Characterisation of prefilled syringe use in an acute care setting: costs and advantages

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Objectives

This research aims to understand the impact of drug administration using prefilled syringes *(PFS)* compared to conventional vials/syringes on following critical clinical and economic outcomes in acute care settings:

- Patient safety
- Supply costs/cost savings
- Time savings

Methods

A targeted literature review was conducted in PubMed and Embase databases to evaluate differences between PFS and vials/syringes using terms related to:

- Patient safety
- Cost of supplies per adverse medical event
- Medication error
- Drug waste
- Preparation/dosing time

A study was included if it evaluated acute care drugs and was published in a peer-reviewed journal between 2001 and 2018. A study was excluded if it did not take place in an acute care setting or did not evaluate PFS or vials/syringes as they related to the topics above.

Results

Eight studies were included in this review, with most studies conducted in the United States and United Kingdom. Results found that the use of PFS can lead to multifactorial benefits, such as lesser medication preparation time, lesser risk of medication errors and adverse events and reduced medication wastage when compared to regular vials/syringes usage. However, initial device cost may be higher with PFS *(Fig. 1)*.

Discussion

PFS demonstrates several advantages, including increased patient safety decreased supply and overall costs and increased time savings, that may offset the higher initial device cost of PFS.

Patient Safety

Medication errors and the associated adverse events pose a significant clinical and economic burden. The use of PFS has been shown to reduce medication errors as compared to vials/syringes, which can improve patient safety and lead to cost savings.[2,7] A database of anesthesia-related medication errors report ~65% of errors are associated with drug administration.[1] Preventable adverse drug events associated with injectable drugs impact 1.2 million hospitalizations per year and could raise U.S. payer costs by $2.7–$5.1 billion annually *(about $600,000/hospital)*.[9]

Supply Costs/Overall

Use of PFS reduces medication wastage, leading to cost savings. Preventable drug wastage from using a single-use vial can cost an institution ~$200,000.[10] PFS may lead to cost savings by reducing drug wastage caused by vials.[2]

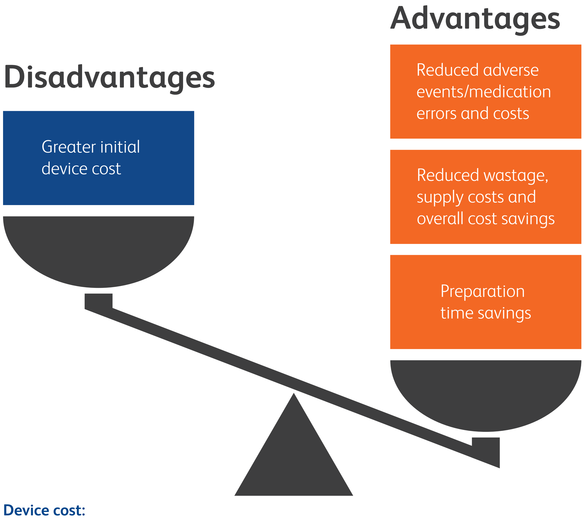
Time Savings

Use of PFS may reduce drug administration time. It is imperative to administer medications without delay, especially in an acute care setting. PFS may help with timely administration in critical situations, which may help avoid complications and result in cost savings.

Conclusion

PFS demonstrated institutional cost savings compared to vials/syringes and increased patient safety. PFS prove to be effective devices for administering medications in acute care settings. PFS may have an initial higher device cost compared to vials and syringes, but these costs are easily offset in the acute care setting by reducing patient adverse event rates, medication errors, supply costs and time wastage.

Figure 1. Advantages and disadvantages associated with the use of prefilled syringes



Device cost:

- PFS required fewer administration supplies; however, it had a higher administration cost than vials/syringes due to a higher initial device cost[2]

Patient safety

- An analysis of an anesthesia-related adverse event quality improvement program found medication errors in all phases of handling.[1] The program authors cited the use of PFS to likely prevent most of these events[1]
- Atropine PFS reduced medication errors by 77% compared to vials/syringes[2]
- Aggregate 22.4% reduction in medication errors when using PFS compared to vials/syringes[3,4]
- Vial/syringe use was 17.0 times more likely to lead to medication errors compared to using PFS[3]
- Oxytocin administration using PFS may prevent >40,000 annual postpartum hemorrhage *(PPH)* events, with more than 4,000 life-years saved in Latin American and Caribbean countries due to its ease of use compared to ampules. PFS was cost-saving or very cost-effective in almost all countries[5]
- A PFS utilization plan was implemented in hospitals that demonstrated cost savings from reduction in drug wastage and medication errors in all scenarios within a budget-impact model[2]

Supply costs/cost savings

- PFS reduced preparation time compared to vials/syringes, resulting in a ~49% reduction in labor cost for PFS[6]
- Although PFS with thiopental had a higher initial device cost, one institution reported annual cost savings of €1,256 *(from daily reconstitutions)* when compared to vials/syringes[7]
- Cost parity or potential long-term savings in supply costs was observed when operating room drug wastage was factored in, especially for high-cost drugs[8]

Time savings

- PFS reduced preparation time by 43.5% when compared to vials/syringes[3]

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