NATIONAL INFLUENZA VACCINE SUMMIT:

STRATEGIES TO OVERCOME MYTHS AND MISCONCEPTIONS

Myth 1: I'm healthy and don't need vaccine

Myth 2: I can't get "flu" because I wash my hands

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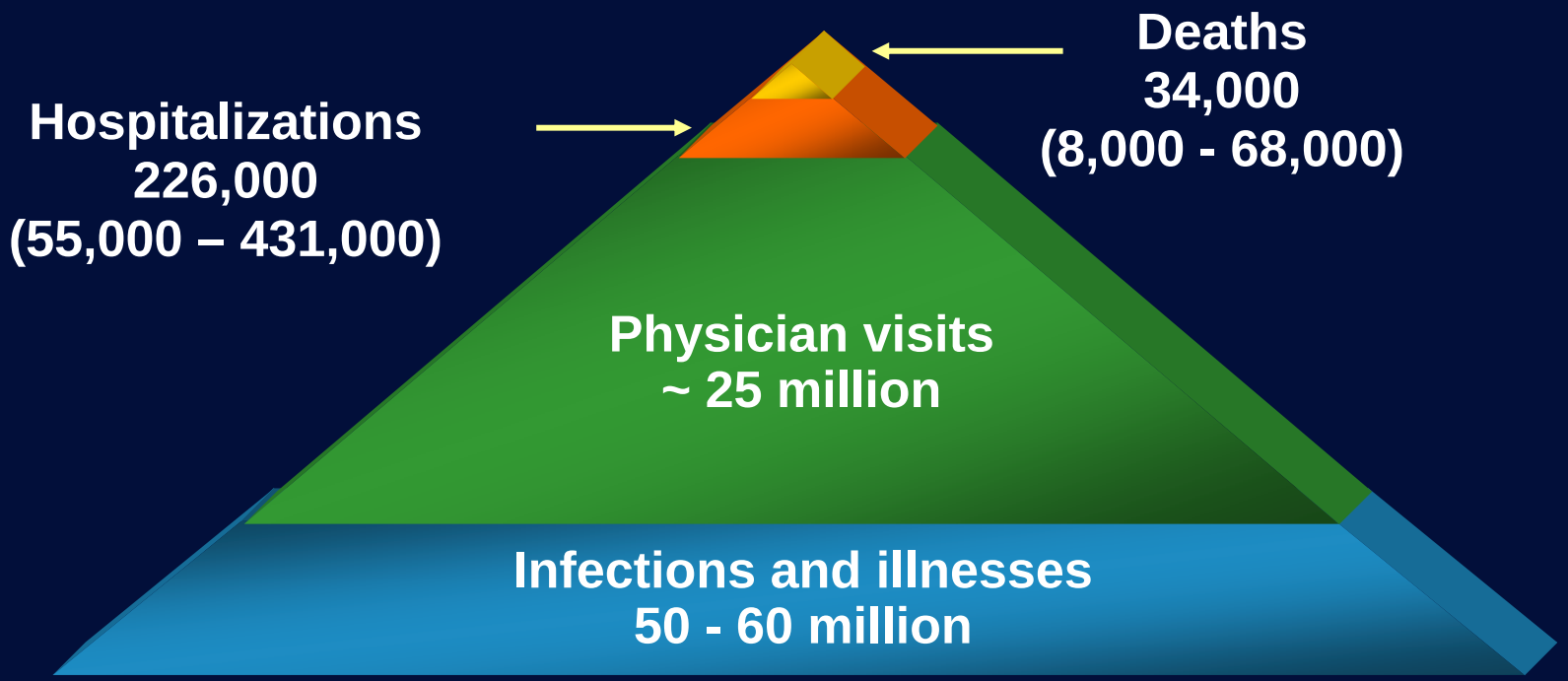
Influenza Disease Burden to U.S. Societyin an Average Year



Thompson WW et al. *JAMA*. 2003;289:179-86. Couch RB. *Ann Intern Med*. 2000;133:992-8. Patriarca PA. *JAMA*. 1999;282:75-7. ACIP. *MMWR.* 2006;56(RR-6):1-40.

INFLUENZA: EPIDEMIOLOGY

- Geographic distribution - global
- Reservoir: Humans, swine, birds
- Incubation - 1 to 4 days (average, 2 days)
- Transmission
  - Droplet (airborne?) route
  - Direct contact
- Communicability
  - 1 to 2 days before onset of symptoms to 5-7 days post-onset (adults) or ≥10 days (children)
  - Attack rates: Up to 60%
- No carrier state (but unapparent illness may occur and such persons may be infectious)

1.

Clinical Manifestations by Age Group

Influenza Sign/Symptom	Children	Adults	Elderly
Cough (nonproductive)	++	++++	+++
Fever	+++	+++	+
Myalgia	+	+	+
Headache	++	++	+
Malaise	+	+	+++
Sore throat	+	++	+
Rhinitis/nasal congestion	++	++	+
Abdominal pain/diarrhea	+	–	+
Nausea/vomiting	++	–	+

++++ Most frequent sign/symptom; + Least frequent; – Infrequent

Monto AS et al. *Arch Intern Med*. 2000;160:3243-47. Cox NJ et al. *Lancet*. 1999;354:1277-82.

Influenza Manifestations & Complications

	Children	Adults
Frequent	Sinusitis, bronchitis, bronchiolitis, pneumonia, croup, acute otitis media	Primary viral pneumonia, secondary bacterial pneumonia, sinusitis, bronchitis
Rare	Encephalopathy, myositis, rhabdomyolysis, myocarditis, pericarditis, Reye syndrome, sepsis-like syndrome	Myositis, rhabdomyolysis, myocarditis, pericarditis
Exacerbations of underlying disease	Cardiovascular, diabetes, asthma, cystic fibrosis	Cardiovascular, diabetes, asthma, COPD

Loughlin J et al. *Pharmocoeconomics*. 2003;21:273-283. Treanor JJ. Influenza virus. In: Mandell GL, Bennett JE, Dolin R, eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases.* 5th ed. Philadelphia, PA: Churchill Livingstone; 2000:1823-1849. ACIP. *MMWR 2004;*53 (RR06):1-40.

INFLUENZA VACCINE: INDICATIONS

- All persons who want to reduce the risk of becoming ill with influenza or of transmitting influenza to others
- Children aged 6-59 months
- Women who will be pregnant during influenza season
- Persons aged ≥50 years
- Children (6 mo–18 yr) receiving aspirin (risk for Reye syndrome)
- Adults and children with chronic cardio-respiratory illnesses
- Adults and children with chronic metabolic disorders, immune deficiencies, or immunosuppression
- Adults and children with any chronic condition that compromised respiratory tract function or at increased risk for aspiration
- Persons who live with people at high risk for influenza complications
- Residents of extended care facilities of any age
- Healthcare workers

ACIP. MMWR 2007;56(RR-6):1-53

MYTH 1

I don’t need an influenza vaccine because I am a healthy adult

EFFECTIVENESS OF INACTIVATED INFLUENZA VACCINES IN HEALTHY ADULTS

- Effectiveness against influenza
  - Influenza immunization 80% (95% CI, 56%-91%) effective against influenza {good vaccine strain match}
  - Influenza immunization 50% (95% CI, 27-65%) effective against influenza {poor vaccine strain match}
- Protection against complications
  - 13% (NS) against physician visits {N=2}
  - 13% (borderline significance) against working days loss (0.4 days){N=5}
  - 29% (NS) against days ill {N=4}
  - 11% (NS) against hospitalization {N=5}

Jefferson TO, Cochrane review, 2008
Healthy adults aged 16-65 years,
38 clinical trials, 66,248 participants

RANDOMIZED CONTROLLED TRIALS OF INFLUENZA VACCINE IN HEALTHY WORKING ADULTS

- 1994-95, N=849*
  - 25% reduction in episodes of URI
  - 43% reduction in sick leave from work
  - 44% fewer MD visits
- 1997-98 (N=1184) & 1998-99 (N=1191)** {attack rate 5-10%}
  - 1997-98: 50% reduction in influenza (p=0.33); No reduction in ILI, MD visits, or lost workdays
  - 1998-99: 86% reduction in influenza (p=0.001); Reduction of ILI = 34% (p<0.001), MD visits = 42% (p<0.001), & lost workdays = 32% (p=0.002)

* Nichol KL, et al. NEJM 1995;333:889-93; ** Bridges CB, et al. JAMA 2000;284:1655-1663

INFLUENZA IN HEALTHCARE FACILITIES

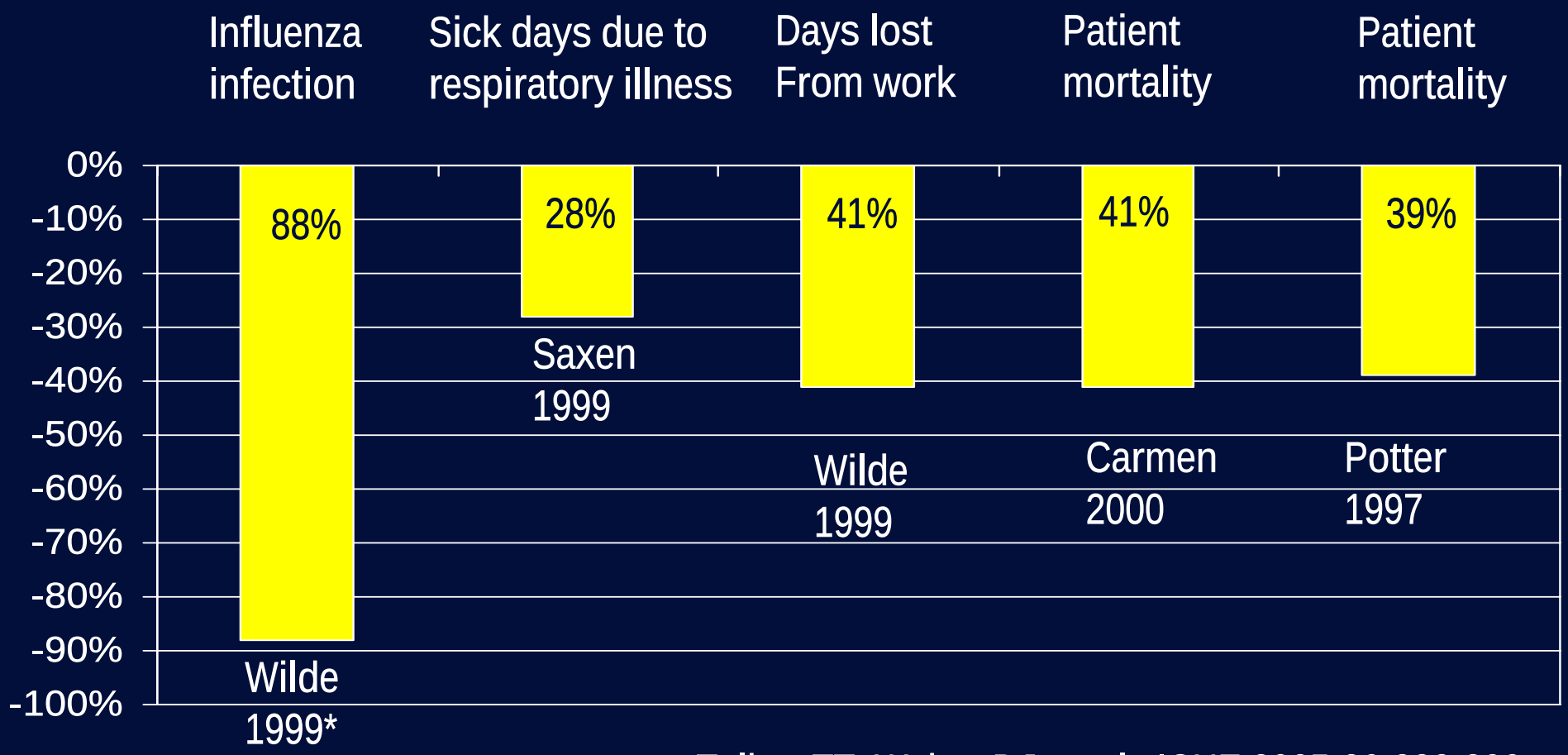
- More than 25 outbreaks described in literature in acute care hospitals
  - Infected staff may initiate outbreak or aid in propagation
  - HCW infection may lead to absenteeism and disruption of health care
  - Attack rates in HCWs have ranged from 25% to 80%
- More than 15 outbreaks described in literature in extended care facilities
  - Important morbidity and mortality among residents may result
  - High rates of immunization (>60%) among staff may lead to decreased attack rate in residents

INFLUENZA VACCINE COVERAGE IN HEALTHCARE WORKERS, NCHS

Occupational Category	1997	1998
MD, dentist, veterinarian, optometrist	44.6%	35.8%
RN, PA, PT, pharmacist	34.6%	41.5%
Technologist/technician, LPN, dental hygienist, radiology technician	31.5%	44.6%
Dental assistant, health aid, nursing aid, orderly	31.2%	29.4%
Non-healthcare occupation in health industry	32.2%	37.0%
Non-healthcare worker	15.9%	18.5%

Walker FJ, et al. ICHE 2006;27:257-265

REDUCTION IN OUTCOMES IN HCWs RECEIVING INFLUENZA VACCINE

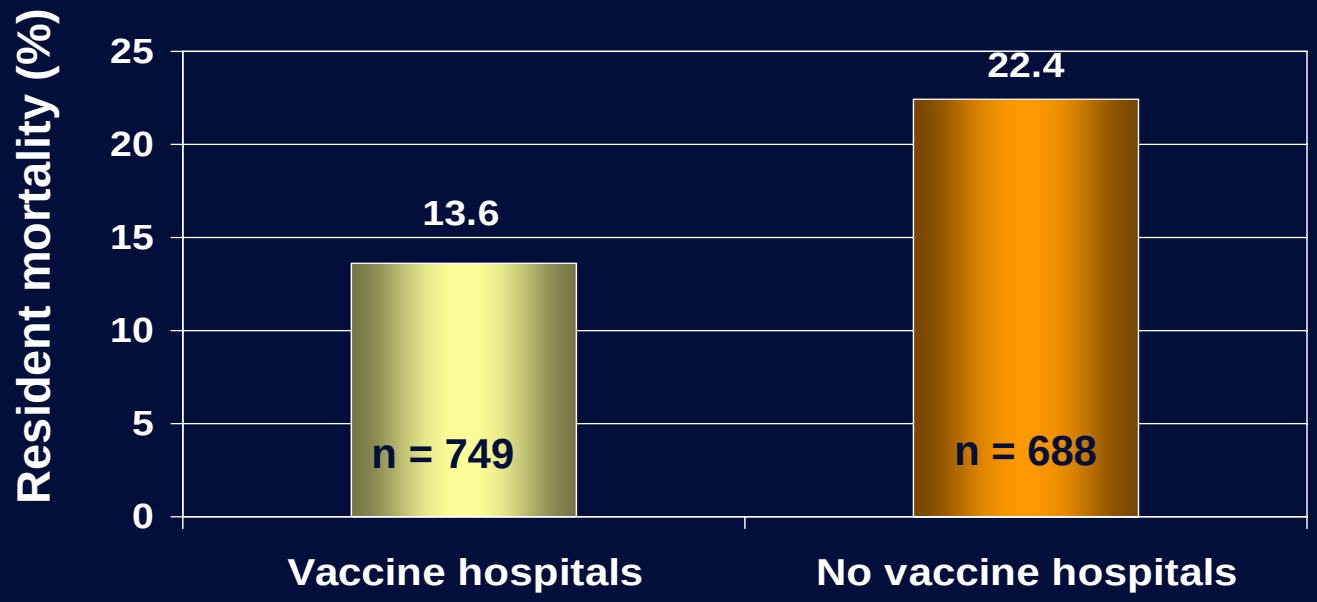


Attack rate unvaccinated = 13.4%

Talbot TT, Weber DJ, et al. ICHE 2005;26:882-890

Indirect Benefits of Influenza Vaccination of Health Care Workers

- 20 long-term care facilities, stratified cluster randomization staff influenza vaccination or not
- Resident mortality odds ratio 0.58 (95% CI 0.40, 0.84) p=0.014

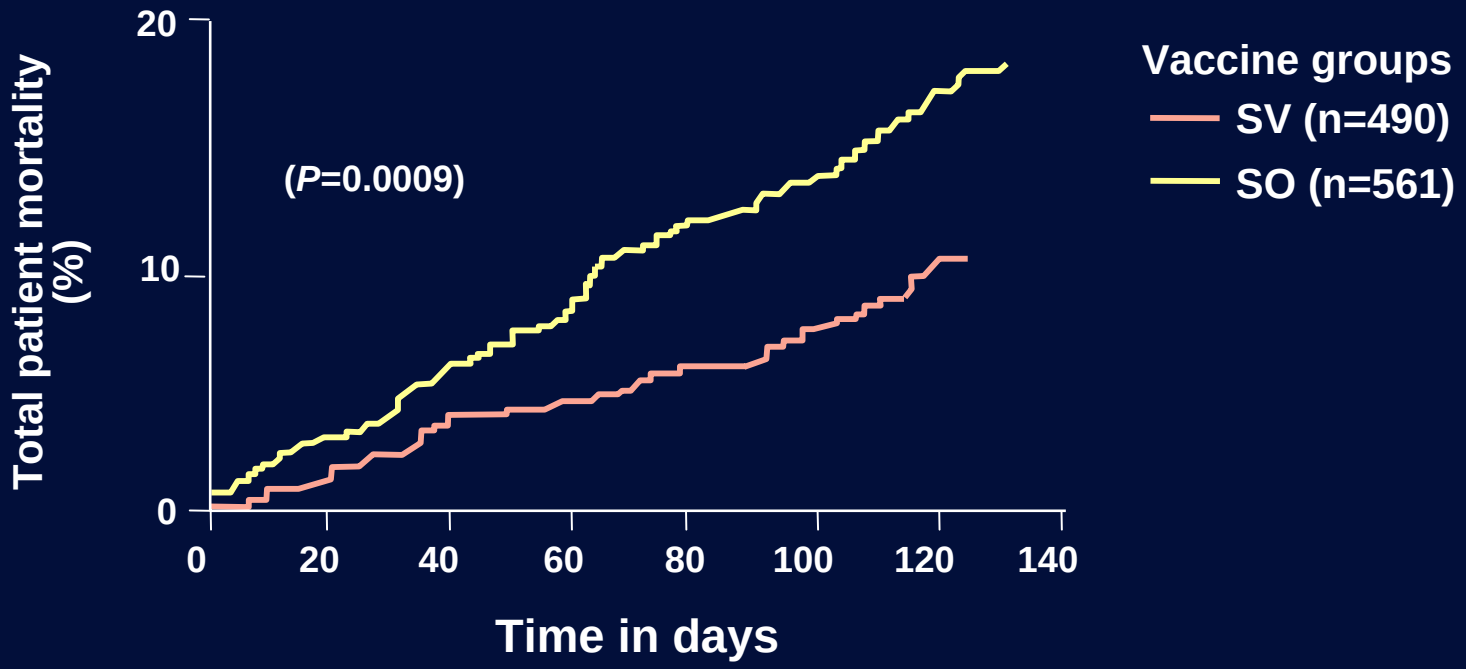


No significant difference in % residents positive for influenza: 'Vaccine hospitals' 5.4%; 'no vaccine hospitals' 6.7%

Carman WF et al. *Lancet.* 2000;355:93-7.

Indirect Benefits of Influenza Vaccination of Health Care Workers

Mortality of residents was significantly reduced (10% vs 17%) in nursing homes where the staff was vaccinated (SV) compared to facilities where they were not (S0)



Potter J et al. *J Inf Dis*. 1997;175:1-6.

MYTH 2

I don’t need to worry about influenza because I wash my hands

VALIDITY OF MYTH THAT HANDWASHING WILL PREVENT INFLUENZA

- Truthful aspects of statement
  - Antiseptics effective against the influenza virus
  - Hand hygiene indeed effective in reducing influenza infections
- False aspects of statement
  - Hand hygiene will not prevent aerosol transmission (droplet or airborne)
  - Hand hygiene often not done even in the healthcare setting

TRANSMISSION OF INFLUENZA: DIRECT OR INDIRECT CONTACT

- Environmental survival (Bean B, et al. JID 1982;146:47-51)
  - Influenza viruses can survive on nonporous surfaces (steel, plastic) 24-48 hr and porous surfaces (cloth, paper, tissues) 8-12 hr
  - Viable virus can be transferred from nonporous surfaces to hands for 24 hr and from tissues to hands for 15 min
- Environmental contamination (Boone SA, Gerba CP. J Infect 2005;51:303)
  - Influenza virus detected on 23% and 53% of inanimate objects present in day care centers in autumn and spring, respectively
  - Home with sick child = 60% objects contaminated

For review see - Brankston G, et al. Lancet ID 2007;7:257-65

TRANSMISSION OF INFLUENZA: AEROSOL TRANSMISSION, ANIMAL DATA

- Aerosolization in nonventilated room lead to infection in mice up to 24 hr after influenza virus introduced (Loosli CG, et al. Proc Soc Exp Biol 1943;53:205-6)
- Transmission of A/Panama/2007/99 (H3N2) virus shown between guinea pigs in the same cage, an adjacent cage, and a cage 91 cm away (Lowen AC, et al. PNAS 2006;103:9988-92)
- Transmission of influenza between ferrets despite physical separation (lateral distance = 1.6m, high = 1.0m) (Andrews C, Glover R. Br J Exp Pathol 1941;22:91-2)

AIRBORNE/DROPLET TRANSMISSION OF INFLUENZA: LESSONS FROM OUTBREAKS ON PLANES

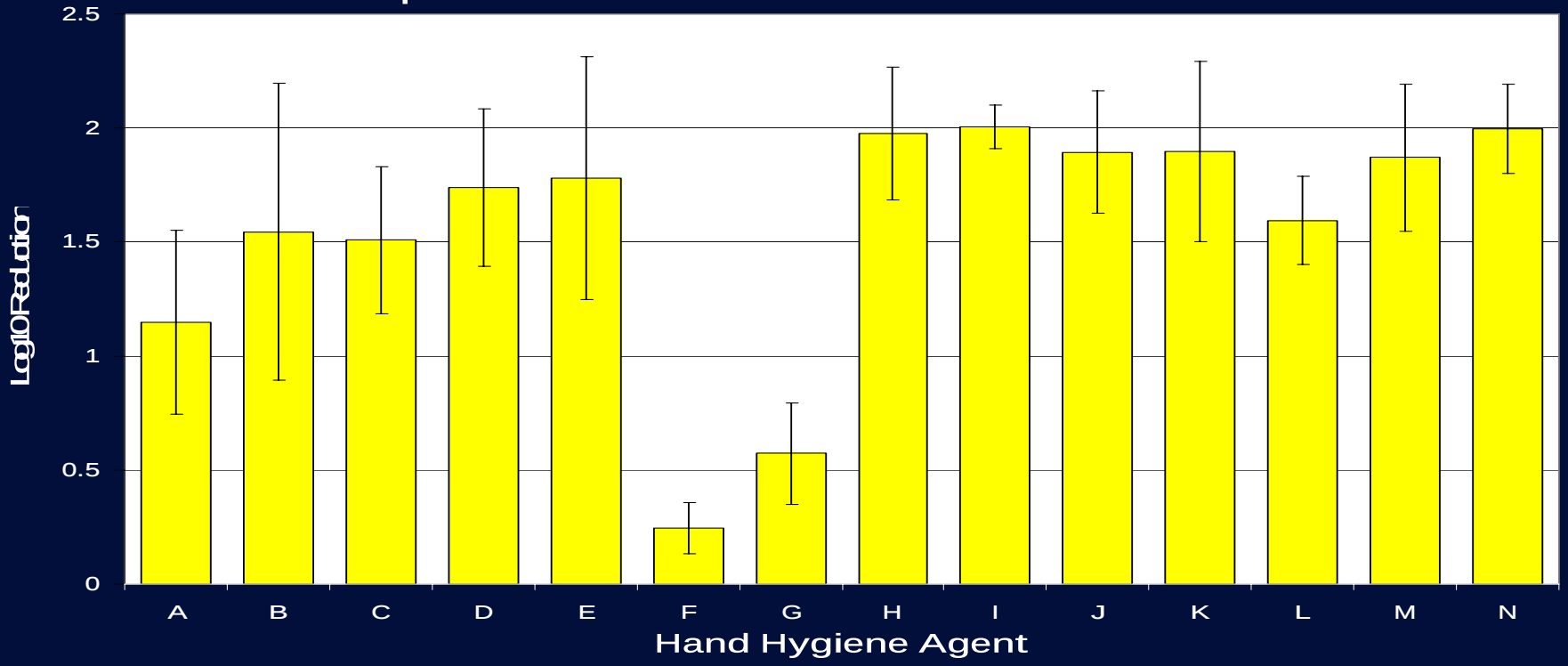
- Commercial plane, 1979
  - 72% attack rate of travelers within 72 hours (travelers remained on non-ventilated plane for 3 hours during repair work)
- Military transport, 1989
  - Influenza A/Taiwan/1/86 – transmission on plane and ground
- Commercial plane, 1999
  - 15 passengers developed influenza within 4 days (9 of 15 seated within 2 rows, all seated within 5 rows of index case)

RATIONALE FOR HAND HYGIENE

- ~40% of healthcare-associated infections due to cross-transmission
- Many infectious agents are acquired via hand contact with contaminated surfaces
  - Contact transmission: Healthcare (MRSA, VRE), day care (MRSA), home (MRSA, “cold viruses”, herpes simplex)
  - Fecal-oral transmission: Day care (*Shigella*, *E. coli* O157:H7), home (*Salmonella*, *E. coli* O157:H7, *Cryptosporidium*)
- Hand hygiene effective in reducing or eliminating transient flora
- Hand hygiene demonstrated to be effective in preventing illness (especially fecal-oral diarrheal illnesses) in healthcare facilities, child care centers and homes, and households

Order of Resistance of Microorganisms to Disinfectants/Sterilants

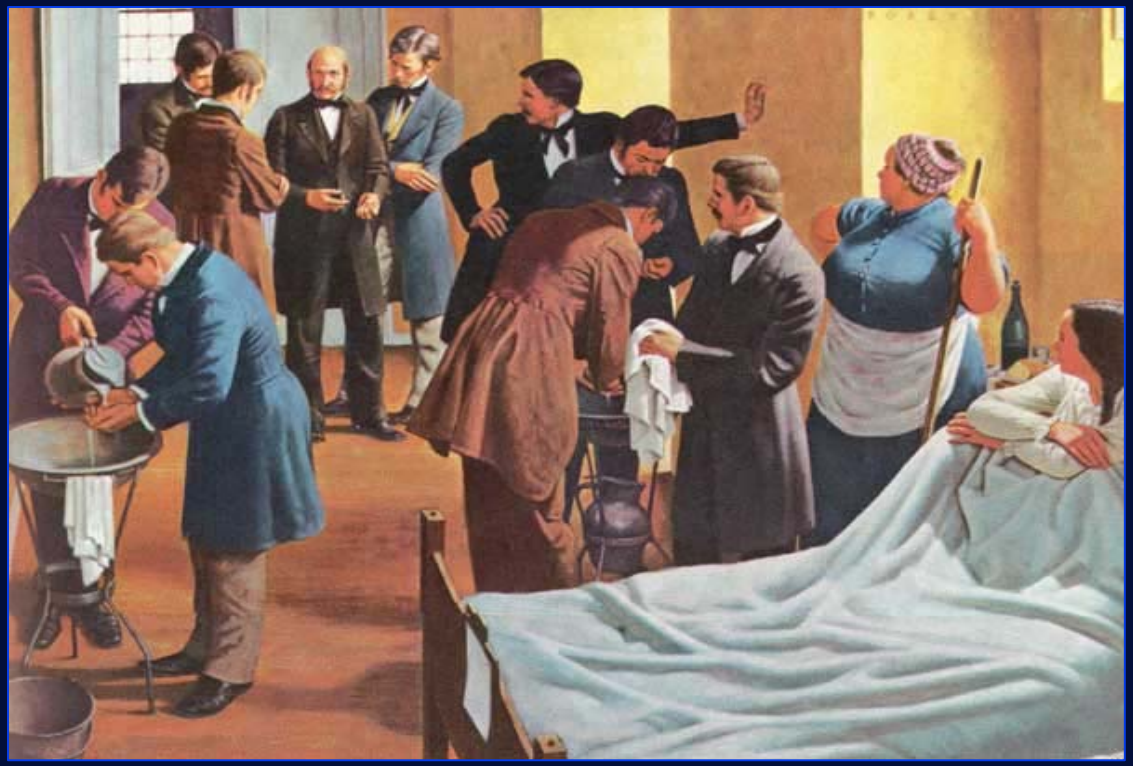
Efficacy of Hand Hygiene Agents in the Log Reductions of Gram-negative Bacteria (S. marcescens) after One Episode with 95% Confidence Intervals



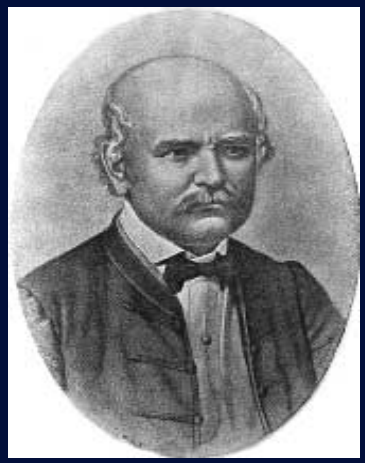
A	60% Ethyl Alcohol (N=5)	H	0.75% Chlorhexidine Gluconate (N=5)
B	61% Ethyl Alcohol (N=5)	I	2% Chlorhexidine Gluconate (N=5)
C	62% Ethyl Alcohol (N=5)	J	4% Chlorhexidine Gluconate (N=5)
D	61% Ethyl Alcohol/1% CHG (N=5)	K	1% Triclosan (N=5)
E	70% Ethyl Alcohol/0.005% Silver Iodide (N=5)	L	0.2% Benzethonium Chloride (N=5)
F	0.4% Benzalkonium Chloride (N=5)	M	Non-antimicrobial Control (N=5)
G	0.5% PCMX/40% SD Alcohol (N=5)	N	Tap Water Control (N=5)

Sickbert-Bennett E, Weber DJ, et al. Am J Infect Control 2005

Improved Patient Outcomes Associated with Proper Hand Hygiene



Chlorinated Lime Hand Antisepsis



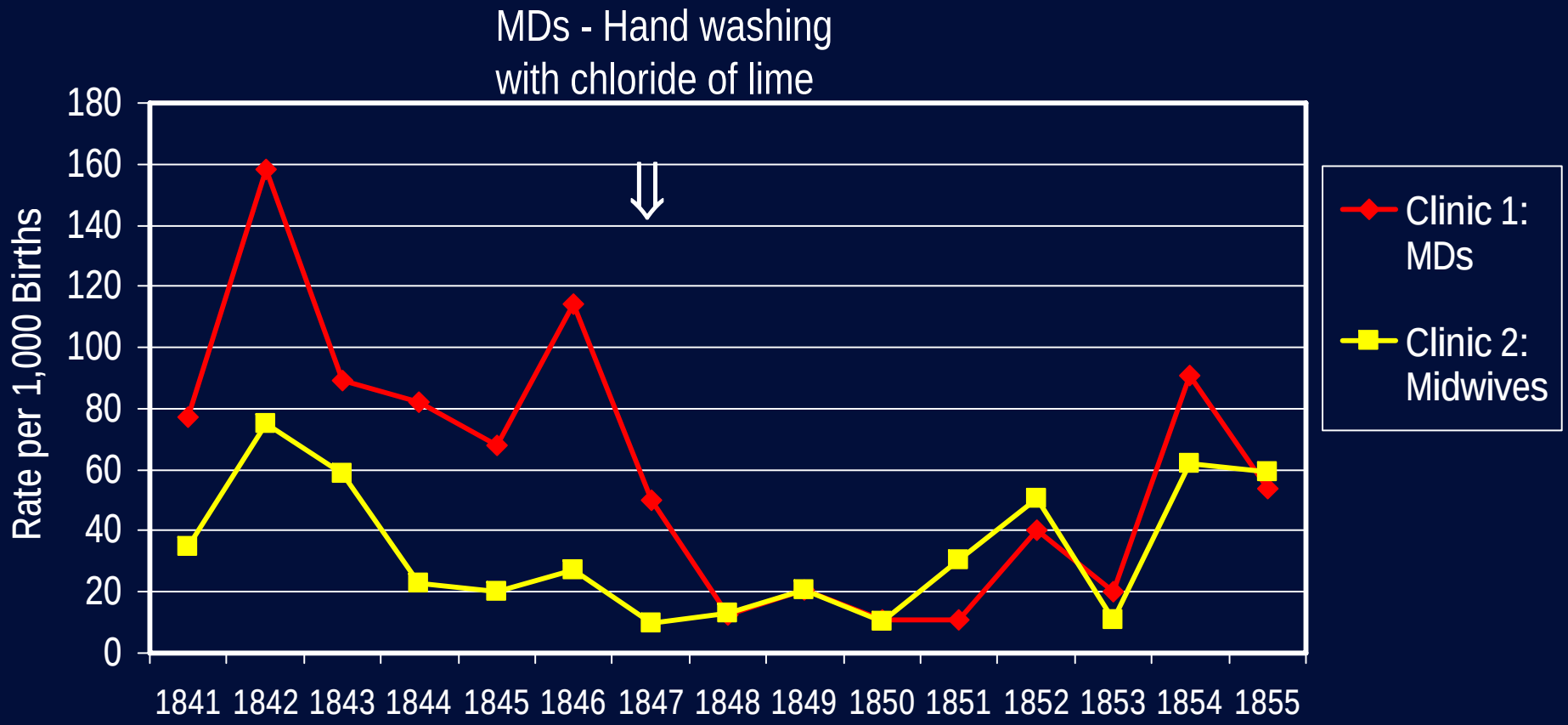
Ignaz Philipp Semmelweis
(1818-1865)

Hand-hygiene basin at the Lying-In Women's Hospital in Vienna, 1847

- "All students or doctors who enter the wards for the purpose of making an examination must wash their hands thoroughly in a solution of chlorinated lime which will be placed in convenient basins near the entrance of the wards. This disinfection is considered sufficient for this visit. Between examinations the hands must be washed in soap and water."

Courtesy of Didier Pittet and John Boyce

MATERNAL MORTALITY, VIENNA MATERNITY HOSPITAL, 1841-1855



Loudin I. Death in Childbirth. Oxford Press, 1992

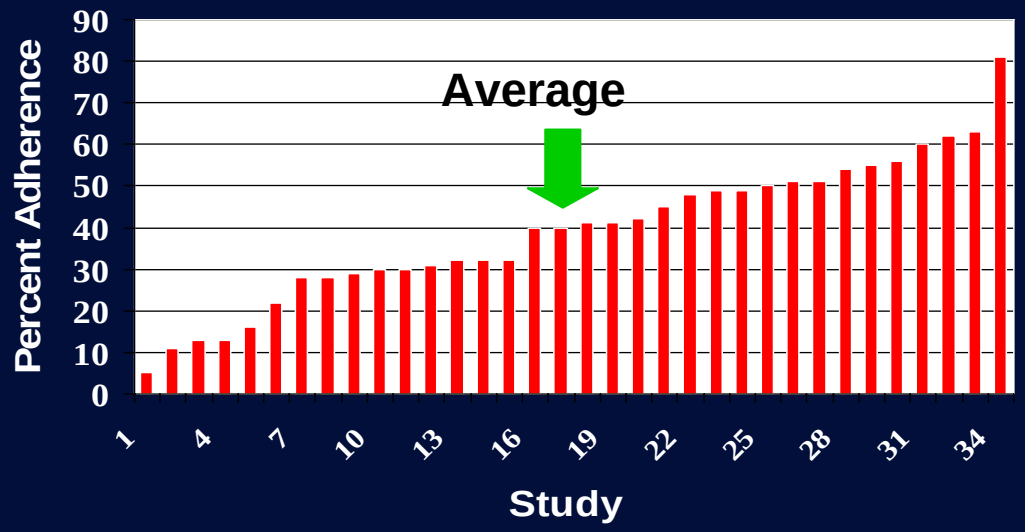
Ignaz Semmelweis
Four Years of Infection Control

Clin Infect Dis 1995;20:691

How Is Our Track Record on Handwashing in Healthcare Facilities?

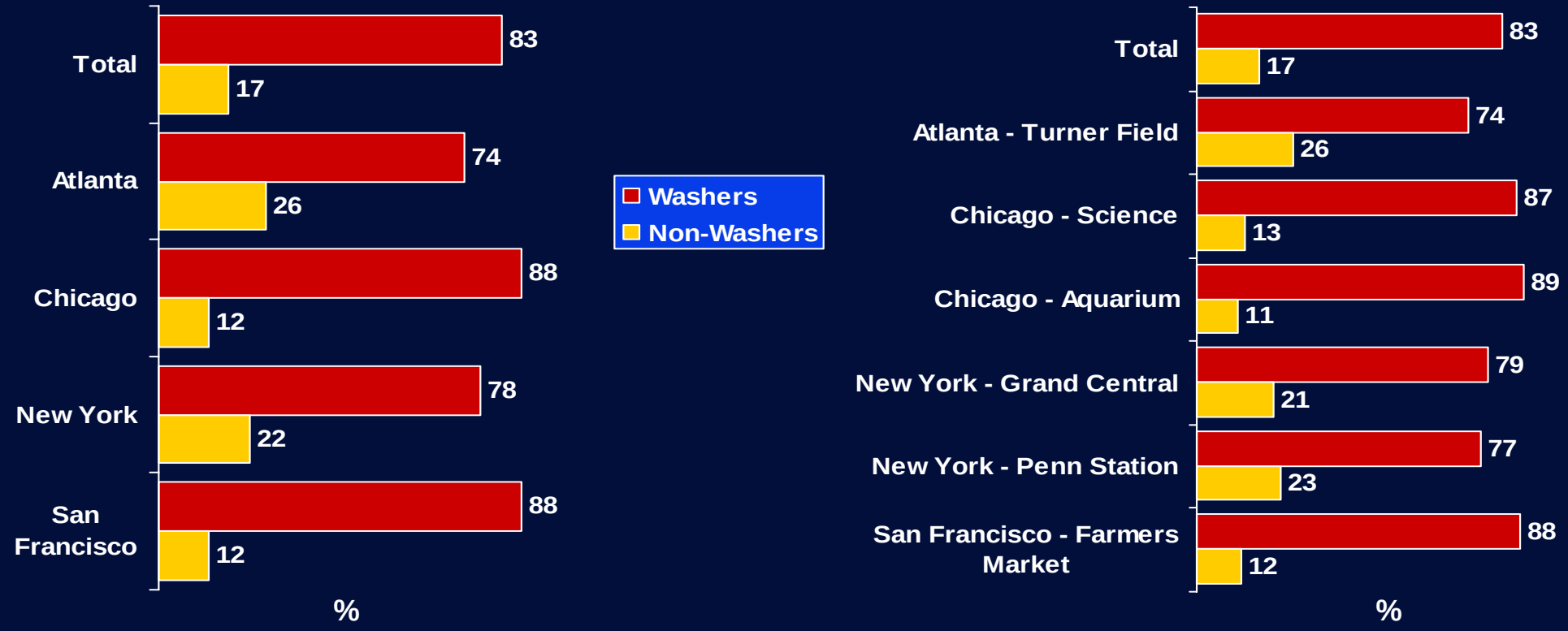
- A review of 34 published studies of handwashing adherence among healthcare workers found that adherence rates varied from 5% to 81%
- The average adherence rate was only 40%

Average Handwashing Adherence of Personnel in 34 Studies



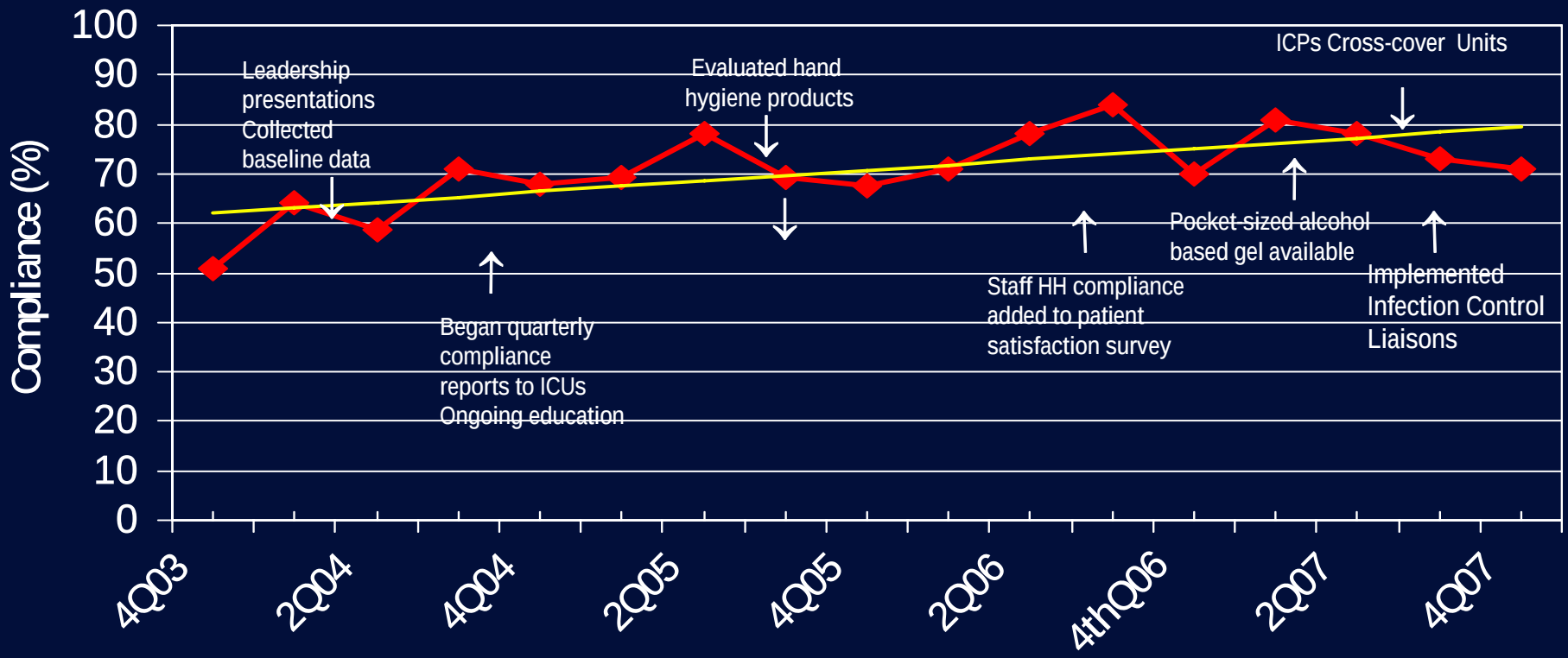
Public Attractions Observations

– Among Complete Sample –



Based on the observation of 6,336 individuals in public restrooms located at major public attractions
Harris Interactive, 2005 findings, produced for ASM

UNC Hospitals Intensive Care Units
Hand Hygiene Compliance



Hospital Epidemiology
Confidential Information for CQI

SUMMARY

- Yearly influenza outbreaks have a high attack rate even among healthy adults
- Myth 1: I am healthy so I don't need to worry about influenza
  - Studies support decreased infections in immunized healthy populations
  - Studies suggest immunization reduces days of lost work
  - Unclear if immunization prevents hospitalizations in healthy persons
- Myth 2: I wash my hands so I can't get influenza
  - Handwashing likely to reduce influenza attack rate
  - Influenza also spread by droplet and possibly airborne route: handwashing will not prevent infection via these routes