SAFETY PEN NEEDLE (SPN) DEVICES IN THE ACUTE CARE SETTING: AN ANALYSIS OF HEALTH RESOURCE UTILIZATION (HRU) IN THE UNITED STATES


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Needle stick injuries (NSI)

• According to National Diabetes Statistics Report by Centers for Disease Control and Prevention (CDC) in 2014, 29.1 million Americans (9.3% of the population) had diabetes. Furthermore, the American Diabetes Association (ADA) has estimated the total costs of diagnosed diabetes to be $245 billion.1

• Diabetes (DM) is prevalent among hospitalized patients making insulin administration a regular practice in acute care. In 2008, 1 in 5 hospitalizations were related to patients with diabetes.2 Generally, hospital guidelines suggest discontinuing oral medications during acute illnesses and using insulin therapy as needed, depending on the patient history.

• Insulin pen devices have several advantages over the traditional vial-and-syringe method of insulin delivery, including greater ease of use, superior accuracy for delivering small doses of insulin, and less reported injection pain.3

Insulin administration in the acute care setting is an integral component of inpatient diabetes management. The current method of insulin administration in the majority of acute care settings is by using a vial and active safety-engineered syringe (requiring activation of the safety device). Safety pen needles (SPNs), however, utilize passive safety (safety component activates automatically).

Insulin consumption varied based on the scenario and affected economic outcomes. It should be noted that the cost of insulin is the greatest contributing factor to this model. (Figure 2)

Conclusion

• NSI contributes significantly to total HRU in the acute care setting in the US. Potential benefits of implementing insulin pen devices and SPN in acute care settings include reducing the risk of adverse events such as NSIs and medication errors.

• Insulin pen devices in the acute care setting may also decrease waste and inefficiencies such as nursing time and in some cases insulin waste. The implementation of insulin pen devices in the acute care setting can lead to increased time to direct insulin administration a regular practice in acute care.

• For individual patient supply scenarios (scenarios 1 and 3), switching to SPN can reduce both NSIs and total cost to the institution.

• It is important to note that although the real-world pilot study results above were not generalizable, the model is adaptable to any institution based on number of beds and yearly insulin consumption.

Methods

A review of published literature was conducted to identify how insulin pen devices in the acute care setting may impact HRU and nurse safety in comparison to safety syringes.

A budget impact model was created to quantify the impact of passive SPN on healthcare worker safety and HRU in the acute care setting.

Inputs for fixed assumptions of insulin waste and cost, needle stick injury (NSI) rates from safety syringe (SS) and SPN, nursing time, and supply costs were obtained from the literature and real-world pilot studies, which were later used for developing the budget impact model, developed in Excel v2013.

Variables include number of hospital beds and amount of insulin dispensed from the pharmacy over a one year period.

The model compared 4 scenarios, described below, using insulin vial with SS versus using insulin pens with SPN:

1. Safety Syringe + 10 mL patient supply vs. SPN + Insulin pen
2. Safety Syringe + 3 mL vial patient supply vs. SS + Insulin pen
3. Safety Syringe + 3 mL vial patient supply vs. SPN + Insulin pen
4. Safety Syringe + 3 mL vial floor stock vs. SPN + Insulin pen

NSI reduction rate used in the model is based on a pilot study evaluating the effect of an interchange program for insulin pens and SPN in acute care settings may also decrease waste and inefficiencies such as nursing time and in some cases insulin waste. The implementation of insulin pen devices in the acute care setting may also decrease waste and inefficiencies such as nursing time and in some cases insulin waste.

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Limitations

• The study is based on pilot study data from a small sample size thereby limiting the generalizability of the findings to a larger population.

• The model assumes 100% bed occupancy and the use of 8000 mLs of insulin over a one year period.

• For individual patient supply scenarios (scenarios 1 and 3), switching to SPN can reduce both NSIs and total cost to the institution.

• It is important to note that although the real-world pilot study results above were not generalizable, the model is adaptable to any institution based on number of beds and yearly insulin consumption.

Results

The model assumed 100% bed occupancy and the use of 8000 mLs of insulin over a one year period.

Insulin volume: Depending on the scenario, a switch to SPN + insulin pens may increase or decrease the anticipated amount of insulin in dispensation.

Scenario % Change Insulin Dispensed When Switching to SS vs. Insulin Pen

SS + 10mL, patient supply 12.3%
SS + 10mL, floor stock 33.6%
SS + 3mL, patient supply 0.0%
SS + 3mL, floor stock 45.2%

Needle stick injury (NSI): The NSI reduction rate used in the model is based on a pilot study evaluating the effect of an interchange program for insulin pens and, was calculated at 100%. Findings from a separate study demonstrated zero NSI using passive safety, providing additional validation for this input.4

Nursing efficiency: Data collected from a previous time and motion study pertaining to the difference in time to administer insulin via a pen versus the traditional vial/syringe were applied. A daily nursing time savings of 31.5 minutes was calculated, and an average hourly rate for nursing was valued at $33.18

Supply costs: The model considered all impacted supply costs, including the increase in price to move to a safety insulin pen needle from a safety syringe.

1. Supply cost for SS vs. using insulin pens with SPN:


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5. Diabetes (DM) is prevalent among hospitalized patients making insulin administration a regular practice in acute care. In 2008, 1 in 5 hospitalizations were related to patients with diabetes.2 Generally, hospital guidelines suggest discontinuing oral medications during acute illnesses and using insulin therapy as needed, depending on the patient history.

6. Insulin pen devices have several advantages over the traditional vial-and-syringe method of insulin delivery, including greater ease of use, superior accuracy for delivering small doses of insulin, and less reported injection pain.3

7. Insulin administration in the acute care setting is an integral component of inpatient diabetes management. The current method of insulin administration in the majority of acute care settings is by using a vial and active safety-engineered syringe (requiring activation of the safety device). Safety pen needles (SPNs), however, utilize passive safety (safety component activates automatically).

8. Insulin consumption varied based on the scenario and affected economic outcomes. It should be noted that the cost of insulin is the greatest contributing factor to this model. (Figure 2)

9. Conclusion

• NSI contributes significantly to total HRU in the acute care setting in the US. Potential benefits of implementing insulin pen devices and SPN in acute care settings include reducing the risk of adverse events such as NSIs and medication errors.

• Insulin pen devices in the acute care setting may also decrease waste and inefficiencies such as nursing time and in some cases insulin waste. The implementation of insulin pen devices in the acute care setting can lead to increased time to direct insulin administration.

• For individual patient supply scenarios (scenarios 1 and 3), switching to SPN can reduce both NSIs and total cost to the institution.

• It is important to note that although the real-world pilot study results above were not generalizable, the model is adaptable to any institution based on number of beds and yearly insulin consumption.

10. Methods

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4. Safety Syringe + 3mL vial floor stock vs. SPN + Insulin pen

Patient supply signifies 2 vial used for only 1 patient while floor stock refers to vials shared across multiple patients.

11. Results

Insulin volume: Depending on the scenario, a switch to SPN + insulin pens may increase or decrease the anticipated amount of insulin in dispensation.

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