



# Electronic Surveillance for Monitoring and Preventing Healthcare-Acquired Infections

Jerome I. Tokars, MD, MPH

Acting Chief, Healthcare Outcomes Branch

Division of Healthcare Quality Promotion

**SAFER • HEALTHIER • PEOPLE™**



# Outline

- Introduction: why use electronic data?
- Events to be studied
- Division of Healthcare Quality Promotion (DHQP) eSurveillance project



# Introduction



- Healthcare-associated adverse events
  - Infections
  - Antimicrobial resistance
- Surveillance (monitoring) an important component of prevention
- National Healthcare Safety Network (NHSN).  
Version 1 will use standard surveillance methods:
  - Definitions for events
  - Trained infection control professionals
  - Manual data collection and entry



# Electronic Data

- Improvements
  - ↑ accuracy/objectivity/consistency/timeliness
  - Broaden scope of surveillance
  - ↓ burden of data collection
- Detecting adverse events, data for risk adjustment
- Routine surveillance and public health research

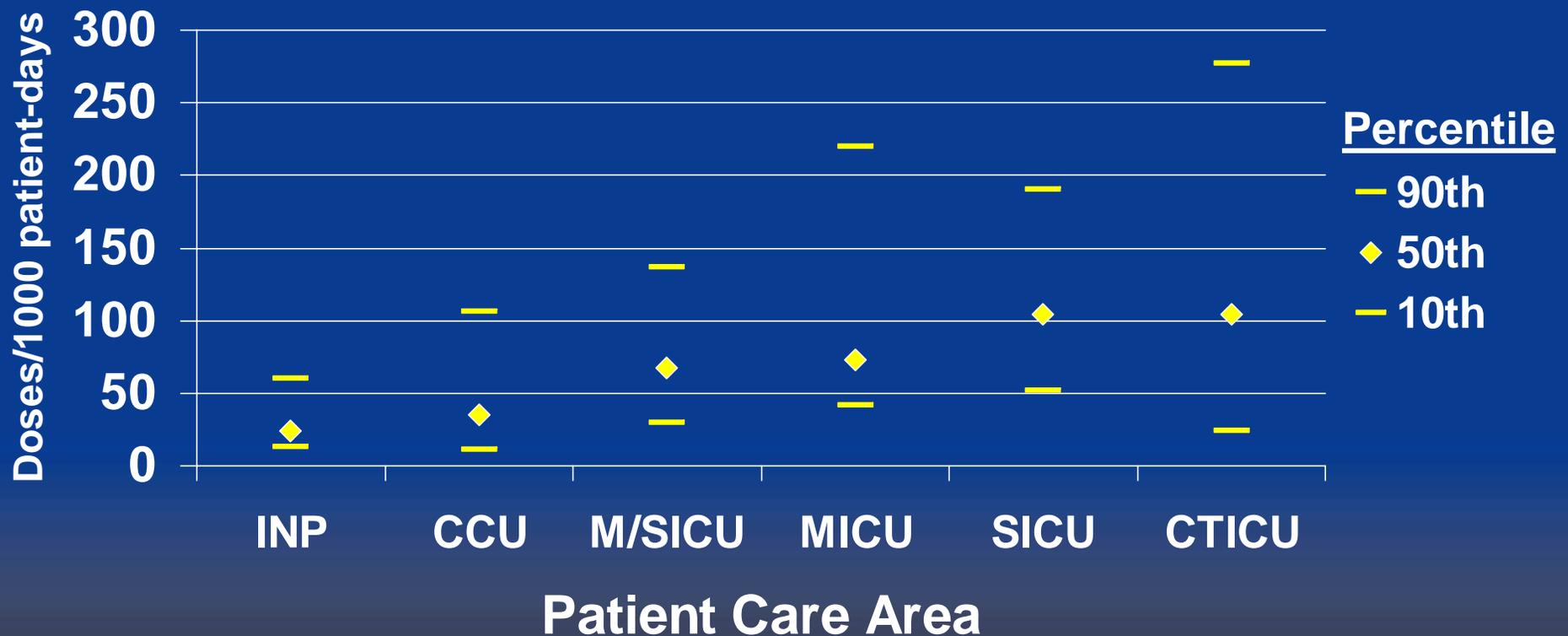


# Events to Be Studied

## Antimicrobial Use and Resistance

- Benchmark rates of:
  - Antimicrobial use
  - Antimicrobial resistance
- Manual data collection is labor intensive
- Well suited to capture of electronic data

# Vancomycin Use, by Patient Care Area



Antimicrobial Use and Resistance Module  
NNIS Report, August 2002

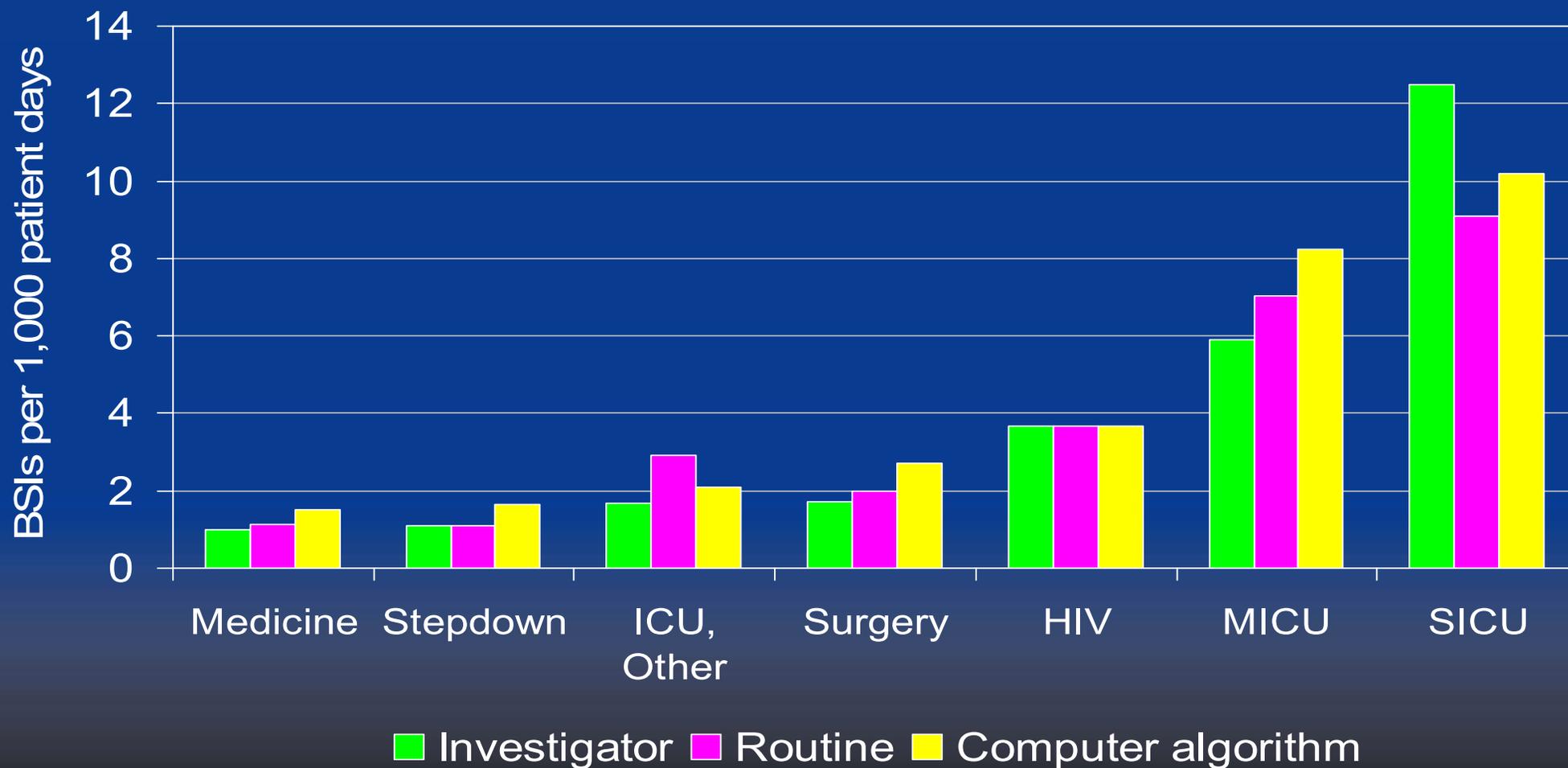


# Detection of Bloodstream Infections (BSI)



- Collaborator: Chicago Antimicrobial Resistance Project (CARP)
  - 3 hospitals (Cook County Hospital)
  - Local data repository, experience in use of electronic data
- Evaluated detection of BSI

# Comparison of Unit-Specific Bloodstream Infection (BSI) Rates, Cook County Hospital



Trick et al. Emerg Infect Dis. 2004 In press

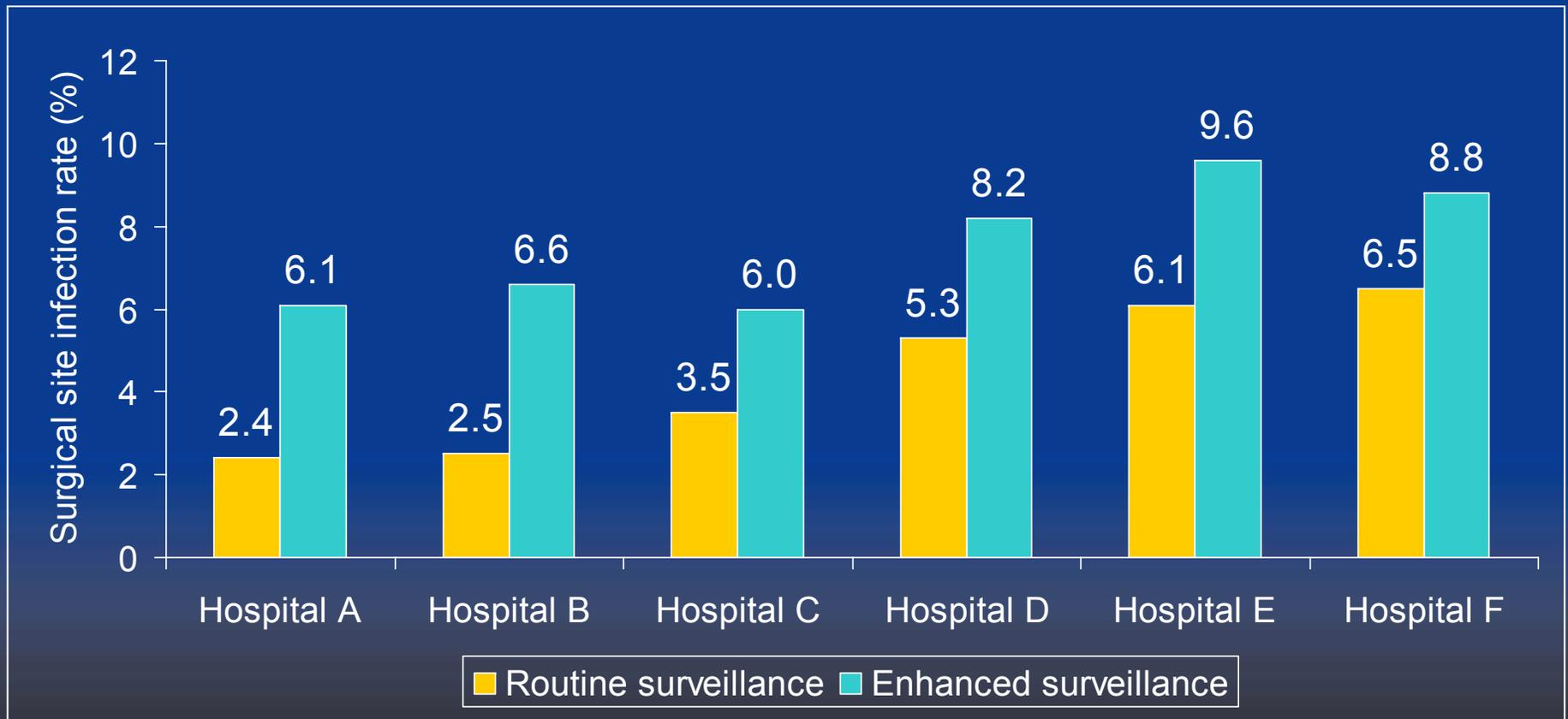


# Surgical Site Infections (SSI)

- Collaborator: Prevention Epicenters
  - 7 academic medical centers funded by DHQP/CDC
- Evaluation of the following screens for SSI after cardiac-bypass
  - Receipt of  $\geq 9$  days of antibiotics post-op
  - Readmission within 60 days with  $\geq 1$  antibiotic days
  - ICD-9 codes for SSI

# Surgical Site Infection Rates

## Routine vs Enhanced Surveillance



Preliminary data

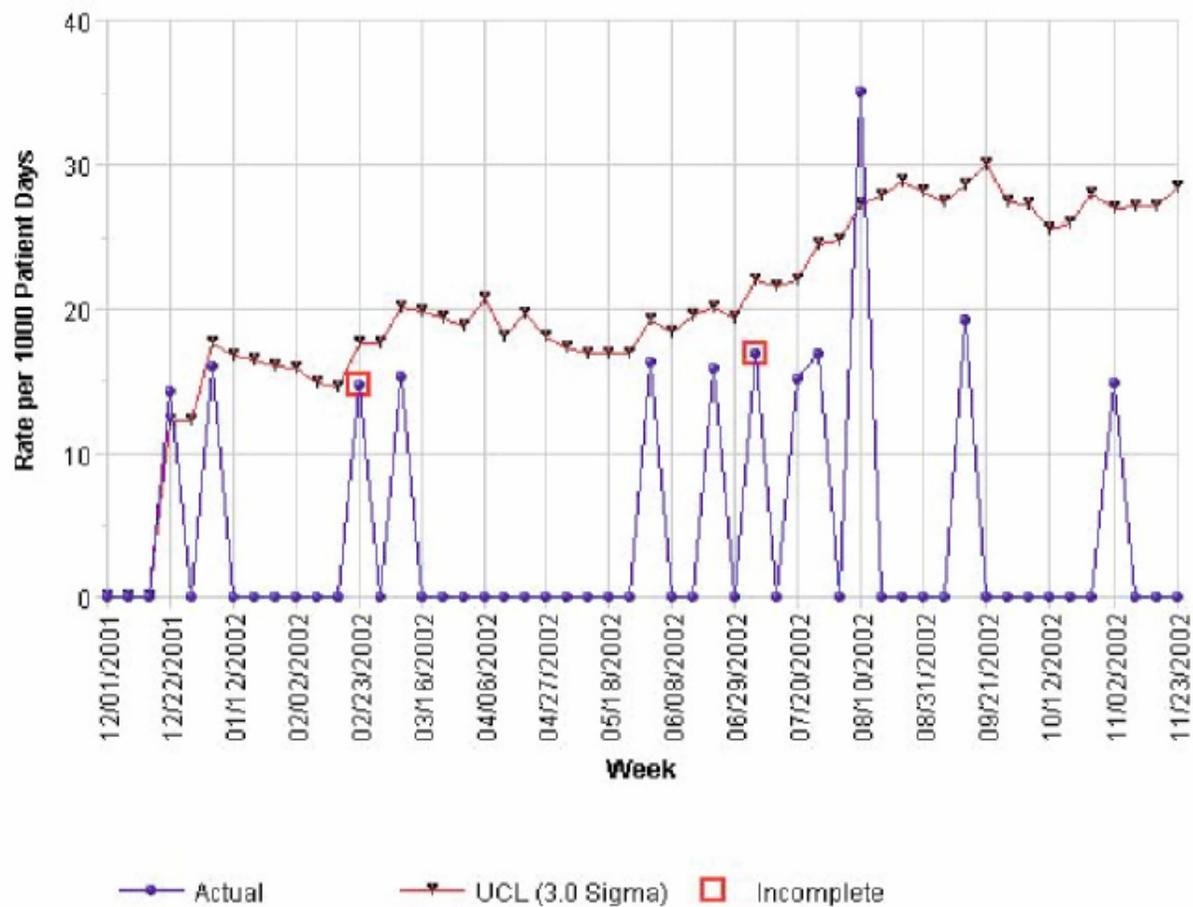


# Use of Electronic Data for Healthcare Surveillance

- An expert system of culture-based infection control surveillance. JAMIA 1996;3:216-223
- Hunting healthcare-associated infections from the clinical microbiology laboratory. J Clin Microbiol 2002;40:1-4.
- Surveillance of medical device-related adverse events in hospitalized patients. JAMA 2004;291:325-334
- Preliminary assessment of an automated surveillance system for infection control. Infect Control Hosp Epidemiol 2004;25:325-332.

## *Clostridium difficile* in Medical ICU

52-Week (12/01/2001 to 11/23/2002)



Wright et al. Infect Control Hosp Epidemiol 2004; 25:325-332



# eSurveillance Project

## Division of Healthcare Quality Promotion

- Goals
  - Use PHIN standards to transmit data from partner hospitals
  - Assist in development of standards for coding and transmission of healthcare data
  - Network of 6-10 hospitals to develop methods and demonstrate the value of this approach for monitoring and preventing disease



# eSurveillance Project

## Division of Healthcare Quality Promotion

- Data collected
  - Microbiology
  - Pharmacy
  - Admission/discharge/transfer (ADT; demographics)
- Immediate uses
  - Antimicrobial use and resistance
  - Bloodstream infection
- Future uses
  - Detection of other events
  - Populate fields on data entry screens



# External Collaborators eSurveillance

- Theradoc, Inc
  - Software to integrate hospital data for patient care/surveillance
  - Partner in creation of HL-7 message, vocabulary
  - U of Utah Hospital
  - Once link established, other Theradoc hospitals
- Chicago Antimicrobial Resistance Project (CARP)
  - 3 hospitals including Cook County Hospital
- 2 Prevention Epicenter hospitals: Northwestern U, U of Iowa



# eSurveillance Progress

- Most progress on microbiology data
- Identify vocabularies/recode to standard
- Creation of HL-7 v3.0 message
- Transmission of data to CDC via PHIN MS
  - Daily from U of Utah Hospital
  - Test messages from other facilities
- Parsing of message and creation of databases at CDC
- Validation of data
- Data analysis and display
- Goal to receive and use all 3 types of data by end of 2004



# Encouraging Use of Electronic Data

- Technical: publish standards, vendors will incorporate export facilities into hospital software  
→ high quality data readily available
- Epidemiology: publish manuscripts demonstrating utility of these methods



# Summary

- Healthcare-acquired infections and antimicrobial resistance are major public health issues
- eSurveillance will improve accuracy/objectivity, expand scope, decrease burden
- DHQP eSurveillance project
  - Data: microbiology, pharmacy, ADT
  - Monitor: antimicrobial use and resistance, bloodstream infections
  - Initial network of 6-10 hospitals
- Future: larger network for routine surveillance and public health research
- Data useful to DHQP/other groups at CDC/other agencies

**SAFER • HEALTHIER • PEOPLE™**



# DHQP eSurveillance Team

- Teresa Horan
- Jonathan Edwards
- Ben Kupronis
- James Tolson
- Wenkai Li
- Kelly Peterson
- Ravi Sampath