Immunizations and the Public Health Model

American Immunization Registry Association Annual Meeting 2016
Immunization Information Systems for a New Era

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DISCLOSURE OF CONFLICTS OF INTEREST

Boris D. Lushniak, MD, MPH

- I do not have any relevant financial relationships with any commercial interests
- No off-label discussion of drugs or devices
- Work supported by US Government (DHHS, USPHS, OS, OSG, FDA, CDC/NIOSH, DoD, USUHS)

10 Great Public Health Achievements-US 1900-1999

- **Vaccination**
- Motor-vehicle safety
- Safer workplaces
- Control of infectious diseases
- Decline in deaths from heart disease and stroke
- Safer and healthier foods
- Healthier mothers and babies
- Family planning
- Fluoridation of water
- Recognition of tobacco as a health hazard

MMWR 1999 Apr 2;48(12):241-3.

Sarah Nelms

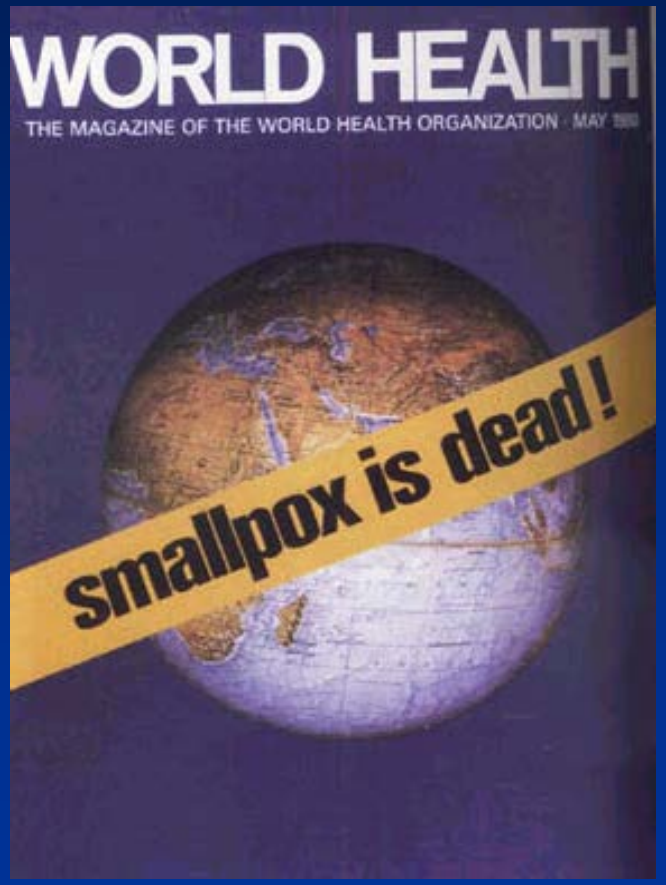
James Phipps, age 8

VACCINATION

- Vaccus – cow
- Benjamin Jesty (1774) used material from cow udders
- Edward Jenner (1796) using material from cowpox lesions
- Vaccinia – a live virus vaccine

Smallpox History

- Appeared 10,000 BC in NE Africa
- Spread to India and China
- Spread to Europe in 5th century and New World in 1400s
- In Africa, India, China and in 18th century Europe practice of inoculation / variolation (inoculare – to graft)
- 1777 – George Washington orders troops to be inoculated
- 1796 – Jenner's cowpox vaccine
- 1949 – last US case
- 1966 – WHO Smallpox Eradication Programme
- 1977 – last natural case (Somalia)
- 1980 – WHO declares smallpox eradicated
- Virus remains stored at CDC and in Russia
- Impact in 20th century – 500 million deaths



Childhood Immunization

- Among the most cost-effective clinical preventive services with a high return on investment
- Each birth cohort vaccinated with the routine immunization schedule
  - Saves 33,000 lives
  - Prevents 14 million cases of disease
  - Reduces direct health care costs by $9.9 billion
  - Saves $33.4 billion in indirect costs

Healthypeople.gov

Childhood Immunization

- For US children born during 1994-2013
  - Prevented 322 million cases of disease
  - Prevented 732,000 early deaths
  - Net societal savings of $1.38 trillion
- For most vaccines coverage is high in age 19-35 months
  - National target of 90% reached for polio, MMR, hep B, varicella
  - Coverage for >=2 doses of hep A at 57.5% (goal is 85%)
  - Children living below poverty level with lower coverage

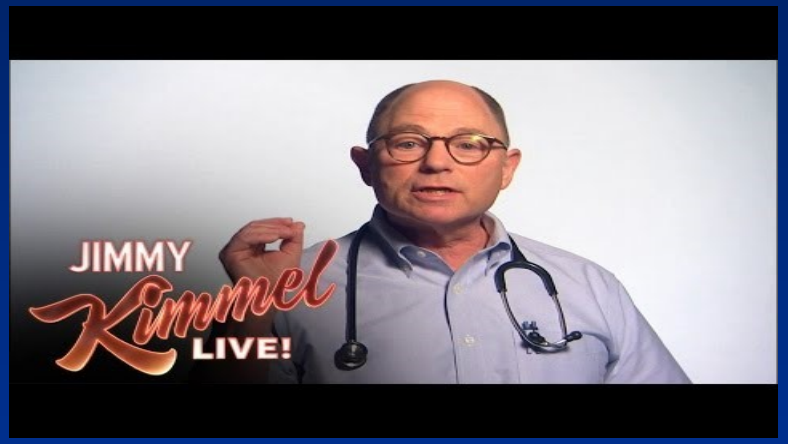
MMWR 2014; 64:252-5
MMWR 2015; 64:889-896

Childhood Immunization

- 300 US children die each year from vaccine-preventable diseases
- Measles
  - Eliminated in US in 2000 increased to 668 cases in 23 outbreaks in 2014 (189 cases in 2015)
- Pertussis
  - 1010 cases in 1976 to 25,827 in 2004 (18,166 cases in 2015)
- Each case represents a failed opportunity to prevent disease
- Vaccine refusal and waning immunity an issue

JAMA 2016; 315 (11):1115-1117 and 1149-1158

Jimmy Kimmel Immunization Rant



Vaccine-Preventable Disease -- Adults

- Invasive pneumococcal disease – 40,000 cases, 4000 deaths
- Season influenza – 3000-49,000 deaths
- Pertussis – 9000 cases
- Acute hepatitis B – 3000 cases
- Herpes zoster – 1 million cases
- Impact on adult patient, their families, and communities

Vaccine Rates -- Adults

- Seasonal Influenza – 39% (goal 70%)
- Seasonal influenza for health workers – 62% (90%)
- Herpes zoster – 24% (30%)
- Hepatitis B for health workers – 64% (90%)

Global Economic Benefits of Vaccines

- 94 low and middle income nations
- $16 return for every $1 invested
  - When examining costs associated with illness (medical care, loss of productivity)
  - $586 billion averted for $34 billion invested
- $44 return for every $1 invested
  - When examining broader economic impact of disease
  - $1.53 trillion averted

Ozawa et al. Health Affairs 2016 35(2):199-207

DATAGRAPHIC

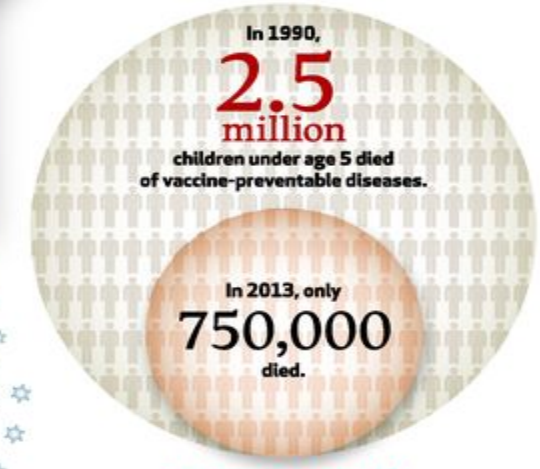
DOI: 10.1377/hlthaff.2015.1518

Why the Decade of Vaccines?

Vaccine-preventable diseases contribute to premature mortality and morbidity for children under age five in low- and middle-income countries. The global community committed to increasing coverage of vaccines during the Decade of Vaccines, 2010–20, to save lives and avert illness in the poorest countries. In 2011 the Global Vaccine Action Plan was created to provide sustainable financing and expand vaccine coverage to all children by 2020. The plan was endorsed by 194 countries at the World Health Assembly in May 2012.

Global Vaccine Action Plan (2011–20)
Target: a world in which all individuals and communities enjoy lives free from vaccine-preventable diseases.

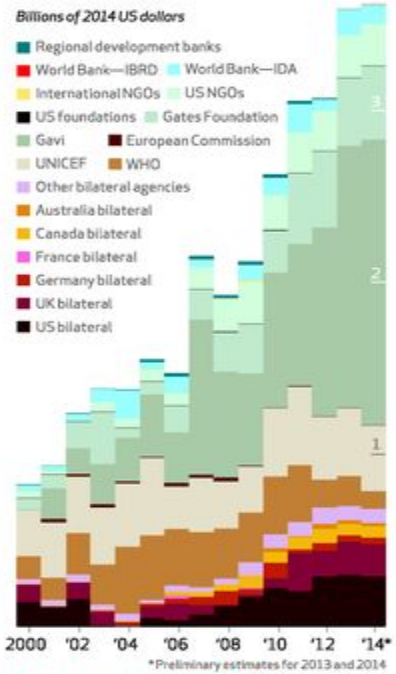
Through vaccination, the world is now closer than ever to achieving global polio eradication.
Polio is now endemic only in Afghanistan and Pakistan. Eradication has happened only once before, when smallpox was eradicated in 1980.



See Haakenstad et al. on page 242

Assistance growth and primary channels of funding

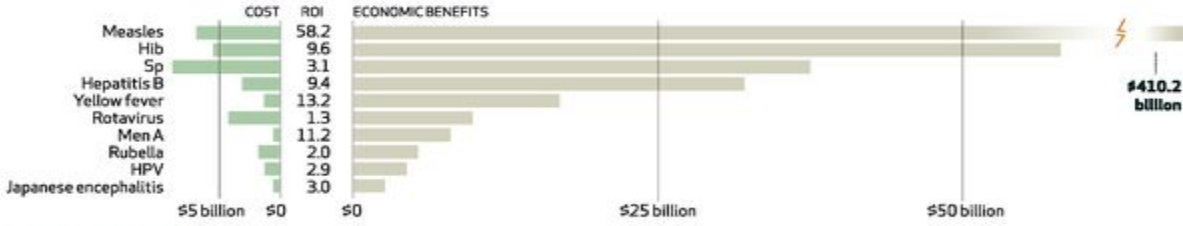
Development assistance for vaccination in low- and middle-income countries increased from primary channels to support vaccine coverage expansion, 2000–14.



See Haakenstad et al. on page 244

What is the value of vaccines? Return on investment (ROI) associated with immunization.

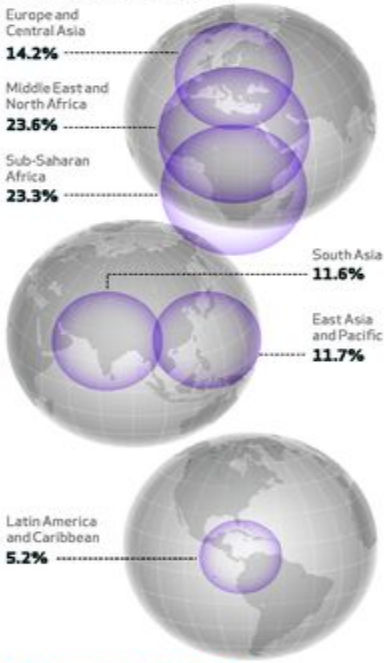
Vaccines are an excellent investment.
Among vaccines related to the following antigens, immunization yields benefits that exceed investment costs in 94 countries.



See Ozawa et al. on page 203

Growth in funding for vaccines by region

Development assistance for vaccination increased from 2000 to 2012 and grew most in the Middle East and North Africa, followed by sub-Saharan Africa.



See Haakenstad et al. on page 246

Childhood vaccination in the United States

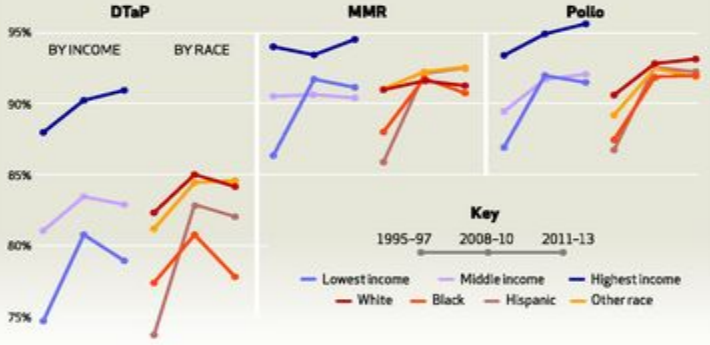
	CASES PREVENTED*	DEATHS AVERTED*
Overall	322 M	732,000
DTaP, MMR, and polio	210 M	600,000

See Walsh et al. on page 356

* In children born since the introduction of the Vaccines for Children Program (1994–2013)

Percentage vaccination utilization by income and race

The Vaccines for Children program in the United States from 1995 to 2013 has resulted in the narrowing of disparities among racial and ethnic groups in the receipt of three major childhood vaccines: DTaP, MMR, and polio. However, income-related disparities changed at different rates within racial and ethnic groups and in some cases increased. The largest gains have been seen in the receipt of the MMR and polio vaccines, particularly among low-income Hispanics.



For a full list of sources and a glossary, click on the Appendix link in the box to the right of the DataGraphic online.

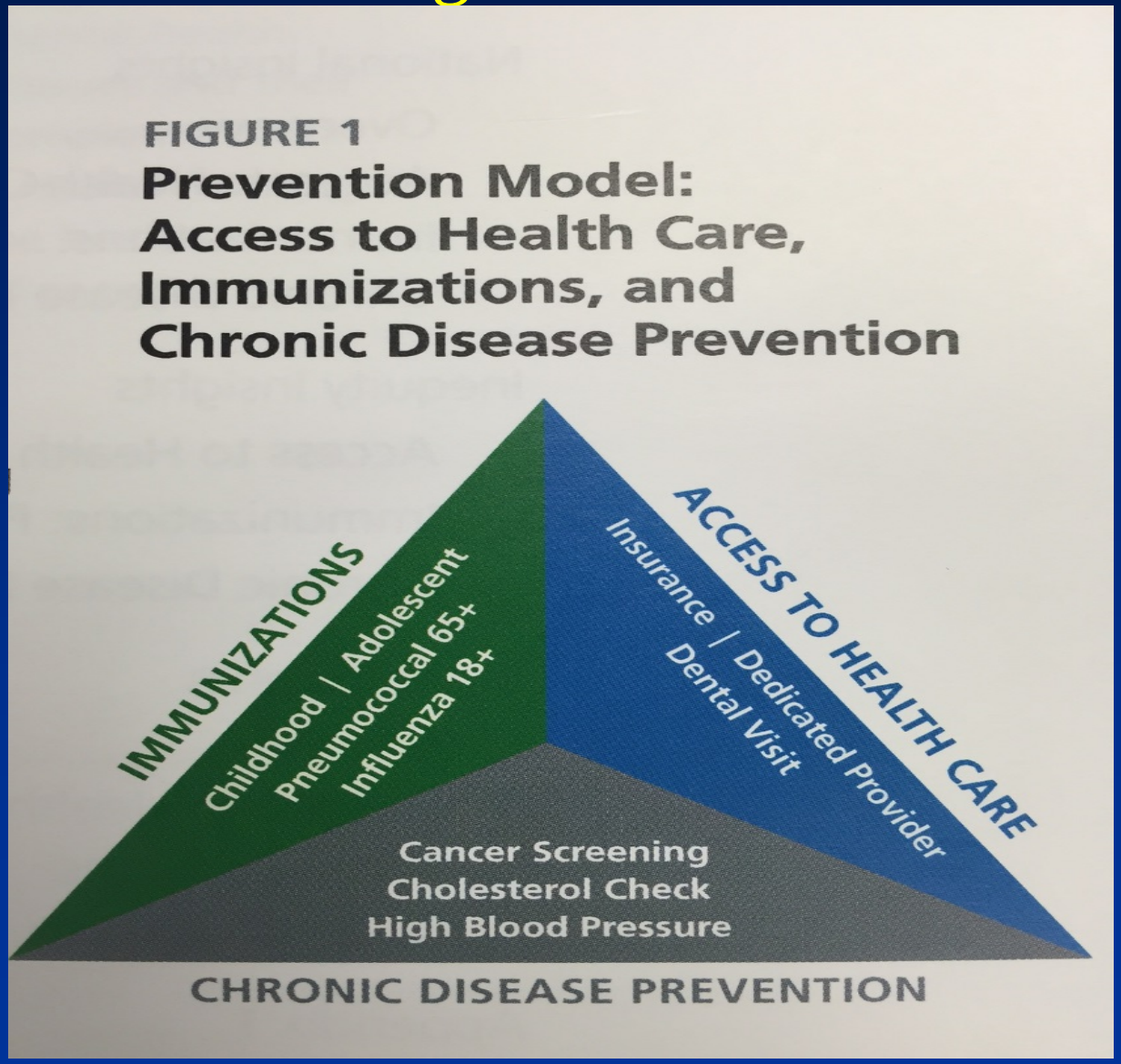
Health Affairs
5W Infographics

Vaccines are now being used to prevent and control 25 vaccine-preventable infections:

SOURCE World Health Organization

Spotlight: Prevention 2016

America's Health Rankings United Health Foundation



Spotlight: Prevention 2016

America's Health Rankings United Health Foundation

- 71.6% of children 19-35 mos completed recommended series (range 63.4% WV to 84.7% ME)
- 39.7% HPV for females 13-17 yrs (20.1% TN to 54.0% NC)
- 40.4% influenza for adults (31.7% FL to 50.2% SD)

NHIS 2014, BRFSS 2014

FIGURE 5

Immunizations: National Average and Range of State Values

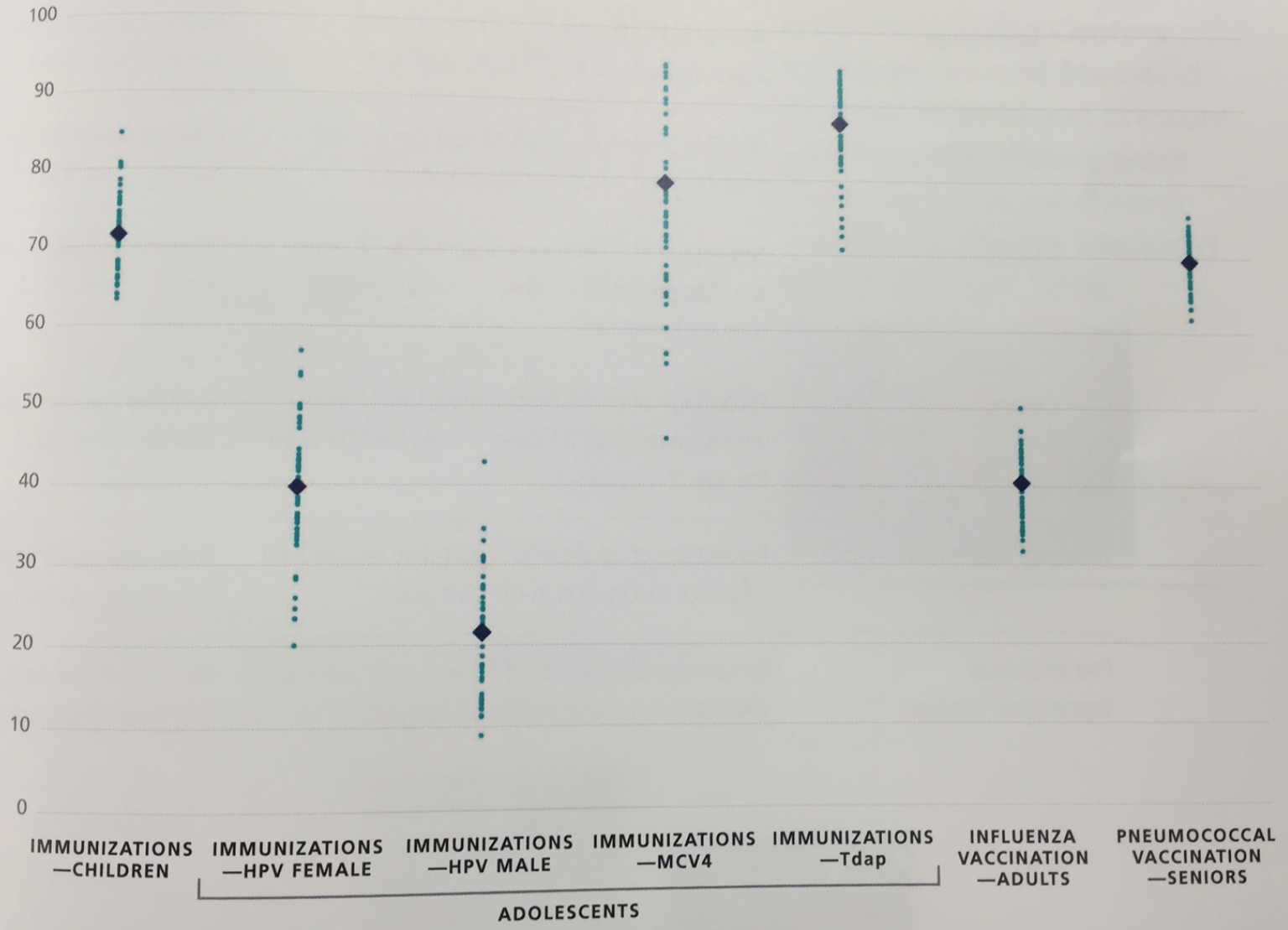
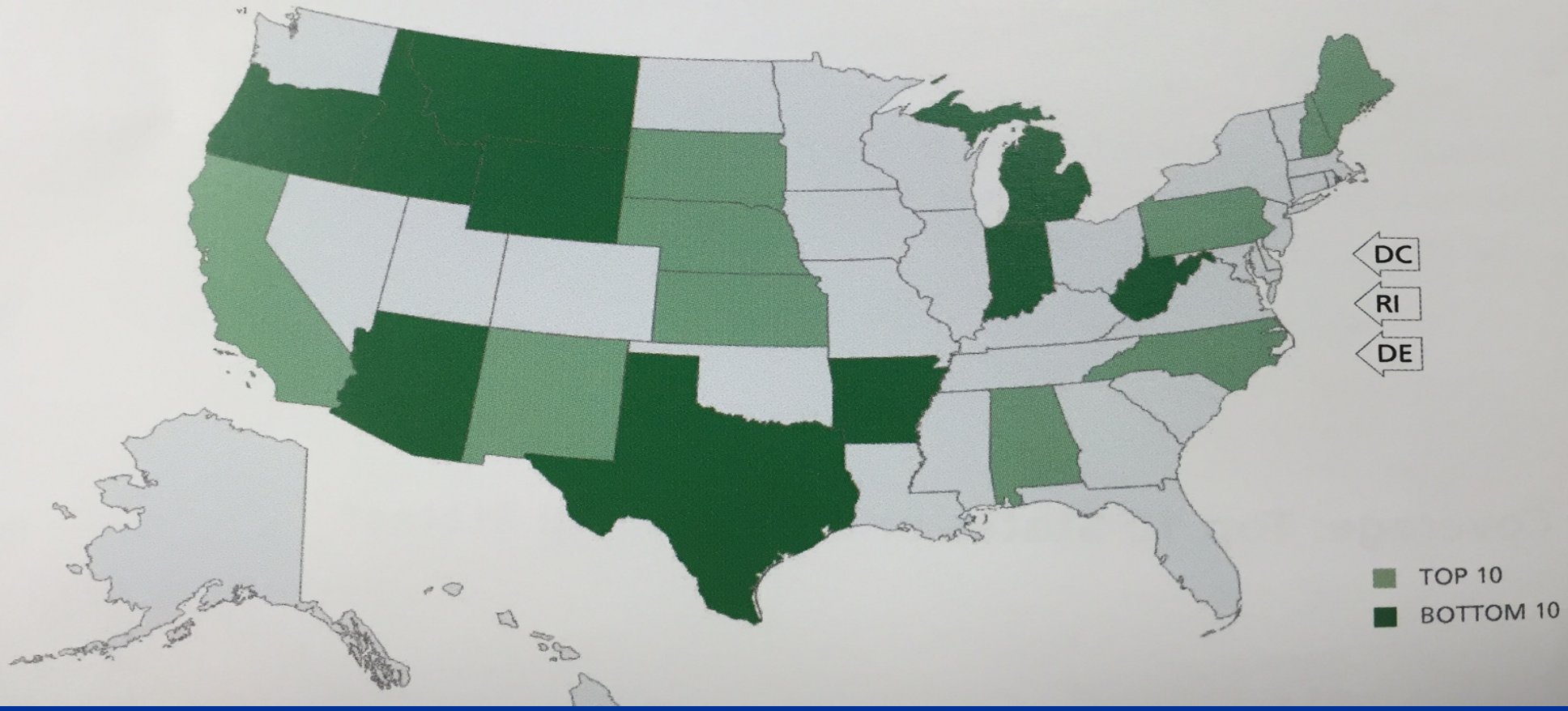


FIGURE 22

Immunizations—Children: Top 10 States and Bottom 10 States*

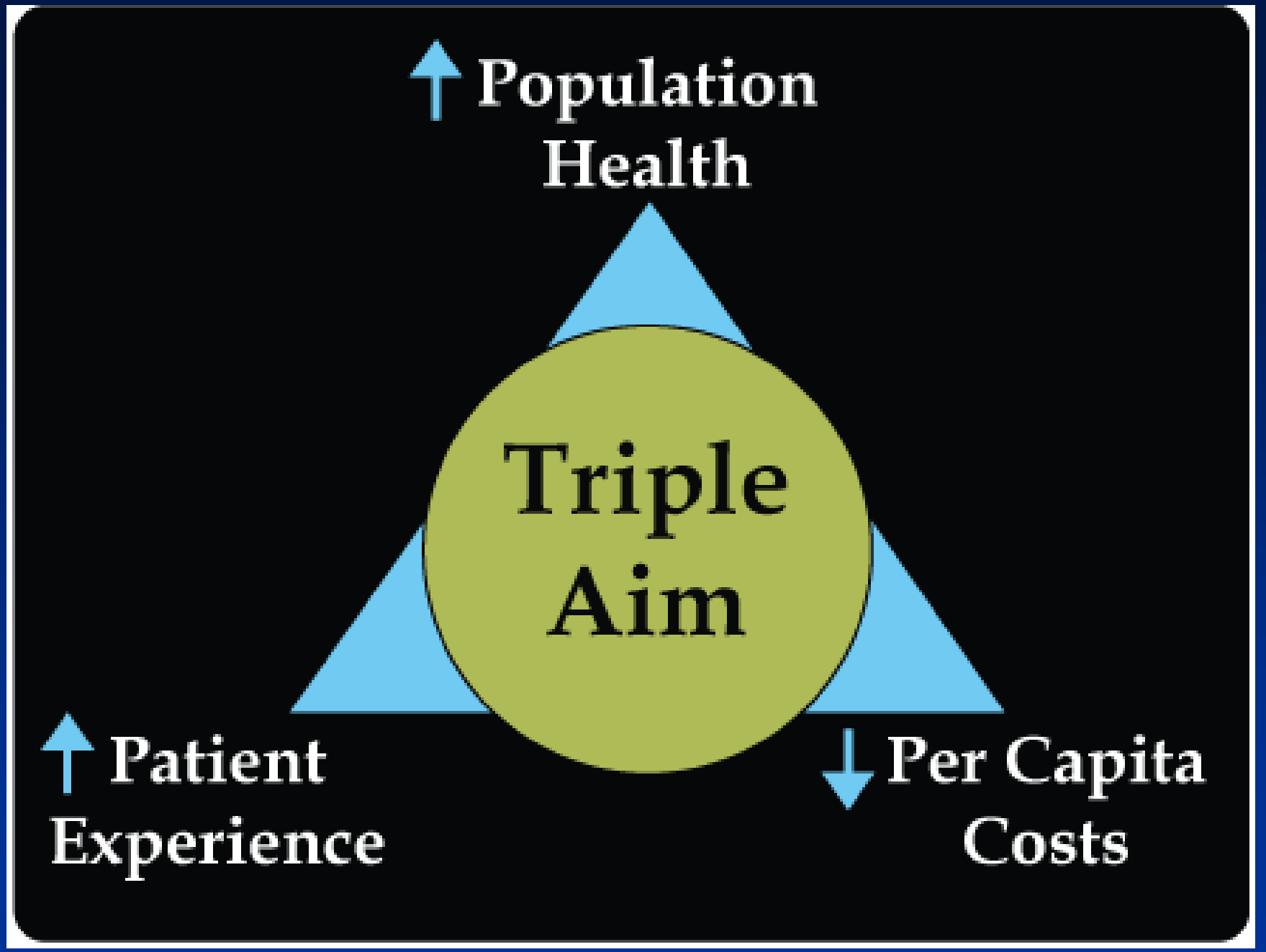


Public Health

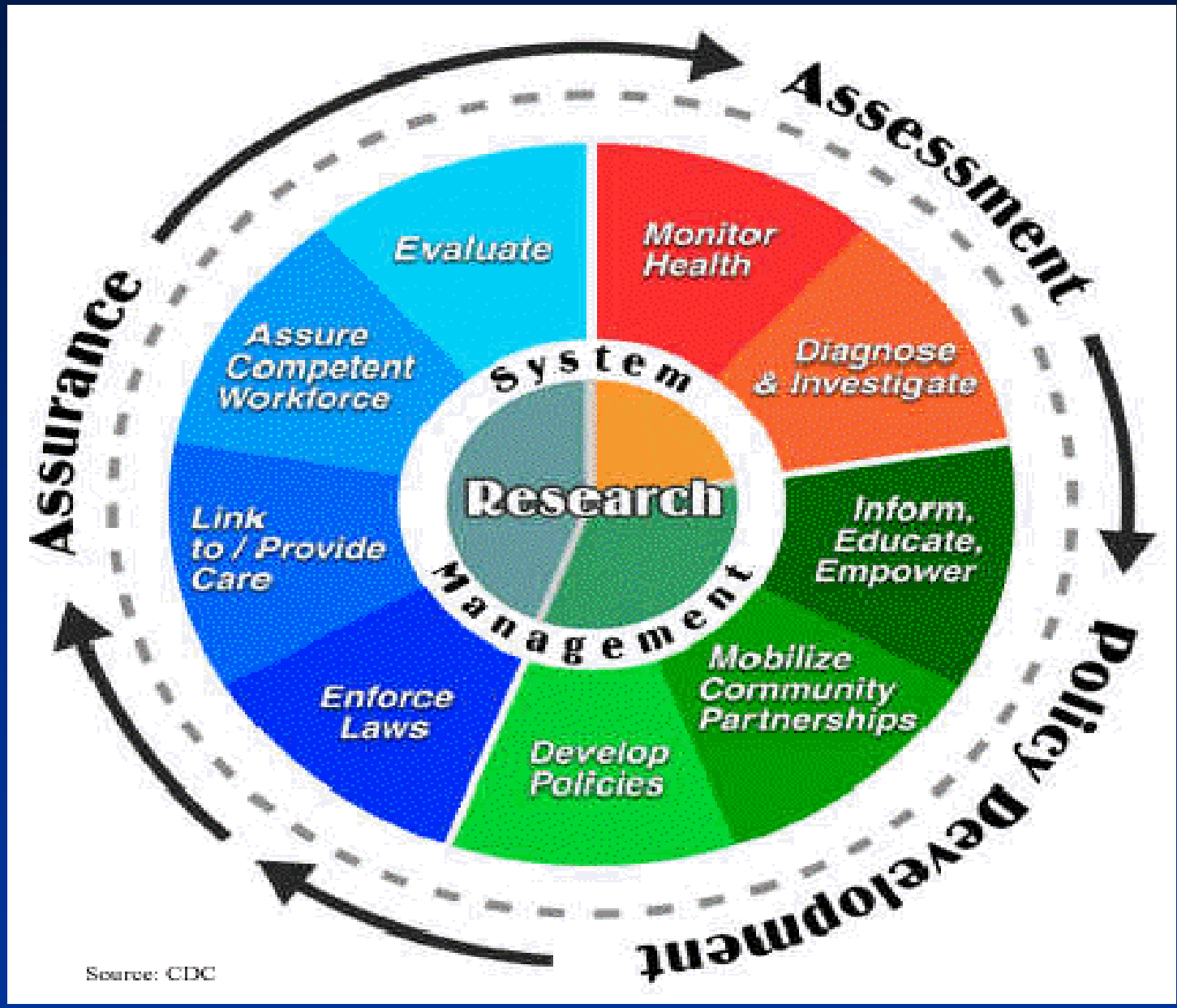
- The science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals.
  - CEA Winslow, 1920

Core Public Health Functions

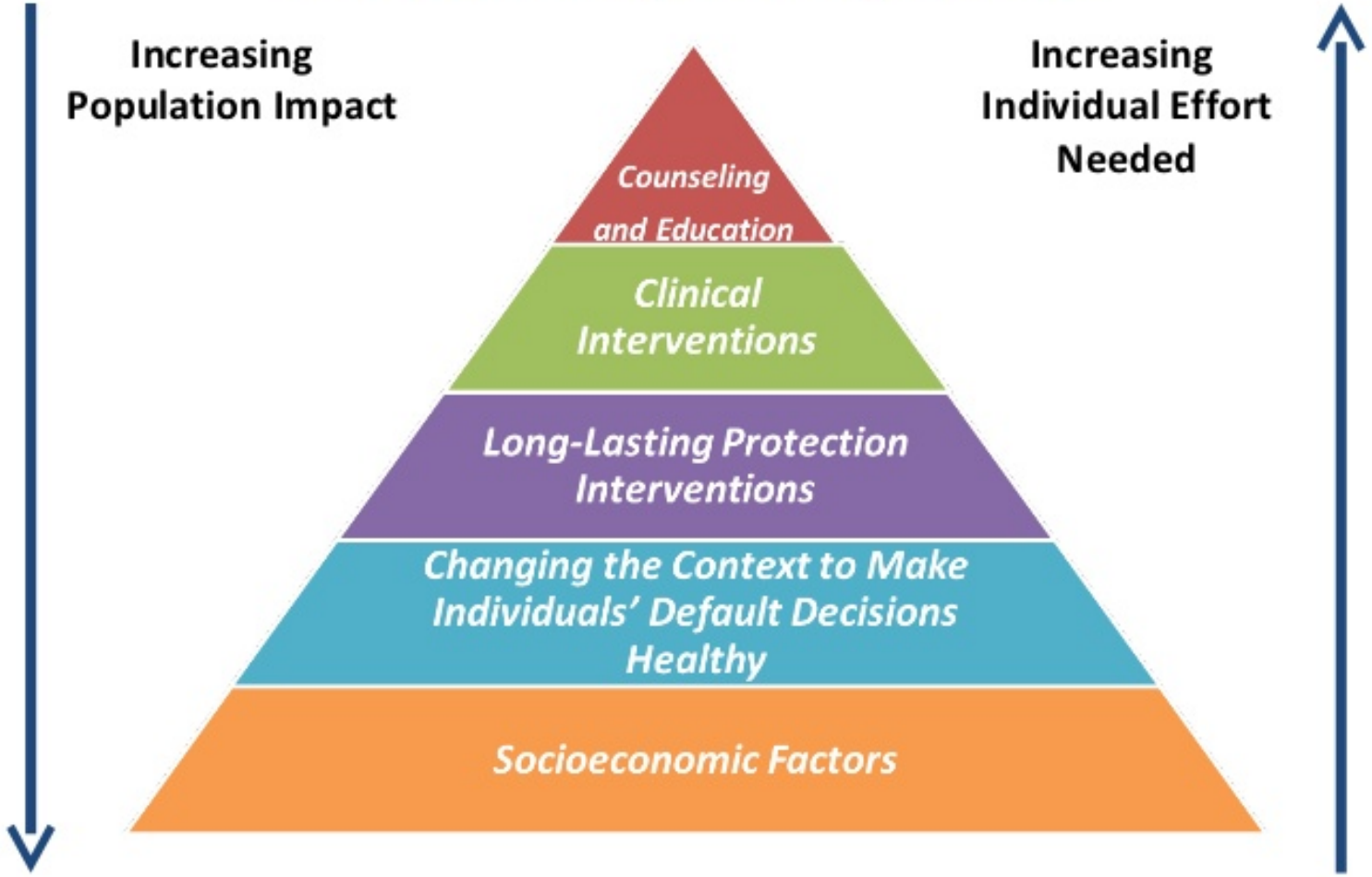
- Assessment and monitoring of the health of communities and populations at risk
  - identify health problems and priorities - surveillance
- The formulation of public policies
  - designed to solve identified local and national health problems and priorities
- Assure that all populations have access to appropriate and cost-effective care (e.g., ACA, the Triple Aim)
  - including health promotion and disease prevention services
  - evaluation of the effectiveness of that care


↑ Population Health
Triple Aim
↑ Patient Experience
↓ Per Capita Costs

Public Health Core Functions and 10 Essential Services



Health Impact Pyramid



Frieden T. American Journal of Public Health | April 2010, Vol 100, No. 4

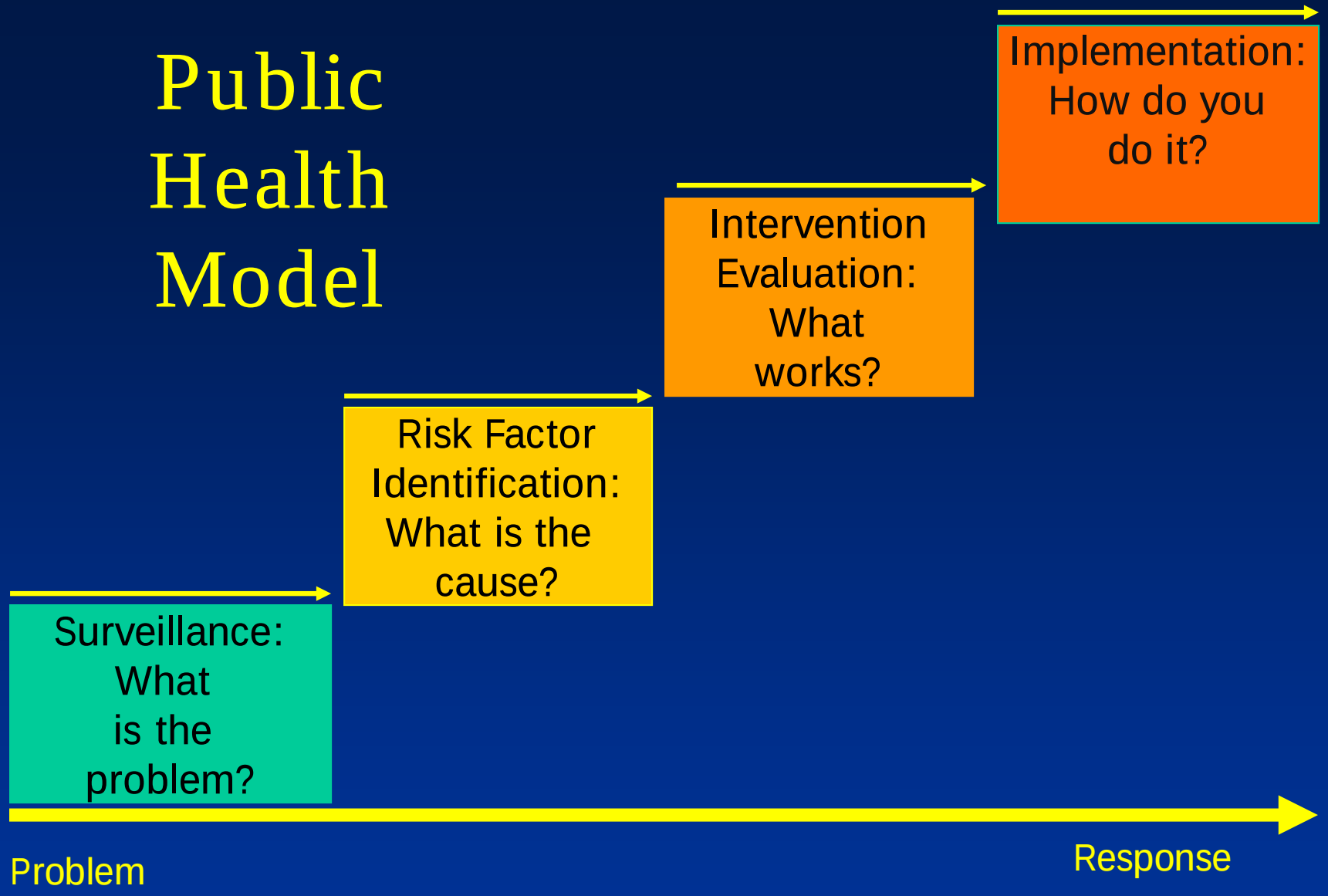
Frieden T, NEJM 2015; 373:1748-54

The Three Buckets of Prevention

- Traditional clinical prevention
  - Increase the use of evidence-based services
- Innovative clinical prevention
  - Provide services outside the clinical settings
- Total population or community-wide prevention
  - Implement interventions that reach whole populations

John Auerbach, J Public Health Management Practice 2016

Public Health Model



Public Health Surveillance

- Ongoing, systematic collection, analysis, and interpretation of health-related data
- Essential to the planning, implementation, and evaluation of public health practice
- Closely integrated with the timely dissemination of these data to those responsible for prevention and control

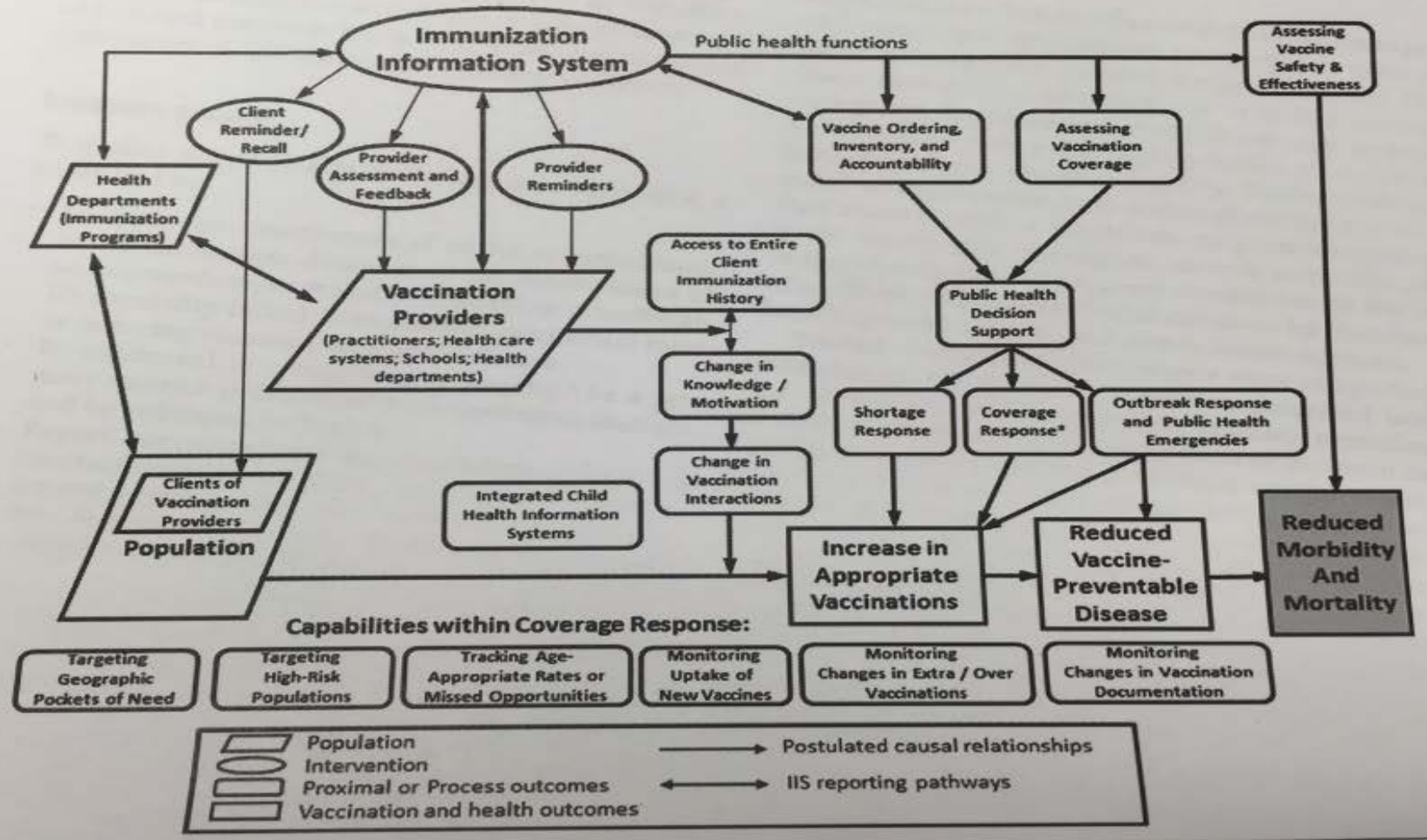
Data Sources and Methods for Surveillance

- Notifiable diseases
- Laboratory specimens
- Vital records
- Sentinel surveillance
  - Monitoring of key health events through sentinel sites, events, providers
- Registries / Surveys – NIS, NHIS, BRFSS, IIS
- Administrative data systems -- IIS
- Other data sources

Immunization Information Systems

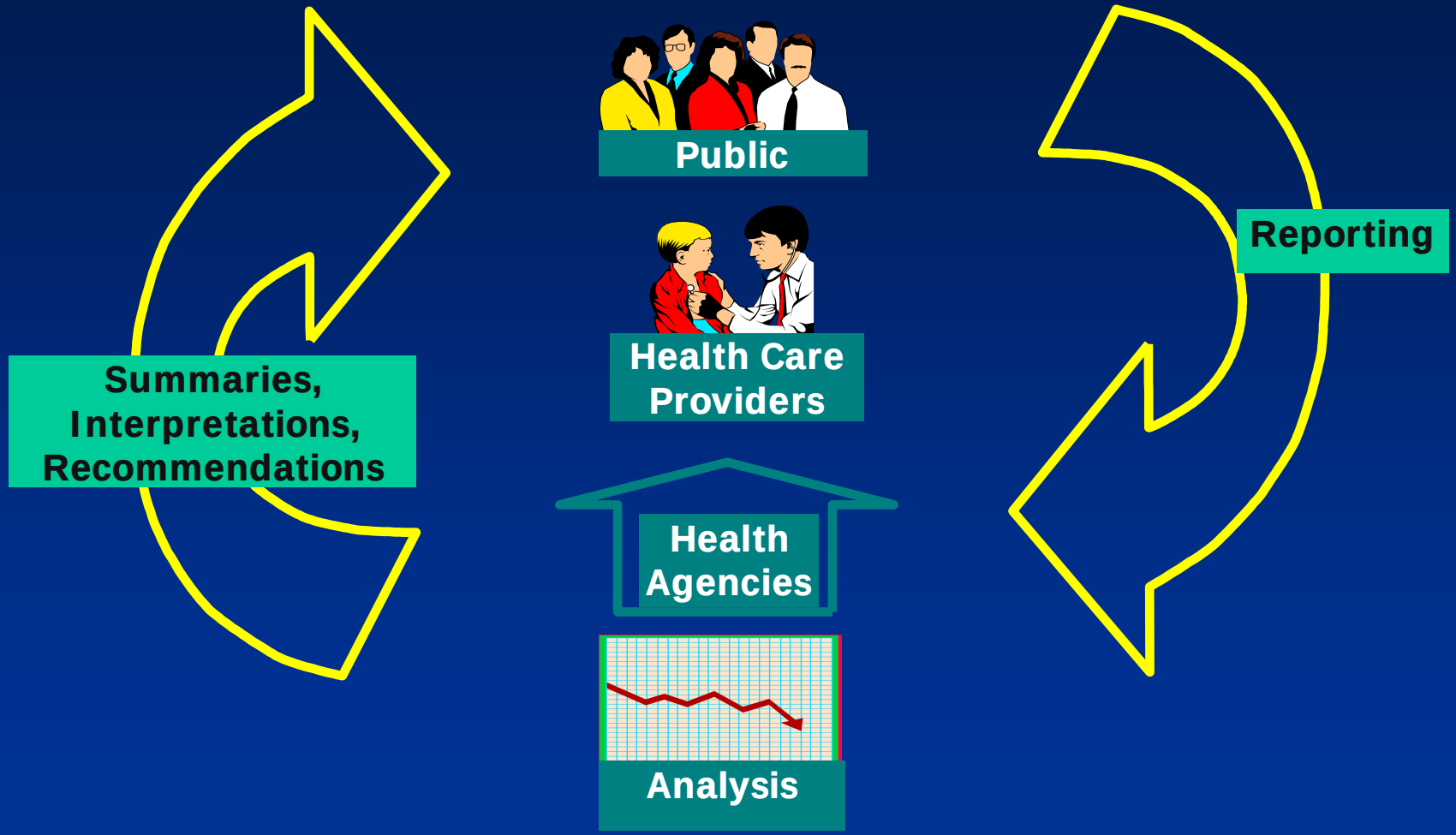
- Confidential, population-based, computerized
- Point of clinical care info
- Geopolitical area info
- Guides public health action
- Goal of improving vaccination rates
- Goal of reducing vaccine-preventable disease

FIGURE Analytic Framework for Review of IISs, Which Postulates the Impact of IIS on a Wide Range of Vaccination Provider and Public Health Outcomes



Groom et al; J Public Health Management Practice 2014

Information Loop of Public Health Surveillance



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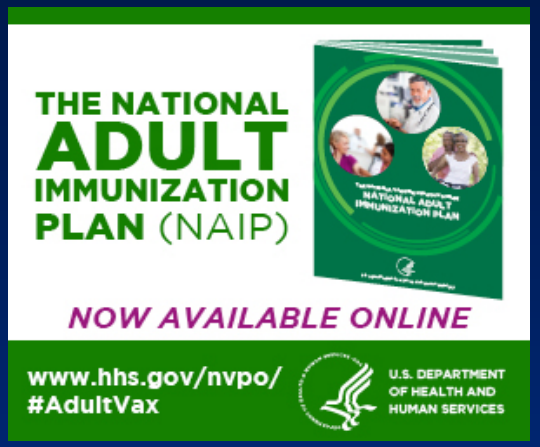
The Vision


Use policies, research agendas recommendations, to attain public health goals

The Vision



HealthyPeople.gov

Healthy People 2020

The Guide to Community Preventive Services
THE COMMUNITY GUIDE
What Works to Promote Health

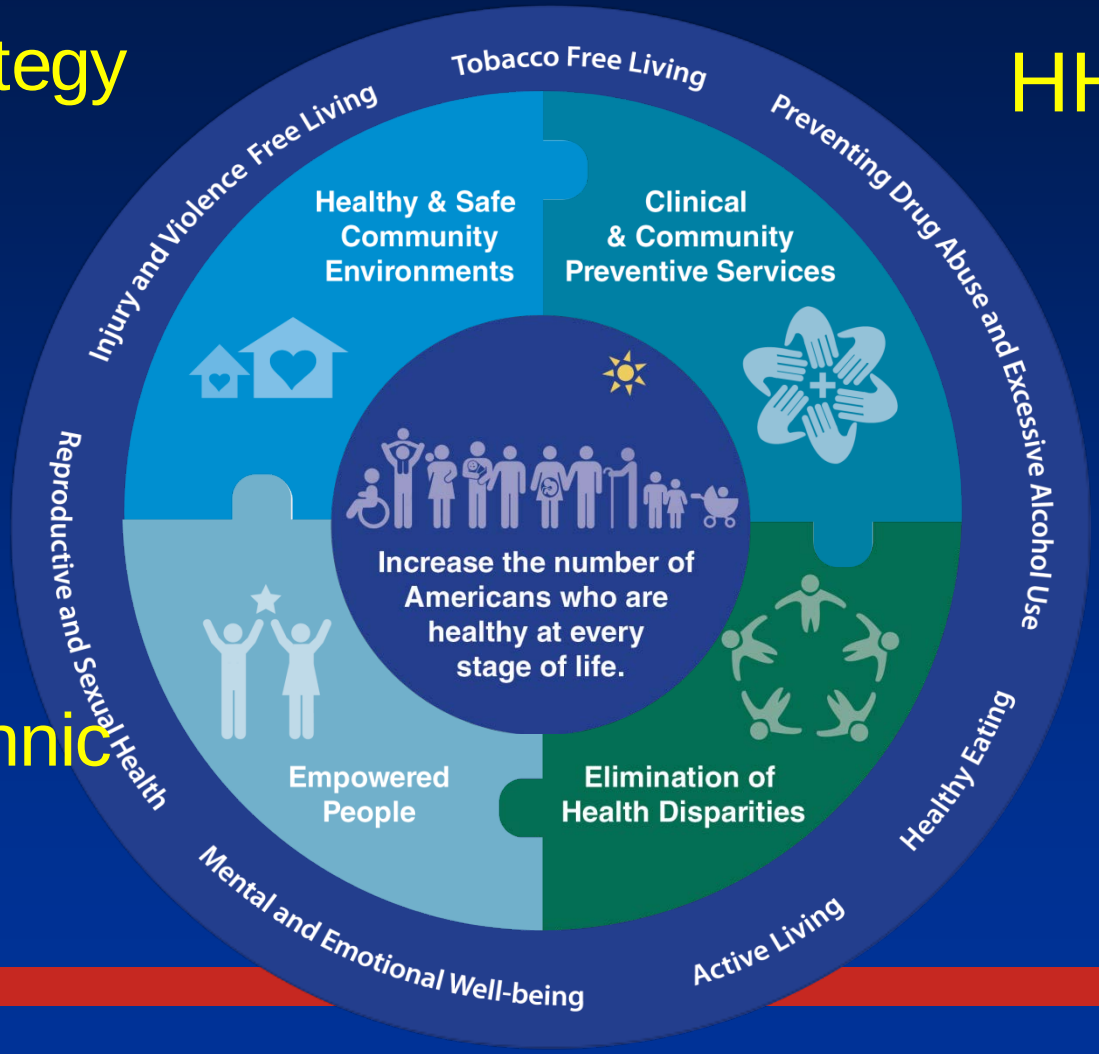
Community Preventive Services Task Force

The National Prevention Strategy

National Quality Strategy

HHS Strategic Plan

HHS Action Plan to Reduce racial and Ethnic Health Disparities



Community Preventive Services Task Force

- Recommends Immunization Info Systems on the basis of strong evidence of effectiveness in increasing vaccination rates
  - Create or support effective interventions (client reminder, recall systems, provider assessment/feedback/reminder)
  - Generate and evaluate public health response to outbreaks
  - Facilitate vaccine management and accountability
  - Determine client vaccination status or decisions made by clinicians, health depts., schools
  - Aid surveillance and investigations on vaccination rates, missed opportunities, invalid doses, and disparities in coverage

CPSTF J Public Health Management Practice 2014

Public Health Priorities
Healthy People

- Developed in 1979 by the Dept of Health & Human Services
- Science-based, 10 year national objectives
- For promoting health and preventing disease
- Includes a vision, mission, goals, focus areas, criteria, objectives and action plans for achieving the targets
- HP 2020 launched Dec 2010 with 600 objectives, 1300 measures

Healthy People 2020

- Increase from 75% to 95% those younger than 6 years whose immunization records are in fully operational, population-based IIS
- Increase the number of states that have 80% of adolescents (11-18 years) with 2 or more age-appropriate immunizations recorded in an IIS

National Adult Immunization Plan

- Released February 2016
- Barriers to adult immunization
  - Lack or underuse of administrative systems (e.g., IIS) for documenting vaccination histories and identifying patients who are due for vaccinations in medical records
  - Limited use of evidence-based strategies to improve vaccine uptake, such as reminder-recall and related systems

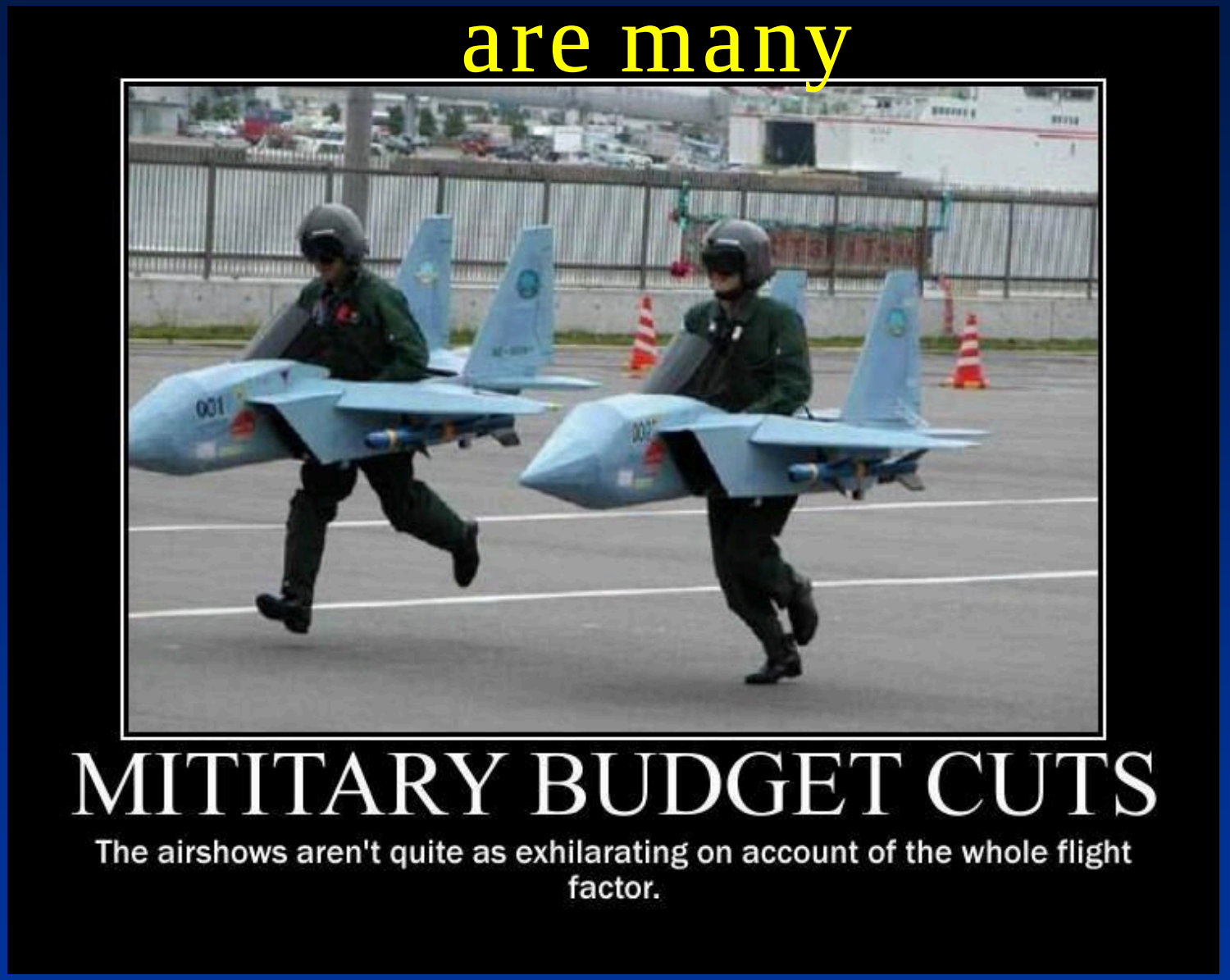
National Adult Immunization Plan

- 8% of internists and 36% of family physicians recorded info on adult vaccinations in state and regional IIS (CDC, 2012) – goal is 50%
- 28% of surveyed pharmacists submitted adult vaccination data to an IIS (CDC, 2013) – goal is 60%
- 25% of adults age 19 and older had one or more immunizations recorded in IIS (CDC, 2012) – goal is 50%

National Adult Immunization Plan

- Objectives
  - Monitor and report trends in adult vaccine-preventable disease levels and vaccination coverage data for all recommended vaccines
  - Increase the use of EHRs and IIS to collect and track adult immunization data

….and the barriers to success are many

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American Immunization Registry Association

- Cultivating Community
- Establishing Standards
- Supporting Implemenation

10 Great Public Health Achievements-US 2000-2099 ??????

MMWR 2099??? Apr 2;48(12):241-3.???