on the ward over time or be forgotten until expiry. Since the portioning involves work time for repackaging and labelling, it is only done for expensive medications like tyrosine kinase inhibitors or HIV medications to make it economically feasible.

Not only does this service reduce waste from unused medications, it also results in a relevant five-digit cost savings per year.



[25] Baum, Stephan, et al. Portionierung und Verblisterung teurer Fertigarzneimittel in der Krankenhausapotheke. Krankenhauspharmazie 2016; 37:54-62

Case Study 4: Centralised preparation and dispensing of Romiplostim (Spain)

Romiplostim is a drug used to treat thrombocytopenia in adult patients with chronic immune (idiopathic) thrombocytopenic purpura (ITP). Doses vary between patients, and are administered every week. Some patients receive their medication from the hospital pharmacy and administer it at home. Others attend the Medical Day Hospital, where nurses administer the drug.

Commercial presentations of the product include three doses: 125 mcg, 250 mcg, and 500 mcg. Most patients do not use the full vials every week resulting in medicines waste because the vial is only stable for one week once opened. To avoid this waste, the Ramón y Cajal Hospital fostered a collaborative effort between the Haematology Department, Day Hospital, and the Pharmacy Department. They grouped the patients and administered the drug in the Day Hospital. In the first step, five patients who came on different days to the Day Hospital were grouped to come on Fridays. The Pharmacy Department prepares the drug the night before the individualised doses, and they get their individualised dose on the same day. This joint initiative has had a significant cost reduction impact in 9 months (Jan-Sep 2023) of €25,774. The next step was to review all the patients who administer incomplete vials at home. To date, this action has had a cost reduction in 3 months (Jan-Mar 2024) of €20,524.

Case Study 5: Repacking and re-labelling (Spain)

The Ramón y Cajal Hospital took a proactive approach to sustainability by analysing all their oral forms in the Hospital Guideline which must be repacked and/or re-labelled. In Feb 2023, there was an online seminar dedicated to repacking and re-labelling promoted by Grupo Tecno of the SEFH (Sociedad Española de Farmacia Hospitalaria) to minimise these tasks [26]. The seminar promoted a tool which consists of an updated Excel archive which hospital pharmacists can feed with the medications included in their hospital, and it proposes the most efficient drug in the market to avoid repacking and re-labelling. Acquiring these medications has not only had a financial impact in reducing the purchase of the material to repack and relabel, but also a positive environmental impact by reducing the use of plastic and the time spent on this process by healthcare workers.

Results

No. of units repackaged Jan-Dec 23: **565,830**

Impact (reduction): **9%**

Impact (reduction) in units: **49,550**

Impact (reduction) in plastic (kg): **33.60**

Impact (reduction) in hours of work: **73.50**

Case Study 6: Exchange stock between pharmacies, leveraging digital technologies for stock management (The Netherlands)

Appropriate management of the stock life cycle is essential for managing internal waste in pharmacies. Utilisation of technology such as automatised expiry date checks, accelerated dispensing of near-expired medications, and exchange with other pharmacies to prevent disposal of undistributed medications are strategies that support this. PharmaSwap is a Dutch online platform that achieves the latter; it essentially provides a sharing marketplace for pharmacists, hospital-based or otherwise, and facilitates transparency in the supply and demand of medication with low demand but high cost. With the right regulation of product conditions,

PharmaSwap also enables the shipment of traded goods in a manner that is safe and complies with good distribution practice, while guaranteeing quality at every stage. To date, it has served 2,000 pharmacies in the Netherlands alone and prevented 175 medication packages from being wasted valued at €184,000. If adopted on a larger scale in line with national regulations, initiatives like PharmaSwap could create a significant circular impact in the reduction of medical waste.

Leveraging technology can help create transparency in the supply and demand of medication and mitigate wastage, especially for medication that is high cost with low demand. This prevents potentially hazardous medicines from unnecessarily entering waste streams.

Case Study 7: Redispensing oral anticancer drugs (The Netherlands)

The ROAD study [27] was a prospective single-group intervention conducted in the outpatient pharmacies of 4 hospitals from 1st Feb 2021 to 1st Feb 2023, with 12-month follow-up of each patient. Patients with cancer who had a prescription for an oral anticancer drug that could be stored at room temperature were included. Participants received oral anticancer drugs for use at home in special packaging (i.e., sealed packaging with time-temperature indicator), to be returned to the pharmacy should these remain unused. The pharmacy ensured quality of returned drugs based on authenticity, appearance, remaining shelf life and adequate storage temperature. Drugs fulfilling quality requirements were redispensed to other patients. The findings of this multicenter intervention study indicate that redispensing unused oral anticancer drugs is associated with waste reduction (lower CO₂e) and cost savings, which in turn may improve the affordability and sustainability of cancer treatment.

[27] Smale EM, van den Bemt BJF, Heerdink ER, Desar IME, Egberts TCG, Bekker CL, et al. Cost Savings and Waste Reduction Through Redispensing Unused Oral Anticancer Drugs: The ROAD Study. *JAMA oncology* [Internet]. 2023 Nov 16 [cited 2023 Dec 6];e234865.

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[https://pubmed.ncbi.nlm.nih.gov/37971730/#:~:text=Redispensing%20unused%20oral%20anticancer%20drugs%20comprised%202.4%25%20\(95%25%20CI](https://pubmed.ncbi.nlm.nih.gov/37971730/#:~:text=Redispensing%20unused%20oral%20anticancer%20drugs%20comprised%202.4%25%20(95%25%20CI)

Case Study 8: Reducing Wastage in the Medicines Pathway (UK)

The hospital pharmacy team at South Warwickshire University NHS Foundation Trust explored the scope of dispensed items and used this data to propose initiatives/changes to working practices to reduce the number of items unnecessarily dispensed. They then proposed initiatives/changes to working practices to reduce the number of items unnecessarily dispensed, saving money, carbon, staff time and reducing the number of inpatients missed doses. In the month data was collected there were 243 redispensed items. A reduction of 10% would result in the following savings:

- Total savings from drug cost and staff time spent dispensing and accuracy-checking is estimated at £9,600 each year.
- Savings of 1,228.8kg CO₂e per year, equivalent to driving 3,629 miles in an average car - a return journey from Aberdeen to Naples
- Savings of up to 16 hours of staff time each month, allowing staff to redirect their time to higher value activities.

Case Study 9: De-implementation of the use of gloves in the process of administration of medication with the exception of dangerous medication (The Netherlands)

According to the Dutch guideline on the administration of parenteral medication disposable gloves are traditionally used during administration. Most parenteral medications do not pose a significant hazardous risk nor does the administration of ready to use preparations pose a significant infection risk. After reevaluating the need for disposable gloves, gloves are only applied during administration of hazardous medication.



Total savings on overall gloves use - 16% (approximately €4000/month, 6200 CO₂ eq, 620 m² land occupation and 320 m³ water usage).

4. LOWER CARBON ALTERNATIVES

Alongside improving patient outcomes and cost management, hospital pharmacists should also consider the environmental impact of treatments our patients receive. For example, early review of intravenous to oral medicines switch is already part of antimicrobial stewardship programs, but intravenous therapies are also associated with larger carbon footprints [28].

Case Study 10: Choosing lower carbon inhalers (UK)

Inhaler emissions account for approximately 3% of the UK health system's carbon footprint. The propellant (HFA gases) used in metered dose inhalers is responsible for most of these carbon emissions. Patients have been called for respiratory reviews such as those in Wyre Forest Health Partnership to consider upgrading to dry powder or soft mist inhalers where appropriate and in line with patient preference. Greener Practice UK has developed the High Quality and Low Carbon Asthma Care toolkit to help primary care in implementing this quality improvement project. These initiatives can also be adopted by hospital pharmacists when opportunistically reviewing patients on the ward or outpatient settings.

See EAHP Congress poster 2024 from Germany : [Reducing hospital pharmacies' carbon emissions by distributing fewer metered dose inhalers](#)

Case Study 11: Use of urinary bags after injection with an X-ray contrast fluid (The Netherlands)

Every year, 30 tons of X-ray contrast fluid ends up in our surface water through the urine of patients. The molecules are not toxic, but are difficult to break down in the environment. To prevent contrast fluid from entering the water sewage systems, a team has asked patients to use [urinary bags](#) the first four times when they urinate after they have been injected with contrast fluids. The urine bag contains material that ensures that the urine coagulates immediately after urination so there is no risk of unpleasant odors or leaking bags. The bag with solidified urine can be thrown away in the gray wheelie bin, thus keeping it out of the water. Read more about this [here](#).

Case Study 12: Choosing lower carbon anaesthetic gases (UK)

2% of the UK health system's carbon footprint comes from anaesthetic and analgesic practices. Amongst anaesthetic gases, desflurane is one of the most harmful with 20 times the environmental impact of other less harmful greenhouse gases and using a bottle of desflurane has the same global warming effect as burning 440 kg of coal. Hospital pharmacists worked with multidisciplinary teams at University Hospitals Bristol to reduce use of desflurane significantly saving the equivalent to 30,000kg CO₂ per month. This [Nitrous Oxide \(N₂O\) project](#) was started by hospital pharmacist Alifia Chakera in Scotland which has now been adopted globally to reduce significant proportion of N₂O emissions due to waste from manifolds and the associated piped infrastructure in hospitals.

Case Study 13: Sustainability criteria for procuring medicines (Germany)

When procuring medicines where generics are available, there are different important aspects to consider e.g. what indications one or the other product is licensed for, the licensed modes of application, the divisibility of tablets and many more.

The pharmacy of the University Hospital rechts der Isar (Technical University Munich) developed a checklist (the HERA instrument) for the comparative evaluation of generic preparations for procuring decisions. Over time, they included several criteria relating to sustainability into the checklist. Due to the multitude of drug shortages however, it is not always possible to consider all these aspects in the procuring decisions.

Concerning the product packaging e.g. the procurement team asks the pharmaceutical companies about the absence of unnecessary outer packaging, about the use of reusable pallets for delivery and about reasonable package sizes (to avoid unnecessary expiration due to big packages). Another question in the checklist is whether the production of active ingredients and final medicinal production takes place in Europe. If yes, it means shorter transport routes and can additionally lead to improved security of supply. They also ask for carbon footprint of the product and whether the pharmaceutical company has social and/or ecological sustainability certifications. According to experience, most pharmaceutical companies currently cannot provide comprehensive data on the carbon footprint of their products.

Nevertheless, it is important that hospital pharmacies, as customers, demand information about suppliers' sustainability efforts as that will hopefully motivate them to implement environmental, social and governance (ESG) policies even if only to ensure competitive advantages.

Related articles:

- [Determination of the carbon footprint of morphine tablets and morphine solution for injection - a collaboration between Amgros and the Capital Region Pharmacy](#)
- [E.g. PharmaSwap: a pioneering healthcare initiative reducing medication waste and promoting sustainability](#)
- [Environmental criteria in medicine procurement](#)
- [Review of the environmental criteria introduced in the tendering of drugs, medical devices and non-medical equipment in a health group procurement organisation](#)



FUTURE PLANS & RECOMMENDATION OF THE EAHP ENVIRONMENT SUSTAINABILITY WG

1. Education and awareness

The EAHP environment sustainability WG would like to help hospital pharmacists in Europe and EAHP member states to facilitate and accelerate the implementation of environmentally sustainable practice. Empowering staff through raising awareness and sharing eco-friendly practice can inspire hospital pharmacists who are new to this topic to take actions locally.

2. Promote research and innovation

This report highlights examples of multidisciplinary work and European wide sustainable pharmacy practices that improve the care of patients and the planet. The uniqueness of this WG is the ability to translate existing climate-health resources from/to different languages and share locally. EAHP can serve as the European hospital pharmacy database or host for discussions through its new website/blog for all sustainable actions in pharmacies.

3. Policy influence

EAHP can work with multiple stakeholders to influence environmental sustainability policies, contractual agreements, or even at parliamentary levels and legislations. This has the potential to greatly influence hospital pharmacy practices and establish EAHP as a leading organisation worldwide.

4. Promote collaborative working and leadership

EAHP can attract new members or collaborative working opportunities from other multidisciplinary organisations (e.g. doctors, nurses, allied healthcare professionals, scientists) who are interested in environmental sustainability. This may result in strategic partnerships with major key stakeholders in pharmacy or attract unexpected new investors who are interested in environmental sustainability.

5. Promote the wider benefits of adopting environmentally friendly practice

The climate emergency, biodiversity loss and pharmaceutical pollution is, by its very nature, negative. However, the WG will highlight wider social, economic and health benefits of action at a personal, community and professional level to portray the positive nature of change.

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