

# Advancing Insulin Delivery with Active Safety Pen Needles: Clinical Insights and Benefits

White Paper

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## Abstract

Insulin pen needles play a critical role in diabetes management, but the type of safety mechanisms in these devices can have significant implications for patient and healthcare provider outcomes. This white paper incorporates findings from recent studies evaluating active versus passive safety pen needles (SPNs), providing insights into their impact on dose accuracy, ease of use, and safety. Notably, studies have highlighted challenges with passive SPNs related to under-dosing, and insulin pooling at the injection site. These issues can be linked to poor patient outcomes, healthcare resource strain, and preventable hospital readmissions for conditions like diabetic ketoacidosis (DKA). In contrast, active SPNs, which require user activation of the safety mechanism, have demonstrated greater reliability in achieving full dose administration and reducing medication errors. This white paper outlines the evidence supporting the transition to active SPNs and proposes best practices for education and implementation to improve safety and efficacy in clinical settings.

## Introduction

Diabetes remains a global public health priority, necessitating safe and effective insulin delivery methods. Insulin pens have become a mainstay due to their convenience and ease of use, yet the attached pen needles—particularly those with safety features—introduce challenges that must be addressed to optimize patient care. Safety pen needles (SPNs) were developed to reduce the risk of needlestick injuries and enhance sharps disposal safety. However, as demonstrated by recent research, passive SPNs that deploy a safety shield automatically upon contact with the skin can be associated with unintended dosing errors due to premature activation or improper technique.<sup>1,2,3</sup>

## Clinical Challenges with Passive SPN Devices

### Suboptimal Insulin Delivery and Associated Risks

Passive SPNs rely on automatic mechanisms to shield the needle upon injection. While these devices reduce needlestick injuries, clinical reports reveal significant challenges in their use. Improper technique or inadequate pressure during administration may result in insulin pooling on the skin or remaining within the device. This can lead to underdosing, fluctuating glycemic control, and potentially severe outcomes such as diabetic ketoacidosis (DKA).<sup>1,2</sup>

In one case study, the use of passive SPNs in a long-term care setting led to recurrent DKA due to inconsistent insulin delivery. Transitioning to a non-retractable needle resolved the issue, emphasizing the need for proper training and device selection for specific patient needs.<sup>1</sup>

### Training and Usability Barriers

Reports from healthcare professionals indicate a steep learning curve with passive SPNs. Challenges include difficulty in ensuring subcutaneous injection in patients with soft or redundant skin and limited visual confirmation of insulin delivery. For instance, pooled insulin at the injection site was noted in both hospital and community settings, often linked to insufficient training or unfamiliarity with device operation.<sup>2,3</sup>

## The Case for Active SPN Devices

### Improved Dosing Accuracy

Active SPNs, such as Unifine® SafeControl®, provide users with visual confirmation during administration and require manual activation of the safety shield after injection. This design enables more accurate dosing by allowing healthcare professionals and patients to verify the

full dose has been delivered. A pediatric study reported 93.9% of nurses felt completely confident in delivering the intended dose with active SPNs, compared to 40% with passive devices.<sup>3</sup>

### Enhanced Usability

Active SPNs are easier to use and teach. Nurses reported higher satisfaction (87.8%) with active devices due to their straightforward mechanism and reduced likelihood of errors. These devices facilitate effective training for patients and caregivers, promoting adherence to insulin therapy post-discharge.<sup>3</sup>

### Safety and Efficiency

Active SPNs offer both injury protection and assured dosing when properly activated.<sup>3</sup> Notably, active SPNs eliminate the need for excessive pressure during injections, addressing a common pain point for patients and caregivers.

### Reduced Risk of DKA and Hospitalizations

By addressing the limitations of passive SPNs, active devices minimize the risks of insulin underdosing. This has profound implications for preventing DKA, which accounts for over 115,000 hospital discharges annually in the U.S. and carries a mortality rate of up to 6.1%.<sup>1,2</sup>

## Economic and Resource Implications

Active SPNs offer cost-saving potential by reducing the incidence of DKA and associated hospitalizations. Additionally, they alleviate the burden on healthcare professionals by streamlining training and minimizing errors. The decrease in adverse events and hospital admissions highlights their importance in clinical practice.<sup>3</sup>

## Conclusion

Active safety pen needles represent an advancement in insulin delivery, addressing critical limitations associated with passive devices. Their ability to ensure accurate dosing and ease of use supports their broader adoption. As the healthcare industry strives for improved patient outcomes and safety, the acceptance of active SPNs represents a significant step toward improved diabetes management and patient outcomes, empowering both providers and patients in their care journeys.

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## References

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