# Health Care Acquired Infections

Patient Safety Conference 2007

Bernard Rosof, M.D., M.A.C.P.

May 22, 2007

# Look Back

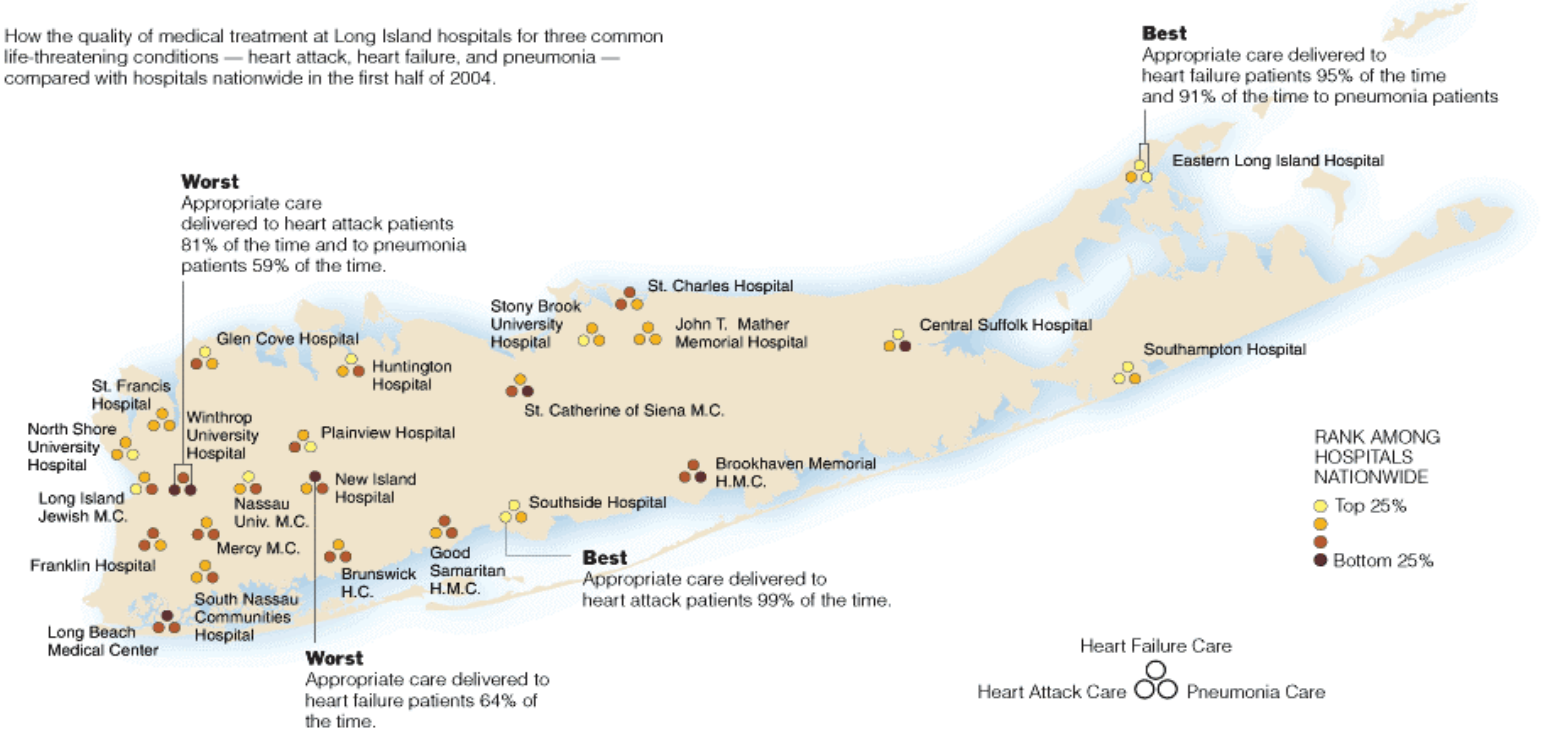
More than 50% of patients do not receive expected care based on

- Best evidence
- Science
- Guidelines

The New York Times

## Uneven Treatment

How the quality of medical treatment at Long Island hospitals for three common life-threatening conditions — heart attack, heart failure, and pneumonia — compared with hospitals nationwide in the first half of 2004.




*Source: Department of Health and Human Services (www.hospitalcompare.hhs.gov).*

*Note: Rankings are based upon a rate of completion for five treatments for heart attack, two for heart failure and three for pneumonia, and reflect how often patients who should have received them actually did. The treatments are considered necessary and life-saving.*

# Look Back

- IHI
  100,000 Lives Campaign
  5 Million Lives Campaign
- JCAHO
- NPSF
- CMS
  - Quality Indicators
  - P4P
  - PQRI

# IHI 100,000 Lives Campaign: Six Changes That Saved Lives

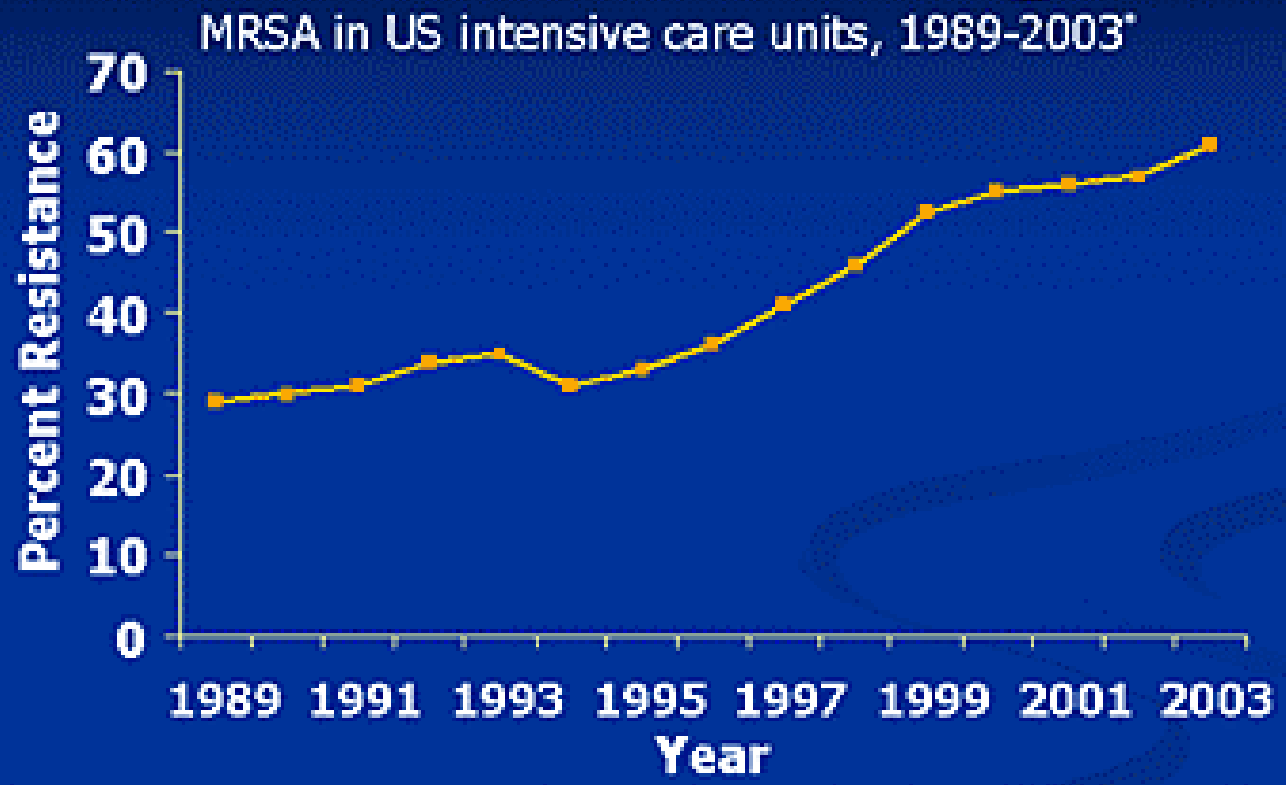
- **Deployment of Rapid Response Teams…** at the first sign of patient decline
- **Prevention of Adverse Drug Events (ADEs)…** by implementing medication reconciliation
- **Delivery of Reliable, Evidence-Based Care for Acute Myocardial Infarction…** to prevent deaths from heart attack
- **Prevention of Central Line Infections…** by implementing a series of interdependent, scientifically grounded steps "Central Line Bundle"
- **Prevention of Surgical Site Infections…** by reliably delivering the correct peri-operative antibiotics at the proper time
- **Prevention of Ventilator-Associated Pneumonia…** by implementing a series of interdependent, scientifically grounded steps "Ventilator Bundle"

**Scorecard: An estimated 122,300 lives saved by participating hospitals**

# 5 Million Lives Campaign: No Harm

- **Prevent Pressure Ulcers...** by reliably using science-based guidelines for their prevention
- **Reduce Methicillin-Resistant Staphylococcus aureus (MRSA) Infection…** by reliably implementing scientifically proven infection control practices
- **Prevent Harm from High-Alert Medications...** starting with a focus on anticoagulants, sedatives, narcotics, and insulin
- **Reduce Surgical Complications...** by reliably implementing all of the changes in care recommended by the Surgical Care Improvement Project (SCIP)
- **Deliver Reliable, Evidence-Based Care for Congestive Heart Failure…** to reduce readmissions
- **Get Boards on Board….** Defining and spreading the best-known leveraged processes for hospital Boards of Directors, so that they can become far more effective in accelerating organizational progress toward safe care

# MRSA Is a Major Nosocomial Pathogen




*Based on data reported to the National Nosocomial Infections Surveillance (NNIS) System, 1989-2003, of nosocomial pneumonia infections among ICU patients (data for 2003 are incomplete).

MRSA=methicillin-resistant *Staphylococcus aureus*.

Division of Healthcare Quality Promotion. Centers for Disease Control and Prevention Web site. Accessed February 29, 2004.

# MRSA

- **Most common cause of post op wound infection**
- **Most common cause of nosocomial pneumonia.**
- **Second most common cause of nosocomial sepsis and line infection.**
- **Emerging cause of UTI, intra abdominal infection, sternal wound infection.**
- **Emerging cause of community acquired cellulitis, and pneumonia in otherwise healthy patients.**

# MRSA Infections

- **Higher mortality and morbidity compared with MSSA infections.**
- **Antimicrobial options growing but still inferior to MSSA strains.**
- **High risk of metastatic infection particularly with intravascular focus of infection (6-10%).**

# Surgical Site Infections
# Impact of Resistance on Clinical Outcomes

| Unadjusted | MSSA (N=165) | MRSA (N=121) | P Value |
|---|---|---|---|
| Mortality, 90-day | 6.7% | 20.7% | P<.001 |
| Length of stay: median days | | | |
| After surgery | 14 (7-25) | 23 (12-38) | P<.001 |
| After infection | 10 (4-17) | 15 (7-30) | P=.001 |

**Adjusted for other predictors of mortality: age, physical status, duration of surgery.*

*Engemann JJ, et al. Clin Infect Dis. 2003;36:592-598.*

# Surgical Site Infections
# Impact of Resistance on Cost of Therapy

| Unadjusted | Uninfected Control Subjects (N=193) | MSSA (N=165) | MRSA (N=121) |
|---|---|---|---|
| **Hospital costs** | | | |
| Median | $29,455 | $52,791* | $92,363* |
| Mean | $34,395 | $73,165* | $118,415* |
| Range | $15,637 - 41,764 | $29,074 - 91,805 | $40,198 - 136,479 |

*$P$<.001.

† adjusted for duration of surgery, hospital, length of hospitalization/ICU stay before infection,
diabetes, and renal disease.

Engemann JJ, et al. *Clin Infect Dis*. 2003;36:592-598.

# Trends in MRSA

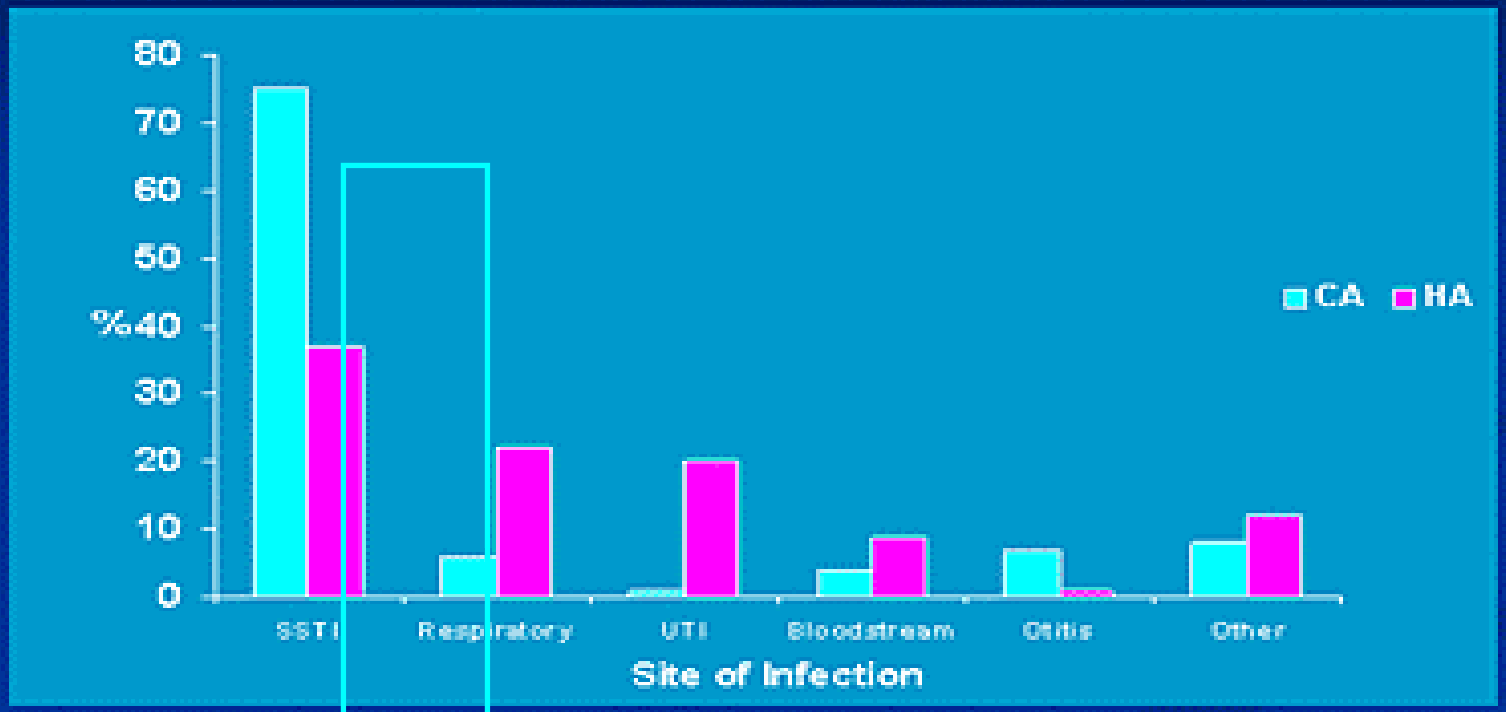
- **CA MRSA** strains are beginning to produce nosocomial outbreaks.
- Specific strains are being identified with tropism for certain tissues and infections.
- Intrinsic low level resistance to vancomycin is increasing even though these organisms are still “sensitive”.

# Comparison of HA and CA MRSA

- **Hospital acquired.**
- **Diabetes, IV, dialysis.**
- **MEC gene present.**
- **Panton Valentine leukocidin toxin absent**
- **Resistant to quinolones.**

- **Community acquired (strain 300).**
- **Horizontal transmission.**
- **Usually skin and soft tissues, but PNA and sepsis occur.**
- **MEC A gene.**
- **sensitive to quinolines.**
- **Panton Valentine present.**

# Site of Infection in CA-MRSA vs HA-MRSA




- 1,100 cases of MRSA in Minnesota, 12% CA

CA-MRSA=community-acquired MRSA; HA-MRSA=healthcare-associated MRSA.

Naimi TS et al. *JAMA* 2003;290:2976-2984.

# Infections due to CA-MRSA

- Furuncles
- Impetigo
- Scalded skin syndrome
- Necrotizing soft tissue infections
- Septic arthritis/osteomyelitis
- Pneumonia
- Endocarditis
- Toxic shock syndrome

# Why have MRSA rates increased?

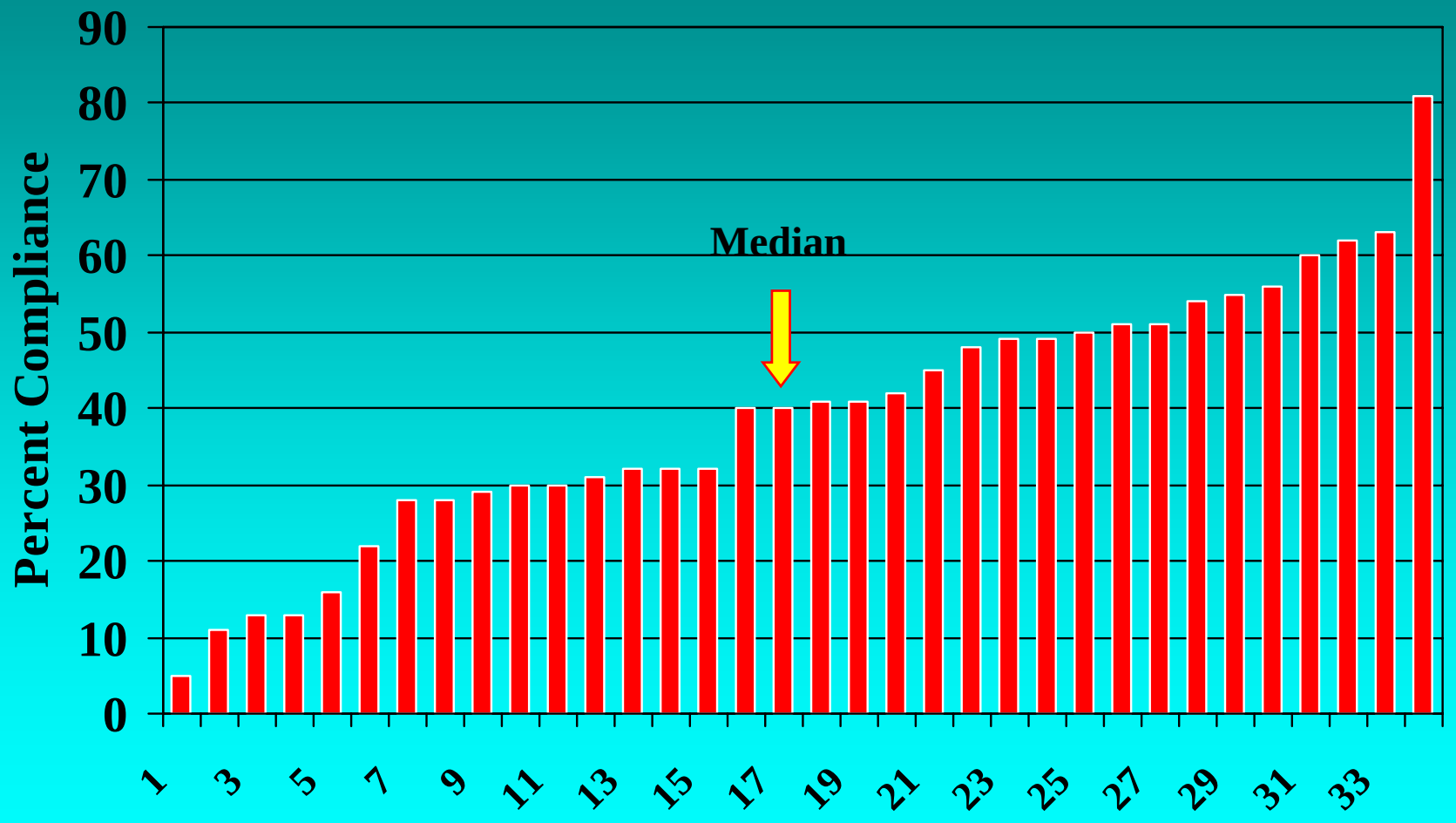
- **Infection control measures have generally failed over last 10 years.**
- **Development of CA MRSA compounds an already difficult task.**

# Adherence to Recommended Barrier Precautions and Handwashing Among HCWs Caring for MRSA Patients

- **Observational survey conducted in a teaching hospital in Canada**
- **488 observations**
- **Adherence to MRSA precautions**
  - **Gloves worn to enter room** **65%**
  - **Gown worn when entering room** **65%**
  - **Hand hygiene after glove/gown removal** **35%**
  - **All measures adhered to** **28%**

***Afif W et al. Am J Infect Control 2002;30:430***

# Percent Handwashing Compliance among HCWs in 34 Observational Studies, 1981-2000




JM Boyce

# IHI 5 Million Lives Campaign

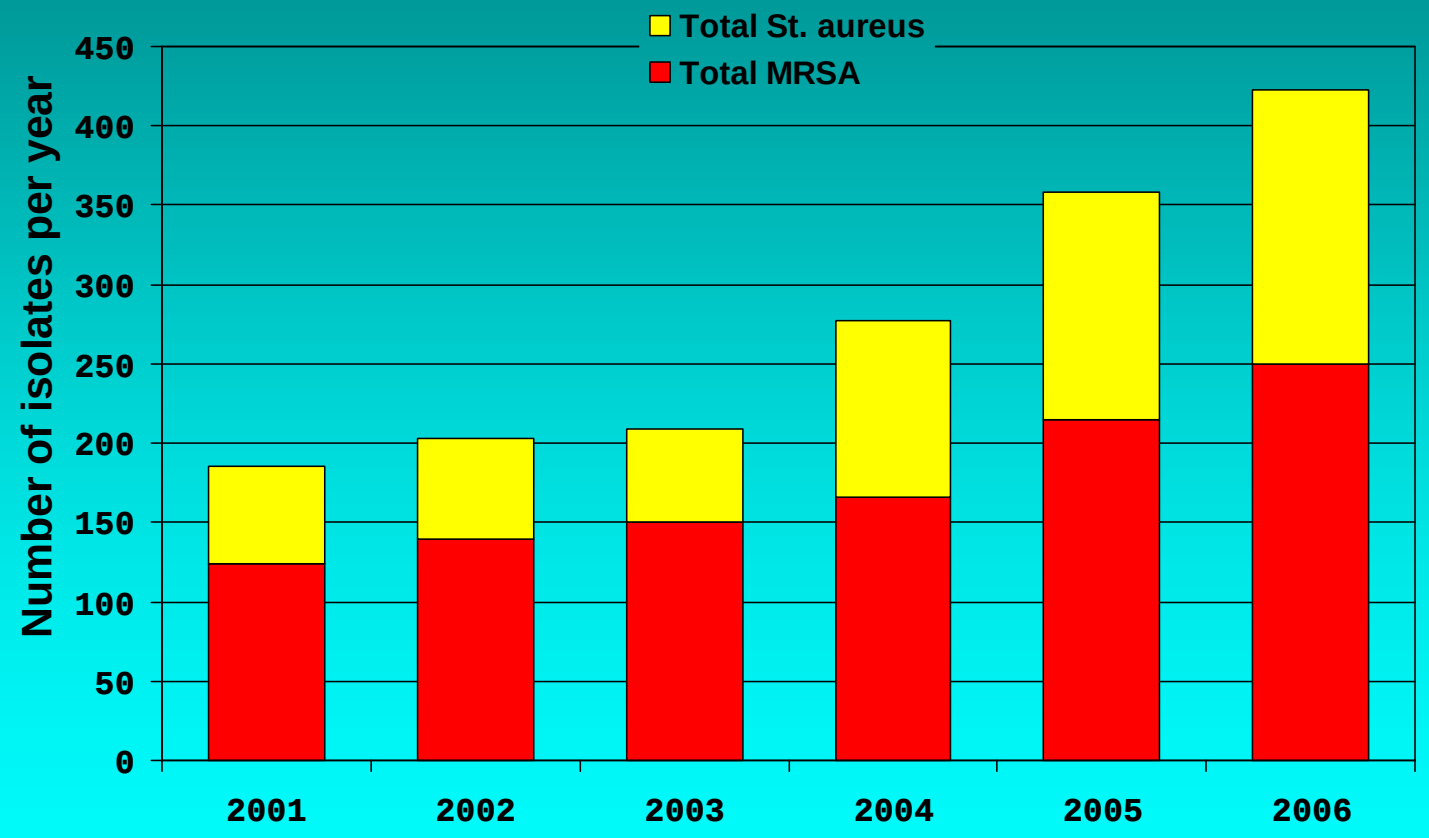
- **Five components of care**
  - **Hand hygiene**
  - **Decontamination of the environment and equipment**
  - **Active surveillance cultures**
  - **Contact precautions for infected and colonized patients**
  - **Device bundles (central line and ventilator)**

# SHEA GOAL: NSLIJHS GOAL

***"Identify all colonized, cohort or isolate***

***to reduce spread"***

# MRSA Emergency Department Incidence 2001 - 2006




| % MRSA | 67% | 69% | 72% | 60% | 60% | 59% |
|---|---|---|---|---|---|---|

# IHI Implementation (2007)

- Voluntary participation in IHI's Preventing 5 Million Lives from Patient Harm Campaign (2007)- Expands the efforts of the 100,000 Lives Campaign
- Introduction of practices to prevent serious hospital infections [Methicillin-resistant *Staph aureus* (MRSA)] including:
  - Hand Hygiene
  - Proper disinfection of patient rooms and equipment
  - Dedicated patient equipment (thermometers, stethoscopes, blood pressure cuffs)
  - Strict enforcement of contact precautions when patients are infected (gowns and gloves for direct patient care
  - Surveillance cultures
  - Proper procedures to avoid central line infections and ventilator associated pneumonias

# Hand Washing Screensaver