Chemical Pollution and One Health – from Reactivity to Proactivity October 2023

Conflicting objectives – using effective drugs without polluting our environment

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Background

Pharmaceuticals are vital for human and animal health but are also polluting our environment. They are designed to interact with physiological processes, often through direct and strong interactions with receptors or enzymes. Pharmaceuticals are also in many cases designed to exhibit stability, to ensure they reach their target organs and exert the intended effects there. Pharmaceuticals thereby have an inherent ability to cause unintended effects when non-target organisms are exposed.

Hundreds of different active pharmaceutical ingredients have been identified in multiple environmental matrices, such as treated sewage water, surface water, drinking water, groundwater, sediment, soil, biota, etc. Because of the constant input and because many of them are designed to resist degradation, the result is unwanted extended exposure in many environmental compartments. For a review[1] of exposure in aquatic fauna, see Miller et al. (2018). Pathways for pollution include household and industrial wastewater treatment systems, aquaculture facilities, manure application, landfill and incineration. While it is generally thought that most emissions can be attributed to the excretion of used pharmaceuticals, production sites have been shown to contribute greatly to local emissions.

Exposure to pharmaceuticals in the environment has been linked to risks of impaired reproduction in fish and frogs, renal failure in vultures as well as altered growth and reproduction in aquatic invertebrates. Furthermore, the presence of antibiotics in the environment can lead to antimicrobial resistance (AMR) and the spread of already resistant strains.

As mentioned, access to safe and efficient medicines is crucial to human and animal health, but it is also clear that actions must be taken to protect our environment.

Approach

The aim of the workshop was to move towards a common understanding of effective ways to tackle environmental pollution due to direct and indirect emissions of pharmaceuticals. Our objective was to form the basis for a set of policy recommendations, based on both present strategies and new ideas, that can guide intervention and risk mitigation on multiple levels and at different phases in the life cycle of pharmaceuticals.

Through a structured process, workshop participants from academia, NGOs, governmental agencies, industry, and the healthcare sector identified action areas to reach the goal of using effective drugs without polluting our environment. Initially, the participants, working in groups, listed obstacles that prevent us from reaching the goal. In the next step, ideation and prioritization were used to generate ideas about how to overcome the identified obstacles. In the final two steps, the prioritized ideas were concretized, and key policy areas – as well as the actors who need to be involved – were identified.

Outcomes and recommendations

The main areas where workshop participants agreed that actions and policy should be focused were procurement, water treatment technologies, legislation/regulation, green chemistry, prescription and addressing the lack of knowledge. When summarizing the discussions, it was suggested that these areas are interconnected and that at the centre of everything is the need for transparency and knowledge (Figure 1). Although not illustrated in Figure 1, the other areas discussed in the workshop are closely connected. For example, introduction of new water treatment technologies and techniques to produce "greener pharmaceuticals" can result from increased procurement demands as well as legislative actions resulting from increased knowledge on environmental effects.

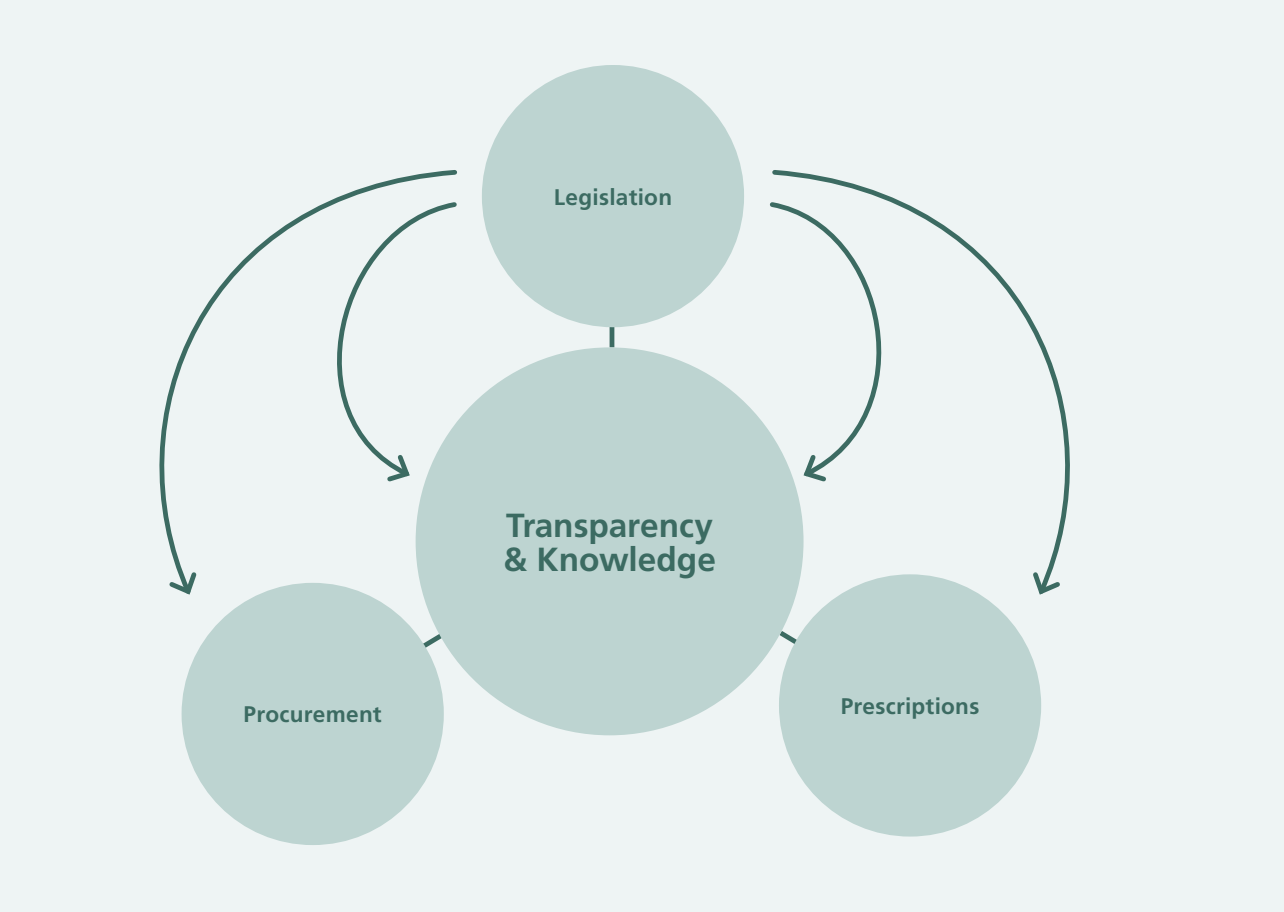

Figure 1. Key areas where policy actions should be directed. At the centre is transparency and knowledge, because science-based knowledge and data transparency are considered necessary to guide legislators, procurers, prescribers, consumers/patients and other actors.

In this policy brief, we have chosen to focus on procurement and prescriptions as well as on actions by and for legislators, procurers, and prescribers. Thus, the summary and recommendations presented do not provide an exhaustive summary of all the discussions that took place at the workshop.

Transparency concerning, for example, environmental risk assessment (ERA) data and pharmaceutical production chains is necessary to achieve "green prescription" and "green procurement". Science-based knowledge will guide legislators, procurers, prescribers as well as consumers and patients striving to achieve a situation in which we can protect the environment and have access to safe and effective medication. Legislation and policies will need to be adapted to enable more focus on environmental issues both in procurement and to direct prescribers.

Legislative actions for increased transparency and data access

Legislation and regulations should ensure that ERA data become available and are publicly accessible. Available ERA data are necessary when deciding on and enforcing appropriate risk mitigation measures, which in turn will support guidance of procurers, prescribers, and consumers.[2] The ERA data are also highly relevant for environmental legislative frameworks to, e.g., develop environmental quality standards. It is also imperative to close the knowledge gaps by addressing the large number of pharmaceuticals for which ERA data are lacking, i.e., those authorized in the EU before 2006[3].

Although data sharing and transparency can theoretically be achieved on a voluntary basis, it was clearly suggested that revisions of legislation will be necessary. In, for example, the ongoing revision of the European Union´s (EU) general pharmaceutical legislation, there is a movement towards increased transparency and access to data. This process should be closely followed, and any attempts to weaken the environmental aspect should be counteracted.

Furthermore, transparency of production chains and environmental standards for production of pharmaceuticals are required and should be part of new legislation. For example, the scope of the EU ERA should be expanded to the production phase, and environmental considerations should be included in the EU's good manufacturing practices[4].

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Considering the difficulties associated with harmonizing legislation worldwide, it is necessary for international organizations and panels with scientific, regulatory, and political competence to be prioritized and for recommendations from such parties to be taken up by federal and national governments.

Procurement

Regulations and frameworks should be adapted to include environmental standards in procurement of pharmaceuticals. By taking environmental effects into account in public procurement and other national systems where pharmaceuticals are made accessible, the prescribers would need to consider this less at the time of prescription.

To enable inclusion of environmental criteria/standards in procurement of pharmaceuticals, it was suggested that procurement be harmonized in larger markets by centralizing it nationally or in even larger international collaborations. Another example mentioned was to create incentives for environment-friendly procurement, for example, economic incentives.

The actors identified as the most important were politicians, who could create incentives, for example via legislation, and non-governmental organizations (NGOs) through their lobbying for a change in current procurement criteria. Moreover, the buyers are important because they need to agree to a green procurement policy, as well as the medicinal authorities who can contribute evidence-based decision support via, for example, position papers.

Prescription

Policies that could reduce environmentally harmful prescriptions by including the environmental aspects of pharmaceutical use are needed. These policies should also emphasize the benefits of shifting towards other preventive measures to avoid unnecessary medicinal treatment.

Prescribers and pharmacists should be educated and given access to environmental information and decision support at the time of prescription and "sale", enabling them to choose less harmful alternatives when available.

Raising the awareness of prescribers and pharmacists who are close to patients will also open a direct pathway for raising the awareness of the general public, through both direct interactions and information campaigns. Information to users on how to handle pharmaceuticals and pharmaceutical waste is likely a very cost-effective way to reduce environmental loads in many parts of the world.

For prescription policies to be effective, a collaborative effort is needed that includes prescribers, healthcare providers working together with agencies and others who can provide science-based treatment recommendations.

References and suggested reading

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Acknowledgements

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