Purpose:
Peripheral intravenous catheters (PIVCs) are regularly used to administer antimicrobials, however many fail prior to completion of therapy. While some antimicrobials are known to increase PIVC failure (e.g. vancomycin, flucloxacillin), the risk profiles for many are unclear. The purpose of this study was to synthesise data from prospective PIVC studies, to determine associations between common peripherally administered antimicrobials and PIVC failure.

Results:
In total, 5,252 PIVCs (4,478 patients) were analysed. Thirty-one unique antimicrobials were administered, with 44.1% of the cohort receiving antimicrobial therapy via the study PIVC. Vessel injury occurred in 19% (n=1000) of all PIVCs, and irritation in 11% (n=582).

After adjustment for age and sex, vessel injury was significantly associated with cefepime hydrochloride (hazard ratio [HR] 2.50; [95% confidence interval, 1.44-4.34]), ceftazidime pentahydrate (HR 1.91 [1.11-3.31]), flucloxacillin sodium (HR 1.84 [1.45-2.33]), lincomycin hydrochloride (HR 1.67 [1.10-2.52]), and vancomycin hydrochloride (HR 1.73 [1.25-2.40]). Flucloxacillin sodium was significantly associated with irritation (HR 1.58 [1.96-3.40]).

Methods:
A secondary analysis of 7 randomised controlled trials and 2 cohort studies, in 3 quaternary hospitals (2 adult; 1 paediatric) in Australia between 2013-2019. Each study prospectively collected data on PIVCs from insertion to removal and incorporated extensive data variables (including medications/infusates administered).

The primary outcome was PIVC failure from: (1) vessel injury (occlusion, infiltration, or extravasation); or (2) irritation (pain or phlebitis). Associations between antimicrobial use and failure were explored using multivariable Cox regression.

Conclusions:
This study identified several antimicrobials associated with increased PIVC failure, including some previously known for this association (vancomycin, flucloxacillin), and some hitherto unidentified (lincomycin, ceftazidime, and cefepime). Research is urgently needed to determine superior modes of intravenous antimicrobial delivery (e.g. dilution, infusion time, device type) that may prevent PIVC failure.