

MY FAVORITE PAPER- 2016

Ali Mirza Onder, M.D.
Pediatric Nephrology
Le Bonheur Children's Hospital

DISCLOSURES

• None

Evaluating Approaches for the Diagnosis of Hemodialysis Catheter-Related Bloodstream Infections

Friederike Quittnat Pelletier,^{1*} Mohammad Joarder,² Susan M. Poutanen,^{1,3#} and Charmaine E. Lok^{4†}
Clin J Am Soc Nephrol 11: 847–854, 2016.

- Catheter-related bacteremia (CRB) is one of the most feared complications of hemodialysis.
- CRB causes significant morbidity and mortality for patients hemodialyzed using tunneled cuffed catheters (TCC).
- Significant increase in medical costs for these patients.
- Both ruling in and ruling out CRB in a highly sensitive and accurate method is essential for the long-term care of these patients.

BACKGROUND

- Infectious Disease Society of America (IDSA)
- **IDSA guidelines 2009**
- Included hemodialysis catheters and patients.
- 1- **Peripheral blood cultures** to be obtained.
 - The results from peripheral blood cultures are compared to
- 2- Blood cultures from the catheter hubs (arterial and venous) using;
 - A) **Quantitative criteria** (>3X CFU/ml compared to peripheral sample)
 - B) **Differential time to positivity** (DTTP) > 2 hours before peripheral sample
- 3- **TCC tip culture** growing the same microorganism as the peripheral sample.

OBJECTIVES

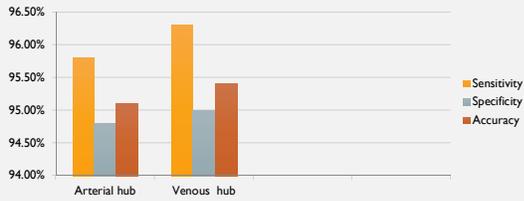
- 1- Applicability of IDSA criteria for the diagnosis of CRB in hemodialysis patients.
- 2- Determine the sensitivity, specificity and accuracy of blood cultures obtained from the HD circuit for diagnosing CRB (alternative real world approach).
- Sensitivity, specificity and accuracy of blood cultures from;
 - Peripheral venous sample
 - Arterial and venous catheter hubs
 - Hemodialysis circuit
- were compared for the optimal diagnostic method.

METHODS AND SUBJECTS

- Prospective, observational study
- Center caring for 300 hemodialysis patients.
- CRB rate < 1/1000 catheter days
- Almost three years to complete the study
- All patients with suspected CRB were attempted for 4 sets of blood cultures.
- BacT/ALERT 3D system
- Time to positivity for blood cultures were determined.
- Differential time to positivity were calculated.
- Quantitative blood culture methods were not utilized.

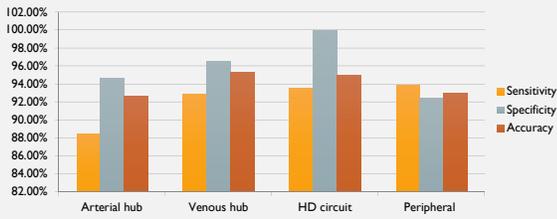
RESULTS- II

HD circuit blood cultures are used as gold standard.



RESULTS- III

All available blood culture results + Exit site cultures + Catheter tip cultures (True gold standard)



RESULTS- IV

	Mean TTP (minutes)
Peripheral vein	1092 (18.2 hours)
HD circuit	966 (16.1 hours)
Arterial hub	1025 (17.1 hours)
Venous hub	947 (15.8 hours)

	Mean DTTP (minutes)	Meeting criteria of DTTP , %
Peripheral vein and HD circuit	-107	28%
Peripheral vein and arterial hub	-106	33%
Peripheral vein and venous hub	-176	29%

LIMITATIONS

- Low CRB rate in the unit (<1 CRB/ 1000 catheter days)
- Prolonged (3 years) study period.
- Lack of negative controls (bacteremia due to another source other than TCC).
- Transport time to microbiology not accounted for; time to positivity started when BC arrived to microbiology lab.
- No quantitative blood cultures

TAKE HOME MESSAGES

- For the diagnosis of hemodialysis CRB;
 - Blood cultures obtained from the **HD circuit** and from the **venous hub** have the highest sensitivity, specificity and accuracy.
 - Peripheral venous blood cultures with any combination with the hub or circuit BC results have the lowest sensitivity, specificity and accuracy.
 - This suggest that **peripheral venous BC are not necessary.**
 - **Differential time to positivity (DTTP)** was not demonstrated for HD CRB and are probably not useful for CRB diagnosis in HD patients.

THE FUTURE OF DIALYSIS NURSE CALLS

- **Our Dialysis Nurse:** Good morning Dr. X;
- Our patient DM is with bacteremia;
- Her arterial hub is 4 times more CFU/ml compared to HD circuit
- Her venous hub is 3.5 times more CFU/ml
- DTTP is 2 hours and 37 min
- Do we need to take the catheter out and culture?

- **Your response:** Do you have some Tylenol for me??

**CURRENT DAILY ISSUES IN
HEMODIALYSIS CRB**

- Obtaining blood cultures in symptomatic children without giving empiric systemic antibiotics.
- Infusing systemic antibiotics prior to OR without obtaining (any) blood cultures from the patients.
- Not recognizing the subtle clinical symptoms of CRB in these patients.
- Arterial and venous hubs are utilized inter-changeable depending on catheter function in these patients.

**DIAGNOSING CATHETER-RELATED
BACTEREMIA IN HEMODIALYSIS PATIENTS**

We thank you
for your attention.

*Saving the world,
One catheter at a time...*