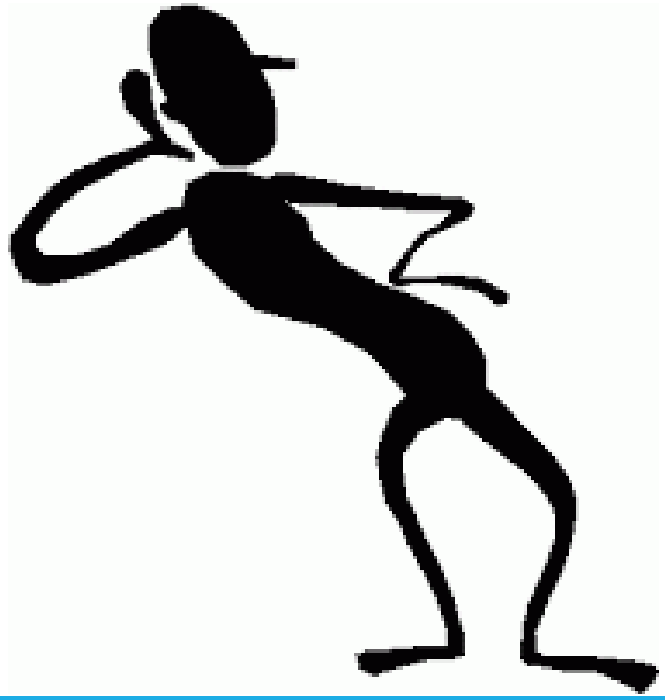
What is PFGE Telling Us…

Are We Listening?



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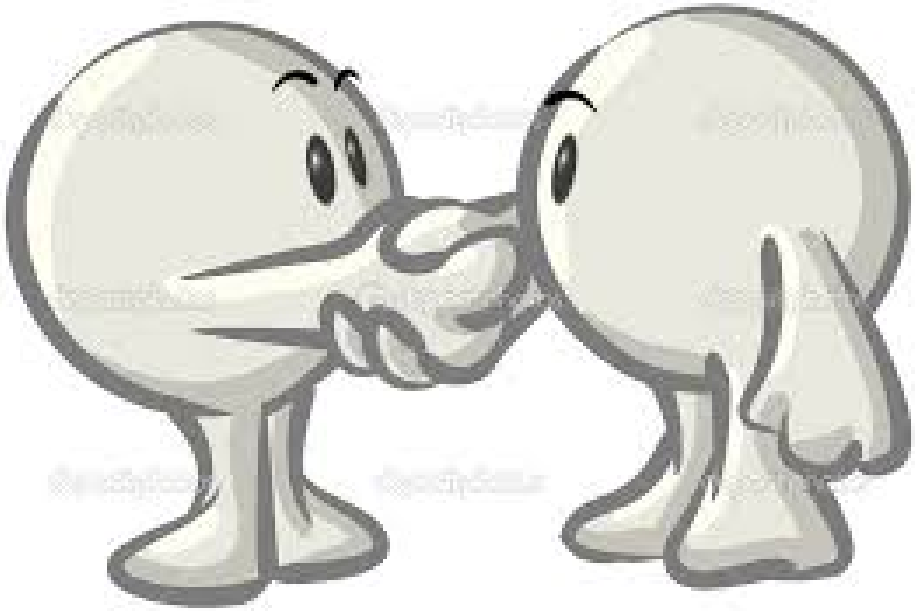
Objectives

- Present some of the challenges we faced with running PFGE on VRE & MRSA/MSSA isolates
- How do we help without opening the flood gates for PFGE testing?
- Do the results make a difference?

VRE Results in 3 Days Instead of 7 Days

	Old Protocol - from Emory University Project (1996)			**PulseNet Gram Positive Procedure (8/2012)**
Day 0	Isolate on BAP		Day 0	Isolate on BAP
Day 1	Single colony pick to BHI			Make cell suspension
	Incubate 18-24 hrs			Make plugs
Day 2	Make cell suspension			Lyse for > 2 hrs
	Centrifuge to remove BHI			Wash >5 times, 15 mins each
	Make plugs		Day 1	Restrict 2 hrs at 25C
Day 3	Lyse for 24hrs (or over weekend)			Load
Day 4	Wash >8 times, 30 mins each		Day 2	Intreprete gel in BN
Day 5	Restrict 4 hrs at 25C			
	Load			
Day 6	Intreprete gel in BN			

A partnership was formed



Case 1: Cluster in ICU?

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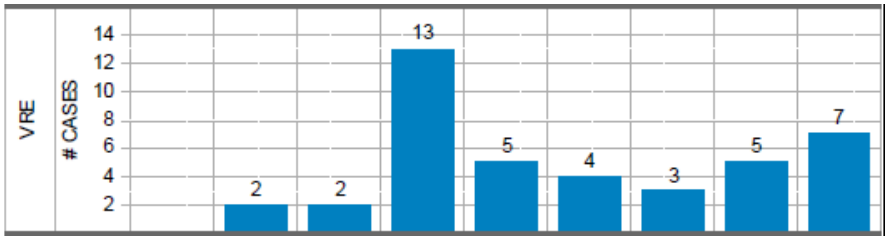
Identified 3 nosocomial VRE cases within a 2 week period



1 week later:

1 additional VRE case

1 of 3 initial cases expires

2 weeks from initial alert:

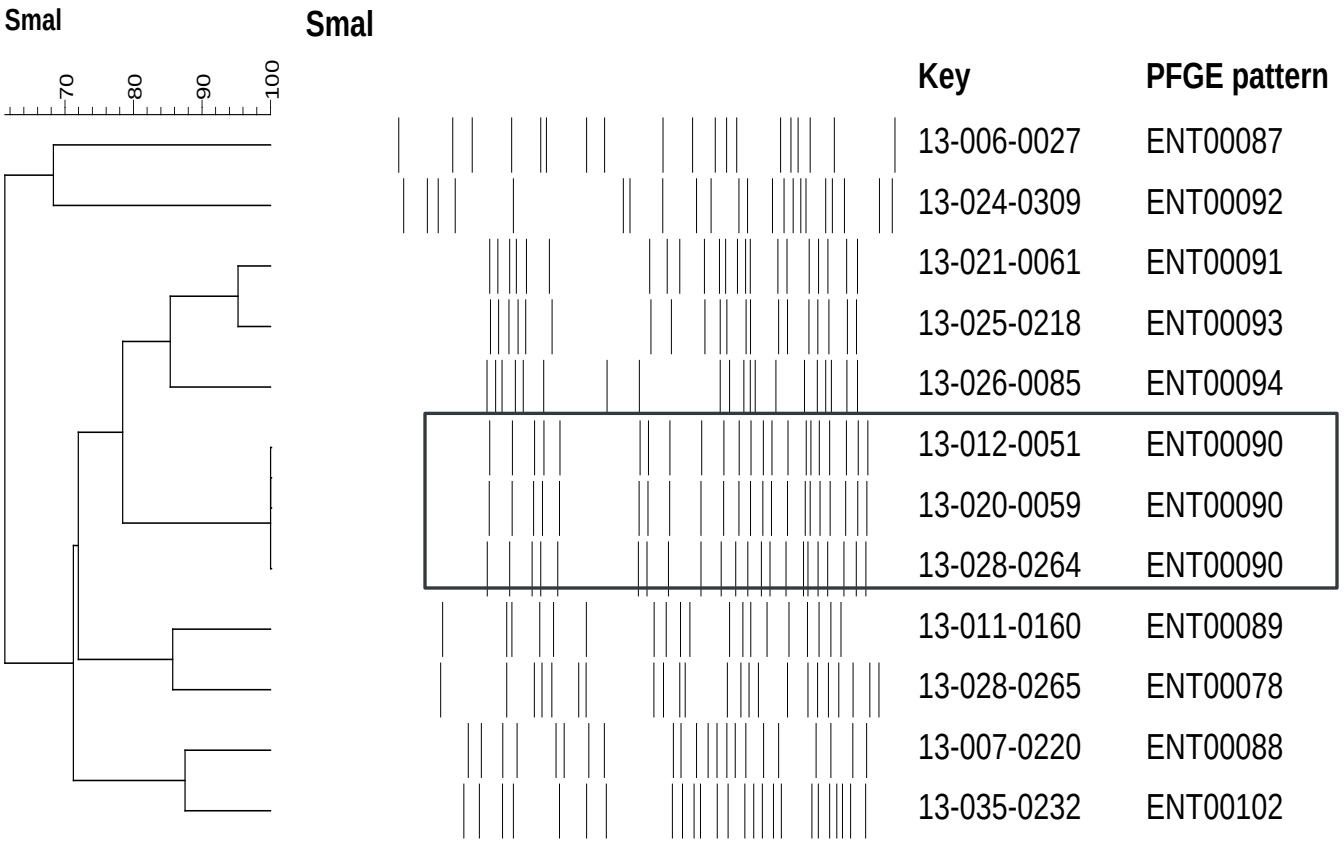
1 additional VRE case

Interventions

- Case investigation
- Cluster Alert
- Increased environmental cleaning
- Increase awareness of HH, PPE compliance
- Additional environmental cleaning

PFGE testing

Case 1: VRE isolates in ICU



Source	PFGE pattern	PFGE Pattern Interpretation
Urine	ENT00099	Indistinguishable
Rectal	ENT00099	Indistinguishable

Case 1: What happened?

A

Next day

B

2 days later

C

COLONIZED

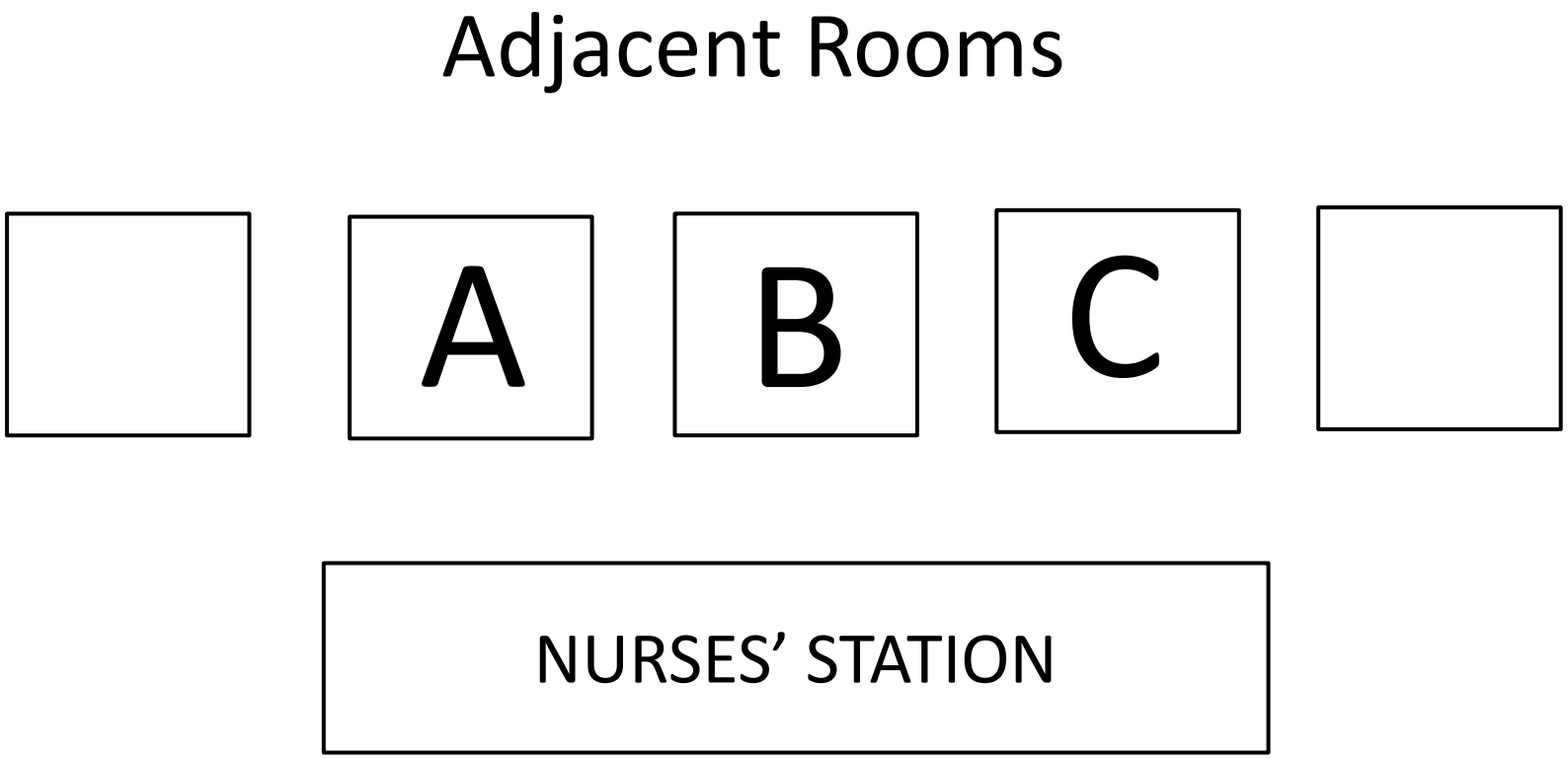
2 WEEKS LATER

2 days LATER

COLONIZED

Patient dies

Case 1: What did they have in common?



Case 1: Interpretation of PFGE

Cluster or not a cluster?

Cluster

- 1 strain between 3 patients
- Combination of nosocomial and present on admission
- Consistent with **healthcare worker transmission**

Interventions

- Deep cleaning of rooms decrease bioburden
- Educate: Aggressive hand hygiene
- Concluded cluster after 3 weeks of no new VRE cases
- Returned to regular cleaning schedule

Case 2: Cluster in Surgical Unit?

Case 2: Cluster in Surgical Unit?

Identified 4 nosocomial VRE cases within a 3 week period
(above norm: 2-5 per quarter)

- Case investigation
- "Heightened Awareness" Alert

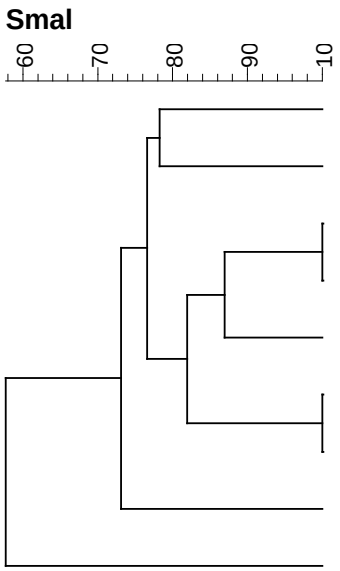
(all but 1 discharged)

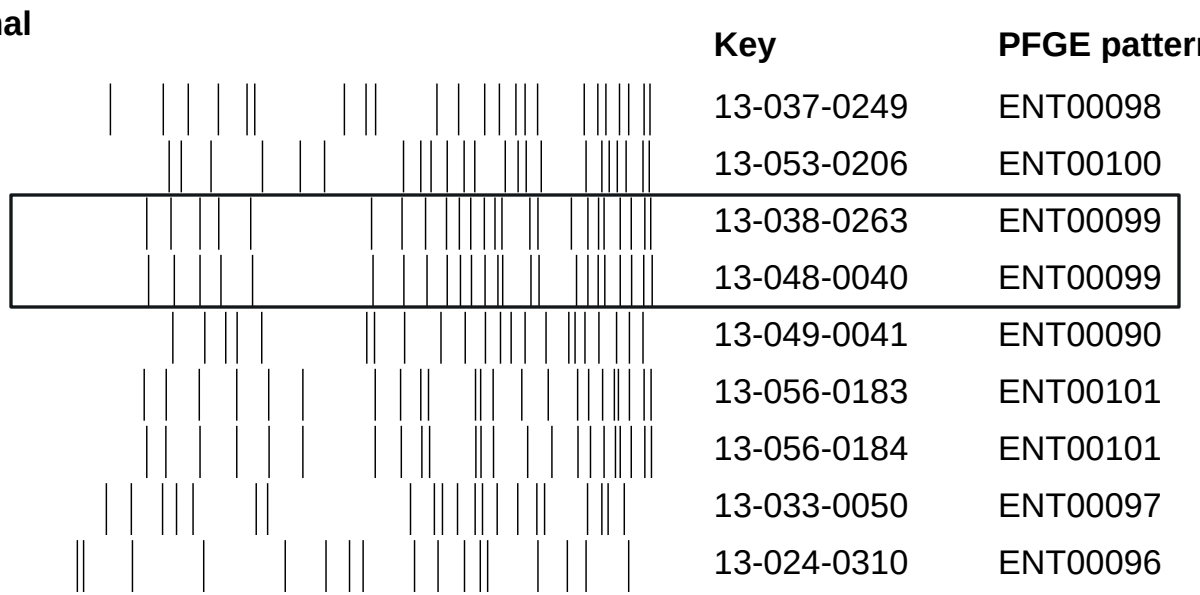
1 week later:
1 additional VRE case

- Initiated Cluster Alert
- Extra cleaning

PFGE testing

Case 2: PFGE Results





Key	PFGE pattern
13-037-0249	ENT00098
13-053-0206	ENT00100
13-038-0263	ENT00099
13-048-0040	ENT00099
13-049-0041	ENT00090
13-056-0183	ENT00101
13-056-0184	ENT00101
13-033-0050	ENT00097
13-024-0310	ENT00096

Source	PFGE pattern	PFGE Pattern Interpretation
Urine	ENT00099	Indistinguishable
Rectal	ENT00099	Indistinguishable

Case 2: What Happened In This Room?

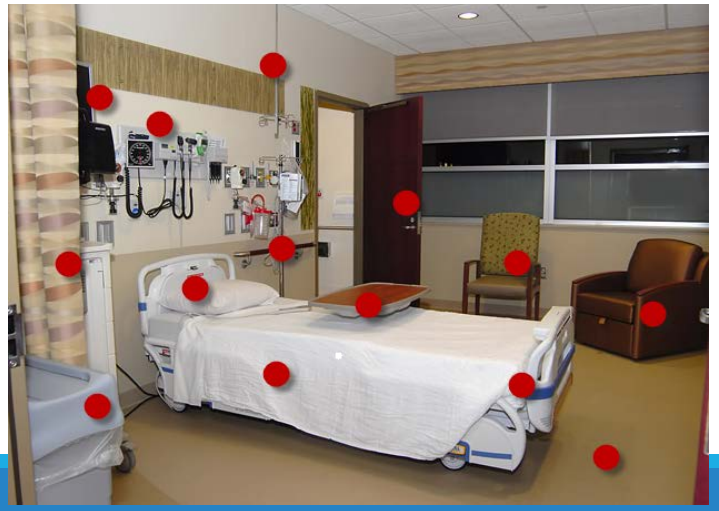
Patient A Day 1: Admit → Day 4: Discharged

Patient B Day 5: Admit → Day 6: Discharged

Patient C Day 6: Admit → Day 7: Discharged

Patient D Day 9: Admit → Day 14:

Environmental Transmission



Case 2: Interpretation of PFGE

Cluster?

Not a cluster, true transmission

- 1 strain between 2 pts
- Never in same unit at the same time
- Never in hospital at the same time BUT, was in same room 5 days apart
- Consistent with <u>Environmental contamination</u>

Interventions

- Deep cleaning of common room
- Educate staff and housekeepers regarding quality cleaning
- No new VRE cases

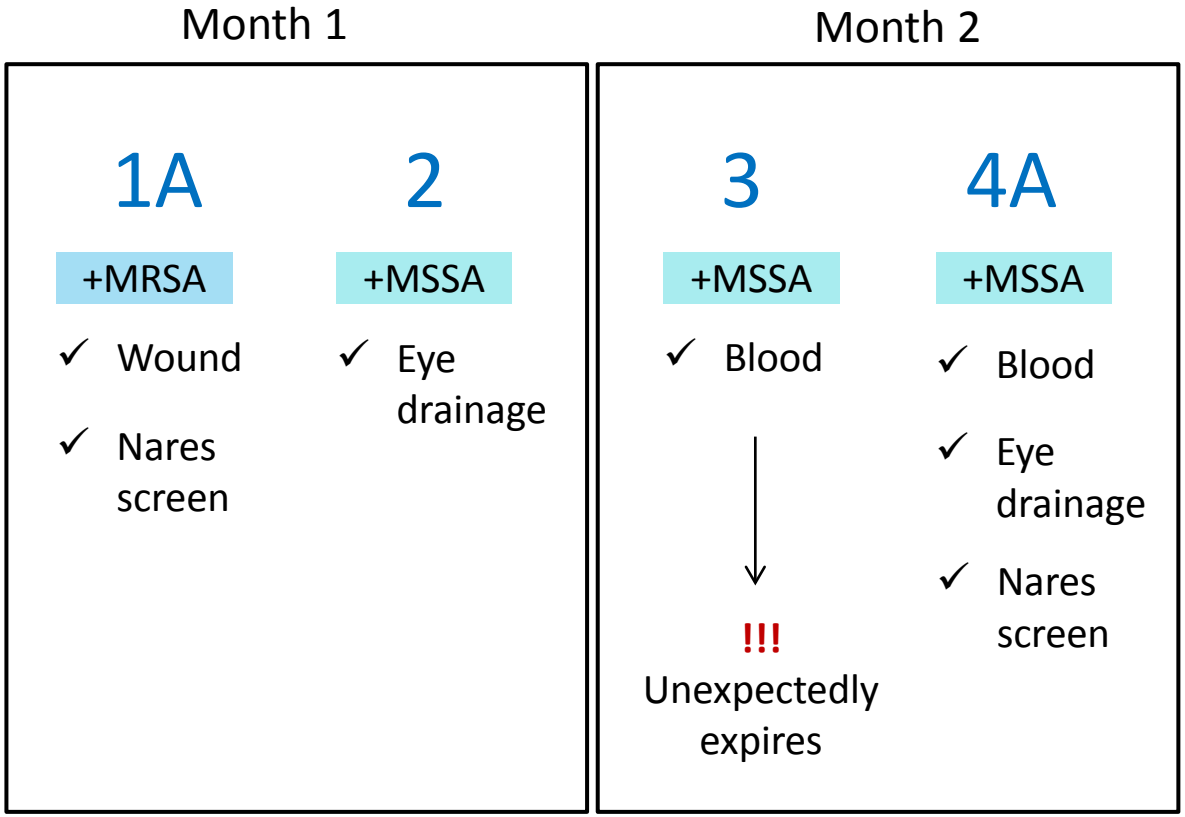
What's Left Behind?
Room Contamination After a Terminal Discharge Cleaning Procedure

Pathogen	% Contaminated After Discharge Cleaning
MRSA [1]	74% of surface cultures
MRSA [2]	46% of rooms
MRSA [3]	24% of rooms
VRE [3]	22% of rooms
VRE [4]	16% of rooms

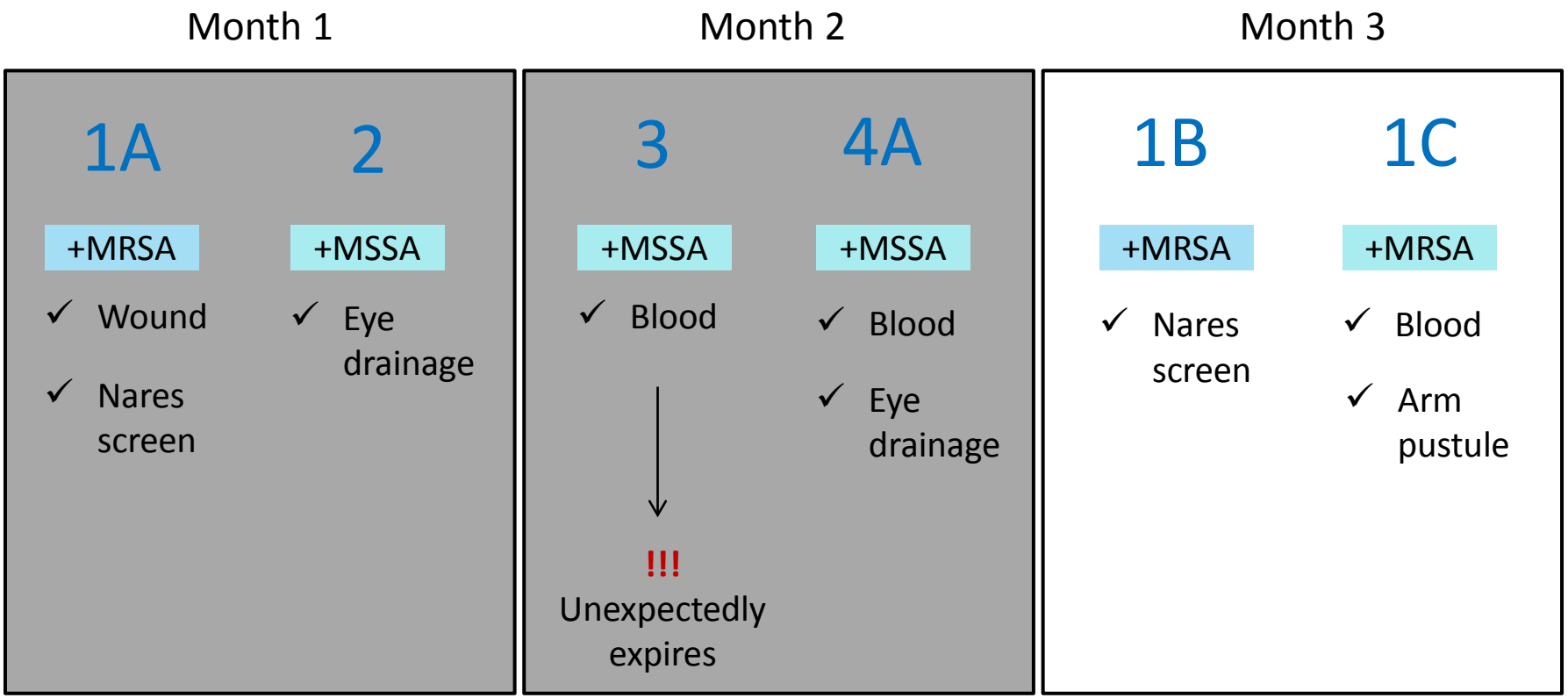
[1] French GL et al. J Hosp Infect 2004;57:31-7
[2] Blythe D et al. J Hosp Infect 1998;38:67-70
[3] Goodman ER et al. Infect Control Hosp Epidemiol 2008; 29:593-9
[4] Byers KE. ICHE 1998;19:261-4.

Case 3: Cluster of MRSA & MSSA in a Neonatal ICU?

Case 3: A potential cluster MRSA & MSSA in a Neonatal ICU



Case 3: Additional Cases

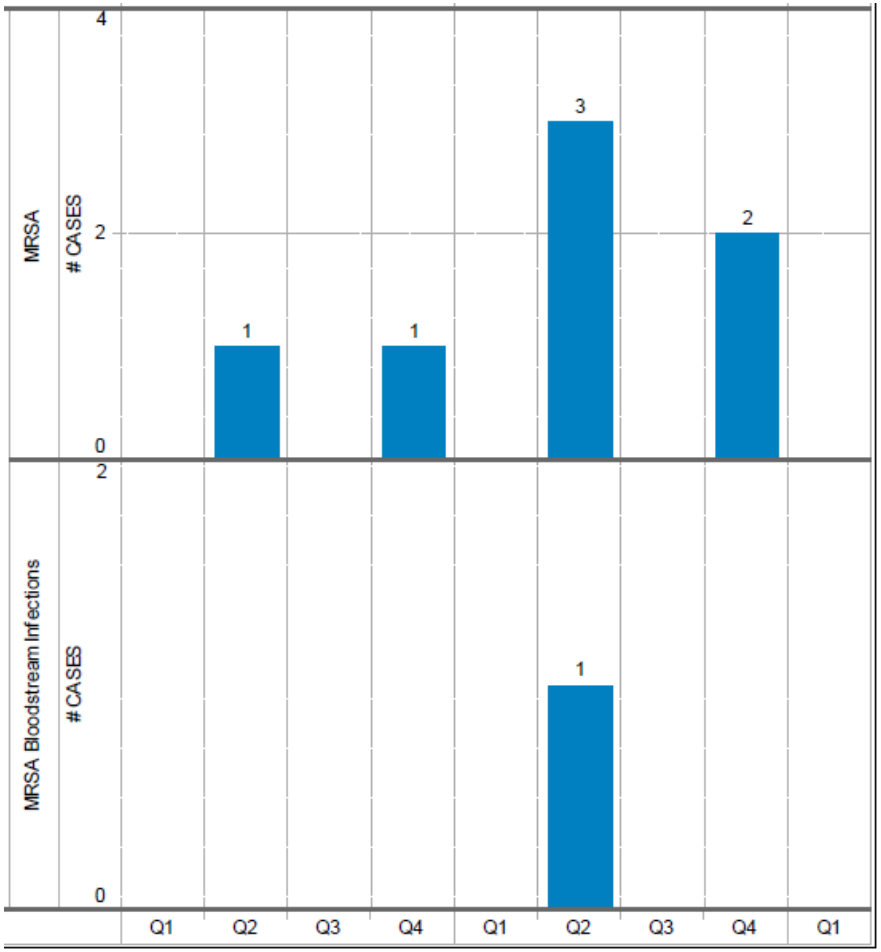


- Initiate MRSA/MSSA screening of all babies in the unit including previous positive babies.

Case 3: Situation above the endemic norm

- Endemic norm:
  - Cases few and far apart
  - No more than 2 per year
- Unexpected MSSA related death

Cluster Alert

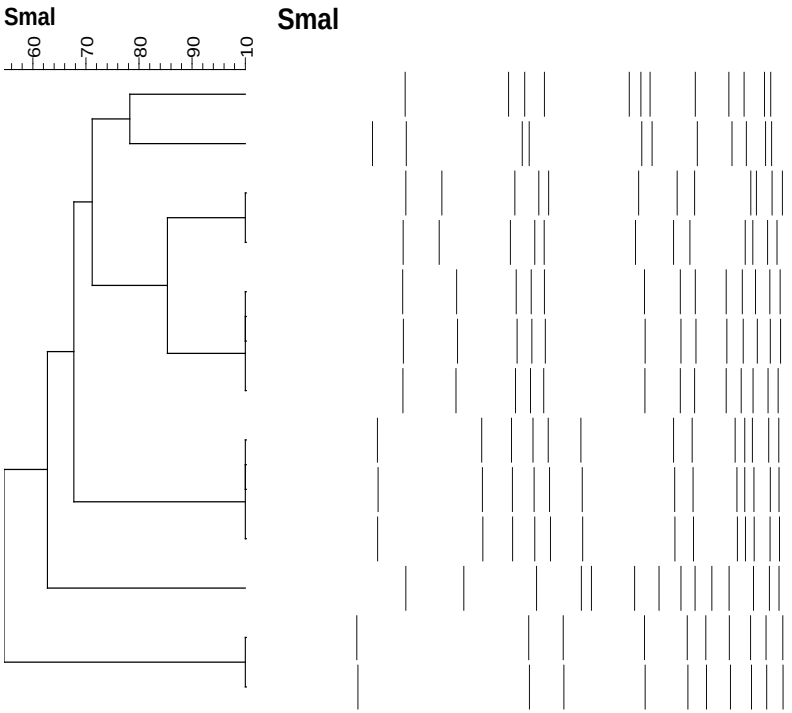


Case 3: Screening Results

- No additional +MRSA patients
- 7 additional +MSSA colonization
  - Up to 30% of population is colonized with any *S. aureus*
- In total:
  - 3 sets of triplets
  - 3 sets of twins
  - 1 singleton

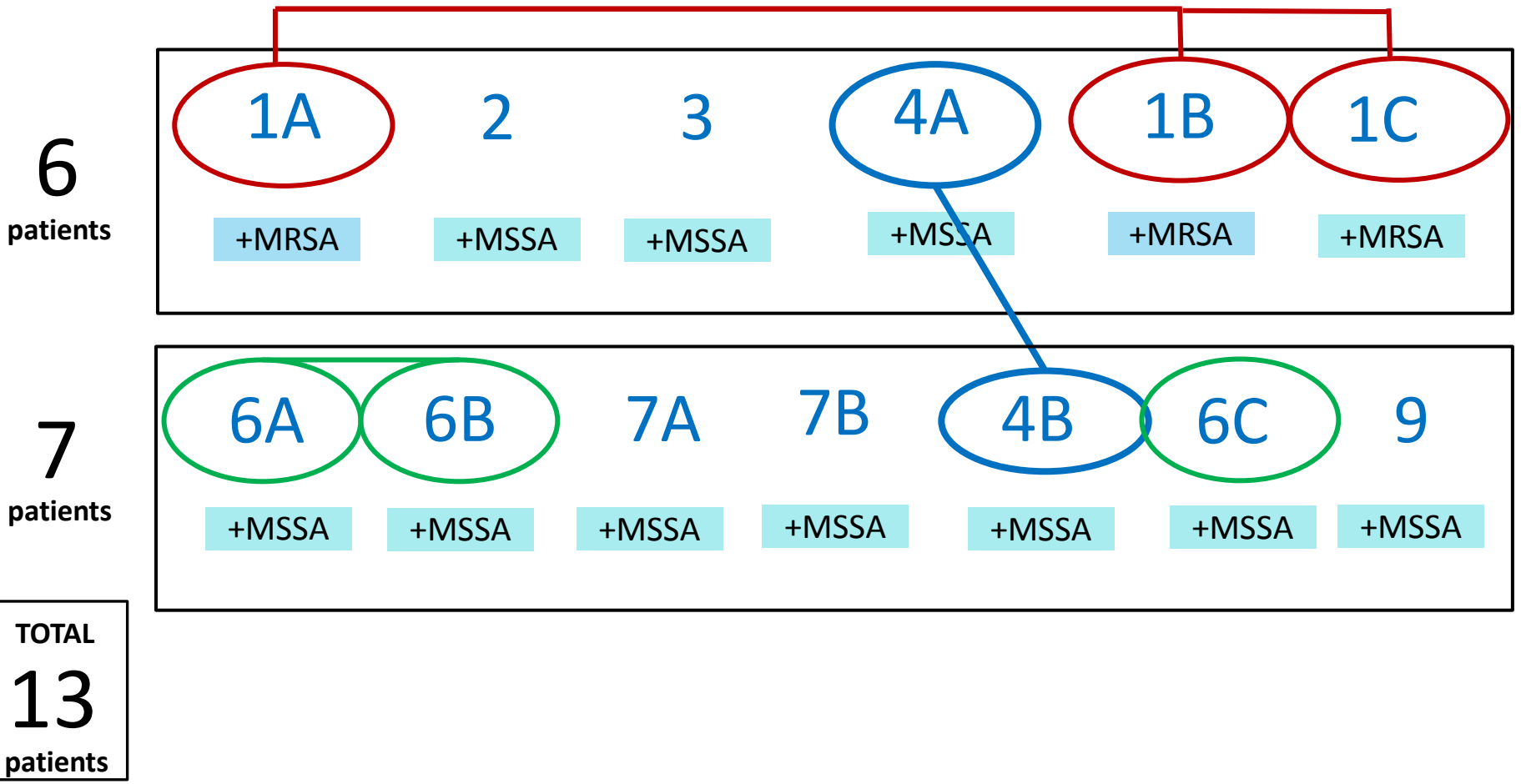
PFGE TESTING

Case 3: PFGE Results



Key	Patient	MRSA or MSSA
13-194-0037	Twin C	MSSA
13-194-0039	Baby A	MSSA
13-194-0032	Twin A	MSSA
13-194-0034	Twin A	MSSA
13-191-0233	Triplet B	MSSA
13-191-0234	Triplet B	MSSA
13-194-0033	Triplet B	MSSA
13-137-0180	Triplet A	MRSA
13-184-0203	Triplet A	MRSA
13-193-0158	Triplet A	MRSA
13-194-0038	Twin C	MSSA
13-194-0035	Twin B	MSSA
13-194-0036	Twin B	MSSA

Case 3: PFGE Results



Case 3: Interpretation of PFGE

- Each set of twins (except 1) shared the same fingerprint
- None of the fingerprints are common between families
- Cluster? NOT a cluster
- Source Unknown:

  Chicken or the egg?
  - Was it a staff, parent, or visitor?
  - Parents' active role in babies activities.

Interventions

- Staff: be more conscientious about activities between sets of twins
- Need to emphasize environmental and hand hygiene activities to keep bioburden low
- Educate parents
- Decolonization of known cases

PFGE did make a difference for detection and defining nosocomial clustering in this hospital setting

"The [PFGE] results make serious impact on residents, interns, and attendings alike – as we struggle to improve HH/PPE [Hand Hygiene/Personal Protective Equipment] compliance among MDs, it is this level of epidemiologic inquiry that actually results in a shift in thinking for our MDs (in my opinion)"

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Thank You

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