
Abstract:

Objective – To develop prediction algorithms for the presence of a central vascular catheter in hospitalized patients with use of data present in an electronic health record. Such algorithms could be used for measurement of device utilization rates and for clinical decision support rules.

Design – Criterion standard.

Setting – John H. Stroger, Jr, Hospital of Cook County, a 464 bed public hospital in Chicago, Illinois.


Methods – Covariates were collected from the electronic medical record for each patient; the outcome variable was presence of a central vascular device. Multivariate models were developed using the derivation set and the generalized estimating equation. Three models, each with increasing database requirements, were validated using the validation set. Device utilization ratios and performance characteristics were calculated.

Results – Although Charlson score and duration of intensive care unit stay were significant predictors in all models, factors that indicated use or presence of a central line were also important. Device utilization rates derived from the algorithmic models were as accurate as those obtained using manual sampling.

Conclusions – Automated calculation of central vascular catheter use is both feasible and accurate, providing estimates statistically similar to those obtained using manual surveillance. Prediction modeling of central vascular catheter use may enable automated
surveillance of bloodstream infections and enhance important prevention interventions, such as timely removal of unnecessary central lines.