

Pneumococcal Vaccination

MSHO Pneumococcal Performance Improvement Project

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Bottom Line

- Pneumococcal disease is one of the “big two” vaccine preventable diseases
- The elderly and other chronically ill persons are at increased risk
- Vaccines are safe, effective, and underused
- Evidence-based strategies can help us improve

Annual Pneumococcal Disease Burden

- Community-acquired pneumonia
 - Etiologic agent in 25% to 50% of cases
 - Case fatality rates in persons hospitalized with positive sterile site culture
 - 13% to 23% in elderly
 - 18% with comorbidities (vs 5% without)
- Invasive disease (US)
 - Bacteremia — 50,000 cases
 - Meningitis — 3000 cases

Feikin DR et al. *Am J Public Health*. 2000;90:223-229.
MMWR 1997; 46 (RR-8).

CXR: Pneumococcal Pneumonia



Gangrene from Pneumococcal Bacteremia



Risk Factors for Invasive Disease – Adults Ages 18 to 64 Years

Factor	Odds Ratio (95% CI)
Male sex	2.7 (1.7 – 4.3)
Black race	3.4 (2.0 – 5.6)
Chronic illness	2.6 (1.4 – 5.1)
Current smoker	4.1 (2.4 – 7.3)
Children in daycare < 6 yrs old	3.0 (1.5 – 6.2)

Nuorti JP. *NEJM* 2000; 342: 681.

Risk Factors for Death Due to Invasive Pneumococcal Disease

Disease	Relative Risk (95% CI)
Cirrhosis	5.8 (3.7, 9.2)
Congestive Heart Failure	4.7 (3.3, 6.7)
Diabetes	2.9 (2.0, 4.3)
Chronic Lung Disease	2.8 (1.9, 4.0)
Asplenia	3.2 (1.1, 9.3)
AIDS	2.3 (1.5, 3.6)
HIV without AIDS	1.1 (0.6, 2.0)
Solid Organ Malignancy	3.7 (2.5, 5.4)
Hematologic Malignancy	2.2 (1.2, 4.3)

Feikin DR, et al. Am J Public Health 2000; 90: 233-9.

Influenza & Pneumococcal Diseases are the "Big Two" Causes of VPD Deaths

Cases & Deaths, US 1989 - 1998

Disease	Cases	Deaths
Influenza	(millions) > 500,000	
Pneumococcal	(millions) ~ 120,000	
Hepatitis A	282,650	1013
Hepatitis B	146,644	9694
Measles	60,189	132
Mumps	24,075	7
Rubella	4412	21
Pertussis	53,634	65
Tetanus	486	77

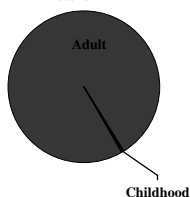
90% in the elderly

11k from 1989-98 (actual is 5x to 10x higher)

MMWR 2001; 48 (RR-53): Thompson et al. JAMA 2003; 289: 179; Feikin DR, et al. Am J Public Health 2000; 90: 223-9.

VPD's Take the Highest Death Toll Among Adults

Annual VPD Deaths



- Adults: 99% of VPD Deaths
 - 30,000 to 70,000 deaths each year
- Children: 1% of VPD Deaths
 - 100 to 300 deaths each year

VPD = Vaccine Preventable Disease
Source: CDC, IOM

PPV Protects Against 23 Invasive Disease Serotypes in Adults

Most Common Serotypes- Invasive Pneumo Disease, US 1998

Serotypes in vaccines	All Ages (n = 3610)	<2 (n = 735)	2 - 64 (n = 1844)	65+ (n = 1031)
7-valent	62.0%	82.2%	57.2%	56.2%
9-valent	64.5%	82.6%	61.0%	58.0%
11-valent	70.6%	83.5%	68.4%	65.3%
23-valent	88.1%	NA	88.2%	85.9%

Robinson KA, et al. JAMA 2001; 285: 1729.

Effectiveness of PPV Against Invasive Disease

Overall	57% (45% to 66%)
Patients with:	
Diabetes	84% (50% to 95%)
CV disease	73% (23% to 90%)
CHF	69% (17% to 88%)
COPD	65% (26% to 83%)
Anatomic asplenia	77% (14% to 95%)
Immunocompetent elderly	75% (57% to 85%)

Butler JC. JAMA 1993;270:1826.

Safety and Acceptability of PPV in NTS

Survey of 636 / 1136 (56%) elderly persons vaccinated in MN MVNA Clinics 1999-00

	Post Vaccination	Control Period	P
Systemic Symptoms			
Fever	3%	.3%	<.001
Under the weather	2.2%	4.2%	.06
Muscle aches	1.4%	3.6%	.02
URI Symptoms	0.9%	5.8%	<.001
Cut down on usual activities	0.6%	2.8%	<.005
Overall health			
Same as usual	94.8%	92.0%	<.001
Better than usual	2.4%	0.6%	
Worse than usual	2.8%	7.4%	
Any Local Symptoms	23.1%		

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

Safety of Pneumococcal Revaccination

- Occurrence of sizeable local reaction
 - 11% (revacc) vs 3% (initial vacc)
 - RR = 3.3 (95% CI 2.1 – 5.1)
- Days to resolution
 - Median = 3 days

* Jackson et al. JAMA 1999; 281: 243.

Safety and Acceptability of PPV in NTS

- Local redness or swelling higher w/ re-vaccination (p = .001)
 - Re-vacc: 13.1%
 - First time: 4.4%
 - Unsure: 1.4%
- In multivariate analyses:
 - Local symptoms → fever (OR 13.15, P < .001)
 - Re-vaccination → local symptoms (adjusted OR 3.77, p < .001)
- 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.

Target Groups for Influenza & Pneumococcal Vaccinations

Influenza Vaccinations

- High priority groups
 - High risk
 - Likely to be high risk
 - People who can transmit
- Others may also be vaccinated
- Frequency: annual

Pneumococcal Vaccinations

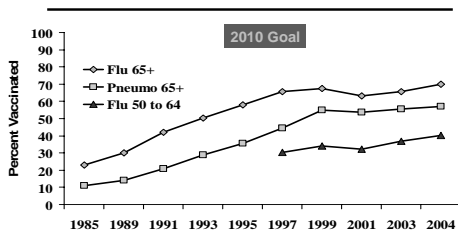
- High priority groups
 - High risk
- Frequency
 - Generally 1x
 - Revaccination
 - Once if > 65 now & previously vacc > 5 yrs ago when < 65
 - Others

MMWR 2003; 52 (RR-8); MMWR 1997; 46 (RR-8)

PPV -- Revaccination

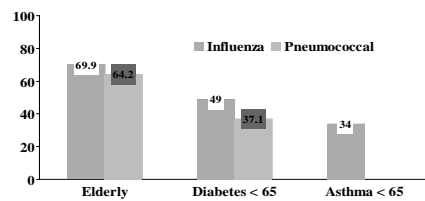
- Antibody levels decline over 5 to 10 years
 - Polysaccharide antigens do not induce immune memory
- Revaccination
 - Increases antibody levels (but no anamnestic response)
 - Recommended after 5 years for
 - Asplenia, immunocompromised, if >= 65 and < 65 when 1st vaccinated

Influenza and Pneumococcal Vaccination Rates Are Still Too Low



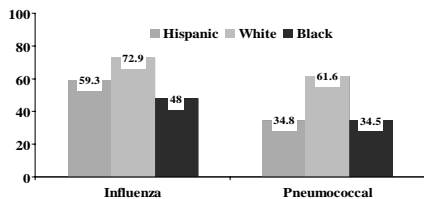
MMWR 2001;50(25):532-537.; NHIS '01, '03, Jan – Jun '04).

Disparities by Age: Influenza & Pneumococcal Vaccination of High Risk Persons, 2003



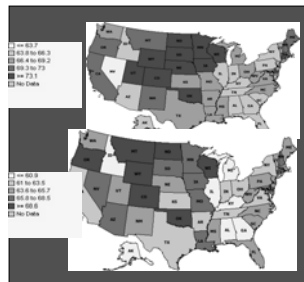
MMWR 2004; 53: 1007

**Disparities by Race:
Influenza & Pneumococcal Vaccination of Elderly Persons,
2004**



NHIS early release estimates, Jan – Jun 2004

**Vaccination Rates of Persons 65+,
2004 BRFSS**



Influenza
Ave: 67.8
Best: 78.8 (CO)
MN: 78.2

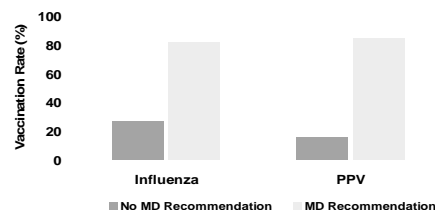
Pneumococcal
Ave: 64.5
Best: 71.6 (MT)
MN: 67.9

**Improving Vaccination Rates –
Provider Issues**

- Know the facts
- Recommend vaccinations to your patients
- Get organized & use systems approaches
 - Ensure offering & administration of vaccine
 - Automatic processes that empower nurses are effective
 - Address convenience, efficiency, durability
- Evaluate & provide feedback
- Consider new paradigms

**Provider Recommendation Can Overcome Negative
Attitudes Among Patients**

Vaccination Rates Among HR Patients With Negative Attitudes



Nichol KL et al. *J Gen Intern Med.* 1996;11:673.

Improving Vaccination Coverage
Task Force on Community Preventive Services

- **Increase demand**
 - Patient reminders
 - Multifaceted programs including education
 - Regulation
- **Enhance access**
 - Reduce cost
 - Walk-in clinics
- **Address provider barriers**
 - Reminders / Feedback
 - Standing orders & policies

MMWR 1999; 48 (RR-8)

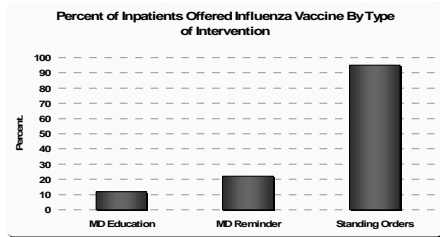
**Standing Orders Are Among the
Most Effective Strategies**



- Nonphysicians offer and administer vaccinations
 - No direct MD involvement at the time of the visit
- Established with physician approved policies and protocols
- Locations:
 - Clinics, hospitals, and nursing homes

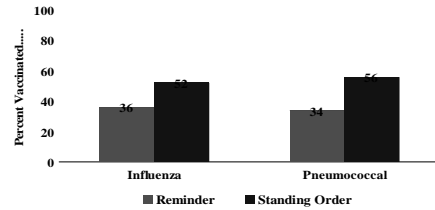
www.cdc.gov/nip/publications/adultstrat.htm
MMWR 2000; 49 (RR-1)

Standing Orders More Effective than Education or MD Reminders for Inpatients



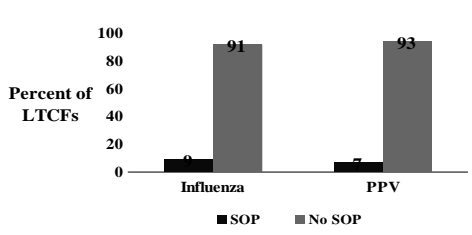
Crouse B, et al. J Fam Pract 1994; 38: 258.

Inpatient Computer-Based Standing Orders vs. MD Reminders



Dexter PR et al. JAMA 2004; 292: 2366.

Standing Orders Programs for Influenza & Pneumococcal Vaccinations in LTCFs



Shefer A, et al. J Am Med Dir Assoc 2005; 6: 97-104.

1999 Survey of Generalist and Medical Subspecialty MDs

N = 1874 / 5858

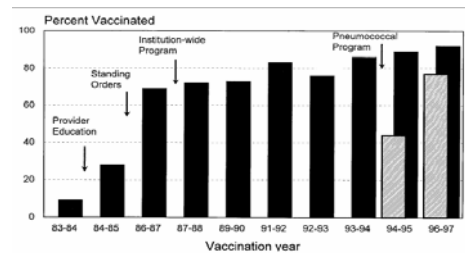
	Generalists	Medical Subspecialists
Very strongly recommend vaccinations to elderly patients		
Influenza	86%	75%
Pneumococcal	81%	64%
Use systems strategies to promote vaccination (patient reminders, special clinics, or standing orders)		
Influenza	<30%	<20%
Pneumococcal	<30%	<20%

Nichol KL. Arch Intern Med. 2001;161:2702.

Multifaceted Program Improved Success & Sustainability

Increase Demand	Annual reminder to pts
Enhance Access	Walk-in Clinics
Address Provider Barriers	Institutional Policy
	Standing Orders
	Standardized Forms
	Efficient Clinic Flow
	Ongoing Measurement & Evaluation

Standing Orders as Part of a Multifaceted Vaccination Program



Nichol. Am J Med 1998; 105: 385.

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