

New frontiers of infection prevention: the non-antibiotic antimicrobial lock

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Disclosure

- Canadian Institute of Healthcare Research
- Sterilecare





Why Is It Important?



Morbidity



Mortality



Health Care Expenditures



Quality of Life



NATIONAL

ACUTE CARE HOSPITALS

Healthcare-associated infections (HAI) are infections patients can get while receiving medical treatment in a healthcare facility. Working toward the elimination of HAIs is a CDC priority. For more information on HAI prevention progress, visit: www.cdc.gov/hai/progress-report/index.html.



CLABSIs

CENTRAL LINE-ASSOCIATED
BLOODSTREAM INFECTIONS

- **1 in 6** CLABSIs were caused by urgent or serious antibiotic-resistant threats.

SSIs

SURGICAL SITE INFECTIONS

- **1 in 7** SSIs were caused by urgent or serious antibiotic-resistant threats.

CAUTIs

CATHETER-ASSOCIATED
URINARY TRACT INFECTIONS

- **1 in 10** CAUTIs were caused by urgent or serious antibiotic-resistant threats.

C. difficile Infections

- **9 in 10** patients diagnosed with *C.difficile* are related to healthcare.

SOURCE: CDC Vital Signs, March 2016. Data used for this analysis was reported to CDC's National Healthcare Safety Network.



Prevention of CLABSI

Techniques

Procedures

Products



Locking Solutions in Home PN Population at Sickkids

- Heparin
- Ethanol lock at Sickkids
 - Early Experience*
 - Systematic Review**

12.2



0.9

*Wales, et al, 2009

** Oliveira, et al, 2012

Locking Solutions in Home PN Population at Sickkids

- Heparin
- Ethanol lock
 - Early Experience*
 - Systematic Review**



81%



72%

*Wales, et al, 2009

** Oliveira, et al, 2012



Challenges

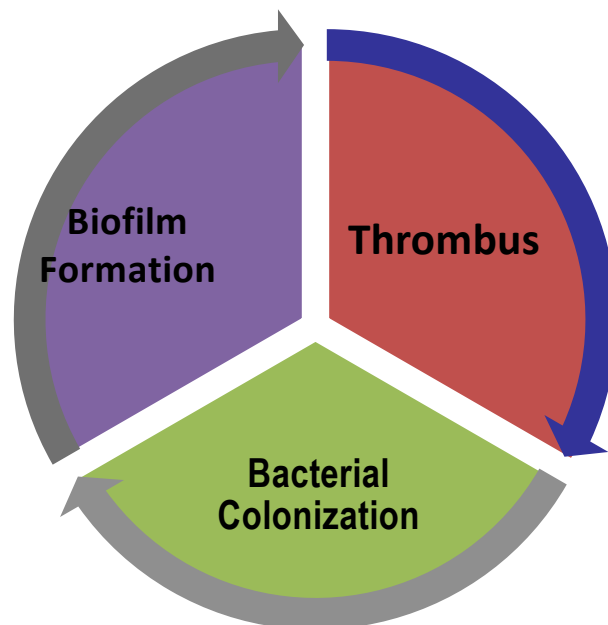
Line Complications

Availability



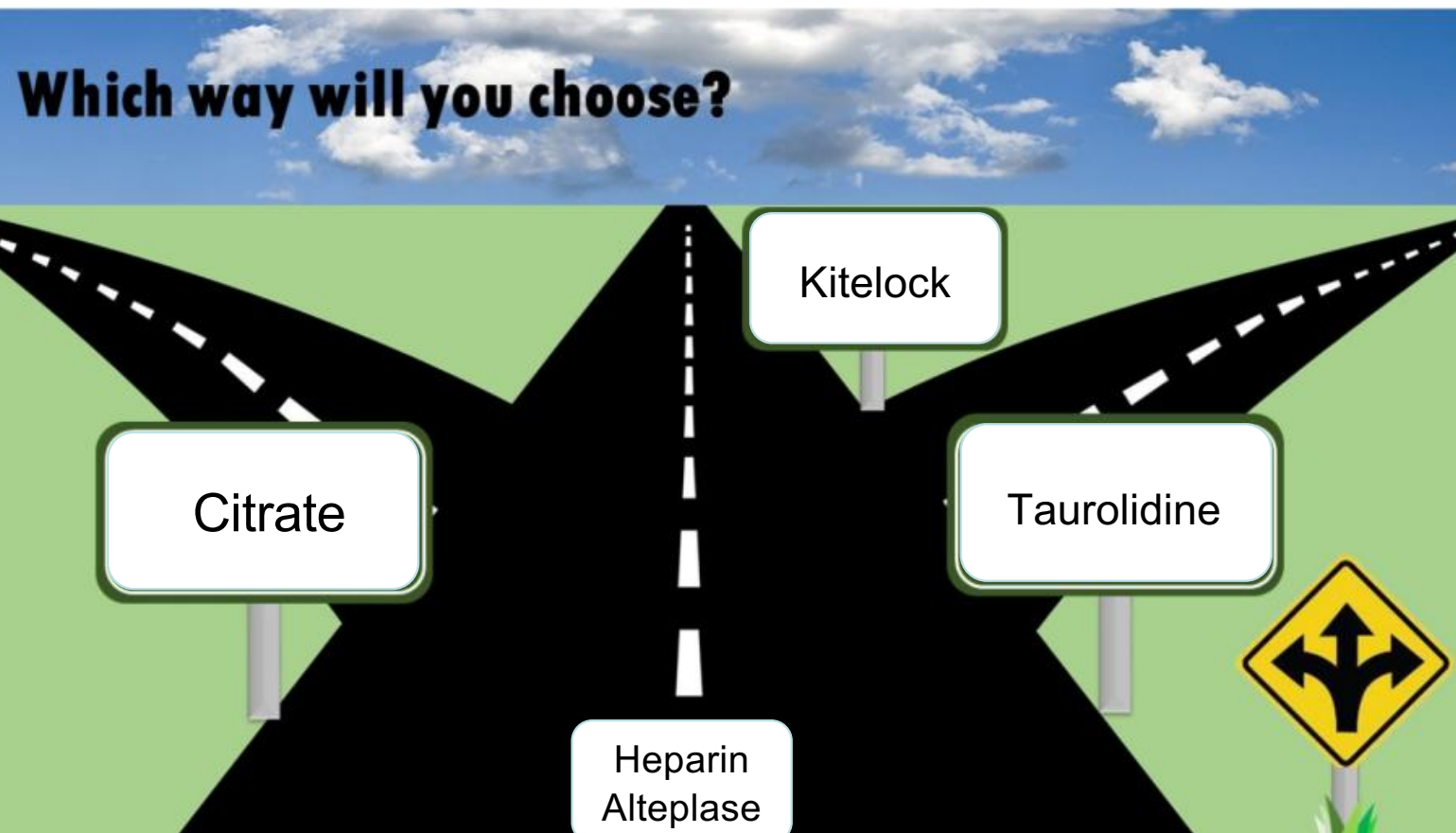
What are We Trying to Treat?

Line occlusion



CLABSI





Citrate

AJKD Official Journal of the
AMERICAN NATIONAL KIDNEY FOUNDATION™
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< Previous Article **March 2014** Volume 63, Issue 3, Pages 479–490 Next Article >

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Citrate Versus Heparin Lock for Hemodialysis Catheters: A Systematic Review and Meta-analysis of Randomized Controlled Trials

[Yuliang Zhao](#), MD^{1,*}, [Zheng Li](#), DDS^{2,*}, [Ling Zhang](#), MD¹, [Jiqiao Yang](#), MD³, [Yingying Yang](#), MD¹, [Yi Tang](#), MD¹, [Ping Fu](#), MD, PhD^{1,*}  



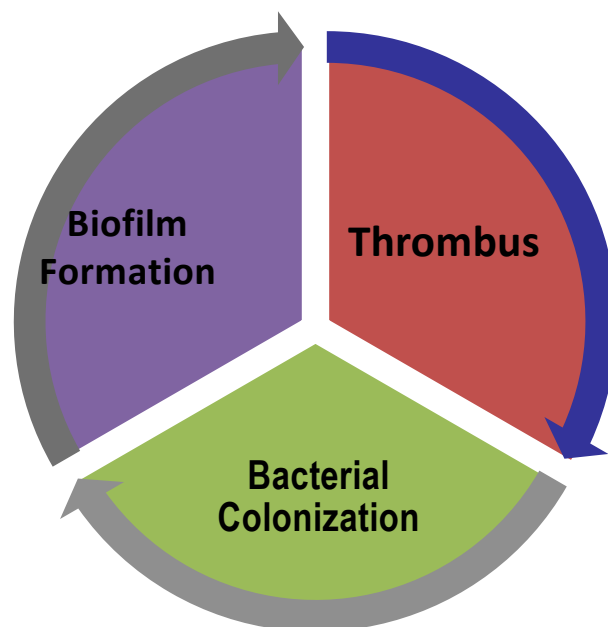
Taurolidine

Authors (Year of Publication)	Study Design	Number of Patients	Intervention	Location	Duration (Days Per Patient)	Outcome	Complications	Notes
Wouters, Y. et al. (2018) [21]	Randomized controlled trial	105 randomized, 102 analyzed	2% taurolidine, 0.9% saline	Denmark, Israel, Italy, the Netherlands, the United Kingdom	363, 346	0.33 versus 1.44 CRBSIs per 1000 catheter days ($p = 0.002$)	No difference in rate of catheter occlusion or patient satisfaction	
Tribler, S. et al. (2017) [19]	Randomized controlled trial	41	1.35% taurolidine + 4% citrate + heparin 100 IU/mL, heparin 100 IU/mL	Denmark	481, 331	No CRBSIs in the taurolidine group versus seven CRBSIs in the heparin group (P-log-rank = 0.0034)	No difference in rate of mechanical complications	There were seven positive blood cultures in the taurolidine group but all were classified as contaminants and only one person received antibiotics for a short period



Noelting, et al. Nutrients, 2018

What are We Trying to Treat?



Tetrasodium EDTA

Anticoagulant



Antimicrobial



Prevent biofilm



Eliminate biofilm



Not an antibiotic



RESEARCH ARTICLE
Clinical Science and Epidemiology



Tetrasodium EDTA Is Effective at Eradicating Biofilms Formed by Clinically Relevant Microorganisms from Patients' Central Venous Catheters

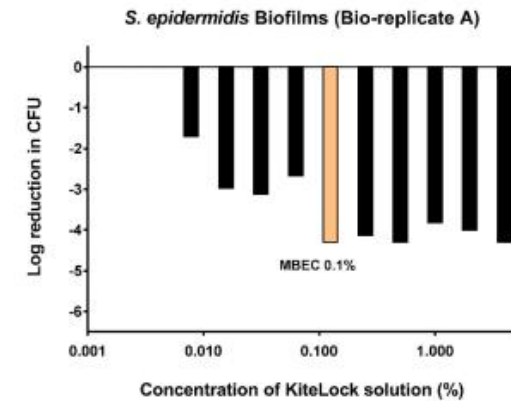
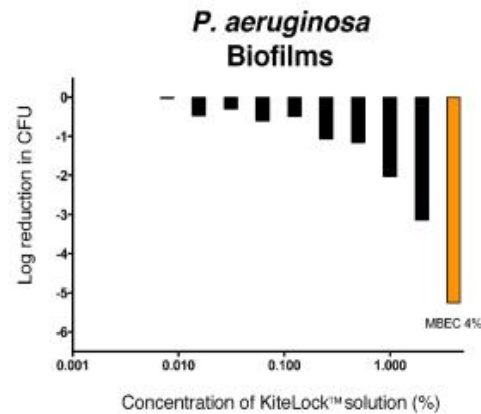
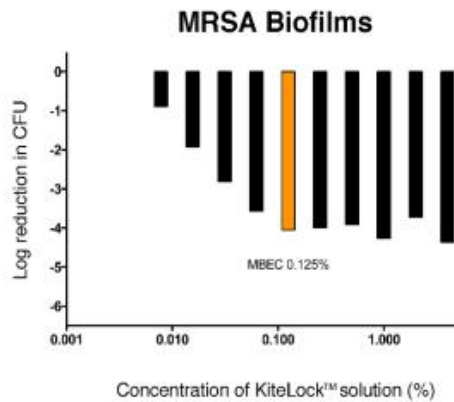
Fangning Liu,^a Satyender Hansra,^a Gordon Crockford,^a Wolfgang Köster,^{a,b} Brenda J. Allan,^a Joseph M. Blondeau,^{c,d,e} Chantal Laine,^f Aaron P. White^{a,g}

Proescher 1951. Proceedings of the Society for Experimental Biology and Medicine. 76(4):
Kanaa et al, 2015. Am J Kidney Dis, 66(6):1015-1023.
Percival et al, 2005. Infect Control Hosp Epidemiol, 26(6):515-519.
Kite et al, 2004. Journal of Clinical Microbiology, 42(7):3073-3076.

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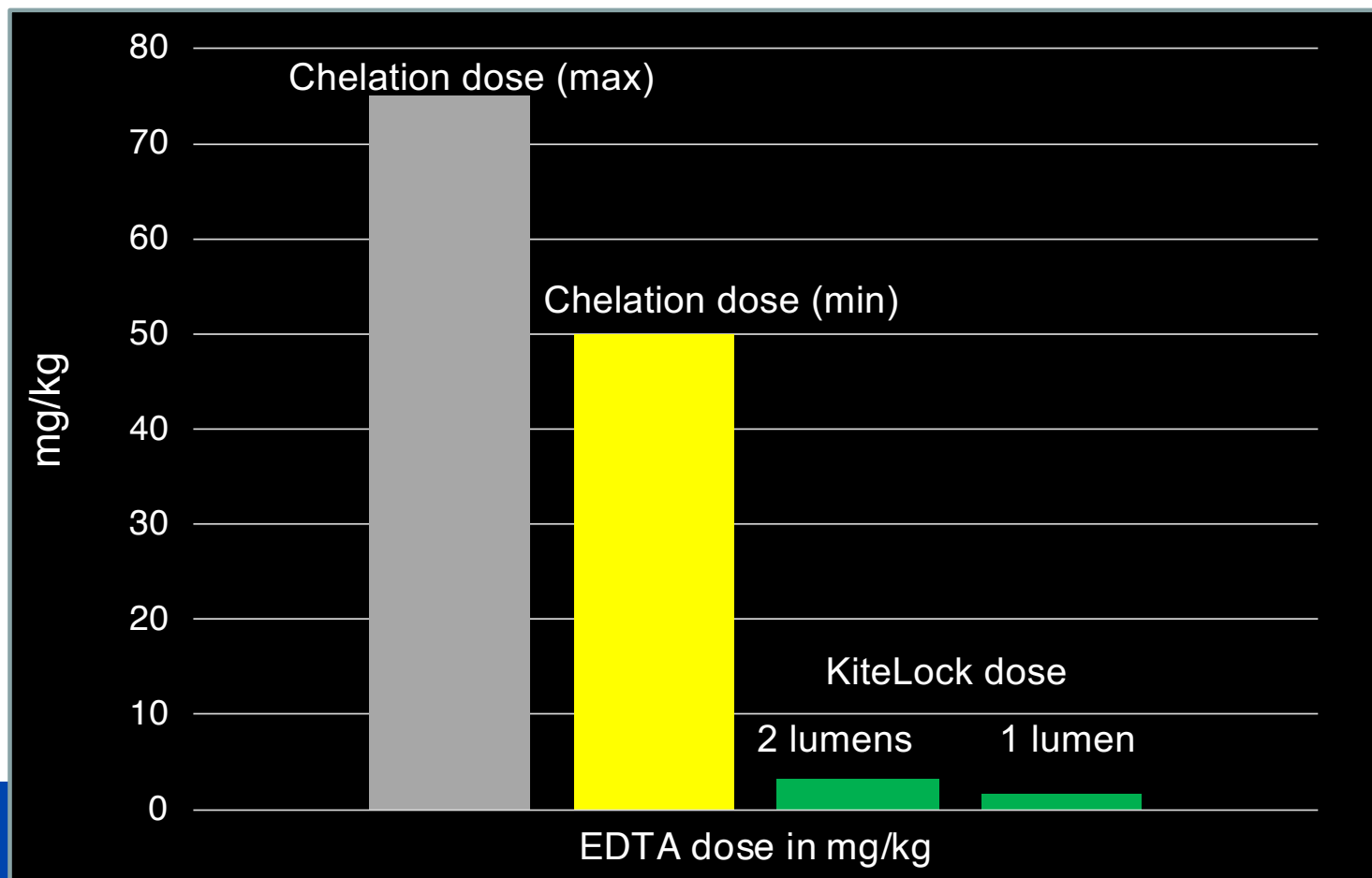
Canadian Clinical Isolates



EDTA Time to kill:
3-6 hours (including MRSA biofilm)



Safety Profile of KiteLock 4% Sterile Catheter Lock Solution



October 2017 – SterileCare Inc/KiteLock 4%

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Our Experience

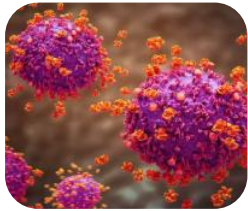
- Outpatient
- History of line infections or recurrent blockages
- Procedure for home:
 - Instill 1 ml at end of cycle time (port volume = 3ml)
 - Initial protocol – withdraw KiteLock prior to starting TPN
 - Current protocol – flush KiteLock prior to starting TPN



Methods for Evaluation



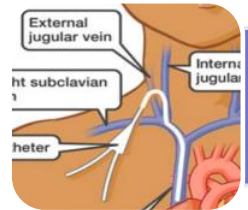
Methods for Evaluation



• Infection Rate



• Alteplase Use



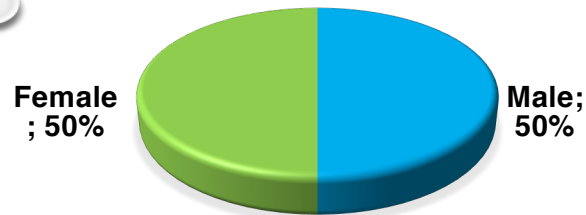
• Line exchange

- ✓ Wilcoxon matched-pairs signed-rank test
- ✓ Medians (IQR) & frequencies (proportions)
- ✓ Alpha value <0.05

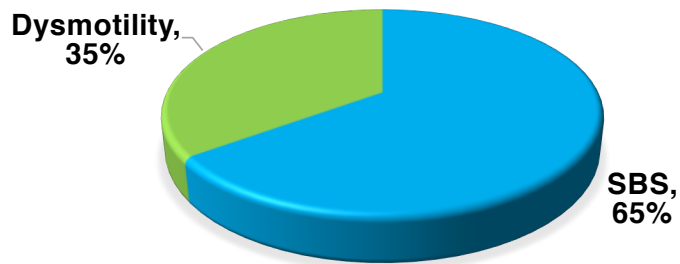


Demographics

SEX



ETIOLOGY

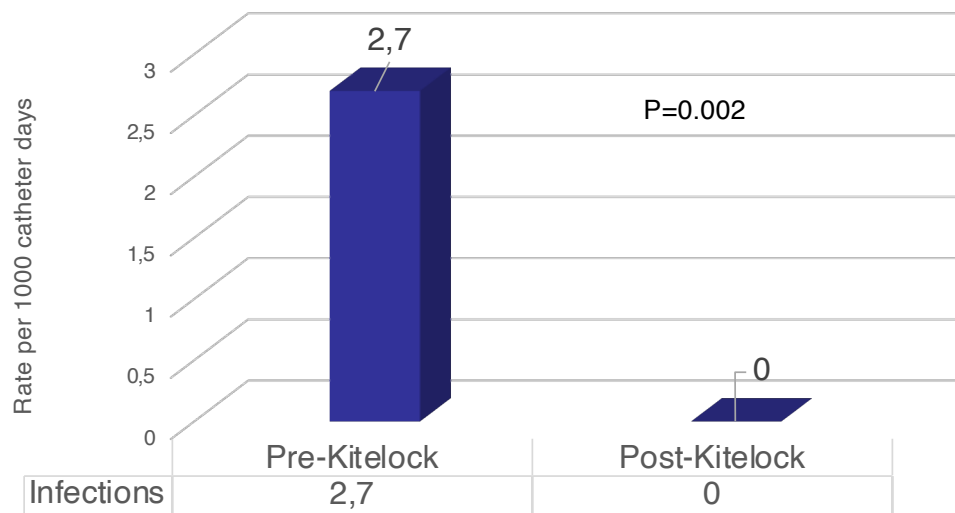


	Median (IQR)/Frequency (%)
PN days	2251 (941-2831)
SB percentage	18.5 (8.5-90.5)
LB percentage	62.5 (9.3-100.0)
Gtube	18 (90.0)
Stoma	6 (30.0)

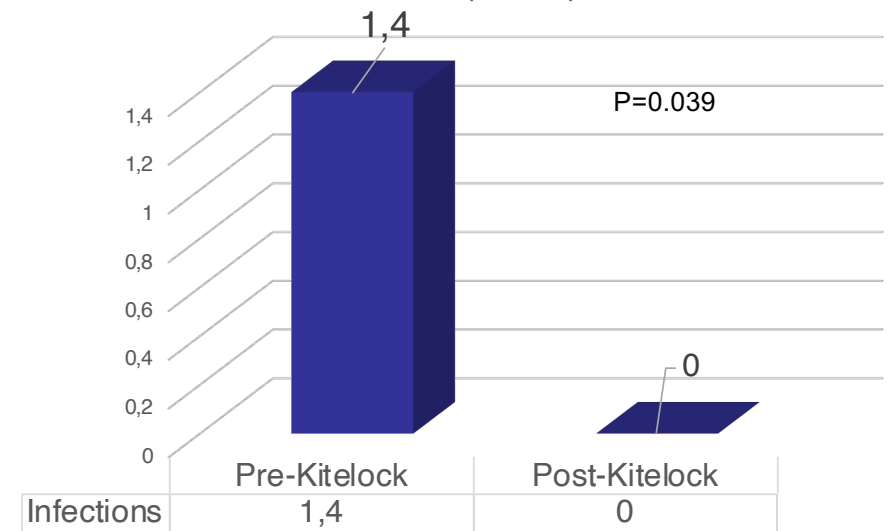


Results

CLABSI Rate in Total Cohort

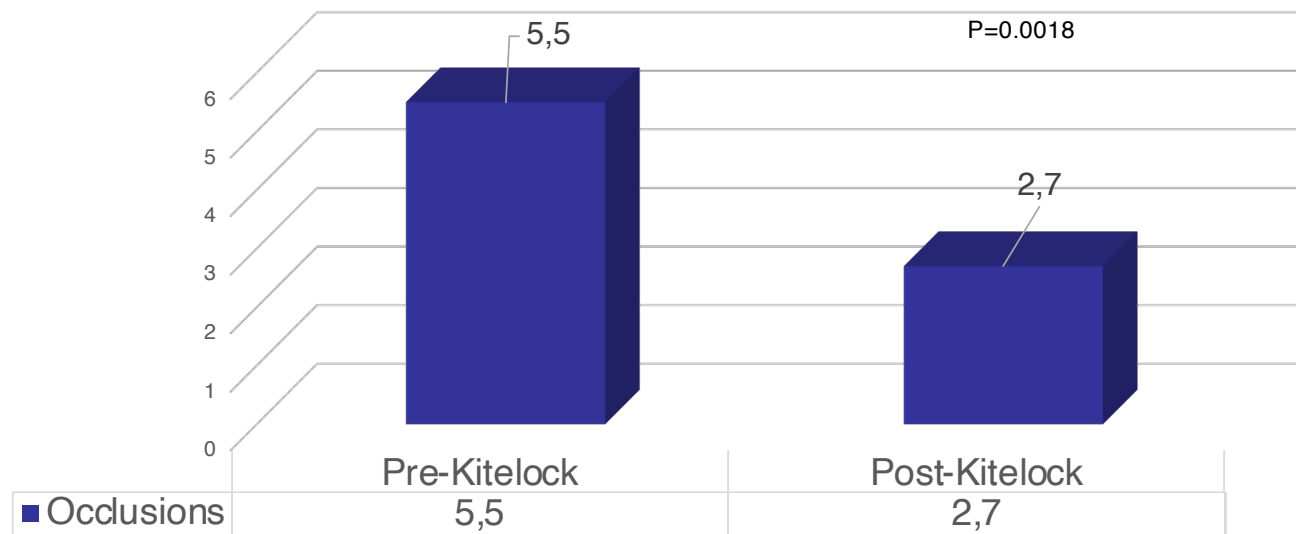


CLABSI Rate in Patients Previously on Ethanol (n=10)

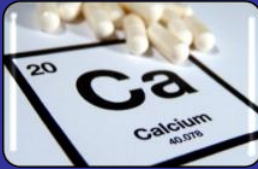


Results

Occlusion Rate per 1000 catheter days in Children with history of alteplase use



Safety Concerns



Calcium



Anemia



Effectiveness



Future Directions



Inpatient
ICU
Outpatient



Monitoring
Evaluation



Other patient
populations
Funding



Conclusion

- Majority of CLABSI are preventable
- CLABSI have significant impact on patient and health care system
- Tetrasodium EDTA has shown early promise in intestinal failure population for prevention of CLABSI and line occlusions
- No safety concerns to date



Thank You



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