MDRO:
Prevention in 7 Steps

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Multi-**D**rug **R**esistant **O**rganism

MDRO

MDRO: What are we talking about?

- MRSA
- VRE
- ESBL (E.coli, Klebs pneum, Pseudo)
- Acinetobacter sp.
- Pseudomonas sp.
- Stenotrophomonas sp.
- KPC (Klebsiella pn. And **others**)
- Etc (and more just waiting)

MDRO Pseudomonas

- CEFEPIME R
- CEFTAZIDIME R
- CIPROFLOXACIN R
- GENTAMICIN R
- IMIPEN/CILASTATIN S
- PIPERACILLIN/TAZO R
- TOBRAMYCIN R
- TRIMETH/SULFA R

Staying up at night?

MDRO Pseudomonas

- CEFEPIME R
- CEFTAZIDIME R
- CIPROFLOXACIN R
- GENTAMICIN S
- IMIPEN/CILASTATIN R
- PIPERACILLIN/TAZO R
- TOBRAMYCIN S
- TRIMETH/SULFA R

Nightmares!

MDRO Acinetobacter

- CEFEPIME R
- CEFTAZIDIME R
- CIPROFLOXACIN R
- GENTAMICIN R
- IMIPEN/CILAST R
- PIP/TAZO R
- TOBRAMYCIN R
- TRIMETH/SULFA S

Do I have your attention?

MDRO Management

- Antimicrobial Resistance in Healthcare Settings HICPAC
- (www.cdc.gov/drugresistance/healthcare/default.htm)
- Multifaceted, evidence-based approach with four parallel strategies:
  1. Infection prevention
  2. Accurate and prompt diagnosis and treatment
  3. Prudent use of antimicrobials
  4. Prevention of transmission

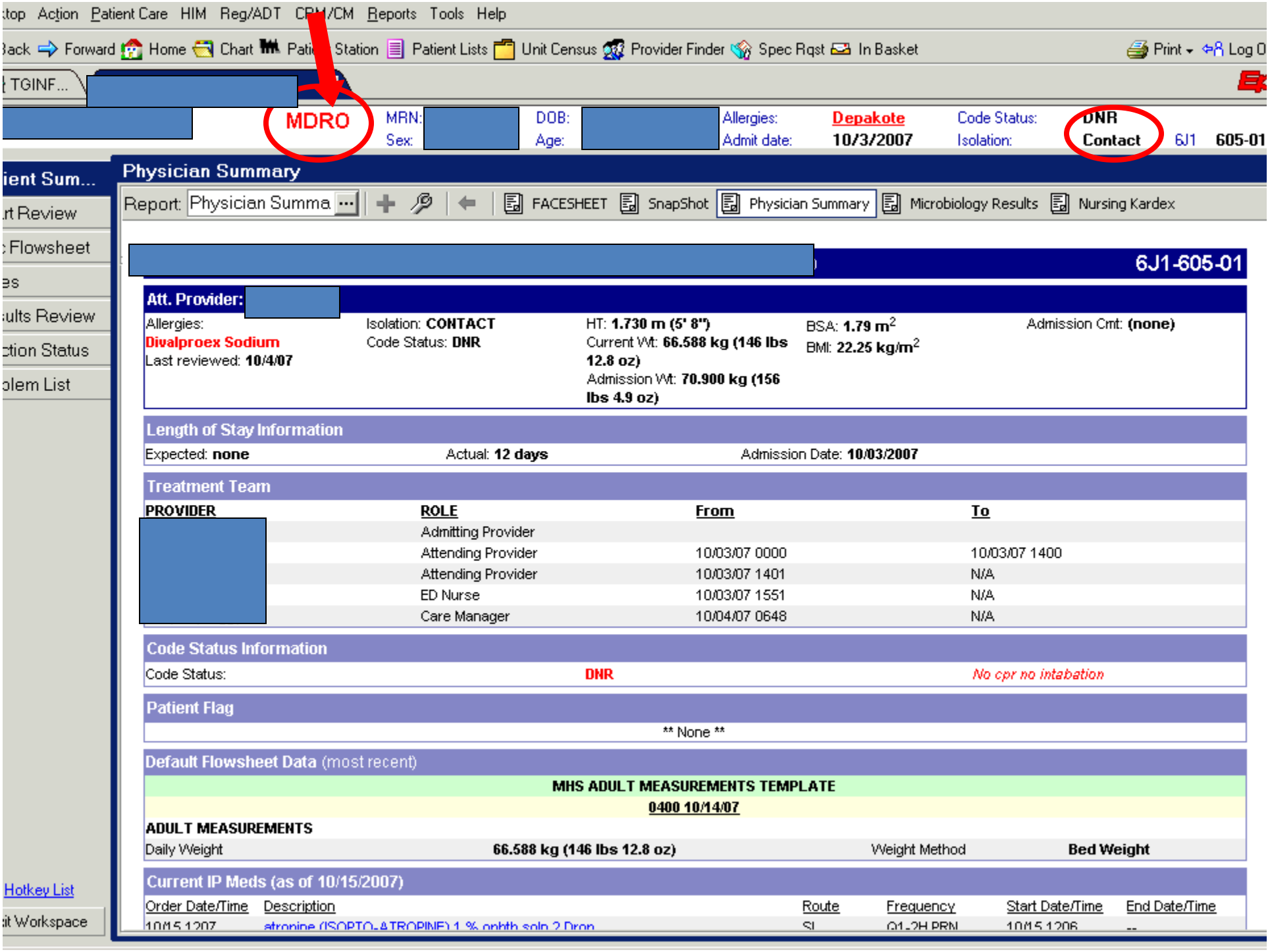
There is NO Silver Bullitt

- “Success = importance of having dedicated and knowledgeable teams of healthcare professionals who are willing to persist for years to control MDROs
- Eradication and control of MDROs frequently required periodic reassessment and the addition of new and more stringent interventions over time (tiered strategy)”*
- Successful MDRO control requires a median of 7 to 8 different interventions concurrently or sequentially!*

*CDC - MDRO Guideline: Prevention - HICPAC

Step 1: ***Administrative support (the hardest part)***

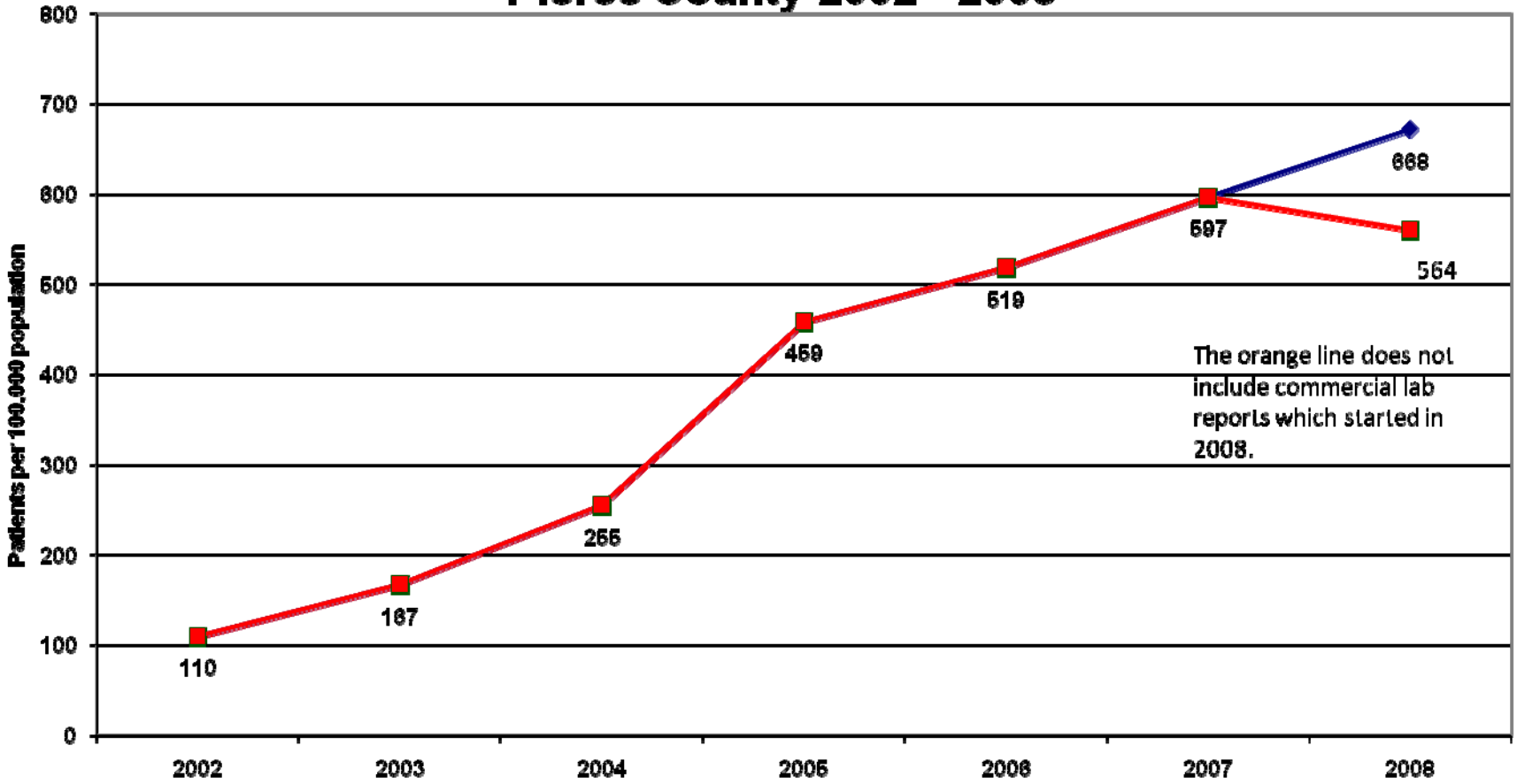
1. Implementing system changes to ensure prompt and effective communications of MDRO condition (FLAGGING, Data Mining, Electronic Medical Records, etc)
2. Number and placement of hand washing sinks and alcohol-containing hand rub dispensers (ease of hand hygiene is vital)
3. Enforce adherence to recommended infection control practices (e.g., hand hygiene, Standard and Contact Precautions) for MDRO control. (Compliance is *expected by the C-suite)*


Action Patient Care HIM Reg/ADT CPM/CM Reports Tools Help
Forward Home Chart Station Patient Lists Unit Census Provider Finder Spec Rqst In Basket Print Log O
MDRO
MRN:
Sex:
DOB:
Age:
Allergies: Depakote
Admit date: 10/3/2007
Code Status: DNR
Isolation: Contact
6J1 605-01
Physician Summary
Report: Physician Summa
FACESHEET SnapShot Physician Summary Microbiology Results Nursing Kardex
6J1-605-01
Att. Provider:
Allergies: Divalproex Sodium
Last reviewed: 10/4/07
Isolation: CONTACT
Code Status: DNR
HT: 1.730 m (5' 8")
Current Wt: 66.588 kg (146 lbs 12.8 oz)
Admission Wt: 70.900 kg (156 lbs 4.9 oz)
BSA: 1.79 m2
BMI: 22.25 kg/m2
Admission Cmt: (none)
Length of Stay Information
Expected: none
Actual: 12 days
Admission Date: 10/03/2007
Treatment Team
PROVIDER
ROLE
From
To
Admitting Provider
Attending Provider 10/03/07 0000 10/03/07 1400
Attending Provider 10/03/07 1401 N/A
ED Nurse 10/03/07 1551 N/A
Care Manager 10/04/07 0648 N/A
Code Status Information
Code Status: DNR
No cpr no intabation
Patient Flag
** None **
Default Flowsheet Data (most recent)
MHS ADULT MEASUREMENTS TEMPLATE
0400 10/14/07
ADULT MEASUREMENTS
Daily Weight 66.588 kg (146 lbs 12.8 oz)
Weight Method Bed Weight
Current IP Meds (as of 10/15/2007)
Order Date/Time
Description
Route
Frequency
Start Date/Time
End Date/Time
Hotkey List

Step 1: ***Administrative support***

5. Observation and feedback to HCW on adherence to recommended precautions and keeping HCW informed about changes in transmission rates (this is more than ICC reports – report at nursing/bed level)
6. Implementing change in ICUs, include analysis of structure, process, and outcomes for interventions, assist in identification of needed administrative interventions
7. Participate in existing, or new, city-wide, state-wide, regional or national coalitions, to combat emerging or new problems (next slide)

MRSA Incidence*, Pierce County 2002 - 2008



Data source: Data is collected from all 7 hospitals in Pierce County, approximately 14 long term care facilities and 10 clinics, and starting in 2008, 2 free-standing labs (Quest and Labcorp). Nares cultures and nasal screens are excluded.

Only the first isolate per patient per year is counted in civilian hospitals. Only first isolate per patient ever is counted for the military hospital. Nares cultures and nasal screens are excluded.

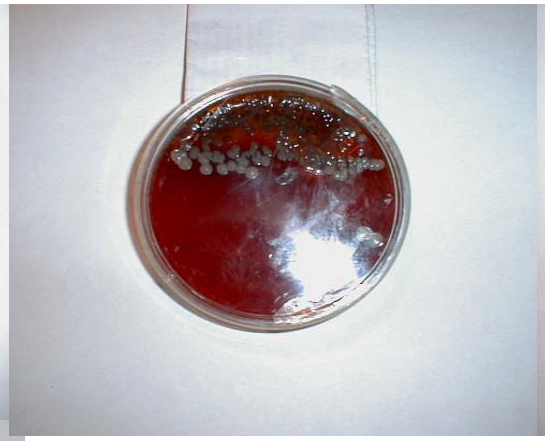
* Note: Data does not reflect true incidence because the county of residence is unknown for cases reported by Labcorp.

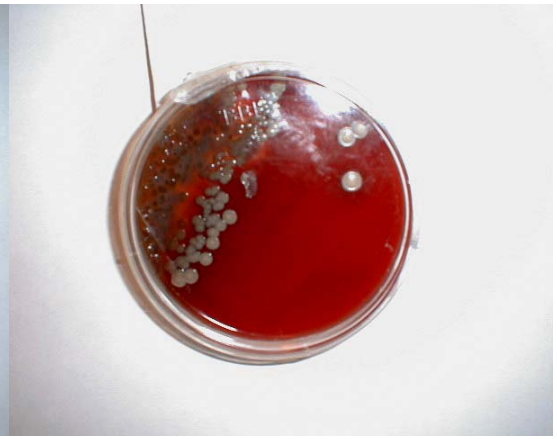
Tacoma | Pierce County Health Department
Healthier. Safer. Smarter.

Step 2: ***Education***

- Facility-wide, unit-targeted, and informal, educational
  - ILD (system wide), Staff meetings, etc.
- Encourage behavior change through improved understanding of MDRO
  - hand hygiene, antimicrobial prescribing patterns, or other outcomes (pictures speak 1000 words)
  - understanding and creating a culture to support and promote desired behavior ("Boots on the Ground" Infection Prevention)
  - Educational campaigns

The great clave experiment.....





15 clave ports from 15 different hospital units in TG & MB were randomly selected and cultured. 11 of the 15 grew Coag-Neg Staph or *Staph Epidermidis* plus lots of other nasty stuff. Four cultures grew nothing (but 2 of them were from brand new IV sets.....)

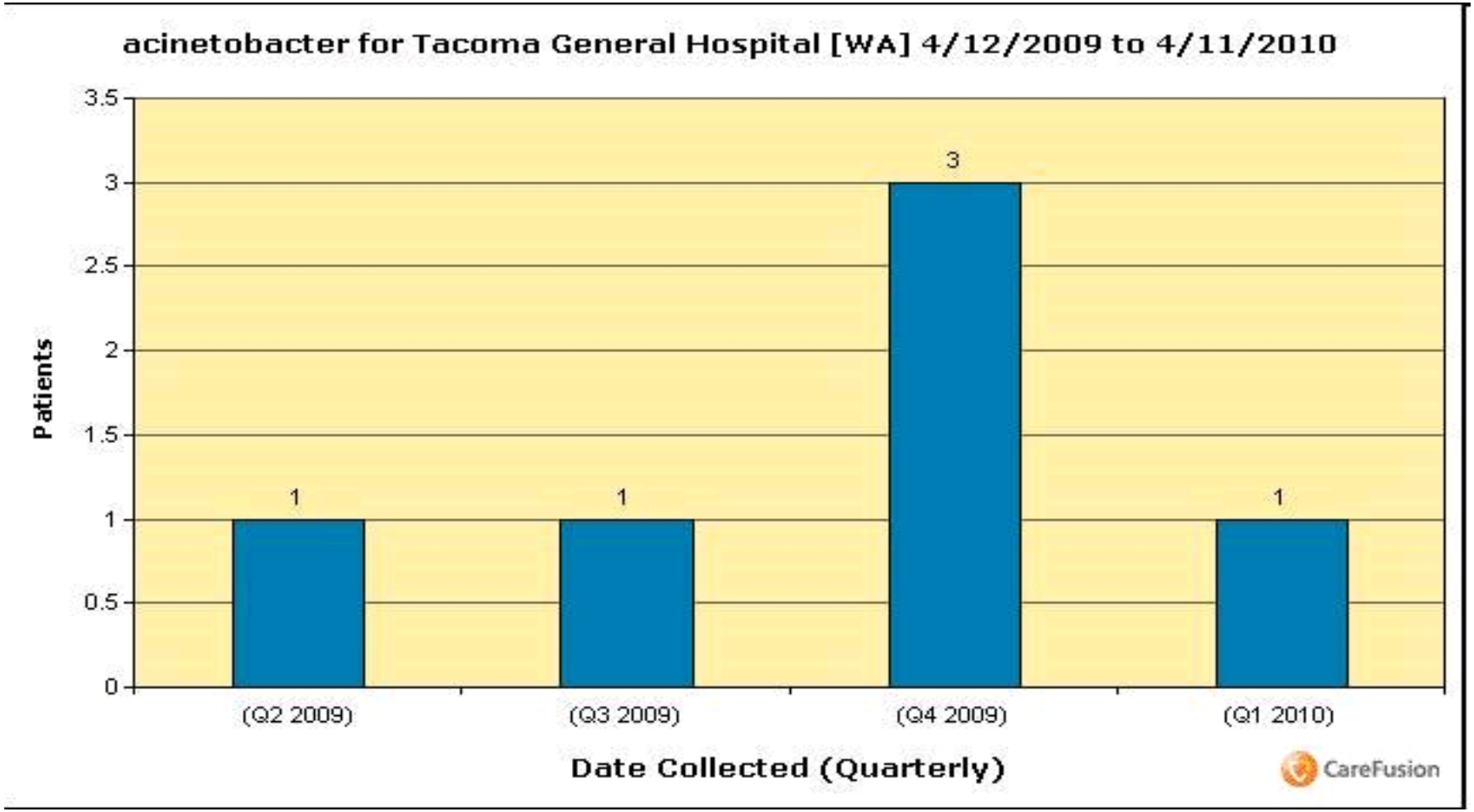
Step 3: **Judicious use of antimicrobials**

- Especially important in MDR-GNBs
- Education
- Formulary restriction
- Prior-approval programs and pre-approved indications
- Automatic stop orders
- Antimicrobial cycling
- Computer-assisted management programs
- Removal of redundant antimicrobial combinations
- Practice guidelines
- Mandatory consultation with peer review and feedback

Step 4: ***MDRO surveillance*** (my favorite = data mining)

- Antibiograms
- Incidence based on clinical culture results
- Targeted MDRO infections in specific patient populations or units (ICUs)
- Molecular typing of MDRO isolates
- Detecting asymptomatic colonization

Tracking Acinetobacter

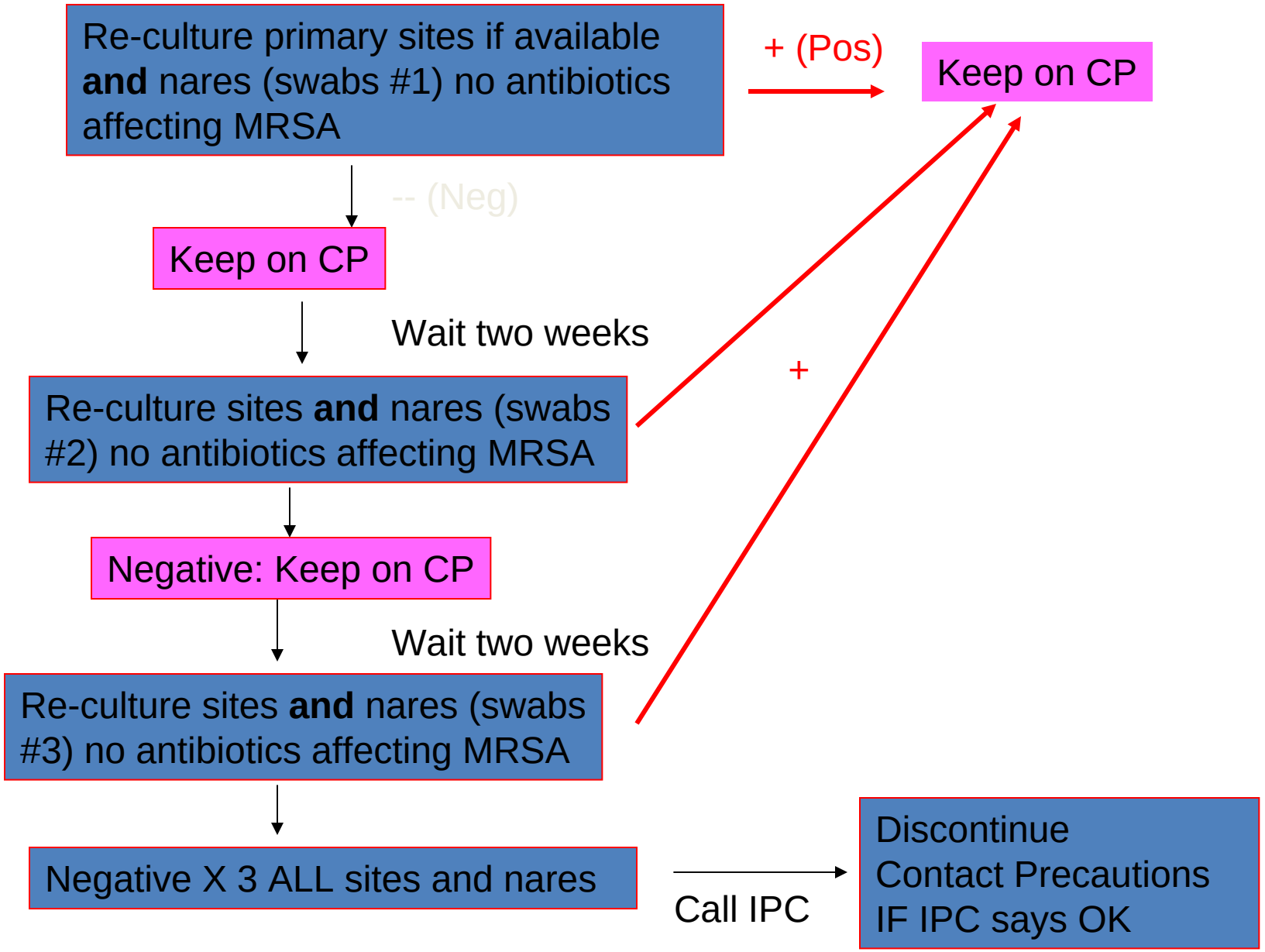


You don’t know if there’s a problem unless you can find it

Step 5: Infection Control Precautions

- Contact Isolation (ALL MDROs, not just MRSA)
- Cohorting
- Duration of Contact Isolation
- Barriers for patient care
- Impact of Contact Precautions on patient care and well-being

To discontinue *Contact Precautions*

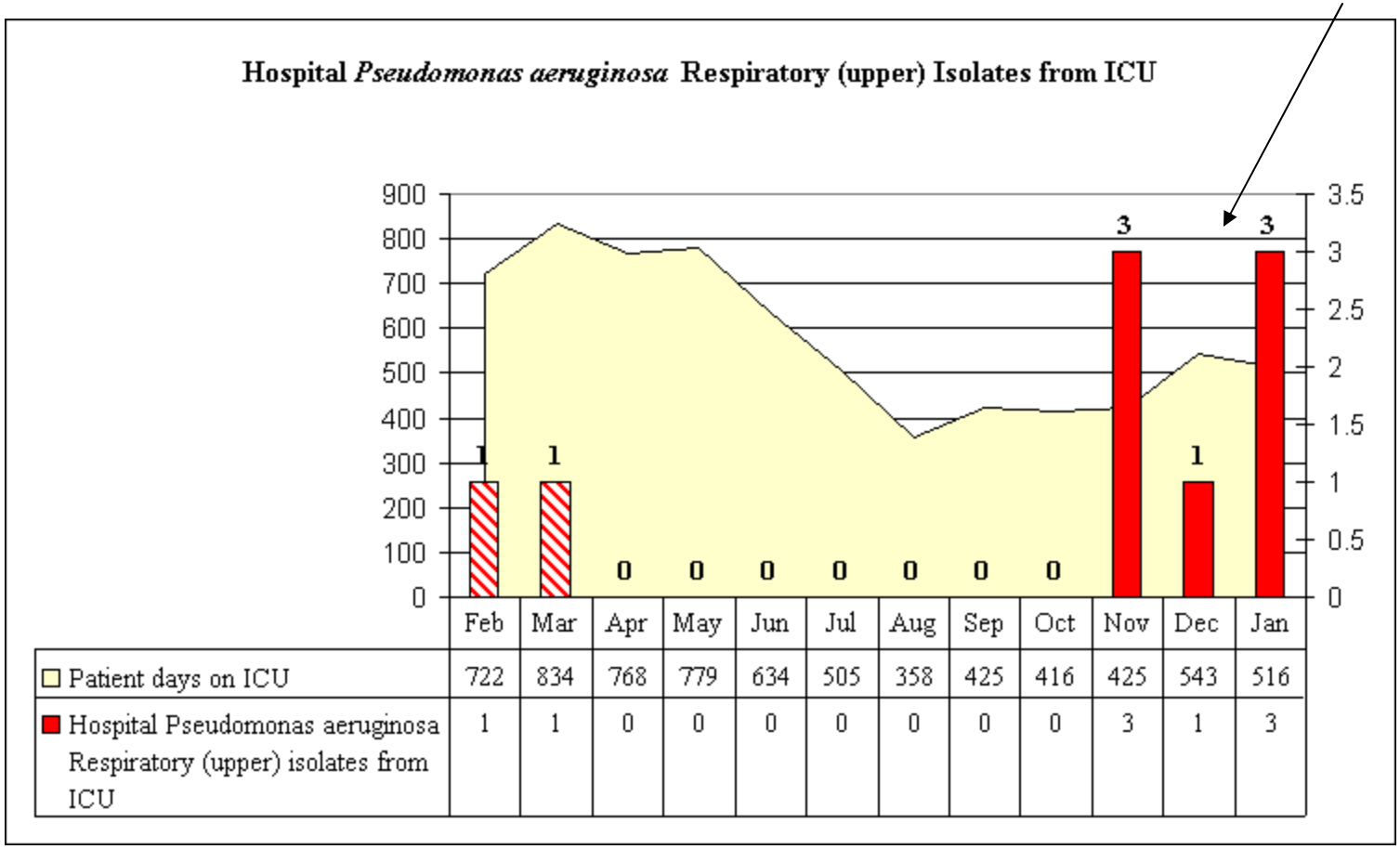


Step 6: **Environmental measures**

- Unidentified environmental reservoirs
- Dedicated noncritical medical equipment
- Assignment of dedicated cleaning personnel
- Increased cleaning and disinfection of frequently-touched surfaces (e.g., bedrails, charts, bedside commodes, doorknobs).
- Educational and observational intervention for housekeeping personnel
- Monitoring for adherence to recommended environmental cleaning

Tracking Pseudomonas

This is a problem!



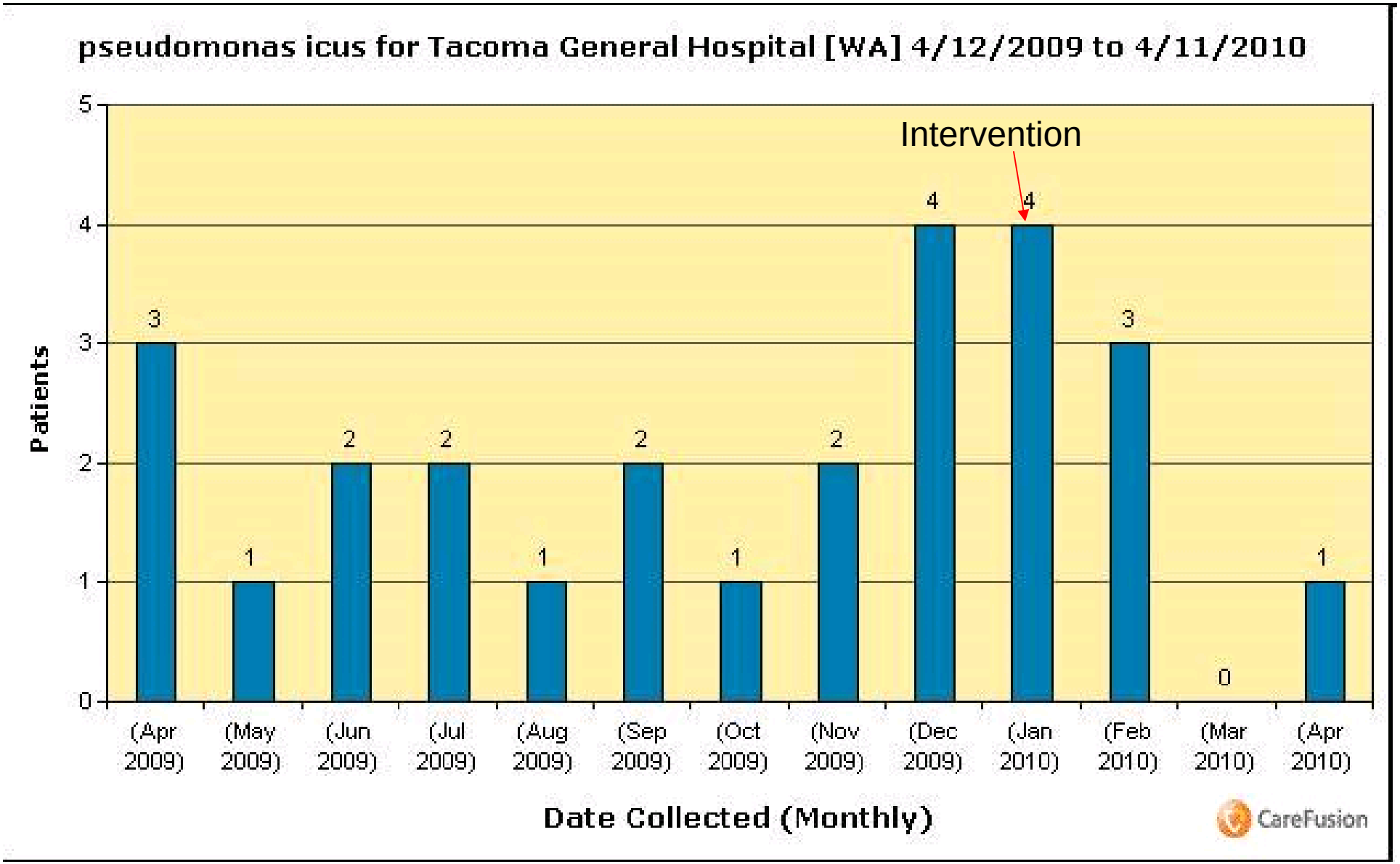
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Patient days on ICU	722	834	768	779	634	505	358	425	416	425	543	516
Hospital Pseudomonas aeruginosa Respiratory (upper) isolates from ICU	1	1	0	0	0	0	0	0	0	3	1	3

Escalation

- Identification of an MDRO from even one patient in a facility or special unit with a highly vulnerable patient population (e.g., an ICU, NICU, burn unit) that had previously not encountered that MDRO.
- Failure to decrease the prevalence or incidence of a specific MDRO (e.g., incidence of resistant clinical isolates) despite infection control efforts to stop its transmission. (Statistical process control charts or other validated methods that account for normal variation can be used to track rates of targeted MDROs)

Address Problems

- Assess environmental cleaning – make changes as needed
- Observe practices
- Who's cleaning what?
- Hand hygiene
- Water?
- Step it up!


pseudomonas icus for Tacoma General Hospital [WA] 4/12/2009 to 4/11/2010
Intervention
Patients
0
1
2
3
4
5
3
1
2
2
1
2
1
2
4
4
3
0
1
(Apr 2009)
(May 2009)
(Jun 2009)
(Jul 2009)
(Aug 2009)
(Sep 2009)
(Oct 2009)
(Nov 2009)
(Dec 2009)
(Jan 2010)
(Feb 2010)
(Mar 2010)
(Apr 2010)
Date Collected (Monthly)
CareFusion

Step 7: **Decolonization?**

- Does it work?
- How long is important?
- HCW?
- Periodic vs Permanent
- Identification of candidates
  - Requires surveillance cultures (who pays?)
  - Candidates receiving decolonization treatment must receive follow-up
  - Recolonization?

Problems

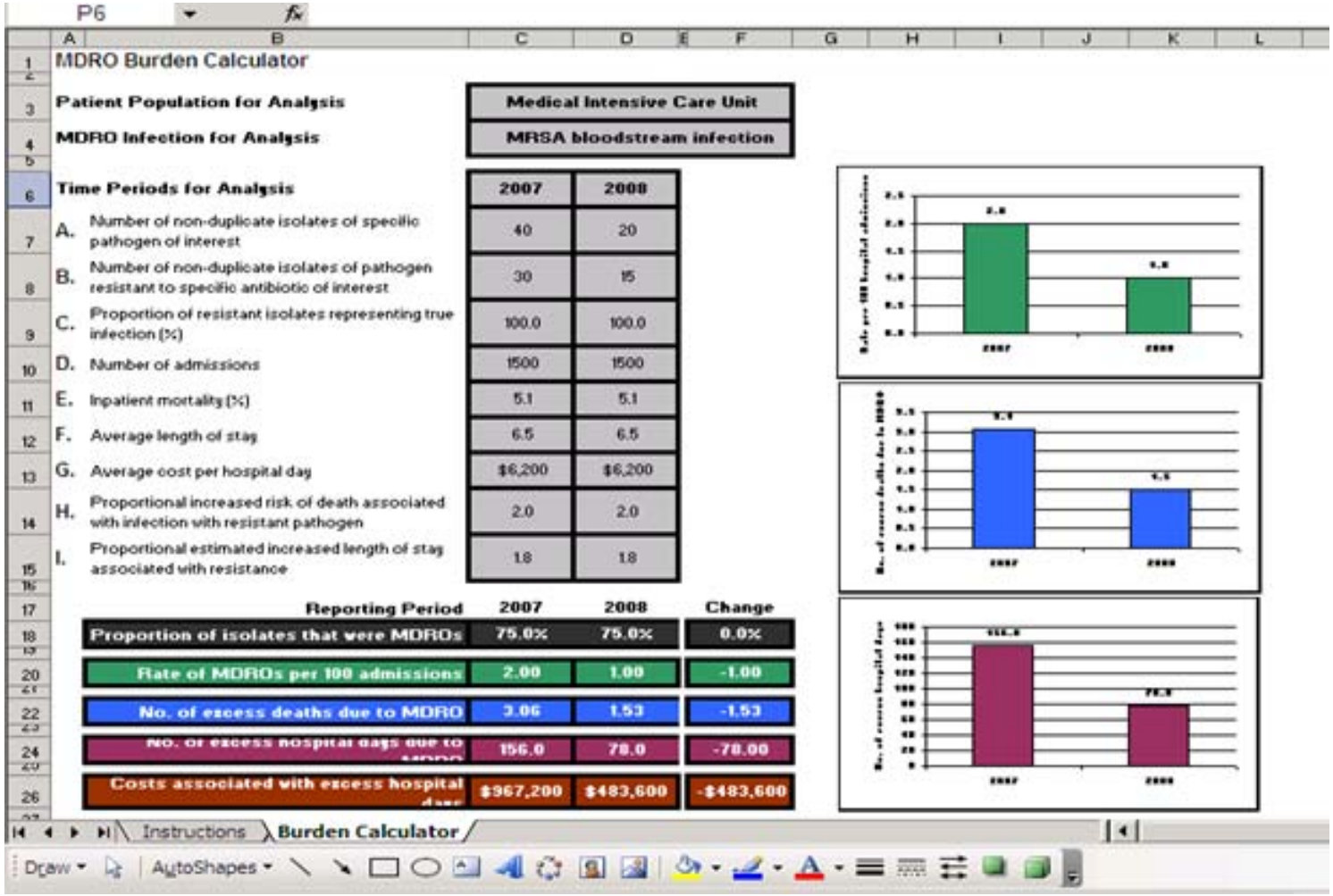
- Got MDRO? >1 MDRO? >2? More?
- Colonization with multiple MDROs is common
- Control programs that focus on only one organism or one antimicrobial drug are unlikely to succeed because vulnerable patients will continue to serve as a magnet for other MDROs

GOT MDRO?
GOT >6?

Problems

- **Costs**
  - How much did it cost your hospital last year to prevent and manage MDROs?
  - How do you find out?

MDRO Burden Calculator



MDRO Burden Calculator

Patient Population for Analysis	Medical Intensive Care Unit
MDRO Infection for Analysis	MRSA bloodstream infection

Time Periods for Analysis	2007	2008
A. Number of non-duplicate isolates of specific pathogen of interest	40	20
B. Number of non-duplicate isolates of pathogen resistant to specific antibiotic of interest	30	15
C. Proportion of resistant isolates representing true infection (%)	100.0	100.0
D. Number of admissions	1500	1500
E. Inpatient mortality (%)	5.1	5.1
F. Average length of stay	6.5	6.5
G. Average cost per hospital day	$6,200	$6,200
H. Proportional increased risk of death associated with infection with resistant pathogen	2.0	2.0
I. Proportional estimated increased length of stay associated with resistance	1.8	1.8

Reporting Period	2007	2008	Change
Proportion of isolates that were MDROs	75.0%	75.0%	0.0%
Rate of MDROs per 100 admissions	2.00	1.00	-1.00
No. of excess deaths due to MDRO	3.06	1.53	-1.53
No. of excess hospital days due to MDRO	156.0	78.0	-78.00
Costs associated with excess hospital days	$967,200	$483,600	-$483,600

Address: *www.jcrinc.com/common/.../**mdro**toolkit/ch2_**mdro_burden_calculator**.xls*

It’s never just ONE thing

thanks