

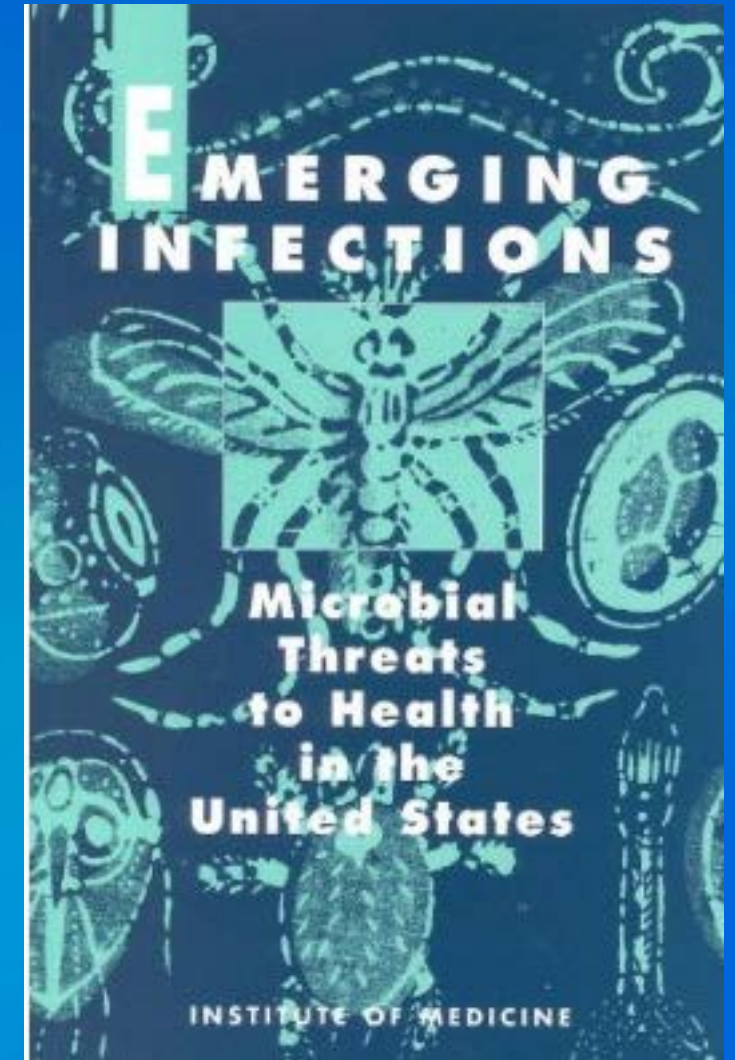
CDC's Emerging Infections Program at 20 years

A collaboration of Academic, Clinical, and Public Health Communities

Monica M. Farley, MD
Emory University School of Medicine
Co-Principal Investigator, Georgia Emerging Infections Program

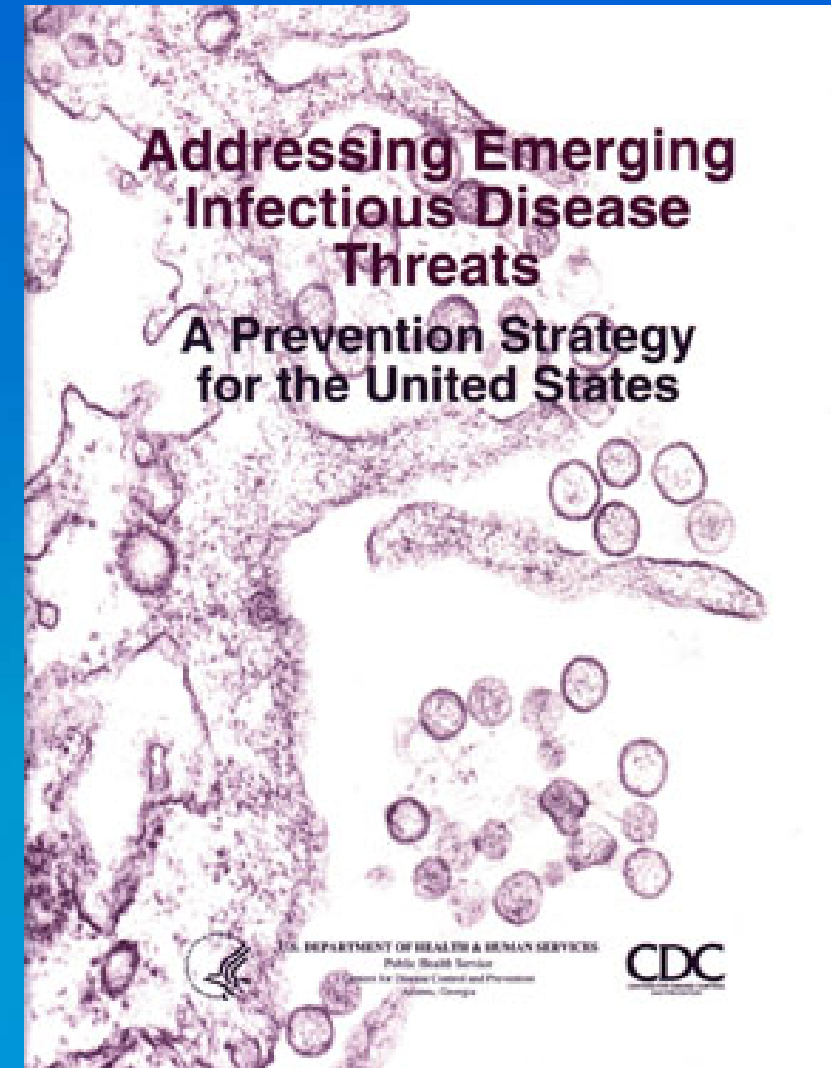
Origins of the EIP

- Disease-causing microbes have threatened human health for centuries. The Institute of Medicine's Committee on Emerging Microbial Threats to Health believes that this threat will continue and may even intensify in coming years.
- The Committee recommends the development and implementation of strategies that would strengthen state and federal efforts in U.S. surveillance

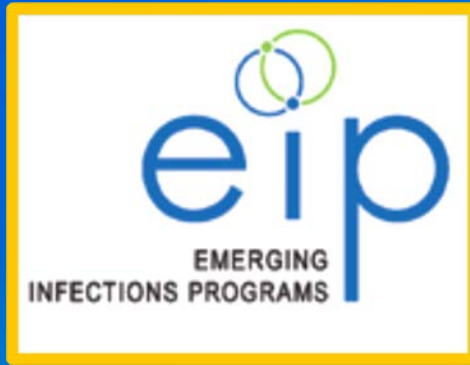


Emerging Infections. Microbial Threats to Health in the United States.
Eds: J Lederberg, RE Shope. Institute of Medicine, 1992

- **Goal I.** Detect, promptly investigate, and monitor emerging pathogens, the diseases they cause, and the factors influencing their emergence.
- **Goal II.** Integrate laboratory science and epidemiology to optimize public health practice.
- **Goal III.** Enhance communication of public health information about emerging diseases and ensure prompt implementation of prevention strategies.
- **Goal IV.** Strengthen local, state, and federal public health infrastructures to support surveillance and implement prevention and control programs.



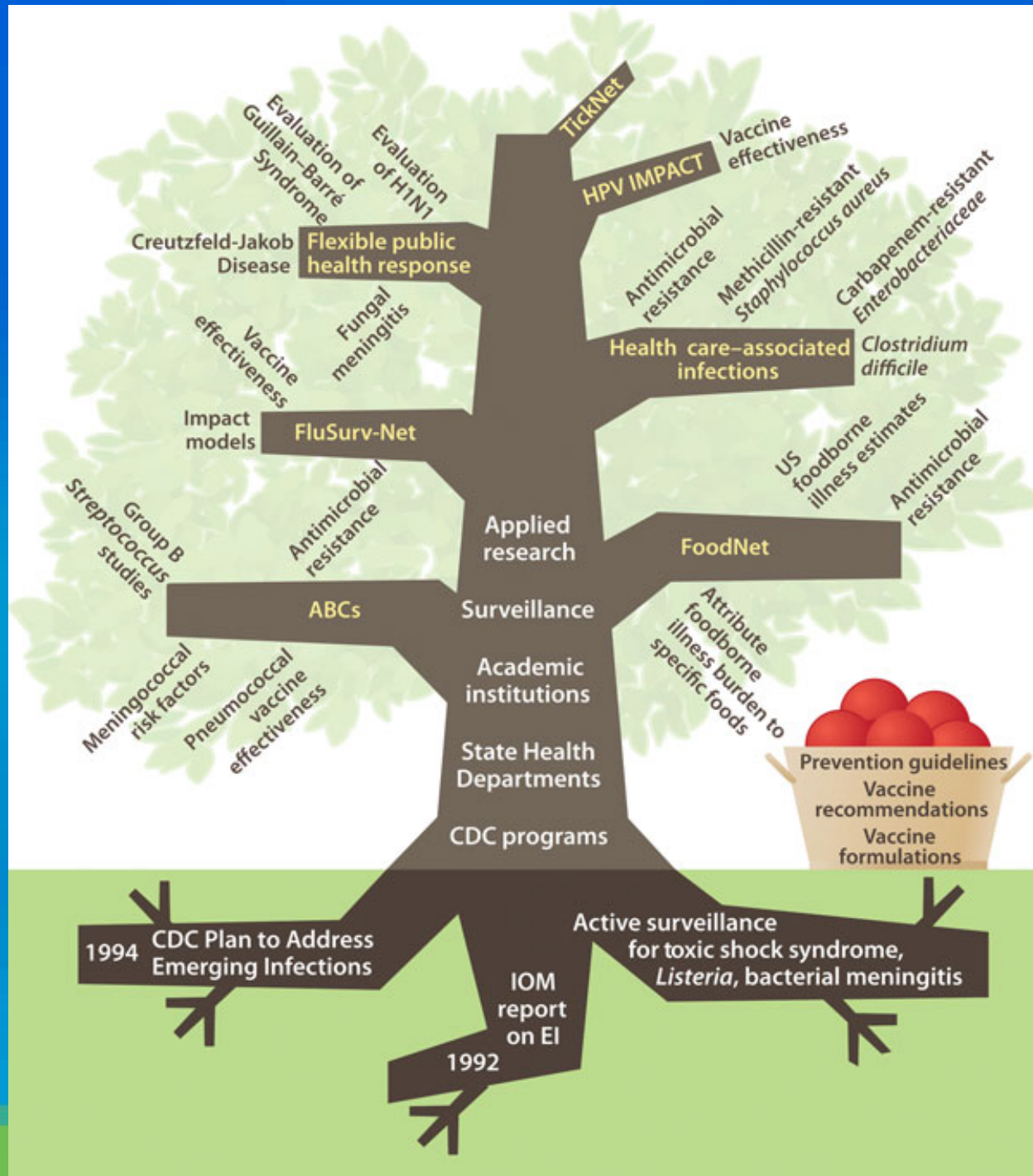
**Establish four population-based Emerging Infections
Epidemiology and Prevention Centers**



- EIPs established in 1995 to:
 - provide a national resource for infectious disease surveillance and response
 - conduct applied epidemiologic and laboratory research
 - identify measures to prevent and control emerging infectious diseases
 - strengthen national public health infrastructure

A Strong Partnership (Funded through Cooperative Agreement)

- CDC
- State Health Departments
- Academic Institutions/Laboratories
- USDA, FDA



The Emerging Infections Program and its Key Partnerships

Minnesota (1995)

Department of Health
Association of Professionals in Infection
Control

Oregon (1995)

Oregon Public Health Division
Oregon Health Sciences University

California (1995)

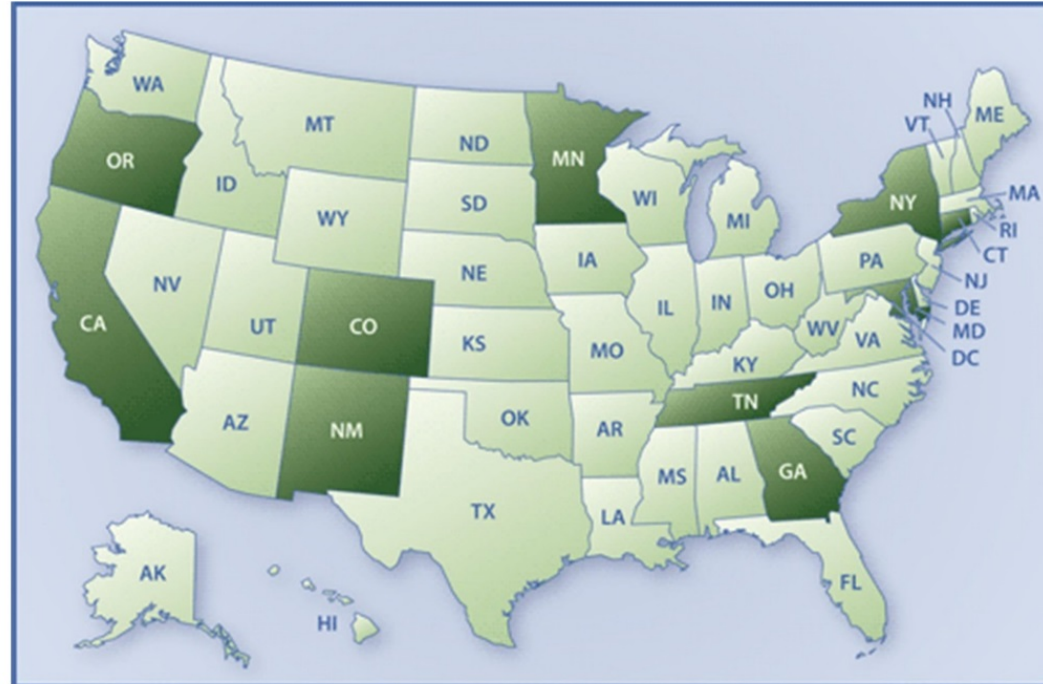
Department of Public Health
University of California School of Public
Health

Colorado (2000)

Department of Public Health and
Environment
University of Colorado Health Sciences
Center

New Mexico (2002)

Department of Health
University of New Mexico
Indian Health Service



New York (1997)

Department of Health
University of Rochester

Connecticut (1995)

Department of Public Health
Yale University School of Public Health

Maryland (1997)

Department of Health and Mental
Hygiene
University of Maryland
Johns Hopkins University

Tennessee (1999)

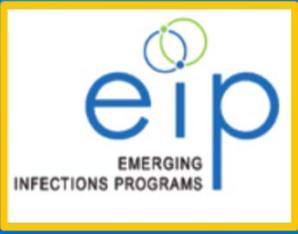
Department of Health
Vanderbilt University

Georgia (1997)

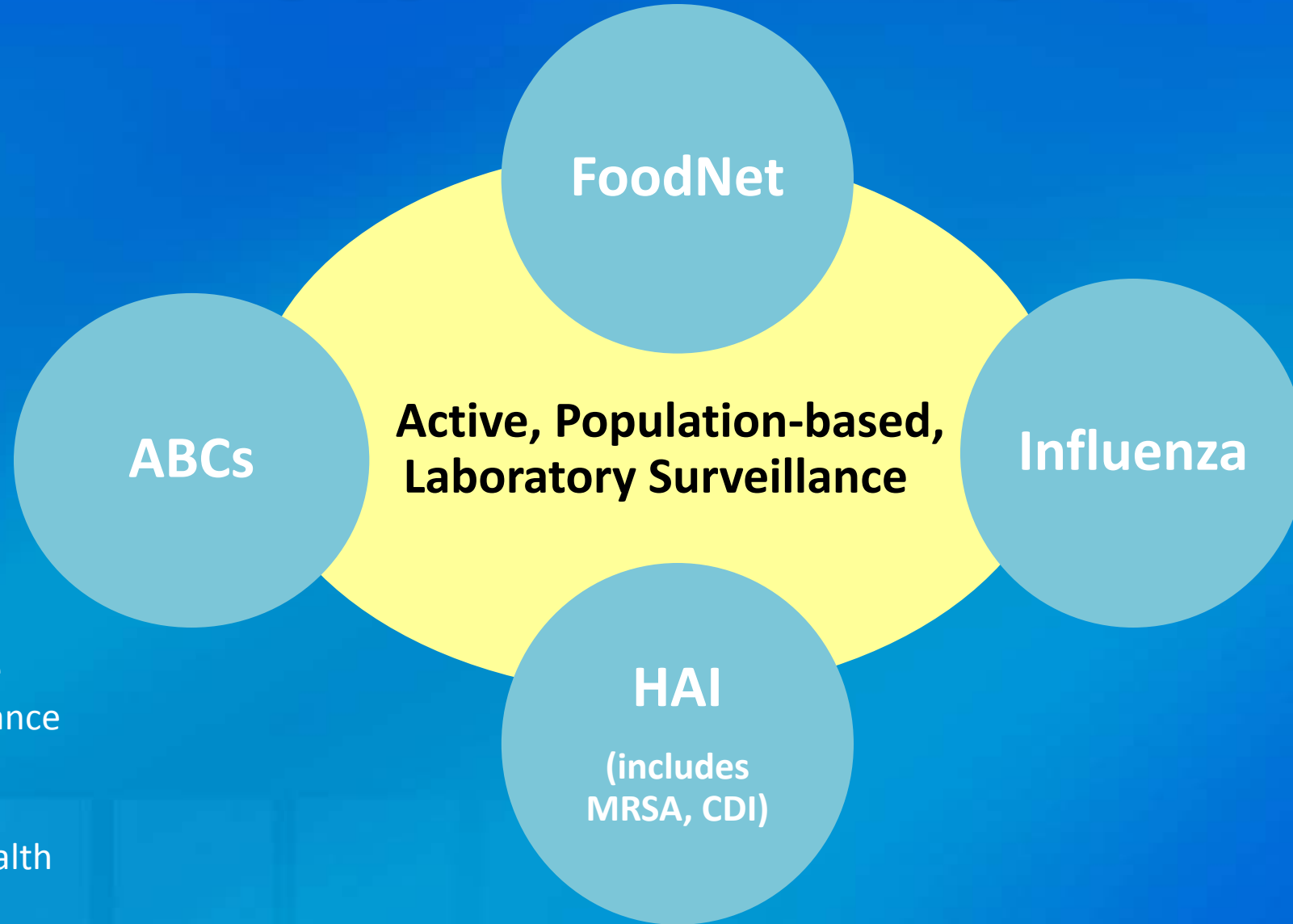
Department of Public Health
Emory University School of
Medicine
Atlanta VA Medical Center



Population under surveillance ranges from 13.2-44 million depending on the pathogen/disease entity



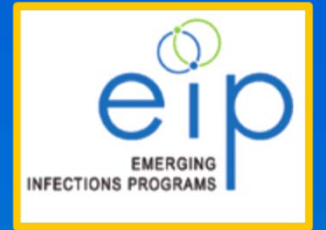
Emerging Infections Program



Other Activities:

- HPV CIN Surveillance
- Encephalitis Surveillance
- TickNet
- Flexible Response
- Training in Public Health

EIP Active Surveillance 2015



ABCs

- Group A Streptococcus
- Group B Streptococcus
- *Haemophilus influenzae*
- *Neisseria meningitidis*
- *Streptococcus pneumoniae*
- Neonatal Sepsis
- *Legionella*
- Pertussis

Healthcare Associated Infections

- Candidemia
- Carbapenem-nonsusceptible Gram Negative Bacilli
- *C. Difficile*
- MRSA—invasive

FoodNet

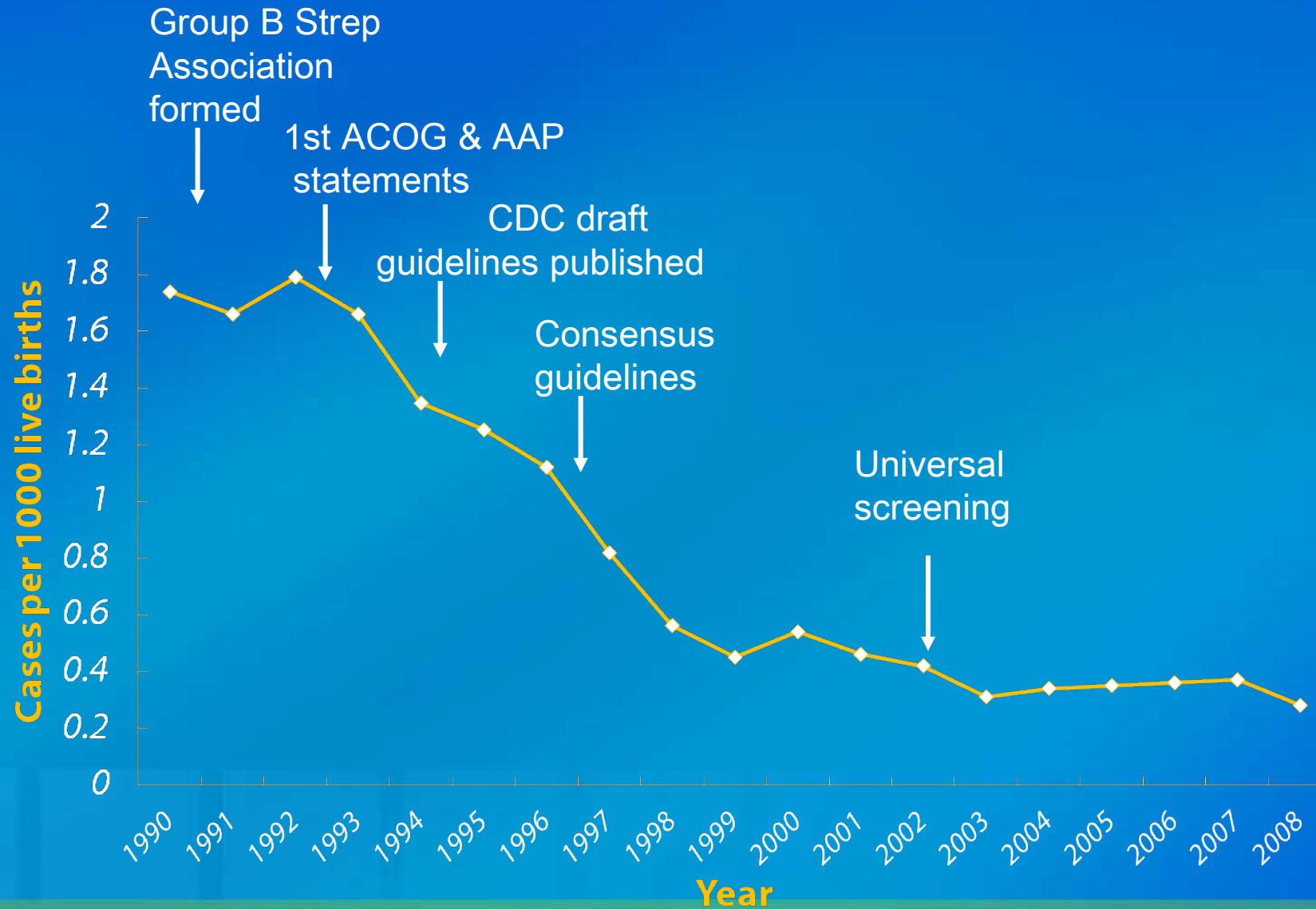
- *Campylobacter*
- *E.coli* O157 or SLT+
- *Listeria monocytogenes*
- *Salmonella*
- *Shigella*
- *Yersinia*
- *Vibrio*
- *Cyclospora*
- *Cryptosporidium*

Influenza

- Laboratory confirmed, hospitalized influenza

Impact on Prevention Policy

Early-onset GBS Disease in the U.S.

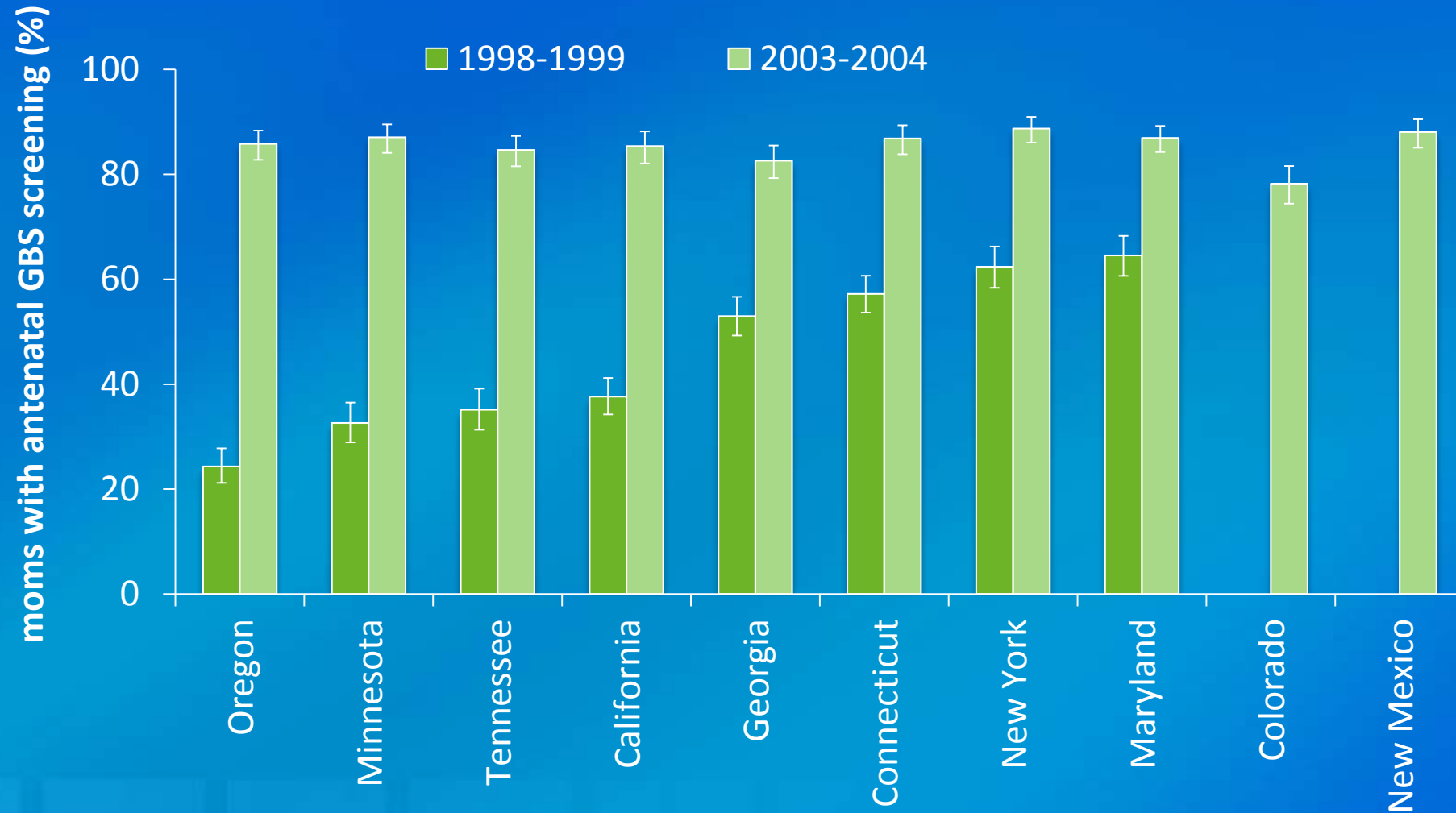


Risk-based vs. Screening

Which is better?

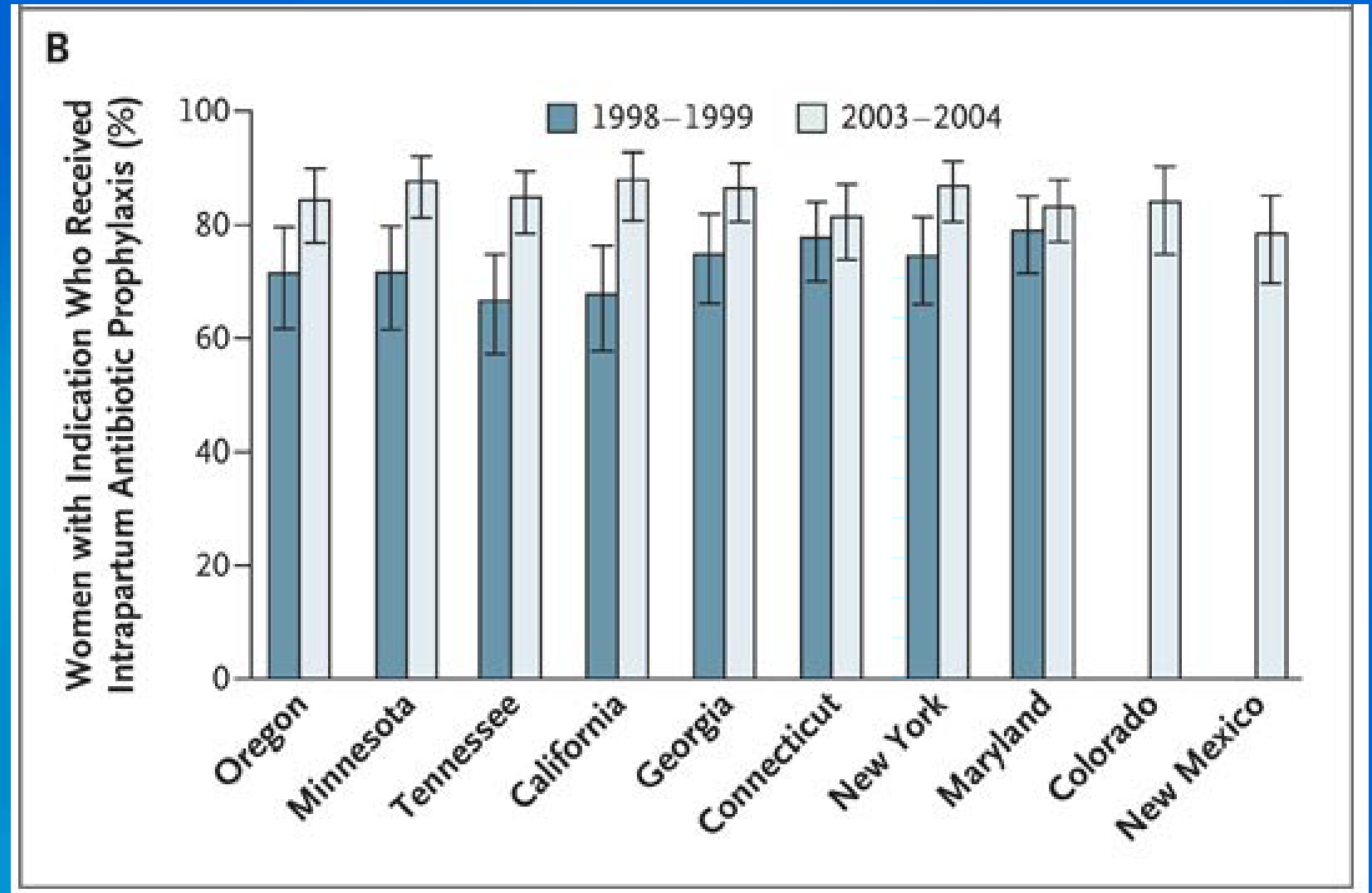
- Population-based surveillance for GBS with sample survey of >600,000 births
- Screening >50% more effective at preventing EOD
- 18% of all deliveries to GBS colonized mothers without other risk factors—IAP 90% effective in this group
- Women GBS + more likely to receive IAP

Prevention Success: Universal screening



Proportion of Women with an Indication for GBS IAP Who Received GBS IAP

Proportion of women with an indication for IAP who then received IAP increased from 74% to 85%





MMWR™

Morbidity and Mortality Weekly Report

www.cdc.gov/mmwr

Recommendations and Reports

November 19, 2010 / Vol. 59 / No. RR-10

Prevention of Perinatal Group B Streptococcal Disease Revised Guidelines from CDC, 2010



Continuing Education Examination available at <http://www.cdc.gov/mmwr/cme/conted.html>

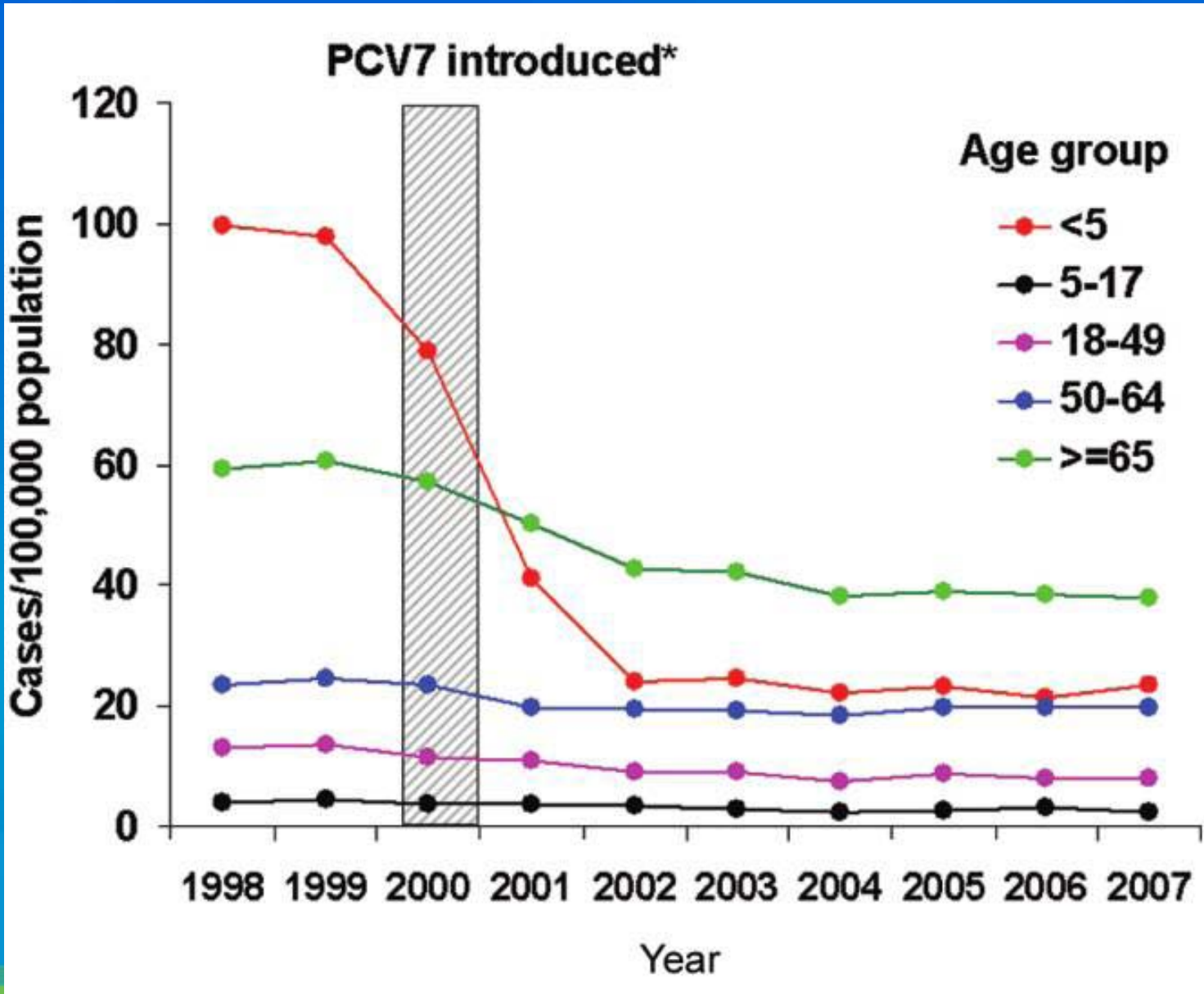
DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

The Recommendations

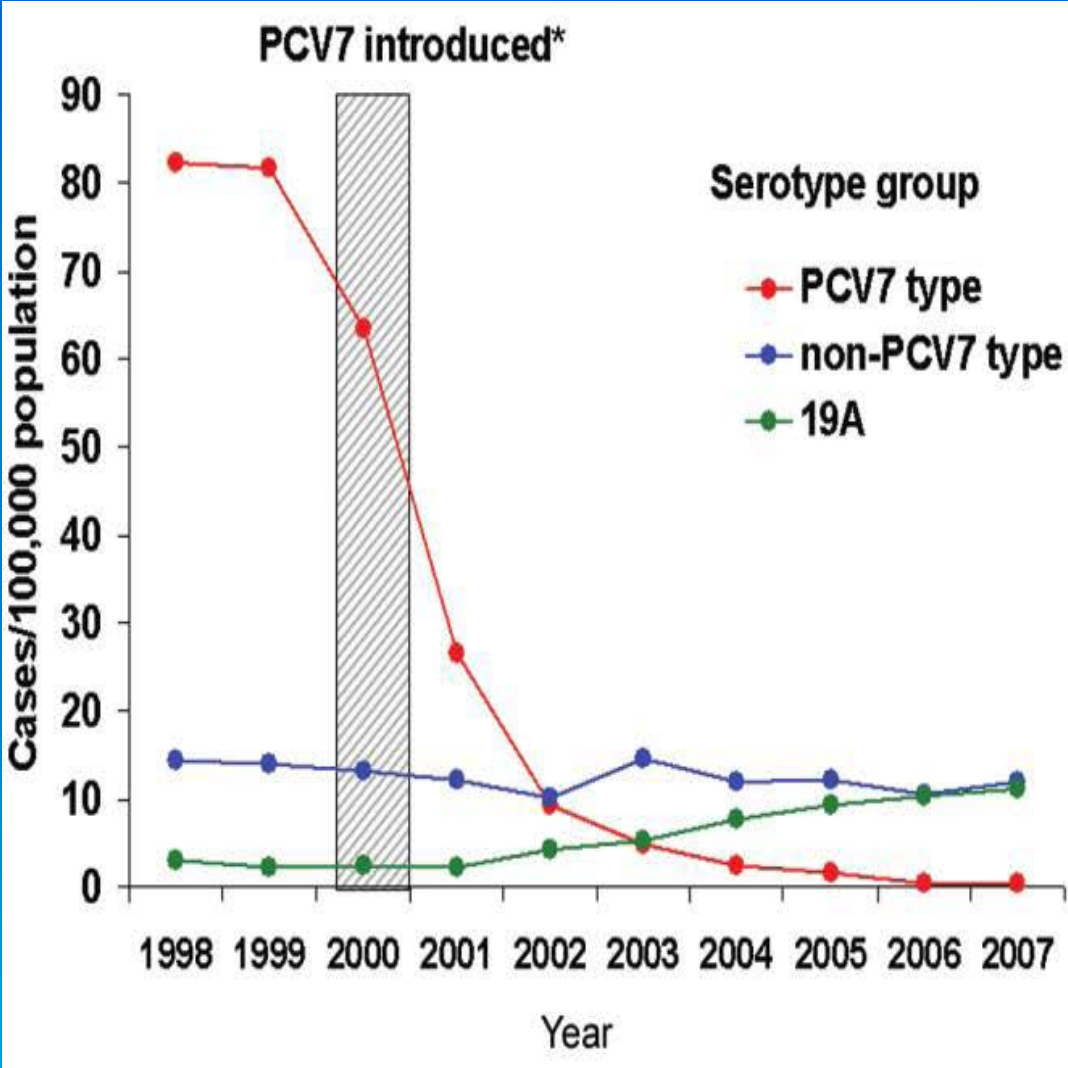
MMWR, Vol 59 (RR-10)

Vaccine formulation, modifications, and measurement of effectiveness

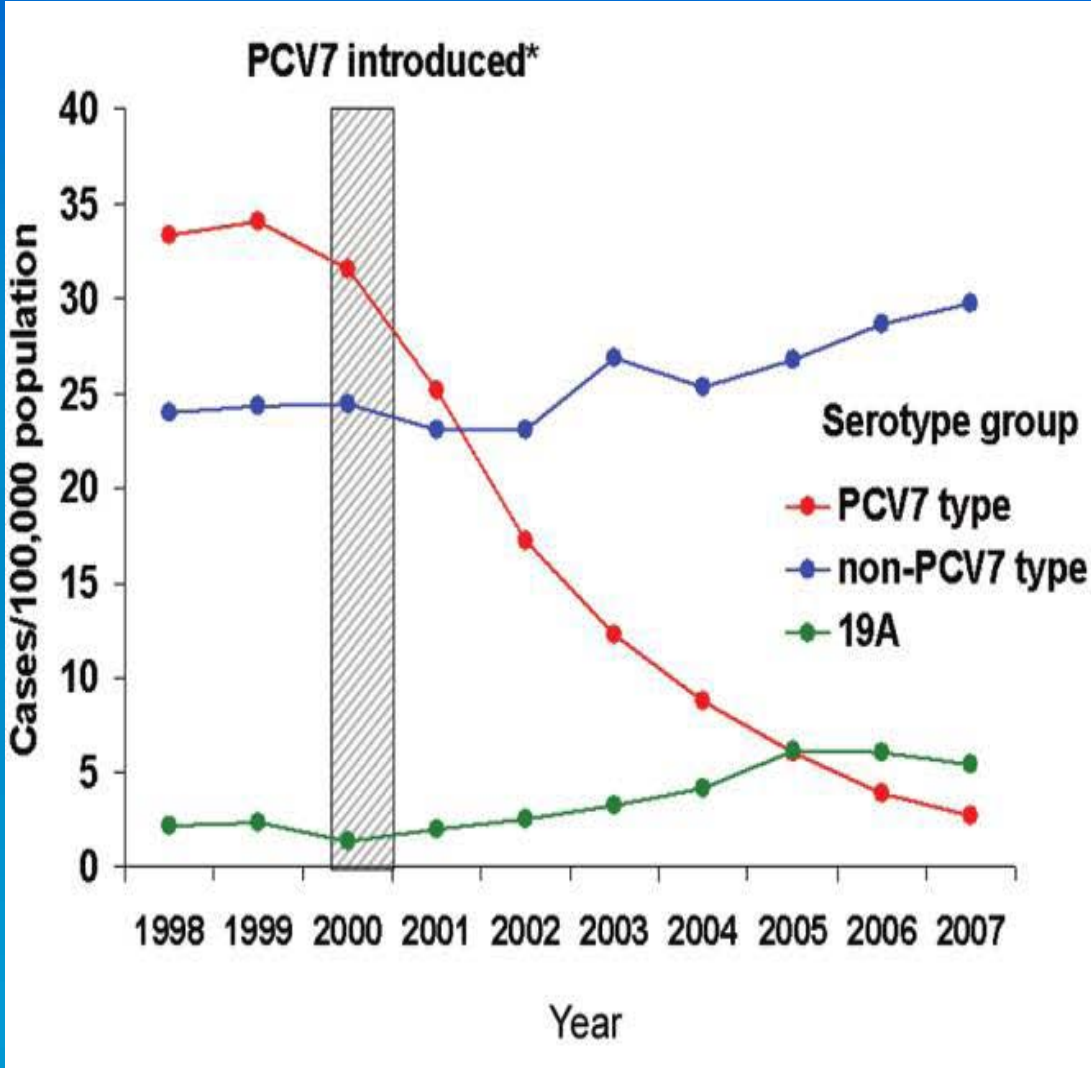
Impact of 7-valent Pneumococcal Conjugate Vaccine on Rate of Invasive Pneumococcal Disease, United States



Impact of 7-valent Pneumococcal Conjugate Vaccine on Rate of Invasive Pneumococcal Disease, United States

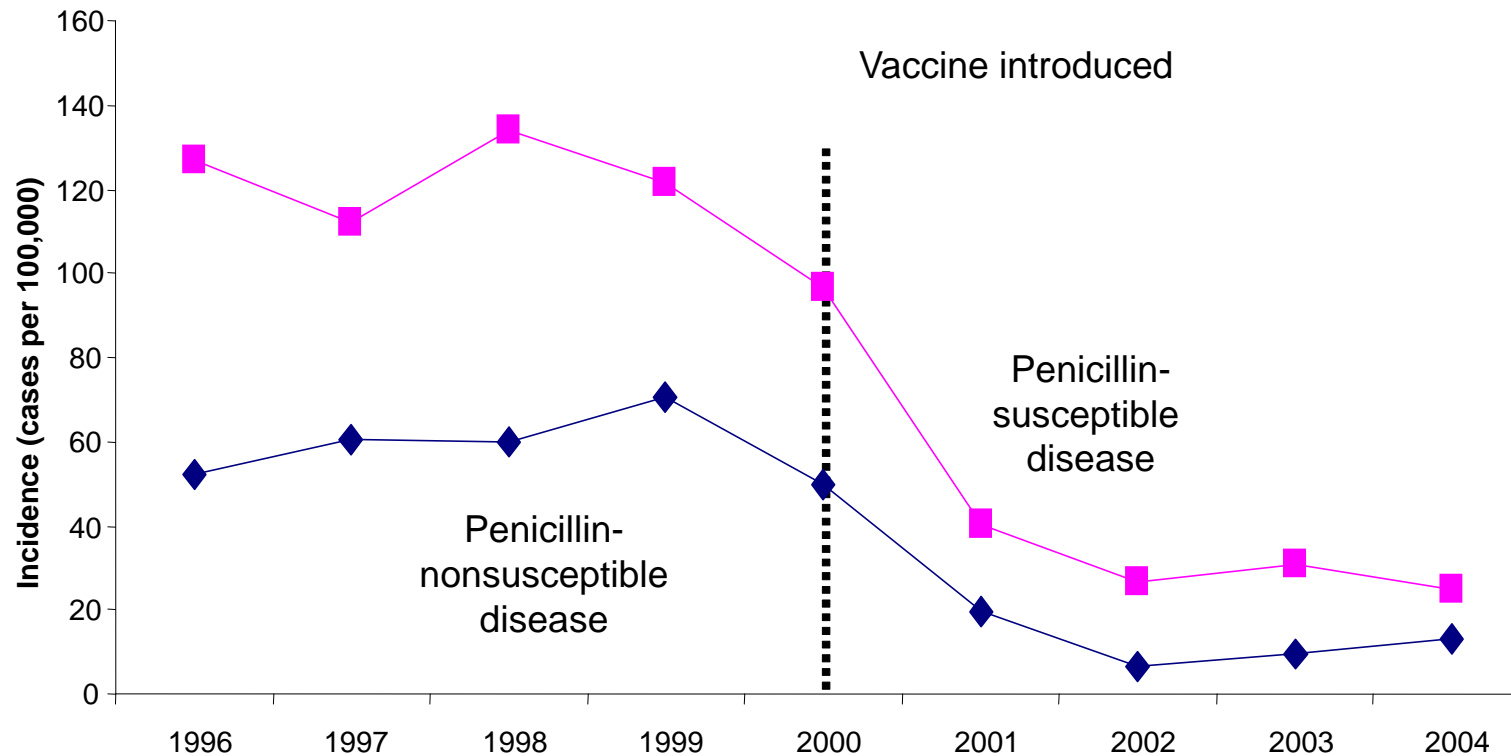


<5y

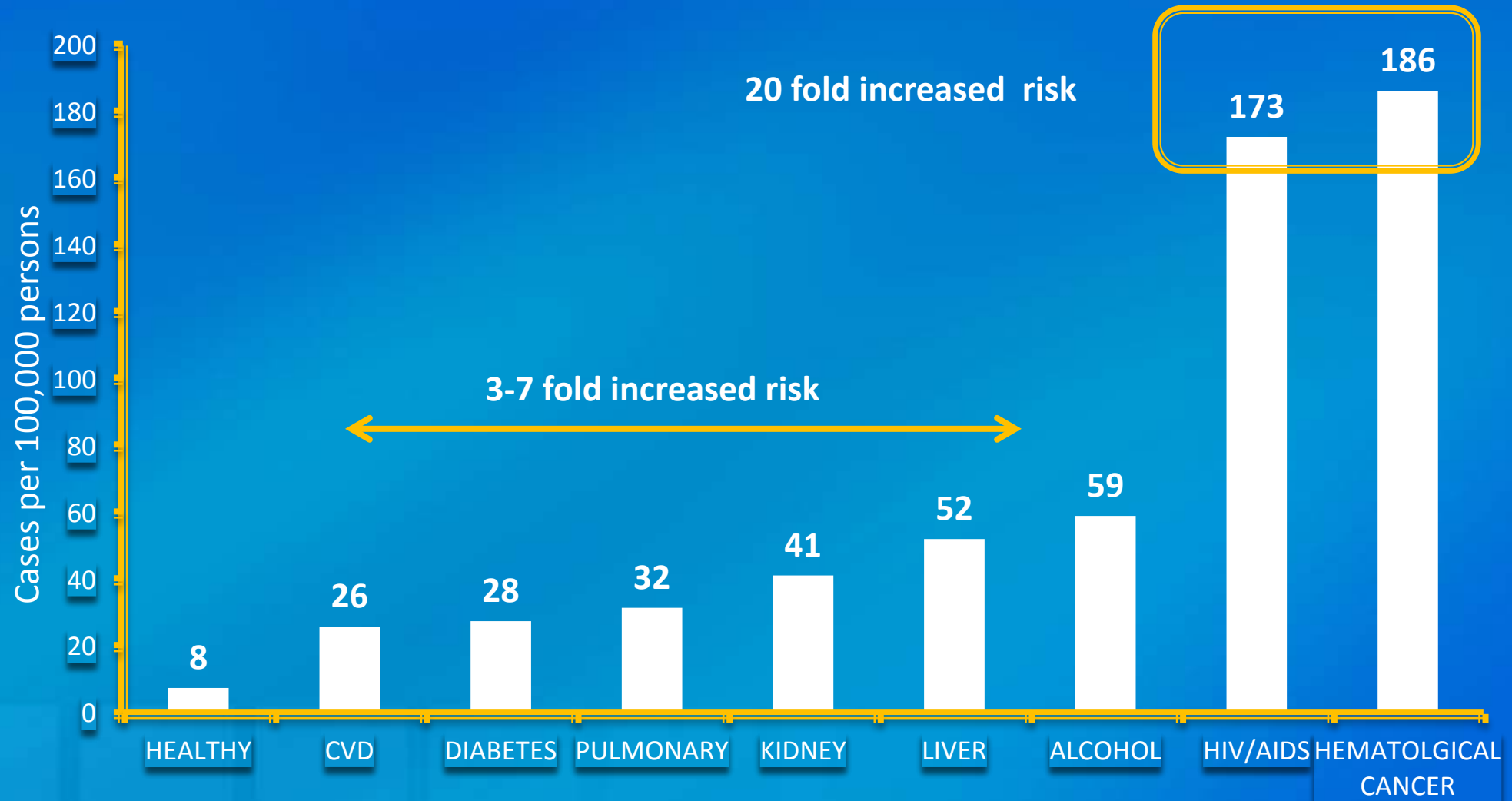


≥65y

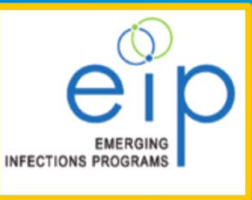
Annual Incidence of Invasive Disease Caused by Penicillin-Susceptible and Penicillin-Nonsusceptible Pneumococci Children < 2 Years of Age, 1996 to 2004



Incidence of IPD in Adults Aged 18–64 Years with Selected Underlying Conditions, United States, 2009



Kyaw, JID 2005;192:377-86—updated with ABCs unpublished data



Flexible Response

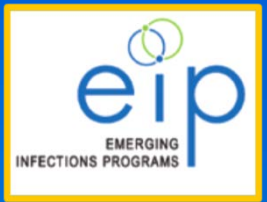
Preliminary Results: Surveillance for Guillain-Barré Syndrome After Receipt of Influenza A (H1N1) 2009 Monovalent Vaccine — United States, 2009–2010

- Active, population-based surveillance for Guillain Barré (GBS)
- 45 million residents in 10 EIP sites
- Rate ratio 1.57; 0.74 excess cases/million pH1N1 vaccine doses
- Risk much smaller than 1976 Swine flu vaccine; risk comparable to some previous seasonal flu vaccine risk estimates

“..unique strength of the EIP surveillance system was its design for near real-time GBS surveillance throughout the 2009-10 pH1N1 vaccination program”.

Evolve: Public Health's Growing Role in Healthcare-associated Infections

Healthcare Associated Infections - Prevalence



N ENGL J MED 370;13 NEJM.ORG MARCH 27, 2014

The New England Journal of Medicine

The NEW ENGLAND JOURNAL of MEDICINE

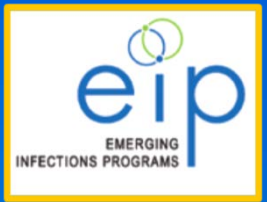
ORIGINAL ARTICLE

Multistate Point-Prevalence Survey of Health Care–Associated Infections

Shelley S. Magill, M.D., Ph.D., Jonathan R. Edwards, M.Stat.,
Wendy Bamberg, M.D., Zintars G. Beldavs, M.S., Ghinwa Dumyati, M.D.,
Marion A. Kainer, M.B., B.S., M.P.H., Ruth Lynfield, M.D., Meghan Maloney, M.P.H.,
Laura McAllister-Hollod, M.P.H., Joelle Nadle, M.P.H., Susan M. Ray, M.D.,
Deborah L. Thompson, M.D., M.S.P.H., Lucy E. Wilson, M.D.,
and Scott K. Fridkin, M.D., for the Emerging Infections Program
Healthcare-Associated Infections and Antimicrobial Use Prevalence Survey Team*

- 1 in 25 hospital inpatients (4%) had at least one HAI
- Estimated national burden of 722,000 HAIs in 648,000 patients in 2011
- Pneumonia and surgical site infections most common HAI types
- *Clostridium difficile* most common pathogen
- Device-related infections: 25.6% of total

Healthcare Associated Infections - Antibiotics



Original Investigation | October 8, 2014

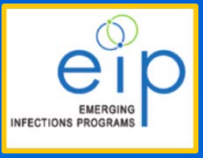
Prevalence of Antimicrobial Use in US Acute Care Hospitals, May-September 2011

Shelley S. Magill, MD, PhD¹; Jonathan R. Edwards, MStat¹; Zintars G. Beldavs, MS²; Ghinwa Dumyati, MD³; Sarah J. Janelle, MPH⁴; Marion A. Kainer, MBBS, MPH⁵; Ruth Lynfield, MD⁶; Joelle Nadle, MPH⁷; Melinda M. Neuhauser, PharmD, MPH^{1,8}; Susan M. Ray, MD^{9,10}; Katherine Richards, MPH¹¹; Richard Rodriguez, MPH¹²; Deborah L. Thompson, MD, MSPH¹³; Scott K. Fridkin, MD¹ ; for the Emerging Infections Program Healthcare-Associated Infections and Antimicrobial Use Prevalence Survey Team

JAMA. 2014;312(14):1438-1446. doi:10.1001/jama.2014.12923.

- 50% of patients were on antimicrobials at the time of the survey
- Of patients getting antimicrobials, half were getting ≥ 2
- Few differences in treatment given to patients in/outside of ICUs, for community and healthcare infections

Healthcare Associated Infections - CRE



- Total surveillance population 13.2 million
- Incidence of CRE 2.93/100K population; wide geographic variation (range 0.82-4.80)
- Most isolated from urine
- 30-day mortality 9% (27.5% in sterile site infections)
- 75% with prior hospitalization; 73% indwelling device
- 60% hospitalized CRE cases discharged to long term care

Research

JAMA.

doi:10.1001/jama.2015.12480

Published online October 5, 2015

Original Investigation

Epidemiology of Carbapenem-Resistant Enterobacteriaceae in 7 US Communities, 2012-2013

Alice Y. Guh, MD, MPH; Sandra N. Bulens, MPH; Yi Mu, PhD; Jesse T. Jacob, MD; Jessica Reno, MPH; Janine Scott, MPH; Lucy E. Wilson, MD, ScM; Elisabeth Vaeth, MPH; Ruth Lynfield, MD; Kristin M. Shaw, MPH; Paula M. Snippes Vagnone, MT(ASCP); Wendy M. Bamberg, MD; Sarah J. Janelle, MPH; Ghinwa Dumyat, MD; Cathleen Concannon, MPH; Zintars Beldavs, MS; Margaret Cunningham, MPH; P. Maureen Cassidy, MPH; Erin C. Philpps, DVM, MPH; Nicole Kenslow, MPH; Tatiana Travls, BS; David Lonsway, MMS; J. Kamile Rasheed, PhD; Brandi M. Limbago, PhD; Alexander J. Kallen, MD, MPH

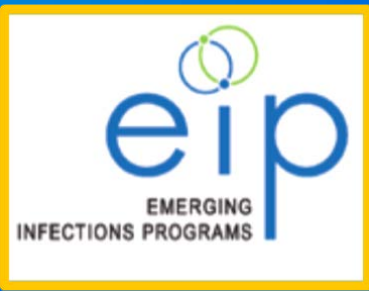
Editorial

IMPORTANCE Carbapenem-resistant Enterobacteriaceae (CRE) are increasingly reported worldwide as a cause of infections with high-mortality rates. Assessment of the US epidemiology of CRE is needed to inform national prevention efforts.

OBJECTIVE To determine the population-based CRE incidence and describe the characteristics and resistance mechanism associated with isolates from 7 US geographical areas.

DESIGN, SETTING, AND PARTICIPANTS Population- and laboratory-based active surveillance of CRE conducted among individuals living in 1 of 7 US metropolitan areas in Colorado, Georgia, Maryland, Minnesota, New Mexico, New York, and Oregon. Cases of CRE were defined as carbapenem-nonsusceptible (excluding ertapenem) and extended-spectrum cephalosporin-resistant *Escherichia coli*, *Enterobacter aerogenes*, *Enterobacter cloacae* complex, *Klebsiella pneumoniae*, or *Klebsiella oxytoca* that were recovered from sterile-site or urine cultures during 2012-2013. Case records were reviewed and molecular typing for common carbapenemases was performed.

Editorial in JAMA, MK Hayden: "The result is the most comprehensive evaluation to date of the burden of CRE in the U. S."



Powerful and Unique Collaboration with Shared Goals

- Inform Prevention Policies
- Optimize Vaccine Formulations/Recommendations
- Assess Risk for and Burden of Disease
- Provide Flexible Public Health Response
- Platform for Training



Edward Munch (Norwegian) (1863–1928), *The Scream*, 1908. Oil on canvas, 20 x 24 in (50.8 x 60.69 cm). Columbus Museum of Art, Ohio, USA; Museum Purchase, Howard Fund | 1981.002

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Danielle Miller
Christine Miner
Rajal Mody
Matthew Moore

Jeff Morelli
Dale Morse
Yi Mu
Elisabeth Mungai
Christina Nelson
Sonja Mali Nti-Berko
Ben Park
Jean Patel
Mary E. Patrick
Ashley Paulick
Lucia Pawloski
Elizabeth Pembleton
Anna Perca
Alejandro Pérez
Joyce Peterson
Cau Dinh Pham