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## Effective practices for reducing blood culture contamination in in-patient settings

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Blood cultures are the primary laboratory test for diagnosis of blood stream infections, and the results are used to direct appropriate antibiotic therapy. Contamination of blood cultures when the blood is collected is a common source of false positive test results which can lead to adverse patient outcomes and wasted healthcare resources, however it may be largely preventable. The studies included in this review assessed the effectiveness of three practices for reducing contamination: venipuncture, phlebotomy teams and pre-packaged prep kits.

### Summary of LMBP™ Findings and Recommendations

The [Laboratory Medicine Best Practices Workgroup](#) recommends venipuncture and phlebotomy teams as evidence-based best practices with high overall strength of evidence based on consistent and substantial reductions in blood culture contamination rates in diverse hospital settings. No recommendation is made for or against prep kits based on inconsistent and typically statistically non-significant reductions in blood culture contamination rates.

### About the Interventions and their Comparators

- **Venipuncture** involves withdrawing blood by puncturing a vein through the skin
  - Studies have contrasted the blood culture contamination rate of venipuncture with the rate of contamination from using an indwelling venous catheter to obtain blood samples. Indwelling catheters may also be used for other purposes such as delivery of antibiotics, pain medication, and saline solution.
- **Phlebotomy teams** are certified or trained phlebotomists who use venipuncture to collect blood specimens

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*Through the Laboratory Medicine Best Practices (LMBP) Initiative, evidence-based evaluations are conducted to identify effective laboratory medicine practices associated with improved healthcare quality outcomes.*

*The LMBP Workgroup and Expert Panels provide guidance and subject matter expertise to the Centers for Disease Control and Prevention to complete these reviews.*

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- Studies have contrasted the blood culture contamination rate of phlebotomy teams with the rate of contamination from using other healthcare personnel (e.g., physicians, interns, nurses) to obtain blood samples.
- **Prepackaged prep kits** are commercially prepared, prepackaged aseptic supplies for collection of blood specimens by venipuncture.
  - Studies have contrasted the blood culture contamination rate of prepackaged prep kits with the rate of contamination from using usual disinfectant supplies that are not prepackaged.

## Results from the Systematic Reviews

A total of seventeen studies met the review inclusion criteria with one study reporting findings for two practices.

- Nine published studies assessed the reduction in blood culture contamination rates associated with venipuncture
- Five studies assessed the reduction in blood culture contamination associated with the use of phlebotomy teams (four published and one unpublished).
- Four published studies, one of which included four separate studies for a total of seven studies, assessed the reduction in blood culture contamination rates associated with the use of prepackaged test kits.
- The estimated effects for venipuncture and phlebotomy teams consistently favored the tested practices. Effects for commercial prep kits were inconsistent and, with one exception, returned statistically non-significant results. Meta-analysis indicates that blood samples collected using:
  - indwelling catheters are approximately 2.5 times as likely to be contaminated as those collected using venipuncture (mean odds ratio of 2.69; 95% CI: 2.03 – 3.57).
  - non-phlebotomists are approximately 2.7 times as likely to be contaminated as those collected using dedicated phlebotomy teams (mean odds ratio of 2.58; 95% CI: 2.07 – 3.21).
  - commercial prep kits are no more likely than non-prepackaged disinfectant supplies in reducing blood culture contamination (mean odds ratio of 1.12; 95% CI: 0.94 – 1.35).
- The majority of studies were conducted in the United States.
- Several studies were conducted in specific settings within a hospital such as emergency departments, medical intensive care units as well as in academic settings and may not be generalizable to other settings.

These results are based on a systematic review of all available studies.

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review along with input from an Expert Panel of subject matter experts in laboratory medicine and systematic reviews.

## Supporting Materials

- [Supplementary Data: Evidence summary tables & included studies](#)
- [Search strategy](#)

## Publications

Snyder SR, Favoretto AM, Baetz RA, Derzon JH, Madison B, Mass D, Shaw C, Layfield C, Christenson R, and Liebow EB. Effectiveness of Practices to Reduce Blood Culture Contamination: A Laboratory Medicine Best Practices Systematic Review and Meta-Analysis. *Clin Chem*. 2012; 45(13-14):999-1011. [Blood Cult Contam Clin Biochem 2012](#).

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## Disclaimer

These findings and conclusions are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention/the Agency for Toxic Substances and Disease Registry (CDC/ATSDR).

## Sample Citation

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<http://wwwn.cdc.gov/futurelabmedicine/pdfs/CDCBloodCultureContaminationSummary.pdf> Last updated:

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