

Plastamination: An Emerging Challenge for Global Health and Nursing Practice

Plastaminação: Um Desafio Emergente para a Saúde Global e a Prática de Enfermagem

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The ubiquitous presence of plastic materials is a defining feature of the Anthropocene. Composed of complex polymer structures and synthetic chemical additives, plastics provide versatility to a wide range of products; however, they also pose unprecedented environmental and health challenges (Landrigan et al., 2023). Improper disposal and degradation of these materials lead to the formation of microplastics (MPs; ≤ 5 mm) and nanoplastics (NPs; $< 1 \mu\text{m}$), ubiquitous contaminants that have already reached some of the planet's most remote ecosystems (Castañeda et al., 2023; Thompson et al., 2009).

More recently, the term *plastamination* has gained prominence in scientific literature to describe the widespread presence of plastic waste in the biosphere (Manfra et al., 2025; Santoro et al., 2024). Beyond early concerns restricted to marine fauna, current evidence indicates that MPs and NPs can cross biological barriers, reaching human tissues such as the gut, brain, and gonads (Meccariello et al., 2026). Human exposure occurs continuously through inhalation, ingestion, and dermal contact, constituting a public health crisis (Nashwan & Singh, 2025).

The Hospital Setting

Between Essentiality and Risk: Plastic consumption is extensive in healthcare, driven by the growing demand for disposable and safe devices. The United States is estimated to consume around 40% of medical devices globally, followed closely by Europe (Rizan et al., 2020). Materials such as polypropylene, PVC, and polycarbonate are used in a wide range of products, from syringes and catheters to ventilators and blood bags (Li, 2024).

This widespread use creates direct sources of exposure. A recent study by Casella et al. (2025) reported alarming concentrations of MPs in intravenous (IV) infusions across several European and Latin American countries. Samples contained up to 299 MPs/L in plastic bags, indicating that IV therapy, which is commonly used in nursing practice, is a direct exposure route for patients.

In addition to physical particles, chemical additives such as bisphenol A (BPA) and phthalates (e.g., DEHP) pose additional chemical risks. These lipophilic compounds act as endocrine disruptors and can migrate from PVC tubing and other PVC-based materials into the body, with serum levels reported to correlate with the duration of care in intensive care units (Badia-Tahull et al., 2018; North & Halden, 2013).

Implications for nursing

The extent of plastic use in healthcare is particularly evident in nursing, where these items are handled daily (Kagan, 2024). However, nurses may be insufficiently aware of potential health problems resulting from frequent contact with plastic materials. Consequently, there is a gap in the literature regarding the impact of plastamination on the health of nursing professionals.

Given nurses' constant handling of plastic materials, preparation of IV solutions, and exposure to plastic-rich hospital environments, it is plausible to hypothesize

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that these professionals may bioaccumulate MPs, NPs, and chemical additives in their bodies. Occupational health risks have not yet been adequately mapped, underscoring the urgent need for research to assess the presence of these particles in the bodies of nursing professionals.

Conclusion

Responding to the threat of plastamination requires a rapid reduction in the consumption of virgin plastics and the pursuit of sustainable alternatives that do not rely on fossil fuels (MacLeod et al., 2021). For nursing, the challenge is twofold: managing waste generated through care delivery and promoting practices that protect both patients and healthcare workers.

It is imperative that the nursing scientific community lead studies on occupational exposure to plastics among nursing professionals. Understanding the global reach of this pollution is essential to transforming clinical practice into an act of care that extends beyond the individual and integrates planetary health.

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