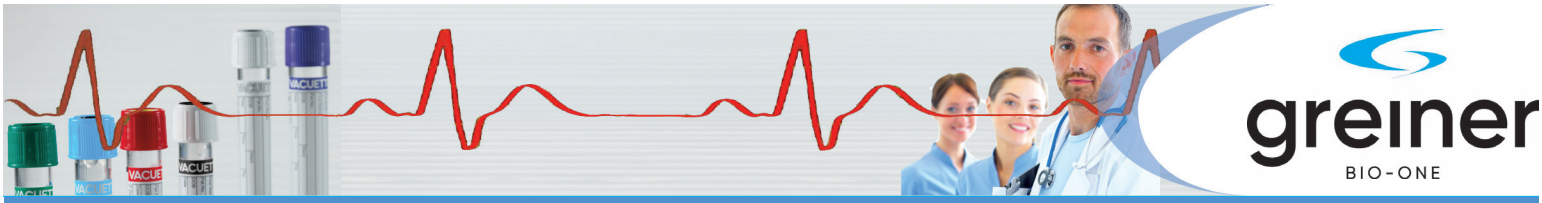


Blood Splatter Does Matter

Healthcare workers are at risk of biohazardous exposure on a daily basis. More specifically, laboratory personnel are at risk for needlestick injury (NSI) and exposure through aerosols and splatter. NSI resulting from a patient known to be infected presents a 0.5 to 30% risk of infection to the injured healthcare worker depending on the pathogen. Though hepatitis and HIV present the most common threat, there are several other pathogens that can result in disease following a needlestick (Haiduven, Applegarth and Shroff, 2009).

With the implementation of the Needlestick Safety & Prevention Act, which was put in place to decrease exposure risk, and subsequent changes in the Bloodborne Pathogen Standard, there have been several safety-engineered devices developed. These devices have a variety of mechanisms including shields that are engaged to cover the sharp or some type of retraction mechanism with the needle being pulled or pushed into a protective shield.

There have been several studies focused on needlestick injuries and the efficacy of safety engineered devices but, though equally important, few on the potential for exposure through splatter when using these devices. Splatter presents a real danger since it is known that infection can occur if mucous membranes are exposed to even minute amounts of blood. Most users may not even be aware that splatter or aerosolization has occurred and, therefore, would not seek prophylaxis to prevent potential infection following exposure.

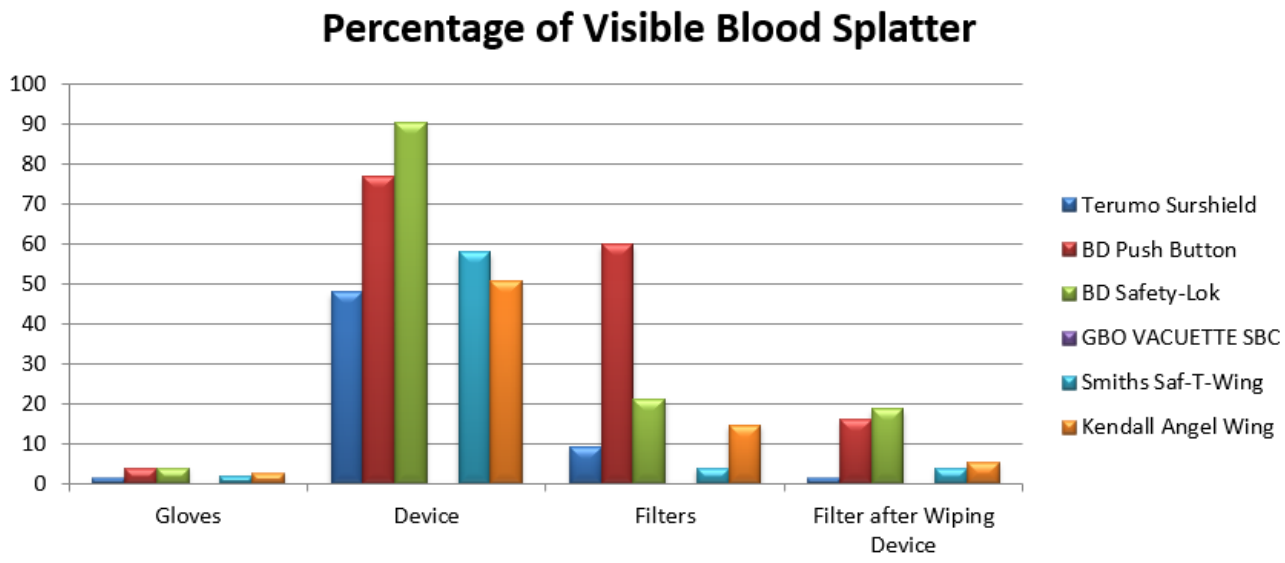
Though methods for assessing splatter may differ slightly, there have been studies that demonstrate visible and/or measureable splatter from use and activation of safety devices. One such study looked at retractable phlebotomy and intravascular devices and showed both measurable and visible splatter with a winged collection device (Haiduven et al., 2009). Studies since have taken this type of evaluation further looking at specific devices and the mechanism of activation.

A study conducted in the UK started out with a general evaluation of several devices, including assessment of splatter, and then narrowed the number to three for further testing based on results: BD Vacutainer® Eclipse™ Needle, Greiner Bio-One **VACUETTE®** QUICKSHIELD and the BD Vacutainer® Push Button Collection Set. With regard to splatter, the QUICKSHIELD performed best out of the three devices. The Push Button produced seven incidents of visible splatter, the Eclipse produced eight (two of these were considerable based on amount within a given area) and the QUICKSHIELD only two out of 20 activations (Ford and Phillips, 2011).

One of the most extensive evaluations specifically addressing blood splatter looked at winged phlebotomy devices (Haiduven, McGuire-Wolfe and Applegarth, 2012). A total of 5 brands (Terumo, two from BD, Greiner Bio-One, Smiths Medical and Kendall) and 6 different blood collection sets (Surshield™ Safety Winged Blood Collection Set, Vacutainer® Push Button Blood Collection Set, Vacutainer® Safety-Lok™ Blood Collection Set, **VACUETTE®** Safety Blood Collection Set, Saf-T-Wing® Blood Collection and Infusion Set and Angel Wing™ Blood Collection Set respectively) were tested for both measurable and visible blood splatter. Various gauges and tubing lengths were included with 25 of each tested. Measurable splatter was assessed by placing filter paper 360° around the collection site. The filter was weighed before and after collection and activation of the safety engineered device. For visible blood splatter detection, the filters placed around the collection site, the tester's gloves, the device itself and a second filter used to wipe the device were observed for droplets.

Two of the devices produced measurable splatter: BD Safety-Lok and Smiths Medical Saf-T-Wing. The Smiths Medical device had one incident of measured splatter and the BD device had 15 instances and was the only device to have a statistically significant difference in filter weight post activation.

The frequency and percentage of occurances of visible blood on the filter, gloves, device and filter used to wipe the device following activation varied (see Chart 1). Visible blood on the filter around the puncture site varied from 0% with the **VACUETTE®** Safety Blood Collection Site to 60 % with the BD Push Button. Blood on the gloves varied from 0% with the **VACUETTE®** device to 4% with both of the BD devices. Visible blood on the device occurred from 48% to 58% of the time with the Terumo, Smiths Medical and Kendall collection sets. At the extremes, the **VACUETTE®** device had no instances of blood on the device but the BD devices showed blood on the device 77% (Push Button) and 90.67% (Safety-Lok) of the time. As a result, when the devices were wiped with filters post activation, results ranged from 0% to 18.67% with the **VACUETTE®** device being the only blood collection set with 0% visible splatter once again. Throughout the study, the **VACUETTE®** Blood Collection Set was the only device with no measurable or visible blood splatter making it the safest choice based on these results.



Because healthcare personnel must be aware of any and all exposures in order to seek the appropriate post exposure care, it is extremely important that use of safety devices meant to protect them does not create an additional risk of infection. Picking the safest device for use should include consideration of splatter risk and assessment of studies such as those cited here. Additionally, especially with devices associated with greater incidence of splatter, the appropriate protective equipment, e.g. face shields or googles, gowns, etc., should be utilized to prevent exposure and potential infection with bloodborne pathogens.

References

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