Abstract:

IMPORTANCE: National Healthcare Safety Network methods for central line-associated bloodstream infection (CLABSI) surveillance do not account for potential additive risk for CLABSI associated with use of 2 central venous catheters (CVCs) at the same time (concurrent CVCs); facilities that serve patients requiring high acuity care with medically indicated concurrent CVC use likely disproportionally incur Centers for Medicare & Medicaid Services payment penalties for higher CLABSI rates.

OBJECTIVE: To quantify the risk for CLABSI associated with concurrent use of a second CVC.

DESIGN, SETTING, AND PARTICIPANTS: This retrospective cohort study included adult patients with 2 or more days with a CVC at 4 geographically separated general acute care hospitals in the Atlanta, Georgia, area that varied in size from 110 to 580 beds, from January 1, 2012, to December 31, 2017. Variables included clinical conditions, central line-days, and concurrent CVC use. Patients were propensity score-matched for likelihood of concurrence (limited to 2 CVCs), and conditional logistic regression modeling was performed to estimate the risk of CLABSI associated with concurrence. Episodes of CVC were categorized as low or high risk and single vs concurrent use to evaluate time to CLABSI with Cox proportional hazards regression models. Data were analyzed from January to June 2019.

EXPOSURES: Two CVCs present at the same time.

MAIN OUTCOMES AND MEASURES: Hospitalizations in which a patient developed a CLABSI, allowing estimation of patient risk for CLABSI and daily hazard for a CVC episode ending in CLABSI.

RESULTS: Among a total of 50 254 patients (median age, 59 [45-69] years; 26 661 [53.1%] women), 64 575 CVCs were used and 647 CLABSIs were recorded. Concurrent CVC use was recorded in 6877 patients (13.7%); the most frequent indications for concurrent CVC use were nutrition (554 patients [14.1%]) or hemodialysis (1706 patients [43.4%]). In the propensity score-matched cohort, 74 of 3932 patients with concurrent CVC use (1.9%) developed CLABSI, compared with 81 of 7864 patients with single CVC use (1.0%). Having 2 CVCs for longer than two-thirds of a patient's CVC use duration was associated with increased likelihood of developing a CLABSI, adjusting for central line-days and comorbidities (adjusted risk ratio, 1.62; 95% CI, 1.10-2.33; P = .001). In survival analysis adjusting for sex, receipt of chemotherapy or total parenteral nutrition, and facility, compared with a single CVC, the daily hazard for 2 low-risk CVCs was 1.78 (95% CI,

1.35-2.34; P < .001), while the daily hazard for 1 low-risk and 1 high-risk CVC was 1.80 (95% CI, 1.42-2.28; P < .001), and the daily hazard for 2 high-risk CVCs was 1.78 (95% CI, 1.14-2.77; P = .01).

CONCLUSIONS AND RELEVANCE: These findings suggest that concurrent CVC use is associated with nearly 2-fold the risk of CLABSI compared with use of a single low-risk CVC. Performance metrics for CLABSI should change to account for variations of this intrinsic patient risk among facilities to reduce biased comparisons and resultant penalties applied to facilities that are caring for more patients with medically indicated concurrent CVC use.

Reference:

Dube, W.C., Jacob, J.T., Zheng, Z., Huang, Y., Robichaux, C., Steinberg, J.P. and Fridkin, S.K. (2020) Comparison of Rates of Central Line-Associated Bloodstream Infections in Patients With 1 vs 2 Central Venous Catheters. JAMA Network Open. 3(3), p.e200396. doi: 10.1001/jamanetworkopen.2020.0396.

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