Using Safety Engineered Intravenous Access Devices in Malaysia to Reduce Needle Stick Injuries: A Meta Analytic Synthesis of Literature & Health System Projection

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Background

The national incidence rate of needle stick injuries (NSI) amongst Malaysian healthcare workers (HCW) is 6/1000 HCW (Ishak et al. 2019), but unsafe practices remain an important concern. There is a need to formulate, implement and monitor safe and consistent practices for the different healthcare professionals.

Objectives

The objectives of the study were

i. to determine an effect size estimate of comparative efficacy of safety-engineered intravenous devices (SED) versus conventional intravenous devices in preventing accidental NSI when used by healthcare workers to perform infusion therapies, and/or intravenous drug and administration based on published literature
ii. to understand the projected impact of increased utilization of passive SED in infusions in Malaysia based on incidence-based estimates from literature and Malaysian healthcare data.

Methods

A meta-analytic synthesis of published evidence pertaining to event rates of needle stick injury prevention using SED for intravenous access was carried out using using RevMan 5 software. Thereafter, a health system impact model was developed based on the incidence rates from published studies, to evaluate projected changes in needle stick injury rates for Malaysian public hospitals in the hypothesis of an increased utilization of passive SED in place of non-SED for incident patients over 5 years. Baseline usage of SED was assumed 20% as per market data. Future scenarios considered increased proportions of use of SED per year in the patient population (incident cohorts): 20%, 40%, 60%, 80%, 100%. The model applies the variations of the market share to the new incident cohorts (naive treatments), without considering the prevalent cohort.

Results

1. Meta Analysis:

The meta-analysis of published literature demonstrated an odds ratio (OR) and risk ratio (RR) in favor of SED. Using a fixed effects model, OR was 0.09 (95% CI [0.06,0.14], p<0.00001), and with random effects model, OR was 0.14 (95% CI [0.07,0.28], p<0.00001). RR using fixed effects was 0.09 (95% [CI 0.06,0.14], p<0.00001) and with random effects RR was 0.14 (95% CI [0.07,0.28], p<0.00001) favoring SED (**Figure 1**).

2. Health System Projection Model:

The health system projection model demonstrated the following trend in NSI/year over 5 consecutive years: 1368, 1027 (24% reduction), 686 (50% reduction), 345 (75% reduction) and 4 (99% reduction). For the reduction of NSI episodes per 100,000 procedures over 5 consecutive years, the model showed the following trend: 21, 16, 10, 5 and 0.01 (**Figures 2–4**).

Disclosures

Pinaki Ghosh and Mohd Emil Azril Bahari Md Noor are employees of B. Braun Medical Industries, Malaysia; Fabia Gansen and Morten Gantner are employees of B. Braun SE, Melsungen, Germany.

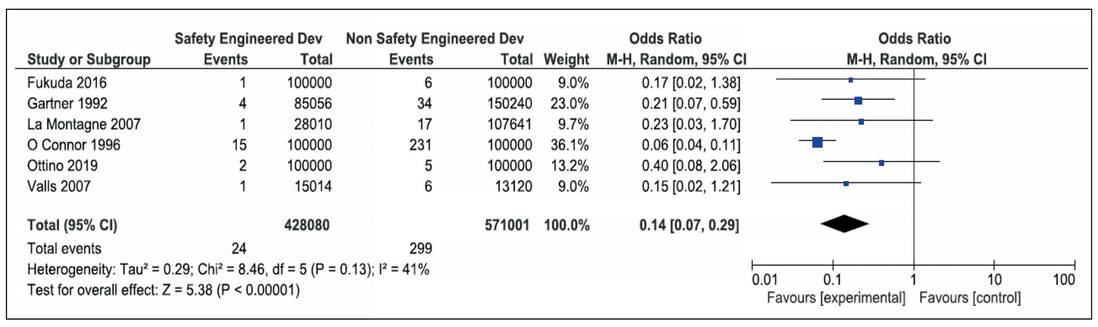

Figure 1. Results of meta-analysis depicting a forest plot demonstrating

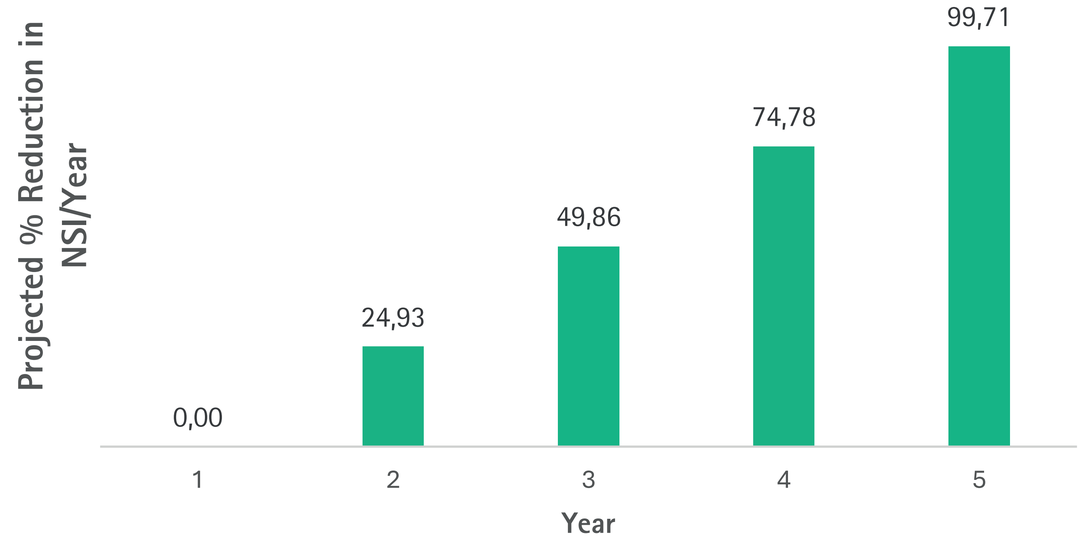

Figure 2. Results of health system model demonstrating projected percent reduction in NSI/year for SED

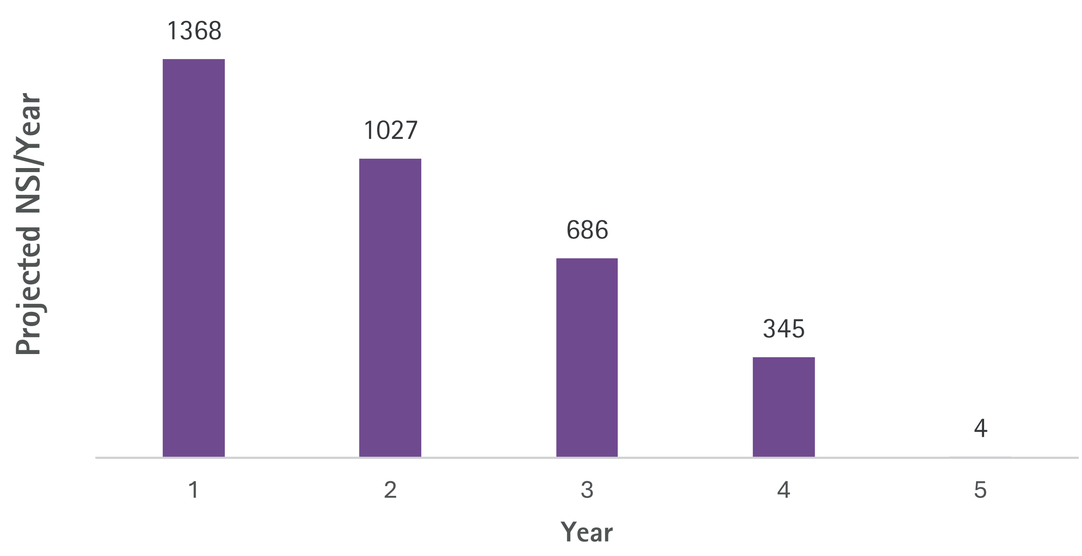

Figure 3. Results of health system model demonstrating projected NSI/year

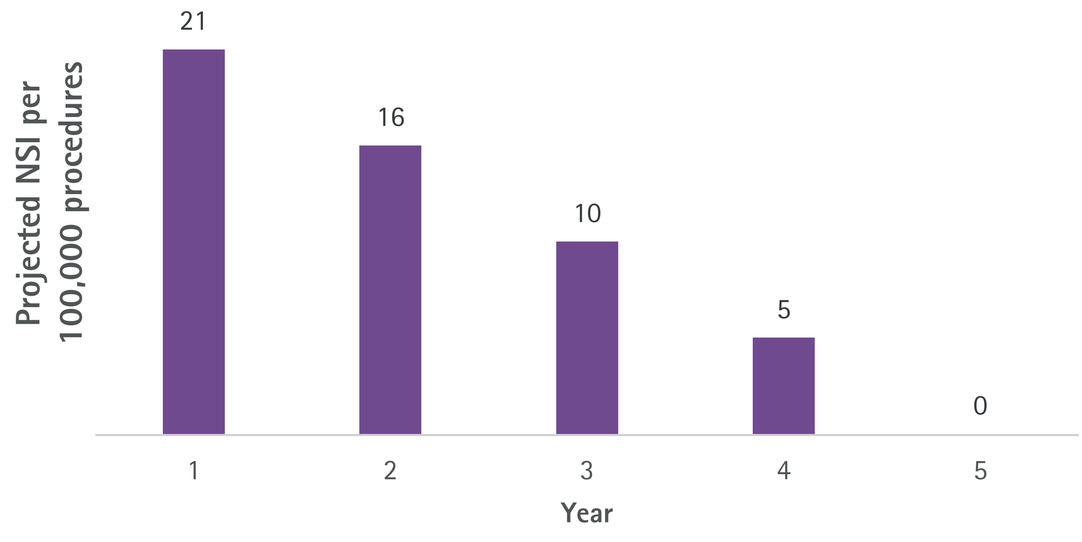

Figure 4. Results of health system model demonstrating projected NSI/10^5 procedures

Conclusion

The analysis demonstrates that SED can prevent significant occupational hazards. NSI could also be reduced substantially if passive safety devices were utilized in higher proportion in Malaysian public hospitals.

References

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