

**Wisconsin Healthcare-Associated Infections (HAIs)  
in Long-Term Care Coalition**

**Infection Prevention and Control in Long-Term Care Conference**  
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**Tracking and Using Antibiotic  
Utilization Data in NHs**

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**Objectives**

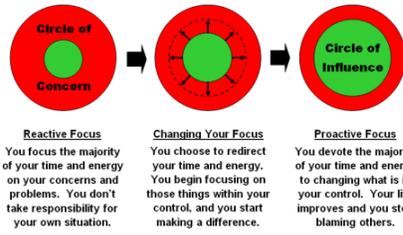
- Why measurement is important
- Design principles
- Anticipated barriers
  - Ideas for making measurement more accessible in NHs
- Ideas for how these data might be used
  - Findings from research studies



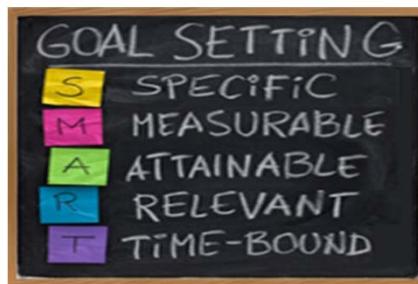
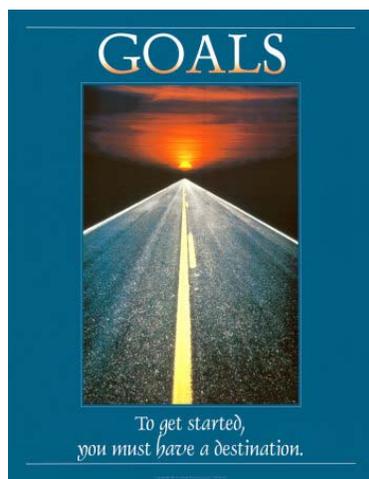
## Whack-A-Mole: A Predictable Result of Not Having a Plan



### Adopting a Proactive Focus



## Why Measurement Matters





## Description of Current Process

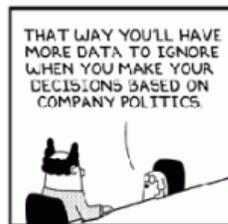
- Great Man Theory: DON or ICP may be auditing prescribing events to assess their appropriateness
- There is no systematic way to look at overall prescribing patterns and processes that feed into the prescribing process
  - Interventions remain focused on the individual level
  - Facility decisions are guided by anecdote or the survey process
- Staff/Providers do not see the forest for the trees
  - At best: Not engaged in quality improvement process
  - At worst: Active resisters



## Let's Get Started



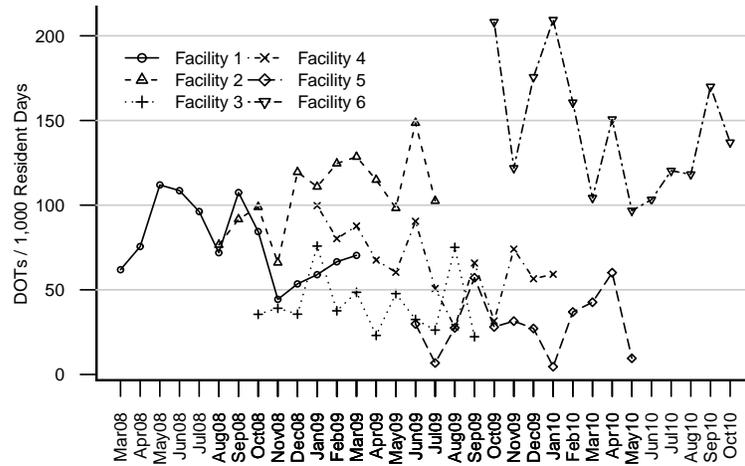
## Measurement: Design Features



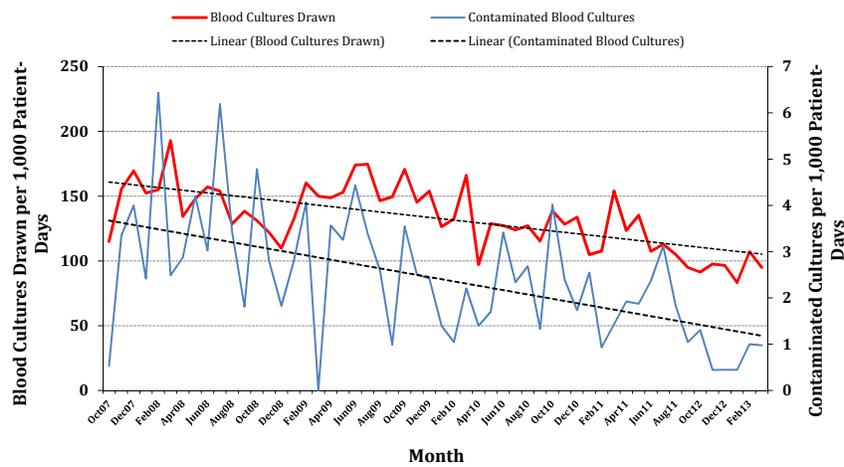
- Don't collect data for data's sake, **data must be actionable**
- Consistency and reliability are a must
- Helpful but potentially biased
  - Raw numbers (particularly when numerators are small)
  - Spot checks
- Better
  - Adjusted data (per 1,000 resident-days) are more meaningful and interpretable
  - Trending data over time



## Example - 1



## Example - 2



## Measurement: Design Features

- Be careful about the round peg in the square hole phenomenon
  - Take advantage of existing sources of data but adapt if needed
  - Don't be afraid to develop and trial your own collection instrument
  - Spend time getting your measures right
- Make sure your collection process is sustainable
  - Develop tools that allow you to outsource collection responsibilities
  - Develop tools that facilitate data entry
  - Develop training materials



## Barriers to Measurement

- Antibiotic prescribing event is documented in many locations
  - Physician order
  - Resident health record
  - 24-hour report
  - MAR
  - Pharmacy database
- Documentation may be incomplete
- Charted in manner that is not amenable to quality improvement

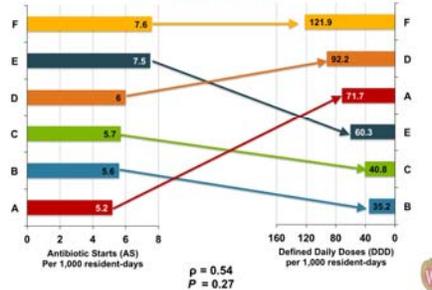


## Potential Solutions - 1

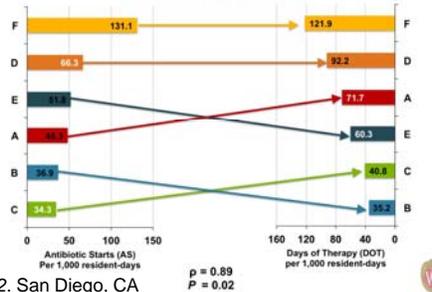
- Work with pharmacy to automate reports derived from pharmacy database
  - Data on new prescriptions is often obtainable
    - Days of therapy harder to get but potentially more useful
    - Defined daily dose may be more feasible and is better correlated with days of therapy
  - Limitations
    - Not indication based
    - Does not address appropriateness
    - Duplications as result of dose changes (e.g., TMP/SMX DS two tabs → 1 tab) and class-switching (e.g., FQ → TMP/SMX) can result in over-estimate of utilization



### AS versus DOT



### DDD versus DOT



Crnich et al. ID Week 2012. San Diego, CA



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## Potential Solutions - 2

- Antibiotic order/event form
  - Standardizes the collection of data needed for quality improvement efforts
  - Order form can be completed by the prescribing provider, by the nurse taking the order, by the multi-disciplinary team reviewing the 24-hour report, by the consulting pharmacist
  - Limitations
    - Depends on others to complete the data
    - Requires secondary data entry (excel)



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**Dropdown List**

	A	B	C	D	E	F	G	H	I
1	rid	start	abx	class	indication	start	stop	days	loeb
2	001		1 ciprofloxacin	1 uti		6/3/13	6/17/13	14	0
3	002		1 augmentin	0 lrti		6/5/13	6/15/13	10	1
4	003		1 augmentin	0 lrti		6/6/13	6/20/13	14	0
5	004		1 levofloxacin	1 uti		6/8/13	6/13/13	5	1
6	005		1 keflex	0 ssti		6/15/13	6/25/13	10	1
7	002		1 augmentin	0 uti		6/18/13	6/25/13	7	0
8	006		1 keflex	0 ssti		6/20/13	6/30/13	10	1
9		7		2				70	4
10									
11									
12									
13	Total Resident Days:			600.00					
14	Antibiotic Starts/1,000 res-days:			11.67					
15	FQ Starts/1,000 res-days:			3.33					
16	Antibiotic Days/1,000 res-days:			116.67					
17	Proportion Appropriate:			0.57					
18									
19									
20									
21									
22									
23									
24									
25									
26									

**Sum**

**Added at end of month**

06\_2013 07\_2013 08\_2013 Sheet4 +



	A	B	C	D	E	F	G	H	I
1	rid	start	abx	class	indication	start	stop	days	loeb
2	001		1 ciprofloxacin	1 uti		6/3/13	6/17/13	14	0
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7	002		1 augmentin	0 uti		6/18/13	6/25/13	7	0
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18									
19									
20									
21									
22									
23									
24									
25									
26									

**= G2 - F2**

**= (B2/D13)\*1000**

06\_2013 07\_2013 08\_2013 Sheet4 +



### Potential Solution - 3

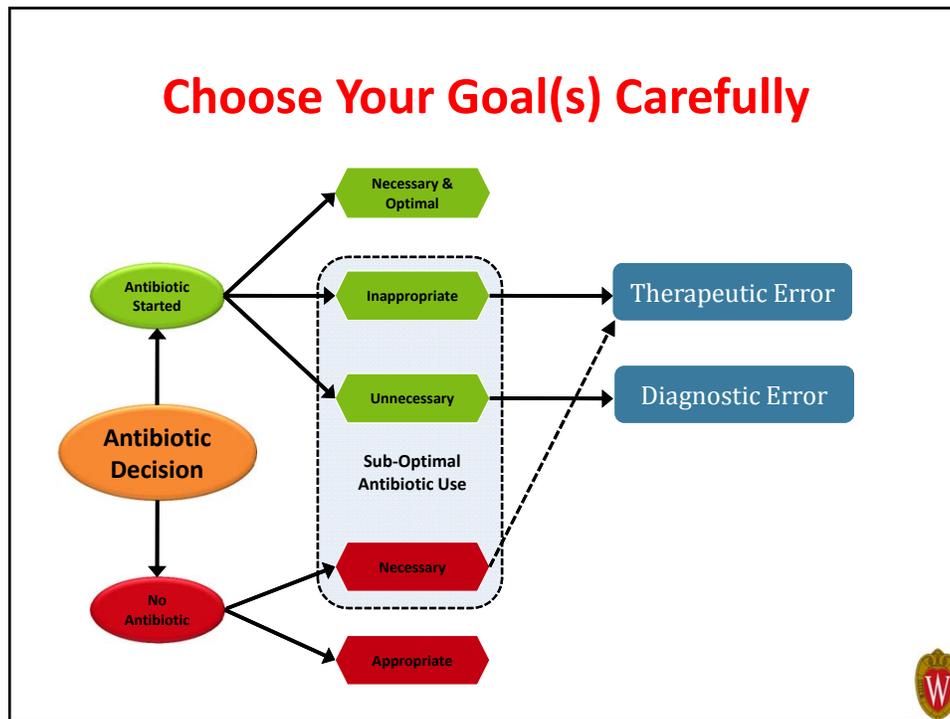
- Use infection control software solution
  - Few nursing home specific options exist (there is one being marketed in Wisconsin currently)
  - There may be an opportunity to leverage hospital EHRs/IC software for this purpose



### Starting the Improvement Process

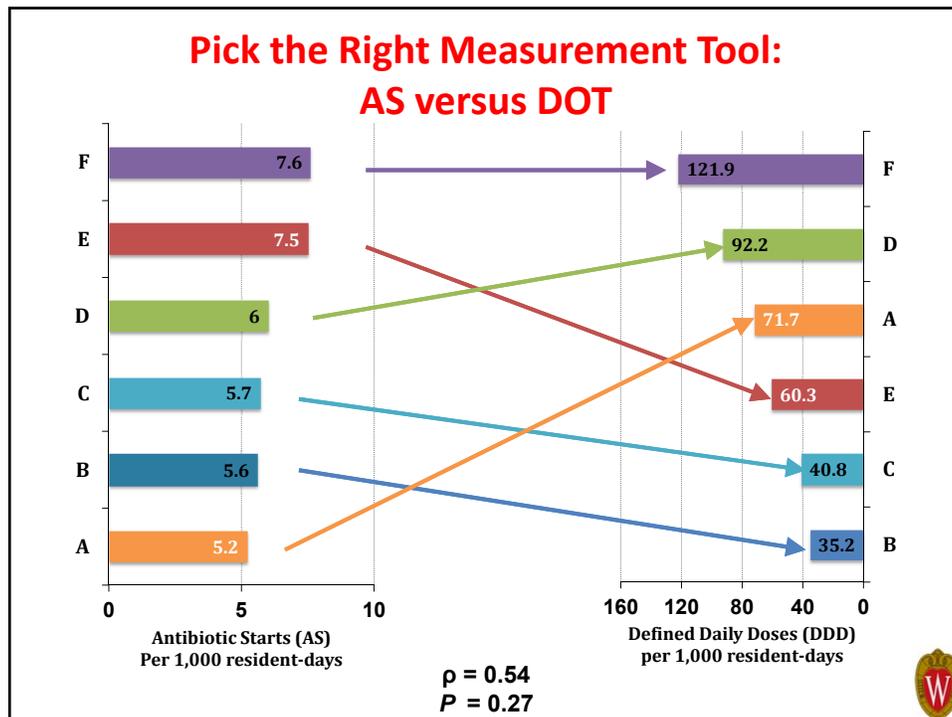
- Collect several months of data in a consistent manner before identifying goals
- Keep goals simple in the first year
- Pay attention to external influences (survey process) but don't let them drive whole process
- It takes a village: get input from medical director, pharmacist, others





### Pick the Right Measurement Tool

Goal	Measure
Reduce unnecessary antibiotic use	Antibiotic Starts
Reduce days of antibiotic therapy	Days of Therapy
Reduce fluoroquinolone pressure	Antibiotic Starts / Days of Therapy



## Diagnostic Errors

- Poorly calibrated illness scripts
- Clinical uncertainty
- Poorly weighted risk aversion calculator

## Diagnostic Errors

- **Poorly calibrated illness scripts**
  - Cognitive bias derived from an over-prioritization of signs/symptoms not supported by evidence
  - Counter-act with:
    - Passive: Interactive education (pre-, post-test)
    - Active: Clinical pathways
- Clinical uncertainty
- Poorly weighted risk aversion calculator



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- Poorly weighted risk aversion calculator



## Diagnostic Errors

- Poorly calibrated illness scripts
- **Clinical uncertainty**
  - Clinical factors (non-modifiable)
  - Poor proxy assessments
  - Poor communication
  - Limited access to diagnostic testing
- Poorly weighted risk aversion calculator



## Diagnostic Errors

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} Standardized  
Assessment and  
Communication Tools  
(Modified INTERACT II?)

High et al. *Clin Infect Dis* 2009; 498(2): 149-71  
 Ouslander et al. *J Am Geriatr Soc* 2011; 59(4): 745-53  
 Loeb et al. *JAMA* 2006; 295(21): 2503-10



## Diagnostic Errors

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} Standardized  
Assessment and  
Communication Tools  
(Modified INTERACT II?)

} Mobile  
EHR-CRP

High et al. *Clin Infect Dis* 2009; 498(2): 149-71  
 Ouslander et al. *J Am Geriatr Soc* 2011; 59(4): 745-53  
 Loeb et al. *JAMA* 2006; 295(21): 2503-10



## Diagnostic Errors

- Poorly calibrated illness scripts
- **Clinical uncertainty** } Delayed Antibiotic Scripts?
  - Clinical factors (non-modifiable)
  - Poor proxy assessments
  - Poor communication
  - Limited access to diagnostic testing
- Poorly weighted risk aversion calculator

Spurling et al. *Cochrane Database Syst Rev* 2007(3): CD004417  
 Pettersson et al. *J Antimicrob Chemother* 2011; 66(11): 2659-66



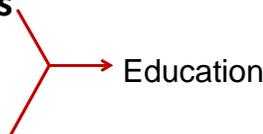
## Diagnostic Errors

- Poorly calibrated illness scripts
- Clinical uncertainty
- **Poorly weighted risk aversion calculator**
  - Over-estimation of patient/family dissatisfaction?
  - Biased estimates of resident susceptibility to adverse outcomes (i.e., hospitalization, death)?
  - Excessive discounting of consequences of antibiotic use (e.g., drug resistance, CDI, diarrhea)?
  - Absence of normative influences



## Diagnostic Errors

- **Poorly calibrated illness scripts**
- Clinical uncertainty
- **Poorly weighted risk aversion calculator**
  - Over-estimation of patient/family dissatisfaction?
  - Biased estimates of resident susceptibility to adverse outcomes (i.e., hospitalization, death)?
  - Concerns about consequences of antibiotic use (e.g., drug resistance, CDI, diarrhea) are overly discounted?
  - Absence of normative influences



Zabarsky et al. *Am J Infect Control* 2008; 36(7): 476-80



## Diagnostic Errors

- Poorly calibrated illness scripts
- Clinical uncertainty
- **Poorly weighted risk aversion calculator**
  - Over-estimation of patient/family dissatisfaction?
  - Biased estimates of resident susceptibility to adverse outcomes (i.e., hospitalization, death)?
  - Concerns about consequences of antibiotic use (e.g., drug resistance, CDI, diarrhea) are overly discounted?
  - Absence of normative influences
    - Track and report back aggregate rates of antibiotic use for a variety of conditions (Abx for ASB, Abx for URTI, etc.)
    - Individual provider performance scorecards



## Therapeutic Errors

- ① Inadequate spectrum during empiric phase of therapy
- ② Sub-optimal dosing
- ③ Sub-optimal duration
- ④ Failure to modify (expand or de-escalate)



## Therapeutic Errors

- ① **Inadequate spectrum during empiric phase of therapy**
  - a. Failure to account for facility patterns of resistance
  - b. Failure to account for individual resident's microbial and prescribing history
- ② Sub-optimal dosing
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## Therapeutic Errors

- ① Inadequate spectrum during empiric phase of therapy
  - ② **Sub-optimal dosing**
  - ③ **Sub-optimal duration**
  - ④ Failure to modify (expand or de-escalate)
- Education  
Prescribing  
Guidelines**
- 



## Therapeutic Errors

- ① Inadequate spectrum during empiric phase of therapy
- ② Sub-optimal dosing
- ③ Sub-optimal duration
- ④ **Failure to modify (expand or de-escalate)**

- a) Mandatory 72-hour antibiotic/culture review
- b) Prospective audit & feedback

Doernberg et al. *ID Week 2012*; Abstract #765

