The Economic Benefit of a Pre-filled Syringe as a Route of Administration: A Targeted Literature Review

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Introduction & Objective

Pre-filled syringes (PFS) are increasingly used as an alternative to vial-based drug administration as PFS can reduce preparation steps and administration time,[1-3] medication errors,[4-6] and contamination risk.[5] However, the economic value of PFS relative to vials is not widely understood. This targeted literature review (TLR) summarized published evidence on the economic impact of PFS compared with vial-based administration across a variety of clinical settings.

Objective: To conduct a TLR to evaluate the economic impact of a PFS versus a vial.

Methods

Literature searches were conducted in the last five years (January 1st, 2020, to November 25th, 2025) across the MEDLINE, Embase, and CENTRAL databases for publications that evaluated the economic impact of a PFS versus vial. The search strategy was developed by an informational specialist, and records were screened by a single reviewer. Only studies published in English were eligible for inclusion.

The following key terms were included in the search strategy: Syringes, including PFS, pre-loaded and dose-limiting syringes, and injectable or self-injectable medications.

Results

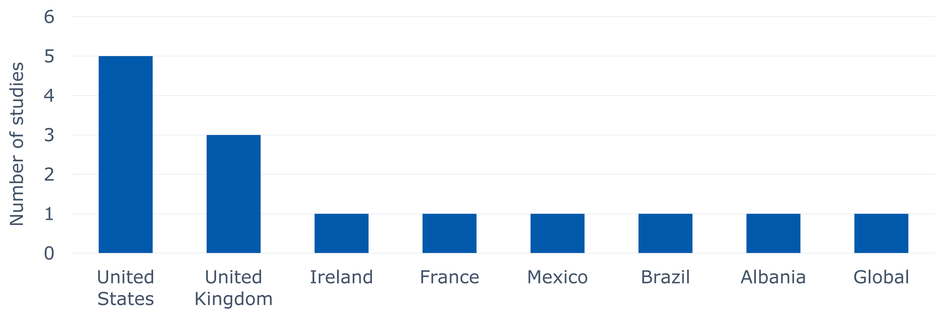
A total of **1,659** records were identified and screened for inclusion, resulting in **13 relevant studies** that reported the economic impact of a PFS compared to a vial.

Included studies assessed a wide range of populations, including patients receiving emergency drugs (n=5), receiving anesthesia (n=3), receiving vaccines (n=2), receiving denosumab for oncology treatment (n=1), receiving intravenous opioids (n=1), and patients with primary immunodeficiency (n=1).

Most studies were conducted in the United States (n=5) and the United Kingdom (n=3), however additional countries were represented in the included studies (**Figure 1**).

All studies were published between 2020 and 2025, with most studies published in 2022 (n=4), 2024 (n=3), and 2025 (n=3). Types of economic analyses identified in the TLR are reported in **Table 1**.

Figure 1: Distribution of studies by region*



*Numbers exceed the total number of studies because one study examined more than 1 country (France and the UK).

12 studies (92.3%) demonstrated **economic savings/benefits associated with PFS** versus vials.†

†A cost analysis from Albania assessed the cost of PFS versus vials for influenza vaccinations of healthcare workers and found similar total economic costs in a PFS only scenario ($163,506 USD) and the base-case analysis, which assumed combination use of PFS and vials ($161,639 USD).[6]

Results (continued)

Emergency Drugs: Use of PFS was associated with lower annual cost[1,3,7-9] due to fewer preventable adverse drug events,[1] reduced medication waste,[1,2] supply costs,[3] and staff preparation time.[1]

- A real-world cost analysis of **a United Kingdom hospital** found weekly reductions in drug waste may lead to **£432.27** in annual drug cost savings with PFS.[7]
- Similarly, an analysis in Ireland considering medication error, waste, contamination risk, and patient safety estimated cost savings of over **£31,000** annually.[9]

Table 1: Distribution of pharmacoeconomic analyses, by type and region

	Budget impact model	Real-world cost analysis	Micro-costing model	Cost-effectiveness	TLR including economic analyses‡
US	✓	✓		✓	
UK		✓		✓	
Ireland		✓			
France				✓	
Mexico	✓				
Brazil	✓§				
Albania			✓		
Global					✓

‡Combination of a budget impact model and cost-minimization analysis. §The TLR included two studies with labor costs and one interview-based assessment of costs.

Anesthesia: PFS resulted in net savings per patient (range: $46 to 48.26 USD),[10,11] were the lowest cost-option versus vials,[5] and reduced costs due to fewer medication errors and contamination.[5]

Other uses for PFS:

- In an oncology-focused budget impact model from the Mexican public healthcare perspective, **denosumab** administered via **PFS** generated **cost-savings** versus vials across four types of cancer (range: **$8.5 to $109 million MXN over five years**), by reducing nurse time required for administration.[12]
- For administering vaccines, a TLR found lower mean cost per dose for PFS versus vaccines requiring reconstitution (VRR) vials; this result was consistent across multiple countries.[2] Additionally, administration time was reduced and use of PFS resulted in fewer errors compared to VRR.[2]
- A United States budget impact analysis for PFS versus vial use when treating patients with primary immunodeficiency reported the uptake of PFS IgPro20 may lead to an incremental savings of **$10.5 million USD** over **three years**.[13]
- A United States cost-effectiveness analysis found PFS for administering intravenous opioids reduced errors by 94% compared to vials, resulting in a cost reduction of **$182 USD per administration**.[4]

Conclusion

This TLR demonstrated that across studies globally, **PFS clearly demonstrate economic benefits** for payers compared to vials. Cost savings were **primarily driven by reduced drug waste**, **reduced errors**, and **efficient preparation and administration**. These findings support PFS as a **cost-efficient route of administration** with **meaningful economic and operational benefits**.

Abbreviations: IgPro20 = Immune Globulin Subcutaneous (Human), 20%; MXN = Mexican peso; PFS = pre-filled syringes; TLR = targeted literature review; UK = United Kingdom; US = United States; USD = US dollar; VRR = vaccines requiring reconstitution.

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