What is ECHO?

- Extension for Community Healthcare Outcomes
  - Started for lack of access to HCV expert care in rural New Mexico
- Key concepts
  - Amplification/Force multiplication
    - Limited access to experts → Train regular participants to be experts
    - Video conferencing for tele-mentoring → "move knowledge, not people"
  - Case-based presentation
    - Sharing knowledge and best practices
  - Tracking data for evaluation
    - Touching 1 billion lives by 2025

Arora S., Thornton K., Murata G., et al. *N Eng J Med*. 2011;364(23):2199-207.

Successful Expansion into Multiple Diseases

MON	TUE	WED	THURS	FRI
Rheumatology • Bankhurst	HBV • Thornton	Community Health Workers • CHW Team	CDC Good Health and Wellness in Indian Country • Struminger	Opioid Addiction • Komaromy
Tuberculosis • Burgos	Bone Health • Lewiecki	Endocrinology & Diabetes • Bouchonville	Chronic Pain and Opioid Management • Comerci	Nurse Practitioner/ Certified Midwife Primary Care • Van Roper
Cardiology • Achrekar, Anderson & Yatskowitz	Crisis Intervention for Community Policing Agencies • Duhigg	Miners' Wellness • Sood	Prison Peer Education Program • Thornton	Integrated Addictions and Psychiatry (IAP) • Komaromy
Reproductive Health • Singh	Seizures and Spells • Imerman	Hepatitis C (HCV) • Arora	HIV/ HCV Corrections • Iandiorio & Thornton	Antimicrobial Stewardship • Brett, Irizarry & Mercier

Stewardship ECHO Objectives

- Create a multi-state network of AS colleagues
- Evaluate/grow/improve ASPs
  - Facilitate and mentor
  - Tailor to local needs
- Discuss AS ideas and challenges
- Meet regulatory standards
- Keep up to date on AS literature
- Prevent/slow antibiotic resistance

The road so far was EASIE…

Date	Topic(s)
10/17/17	-Intro to EASIE -Overview of ASP regulatory requirements (plus AFH survey experience) **-Site update/project example** – American Fork meropenem MUE
11/28/17	-System stewardship update (pharmacy)
1/31/18	-Asymptomatic Bacteriuria - cases
2/28/18	-System stewardship update (physician), Intermountain restructure
3/28/18	-Update on C.diff diagnostics
4/25/18	-Role of front line nurses in antibiotic stewardship
5/23/18	-SSTI Care Process Model update
6/27/18	-**Site update/project example** - Cassia surgical prophylaxis audit
8/22/18	**-Site update/project example** - Logan rapid diagnostics protocol
9/26/18	**-Site update/project example** - Riverton ED culture call backs
10/24/18	-Pneumonia update – Duration, DRIP score, de-escalation

Transition to EASIE ECHO:
We want to hear from you!!

Patient case presentations

- Local sites present
  - Cases identified through daily AS activities → presented later for larger group
- Alternative – speakers present

QI project presentations

- Project identification (together with ID Tele ahead of time)
  - Identify goals/outcome measures, key barriers, data needs
- **Initial presentation**
  - Project logistics/design, feedback on baseline data, overcoming barriers, other ideas
- **Follow-up presentation**
  - Results/outcomes, lessons learned, future directions

EASIE ECHO Curriculum
We want to hear from you!!

- AS Overview
  - Regulatory requirements/updates
    - How to meet, experience with surveys
  - Updates on abx use/resistance data
- System communication/updates
  - iASC, corporate updates
  - CPMs
  - Dashboards
  - iCentra tools
  - **Site updates**
- "Case" presentations
  - Patient cases
  - QI projects
- Core ID topics
  - SSTI, PNA, UTI/ASB
  - C.diff
  - S.aureus bacteremia
- Core stewardship topics
  - Duration of therapy
  - Double anaerobic coverage
  - Abx allergies
  - PK/PD

Questions?

EASIE ECHO: November 2018

Blood Culture Interpretation and *S. aureus* bacteremia

Infectious Diseases Telehealth Service
Todd J. Vento, MD, MPH, FACP, FIDSA (Med Director)
John J. Veillette, PharmD, BCPS (ID Pharmacist)

Objectives

1. Review recent cases w/positive blood cultures at SCHs*
2. Review significance of positive blood culture results
3. Highlight important clinical issues associated with *S.aureus*-positive blood cultures/bacteremia

* SCH: Small Community Hospitals

Your nursing staff says to you:

"we have a new patient with sepsis in Room 1"

"we got 6 blood cultures for you already"

Q: What do you want to know about the blood cultures?

Positive Blood Culture Interpretation: Recent Small Community Hospital (SCH) Cases

Intermountain Healthcare

SCH Case 1

30 y/o F with PMH gastroparesis with J-tube + Hickman catheter on home TPN presents to ED on Day 1 with N/V, abdominal pain

- WBC 10, T 37, HR 98, RR 20, BP 117/86; blood cultures drawn x 2 sets; discharged off abx

Micro Data (date of result)

Day 2

Set 1 (peripheral) – 1/2 GPC clusters

Set 2 (Hickman) – No growth

Day 5

Set 1 (peripheral) – 1/2 CoNS

Set 2 (Hickman) – No growth

Results Callback

Day 2 "Please call patient - advise of positive cultures - if currently ill, have her return here - otherwise she must follow up with PCP tomorrow"

Day 3 "Patient followed up with PCP and is feeling better"

Day 6 "Likely contamination. Please call and check on patient. Have her f/u with PCP or return if still symptomatic."

Question

What percentage of time does Coagulase-Negative Staphylococcus (CoNS) represent TRUE bacteremia?

Answer: 10%

However,…a few thoughts about pre-test probability…

Pien et al., *Am J Med* 2010

SCH Case 2

60 y/o F with PMH: lymphoma, chemo-induced gastroparesis on TPN via indwelling port presents to outpatient clinic on Day 1 with subjective fevers

- T 37, HR 90, BP 113/71; WBC 6,
- blood cultures drawn x2 sets; sent home off abx

Micro Data (date of result)	Interpretation?
Day 2 (AM) Set 1 (L peripheral) – 1/2 GPC clusters Set 2 (R peripheral) – No growth	Continue to follow
Day 2 (PM) Set 1 (L peripheral) – 1/2 GPC clusters Set 2 (R peripheral) – 1/2 GPC clusters	Continue to follow…higher suspicion of true bacteremia
Day 3 Coagulase-negative Staph, 4/4 bottles	Bacteremia highly likely (or confirmed?); Admit patient for workup, repeat BCx

Clinical course

- Readmitted to hospital, found to have persistent CoNS bacteremia → port removal

SCH Case 3

80 y/o F with COPD (3L O2 at baseline) presents to ED with dyspnea on Day 1

- T 37, HR 140, RR 26, BP 98/60; O2 sat increased > 90% on 4L; WBC 13,
- blood cultures drawn x2 sets; discharged on 5-day "Z-pak"

Micro Data (date of result)

Day 2

Set 1 – GPC in clusters 1/2 bottles

Set 2 – GPC in clusters 2/2 bottles

ED calls patient, who says they are feeling better on the z-pak

Day 3 and Day 4

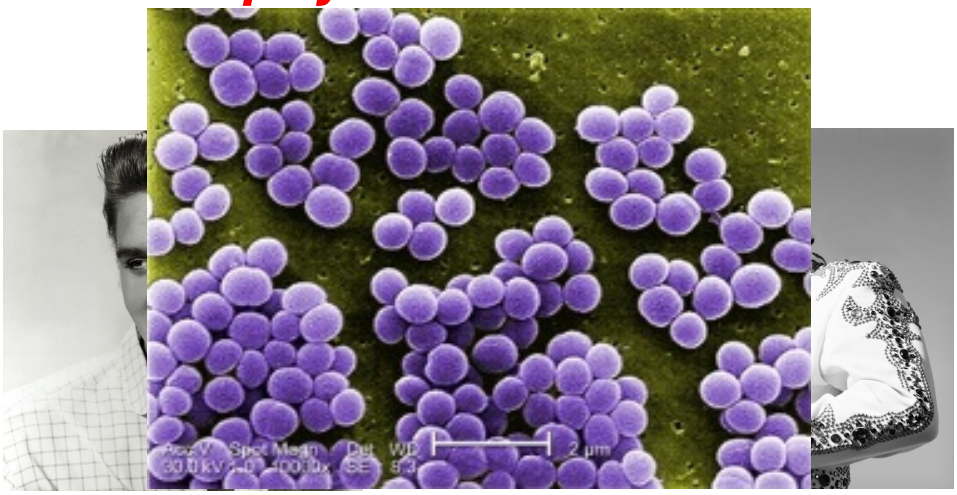
- Both sets MSSA, 4/4 bottles

Clinical course

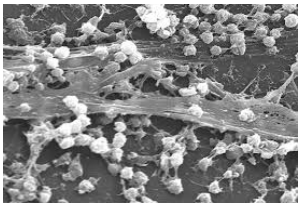
- Day 7 Readmitted to hospital, found to have persistent MSSA bacteremia (D1, D4, D7, D8)
- Day 11 Decompensation → withdrawal of care

Which one is the true KING?

Staphylococcus aureus



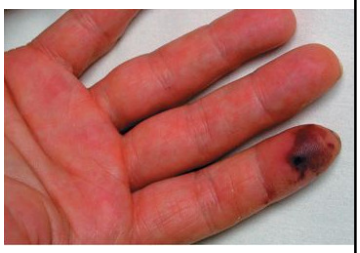
S.aureus bacteremia



Highly virulent/invasive (10-40% mortality)

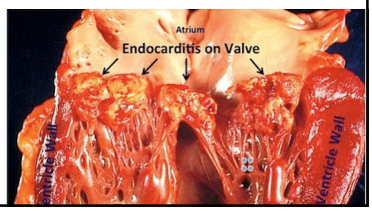
High risk of metastatic foci

- 1/3 of patients
- Especially if long-standing/community-onset
- Most common cause of endocarditis in U.S.



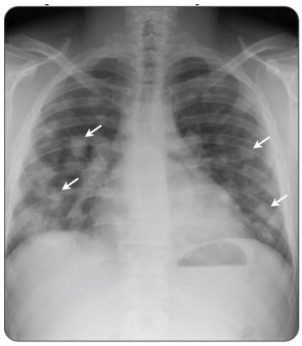
Attributable costs

- 10K-50K+ / hospitalization
- 4-12 days addl LOS



Clin Infect Dis 2009;48:S254-7
www.sidp.org

S. aureus Bacteremia: Common sources/syndromes



Sources

- Deep wounds/abscesses
- Catheter/device-associated infections
- IVDU
- Other primary sources: skin/lung

Syndromes

- Vertebral osteomyelitis/epidural abscesses
- Sepsis
- Infective endocarditis
- Embolic phenomenon
  (e.g. stroke, septic pulmonary emboli, kidneys*)

**S. aureus* positive urine culture

SAB: treatment duration

It depends…

- Uncomplicated: 2 weeks
- Complicated: at least 4 weeks
- Endocarditis: at least 6 weeks

Duration start

- Date of negative blood culture and…
- Removal/control of source

Example:

7/14 positive blood cultures
7/15 no blood cultures drawn
7/17 negative blood cultures

Source: SIDPEC website IDSA MRSA Guideline: *Clin infect Dis* 2011 52(3)e18-55

SCH Case 4 – *S. aureus* in the Urine

- 60 y/o male seen in ED for fevers/chills/malaise/flank pain
  - Abnormal UA—sent home on levofloxacin
  - Urine Culture positive for MRSA (48 h later)
  - Pharmacist sees alert
    - Identifies bug-drug mismatch
    - Team asks for assistance w/ MRSA-UTI management
- What questions/concerns do you have?
- Clinical course
  - Pt contacted and found to have MS changes/clinical decline
  - Pt later admitted to IMC: positive MRSA-blood culture
  - Diagnosed with MRSA bacteremia secondary to empyema

S. aureus in the Urine

Risk factors for urinary source:

- **Urinary catheterization** → Foley, suprapubic, intermittent cath
- Invasive urinary tract procedure

Other mechanisms:

- Hematogenous seeding of the kidneys (*S. aureus* bacteremia)
  - **Associated with high mortality!**

Teaching point

- *S.aureus* in the urine (without urinary catheter or prior surgery) should prompt evaluation for bloodstream infection with blood cultures, especially if systemic signs/symptoms of infection

Intermountain Healthcare

SCH Case 5

- 60 yo WM presented with fevers, chills, and back pain.
- Blood and Urine cultures on admission were positive for MRSA.
  - Diagnosis – MRSA bacteremia secondary to UTI
  - Discharge regimen – oral Bactrim

Questions? Concerns?

Clinical course

- Returns 6 weeks later to another facility with persistent back pain and LE weakness, neurogenic bladder
- Diagnosed with epidural abscess, taken to OR for decompression

Intermountain Healthcare

Factors that can affect blood culture interpretation

- Clinical pre-test probability of bloodstream infection
- Influence of blood culture contaminant rate at each facility
- Blood culture interpretation
  - Interpretation of *S.aureus* from single site
  - Interpretation of "GPCs" from single vs. multiple sites
- Patient showing clinical improvement despite not receiving IV antibiotics for S. aureus bacteremia

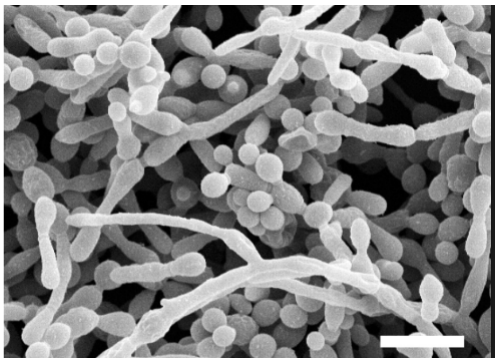
Teaching Points/Summary

- Significance of "GPCs" on blood culture result
  Depends on pre-test probability/number of positive cultures
- *S. aureus* rarely a contaminant
  - High morbidity/complication risk
  - Positive urine culture may represent hematogenous source
  - Document clearance of bacteremia
  - Typically requires minimum of 14 days of targeted IV ABX therapy
    [Longer duration (4-8 weeks) if other clinical factors]

Final Pop Quiz:

Which of the following is likely to be a contaminant in blood?

S. aureus
Candida
S. pneumoniae
Pseudomonas
Enterobacteriaceae
(e.g. *E.coli, K.pneumoniae)*
Mycobacteria



Predictive value of positive blood culture

Microorganism	Total Isolates	True Bloodstream Infection		Contaminant		Unknown Clinical Significance	
	n	n	%	n	%	n	%
Coagulase-negative staphylococci	1005	105	10	828	82	72	7
Staphylococcus aureus	339	315	93	4	1	20	6
Enterococcus spp.*	203	128	63	23	11	52	26
Viridans group streptococci	98	29	30	54	55	15	15
Streptococcus pneumoniae	26	26	100	0	0	0	0
β-hemolytic streptococci†	32	31	97	0	0	1	3
Corynebacterium spp.	86	7	8	76	88	3	3
Bacillus spp.	33	0	0	33	100	0	0
Micrococcus spp.	14	0	0	14	100	0	0
Lactobacillus spp.	10	4	40	6	60	0	0
Other Gram-positive bacteria‡	13	3	23	9	69	1	8
Escherichia coli	175	170	97	1	1	4	2
Klebsiella pneumoniae	118	112	95	1	1	5	4
Enterobacter cloacae	46	43	93	0	0	3	7
Serratia marcescens	42	39	93	0	0	3	7
Proteus mirabilis	25	25	100	0	0	0	0
Other *Enterobacteriaceae*	62	62	100	0	0	0	0
Pseudomonas aeruginosa	52	50	96	2	4	0	0
Stenotrophomonas maltophilia	11	8	73	0	0	3	27
Acinetobacter baumanii	15	10	67	0	0	5	33
Other Gram-negative bacteria§	22	12	55	5	23	5	23
Clostridium spp.	25	16	64	6	24	3	12
Propionibacterium spp.	35	1	3	33	94	1	3
Peptostreptococcus spp.	13	5	38	4	31	4	31
Other Gram-positive anaerobic bacteria‖	4	3	75	1	25		0
Bacteroides spp.	35	34	97	0	0	1	3
Other Gram-negative anaerobic bacteria¶	8	7	88	0	0	1	13
Candida albicans	46	45	98	0	0	1	2
Candida glabrata	32	32	100	0	0	0	0
Other *Candida* spp.**	30	30	100	0	0	0	0
Other fungi††	7	5	71	1	14	1	14
Mycobacterium spp.‡‡	7	7	100	0	0	0	0
All microorganisms	2669	1364	51	1101	41	204	8

Am J Med 2010.123:819

Questions?

Intermountain Healthcare

Contact information: (ID Telehealth Service)

Infectious Diseases On-Call* (SCORE) Line:

- 801.50.SCORE (801.507.2673)
- (24/7/365 availability)

Todd Vento (Medical Director)

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- Cell: 385.228.9549
- Desk: 801.507.9340
- john.veillette@imail.org

*On Call for all Intermountain Small Community Hospitals;
Separate on-call services for Medical Centers: IMC/LDSH/McKay-Dee/Utah Valley/Dixie

SCH Case 2

20 y/o M (chronic neuro condition requiring leg braces) presents to ED on 5/22 with bilateral foot ulcers draining purulent material and surrounding cellulitis

- T 37, HR 106, RR 16, BP 161/87; WBC 13,
- blood cultures drawn x2 sets + abscess culture;
- discharged on Augmentin (amoxicillin/clavulanate)

Micro Data (date of result)

5/22 Abscess cx – 4+ MSSA

Blood cx drawn

5/22

Set 1 – GPC clusters, 1/2 bottles

Set 2 – GPC clusters, 1/2 bottles

5/23 and 5/24

MSSA, 3/4 total bottles

Clinical course

- 5/25 Readmitted to hospital for IV abx