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Short communication

Environmental risk assessment of pharmaceuticals in the EU: EMA guidelines and current challenges

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Introduction

The increasing consumption of pharmaceuticals has led to their continuous release into the environment, raising concerns about potential ecological risks. Active pharmaceutical ingredients (APIs) can enter aquatic and terrestrial ecosystems through excretion, and improper disposal, where they may affect non-target organisms even at low concentrations.

In the EU, the European Medicines Agency (EMA) provides guidance for assessing the environmental impact of human medicinal products through a tiered Environmental Risk Assessment (ERA) approach. While the EMA guideline represents an important regulatory tool, challenges remain in its application, especially data gaps.

This paper reviews the EMA guideline for ERA and identifies limitations in its current implementation.

Regulatory aspects

EMA guidelines and regulatory expectations

The ERA for medicinal products was formally introduced in the EU in 2006 with the publication of the EMA guideline (EMEA/CHMP/SWP/4447/00), providing for the first time a harmonised framework to evaluate the environmental impact of pharmaceuticals. Its legal basis stems from Article 8(3)(g) of Directive 2001/83/EC (Wess, 2021), which requires that any marketing authorisation application (MAA) for a medicinal product includes an assessment of potential environmental risks and, where appropriate, measures to mitigate them.

In terms of regulatory applicability, an ERA is required for all new MAAs for human medicinal products in the EU. Furthermore, updates to an existing ERA are necessary when increased exposure is expected with a subsequent change in the lifecycle of the medicinal product.

The initial version of the ERA Guideline, together with its subsequent corrigenda up to 2015 (EMEA/CHMP/SWP/4447/00 Corr. 2), as well as the related Questions and Answers document (EMA/CHMP/SWP/44609/2010 Rev. 1), allowed generic applicants to justify the absence of a full ERA in their dossiers by demonstrating that the generic application would not lead to an increase in environmental exposure of the active substance.

In contrast, the most recent revision of the Guideline (EMEA/CHMP/SWP/4447/00 Rev. 1 – Corr.) introduces a more structured approach and no longer accepts justifications based solely on the absence of increased environmental exposure. Instead, applicants are generally expected to submit a full ERA with each MAA, unless a suitable ERA is already available for another medicinal product containing the same active substance.

Even in such cases, the Guideline foresees that the applicant should provide a Letter of Access to the relevant data. However, in practice, certain EU competent authorities may accept evidence that the

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applicant has made reasonable efforts to obtain access to the ecotoxicity data, even if such access has not been granted.

Despite the strengthened regulatory framework, significant gaps remain between what the updated guideline requires and what the available scientific evidence can currently support.

Current challenges

A key limitation of the EU ERA framework is the lack of data for legacy APIs authorised before ERA requirements were introduced in 2006. These substances entered the market without environmental evaluation, leaving significant gaps for many widely used pharmaceuticals (Wess, 2021).

A comprehensive analysis of pharmaceuticals in the European environment found that approximately 68% of APIs lack sufficient ecotoxicological or monitoring data, and only about 1.5% have enough information to perform a complete ERA in line with current EMA standards. This indicates that, despite decades of pharmaceutical use, the majority of substances circulating in the environment remain poorly characterised in terms of their ecological risks (Spilsbury et al., 2024).

Another important limitation is the lack of transparency and accessibility of environmental data, particularly for older products. Much of the existing information is either unpublished, fragmented across different sources, or not aligned with current scientific standards, making it difficult for regulators and researchers to perform robust assessments (AESGP, 2022).

In response to these challenges, several industry initiatives have emerged to promote data sharing and reduce unnecessary duplication of environmental studies. In particular, the AESGP matchmaking platform and the AESGP ERA consortia aim to facilitate collaboration between pharmaceutical companies by identifying potential partners for joint data generation and shared access to environmental risk assessment data for over-the-counter products, in line with the 3Rs (replace, reduce, refine) principles (AESGP, 2026).

Conclusion

The ERA of pharmaceuticals has become an indispensable component of the EU regulatory framework, and the 2024 revision of the EMA guideline marks a meaningful step toward more rigorous and harmonised environmental oversight. However, the effectiveness of this framework is fundamentally constrained by the state of the underlying data: with only 1.5% of EMA-approved APIs having sufficient information for a complete ERA, the gap between regulatory expectation and scientific reality remains vast. Bridging this gap will require coordinated action, through industry data-sharing initiatives, ERA consortia, and targeted generation of ecotoxicological data for legacy substances, if environmental risk assessment is to fulfil its intended protective function.

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