Introduction:
To locate vessels for percutaneous central venous catheterizations, it may be helpful to apply not only real-time ultrasound (US) guidance but also US-assistance vein prelocation. The aim of this study was to evaluate the superiority of two US methods compared to surface landmark methods by reviewing randomized control trials (RCTs).

Methods:
As updating an earlier systematic review [1], we searched PubMed and CENTRAL in November 2017. We included RCTs which compared the failure rates of internal jugular or femoral venous cannulations among 1) real-time US guidance, 2) US-assistance vein prelocation and 3) surface landmark methods. A frequentist network meta-analysis was conducted using the netmeta package on R.

Results:
Out of 1395 citations, 11 RCTs (935 patients) were eligible. The number of studies comparing outcomes between real-time US guidance vs. surface landmark methods, US-assistance vein prelocation vs surface landmark methods and real-time US guidance vs US-assistance vein prelocation was 7, 3 and 1. Regarding cannulation failure rate, network meta-analysis in a fix-effect model showed that a p-score was lower in the real-time US guidance than US-assistance vein prelocation (0.61 vs. 0.88), by reference to surface landmark methods, and also regarding arterial punctures, a p-score was lower in the real-time US guidance than US-assistance vein prelocation (0.64 vs. 0.83).

Conclusion:
Based on the present network meta-analysis of RCTs, p-scores of cannulation failure and arterial puncture were lower in the real-time US guidance, suggesting that the US-assistance vein prelocation is superior than the real-time US guidance, both of which achieve lower rates of failure and arterial puncture compared to the landmark methods. We speculate that the inferiority of real-time guidance is associated with difficulties in manipulating the needle together with an echo probe in targeting relatively smaller veins in children.

References: