IMPROVING THE QUALITY OF ELDERLY CARE IN INDIANA:

Reducing the Incidence of Vaccine-Preventable Pneumonia and Related Morbidity and Mortality

Access additional quality improvement strategies by visiting the full toolkit here:
www.achlcqicme.org/pneumonia/toolkit.apsx

INDIANA UNIVERSITY
SCHOOL OF MEDICINE

ACHL
ACADEMY for CONTINUED HEALTHCARE LEARNING

Co-sponsored by Indiana University School of Medicine and The Academy for Continued Healthcare Learning

Pneumococcal Disease: Morbidity and Mortality

Streptococcus pneumoniae (Pneumococcus)

- Gram-positive bacteria
  - 91 known serotypes
  - Relatively limited number of serotypes cause majority of invasive pneumococcal disease
- Spread by person-to-person contact and airborne droplets
  - Pneumonia
  - Bacteremia
  - Meningitis

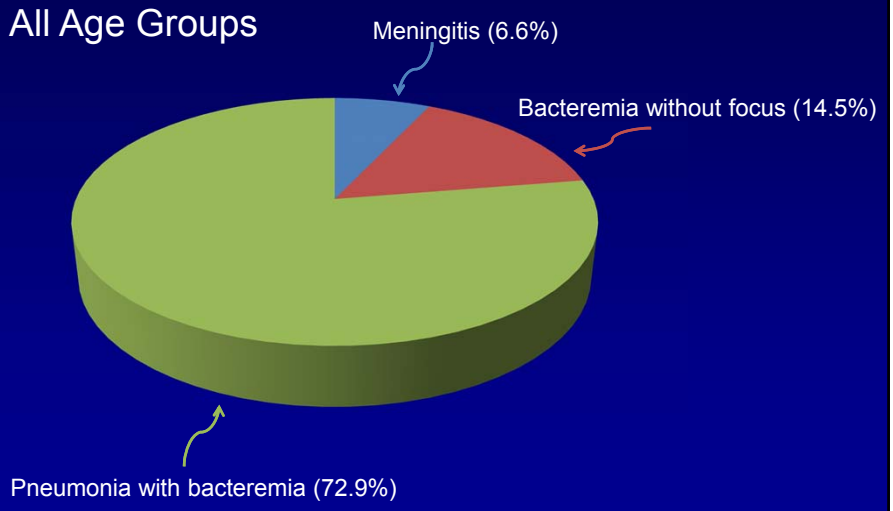
Lynch J, Zhanel G. *Sem Respir Crit Care Med*. 2009;30(2):189-209.

Clinical Syndromes of Pneumococcal Disease

Syndrome	Impact in United States	Case-fatality Rate
Pneumococcal pneumonia	• Estimated 175,000 hospitalizations per year • Up to 36% of adult community-acquired pneumonia and 50% of hospital-acquired pneumonia	5%-7%, higher in elderly
Pneumococcal bacteremia	More than 50,000 cases per year	~20%; up to 60% among the elderly
Pneumococcal meningitis	Estimated 3,000-6,000 cases per year	~30%, up to 80% in the elderly

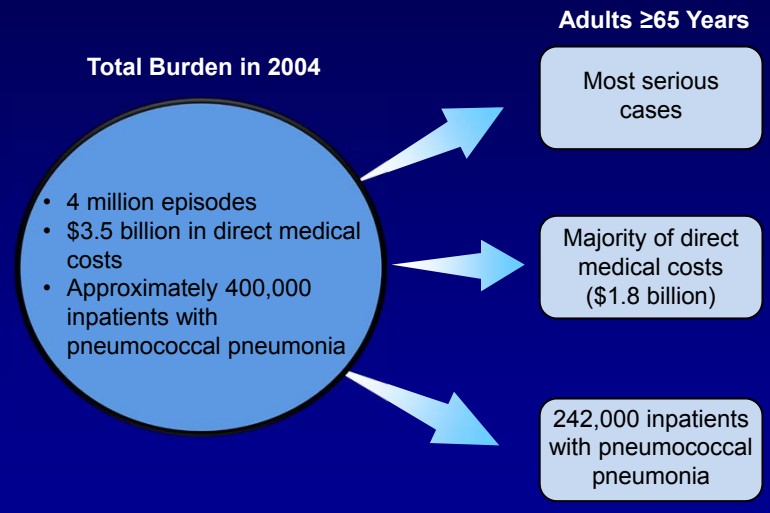
CDC. http://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html. Accessed July 24, 2013.

S. Pneumoniae Active Bacterial Core Surveillance Provisional Data: US 2011



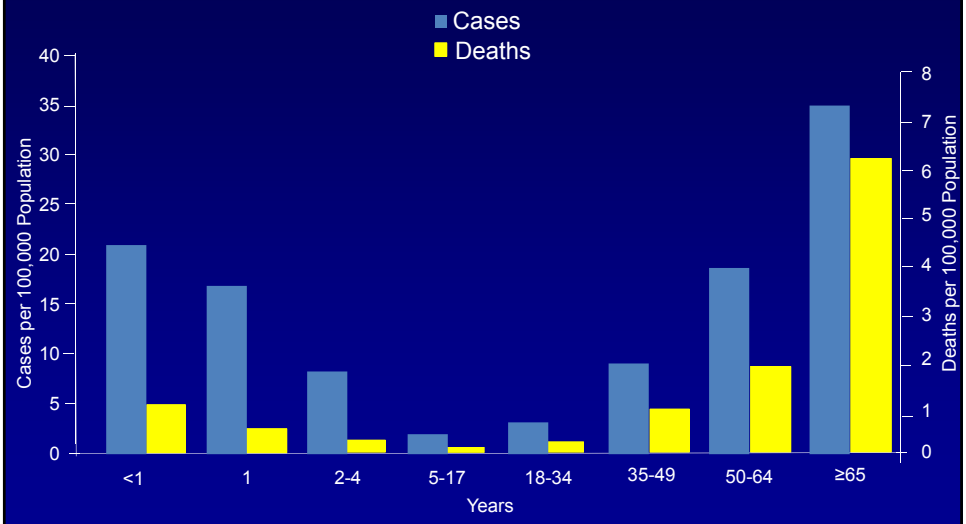
CDC. Available at: http://www.cdc.gov/abcs/reports-findings/survreports/spneu11.html. Accessed May 1, 2013.

The Burden of Pneumococcal Disease is High in Older Adults



Huang SS et al. *Vaccine*. 2011;29(18):3398-412.

S. pneumoniae Cases and Deaths: US 2011



CDC. Available at: http://www.cdc.gov/abcs/reports-findings/survreports/spneu11.html. Accessed May 1, 2013.

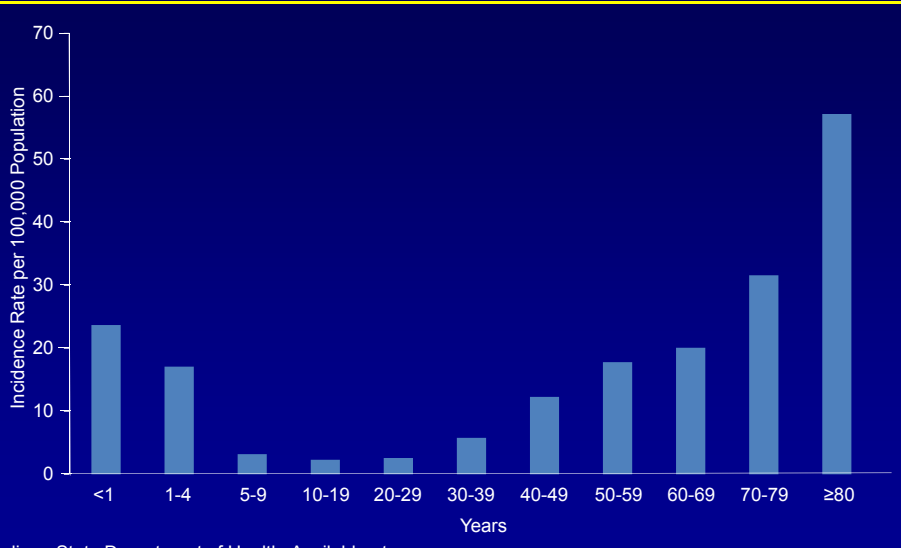
Invasive Pneumococcal Disease Risk Factors

- Comorbidities
  - Alcohol abuse
  - Congestive heart failure
  - Chronic lung disease
  - Cigarette smoking
  - Asthma
  - Recent influenza infection
  - Diabetes mellitus
  - Neurological disorders
- Certain ethnic groups
  - American Indians, Alaska Natives, African Americans in the US
- Immune deficiencies
  - B cell defects
  - Deficiencies of early components of classical pathway of complement
  - Asplenia
  - Sickle cell disease
  - Hematological or solid malignancies
  - Organ transplant recipients
  - HIV infection
  - Immunosuppressive drugs

Lynch J, Zhanel G. *Sem Respir Crit Care Med*. 2009;30(2):189-209.

Pneumococcal Disease: How Are We Doing in Indiana?

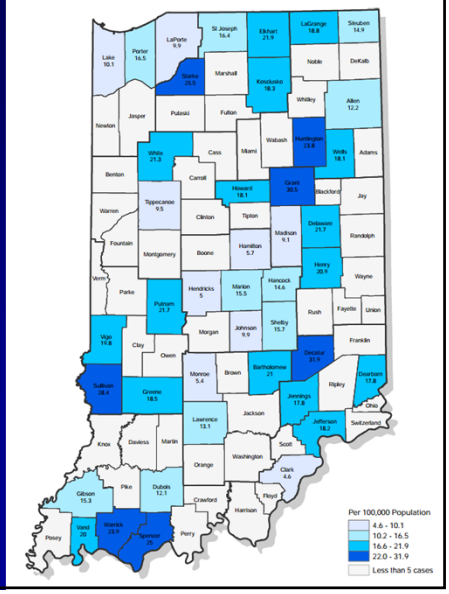
Pneumococcal Disease Incidence Rates Vary by Age: Indiana 2009



Indiana State Department of Health. Available at: http://www.state.in.us/isdh/files/2009IndianaReportofInfectiousDiseases.pdf . Accessed July 8, 2013.

Pneumococcal Cases by County for All Ages: Indiana 2009

- Incidence rates among counties reporting five or more cases were highest in:
  - Decatur (31.9/100,000 population)
  - Grant (30.5/100,000 population)
  - Sullivan (28.4/100,000 population)



Indiana State Department of Health. Available at: http://www.state.in.us/isdh/files/2009IndianaReportofInfectiousDiseases.pdf . Accessed July 8, 2013.

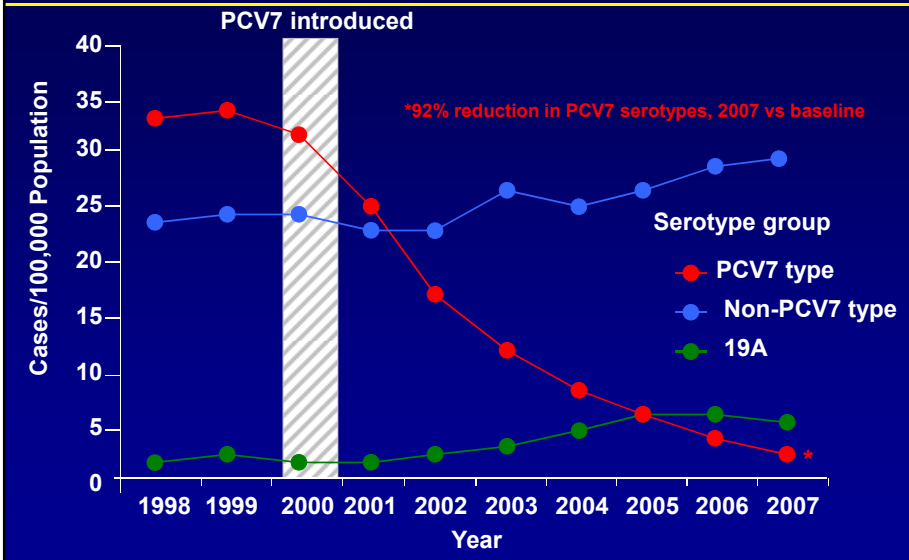
Healthy People 2020 Update

- Goal: Decrease the incidence of invasive pneumococcal infections to 31 per 100,000 persons aged 65 and older
- In Indiana, the incidence rate for adults aged 65 and older was 23.2 per 100,000 population in 2009

CDC. Available at: http://www.cdc.gov/abcs/reports-findings/survreports/spneu11.html. Accessed May 1, 2013.

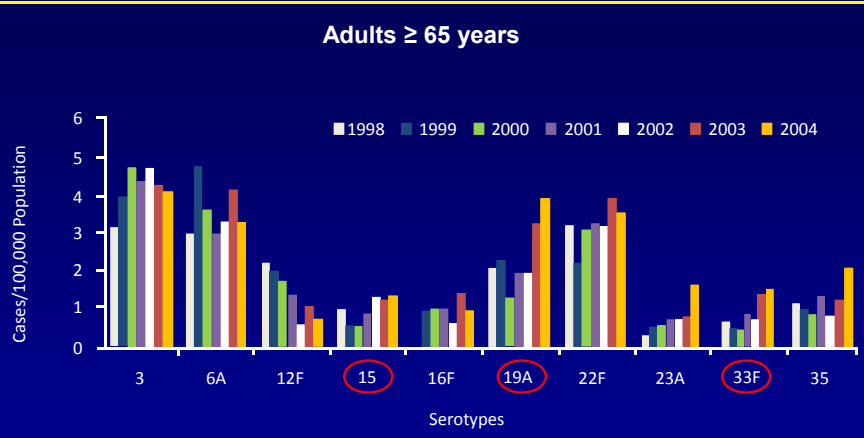
Pneumococcal Disease: Vaccination

Invasive Pneumococcal Disease Among Adults ≥65 Years, 1998/99-2007



Pilishvili T et al. *J Infect Dis*. 2010;201:32-41.

Change in Serotype-Specific Incidence of Invasive Pneumococcal Infections



Adapted from: Hicks LA et al. *J Infect Dis*. 2007;196:1346-1354.

Licensed Pneumococcal Vaccines in the US

Property	Pneumococcal conjugate vaccine (PCV13)	Pneumococcal polysaccharide vaccine (PPSV23)
Trade Name (manufacturer)	Prevnar (Wyeth)	Pneumovax (Merck)
Formulation	PCV13 is a vaccine indicated for prevention of pneumococcal disease caused by *S. pneumoniae* serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F	PPSV23 is a vaccine indicated for prevention of pneumococcal disease caused by the 23 serotypes contained in the vaccine (1, 2, 3, 4, 5, 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19F, 19A, 20, 22F, 23F, and 33F).
Indications	PCV13 is approved for prevention of pneumococcal disease in: • Children 6 weeks through 17 years of age • Adults 50 years of age and older PCV13 is approved for prevention of otitis media caused by *S. pneumoniae* serotypes in children 6 weeks through 5 years of age	PPSV23 is approved for use in persons 50 years of age or older and persons aged ≥2 years who are at increased risk for pneumococcal disease

Prevnar (pneumococcal 13-valent conjugate vaccine) [prescribing information]. http://labeling.pfizer.com/showlabeling.aspx?id=501; Pneumovax (pneumococcal vaccine polyvalent) [prescribing information]. http://www.merck.com/product/usa/pi_circulars/p/pneumovax_23/pneumovax_pi.pdf.

ACIP Recommendations: Pneumococcal Conjugate Vaccine (PCV13) for Adults

Single dose recommended for:

- Adults aged ≥19 years with immunocompromising conditions, functional or anatomic asplenia, cerebrospinal fluid (CSF) leaks, or cochlear implants
- **Pneumococcal vaccine-naïve persons:** Adults aged ≥19 years with immunocompromising conditions who have not previously received PCV13 or PPSV23 should receive a dose of PCV13 first, followed by a dose of PPSV23 at least 8 weeks later.
- **Previous vaccination with PPSV23:** Adults aged ≥19 years with immunocompromising conditions who previously have received ≥1 doses of PPSV23 should be given a PCV13 dose ≥1 year after the last PPSV23 dose was received. For those who require additional doses of PPSV23, the first such dose should be given no sooner than 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

In August 2014, ACIP recommended routine use of PCV13 in series with PPSV23, for all adults aged 65 years and older. For full information on the sequential administration and recommended intervals for the vaccinations, please refer to http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6337a4.htm.

CDC. *MMWR*. 2012;61(40):816-819.

ACIP Recommendations: Pneumococcal Polysaccharide Vaccine (PPSV23) for Adults

Single dose recommended for:

- All ≥ 65 years
- Adults aged 19-64 years with chronic or immunosuppressing medical conditions, including chronic cardiovascular disease, asthma, chronic pulmonary disease, diabetes, cigarette smoking, alcoholism, chronic liver disease, CSF leaks, asplenia, cochlear implants

Revaccination:

"A second dose of PPSV23 is recommended 5 years after the first dose for persons aged 19-64 years with functional or anatomic asplenia and for persons with immunocompromising conditions"

In August 2014, ACIP recommended routine use of PCV13 in series with PPSV23, for all adults aged 65 years and older. For full information on the sequential administration and recommended intervals for the vaccinations, please refer to http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6337a4.htm.

CDC. *MMWR*. 2010;59(34):1102-1106.

Contraindications to Pneumococcal Vaccination

- Severe allergy to a vaccine component or previous life-threatening allergic reaction to PCV13 or PPSV23
- Adults with mild illness can be vaccinated; those with moderate or severe illness may require waiting until recovery to be vaccinated

Efficacy of PPV23 in Adults

- Meta-analysis of 25 studies
  - 18 randomized controlled trials (RCTs), N=64,852
  - 7 non-RCTs, N=62,294

Variable	Odds Ratio (95% CI)
Culture-confirmed invasive pneumococcal disease	0.26 (0.14-0.45)
All-cause pneumonia	0.71 (0.45-1.12)
All-cause mortality	0.90 (0.74-1.09)

Moberley S et al. *Cochrane Database Syst Rev*. 2013;1:CD000422.

Efficacy of PPV23 in Older Adults

- Retrospective cohort study; N=47,365; ≥65 years; 1998-2001

Variable	Multivariate-adjusted Hazard Ratio (95% CI)	*P* Value
Pneumococcal bacteremia	0.56 (0.33-0.93)	*P*=0.03
Hospitalization for pneumonia	1.14 (1.02-1.28)	*P*=0.02
Outpatient pneumonia	1.04 (0.96-1.13)	*P*=0.31
Community-acquired pneumonia	1.07 (0.99-1.14)	N/A

Jackson L et al. *N Engl J Med*. 2003;348:1747-1755.

Acceptance of PPV23 Vaccination of Elderly in Nontraditional Settings

- Survey of 636 elderly persons vaccinated in MN MVNA Clinics 1999-2000
- Systemic symptoms similar or lower during postvaccination vs comparison week
  - Fever more common postvaccination (3% vs 0.3%; *P*<0.01)
  - Local symptoms (soreness, redness, or swelling) in 23.1%
- High patient satisfaction
  - Very convenient: 96.2%
  - Very satisfied: 97.0%
  - Would recommend to family/friend: 99.4%

D'Heilly S et al. *Am J Infect Control*. 2002;30:261-268.

Efficacy of PCV13 in Older Adults

- Approval in adults based on immunogenicity studies comparing PCV13 antibody responses with PPSV23
  - In adults aged 60–64 and >70 years, PCV13 elicited mean antibody titers comparable with, or higher than, responses elicited by PPSV23
  - In studies of HIV-infected subjects, antibody responses to single dose of PCV7 comparable with PPSV23
- PCV13 tolerability comparable to PPSV23
- Randomized, placebo-controlled clinical trial of PCV in adults ≥ 65 years ongoing

Hak E et al. *Netherlands J Med*. 2008;66(9):378-383; *MMWR*. 2012;61(40):816-819.

FAQs About Adult Vaccination

- Can other vaccines be administered at the same as PCV13 or PPSV23?
  - Yes, PCV13 or PPSV23 are inactivated vaccines and can be administered with other vaccines, including the influenza vaccine with a few exceptions: PCV13 and PPSV23 can't be given at the same time and there are specifications for administration of PCV13 and the meningococcal conjugate vaccine in patients that are candidates for both vaccines
- A patient in a recommended risk group for PPSV23 or PCV13 isn't sure if they have previously received the vaccine, can they be vaccinated?
  - Yes, a patient without a documented vaccination history can receive the recommended doses; an extra dose will not cause harm.

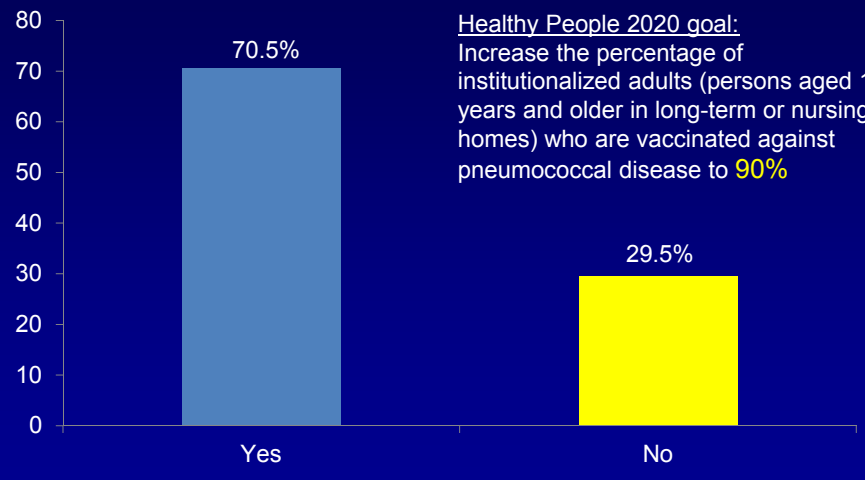
Immunization Action Coalition. http://www.immunize.org/askexperts/experts_pneumococcal_vaccines.asp.

FAQs About Adult Vaccination (cont)

- Should a healthy 75-year-old patient who was given PPSV23 at age 65 years be revaccinated?
  - No, adults first vaccinated at age 65 years or older need only one dose.
- Does a patient who was vaccinated with PPSV23 before age 65 need an additional dose of PPSV23 at age 65 or later?
  - Yes, patients who received PPSV23 for any indication at age 64 years or younger should receive an additional dose of PPSV23 vaccine at age 65 years or older if at least 5 years have elapsed since their previous PPSV23 dose.

Immunization Action Coalition. http://www.immunize.org/askexperts/experts_pneumococcal_vaccines.asp.

Adults ≥65 Years in Indiana With Pneumococcal Vaccine: 2011



Healthy People 2020 goal:
Increase the percentage of institutionalized adults (persons aged 18 years and older in long-term or nursing homes) who are vaccinated against pneumococcal disease to 90%

Centers for Disease Control and Prevention. Available at: http://apps.nccd.cdc.gov/BRFSS/display.asp?cat=IM&yr=2011&qkey=8351&state=IN. Accessed July 22, 2013.

Seasonal Influenza: Ensuring Herd Immunity

Influenza and Pneumococcal Infection

- Influenza increases pneumococcal disease incidence
  - Sequential-infection hypothesis: 1918–19 influenza pandemic caused by novel influenza strain followed by secondary opportunistic bacterial pneumonias
- Vaccination for seasonal influenza missed opportunity for pneumococcal vaccination
  - Concomitant use of PPSV23 with seasonal influenza vaccine is cost-effective and has additive effects on all-cause mortality

Gilchrist SA et al. *Am J Public Health*. 2012;102(4):596-605; Mahamat A et al. *Hum Vaccin Immunother*. 2013;9(1):128-35.

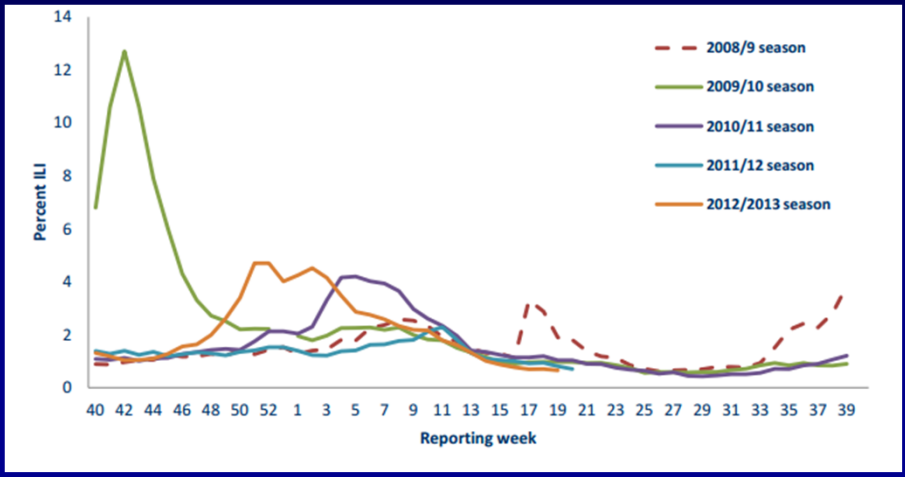
Influenza Vaccines

- Seasonal flu vaccines protect against three influenza viruses (trivalent) estimated to be most common
  - Quadrivalent vaccines anticipated to be available for 2013-2014 season
  - Cell-based vaccine recently approved for patients with severe egg allergy

Route of Administration	Approved For
Inactivated	
Intramuscular injection	≥6 months
High-dose intramuscular injection	≥65 years
Intradermal injection	18-64 years
Live Attenuated Influenza Vaccine	
Nasal spray	2-49 years (not pregnant)

CDC. http://www.cdc.gov/flu/protect/keyfacts.htm

Influenza-like Illnesses in Indiana



Indiana State Department of Health.
http://www.in.gov/isdh/files/Weekly_Influenza_Report_Week_20_2012_2013(1).pdf

Healthy People 2020 Update

- Goal: Increase the percentage of institutionalized adults aged 18 years and older in long-term or nursing homes who are vaccinated annually against seasonal influenza to 90%
- In Indiana, 66.4% of adults ≥65 years received the influenza vaccine in 2010

Indiana Area	Sample Size	%	SE
Allen County	195	60.9	3.9
Lake County	313	61.4	4.5
Marion County	457	69.1	3.1

MMWR. 2013;62(ss01):1-247.

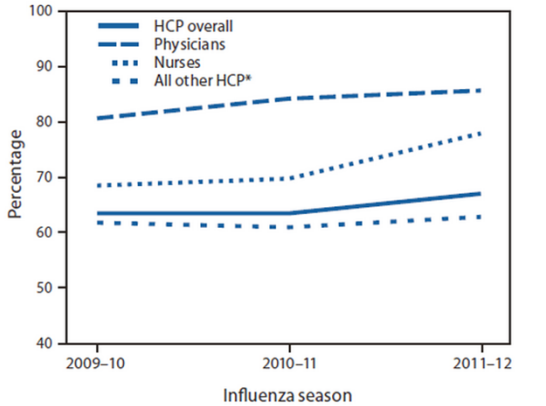
Influenza Vaccination of HCPs Reduces Risks of Residents

- Increased vaccination among direct-care employees significantly decreased outbreaks of laboratory-confirmed influenza and influenza-like illness in 75 LTCFs in New Mexico
- Vaccination rates of 60% significantly decrease influenza-like illness, mortality, and influenza hospitalizations in a series of UK nursing home residents

Wendelboe AM et al. *Infect Control Hosp Epidemiol*. 2011;32(10):990-7; Hayward AC et al. *BMJ*. 2006;333(7581):1241.

Influenza Vaccination Coverage Among Health-Care Personnel

- Internet panel survey of 2,348 HCP during April 2012
- Overall, 66.9% reported having an influenza vaccination for the 2011-12 season
- Healthy People 2020 goal: Increase the percentage of health care personnel who are vaccinated annually against seasonal influenza to 90%



MMWR. 2012;61:753-757.

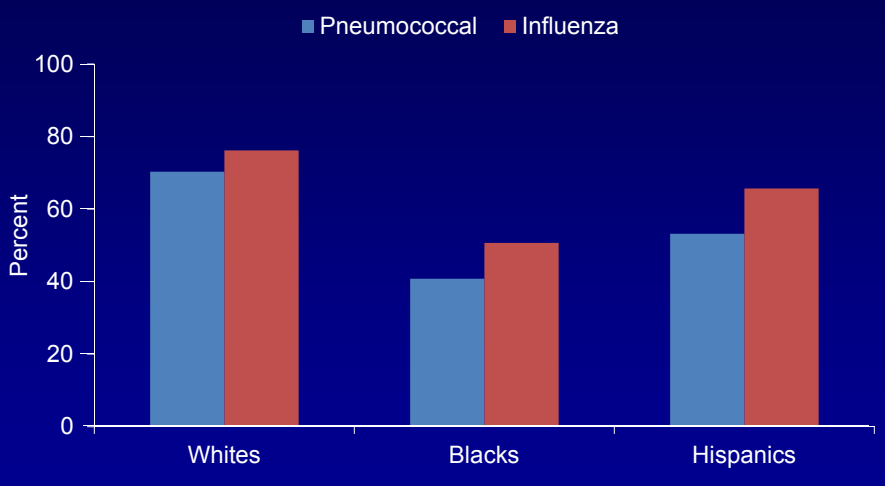
Improving Vaccination Rates

Why Aren't We Achieving Goals?

- Missed opportunities to vaccinate
  - Failure to assume responsibility
  - Competing priorities
  - Incomplete/inaccessible documentation of previous vaccines
  - Health care system delivery challenges
- Refusal of vaccine by patients
  - Lack of perception about risk
  - Misconceptions about vaccine efficacy
  - Fear of adverse events
- Healthcare provider lack of knowledge or fear
- Lack of access/availability

Brownfield E et al. *Am J Infect Control*. 2012;40(7):672-4; Rehm S et al. *Postgrad Med*. 2012;124(3):71-9.

Racial/Ethnic Disparities in Vaccination



Winston CA et al. *J Am Geriatr Soc*. 2006 ;54(2):303-10.

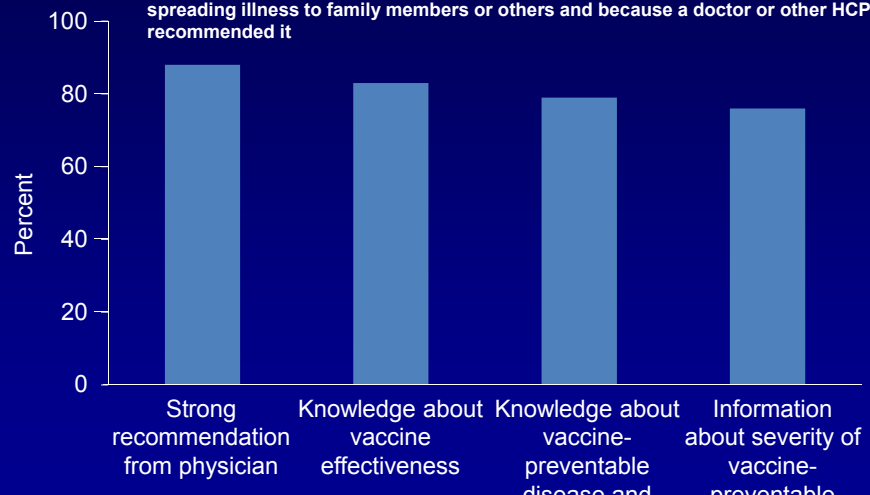
Educating Residents

- Display educational materials (eg, posters, fact sheets) in common areas
- Urge families to encourage vaccination
- Encourage residents to incorporate pneumococcal and other vaccines into wellness efforts
- Use strong language, eg, “You should be vaccinated”
- Inform recipients about Medicare and Medicaid coverage of pneumococcal vaccination
- Engage trusted community leaders

NFID. http://aahivm.org/Upload_Module/upload/Provider%20Resources/Pneumococcal%20CTA%20Older%20Americans%20AAHIVM%20Partner.pdf.

NFID Survey: Motivating Patients

The two top reasons why adults are most likely to get a vaccine are to prevent spreading illness to family members or others and because a doctor or other HCP recommended it



NFID. Available at: http://www.adultvaccination.com/newsroom/Events/2010-cdc-vaccination-rates-news-conference/2010-Survey-Backgrounder.pdf

Healthcare Provider Roles

- Educate yourself and other health care workers
- Recommend vaccination to high-priority patients
- Set up systems for promoting vaccination
- Evaluate your efforts and provide feedback
- Consider new locations for vaccine delivery
- Get vaccinated!

Nichol KL. *Cleve Clin J Med*. 2006;73(11):1009-15.

Standing Orders Programs (SOPs) to Improve Adult Vaccination Rates

- Nurses and pharmacists offer and administer vaccinations
  - Established physician- and medical director-approved policies and protocols
  - Recommended by ACIP
- Accumulating data supports effectiveness
  - Pharmacist SOP in LTCFs increased rates
  - Nursing protocols more effective than patient reminders
  - Hospital-based SOP increased vaccination in high-risk patients

McKibbin LJ et al. *MMWR Recomm Rep.* 2000;49(RR1):15-26.

SOPs In LTCFs

- Intervention study of LTCFs implementing SOPs for pneumococcal vaccines
  - 28% of facilities with ≥10% increase in pneumococcal immunizations
- Predictors of success included:
  - Adoption of recording pneumococcal immunizations in a consistent place
  - Affiliation with a multifacility chain
  - Provision of resource materials

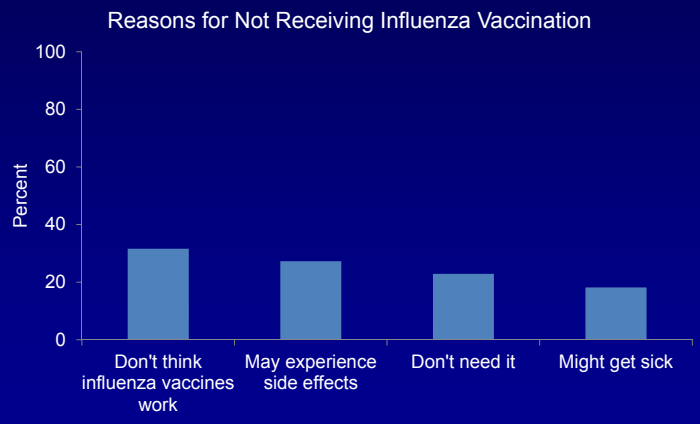
Bardenheier BH et al. *J Am Med Dir Assoc*. 2005;6(5):291-9.

Barriers to SOPs

- Survey of Medicare- or Medicaid-licensed LTCFs in 13 states
- Few LTCFs have SOPs for influenza (9%) or pneumococcal vaccination (7%)
  - Influenza SOPs more frequently used in government owned and nonprofit entities compared with for-profit entities
  - SOP use varies by state
- Barriers to SOPs include legal concerns: facility liability (53%) and staff lacking authority (39%) to vaccinate by SOPs

Shefer A et al. *J Am Med Dir Assoc*. 2005;6(2):97-104.

Vaccination Among Healthcare Providers



CDC. http://www.cdc.gov/flu/professionals/vaccination/health-care-personnel.htm#references.

Promoting Vaccination Among Staff

Healthy work force
- Employees report to work regularly
- Employees are more productive while working

Protects vulnerable members of community (herd immunity)
- Young children
- Immunodeficient patients
- Those who cannot be vaccinated

Rittle C. *Workplace Health Saf*. 2013;61(7):314-22.

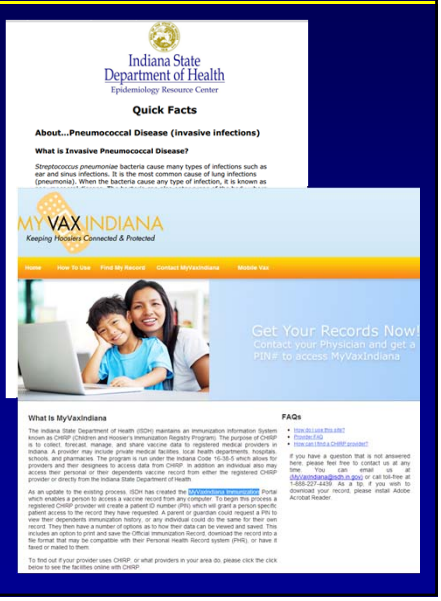
Increasing Staff Vaccination Rates

- ACIP recommends that all HCP receive an annual influenza vaccination
- Interventions
  - Educational and promotional campaigns
  - Access to seasonal influenza vaccine
  - Permit declination statements
- Some facilities and states (not Indiana) mandate influenza vaccination for certain HCPs
- Free on-site influenza vaccination improves vaccination rates in HCPs

Stewart AM et al. *Vaccine*. 2013;31(5):827-32; Kimura AC et al. *Am J Public Health*. 2007;97(4):684-90.

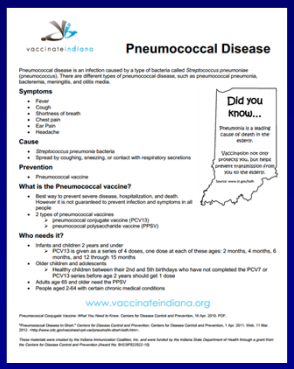
Resources in Indiana

- Department of Health
  - http://www.state.in.us/isdh/25720.htm
  - Quick fact sheets
  - MyVaxIndiana Immunization Portal



Resources in Indiana (cont)

- Indiana Immunization Coalition
  - http://www.vaccinateindiana.org
  - Disease information
  - Vaccination schedules
  - Immunization providers



vaccinateindiana

Pneumococcal Disease

Pneumococcal disease is an infection caused by a type of bacteria called Streptococcus pneumoniae (pneumococcus). There are different types of pneumococcal disease, such as pneumococcal pneumonia, bacteremia, meningitis, and otitis media.

Symptoms

- Fever
- Cough
- Shortness of breath
- Chest pain
- Ear Pain
- Headache

Cause

- *Streptococcus pneumonia* bacteria
- Spread by coughing, sneezing, or contact with respiratory secretions

Prevention

- Pneumococcal vaccine

What is the Pneumococcal vaccine?

- Best way to prevent severe disease, hospitalization, and death. However it is not guaranteed to prevent infection and symptoms in all people
- 2 types of pneumococcal vaccines
  - pneumococcal conjugate vaccine (PCV13)
  - pneumococcal polysaccharide vaccine (PPSV)

Who needs it?

- Infants and children 2 years and under
  - PCV13 is given as a series of 4 doses, one dose at each of these ages: 2 months, 4 months, 6 months, and 12 through 15 months
- Older children and adolescents
  - Healthy children between their 2nd and 5th birthdays who have not completed the PCV7 or PCV13 series before age 2 years should get 1 dose
- Adults age 65 and older need the PPSV
- People aged 2-64 with certain chronic medical conditions

Did you know...

Pneumonia is a leading cause of death in the elderly.

Vaccination not only protects you, but helps prevent transmission from you to the elderly.

Source: www.in.gov/isdh

www.vaccinateindiana.org

"Pneumococcal Conjugate Vaccine: What You Need to Know. Centers for Disease Control and Prevention, 10 Apr. 2010. PDF.

"Pneumococcal Disease In Brief." Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, 1 Apr. 2011. Web. 11 Mar. 2012. <http://www.cdc.gov/vaccines/pubs/pinkbook/pneumo-short-toolkit.htm>.

These materials were created by the Indiana Immunization Coalition, Inc. and were funded by the Indiana State Department of Health through a grant from the Centers for Disease Control and Prevention (Award No. 5H23IP922522-10)

Quality Improvement Plan

Quality Improvement Plan

- Participants collectively develop a customized quality improvement (QI) plan specific to your facility (based on initial performance data from resident chart reviews) to increase pneumococcal and influenza vaccination rates

Potential Quality Improvement Strategies

- Establish methods of documenting resident vaccinations
- Develop procedures to check vaccination status of new residents
- Implement several approaches to educate staff, caregivers, family, and residents on vaccinations
- Develop standing order programs
- Provide opportunities for onsite vaccination of residents and staff

Quality Improvement Plan Example 1

Quality improvements	Key Success Factors	Barriers	Action Steps	Responsible Parties	Resources Needed	Timeline/ Benchmarks
Educate residents and families about importance of pneumococcal vaccine	Increased number of residents interested in receiving pneumococcal vaccine	• Time • Vaccine hesitancy • Patient access	• Identify educational tools • Determine how to disseminate tools	Staff providing education will include: • Person 1 • Person 2	• Educational tools • Photocopying • Staff to distribute and answer questions	• One year • Assess interventions after several months

Quality Improvement Plan Example 2

Quality improvements	Key Success Factors	Barriers	Action Steps	Responsible Parties	Resources Needed	Timeline/ Benchmarks
Increase number of staff receiving 2013-2014 influenza vaccine	Increased number of staff vaccinated against influenza vaccine	Vaccine hesitancy	• Identify educational tools • Determine how to disseminate tools	Staff providing education will include: • Person 1 • Person 2	• Educational tools • Photocopying • Staff to distribute and answer questions	• One year

Quality Improvement Plan

Quality improvements	Key success factors	Barriers	Action steps	Responsible parties	Resources needed	Timeline/ benchmarks
Goal 1:						
Goal 2:						
Goal 3:						