Title: High rates of Central Line and Port Infections following Ambulatory CVC Procedures detected by AM-PPC

Introduction

Outpatient central venous catheter (CVC) procedures are shifting to ambulatory settings to deliver outpatient and home infusion therapies, with cost benefits, patient convenience, and reduced risk of hospital acquired conditions (HAC). Post-procedure, CVC can have complications including line dysfunction, thrombosis, and life-threatening risk of central line-associated bloodstream infections (CLABSIs) (Becera-Bolanos, Nature, 2025). Solventum Ambulatory Potentially Preventable Conditions (AM-PPC) is a risk adjusted clinical categorical model focused on measuring and benchmarking complications following outpatient procedures. This includes a focus on hospital admissions and Emergency Room visits. We evaluate CVC complications post-ambulatory procedure with AM-PPC in the Medicare population.

Methods

Analysis was done with CMS Medicare FFS facility claims for CY 2019-2022. Data was processed with Solventum AM-PPC v1.1 clinical classification software. AM-PPC groups procedures into procedure groups (PSG) and complications into complication groups. For individual procedures, complications are measured up to 30 days post procedure and categorized by encounter type including emergency department (ED) visits that did not result in admission, inpatient admissions (IP), and outpatient visits (OP). Analysis tools were Python v3.7.9 with Visual Studio Code v1.96.3 and Microsoft Excel v2411. We performed a sub-analysis for CVC procedures focused on PSG for CVC with external hubs including Peripherally Inserted Central lines (CL), and CVC with hubs below the skin (Port). We further analysed Sepsis and other Severe Infection (SOSI) AM-PPC complication group as representative of CLABSI and CVC infection.

Results

CL accounted for 197,169 procedures with 12% of those CL replacement. Ports accounted for 343,118 procedures with 1% of those Port replacement. CL and Ports had complications numbers that qualified them in the top 10 PSGs with the most complications (CL: 9155, Port: 10383). It was notable that CL had a substantially higher complication rate than ports (CL: 9.66%, Port: 5.16%). Distribution of total complications by location was not dramatically different for CL (ED: 6566, IP: 12480, OP: 16283) compared to Port (ED: 4302, IP: 13354, OP: 14033). SOSI was the most common AM-PPC complication group and accounted for 29% of all complications for CL and Port. The proportion of SOSI events in the ED was comparable for CL and Port (CL: 3.8%, Port: 4.3%). SOSI was most often IP (CL: 7028, Port: 9537). CL had considerably more

SOSI as OP (IP: 76.8%, OP: 19.5%) compared to Ports (Inpatient: 91.9%, Outpatient: 3.9%).

Discussion/Conclusions

We demonstrate with Solventum AM-PPC, that ambulatory CVC procedures have frequent complications including potential life-threatening SOSI. Although CL and Ports both have high rates of SOSI, the almost doubled rate in CL may reflect challenges with care of central lines with external hubs that can be challenging to maintain due to exposure to outside environment and frequent access. The analysis emphasizes the value of precision monitoring of ambulatory procedure complications for identifying concerning outcome trends. This facilitates local efforts to prioritize problems, perform corrective interventions, and measure results to drive patient safety and healthcare value. For CL and Ports, this may involve a myriad of local strategies focused on infection control, patient education, home care and remote monitoring, and patient selection and education.