Prevention of Needlestick Injuries and Blood Exposures Among Kenyan Healthcare Workers Using Safety Engineered Devices

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Objectives

Exposure to blood-borne pathogens poses a serious risk to health care workers (HCW). In Kenya, 76.6% of occupational exposures to HIV/AIDs among HCWs were attributed to needle stick injuries (NSIs).[1] Blood exposures (BEs) are strongly associated with lack of safety device use and inadequate safety practices. Safety engineered devices (SEDs) can be a cost-effective solution as they can minimize the involved risks.

Methods

A health economic calculator was developed using MS Excel 2016 for analyzing costs of using SEDs to prevent NSIs and BEs in Kenyan HCWs. The cost analysis estimates the impact of switching to safety injections and PIVCs from conventional devices from a hospital perspective. A targeted literature review informed published values for the rate of PIVC utilization, occurrence of NSIs, reduction in NSIs due to SEDs, and costs of managing varying risk of NSIs.

Results

The base-case analysis assumed a Kenyan facility with 1,000 beds, an occupancy rate of 80%, average patient length of stay of 3 days, and 400 healthcare workers. It was found, with an estimated 70% of needles used for injection, three needles used per bed per day, and 80% patients getting a PIVC, that 613,200 injection needles and 98,151 PIVCs were used annually. A scenario with 100% SED adoption could potentially lead to 81 fewer NSIs and 35 fewer BEs versus 100% conventional device usage. Correspondingly, the cost of managing exposure may be reduced by $193,408. Further considering device costs (Injection needle: conventional $0.0154, SED $0.1440; PIVC: conventional $0.6768, SED $0.9864), the total economic impact was a savings of $84,163.

Conclusion

NSIs and BEs pose a significant burden to the health system, while SEDs provide an opportunity to help mitigate clinical risks and generate cost savings. SEDs could, thus, promote safer injection practices and facilitate behavior change among HCWs and communities to appropriately reduce risks.

Needlestick injuries or blood exposures should not be "just part of the job" for healthcare workers; safety engineered devices have the potential to minimize clinical risks and can result in economic benefits in the long run.

Key Inputs for Cost Analysis Using both Injection Needles and PIVCs

PUBLISHED REFERENCE VALUES*	
Average indwelling time of PIVC (days)[2]	2.38
Percentage of HCWs getting at least one NSI[1,#]	76.6%
Percentage of all NSIs from contaminated devices[3]	85.0%
NSI rate in injection needles (percent of total exposures)[1]	34.2%
NSI rate in PIVCs (percent of total exposures)[1]	10.5%
Percent reduction with SED for NSI rate in injection needles[4]	70.0%
Percent reduction with SED for NSI rate in PIVCs[5]	66.0%
Percentage of HCWs with blood exposure[1]	10.9%
Source of NSI known as high-risk or unknown (% of exposures)[1,&]	64.9%
Source of NSI known as low-risk (% of exposures)[1,&]	10.5%
Cost per high-risk NSI[6]	$2,308
Cost per low-risk NSI[6]	$405

*Appropriate proxy values used wherever local/regional values were not available; [#]annual estimate; [&]model is conservative not accounting for the portion of medium-risk NSIs and corresponding potential cost savings

Cost Outputs of a Kenyan Facility with 1,000 beds, occupancy rate of 80% and 400 healthcare workers

Conventional Devices		Safety-Engineered Devices	
Total number of needlestick injuries	118	Total number of needlestick injuries	37
Total number of blood exposures	44	Total number of blood exposures	9

Figure 1: Number of needlestick injuries (NSIs) and blood exposures (BEs) while using the conventional devices and safety-engineered devices respectively. NSIs and BEs pose a significant burden.

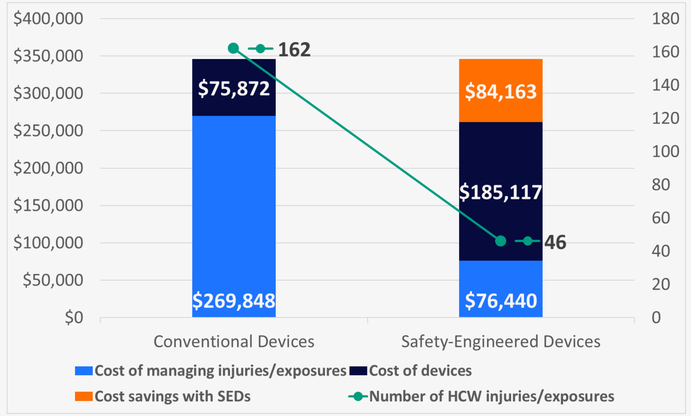

Figure 2: Results summary of using safety-engineered devices (SEDs) to address needlestick injuries (NSIs) and blood exposure (BEs) in healthcare workers. SEDs can be a cost-effective solution if savings associated with management of NSIs and BEs are considered.

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