Clinically-indicated replacement versus routine replacement of peripheral venous catheters

There is moderate-certainty evidence of no clear difference in rates of CRBSI, thrombophlebitis, all-cause BSI, mortality and pain between clinically indicated or routine replacement of PIVC” Webster et al (2019).

Abstract:

BACKGROUND: US Centers for Disease Control guidelines recommend replacement of peripheral intravenous catheters (PIVC) no more frequently than every 72 to 96 hours. Routine replacement is thought to reduce the risk of phlebitis and bloodstream infection. Catheter insertion is an unpleasant experience for patients and replacement may be unnecessary if the catheter remains functional and there are no signs of inflammation or infection. Costs associated with routine replacement may be considerable. This is the third update of a review first published in 2010.

OBJECTIVES: To assess the effects of removing peripheral intravenous catheters when clinically indicated compared with removing and re-siting the catheter routinely.

SEARCH METHODS: The Cochrane Vascular Information Specialist searched the Cochrane Vascular Specialised Register, CENTRAL, MEDLINE, Embase and CINAHL and World Health Organization International Clinical Trials Registry Platform and ClinicalTrials.gov trials registers to 18 April 2018. We also undertook reference checking, and contacted researchers and manufacturers to identify additional studies.
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SELECTION CRITERIA: We included randomised controlled trials that compared routine removal of PIVC with removal only when clinically indicated, in hospitalised or community-dwelling patients receiving continuous or intermittent infusions.

DATA COLLECTION AND ANALYSIS: Three review authors independently reviewed trials for inclusion, extracted data, and assessed risk of bias using Cochrane methods. We used GRADE to assess the overall evidence certainty.

MAIN RESULTS: This update contains two new trials, taking the total to nine included studies with 7412 participants. Eight trials were conducted in acute hospitals and one in a community setting. We rated the overall certainty of evidence as moderate for most outcomes, due to serious risk of bias for unblinded outcome assessment or imprecision, or both. Because outcome assessment was unblinded in all of the trials, none met our criteria for high methodological quality.

Primary outcomes:

Seven trials (7323 participants), assessed catheter-related bloodstream infection (CRBSI). There is no clear difference in the incidence of CRBSI between the clinically indicated (1/3590) and routine change (2/3733) groups (risk ratio (RR) 0.61, 95% confidence interval (CI) 0.08 to 4.68), low-certainty evidence (downgraded twice for serious imprecision). All trials reported incidence of thrombophlebitis and we combined the results from seven of these in the analysis (7323 participants). We excluded two studies in the meta-analysis because they contributed to high heterogeneity. There is no clear difference in the incidence of thrombophlebitis whether catheters were changed according to clinical indication or routinely (RR 1.07, 95% CI 0.93 to 1.25; clinically indicated 317/3590; 3-day change 307/3733, moderate-certainty evidence, downgraded once for serious risk of bias). The result was unaffected by whether the infusion was continuous or intermittent. Six trials provided thrombophlebitis rates by number of device days (32,709 device days). There is no clear difference between groups (RR 0.90, 95% CI 0.76 to 1.08; clinically indicated 248/17,251; 3-day change 236/15,458; moderate-certainty evidence, downgraded once for serious risk of bias). One trial (3283 participants), assessed all-cause bloodstream infection (BSI). We found no clear difference in the all-cause BSI rate between the two groups (RR 0.47, 95% CI 0.15 to 1.53; clinically indicated: 4/1593 (0.02%); routine change 9/1690 (0.05%); moderate-certainty evidence, downgraded one level for serious imprecision). Three trials (4244 participants), investigated costs; clinically indicated removal probably reduces device-related costs by approximately AUD 7.00 compared with routine removal (MD -6.96, 95% CI -9.05 to -4.86; moderate-certainty evidence, downgraded once for...
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Serious risk of bias). Secondary outcomes: Six trials assessed infiltration (7123 participants). Routine replacement probably reduces infiltration of fluid into surrounding tissues compared with a clinically indicated change (RR 1.16 (95% CI 1.06 to 1.26; routine replacement 747/3638 (20.5%); clinically indicated 834/3485 (23.9%); moderate-certainty evidence, downgraded once for serious risk of bias). Meta-analysis of seven trials (7323 participants), found that rates of catheter failure due to blockage were probably lower in the routine-replacement group compared to the clinically indicated group (RR 1.14, 95% CI 1.01 to 1.29; routine-replacement 519/3733 (13.9%); clinically indicated 560/3590 (15.6%); moderate-certainty evidence, downgraded once for serious risk of bias). Four studies (4606 participants), reported local infection rates. It is uncertain if there are differences between groups (RR 4.96, 95% CI 0.24 to 102.98; clinically indicated 2/2260 (0.09%); routine replacement 0/2346 (0.0%); very low-certainty evidence, downgraded one level for serious risk of bias and two levels for very serious imprecision). One trial (3283 participants), found no clear difference in the incidence of mortality when clinically indicated removal was compared with routine removal (RR 1.06, 95% CI 0.27 to 4.23; low-certainty evidence, downgraded two levels for very serious imprecision). One small trial (198 participants) reported no clear difference in device-related pain between clinically indicated and routine removal groups (MD -0.60, 95% CI -1.44 to 0.24; low-certainty evidence, downgraded one level for serious risk of bias and one level for serious imprecision). The pre-planned outcomes ‘number of catheter re-sites per patient’, and ‘satisfaction’ were not reported by any studies included in this review.

AUTHORS’ CONCLUSIONS: There is moderate-certainty evidence of no clear difference in rates of CRBSI, thrombophlebitis, all-cause BSI, mortality and pain between clinically indicated or routine replacement of PIVC. We are uncertain if local infection is reduced or increased when catheters are changed when clinically indicated. There is moderate-certainty evidence that infiltration and catheter blockage is probably lower when PIVC are changed routinely; and moderate-certainty evidence that clinically indicated removal probably reduces device-related costs. The addition of two new trials for this update found no further evidence to support changing catheters every 72 to 96 hours. Healthcare organisations may consider changing to a policy whereby catheters are changed only if there is a clinical indication to do so, for example, if there were signs of infection, blockage or infiltration. This would provide significant cost savings, spare patients the unnecessary pain of routine re-sites in the absence of clinical indications and would reduce time spent by busy clinicians on this intervention. To minimise PIVC-related complications, staff should inspect the insertion site at
each shift change and remove the catheter if signs of inflammation, infiltration, occlusion, infection or blockage are present, or if the catheter is no longer needed for therapy.

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