"Do Pathogens Exploit Economic and Social Systems to Cause Healthcare-Associated Infection?"

Salah S. Qutaishat, PhD, CIC, FSHEA

Outline

- Types of healthcare-associated Infections
- Cost of healthcare-associated Infections
- What causes healthcare-associated Infections
- Are they preventable?
- What Prevents us from preventing them?

Healthcare-Associated Infections (HAIs)

- **Pathogen-Associated**
  - MRSA, *C. diff*, VRE, CRE, etc.
- **Device-Associated**
  - Central Line-Associated Bloodstream Infections (CLABSI)
  - Catheter-Associated Urinary Tract Infection (CAUTI)
  - Ventilator Associated Events (VAE)
- **Procedure-Associated**
  - Surgical Site Infections (SSI)

Healthcare-Associated Infections

- **Employee Exposure**
  - Human **Immuno**deficiency Virus (HIV)
  - Hepatitis B Virus (HBV)
  - Hepatitis C Virus (HCV)
  - Ebola Virus
  - Other Infectious Agents
- **Others Infections/Outbreaks**
  - Blood Transfusion
  - Endoscopy
  - Dialysis Centers

Most Prevalent Pathogens Causing Healthcare-Associated Infections (HAIs): most prevalent overall contributors to HAIs (NHSN/CDC)	
Organism	**Percent**
Staphylococcus aureus	15.6
Escherichia coli	11.5
Coagulase-negative *Staphylococcus*	11.4
Klebsiella	8.0
Pseudomonas aeruginosa	7.5
Enterococcus faecalis	6.8
Candida albicans	5.3
Enterobacter species	4.7
Other *Candida* species	4.2
Enterococcus faecium	4.1
Enterococcus species	3.0
Proteus species	2.5
Serratia species	2.1
Acinetobacter baumannii	1.8

Most common causes of outbreaks and ward closures by causative pathogen, which are relatively hard to kill
Organism
***Clostridium difficile* spores**
Norovirus
Aspergillus
Rotavirus
Adenovirus

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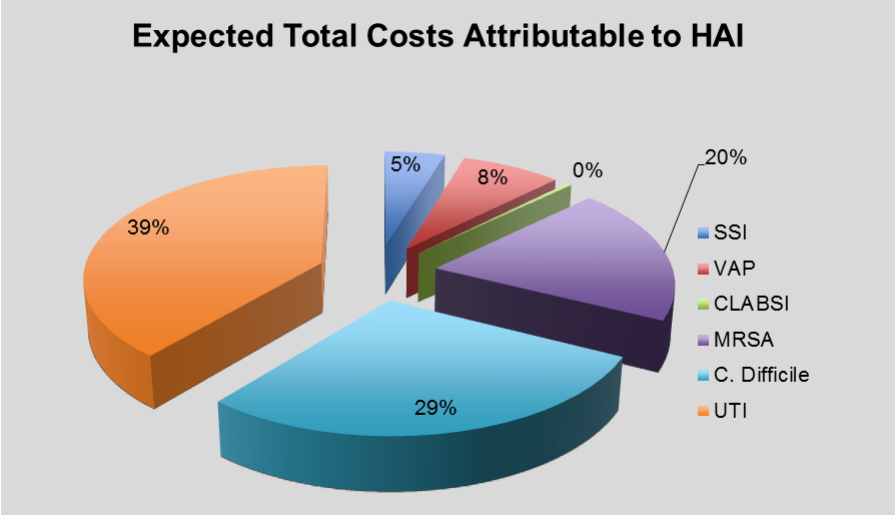
Author – R. Douglas Scott II, *Economist*

Division of Healthcare Quality Promotion
National Center for Preparedness, Detection,
and Control of Infectious Diseases
Coordinating Center for Infectious Diseases
Centers for Disease Control and Prevention
March 2009

http://www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf



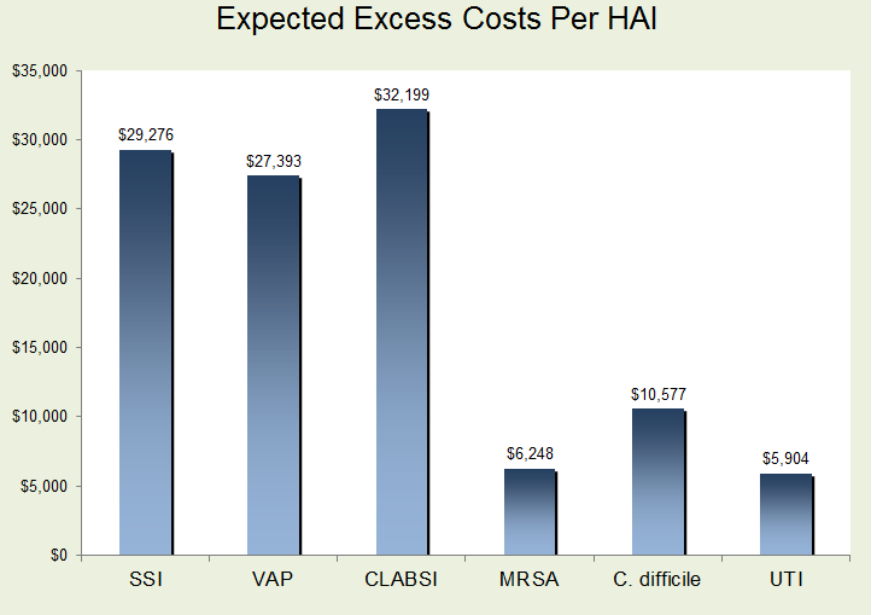
Costs of HAIs and Benefit Analysis of Preventing HAI

Annual Direct Medical Cost:

- Low: $28.4 to $33.8 billion
- High: $35.7 to $45 billion

Annual Benefit

- Low $5.7 to $6.8 billion
- High 25.0 to 31.5 billion



Type	Estimated Cost
CLABSI	**$45,814**
VAP	**$40,144**
SSI	**$20,785**
CDI	**$11,285**
CAUTI	**$896**

JAMA Intern Med. 2013;173(22):2039-2046

Ops, I forgot to mention our patients and their families!

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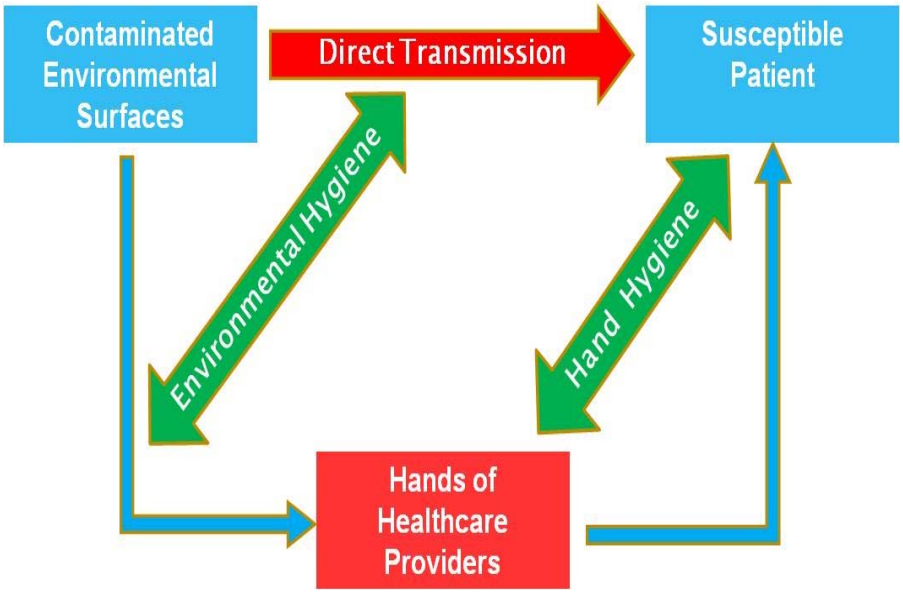


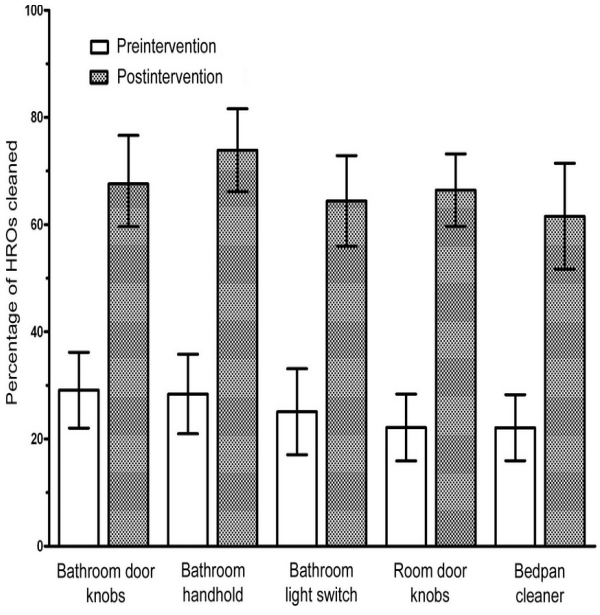
QUIZ #1

- Hand Hygiene
- Environmental Hygiene

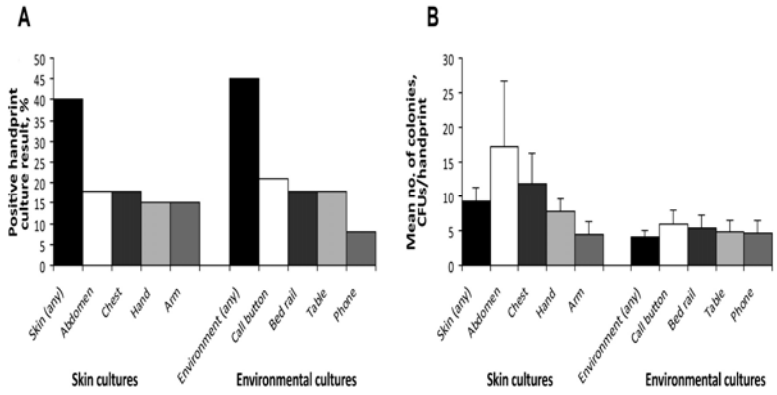
Hand Hygiene Compliance

	Me	Them
Compliance	**25-60%**	**90-80%**

Environmental Hygiene Compliance

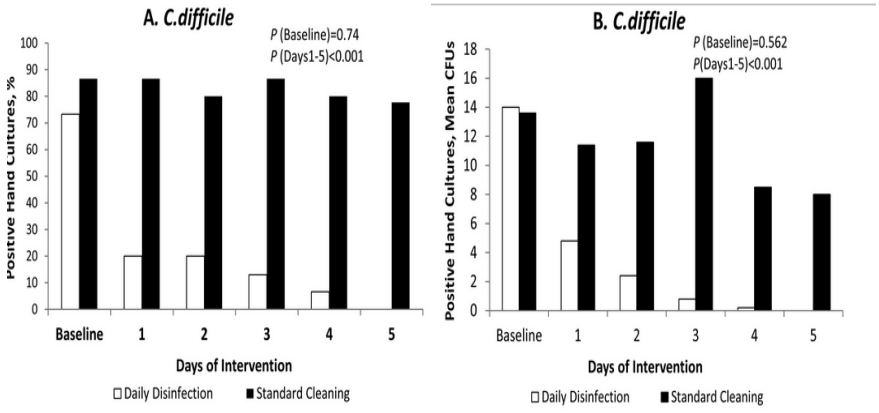


Acquisition of MRSA on gloved hands after contact with skin and environmental sites



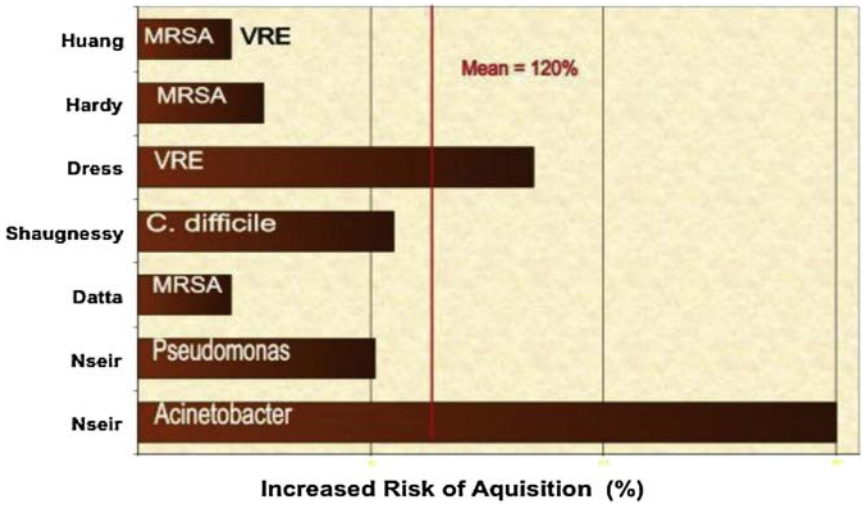
Steifel. ICHE. 32(2) 185–187. 2011

Impact of Daily Cleaning on Contamination of Healthcare Personnel Hands



Kundrapu et al. Daily Disinfection of High-Touch Surfaces in Isolation Rooms to Reduce Contamination of Healthcare Workers' Hands. Infection Control and Hospital Epidemiology. 33(10) 2012.

Increased HAP acquisition risk from prior room occupant.



American Journal of Infection Control 2013; 41:S20-S25

Significant Improvement in Patient Room Discharge Cleaning After the Introduction of an Environmental Hygiene Bundle.

T. Jake Foster, BA[a]; Vincent Kish[a]; Kathy Bryant, MHSCA, RN, CIC[a]; Ginger Hucks, CST, CHESP[a]; Michelle Carney, MD[a]; Maynard Riley, BA[b];Peter Teska, BS, MBA[b]; Salah Qutaishat, BS, MS, PhD[2], CIC, FSHEA[b]

[a] Spartanburg Medical Center

[b] Diversey Care Sealed Air

Table1. Comparison of pre- and post-intervention cleaning rates at two hospitals

	Pre- Intervention			Post-intervention		
	Tested	Cleaned (%)	95% CI	Tested	Cleaned (%)	95% CI
Both Hospitals	460	269 (58)	55-64	430	356 (83)	79-86
Hospital A	250	155 (62)	56-68	150	128 (85)	80-91
Hospital B	220	124 (56)	50-63	280	228 (81)	77-86

Table 2. Comparison of cleanliness rates for 10 high-touch surfaces in two hospitals before and after intervention

	Hospital A			Hospital B		
Surface tested	**Pre-intervention**	**Post-intervention**	**Change**	**Pre-intervention**	**Post-intervention**	**Change**
Call Button	**40.0%**	**86.7%**	**46.7%**	**81.8%**	**63.3%**	**-18.2**
Room Door Handle	**36.0%**	**80.0%**	**44.0%**	**36.4%**	**86.4%**	**50.0%**
Patient Chair	**64.0%**	**100.0%**	**36.0%**	**77.3%**	**86.4%**	**9.1%**
Toilet Grab Bar	**52.0%**	**80.0%**	**28.0%**	**18.2%**	**72.2%**	**54.5%**
Toilet Flush Handle	**60.0%**	**86.7%**	**26.7%**	**63.6%**	**90.9%**	**27.3%**
Telephone	**76.0%**	**92.9%**	**16.9%**	**90.9%**	**90.9%**	**0.0%**
Bed Control Panel	**72.0%**	**86.7%**	**14.7%**	**13.6%**	**40.9%**	**27.3%**
Overbed Table	**80.0%**	**93.3%**	**9.3.%**	**45.5%**	**86.4%**	**-4.5%**
Room Sink	**64.0%**	**73.3%**	**9.3%**	**45.5%**	**86.4%**	**40.9%**
Bed Rail	**76.0%**	**80.0%**	**4.0%**	**36.4%**	**90.9%**	**54.5%**

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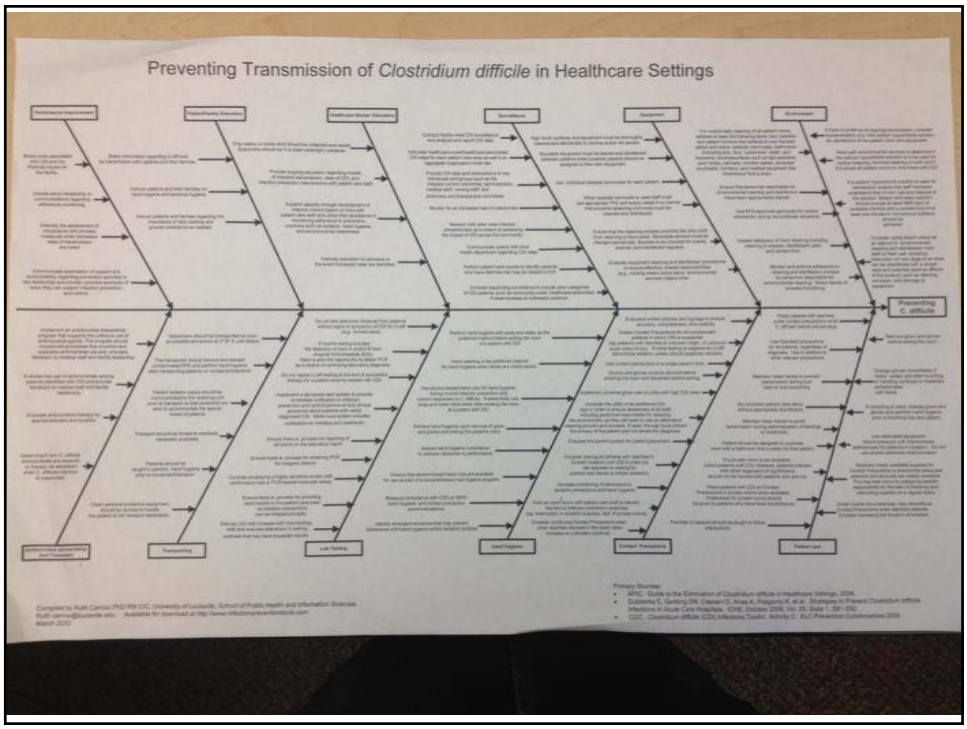
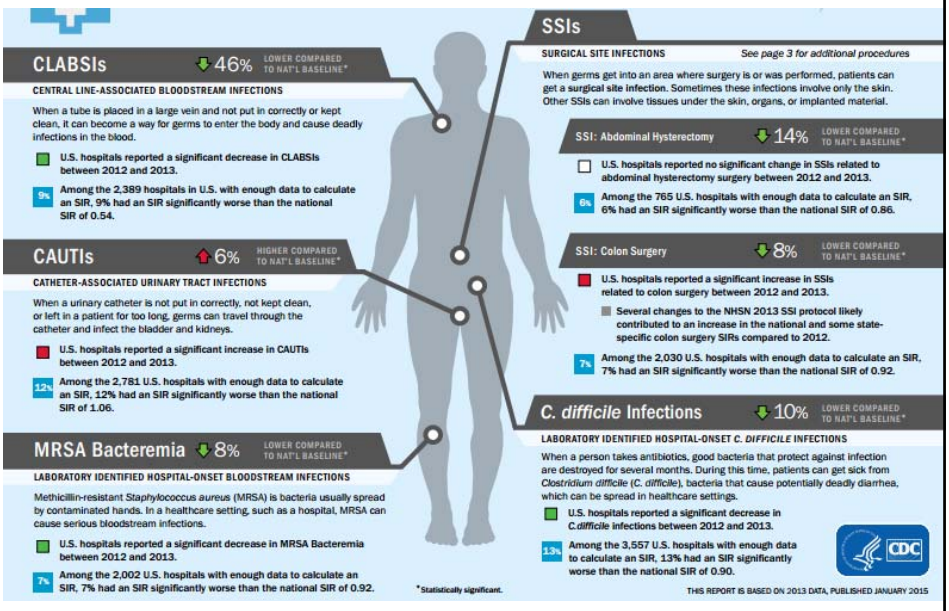


Major site of Infection	Estimated Number of Infections (2002)
Healthcare-Associated Infection (all HAI)	1,737,125
Surgical Site Infection (SSI)	290,485
Central Line Associated Bloodstream Infections (CLABSI)	92,011
Ventilator-associated Pneumonia (VAP)	52,548
Catheter associated Urinary tract Infection (CAUTI)	449,334
Clostridium difficile-associated disease (CDI)17	178,000

HEALTHCARE-ASSOCIATED INFECTIONS (HAI) PROGRESS REPORT

HTTP://WWW.CDC.GOV/HAI/PROGRESS-REPORT/INDEX.HTML

Major site of Infection Estimated Number of Infections (2013)	
Pneumonia	157,500
Gastrointestinal Illness	123,100
Urinary Tract Infections	93,300
Primary Bloodstream Infections	71,900
Surgical site infections from any inpatient surgery	157,500
Other types of infections	118,500
Total number of infections in hospitals	**721,800**



HAI TYPE	# OF U.S. HOSPITALS THAT REPORTED DATA TO CDC'S NHSN, 2013+	2013 NAT'L SIR vs. 2012 Nat'l SIR‡	2013 NAT'L SIR vs. Nat'l Baseline‡	2013 NAT'L SIR
CLABSI Nat'l Baseline: 2008	3,578	↓ 4%	↓ 46%	0.54
CAUTI Nat'l Baseline: 2009	3,640	↑ 3%	↑ 6%	1.06
SSI, Abdominal Hysterectomy Nat'l Baseline: 2008	3,182	⇩ 4%	↓ 14%	0.86
SSI, Colon Surgery Nat'l Baseline: 2008	3,348	↑ 14%	↓ 8%	0.92
MRSA Bacteremia Nat'l Baseline: 2011	3,827	↓ 5%	↓ 8%	0.92
***C. difficile* Infections** Nat'l Baseline: 2011	3,924	↓ 6%	↓ 10%	0.90

PROCEDURE CATEGORY	# FACILITIES REPORTING	# PROCEDURES REPORTED	2013 NAT'L SIR VS. NAT'L BASELINE	2013 NAT'L SIR
Hip arthroplasty	1,761	261,809	↓ 27%	0.73
Knee arthroplasty	1,750	378,846	↓ 40%	0.60
Colon surgery	3,348	296,623	↓ 8%	0.92
Rectal surgery	322	6,633	↓ 21%	0.79
Abdominal hysterectomy	3,182	302,250	↓ 14%	0.86
Vaginal hysterectomy	826	35,488	↓ 19%	0.81
Coronary artery bypass graft	742	116,105	↓ 40%	0.60
Other cardiac surgery	371	43,409	↓ 44%	0.56
Peripheral vascular bypass surgery	288	8,856	↓ 43%	0.57
Abdominal aortic aneurysm repair	302	2,462	↓ 70%	0.30
These 10 procedures combined	3,581	1,452,481	↓ 19%	0.81

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Salmonella

- Qutaishat S. Stemper M. Direct patient to healthcare provider transmission of *Salmonella typhimirium*. Association for Professional in Infection Control and Epidemiology Annual Meeting, 2002.


PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Transmission of *Salmonella enterica* Serotype Typhimurium DT104 to Infants Through Mother's Breast Milk

Salah S. Qutaishat, Mary E. Stemper, Susan K. Spencer, Mark A. Borchardt, James C. Opitz, Timothy A. Monson, Jennifer L. Anderson and Jay L. E. Ellingson

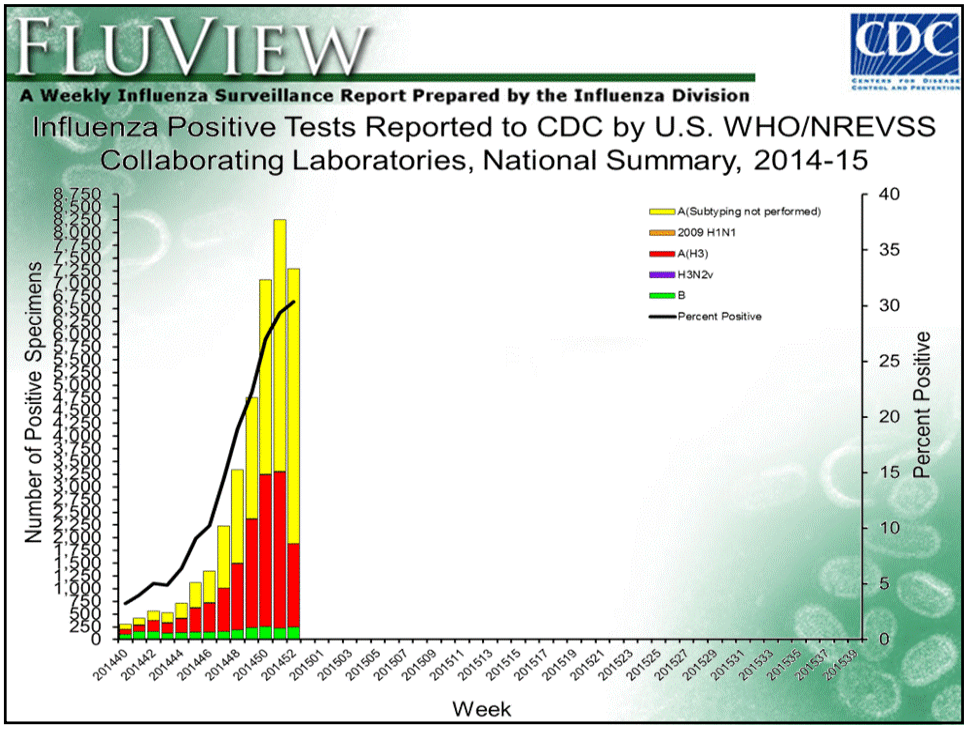
Pediatrics 2003;111;1442

1/20/2015 37

The Ebola Story

- Thomas Frieden MD
- “Breach of protocol”

- #Ebola is not #MRSA time to create "bug busters" teams at hospitals. Well-trained specialist in treatment, prevention and protection.


FLUVIEW
A Weekly Influenza Surveillance Report Prepared by the Influenza Division
CDC
Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2014-15
Number of Positive Specimens
Percent Positive
A(Subtyping not performed)
2009 H1N1
A(H3)
H3N2v
B
Percent Positive
Week

Norovirus


Micro Musings....
"WELL, IT LOOKS LIKE YOU'VE PICKED UP A RHINOVIRUS!"

Norovirus Impact-US

- 19–21 million cases of acute gastroenteritis (inflammation of the stomach or intestines or both)
- 1.7–1.9 million outpatient visits and 400,000 emergency department visits, primarily in young children
- 56,000–71,000 hospitalizations
- 570-800 deaths, mostly among young children and the elderly

SETTING OF NOROVIRUS OUTBREAKS REPORTED THROUGH THE NATIONAL OUTBREAK REPORTING SYSTEM (NORS), 2009-2012

Exposure setting	Number of Outbreaks	Percentage of Outbreaks
Health care facility	2189	62.7%
Restaurant or banquet facility	771	22.1%
School or day-care facility	214	6.1%
Private residence	69	1.9%
Other/multiple settings	251	7.2%

41

Clostridium difficile

Fecal Transplant

2006

Deficit Reduction Act Enacted
- HAC Policy to impact 2008 payment
- Uses funding as incentive for quality improvement

2008

GAO Issues Report on Need for HAI Coordination

2009

American Recovery and Reinvestment Act (ARRA)
- Grants to States for HAI Coordinators and activities

Omnibus Appropriations Act
- States to develop HAI Plans (or lose block grant funds)

National Action Plan to Prevent HAIs
- Response to Congressional Hearing and GAO report
- Plan to better coordinate federal HAI activities

2010

Affordable Care Act (Obamacare)
- Required HAI reporting as part of healthcare quality improvement programs

Value Based Purchasing (VBP)

- **Total Performance Score –** determined by hospital's achievement and improvement compared to a 9-month baseline period.
- **2010** - Established by the Affordable Care Act as incentive program to improve quality of healthcare.
- **FY 2013 –** first year of payment adjustments under the VBP program
- Total amount available for incentive payments for a fiscal year = the total amount of the payment reductions for all participating hospitals that year:

  FY 2013 – 1% of base-operating DRG payment to all participating hospitals
  FY 2014 – 1.25%
  FY 2015 – 1.5%
  FY 2016 – 1.75%
  FY 2017 and beyond – 2%

Are they preventable?

- Weissenbach M. Barrett C. Qutaishat S. Automating and expanding the presentation of cumulative antibiogram reports to include patient care units and major specimen sources. The Society for Healthcare Epidemiology of America (SHEA) Annual Meeting, April, 2011.
- Jadin S. Burns P. Janasie M. Johnson V. Riley L. Simon K. Wells P. Qutaishat S. Accuracy of catheter-associated bloodstream infection (CLABSI) rates based on extrapolation of monthly central line days collected one day a week. The Society for Healthcare Epidemiology of America (SHEA) Annual Meeting, April, 2011.
- Green L. Bivens A. Vignari M. Qutaishat S. Using automated surveillance technology for influenza detection. Fifth Decennial International Conference on Healthcare-Associated Infections, 2010.
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- Qutaishat S. Mule K. Kallman C. Roehrs V. Prevention of Catheter-Associated Urinary Tract Infections: Successful Development and Implementation of a Urinary Catheter Bundle. American Journal of Infection Control; 34, E63, 2007.
- Jadin, S. Kloth, G. Ehlert, S. Qutaishat, S. Barriers to Receiving the Influenza Vaccine by Healthcare Workers in a Rehabilitation Facility. American Journal of Infection Control; 34, E166-E167, 2007.
- Qutaishat S. Giese H. Nienow K. Promoting alcohol-based hand sanitizers to patients and their families on a pediatric unit: partnership to enhance compliance with hand hygiene. American Journal of Infection Control; 33, E8, 2005.
- Qutaishat S. Gadke J. Successful Pilot Performance Improvement Initiative to Increase Influenza and Pneumonia Vaccination Rates of Hospitalized Adults. Association for Professional in Infection Control and Epidemiology Annual Meeting, 2003.