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Can Mortality be Lowered by Switching from an Open to a Closed Infusion System?

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Abstract:

Objective: Examine mortality rates using open (burette, glass, semi-rigid plastic) and closed (fully collapsible plastic) infusion systems.

Methods: Four prospective cohort, active healthcare-associated infection surveillance, sequential studies of 15 ICUs in Argentina, Brazil, Mexico, and Italy were analyzed. Studies used identical protocol and methodology. Mortality for open versus closed infusion systems varied by country. To provide a more robust sample size, country datasets were pooled to investigate these differences. Recursive partitioning was performed during the open infusion system phase identified subject characteristics affecting mortality. Ten strata were identified based on severity of illness, age, ICU stay and prior infection and country. Open versus closed infusion system phase data were analyzed for each strata using Chi-square test. Mortality was analyzed using Cochran-Mantel-Haenszel.

Results: From Aug 99-Feb 06, 4,373 adult-ICU patients with CVC >24 hours were enrolled. Country-specific mortality for open and closed infusion system phases, respectively, were: Argentina 42% vs 37% (RR=0.89, 95% CI=0.76-1.04, P=0.15), Brazil 19% vs 16% (RR=0.85, 95%CI=0.66-1.10, P=0.22), Mexico 23% vs 16% (RR=0.69, 95%CI=0.54-0.88, P=0.002), and Italy 4% vs 5% (RR=1.29, 95%CI=0.77-2.17, P=0.33). Patient characteristics were similar across all studies. Five strata showed lower mortality for closed system; 3 strata comprising seriously ill patients showed significance (RR= 1.3-1.5) and 2 trending (RR=1.1-1.2). Three strata were comparable. One stratum (5% of data) showed lower mortality but not significance (RR=0.8) for open phase. One stratum had small sample size. Adjusting for strata, overall mortality was significantly lower in closed versus open infusion systems, 17%, 22%, respectively (P=0.003).

Conclusions: In this pooled analysis, despite differences among the 4 countries, closed infusion systems (fully collapsible plastic) had lower mortality than open infusion systems (burette, glass, semi-rigid plastic).