

### Single-needle vs. Double-needle Techniques for Blood Culture Collection

Although it has been widely appreciated for many years among physicians and microbiologists that blood cultures are among the most important laboratory tests performed in the diagnosis of serious infections, it has become equally apparent in more recent years that contaminated blood cultures are common<sup>(1, 2)</sup>, enormously costly<sup>(3, 4)</sup>, and frequently confusing for clinicians<sup>(5, 6)</sup>. Clinical studies of bloodstream infections over 3 decades have provided guidelines for differentiating true pathogens from contaminants or organisms of unknown significance<sup>(7, 8, 9, 10)</sup>; however, a true “gold standard” for differentiating pathogens from contaminants does not exist<sup>(1, 11)</sup>.

Throughout the decades, various strategies have been discussed in order to increase the specificity of blood cultures by reducing contamination. Factors that have been explored include skin preparation, single versus double needle for bottle inoculation, source of culture (catheter versus percutaneous), the use of dedicated phlebotomy teams, and the use of commercial blood culture collection kits<sup>(12)</sup>. In this issue, practice of changing needles during the blood collection will be discussed.

Until the late 1980s, discarding the needle used to draw blood cultures and using a new, different needle to inoculate the bottles (double-needle technique) was a standard practice. In some protocols, an additional needle change before inoculation of the second bottle was also advocated. This was based on the theory that the needle used for phlebotomy may be contaminated, thereby leading to blood culture contamination. However, with the emergence of human immunodeficiency virus, this practice became questionable, as the process of changing needles was felt to increase the risk of needlestick injuries to phlebotomists. Confirmation of the risk associated with

this procedure was shown in studies revealing that most (42%) needlestick injuries occurred after use and before disposal of the naked needle, and transferring specimens from one container to another with a hollow-bore needle has been responsible for 5% of needlestick injuries<sup>(13)</sup>. Subsequently, since 1990, the double-needle technique has been strongly discouraged in favour of using the same needle to draw blood and to inoculate the culture bottles (single-needle technique)<sup>(12)</sup>.

The effect of the double-needle technique versus the single-needle technique on blood culture contamination rates has been evaluated by several controlled studies<sup>(14, 15, 16, 17, 18)</sup>. Leisure and colleagues reported that 2.2% of bottles were contaminated when the needle was not changed, compared to 0.6% when the needle was changed<sup>(17)</sup>; Study by Smart *et. al.* revealed that contamination rate with no needle change is 6.4% compared with 4.2% with needle change<sup>(18)</sup>; Issacman and colleagues studied the effect of needle change among children. The contamination rate for no needle change, 1 change and 2 changes were 2.2%, 0% and 1.9%, respectively<sup>(16)</sup>. The small difference in contamination rate observed in these studies was not statistically significant. For each of these studies, the authors admitted to have inadequate power to detect the level of difference that was actually observed between the two techniques. In order to improve power, Spitalnic *et. al.* conducted a meta-analysis from various studies and concluded that the double needle technique did in fact decrease contamination rates from 3.7% to 2.2%.<sup>(19)</sup> Furthermore, the 1997 CAP survey of 640 institutions found that the median contamination rate was 2.2% in settings where double-needle technique was used compared to 2.7% in settings where a single needle was used, but this difference was not statistically significant<sup>(12, 20)</sup>.

## CONCLUSION

- i. Changing the needle when inoculating blood cultures is *“A No-Benefit and High-risk Procedure”*
- ii. Any benefit from the double-needle technique do not outweigh the risk of needlestick injuries.

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