Healthcare-associated Infections in Illinois

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Outline

- Central Line-associated Bloodstream Infections (CLABSIs) in Intensive Care Units (ICUs)
- Methicillin-resistant *Staphylococcus aureus* (MRSA) & *Clostridium difficile* Trends in Hospital Discharge Data
- Survey of Illinois Acute Care Facilities on Carbapenem-Resistant *Enterobacteriaceae* (CRE)
- Discussion of trends
- *C. difficile* Counts and Hospital-onset Status in 2 Data Sources

Part I: Central Line-associated Bloodstream Infections (CLABSIs) in Intensive Care Units (ICUs)

2009-2010

CLABSI Reporting in Illinois

- National Healthcare Safety Network (NHSN) Device-associated Module
- Reporting ICU types added over time
  - November 2008: adult medical, surgical, medical/surgical
  - October 2009: neonatal (III, II/III), pediatric
  - July 2010: all other adult
- Data for 2010 from first two groups of unit types currently on Hospital Report Card

Standardized Infection Ratio?

- Standardized Infection Ratio, SIR, is a summary measure used to compare the HAI experience among one or more groups of patients to that of a standard population's
- Indirect standardization method
- Accounts for differences in risk of HAI among the groups

Calculating an SIR

$$\text{SIR} = \frac{\text{Observed (O) HAIs}}{\text{Expected (E) HAIs}}$$

- To calculate O, sum the number of HAIs among a group
- To calculate E, requires the use of the appropriate aggregate data (risk-adjusted rates)

Potential Applications for the SIR

- Can provide public health policy makers (and others) with an overview of HAI rates across several units or facilities.
- Is a measure with some “built-in” risk adjustment.
- Might be useful in helping direct us to facilities with particular problems.

Limitations of the SIR

- Like any aggregate measure, the SIR does not tell the whole story.

CLABSIs in Adult ICUs, 2009-2010

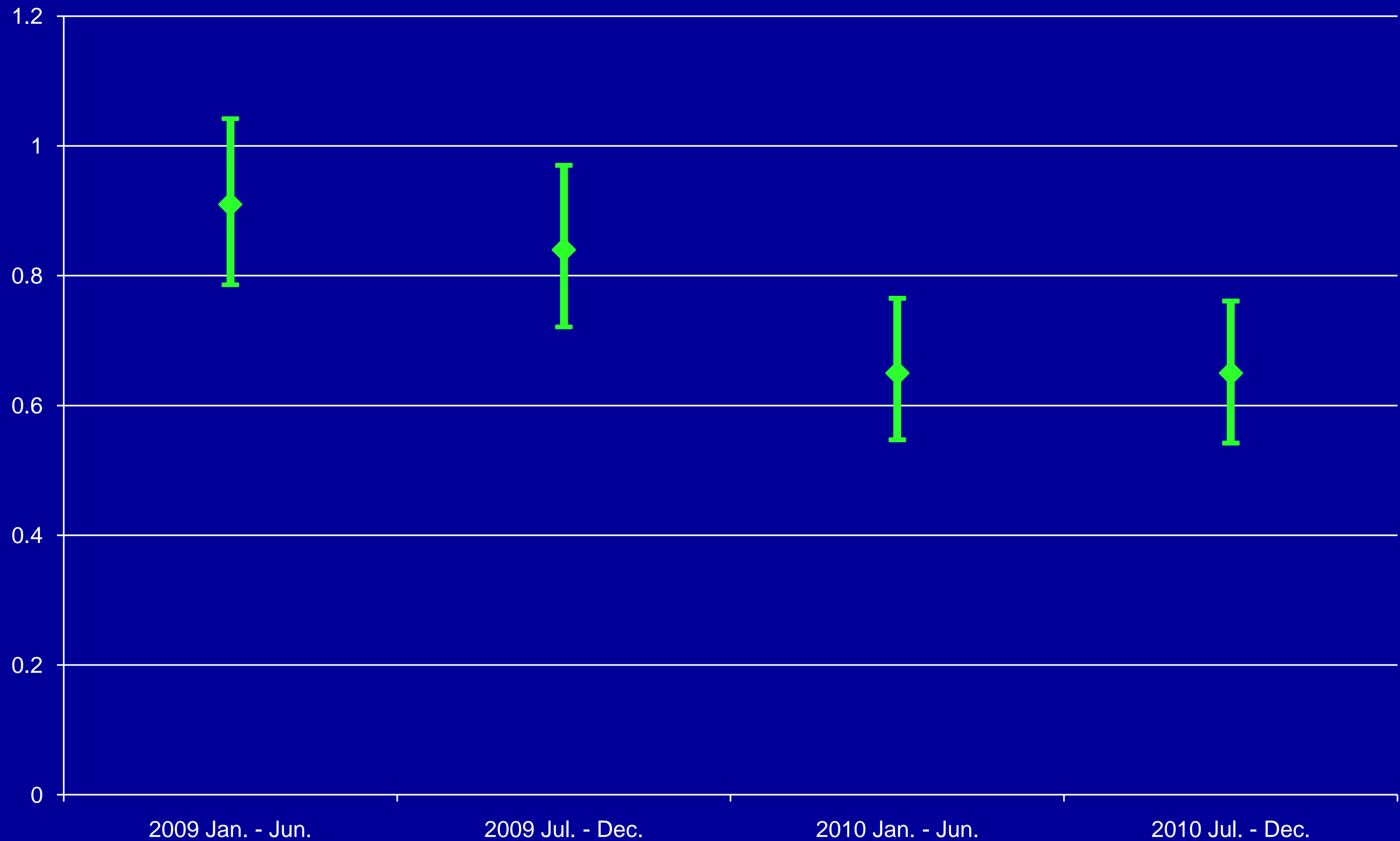
- About 150 hospitals report CLABSIs in ICUs to IDPH
- Two years of data available for adult medical, surgical, and medical/surgical ICUs
  - 383 CLABSIs in 2009
  - 282 CLABSIs in 2010
- 31% of hospitals reported zero CLABSIs during 2009-2010
- 75% of hospitals same number or fewer CLABSIs in 2010 vs. 2009
  - Of 34 hospitals that had more CLABSIs in 2010, 28 (82%) had only 1 more

CLABSIs in Adult ICUs, 2009-2010

	Count	SIR
Jan. – Jun. 2009	201	0.91
Jul. – Dec. 2009	182	0.84
Jan. – Jun. 2010	143	0.65*
Jul. – Dec. 2010	139	0.65

*Statistically significant decrease

CLABSI SIRs in Adult ICUs, 2009-2010



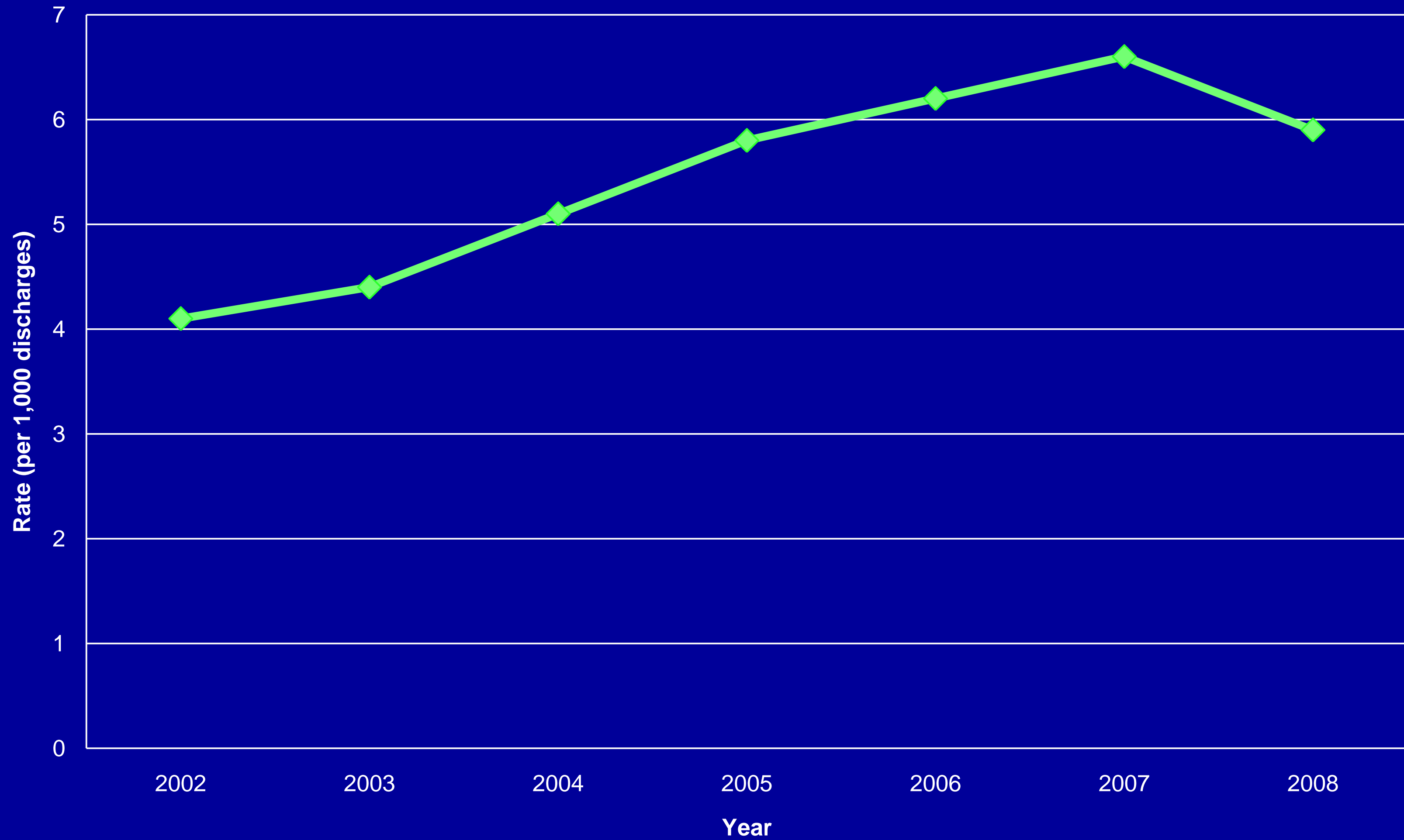
Part II: Methicillin-resistant *Staphylococcus aureus* (MRSA) & *Clostridium difficile* Trends in Hospital Discharge Data

1999-2009

Hospital Discharge Data

- ICD-9 codes collected for billing
  - First 9 codes available to IDPH through 2007
  - Access to 25 codes beginning in 2008
- Coding change for MRSA
  - Through 2008, V09.0 (Infection with microorganisms resistant to penicillins)
  - Beginning in 2009, MRSA specific codes added
    - 038.12 = MRSA septicemia
    - 041.12 = MRSA
    - 482.42 = MRSA pneumonia
    - V02.54 = MRSA colonization (excluded in analysis)
- Code for *C. difficile* = 008.45

MRSA in Illinois, 2002-2008

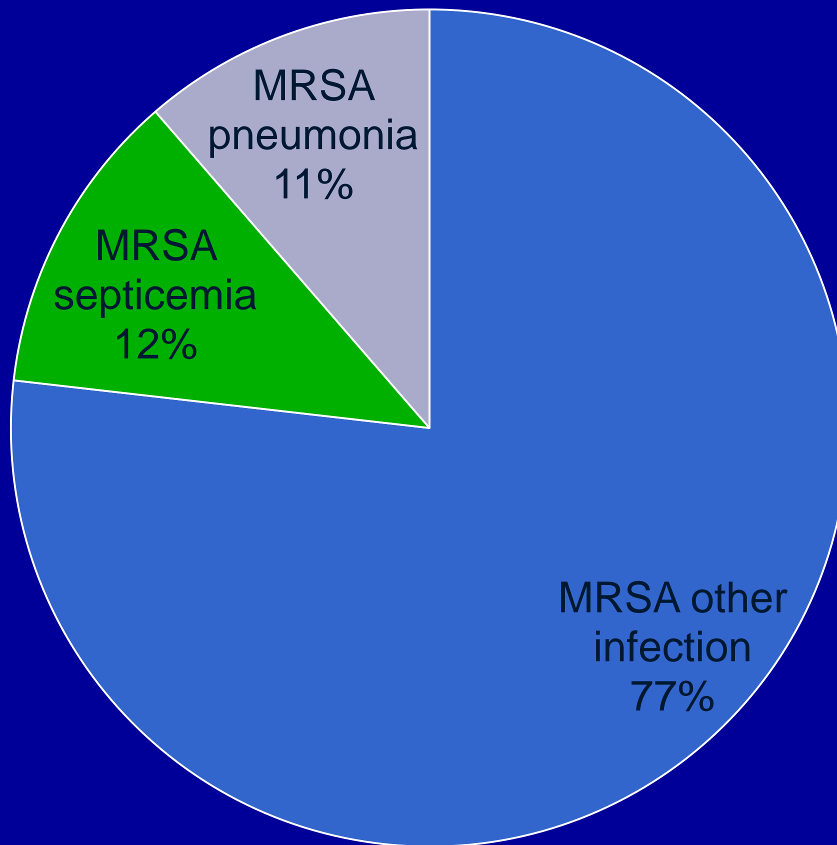


MRSA in Illinois, 2009

- 19,565 MRSA codes in 1,668,396 discharges
  - 11.7 MRSA codes/infections per 1,000 discharges

Variable	%
Female	48
65 and older	47
Infection category	
Not POA	6.9
POA, HC exposure	20.8
POA, no HC exposure	71.8

MRSA in Illinois, 2009



C. difficile in Illinois, 1999-2009

C. difficile in Illinois, 2009

- 16,504 *C. difficile* codes in 1,668,396 discharges
  - 9.9 *C. difficile* codes/infections per 1,000 discharges

Variable	**%**
Female	58
65 and older	68.5
Infection category	
Not POA	23
POA, HC exposure	25.2
POA, no HC exposure	51.4

Part III: Survey of Illinois Acute Care Facilities on Carbapenem-Resistant *Enterobacteriaceae* (CRE)

November 2010 – March 2011

CRE Background

- Importance of carbapenem-resistant *Enterobacteriaceae*
  - Limited treatment options, high mortality rates
- *Klebsiella pneumoniae* carbapenemase (KPC) most common mechanism for resistance in US
- Metallo-β-lactamases (MBLs) such as NDM, VIM, IMP
  - 13 identified in the US 2009-2011

Methods

- Distributed CDC-developed survey to hospitals
  - Paper copy at November 5th conference
  - Online survey open November 2010 – March 2011
- Short survey – 8 questions
  - Lab practices
  - How often CRE identified
  - Surveillance and IC practices
- Sent to all IL acute care hospitals
  - LTACHs included
  - Psychiatric hospitals excluded
- Follow up by phone, email to non-responders

Results

- 201 out of 201 non-psychiatric acute care hospitals responded
  - 100% response rate

THANK YOU!!!

Results – Hospital Characteristics I

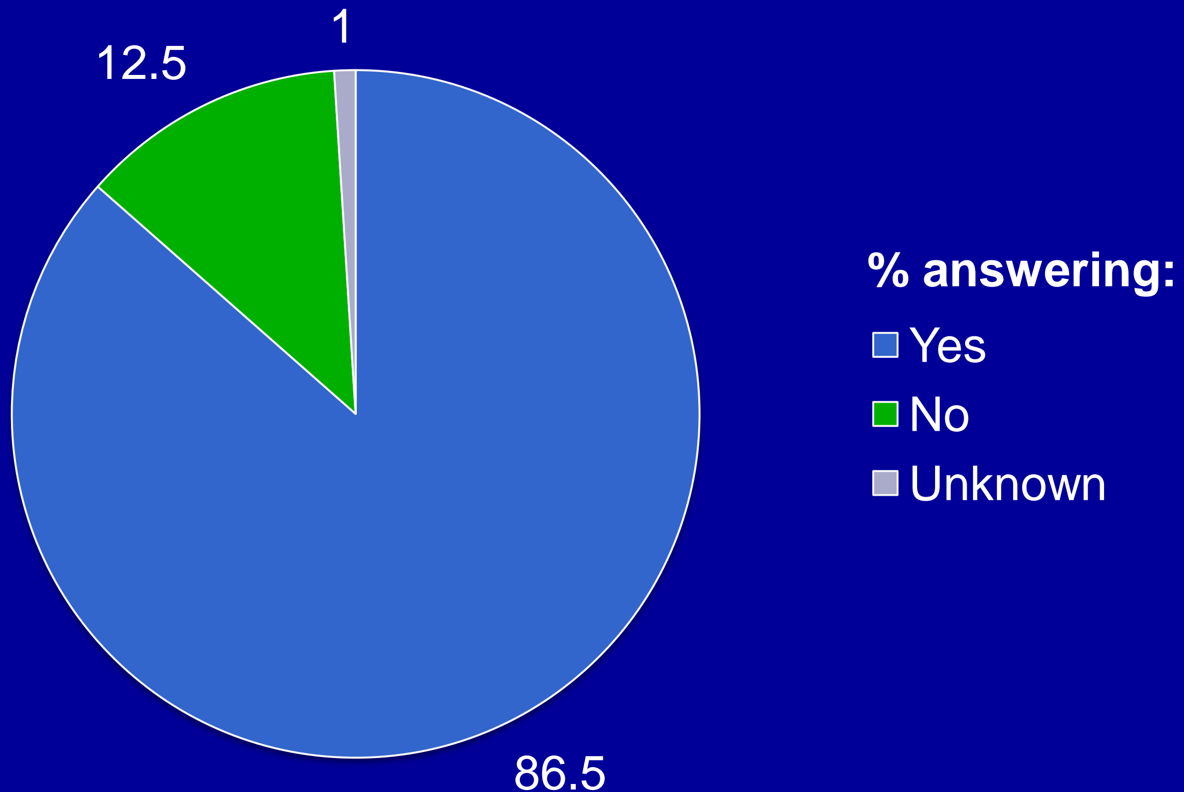
Variable	N (%)
Size	
≤ 50 beds	51 (25)
51 – 200 beds	76 (38)
201 – 500 beds	66 (33)
≥ 501 beds	8 (4)
LTACH	
Yes	9 (4.5)
No	192 (96)

Results – Hospital Characteristics II

Variable	N (%)
Region	
Chicago	35 (17)
Cook Co. (excl. Chicago)	26 (13)
NE IL (excl. Cook Co.)	29 (14)
NW IL	17 (8)
Central IL	28 (14)
Western IL	27 (13)
SW IL	19 (9)
Southern IL	20 (10)

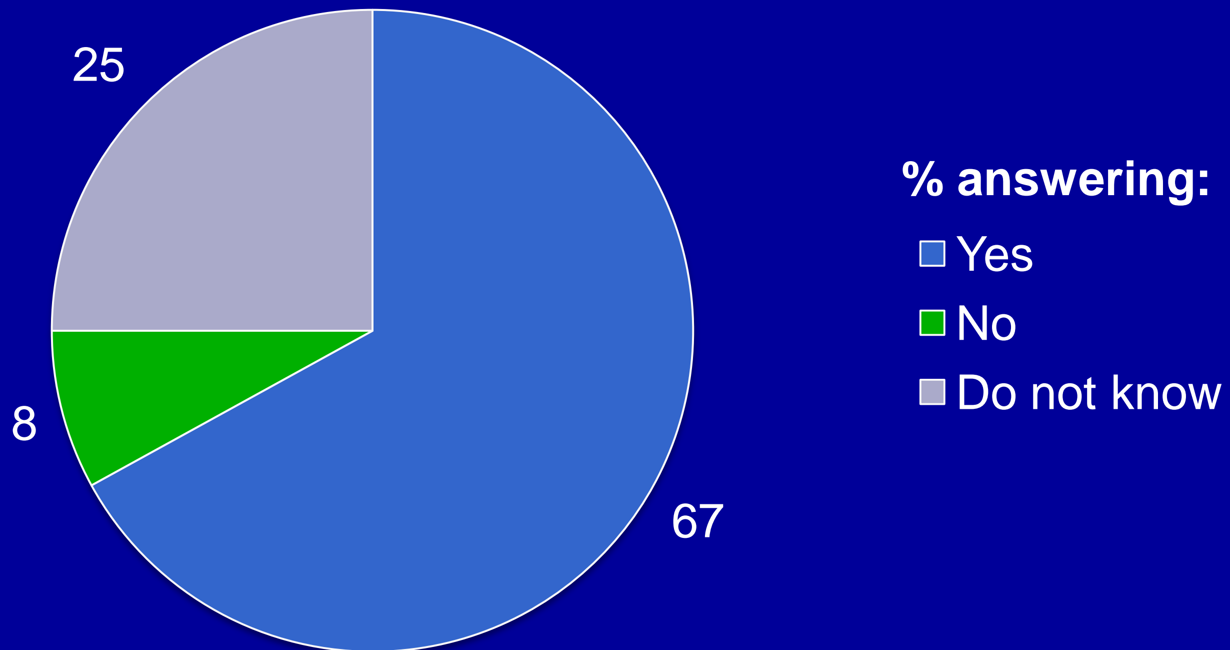
Lab Alerts

Micro lab has system for alerting IP staff when CRE identified



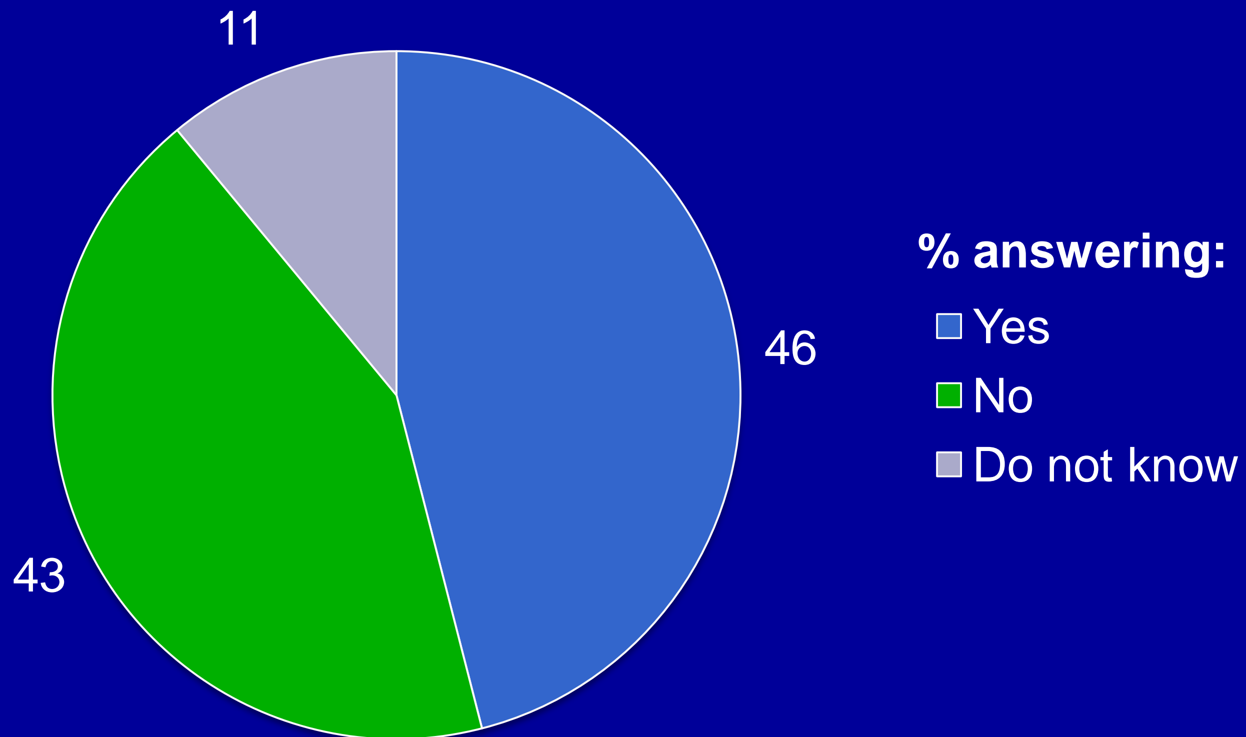
Lab Testing

Micro lab follows CLSI guidelines for carbapenem susceptibility testing and carbapenemase detection in *Enterobacteriaceae*

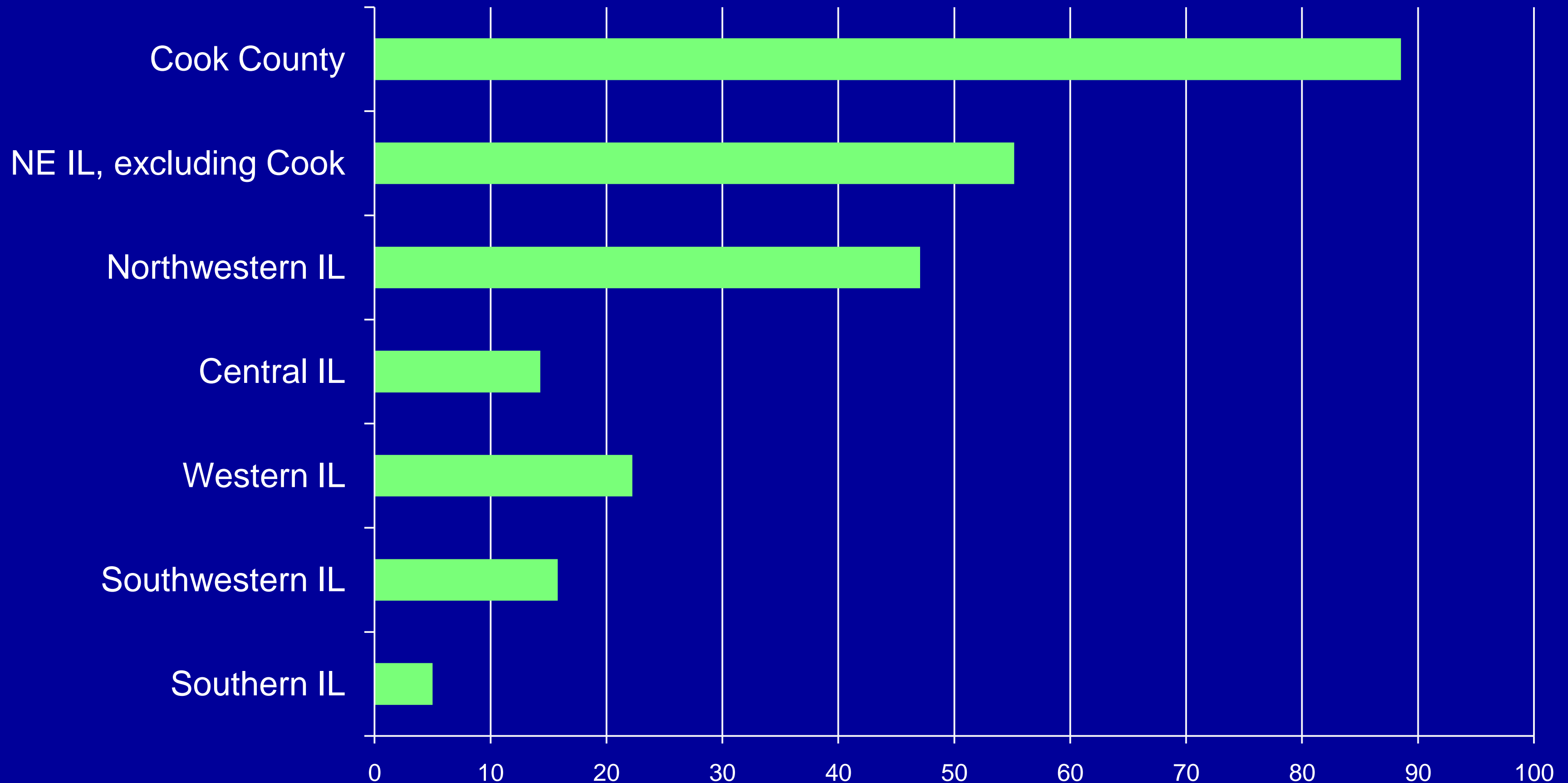


Presence of CRE Patients

Presence of CRE infected or colonized patients in facility in past 12 months



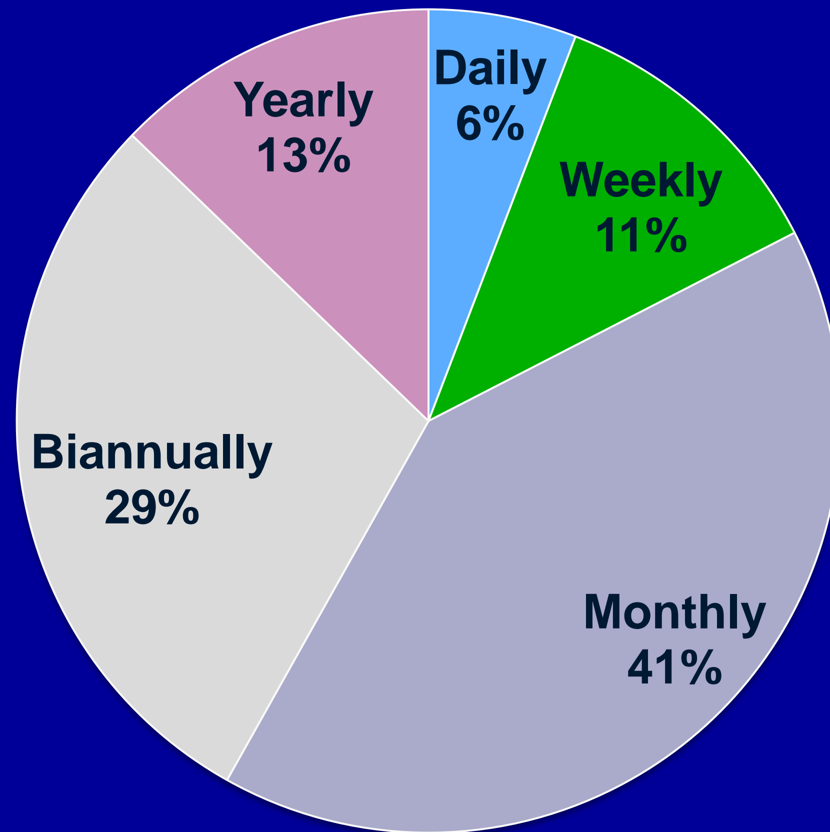
Presence of CRE Patients by Region



Percent of facilities responding "Yes" to the question: "In the past 12 months, have any CRE infected- or colonized-patients been present in your facility?"

Frequency of CRE Identification

Frequency with which CRE infected or colonized patients identified (n=86)



Surveillance

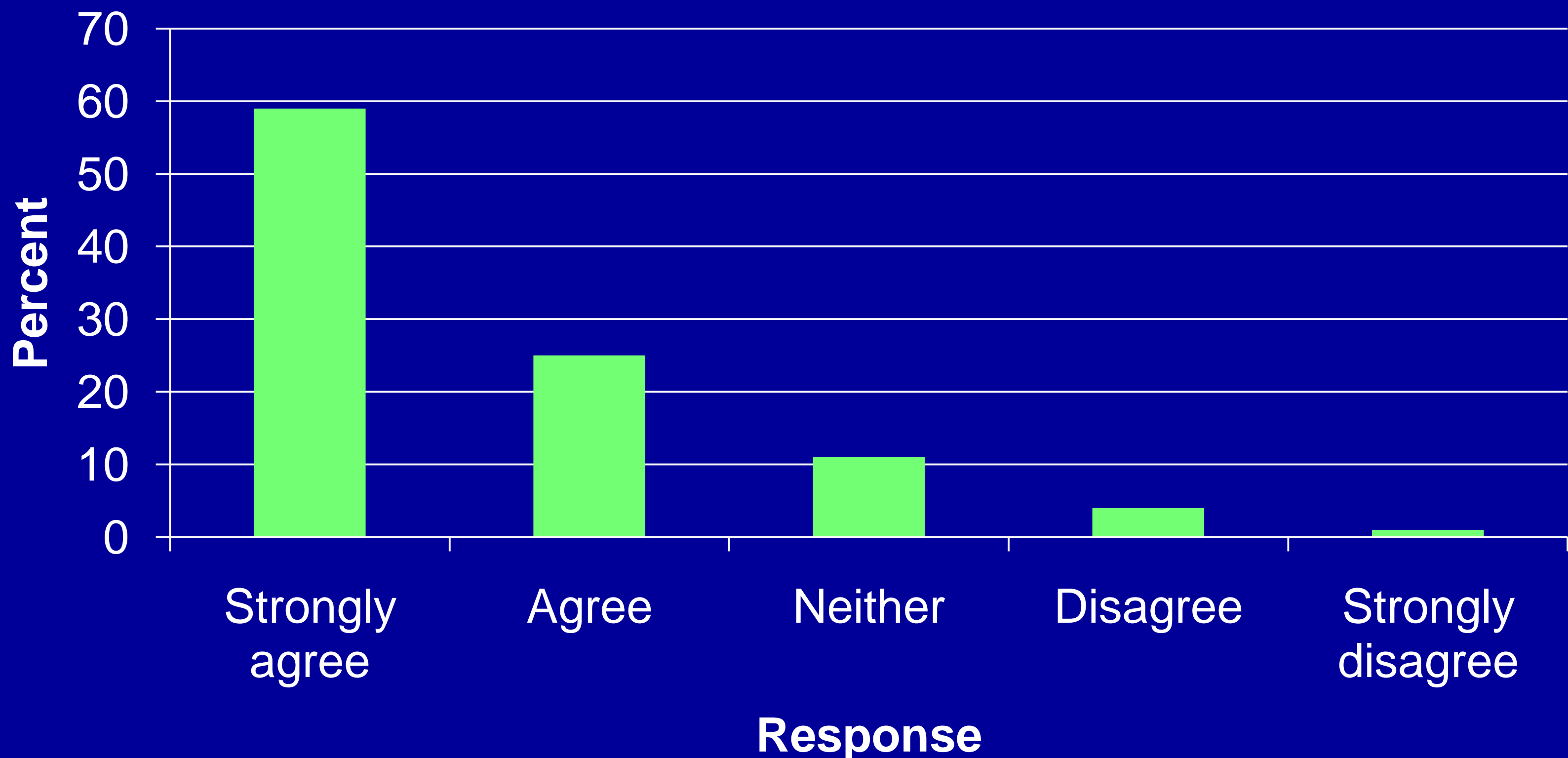
Surveillance activity	% answering yes
Reviewed 6-12 months of micro records to detect unrecognized CRE (n=162)	45%
Conducted point prevalence survey in high risk unit	11%
If CRE case identified, conduct active surveillance testing of patients with epidemiologic link to CRE case (n=138)	25%

Infection Control

Infection control measure	% answering yes
CRE infected or colonized patient placed on contact precautions (n=183)	97%
CRE infected or colonized patient placed in single patient room when possible (n=176)	99%

CRE as Epidemiologically Important MDRO

Facility considers CRE epidemiologically important MDRO for which IC practices are indicated to eliminate transmission



Follow Up

- Memo distributed March 25, 2011
  - Survey results
  - Infection control recommendations
  - Lab standard reference
- Aggregate data shared with CDC
- Continuing discussion with partners regarding CRE surveillance, control

Part IV: Discussion of trends

Prevention Initiatives, Trends in Health Care

- IHA BSI prevention collaborative
  - 75 Illinois hospitals have participated
- IFMC-IL MRSA prevention collaborative
- IDPH/IFMC-IL C. difficile prevention collaborative
  - 20 Illinois hospitals participating
- Facility or system prevention initiatives
- Increasing antimicrobial resistance
- Patient movement across care settings
- Public reporting

Surveillance Trends

- Increasing use of electronic systems
- Changes in surveillance for collaborative participation
- Changes in lab testing and lab standards
- Discharge data, reimbursement
- Public reporting

Part V: *C. difficile* Counts and Hospital-onset Status in 2 Data Sources

March – September 2010

Background

- *Clostridium difficile* infection
  - Increasing rates, severity in Illinois, U.S.
- Illinois Department of Public Health required to publish annual reports on *C. difficile* infections
- Hospital discharge data
- Present on admission (POA) variable
- No studies evaluating POA variable for *C. difficile* infections
- Pressure to provide hospital-specific rates
- Access to an additional data source as of March 2010

Methods

- Eleven hospitals reporting *C. difficile* via the National Healthcare Safety Network (NHSN) during March – September 2010
  - LabID Event reporting
- Hospital discharge data (HDD)
  - ICD-9 code 008.45 in first 25 codes
- Hospital-onset *C. difficile* infection
  - NHSN: occurring on 4th day after admission or later
  - HDD: no POA code assigned to *C. difficile* code

Methods

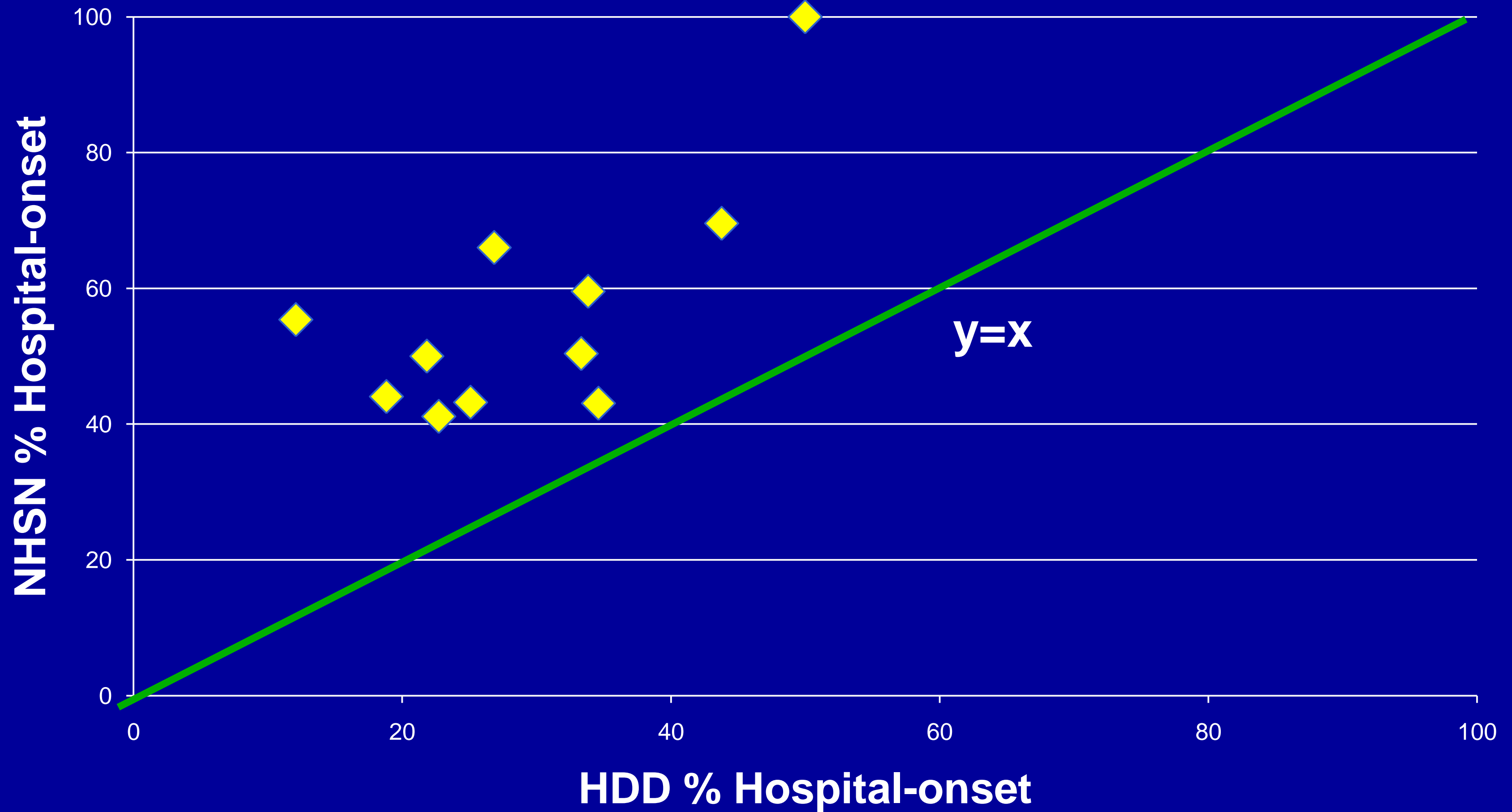
- Compare number of cases
- Compare proportion hospital-onset overall and by hospital
  - χ^2 test
- Compare hospital-specific hospital-onset infection rates
  - Rank lowest to highest rates

Results

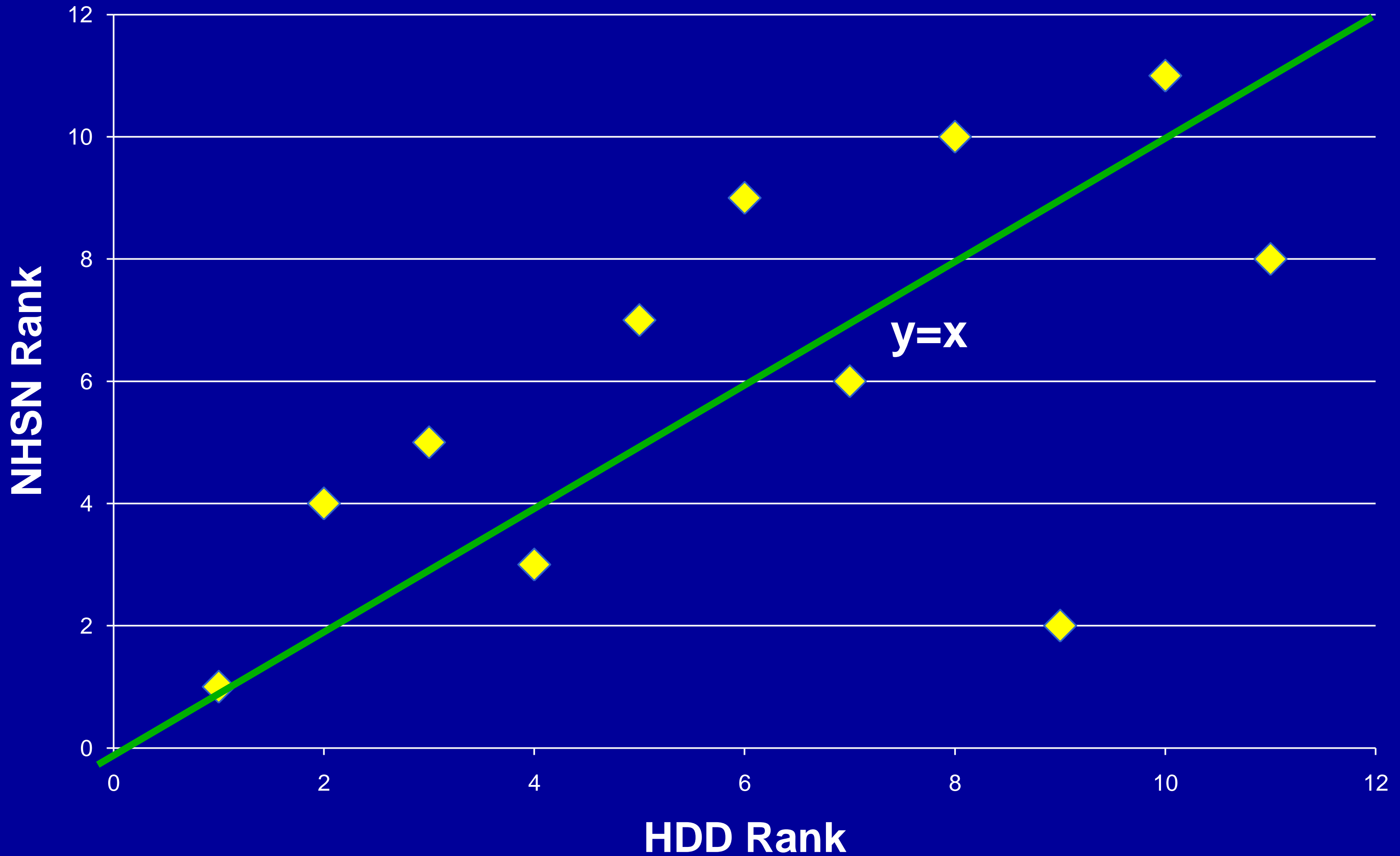
	HDD	NHSN
# Infections	1,838	1,286
# Hospital-onset	518	635
% Hospital-onset*	28	49
# Hospital-onset infections by hospital, range (n=11)	1-135	1-197
Hospital-onset infection rates by hospital, range (n=11)	0.5-6.8 infections per 1,000 discharges	1.8-18.6 infections per 10,000 patient days

*$\chi^2 = 145.97$, $p<0.0001$

Percent Hospital-onset, by Hospital



Hospital Rank, NHSN vs. HDD



Conclusions

- More cases of *C. difficile* infection reported in HDD than NHSN
- Higher proportion reported as hospital-onset in NHSN than HDD
- Differences in ranking among hospitals

Limitations

- Limited validation of data submitted to NHSN
- Hospital selection for NHSN reporting not random
- Differences between definitions in systems

Recommendations and Follow Up

- Do not make hospital-specific rates of *C. difficile* infection from HDD publicly available
- Interpret POA variable in HDD with caution
  - IDPH annual aggregate *C. difficile* and MRSA reports
- Evaluate characteristics of cases not reported in both data sources
- Passage of Senate Bill 1805 in Illinois
  - Use of NHSN for collection of *C. difficile* and MRSA data

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Questions?

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