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Background

- Phoenix Children's Hospital (PCH) providers perceived an increased rate of venous thromboembolism (VTE) in neonates and infants
- Previous studies have implicated the presence of central venous catheter (CVC) as a risk factor for VTE [1,2,3]
- Evidence is lacking regarding characteristics of CVCs resulting in VTE in patients < 1 year of age
- Various guidelines recommend measurement of vein diameter to ensure a CVC/Peripherally inserted central catheter (PICC) is < 45% of the total diameter of vein to decrease risk of VTEs [4]

Objectives

Primary

- Determine rate of VTE in patients <1 year of age

Secondary

- Compare rate to other hospitals in Pediatric Hospital Information System (PHIS) database
- Identify risk factors and CVC characteristics of VTE

Methods

IRB approved retrospective chart review Jan 1, 2017-Dec 31, 2018

Inclusion: Any inpatient < 1 year of age who underwent CVC placement or developed VTE (confirmed by ICD-10 codes or imaging)

Exclusion: VTE at/prior to admission, arterial thrombus, congenital thrombophilia, therapeutic anticoagulation at time of VTE, pulmonary embolism, and those with fibrin sheath in catheter without a vascular component

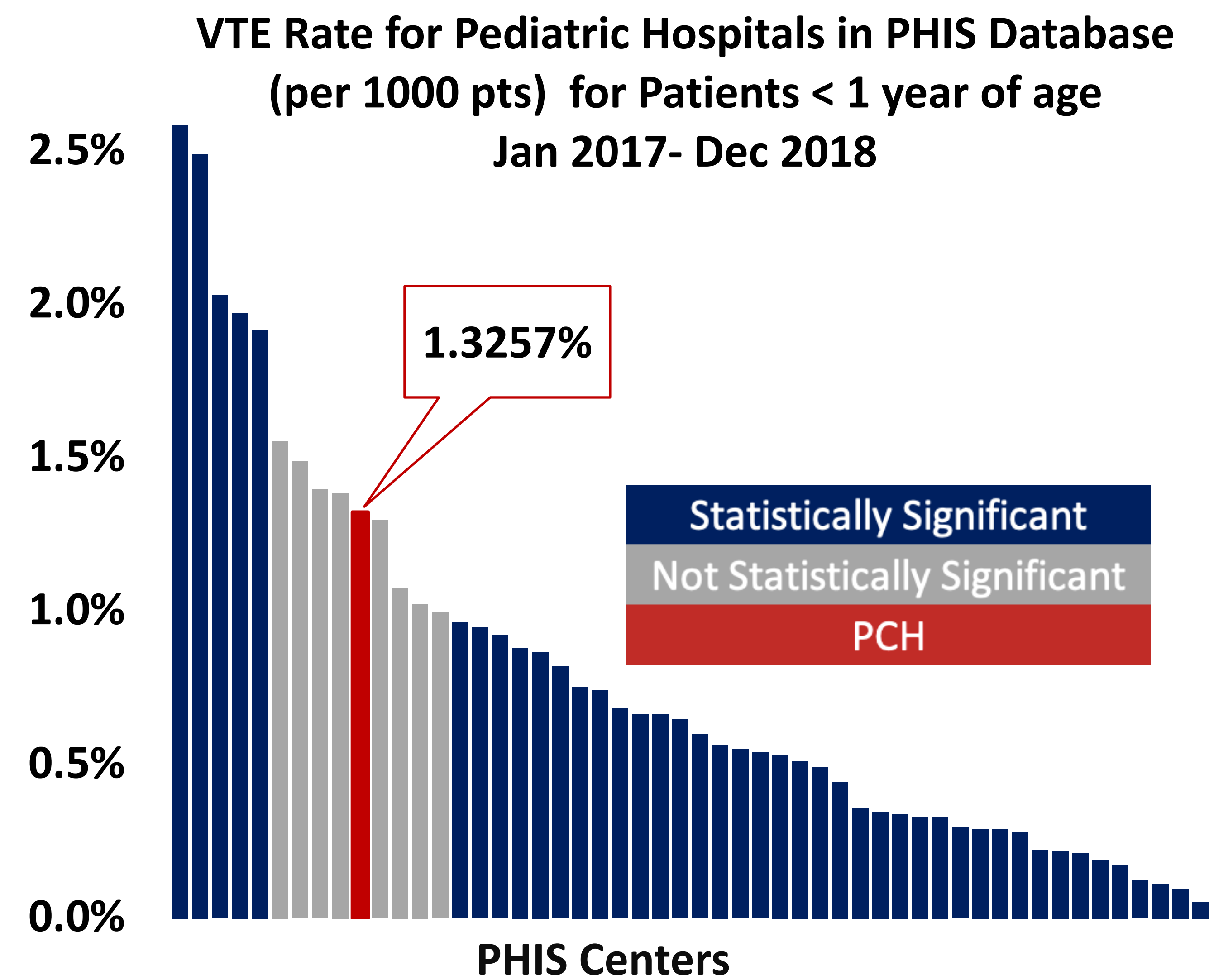
Data elements: Patient demographics, characteristics of CVC (method/location of insertion, catheter size, documentation of vessel measurement), presence of risk factors for VTE (pro-thrombotic medications, congenital heart defect (CHD), cardiac catheterization, infection, surgery)

Statistical Analysis: Chi-squared test for comparison of VTE rates and multivariate logistic regression for risk factors/ characteristics of CVC analysis

References

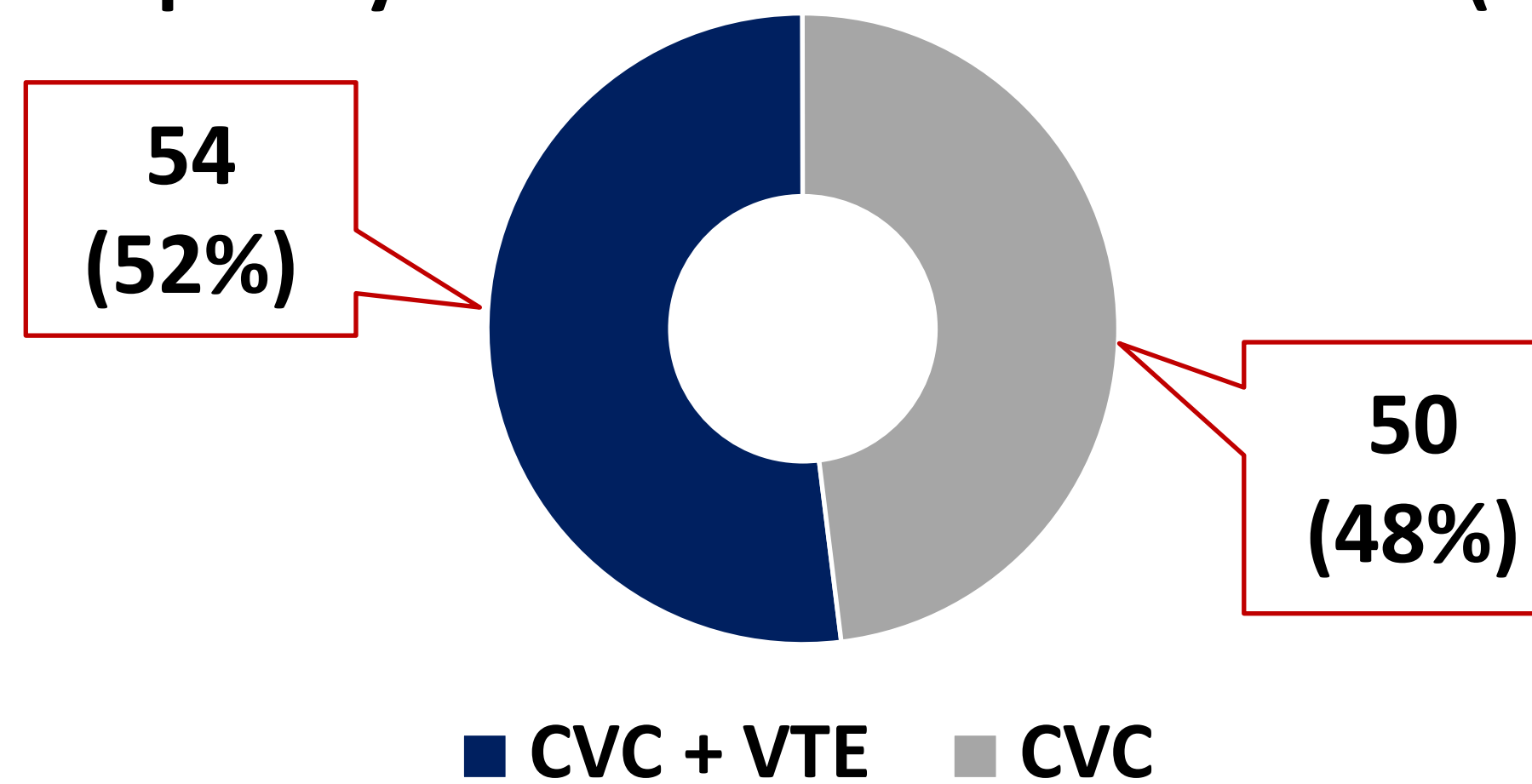
- [1] Raheja, P., et al. "Pediatric Venous Thromboembolism: Incidence, Risk Factors and Management of Hospitalized Patients in a Tertiary Care Teaching Hospital." *Haematologica*. Vol. 102. Via Giuseppe Belli 4, 27100 Pavia, Italy: Ferrata Storti Foundation, 2017.
- [2] Amankwah, E. K., et al. "Risk factors for hospital-associated venous thromboembolism in the neonatal intensive care unit." *Journal of Thrombosis and Haemostasis* 12 (2014): 59
- [3] Jaffray, J., et al. A multi-institutional registry of pediatric hospital-acquired thrombosis cases: The Children's Hospital-Acquired Thrombosis (CHAT) project (2018). *Thrombosis research*, 161, 67-72.
- [4] Lambert, I., Tarima, S., Uhing, M., & Cohen, S. S. Risk Factors Linked to Central Catheter-Associated Thrombosis in Critically Ill Infants in the Neonatal Intensive Care Unit. *American journal of perinatology* (2018).

Results



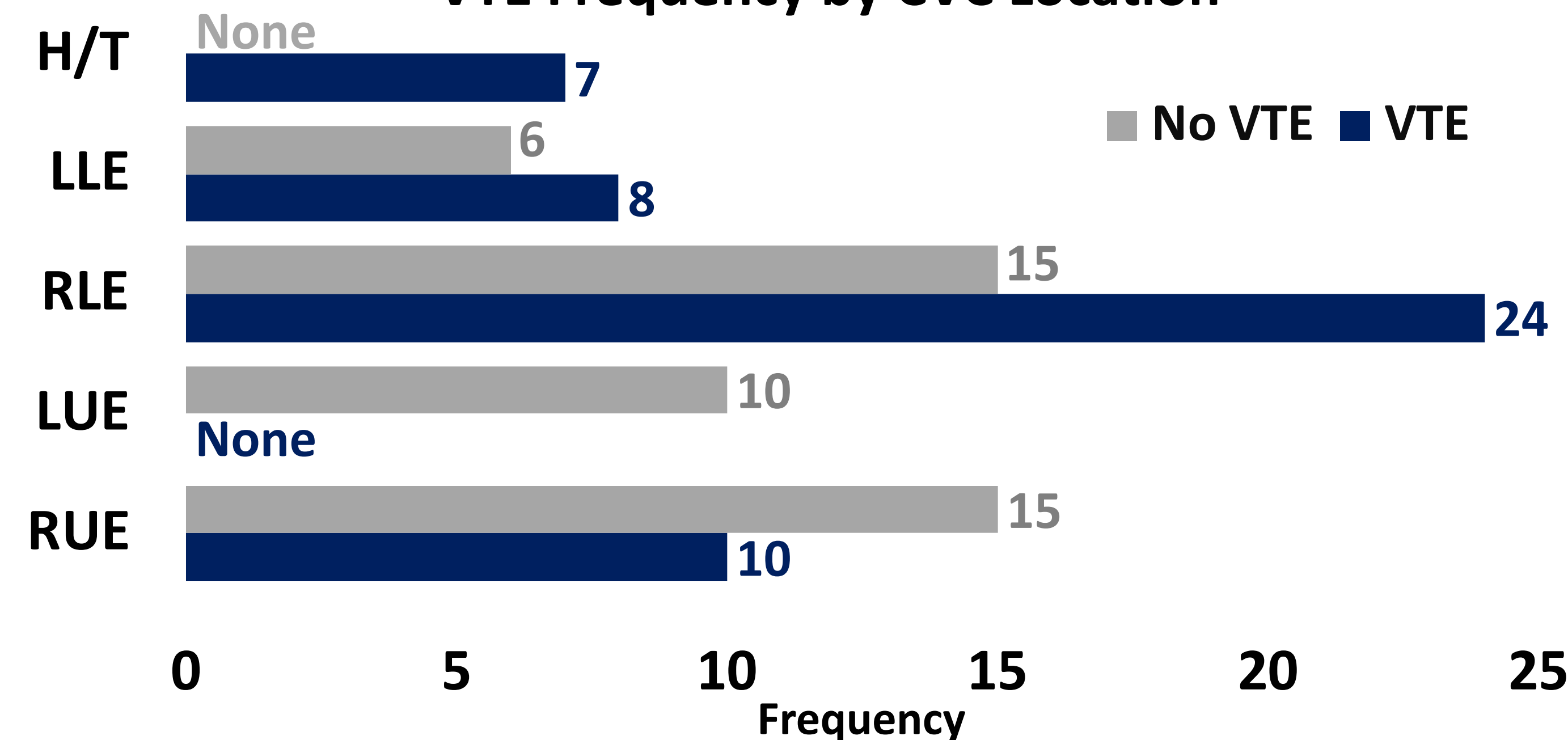
PCH VTE rate was noted to be higher than 37 of 52 centers (p<0.05)

Frequency of VTE in Patients with CVC (n=104)



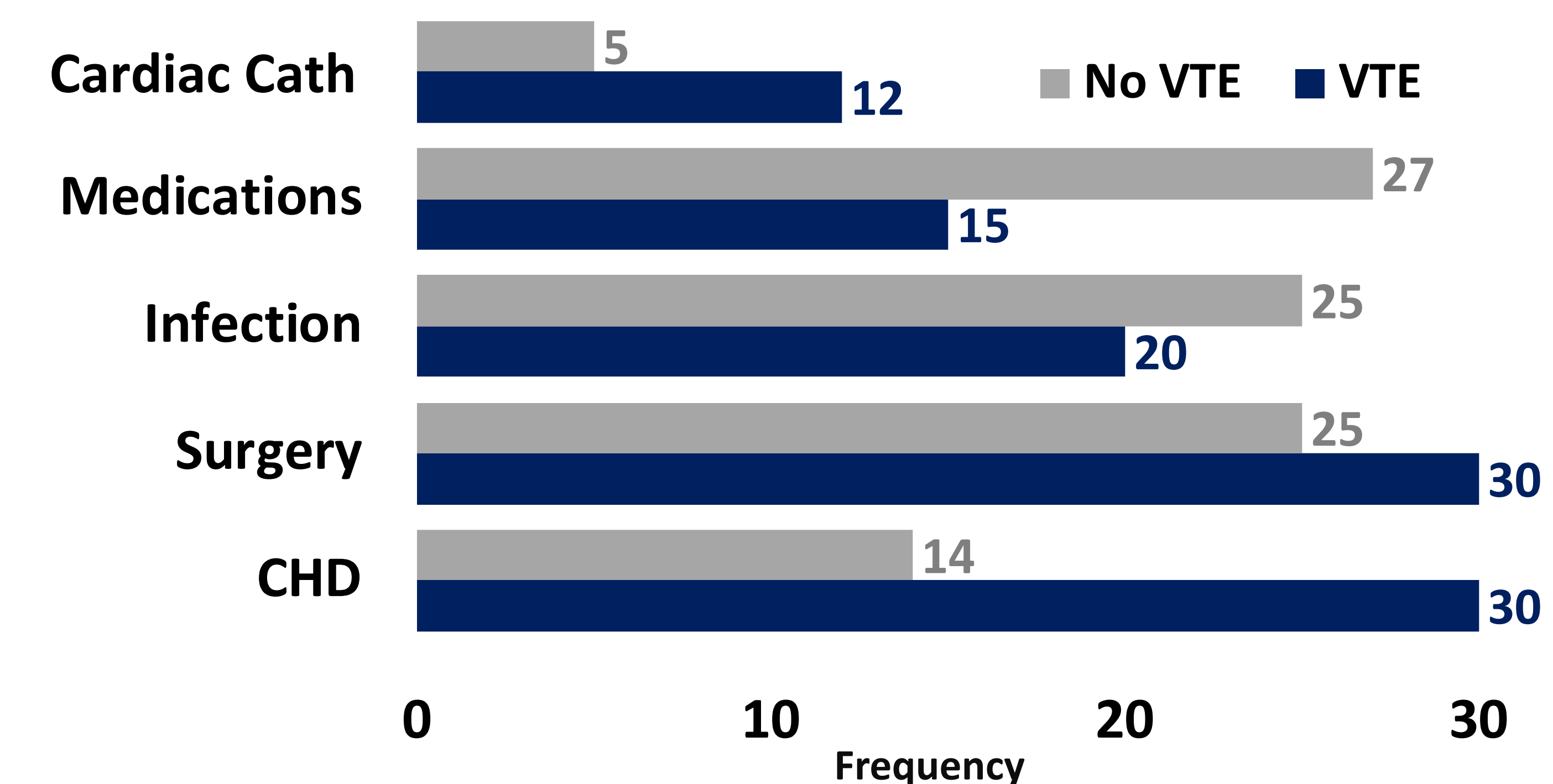
100% of VTE cases had a CVC present

VTE Frequency by CVC Location



LLE=left lower extremity H/T=head/thoracic RLE=right lower extremity
RUE=right upper extremity LUE=left upper extremity

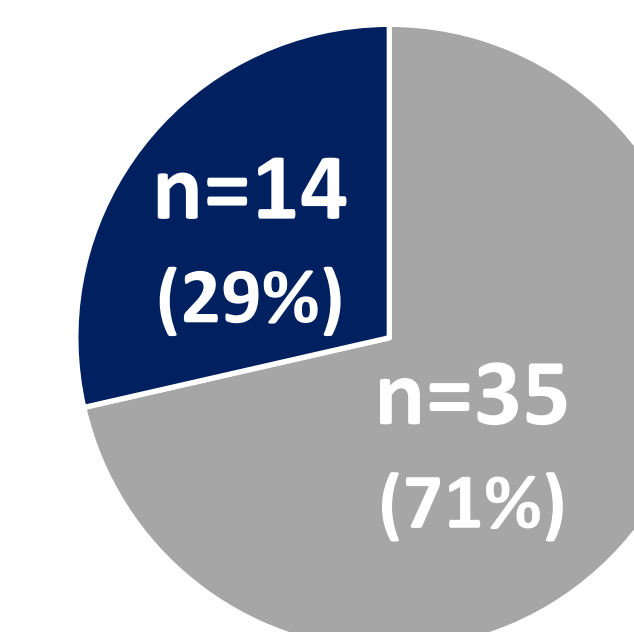
VTE Risk Factors* Present in Patients with CVC



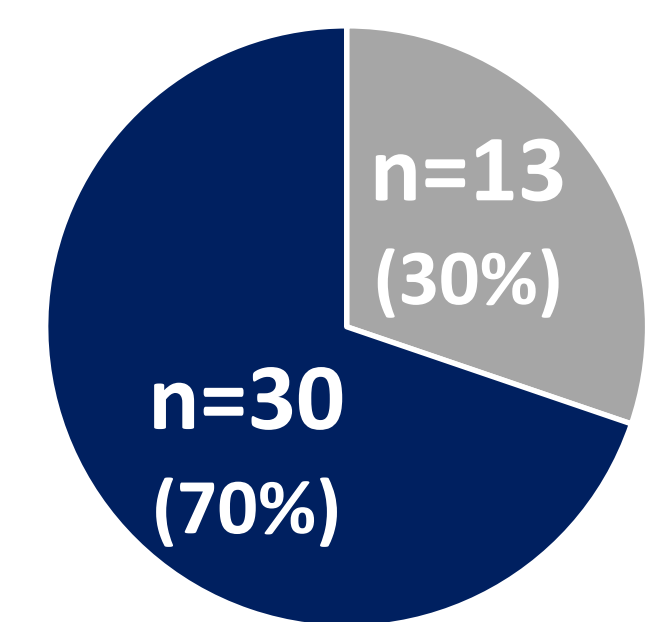
Presence of CHD significantly increased risk of VTE (OR=2.718, 95% CI: 1.12-6.52) *[Some patients had multiple risk factors]

CVC Size Related to VTE Frequency

≤ 3 French



≥ 4 French



- CVCs ≥ 4 French were associated with an increased frequency of VTE compared to CVC's ≤ 3 French (OR=19.2, 95% CI:2.1-3.8)
- Zero cases had documentation of vessel measurement

Conclusions

- PCH VTE event rate of 1.3257% in infants < 1 year is in the upper quartile of comparative PHIS hospitals
- CHD and CVCs ≥ 4 Fr most often associated with VTE

Limitations

- This was a retrospective study and ability to collect information was limited to chart reviews
- Morbidity due to VTE was not addressed in this study

Future Application

- Utilize results to facilitate inter-disciplinary development of VTE prevention strategies for this population
- VTE Prophylaxis
 - Measurement of vein diameter prior to CVC insertion