Pharmaceutical waste: practices and challenges in ensuring their environmentally sound management

Basel Convention OEWG-14 side event, 28 June, from 1:15 to 2:45 PM
Pharmaceutical waste: practices and challenges in ensuring their environmentally sound management

SPEAKERS
By order of intervention.

Nada HANNA
Pharmaceutical and Antimicrobial Resistance Expert, Chemicals and Health Branch, UNEP

Maggie MONTGOMERY
Technical Officer, Water, Sanitation, Hygiene and Health, World Health Organization (WHO)

Lilian CORRA
International Society of Doctors for the Environment

Alpha Tarusenga CHIKURIRA
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Yang ZHENG
Director, Hazardous Waste Management Division, Solid Waste and Chemicals Management Technology Centre, Ministry of Ecology and Environment, China

Judith TORRES
Officer Cooperation and International Relations Adviser, Ministry of Environment, Uruguay

Stephanie LARUELLE
Programme Management Officer, Chemicals and Health Branch, UNEP | Moderator

28 June 2024 | 13:15-14:45 CEST
CICG | Room B & Online Webex

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TECHNICAL INFORMATION

- Throughout the event, you may raise your questions in the Q&A box
- Automatically translated subtitles in many languages are available through the captions button on the bottom left of your screen
- The recording, summary and documents will be made available on the event's website
ENGLISH CAPTIONS CAN BE ACTIVATED BY CLICKING ON THE BUTTON ON THE LEFT-SIDE OF THE BOTTOM BAR ON THE SCREEN
AGENDA

Opening
- Stephanie LARUELLE | Programme Management Officer, Chemicals and Health Branch, UNEP | Moderator

Ensuring the Safe Management of Pharmaceutical Waste
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Pharmaceutical Waste: Practices and Challenges in Ensuring their Environmentally Sound Management

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Basel Convention OEWG-14 side event

Ensuring the Safe Management of Pharmaceutical Waste

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Safe Disposal of Unused Pharmaceuticals

Nada Hanna
Pharmaceutical and Antimicrobial Resistance Expert
UNEP

Side event-14 OEWG, 28 June, from 1:15 to 2:45 PM
Pharmaceutical waste

Background:
Pharmaceuticals are crucial for human, animal, and plant health, significantly improving disease prevention and treatment. However, their release into the environment is becoming an increasing concern.

Sources:
Discharges from pharmaceutical manufacturing, healthcare facilities, agriculture, food production, and households contribute to global environmental contamination by pharmaceuticals, their metabolites, and transformation products. Improper disposal of unused pharmaceuticals is considered one of the major pathways.
Impacts on environment and public health

Impacts:
Active pharmaceutical ingredients (APIs) contaminate the environment, causing risks to biodiversity, ecosystem services and public health, including:
the emergence and spread of antimicrobial resistance, endocrine disruption, increasing the possibility of poisonings and wrongful consumption of expired/falsified medication; promoting black market sales.

Humans can be exposed to pharmaceutical residues through drinking water and food consumption.

Call to action:
As evidence grows, addressing the environmental release of pharmaceuticals is crucial to safeguard both ecological and human health.
Disposal of unused (expired and unexpired) pharmaceuticals

Pharmaceuticals may be unused or become leftovers because of, over-prescription, misdiagnosis, therapy changes, self-medication, over-the-counter purchases, adverse reactions, non-adherence, stockpiling, prescription errors, and expiring medications.

An estimated 3-50% of medicines become waste due to improper disposal practices.

Figure. Variation in household disposal practices (Source: Laubinger, F. 2022)
OECD countries
Disposal of unused (expired and unexpired) pharmaceuticals

Disposal methods:

Disposal through municipal solid waste can lead to environmental leaching if landfill leachate is not managed properly.

Flushing unused pharmaceuticals down sinks and toilets contributes to pharmaceutical pollution in wastewater.

Figure. Variation in household disposal practices (Source: Laubinger, F. 2022) OECD countries
Actions to prevent and reduce impacts of unused pharmaceuticals

- Waste prevention
- Collection: tack back schemes
- Planning, sorting and registration, storage, official approval, and control
- End-of-pipe treatment
- Legal framework and institutional arrangements
- Record-keeping, audit, and monitoring
- Awareness raising
- Resource mobilization
- Emergency preparedness and response
- Research and innovation
Waste prevention strategies

**Enhance disease prevention:**
- Improve hygiene and sanitation practices.
- Strengthen infection prevention and control measures.
- Increase vaccination coverage.

**Promote responsible use of medicines:**
- Enhance diagnostics accuracy.
- Implement stewardship programs.
- Develop and adhere to guidelines on medicine usage.
Waste prevention strategies

**Personalized and precision pharmaceuticals:**
Medications tailored to patients’ specific needs lead to fewer, more effective treatments, minimizing waste.

**Dimensioning:**
Reducing packaging sizes can decrease the risk of accumulation and improper disposal of unused medicines.

**Promote marketplace:**
Establish marketplaces for unused medicines that are unexpired and unopened, with at least six months to expiry, to better match supply and demand and prevent medicine wastage.

PharmaSwap (Netherlands, 2022): A platform where certified pharmacists can sell unused medicines to other pharmacies in need, often at reduced prices.

Sirum and Prescription Promise (USA, 2020): Start-ups focused on collecting and redistributing unused medicines to low-income patients and those in need.
Collection: medicine take-back schemes

**Voluntary collection schemes:**

Medicine take-back schemes are implemented in the form of voluntary approaches.

In the Netherlands, pharmacies voluntarily serve as collection points for unused medicines, with municipalities handling their safe disposal (KNMP 2020). 54% of the population use the return scheme and dispose of unused medication via this channel (Reitsma et al., 2013).

In Senegal, JokkoSanté, a free mobile app launched in Dakar, works with locals bringing in unused medication to a licensed pharmacy in exchange for points they can then spend on future prescriptions (CNN 2017).

**Government-funded collection schemes:**

Australia’s National Return of Unwanted Medicines Scheme (NatRUM, established in 1999) collects unused medicines via pharmacies, financed entirely by the Australian Health Department (NatRUM 2020).
Collection: medicine take-back schemes

**Extended producers responsibility scheme:**

This scheme incentivizes pharmaceutical companies to collect and dispose of unused medicines they've marketed. It shifts the financial and organizational burden from the government to the industry, aligning with the 'polluter pays' principle.

In Portugal, a producer responsibility organization manages the collection and disposal of unused medicines and related reporting (Health Care Without Harm 2013).
Raising awareness on proper disposal of medicines

- Awareness and information campaigns
- Incentives for returning medicines to collection points
- Product information
- Eco-labeling
- Environmental classification schemes
End-of-pipe treatment

Solid waste
- High-temperature incineration with flue gas treatment
- Co-incineration,
- Waste immobilization followed by landfill disposal
- Sanitary or engineered landfill
- Chemical decomposition

Wastewater
- Wastewater treatment plants
Example of take back scheme - the case of Colombia

Policy introduction
• In 2009, Colombia implemented Resolution 371, assigning the costs and responsibilities for managing unused medications to the manufacturers and importers.

Participation and impact:
• By 2018, 680 manufacturers and importers, representing 95% of the market, participated.
• Established 2,593 take-back points, covering 70% of the population.
• More than 930 tons of medicines were properly disposed of.

Consumer awareness:
• A significant increase in awareness, with 78% of pharmaceutical consumers aware of the take-back programs (Future Policy Special Award 2022).
Thank you

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Pharmaceutical Waste: Practices and Challenges in Ensuring their Environmentally Sound Management

Kei OHNO WOODALL
Senior Coordination Officer, Secretariat of the Basel, Rotterdam and Stockholm Conventions
Biomedical and health care wastes under the Basel Convention

Kei Ohno Woodall
Secretariat of the Basel, Rotterdam and Stockholm conventions
Routes of pharmaceuticals entering the environment

Technical guidelines on environmentally sound management of biomedical and healthcare wastes (Y1; Y3)

Adopted at the Basel COP-6 in Dec 2006

Biomedical and health-care waste requiring special attention

>> Pharmaceutical waste (e.g. expired medicines)

Pharmaceutical wastes are pharmaceuticals which have become unusable for the following reasons:

• Exceeded expiration date;
• Expiration date exceeded after the packaging, or the ready-to-use preparation prepared by the user has been opened;
• Cannot be used for other reasons (e.g. call-back campaign).
Waste management guidance

Waste prevention: To reduce the generation of pharmaceutical waste, stocks of pharmaceuticals should be inspected periodically and checked for their durability (expiration date).

Recovery by specialized facilities: Possibilities for returning old pharmaceuticals to the producer or handing them over to a special collection system (e.g. pharmacies) for possible subsequent use could be explored. Such a return of pharmaceuticals in their original packaging prior to or within a reasonable period after the expiration date is possible if it is ensured that the producer or collector examines possibilities for subsequent use of the pharmaceuticals and that pharmaceuticals which are no longer usable are disposed of in an environmentally sound manner.

Pharmaceutical wastes which are considered to be hazardous wastes have to be collected separately in appropriate containers. Intermediate storage takes place at a location which is accessible only to trained personnel. This should be done in a manner to avoid misuse.
Healthcare or Medical Waste
Basel Convention
on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

This fact sheet is part of a series of fact sheets to support the implementation of the environmentally sound management of hazardous wastes and other wastes, in accordance with the obligations of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The fact sheet provides information on the environmentally sound management (ESM) of healthcare waste, also sometimes referred to as medical waste. This fact sheet is primarily intended for use by waste managers at facilities generating or disposing of healthcare waste, but also contains information useful for transport and collection.

In addition, the reader should take due account of the Technical Guidelines on the Environmentally Sound Management of Biomedical and Healthcare Wastes (T2-02), developed under the Basel Convention.

Facilities generating and disposing of healthcare waste should appoint a waste management officer who shall have overall responsibility for developing a waste management plan for the facility, and for the day-to-day operation and monitoring of the waste management system. The waste management plan should address, among others, responsibilities, waste management procedures, monitoring and training.

Ensure adequate lighting and good ventilation to prevent the accumulation of toxic fumes. A sample design of a storage room for waste is presented in Figure 4.

Low-level radioactive waste
Store for decay in a shielded container, in accordance with national law. The storage area should be identified using the radiation warning symbol (radioactive).

Transport
On-site transport of waste
On-site transport should take place during less busy times and using set routes to prevent the exposure of staff and patients. Hazardous and non-hazardous waste should be transported separately. Infectious waste should not be transported together with other hazardous waste. Separate hazardous and non-hazardous routes should be planned and used. In general, a waste route should follow the principle “from clean to dirty”. Collection should start from the most hygienically sensitive medical areas (e.g. intensive care) and follow a fixed route around other medical areas and interim storage locations. Infectious waste should be collected at least daily. The use of waste chutes is not recommended.

Equipment used to transport waste should be able to contain any leak and be easy to clean and drain. It should be cleaned and disinfected daily. Waste should not be transported by hand due to the risk of accident or injury from infectious material or incorrectly disposed sharps that may protrude from a container.

Persons performing this work should wear appropriate personal protective equipment, including heavy-duty gloves, safety shoes or industrial rubber boots, industrial aprons, overalls and face masks.
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Safe and sustainable management of pharmaceutical waste for higher quality care

Basel Convention OEWG-14 Side Event

Maggie Montgomery (montgomerym@who.int)
28 June 2024
“QUALITY” – and preventing spread of antimicrobial resistance (AMR) an empty promise without the fundamentals

- 1 in 4 health care facilities, globally, lack basic water, sanitation, hygiene, health care waste, cleaning and electricity services
- Lack of basic services puts 1.8 billion people at greater risk of infection
- In least developed countries only 44% of hospitals and 23% of primary care facilities have basic health care waste management systems
- 8.6 million deaths per year in 137 LMICs are due to inadequate access to quality care.
- Improper disposal of antimicrobial pharmaceuticals contributes to AMR (5 million deaths annually due to bacterial AMR)
Global community committed to strengthening WASH, waste and electricity in health care facilities

Ongoing country implementation (75+) of standards, regular monitoring, WASH FIT, roadmaps

**Ultimate Aim:**
Every person has quality, essential health care

**Global Efforts co-led** by WHO and UNICEF

**Contributions from 50+ Partners** (e.g. World Bank, UNDP, IFRC, Global Fund, Gavi, WaterAid, World Vision, Save the Children, Helvetas)

**Strategic Inputs from Core Partners** (trailblazer countries+ UN/NGOs + academia + donors e.g. FCDO, USAID, ROK, SIDA, GIZ)

**Global Knowledge Portal** (*www.washinhcf.org*)
- Training and resource materials
- Country tracker
- Latest news and case studies
Leveraging commitments and a growing movement on WASH and health care waste

**2019 World Health Assembly Resolution calls for Countries to:**

- Establish **national roadmap, targets** and implement WASH in HCF and infection prevention and control (IPC) standards
- Integrate WASH and IPC **standards and indicators** into health programming and monitoring and increase domestic funding

**2023 UN General Assembly Resolution on Sustainable and safe WASH, waste and electricity**

- Countries to develop **roadmaps** and allocate **adequate budgets**
- Articulates need for enhanced **collaboration, leadership and partner investments**

**2024 Global Framework on WASH, waste and electricity in health care facilities**

- Greater focus on equity, climate resilience/sustainability, and integration
- Systems strengthening and service delivery targets and regular reporting

Learn more at the WHO/UNICEF Global Knowledge Portal (www.washinhcf.org)
Updating guidance on best practices on safe disposal of pharmaceuticals

• Basis for document
  • Focus on health sector and health care facilities
  • Need systems approach (policies, processes, treatment technologies)
  • New emerging trends on AMR, emergencies, pandemics heightens need for up-to-date guidance and better practices
• Zero draft shared with multi-sectoral technical group for input and review in April 2024
• Ongoing revisions and hybrid technical consultation: Q3 2024
• Publication and dissemination: Q4 2024-Q1 2025
Highlights from best practices on safe disposal of pharmaceuticals

- Greater attention to antimicrobials and cytotoxic medicines
- Green procurement of products that are environmentally friendly, recyclable and biodegradable
- Extended producer responsibility
- Improved stock management, including longer expiration dates, more flexible package sizes
- Reduction of unnecessary prescriptions and treatments
- Disposal of different types of vaccine waste
- Specific treatment considerations, including for Antineoplastics, Anti-infective products, other hazardous waste
- Emergency preparedness plans that seek local manufacturers, waste storage/handling/treatment capacity and funding
Integrating updated best practices into existing tools and training

- Risked based quality improvement tool covering water, sanitation, hygiene, cleaning, and health care waste
- Used in over 75 countries often as part of wider health efforts
- Supports improvements infrastructure, hygiene behaviour and management; also linked to costing and investments
- New Open WHO course to be launched in September 2024
- All resources at: www.washinhcf.org
Thank you

WHO/UNICEF knowledge portal:
www.washinhcf.org

WHO/UNICEF Joint Monitoring Programme:
www.washdata.org
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Progress in Environmental Management of Pharmaceutical Waste in China

Mr. Yang ZHENG
Solid Waste and Chemicals Management Center
Ministry of Ecology and Environmental of P.R.China

June 28, 2024
Main content

01 Sources and types of pharmaceutical waste

02 Collection system for pharmaceutical waste

03 Disposal strategies for pharmaceutical waste
Source of pharmaceutical waste

- Health care
- Industry
- Households
- Agriculture
Classification of pharmaceutical waste

1. Pharmaceutical waste from hospital

Medical Waste Classification Catalogue

- **Definition**: Outdated, obsolete, spoiled or contaminated medicine generated from hospital.
  - Discarded general medicine, such as antibiotics, over-the-counter (OTC) drugs, etc.;
  - Discarded cytotoxic and genotoxic drugs;
  - Discarded vaccines and blood products.
Classification of pharmaceutical waste

2. Industrial and veterinary pharmaceutical waste

National Hazardous Waste Catalogue

Definition: Reaction residues, waste products and intermediates generated in the manufacturing process of chemical active pharmaceutical ingredients, chemical pharmaceutical preparations and biological pharmaceutical products.
Definition: Substances in household waste that cause direct or potential harm to human health or the environment, including waste medicine, such as expired capsules, tablets as well as inner packaging; herb waste, that is, discarded herbs and the residue after decocting herbs.
Main content

- **01** Sources and types of pharmaceutical waste
- **02** Collection system for pharmaceutical waste
- **03** Disposal strategies for pharmaceutical waste
Collection system for pharmaceutical waste

The collecting process of pharmaceutical waste from different sources are different:

1. Pharmaceutical waste generated from hospitals follows the requirements of medical waste management system;
2. Pharmaceutical waste generated from industrial sectors is collected as industrial hazardous waste;
3. Pharmaceutical waste from household waste goes household waste collecting system.
1. Hospital pharmaceutical waste collection system

- **generation**: Pharmaceutical waste from hospitals.
- **collection**: Use specific packing bag or turnover bucket with infectious medical waste.
- **storage**: Stored in medical waste staging area.
- **transport**: Transport of medical waste by special transport vehicles.

**Supporting regulations and standards**:
- Medical Waste Management Regulations (by State Council)
- Pollution control standard for disinfection treatment and disposal of medical waste (GB 39707-2020)
- Technical specifications for steam-based / chemical / microwave disinfection centralized treatment engineering on medical waste
Collection system of pharmaceutical waste generated by industrial/agricultural sector

• **Generation**
  
  **Article 79** Units that generate hazardous waste shall store, utilize and dispose of hazardous waste in accordance with the relevant provisions of the State and the requirements of environmental protection standards, and shall not dump or pile up hazardous waste without authorization.

• **Collect & Storage**
  
  **Article 81** The collection and storage of hazardous waste shall be classified according to the characteristics of hazardous waste. It is prohibited to mix the collection, storage, transportation and disposal of hazardous wastes of incompatible nature without safe disposal. Protective measures in conformity with the State standards for environmental protection shall be taken for storing hazardous waste.

• **Transport**
  
  **Article 83** In transporting hazardous waste, measures to prevent pollution of the environment shall be taken, and state provisions on the control of transport of dangerous goods shall be followed.

——<Law of the People’s Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste>
Collection system of pharmaceutical waste from household/peasant

**generation**
- Pharmaceutical waste generated in households.

**collection**
- Sorting and collection of municipal waste.

**storage**
- Stored in municipal waste transfer sites.

**transport**
- The use of garbage trucks for transport.

Main content

01 Sources and types of pharmaceutical waste

02 Collection system for pharmaceutical waste

03 Disposal strategies for pharmaceutical waste
Centralized disposal of medical waste:

- Pharmaceutical waste generated from hospitals, industrial & agricultural sectors is usually incinerated in qualified centralized medical waste disposal units or hazardous waste disposal units. Some industrial generators run their own disposal facilities.
- Pharmaceutical waste generated from households is either disposed of in municipal waste incineration plants, or sent to facilities for medical/hazardous waste disposal if it is separately collected/sorted.

### Key technical indicators

<table>
<thead>
<tr>
<th>Key technical indicators</th>
<th>medical waste incinerator</th>
<th>hazardous waste incinerator</th>
<th>MSW incinerator</th>
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<tbody>
<tr>
<td>Incinerator temperature</td>
<td>≥850°C</td>
<td>≥1100°C</td>
<td>≥850°C</td>
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<tr>
<td>Smoke residence time</td>
<td>≥20S</td>
<td>≥20S</td>
<td>≥2S</td>
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<td>Combustion efficiency</td>
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<td>99.9%</td>
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<td>Heat burn reduction rate</td>
<td>&lt; 5%</td>
<td>&lt; 5%</td>
<td>≤5%</td>
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<tr>
<td>Incineration removal rate</td>
<td>— —</td>
<td>≥99.99%</td>
<td>— —</td>
</tr>
</tbody>
</table>

*Pollution control standard for medical waste treatment and disposal (GB 39707-2020)*

*Pollution control standard for hazardous waste incineration (GB 18484—2020)*

*Pollution control standard for incineration of household waste (GB 18485-2014)*
Whereabouts of pharmaceutical waste after incineration disposal:

- Fly ash and bottom slag from incineration disposal of medical waste:
  Both fly ash and bottom slag are still classified as hazardous waste and shall be landfilled at a hazardous waste landfill. While according to <National Catalogue of Hazardous Waste>, the whole process of bottom slag can be exempted and not be managed as hazardous waste. If the disposal process of fly ash or bottom slag meets the requirements of the <Municipal Waste Landfill Pollution Control Standard> (GB16889), it can be entered into a municipal waste landfill.

- Fly ash and bottom slag from incinerator disposal of municipal waste
  Fly ash is classified as hazardous waste. Landfilling fly ash shall meet the <Hazardous waste landfill pollution control Standard> (GB 18598) or the <Household waste landfill pollution control Standard> (GB16889); Co-processing of fly ash in cement kiln is increasing recently, according to the <Pollution Control Standard for Cement Kiln Collaborative Disposal of Solid Waste> (GB30485) and the <Technical Specifications for Environmental Protection of Cement Kiln Collaborative Disposal of Solid Waste> (HJ662).
  Bottom slag is not classified as hazardous waste and is generally used to produce construction materials.
Treatment strategies for pharmaceutical waste

◆ Resource utilization of traditional Chinese herb waste

Herb waste is mainly used as soil conditioner, biomass pellet fuel, organic fertilizer, feed and medicine residue medium, etc.

- soil conditioner
- biomass pellet fuel
- organic fertilizer
- feed
- medicine residue medium
Thank you for your attention

Contact Info:
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Now 144-hour or 72-hour visa-free transit policy is now accessible to travelers from 54 foreign countries at 30 ports in 23 cities in China Mainland
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Pharmaceutical Waste: Practices and Challenges in Ensuring their Environmentally Sound Management

Lilian CORRA
International Society of Doctors for the Environment

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Visibility and actions on chemical pollution from pharmaceutical origin
Have we advanced and done enough?

Lilian Corra
in the collaboration with Agostino Di Ciaula

International Society of Doctors for the Environment
ISDE
Linking Human Health and the Environment
Pharmaceuticals are designed to be **biologically active** at low concentrations. When enter in the environment **exposure humans and biodiversity**. Many are **resistant to degradation (persist in the environment)** which leads to potential accumulation in living beings (potentiating doses, effects and interactions) and may be **present “since conception” (toxic exposure affecting early development)**.

**Management of pharmaceutical waste:** The main sources of emission of pharmaceutical pollutants and waste production occurs throughout their entire life cycle.

- **Manufacturing:** inadequate treatment of waste and effluents containing active pharmaceutical ingredients can lead to significant environmental pollution.
  
  - **Consumption:** humans and animals (*livestock farming*) do not fully metabolized these chemicals. A significant portion is excreted entering in wastewater systems. Wastewater treatment plants are often not equipped to remove them. Most Health Care Centers do not have treatment plants at all discharging directly in the sewage urban system.

- **Improper disposal:** surplus and expired medications are frequently disposed improperly at home, flushed down in toilets or thrown in the trash, entering into landfills or water systems without adequate treatment.
The widespread presence of pharmaceutical pollutants in water, soil and food (mainly as a consequence of medical and veterinary production and use) is very well scientifically documented and as an issue of concern.

In 2011, ISDE presented the issue for the first time as a new and emerging issue under SAICM. Based in WHO reaction stating that the concentration in surface water was "too low to be biologically active", the first reaction was that there were no sufficient or strong evidence to consider the proposal.

Immediately after (in 2012) WHO published a new document on the issue presenting new aspects and widening the scope on the possible effects on health, the environment and on biodiversity.

In 2015, ISDE accompanied by the governments of Uruguay and Peru, again called the attention on the issue and SAICM 4th International Conference of Chemicals Management (ICCM4) adopted Environmentally Persistent Pharmaceutical Pollutants as an “emerging policy issue”.

Today continue being an “issue of concern” under the new Global Framework of Chemicals.
Biologically active chemicals from pharmaceuticals present in the environment have been clearly recognized as relevant pollutants.

The great interest of the scientific community is documented by the continuously increasing number of papers published in highly recognized international scientific journals.

Only by searching the keywords “pharmaceutical pollution” in PubMed returned a total of 42,470 papers published to May 2024.

As shown in the next slide, the number of scientific publications on chemical pollution from pharmaceutical origin started to significantly increase since the year 2001.

But only after the first introduction of the proposal of EPPP as a new and emerging issue under SAICM, in the decade 2012-2022 the number of international papers on pharmaceutical pollution growth by 134%.
Monitoring the presence of EPP in surface water is not easy

The main problems are:

• the **lack of laboratory capacity** to detect the presence of low but biologically active chemical pollutants from pharmaceutical origin in surface water or to bio-monitor them.

• the **lack of information** on the persistency of the molecules in the environment and their environmental fate.

• the **low recognition of the problem created by early exposure since conception and chronic toxic exposure to low doses** to implement monitoring and detection and implement effective interventions.
Pharmaceutical pollution of the world’s rivers.
John Wilkinson, Alistar Boxall and Col.
February 14, 2022. Environmental Science
https://doi.org/10.1073/pnas.2113947119

“Despite growing evidence of the deleterious effects on ecological and human health, little is known regarding the global occurrence of pharmaceuticals in rivers.

Studies assessing their occurrence are available for 75 of 196 countries, with most research conducted in North America and Western Europe.

This leaves large geographical regions relatively unstudied.

The findings recognize a global pharmaceutical pollution in rivers.

The study monitored 1,052 sampling sites along 258 rivers in 104 countries of all continents, thus representing the pharmaceutical fingerprint of 471.4 million people.

The presence of these contaminants in surface water poses a threat to environmental and/or human health in more than a quarter of the studied locations globally.”
Conclusions:
These group of pollutants under EPP requires urgent attention and action due to the important consequences.

• Even if scientifically well documented, the problem of biologically active chemical pollutants from pharmaceutical origin remains invisible.

• AMR is only the tip of the iceberg, the most visible and understood. (ATB ⇒ ATB/AMR resistance).

• An integral approach is necessary considering the burden on health (from hormones, major pain killers, anesthetics, drugs for cancer treatment, only to mention a few) and the negative effects on biodiversity (as, by example, affects the “key stone species”, fundamental for the ecosystemic equilibrium).

• A comprehensive detailed and updated report of the scenario in different regions is still lacking (considering that is a problem of global concern and the diffuse presence in water, soil and food). Monitoring in LMICs is limited to a small number of these pollutants or inexistent.

• Involvement of the Health, Environment and Production areas is important to give visibility and install pollution prevention policies and actions to protect the environment, biodiversity and human health.
Prevention is the easier, simpler and cheaper way to control the emissions all along the lifecycle.

Addressing chemical pollution from pharmaceuticals requires

- Install a comprehensive approach,
- better control of manufacturing practices: emissions and waste management,
- implement (improve) wastewater treatment from Health Care Centers,
- higher commitment of the Public Health sector,
- strength medical and public education and information on waste management,
- stricter regulations on labeling (environmental fate and waste management),
- reduce packaging waste
- proper disposal strategies and control all long the chain of waste production/management.
ISDE campaign on “Responsible Prescription”

ACT IN PREVENTION:

- Engage health professionals at all levels
- Educate and inform health professionals
- Prescribe only the necessary doses and instruct the patient on how to proceed.

International Society of Doctors for the Environment
ISDE
Linking Human Health and the Environment
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Pharmaceutical Waste: Practices and Challenges in Ensuring their Environmentally Sound Management

Judith TORRES
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Environmental Quality Manager, Department of Environment, Environmental Management Agency, Zimbabwe

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PHARMACEUTICAL WASTE MANAGEMENT: EXPERIENCES FROM ZIMBABWE

_____________________________________
Mr. A Chikurira (EQ Manager)
Environmental Management Agency
Pharmaceutical waste encompasses a broad category of unwanted or expired medications, medical products, and their associated packaging materials. Here's a breakdown of the key elements:

- **Medications**: This includes expired, unused, or leftover prescription drugs, over-the-counter medications, and veterinary medicines.

- **Medical Products**: Sharps (needles, syringes, lancets), swabs, bandages, and other medical supplies used during procedures or treatment can also be considered pharmaceutical waste if they come into contact with pharmaceuticals.

- **Packaging Materials**: Blister packs, vials, bottles, and other containers used to store and dispense pharmaceuticals are also classified as pharmaceutical waste once they become empty or unusable.
Categorization of Pharmaceutical Waste: Pharmaceutical waste can be categorized based on its potential risk to human health and the environment:

- **Hazardous Pharmaceutical Waste**: This category includes medications with toxic or cytostatic (cell-killing) properties, antibiotics, hormones, and controlled substances. These wastes require special handling and disposal due to their potential to harm human health or contaminate the environment.

- **Non-Hazardous Pharmaceutical Waste**: This category includes expired or unused medications that do not significantly threaten human health or the environment. Examples include some over-the-counter medications like Electrolytes, Vitamins, Salts, Herbals, Glucose, Minerals
Improper disposal of pharmaceutical waste can pose adverse impacts:

- **Public Health Risks:** Expired or improperly discarded medications can be accidentally ingested by humans or animals, leading to poisoning or other health issues. Additionally, the presence of antibiotics in the environment can contribute to antibiotic resistance.

- **Environmental Contamination:** Pharmaceutical waste can leach harmful chemicals into the soil and water when dumped in landfills or disposed of improperly. This can contaminate drinking water sources and harm aquatic life.
National Legislative Framework

Constitution of Zimbabwe

- Environmental Management Act CAP 20:27
- Medicines & Allied Substances Control Act CAP 15:03
- The Public Health Act CAP 15:07

Supreme Law

Regulations

1. SI 10/2007
2. SI 6 of 2007
Zimbabwe has a legal framework in place to address pharmaceutical waste management.

- **The Public Health Act** recognises pharmaceutical waste as healthcare waste and mandates its proper handling.

- **The Environmental Management Act** regulates the disposal of hazardous waste, which includes some categories of pharmaceutical waste.

- Additionally, the Medicines Control Authority of Zimbabwe provides guidelines for healthcare facilities to follow regarding proper waste disposal practices.
In Zimbabwe the exact quantity of pharmaceutical waste generated is unknown due to a lack of comprehensive data.

Estimates suggest 2-5% of procured medications become waste due to various factors like expiry, damage, or changes in prescriptions.

Improper disposal practices are common in Zimbabwe i.e. Open burning, dumping in landfills, and burying are frequently used methods.

These practices lead to environmental contamination and pose health risks to waste handlers and communities.

The current situation regarding pharmaceutical waste management in Zimbabwe is a cause of concern.

Contaminated soil and water can spread diseases, and harmful chemicals released during burning can cause respiratory problems.
1. **High-Temperature Incineration:**

- Considered the most effective method for destroying a broad range of pharmaceutical waste, including infectious agents and hazardous chemicals.
- Requires specialized incinerators with extremely high temperatures (ideally above 1200°C) and advanced emission control systems to minimize air pollution.
- This technology is expensive to set up and maintain, making it more suitable for countries with the necessary infrastructure and resources.
Considerations for pharmaceutical waste management technologies

1. **Type of waste**: The specific composition and characteristics of the waste will determine the most suitable treatment method.

2. **Volume of waste**: Larger waste volumes might necessitate high-capacity technologies like incineration.

3. **Available resources**: Cost, infrastructure, and skilled personnel availability play a crucial role in selecting a feasible technology.

4. **Environmental regulations**: Local regulations regarding emissions and waste disposal methods must be considered.
Challenges in pharmaceutical waste management in Zimbabwe

➢ **Limited Resources:** Similar to general waste management, financial constraints limit the development of proper pharmaceutical waste management systems. This includes a lack of designated collection bins, safe transportation options, and authorized treatment facilities for expired or contaminated drugs.

➢ **Weak Enforcement:** Existing regulations regarding pharmaceutical waste disposal might not be effectively enforced, allowing for improper practices like flushing medications, burning them in open pits, or dumping them in landfills not equipped to handle hazardous materials.

➢ **Low Awareness:** Healthcare workers and the public may lack sufficient knowledge about the dangers of improper pharmaceutical waste disposal. This can lead to unsafe practices at home and healthcare facilities.

➢ **Fragmented System:** Currently, there's no established national system for collecting, transporting, and treating pharmaceutical waste. This creates logistical challenges and increases the risk of environmental contamination.
Opportunities in pharmaceutical waste management in Zimbabwe

➢ **Collaboration**: Partnerships between the government, healthcare facilities, pharmaceutical companies, agriculture production, farms and waste management firms can create a comprehensive waste management system. This collaboration can share resources, expertise, and responsibilities for collection, transportation, and treatment.

➢ **Awareness Campaigns**: Educational programs targeting healthcare workers, pharmacies, and the public can raise awareness about the safe disposal of pharmaceutical waste. This can encourage responsible practices and reduce environmental risks.

➢ **Take-Back Programs**: Pharmacies and healthcare facilities can implement take-back programs, allowing patients to return unused or expired medications for proper disposal. This reduces the risk of improper disposal at home.

➢ **Safe Treatment Facilities**: Investing in and establishing treatment facilities with environmentally sound technologies for pharmaceutical waste disposal is crucial. This can involve incineration with advanced emission control systems or other approved methods.

➢ **Extended Producer Responsibility (EPR)**: Implementing an EPR program can incentivize pharmaceutical companies to take responsibility for the proper collection and treatment of their waste after it reaches the end of its lifecycle.
In conclusion

➢ The responsible management of pharmaceutical waste in Zimbabwe is not merely an environmental concern; it’s a critical investment in public health and a sustainable future.

➢ By addressing the existing challenges head-on, we can unlock a world of opportunities. Collaboration between government, healthcare institutions, and the private sector can pave the way for a comprehensive waste management system.

➢ Targeted awareness campaigns can empower healthcare workers and the public to become responsible stewards of their pharmaceutical waste.

➢ Implementing best practices like take-back programs and investing in environmentally sound treatment technologies will ensure the safe disposal of these potentially hazardous materials.

➢ The journey towards a sustainable solution requires dedication and a commitment to innovation.

➢ By embracing these challenges and harnessing the available opportunities, Zimbabwe can establish a model for responsible pharmaceutical waste management in Africa.

➢ This will not only safeguard public health and the environment but also potentially unlock new economic opportunities in the waste management sector. Let us choose a path that prioritizes the well-being of our people and the health of our planet for generations to come.
Thank You

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Basel Convention OEWG-14 side event

Pharmaceutical waste: practices and challenges in ensuring their environmentally sound management

28 June 2024 | 13:15-14:45 CEST
CICG | Room B & Online Webex

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THANK YOU!

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Basel Convention OEWG-14 side event, 28 June, from 1:15 to 2:45 PM