

Efficacy of a Retractable Safety Winged Steel Needle (Butterfly Needle) to Significantly Reduce Needlestick Injuries in Healthcare Workers: A 21-Month Experience

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Abstract

Objective: Needlestick injuries (NIs) from winged steel needles (WSNs), also referred to as butterfly needles, like other hollow-bore blood collection needles are considered high-risk for bloodborne pathogen transmission and are implicated in occupational HIV seroconversion. WSNs compared to phlebotomy needles are also disproportionately involved in NIs that occur during percutaneous venous puncture procedures. In this study, the efficacy in reducing NIs involving WSNs by transitioning from a first generation safety WSN device (baseline) to a second-generation WSN safety device (study) was evaluated during the 21-month post-implementation period.

Methods: A second-generation safety WSN utilizing an in-vein retractable needle technology (Push Button Blood Collection Set, BD Vacutainer®) was implemented at a 431-bed hospital medical center following selection and successful pilot testing by clinical laboratory and nursing staff members. This study device replaced a longstanding first-generation safety WSN (Safety-Lok™ Blood Collection Set, BD Vacutainer®). NIs related to blood collection were tracked using the facility's needlestick injury report form and one-on-one post-injury employee interviews to analyze baseline and study injuries.

Results: During the 52-month baseline period (10/01-2/06), exclusively utilizing the 1st generation safety WSN (Safety-Lok, BD), the WSN NI rate was 3.76/100,000 safety WSNs purchased (20 NIs/532,000). During the 21-month study period (3/06-12/07), exclusively utilizing the 2nd generation safety WSN (Push Button, BD), the WSN NI rate was 0.64/100,000 safety WSNs purchased (2 NIs/310,000). Utilization of the Push Button Blood Collection Set during the study period was associated with an 83% reduction ($P < 0.01$), in reported WSN related needlestick injuries compared to the baseline period utilizing the Safety-Lok, Blood Collection Set, BD Vacutainer®.

Analysis of the baseline safety WSN device (Safety-Lok, BD) NIs: 20 percutaneous venous puncture procedures wherein 3 (15%) occurred during procedure (patient moved, pulled out needle), 6 (30%) occurred immediately after needle withdrawal, and before safety feature activation (manual shielding) could be accomplished, and 11 (55%) occurred during safety feature activation itself (manual needle shielding process). Analysis of the study safety WSN device (Push Button, BD) NIs: 2 percutaneous venous puncture procedures wherein 2 (100%) occurred during the procedure (patient moved, pulled out needle), 0 occurred during any other venous puncture step including safety feature activation or disposal.

Conclusion: The Push Button Blood Collection Set (BD) safety WSN device has significantly reduced the incidence of reported NIs related to WSNs for 21-months immediately following implementation at this hospital medical center. During the past 12-months using this WSN safety device, no NIs related to WSNs were reported. Continued use of the Pushbutton Blood Collection Set (BD) WSN safety blood collection device that utilizes in-vein safety feature activation to retract the contaminated needle prior to needle withdrawal should effectively reduce the opportunity of bloodborne pathogen exposure and transmission to healthcare workers.

Objective

Needlestick injuries (NIs) from winged steel needles (WSNs), also referred to as butterfly needles, like other hollow-bore blood collection needles are considered high-risk for bloodborne pathogen transmission and are implicated in occupational HIV seroconversion. WSNs compared to phlebotomy needles are also disproportionately involved in NIs that occur during percutaneous venous puncture procedures. In this study, the efficacy in reducing NIs involving WSNs by transitioning from a first generation safety WSN device (baseline) to a second-generation WSN safety device (study) was evaluated during the 21-month post-implementation period.

Methods

A second-generation safety winged steel needle (WSN) utilizing an in-vein retractable needle technology (Push Button Blood Collection Set, BD Vacutainer®) was implemented at a 431-bed hospital medical center following selection and successful pilot testing by clinical laboratory and nursing staff members. This study device replaced a longstanding first-generation safety WSN (Safety-Lok™ Blood Collection Set, BD Vacutainer®). NIs related to blood collection were tracked using the facility's needlestick injury report form and one-on-one post-injury employee interviews to analyze the number and the manner in which baseline and study injuries occurred.

Results

During the 52-month baseline period (10/01-2/06), exclusively utilizing the 1st generation safety butterfly needle, also referred to as winged steel needle, (WSN) (Safety-Lok™, BD Vacutainer®), the WSN needlestick injury (NI) rate was 3.76 per 100,000 safety WSNs purchased (20 NIs/532,000). During the 21-month study period (3/06-12/07), exclusively utilizing the 2nd generation safety butterfly needle (WSN) (Push Button, BD Vacutainer®), the WSN NI rate was 0.64/100,000 safety WSNs purchased (2 NIs/310,000). Utilization of the BD Vacutainer® Push Button Blood Collection Set during the study period was associated with an 83% reduction ($P < 0.01$), in reported WSN related needlestick injuries compared to the baseline period utilizing the BD Vacutainer® Safety-Lok™, Blood Collection Set. (Figure 1)

Analysis of needlestick injury (NI) reports and injured staff interviews during use of the baseline safety butterfly WSN device (Safety-Lok™, BD Vacutainer®) revealed there were a total of 20 needlestick injuries (NIs). Each NI involved percutaneous venous puncture procedures wherein 3 (15%) occurred during procedure (patient moved, pulled out needle), 6 (30%) occurred immediately after needle withdrawal, and before safety feature activation (manual shielding) could be accomplished, and 11 (55%) occurred during safety feature activation itself (manual needle shielding process).

Analysis of the NIs using the study safety WSN device (Push Button, BD Vacutainer®) involved 2 percutaneous venous puncture procedures wherein 2 (100%) occurred during the procedure (patient moved, pulled out needle), 0 occurred during any other venous puncture step including safety feature activation or disposal. (Figure. 2)

Butterfly Needlestick Injuries per 100,000 Purchased Safety-Lok vs. Push Button

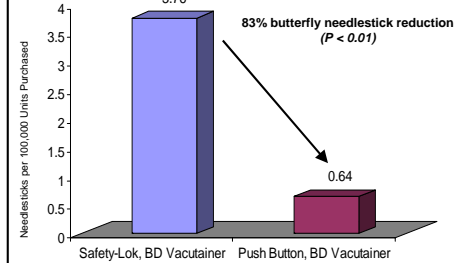


Figure 1. BD Push Button butterfly use significantly reduced butterfly needlesticks by 83%, from 3.76 to 0.64 per 100,000 units purchased, $P < 0.05$

Analysis of Needlestick Injuries by Butterfly Needle Device and Phlebotomy Step

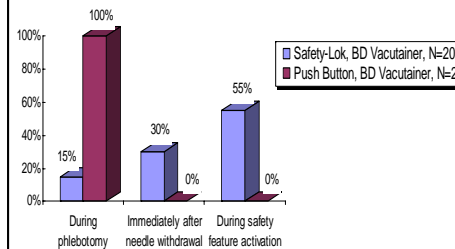


Figure 2. Analysis of needlestick injuries (N=20) sustained using the baseline BD Safety-Lok butterfly device revealed 85% of butterfly needlesticks occurred during problem prone phlebotomy steps: after needle withdrawal (30%) and during safety feature activation (manual needle shielding) (55%). With the study BD Push Button butterfly device, 0% occurred during these problem prone steps, 100% occurred during the phlebotomy procedure e.g. needle pulled out by patient movement (N=2).

Conclusions

The BD Vacutainer® Push Button Blood Collection Set safety WSN device has significantly reduced the incidence of reported needlestick injuries (NIs) involving butterfly needles by 83%, ($P < 0.01$), for 21-months immediately following implementation at this hospital medical center. During the past 12-months, 0 NIs related to WSNs were reported.

Strikingly, the 83% reduction in butterfly needlesticks observed with the BD Vacutainer® Push Button blood collection sets correlates closely with the large proportion (85%) of reported NIs that occurred during problem prone phlebotomy steps identified with the previous WSN device butterfly, Safety-Lok™ (BD Vacutainer®). This 83% butterfly needlestick reduction appears to be directly related to Push Button's in-vein safety feature activation that retracts the contaminated needle prior to needle withdrawal and serves as an effective means to avoid needlesticks during problem prone phlebotomy steps: immediately after needle withdrawal and before safety feature activation is accomplished, and during safety feature activation itself (manual needle shielding process).

Continued use of the Pushbutton Blood Collection Set (BD Vacutainer®) WSN safety blood collection device that utilizes in-vein safety feature activation should effectively reduce the opportunity of bloodborne pathogen exposure and transmission to healthcare workers.

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