The use of safety-engineered devices in preventing needle-stick injuries: A Budget Impact Analysis

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Background

Needlestick injuries (NSIs) are one of the most common and serious risks to healthcare workers. The main risk following a NSI is infection with a blood-borne virus (HBV, HCV, HIV). The economic burden of NSIs could be relevant, including direct and indirect costs. Safety Engineered Devices (SEDs) are designed to protect the user from exposure to the sharp, reducing the risk of incurring in NSIs. Problem related to NSIs could be particularly evident in diabetes setting, with regards to the devices used for insuline injection. Thanks to the adoption of SEDs in this setting, it could be possible to avoid NSIs and achieve clinical, organizational and economical benefits.

Objectives

Our research objective was to define the economic impact for hospitals related to the introduction of SEDs for insulin injection instead of traditional devices, across Italy, France, Germany, Spain, Netherlands, Belgium, United Kingdom and Saudi Arabia.

Methods

A 3-year incidence-based Budget Impact Model (BIM) was implemented from the hospital perspective, comparing the impact of SEDs and conventional devices use, considering the device acquisition costs and the potential cost savings associated with avoided NSIs in the inpatients' diabetes care. The costs considered in the model are direct and indirect, related to the testing for blood-borne diseases, vaccinations, post-exposure prophylaxis, reporting activities, counselling, follow-up, treatment for the eventual infections, loss of productivity due to anxiety or distress, absenteeism and possible litigations. Model input data were sourced through a systematic literature review on evidence, clinical guidelines, and market research results, based on the availability of country-oriented information. It was considered an average sized hospital with 50,000 inpatients per year, including diabetes prevalence, average number of insulin injection, population growth, NSIs rate (with conventional and innovative devices), actual devices prices in the involved countries, a substitution rate of the innovative insulin pen of 100%.

Results

Results consider system-wide economic impact including NSIs management costs and costs of supplies. The results depend on the number of inpatients in the hospital and the supply quota of SEDs. Considering a hospital that treats 960 inpatients per week and assuming that in the AS-IS scenario the hospital does not use any SEDs versus a TO-BE scenario in which insulin injections are performed with SEDs, an economic saving percentage ranging from a minimum of 18.66% (Italy) to a maximum of 41.9% (Germany) could be achieved. Results depend on the cost of labour in the different countries and on the different procedures for treating NSIs. Beside economic impact, it was calculated also the number of NSIs avoided in the TO BE scenario, in comparison with the AS IS situation: NSIs avoided range from 884 (France) to 297 (United Kingdom). Number of personnel hours saved for the management of NSIs are reported in the tables 1-8.

Budget Impact Analysis

Table 1. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in Belgium

Belgium – 3-years	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	251.109 €	328	846
100% use of SEDs	179.453 €	26	0
Reduction [abs. value]	-71.656 €	-302	-846
Reduction [%]	-28,54%	-92,00%	-100,00%

Table 2. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in France

France – 3-years	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	354.216 €	961	2.475
100% use of SEDs	259.683 €	77	0
Reduction [abs. value]	-94.533 €	-884	-2.475
Reduction [%]	-26,69%	-92,00%	-100,00%

Table 3. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in Germany

Germany – 3-years	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	354.645 €	585	1.507
100% use of SEDs	206.058 €	47	0
Reduction [abs. value]	-148.587 €	-538	-1.507
Reduction [%]	-41,90%	-92,00%	-100,00%

Table 4. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in Italy

Italy – 3-years	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	218.148 €	578	1.490
100% use of SEDs	177.437 €	46	0
Reduction [abs. value]	-40.711 €	-532	-1.490
Reduction [%]	-18,66%	-92,00%	-100,00%

Table 5. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in Netherland

Netherland – 3-years	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	296.580 €	592	1.525
100% use of SEDs	225.883 €	47	0
Reduction [abs. value]	-70.697 €	-545	-1.525
Reduction [%]	-23,84%	-92,00%	-100,00%

Table 6. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in Saudi Arabia

Saudi Arabia – 3-year	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	956.468 SAR	928	2.390
100% use of SEDs	576.170 SAR	74	0
Reduction [abs. value]	-380.298 SAR	-854	-2.390
Reduction [%]	-39,76%	-92,00%	-100,00%

Table 7. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in Spain

Spain – 3-year	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	213.097 €	569	1.466
100% use of SEDs	139.423 €	46	0
Reduction [abs. value]	-73.674 €	-524	-1.466
Reduction [%]	-34,57%	-92,00%	-100,00%

Table 8. Economic, Clinical and Organizational impact in case of use of 100% SEDs for insulin injection in an average-sized hospital in UK

United Kingdom – 3-years	Economic impact (Total cost of NSIs management)	Clinical impact (number of NSIs)	Organizational impact (Number of personnel hours due to avoidable NSIs)
0% use of SEDs	196.409 £	323	831
100% use of SEDs	148.783 £	26	0
Reduction [abs. value]	-47.626 £	-297	-831
Reduction [%]	-24,25%	-92,00%	-100,00%

Conclusion

The NSIs incidence and the associated costs could be reduced through the adoption of safer working practices, including investment in SEDs. For each country involved in the study, the BIM reports that the incremental costs of acquiring SEDs are offset by savings from fewer NSI. Moreover, avoiding NSIs through SEDs could free personnel hours, that can be dedicated to other activities and core processes. Most important, avoiding risk of contracting blood borne diseases could allow hospitals to be more compliant with laws about safety on work, together with possible litigations. The relevance of the topic and the availability of results stratified per Country of reference could acquire a significant value in the hospital decision making process. In the future, a wider availability of evidences and data could be useful to define more precisely the results, stratified by country.

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