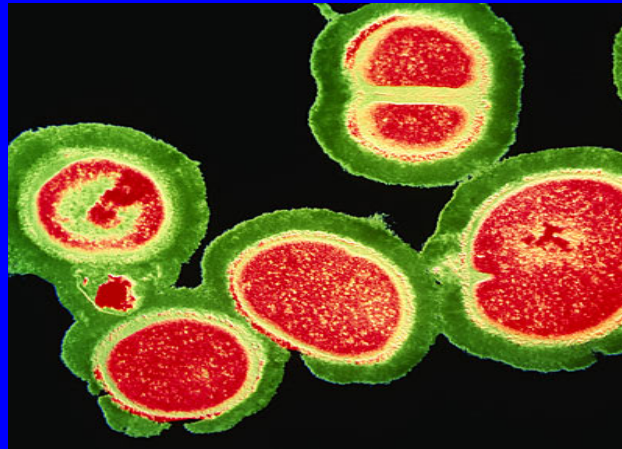


Methicillin Resistant *Staphylococcus aureus* MRSA and Fire Departments



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Background

- ❖ *S. aureus* found in 25-35% of general US population, MRSA in 1- 2%
- ❖ Colonizes the nose, skin, urogenital tract
- ❖ Methicillin resistant *S. aureus* [MRSA] first identified in 1940's
- ❖ Today 100,000 MRSA infections/year; $\frac{3}{4}$ found in the community
- ❖ Community Acquired MRSA [CA-MRSA] primarily 1 strain which has toxins and can infect all ages without risk factors

MRSA Disease

- ❖ *S. aureus* and MRSA does not cause disease unless the skin is broken or bacteria gets inside the body
- ❖ Skin infection often looks like a bug bite
- ❖ *S. aureus* and MRSA can be inhaled and cause respiratory disease
- ❖ Carriage of MRSA for > 1 year increases risk of disease

Community MRSA Disease

Respiratory disease



*Skin infections
most likely for
Fire personnel



Seasonal/Swine Flu and MRSA 2009-10

❖ Many of the deaths in 1918 flu pandemic was due to secondary infections

❖ **Today secondary infections with MRSA and other respiratory bacterial pathogens still very important cause of morbidity/mortality**

Fire Station Study

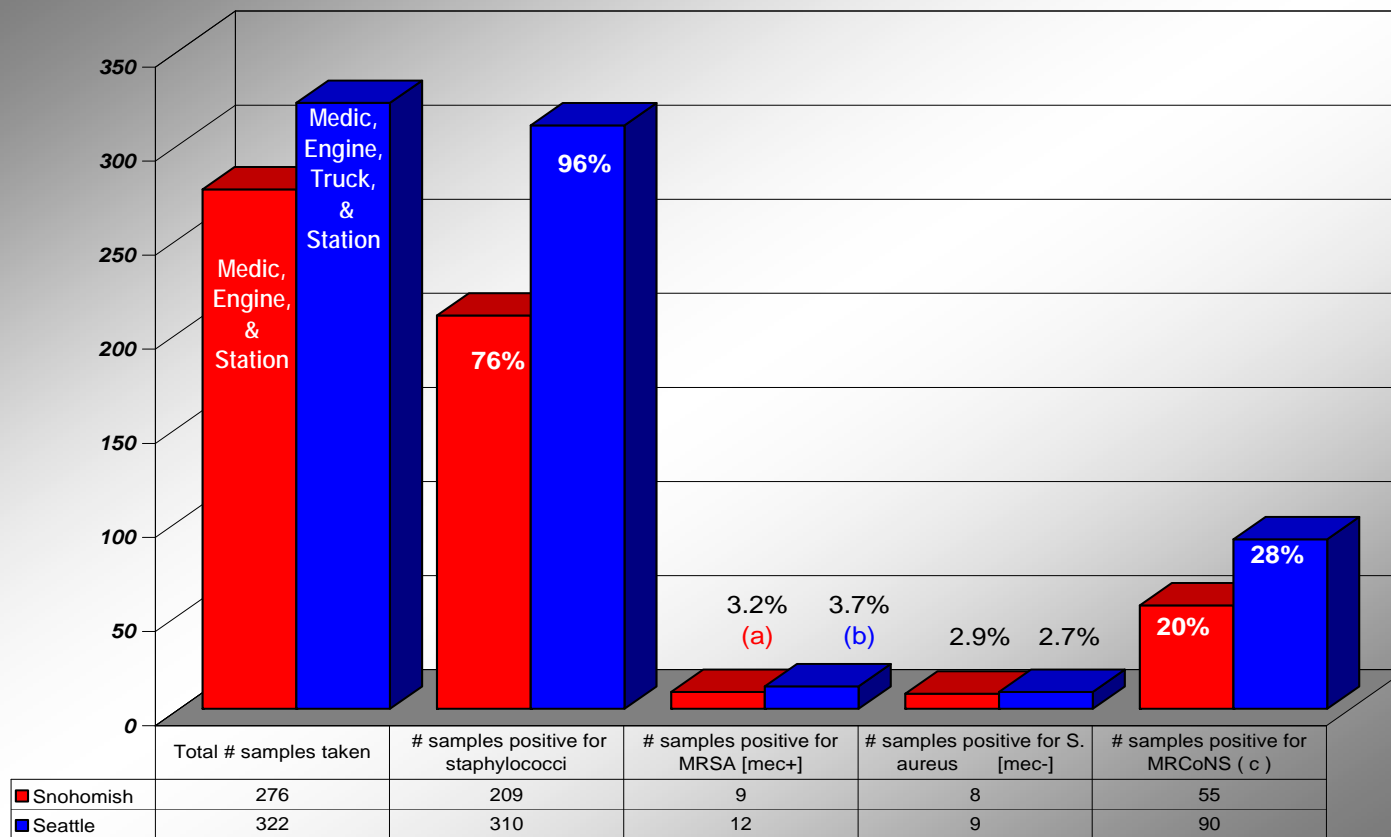
- ❖ Bacterial cultures in 1 Seattle and 1 Snohomish Fire Station
- ❖ Cultured surfaces in/on Fire Apparatus
- ❖ Cultured surfaces in living quarters
- ❖ Snohomish cultured washing machine

Fire Station Study

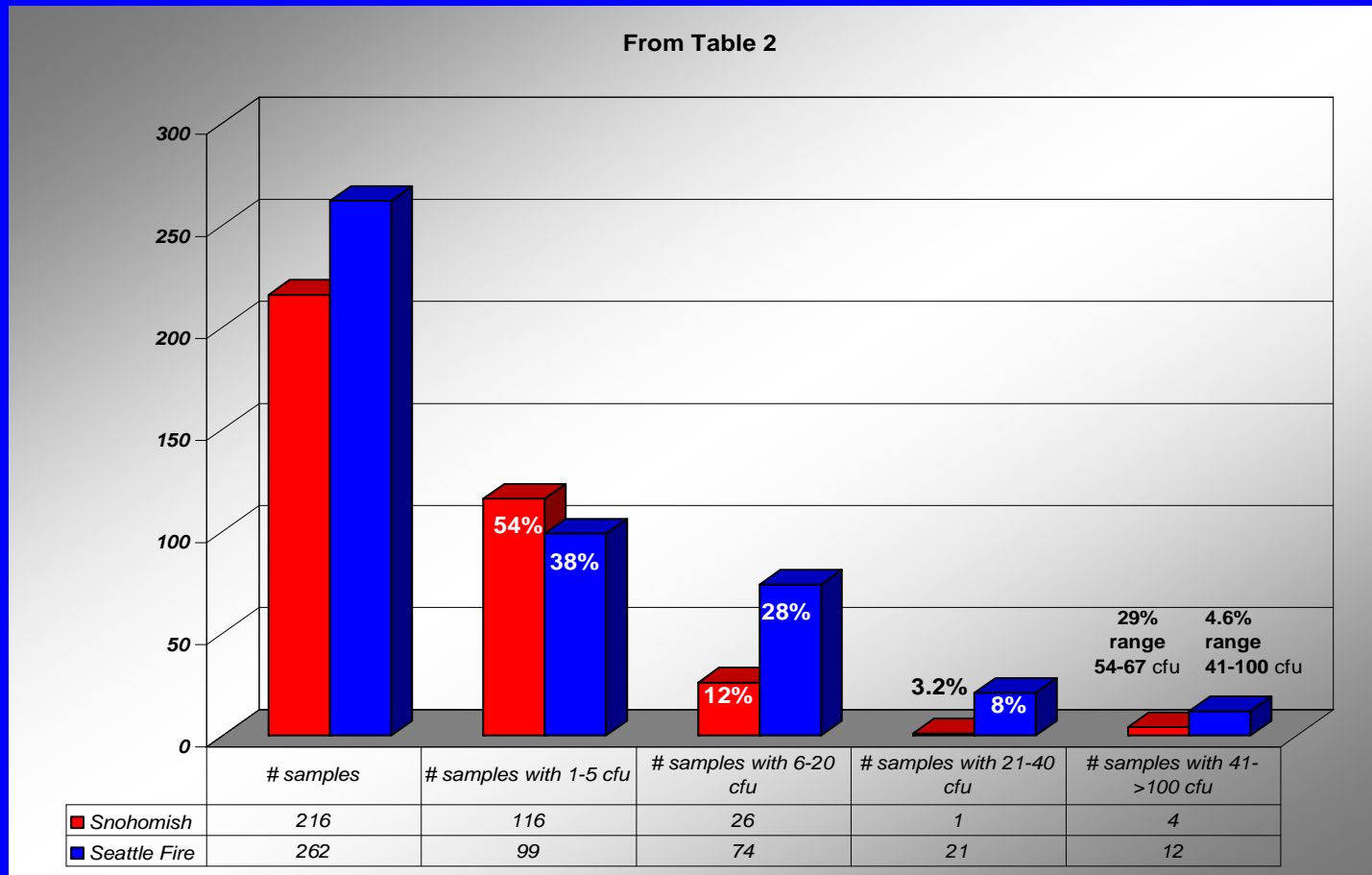
- ❖ Determine how many samples are positive for:
MRSA, *S. aureus*,
other staphylococci [CoNS],
other methicillin resistant staphylococci [MRCoNS]
- ❖ More likely to see MRCoNS, use as a surrogate for MRSA
- ❖ **Detect level normally $\leq 10\%$ of what is on the surface**
- ❖ All MRSA were characterized

Culture Results

From Table 1. Culture Results



Level of methicillin + staphylococci



MRSA Found

- ❖ MRSA + samples in medic trucks, fire engines and fire trucks
- ❖ Found both community and hospital acquired MRSA
- ❖ Same MRSA strains in Fire Apparatuses and Fire Station's living space
- ❖ MRSA spread from Fire Apparatuses into living space

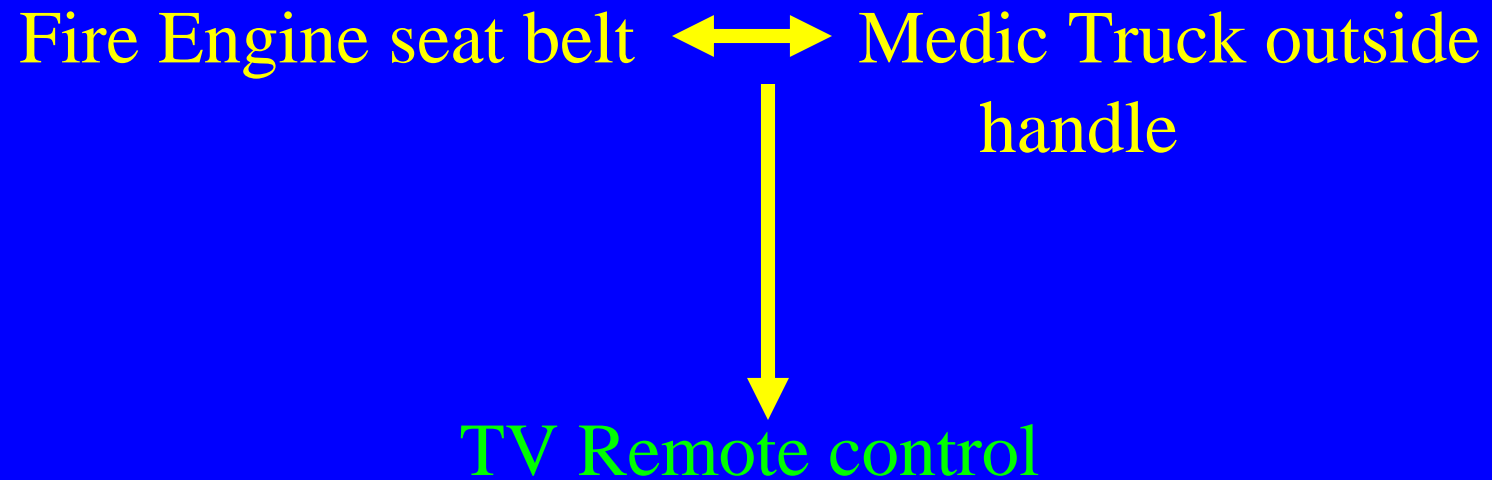
MRSA Positive Fire Apparatuses



MRSA Positive Fire Apparatuses



One MRSA Strain

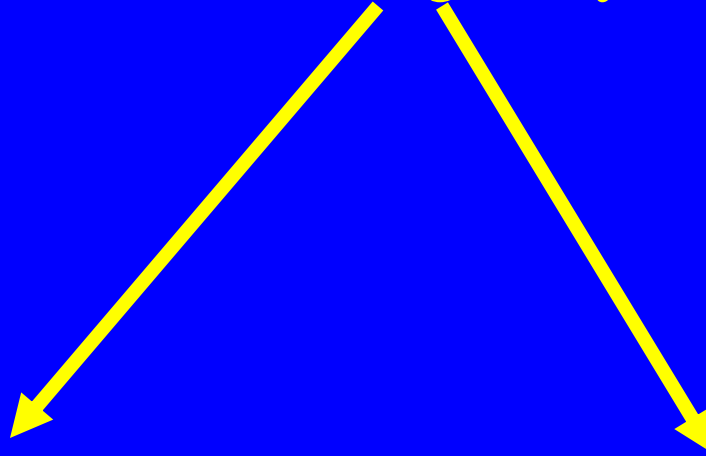


Other MRSA Positive Surfaces



One MRSA Strain

medic Truck electronics, gurney straps, soft bag handle



kitchen sink handle ↔ men's bathroom outer door

MRSA Positive Surfaces in Living Quarters



Gas/Brake Pedals in this Fire Truck MRSA+



One MRSA Strain

Fire Engine foot pedal ↔ Medic Truck floor



Bunk Jacket



Bathroom Counter

How MRSA Moves into Fire Station

- ❖ Medic truck the most likely source of MRSA
- ❖ Fire apparatuses may also be source of MRSA
- ❖ MRSA is spread from hands, shoes, bunk gear, clothing into Fire Station living space
- ❖ Once in Fire Station continues to spread
- ❖ **Aim to reduce the spread of MRSA by reducing carriage of MRSA from garage into living space**

Summary

- ❖ Current methods miss ~ 90% of the MRSA present on surfaces
- ❖ Both Fire Stations had similar percentage of MRSA, *S. aureus*, and MRCoNS
- ❖ Both hospital and community acquired MRSA were identified **IN BOTH STATIONS**
- ❖ **Current disinfectant protocols are not adequate to keep the MRSA levels low on/in the Fire apparatuses and the Fire Stations**

Evaluating Decontamination Process

- ❖ Determine if disinfecting contaminated surfaces once/week is adequate
- ❖ Use materials commonly found in Medic truck
- ❖ Seed 10^6 cfu/ml MRSA contact plate
- ❖ Disinfect then contact plate
- ❖ Contact plates on day 1, 3 and 4



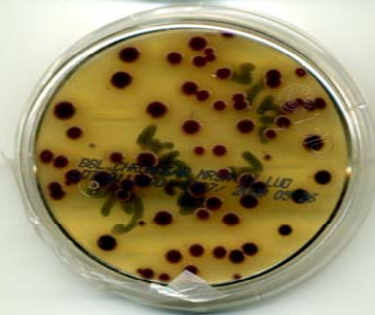
Before



After Disinfectant



One Day After



3 Days After



4 Days After

Disinfectants

- ❖ **No disinfectant eliminates 100% of the bacteria**
- ❖ **Good disinfectant activity reduces bacterial count by 10^3**
- ❖ **If 10^6 bacteria disinfectant will reduce to 10^3**
- ❖ **Disinfection of patient contaminated spaces, surfaces & equipment including Fire department apparatus: **should be done daily****
- ❖ **Thorough cleaning should be done after MRSA positive client**

Disinfectants

- ❖ Reduce or cover all fabric, woven/webbed materials
- ❖ Purchase new furniture with easily cleanable surfaces
- ❖ Cover all electronics, TV remotes, computer key boards, mattresses to allow for daily cleaning
- ❖ Disinfect handles of doors, trucks, cupboards, washing machines
- ❖ Automatic hand sanitizers by all doors from garage to living space

Other Suggestions

- ❖ More signs need to remind personnel to wash hands regularly
- ❖ Proper disposal of biohazardous waste needed at all times
- ❖ If MRSA infections persist in Fire Station personnel: then determining level of MRSA carriage and the type of strain present would be advised

Next Steps

- ❖ Make changes at Fire Station to reduce MRSA spread from garage to living quarters
- ❖ Estimate need ~8 weeks to see changes in bacterial cultures
- ❖ Develop educational material which will be evaluated by Fire Station personnel
- ❖ Validated educational materials distributed



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