Therapeutics

Clinically indicated and routine replacement of peripheral IV catheters did not differ for phlebitis

Clinical impact rating: ★★★★★☆☆☆☆

Question
In hospitalized patients, is clinically indicated replacement of peripheral IV catheters (PIVCs) equivalent to routine replacement every 3 days for phlebitis?

Methods
Design: Randomized, controlled, equivalency trial. ACTRN12608000445370.

Allocation: Concealed. *

Blinding: Blinded* (laboratory staff, outcome assessor, and safety committee).

Follow-up period: 48 hours after catheter removal.

Setting: 3 university-affiliated hospitals in Queensland, Australia.

Patients: 3283 hospitalized medical or surgical patients ≥ 18 years of age (mean age 55 ± 63% men) with a PIVC in place and expected treatment > 4 days. Exclusion criteria were bloodstream infection, planned removal of catheter within 24 hours, catheter already in situ for > 72 hours, or catheter insertion in an emergency.

Intervention: Replacement of PIVCs as indicated clinically by completion of therapy, phlebitis, infiltration, occlusion, accidental removal, or suspected infection (n = 1593); or routinely every third calendar day, unless otherwise clinically indicated (e.g., catheter failure before day 3 or unable to recannulate) (n = 1690). 39% (2322/5907) of catheters were inserted by an IV insertion service.

Outcomes: Primary outcome was phlebitis during use or within 48 hours of catheter removal. Phlebitis was defined as simultaneous presentation of ≥ 2 of the following: patient-reported pain or tenderness, with severity ≥ 2 on a 10-point scale; erythema extending ≥ 1 cm from insertion site; swelling extending ≥ 1 cm from insertion site; purulent discharge; or palpable venous cord beyond the catheter tip. 3000 patients were needed to detect equivalence of therapies at 4% phlebitis (equivalence margin 3%) with 95% power (α = 0.05).

Patient follow-up: 100% (intention-to-treat analysis).

Main results
Main results are in the Table. The absolute risk difference between groups for phlebitis (0.41%, 95% CI –1.33 to 2.15) was within the equivalence margin of 3%.

Conclusion
Clinically indicated peripheral IV catheter replacement did not differ from routine replacement every 3 days for phlebitis in hospitalized patients.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Event rates</th>
<th>During catheterization or within 48 h after IV removal</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Clinically indicated</td>
<td>Routine</td>
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<tr>
<td>Phlebitis†</td>
<td>7.2%</td>
<td>6.7%</td>
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</tbody>
</table>

*NS = not significant; other abbreviations defined in Glossary. RRI and CI calculated from relative risk in article.

† ≥ 2 of patient-reported pain or tenderness with severity ≥ 2 on a 10-point scale; erythema extending ≥ 1 cm from insertion site; swelling extending ≥ 1 cm from insertion site; purulent discharge; or palpable venous cord beyond catheter tip.

See Glossary.

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Commentary
Rickard and colleagues’ results suggest that removing PIVCs only when clinically indicated, versus routine replacement at 3 days, will have no effect on PIVC-associated phlebitis and reduce costs. However, the original recommendation for routine removal at 3 days was for prevention of PIVC-related bloodstream infection (BSI), as well as phlebitis. Overall, Rickard and colleagues found that only 1 in 3283 patients developed PIVC-related BSI, and inferred that clinically indicated PIVC removal with close monitoring of insertion sites would not materially affect this very low risk. However, across the 2 groups, 10 of 15 nosocomial BSIs identified were primary BSIs (no local site of infection), including 2 of 3 Staphylococcus aureus bacteremias. It is plausible that there were more PIVC-related BSIs than met the stringent study definition. Recent observational studies (1–3) have reported frequent PIVC-related bacteremias caused by S. aureus, especially with methicillin-resistant S. aureus (MRSA), with mortality as high as 20% (1). In those studies, most S. aureus PIVC-related bacteremias originated from catheters left in place for > 3 days, and most cases had insertion site infection manifested by the time bacteremia manifested clinically.

2 of 3 study hospitals used IV teams and had low rates of MRSA infection. However, the results may not be generalizable, especially to hospitals without IV teams or with high rates of vascular catheter–related BSI or MRSA infection. It would especially be prudent to continue to limit PIVC placements to 3 days in patients at high risk for S. aureus PIVC-related bacteremia and with prosthetic heart valves or total joint arthroplasties. In all patients with PIVCs, it is essential that the insertion site be inspected at least daily, and the catheter be replaced at an alternate site if there is any local inflammation (4). If there is local purulence or the patient has unexplained fever, the catheter should be immediately removed, appropriate cultures should be obtained, and empirical antimicrobial therapy should be considered.

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References