

Use of Standing Orders for Adult Influenza Vaccination

A National Survey of Primary Care Physicians

Richard K. Zimmerman, MD, MPH, Steven M. Albert, PhD, Mary Patricia Nowalk, PhD, RD, Michael A. Yonas, DrPH, Faruque Ahmed, PhD

Background: Influenza vaccination of adults remains below recommended levels. Standing orders programs (SOPs) that allow nonphysician medical staff to assess eligibility and administer vaccines without an individualized physician's order are a proven method to increase vaccination rates. However, recent data on their use are not available.

Purpose: Investigators surveyed primary care physicians nationwide in 2009 to assess factors related to awareness and use of SOPs.

Methods: Using the AMA Master List, a stratified random sample of U.S. family physicians ($n=820$) and general internists ($n=820$) was selected to receive a mailed questionnaire. The inclusion criterion was providing primary care to adults in an office-based practice. The primary outcome measure, analyzed in 2010, was consistent use of SOPs.

Results: The survey response rate was 67% (1015/1517). Forty-two percent of respondents who immunized adults in their practices reported consistent use of SOPs. Those physicians differed in several dimensions, including awareness of recommendations and regulations regarding SOPs for vaccines, size and type of practice, number and level of training of clinical staff, attributes of the staff. The two variables in logistic regression models that were associated with the highest likelihood of using SOPs were awareness of recommendations to use them (OR=3.0; 95% CI=2.2, 4.1) and agreement with their effectiveness (OR=2.7, 95% CI=1.9, 3.8).

Conclusions: Fewer than half of physicians report using SOPs for influenza vaccination, a number that is not much higher than it was about a decade ago. Approaches to increase use of SOPs are needed.

(Am J Prev Med 2011;40(2):144–148) © 2011 American Journal of Preventive Medicine

Introduction

Influenza causes more deaths in the U.S. than all other vaccine-preventable diseases combined, totaling an estimated 24,000 deaths annually.¹ However, adult vaccination rates are moderate at 67% for those aged ≥ 65 years, 42% for those aged 50–64 years, and 32% for those aged 18–49 years with high-risk conditions, with racial disparities in rates.²

From the Department of Family Medicine and Clinical Epidemiology, University of Pittsburgh School of Medicine (Zimmerman, Nowalk, Yonas); Department of Behavioral and Community Health Sciences, University of Pittsburgh Graduate School of Public Health (Zimmerman, Albert), Pittsburgh, Pennsylvania; and the CDC (Ahmed), Atlanta, Georgia

Address correspondence to: Mary Patricia Nowalk, PhD, RD, Department of Family Medicine and Clinical Epidemiology, 3518 5th Avenue, Pittsburgh PA 15261. E-mail: tnowalk@pitt.edu.

0749-3797/\$17.00

doi: 10.1016/j.amepre.2010.10.027

Missed opportunities, namely, failure to vaccinate at all visit types, and infrequent preventive care visits contribute to low rates.^{3,4} Standing orders programs (SOPs) are a powerful way to reduce missed opportunities and to raise rates, as they enable nonphysician medical personnel to assess patient immunization status and administer vaccines without direct physician involvement. Recent studies^{5–7} demonstrate the effectiveness of SOPs across a spectrum of outpatient settings. When SOPs are used in combination with other strategies, immunization rates increase by ~ 16 percentage points.⁸ The Advisory Committee on Immunization Practices (ACIP),⁹ the Task Force for Community Preventive Services,¹⁰ and the Southern California Evidence-Based Practice Center–RAND¹¹ have endorsed SOPs for improving immunization rates.

Despite this evidence, SOPs are not commonly used in the outpatient setting. An earlier study¹² reported that in

2000–2001, only 33% of a national sample of 220 physicians who reported providing adult vaccinations were using SOPs and 36% were willing to try SOPs. That study was concurrent with the ACIP recommendation to use SOPs but predated an important change in the Medicare regulations in 2002 that allowed an exception for adult immunizations to the prohibition on SOPs for medications.¹³ The present study was designed to determine the prevalence, correlates of use, and physicians' adoption readiness for SOPs for influenza vaccine in the outpatient setting nearly a decade later.

Methods

Questionnaire

In 2009, three focus groups of primary care physicians and nursing staff, and seven key informant interviews were conducted locally in sites selected for diversity in patient populations and use of SOPs for adult immunizations. Key themes and concepts were identified in the transcripts through content analysis. These items, aspects of the Awareness-to-Adherence model,¹⁴ which predicts physician behavior regarding new guidelines for care, and the diffusion of innovation theory were used to develop the survey.^{15,16} The questionnaire consisted of 22 closed-ended questions about demographics, practice characteristics, barriers to and facilitators of SOPs, and physician attitudes about SOPs. It was pilot-tested and revised as appropriate.

Subjects

A national sample of 1640 outpatient-based family physicians ($n=820$) and general internists ($n=820$) was drawn from the American Medical Association's (AMA's) Master List of 59,449 outpatient-based family physicians and 59,732 general internists, stratified by specialty. The survey was mailed in May 2009 with a cover letter, a \$5.00 cash incentive, and a self-addressed stamped envelope. Nonrespondents received a second mailed survey ~8 weeks after the first. After another 8 weeks, nonrespondents were telephoned to request completion of the survey. Physicians self-excluded if they were no longer in practice or primary care, or did not treat adult patients. The protocol was approved by the University of Pittsburgh IRB.

Data Processing and Analyses

Data from returned surveys were entered using a double-entry protocol and differences were reconciled. Mean values were imputed for the <5% of the data that were missing. Data were analyzed in 2010 by examining frequency distributions and measures of central tendency. Physicians were asked to rate their use of standing orders using the following statement: *For the purposes of this survey, standing orders refers to an office policy that allows non-physician staff to screen adults for influenza and PPV and administer either vaccine to eligible adults without getting an individual order from the patient's physician.* They were then asked to respond individually for influenza vaccine and PPV, their practice's use of standing orders with these choices: *Not using standing orders, no plans to implement them; Not using standing orders,*

would like to implement them; Inconsistently using standing orders, some physicians use but not all; and Consistently using standing orders. These four response choices for influenza vaccine SOP status formed the dependent measure in the analyses. The four groups were compared in univariate analyses (χ^2 for proportions, one-way ANOVA for continuous measures) to identify correlates of SOP use. Logistic regression models were developed to examine differences between physicians reporting consistent use of SOPs and physicians in the other three groups combined. ORs and 95% CIs were estimated. Interaction effects were assessed but none was significant.

Results

Of the 1640 physicians contacted by mail, 107 were deceased, no longer in practice, unknown at the practice, or not in primary care, and 16 surveys were returned as undeliverable, leaving 1517 eligible physicians. Of these, 1015 physicians returned surveys, for a response rate of 67%. Participation was slightly higher among family physicians (68.9%) than internists (64.8%, $p<0.01$), and among board-certified physicians (68.9%) than non-board certified (60.7%, $p<0.01$). Participants and non-participants did not vary by age (mean=50.7 years); length of time in practice (mean=23 years); domestic versus international training; or geographic region.

One hundred fifteen physicians (74 internists and 41 family physicians; $p<0.001$) reported not immunizing adults at their practices and were not included in the analyses, leaving a sample size for analysis of 900. Internists were significantly less likely to perform influenza immunization on site; 15.4% of internists reported not vaccinating adults in their practices compared to 7.7% of family physicians ($p<0.001$). Excluding these, as well as a small number who did not provide information on standing orders (~2% in both groups), the prevalence of consistent use of SOPs was 42.4% (38.9% among internists and 46.3% among family physicians). Because weighting for nonresponse showed similar results (weighted prevalence of SOP use=42.3%), only unweighted results are presented.

In analyses comparing the four SOP groups, physicians differed in several dimensions, including awareness of recommendations and regulations regarding SOPs for vaccines; size and type of practice; number and level of training of clinical staff; attributes of the staff, such as level of teamwork and openness to innovation; and technological capabilities, such as electronic medical records, electronic prompts, and reminders (Table 1).

Table 2 shows the results of the logistic regression model. The most important factors associated with greater likelihood of a practice consistently using SOPs were being aware of the ACIP recommendations or Medicare regulations regarding adult immunizations, agreeing that SOPs are effective, and having two or

Table 1. Physician and practice characteristics by use of standing orders for adult vaccination, %

Physician/practice characteristic	No standing orders; no plans to implement (n=273)	No standing orders; would like to implement (n=142)	Standing orders inconsistently used (n=87)	Standing orders consistently used (n=378)	p-value
PHYSICIAN CHARACTERISTICS					
Family practice (ref=internal medicine)	48.0	57.0	55.2	59.3	0.038
Aware of either ACIP recommendations or Medicare regulations allowing SOPs for immunizations	35.8	41.8	63.9	70.9	<0.001
Physician agrees that SOPs are effective	50.6	73.9	69.8	81.4	<0.001
PRACTICE CHARACTERISTICS					
Number of physicians in practice					
Solo	33.1	22.5	11.6	21.8	<0.001
2–4	38.6	43.0	48.8	38.5	
≥5	28.3	34.5	39.5	39.8	
Type of practice					
Independent	57.0	50.0	40.7	47.4	0.029
Large corporate/health system	20.6	23.2	30.2	30.7	
Other	22.4	26.8	29.1	22.0	
Clinical staff per provider					
2	12.6	18.1	19.3	23.0	0.001
1	66.8	65.9	66.3	66.6	
<1	20.6	15.9	14.5	10.4	
Primary assistant					
RN/LPN	30.0	22.1	49.4	39.2	0.003
MA	67.1	72.9	50.6	58.1	
PA/CRNP	2.3	5.0	0.0	2.7	
Practice has very good or excellent teamwork	70.3	65.7	57.0	83.2	<0.001
Practice is open or very open to innovation	51.5	55.3	49.4	70.7	<0.001
Practice has immunization champion	24.5	22.6	29.8	34.0	0.005
Uses electronic medical record	38.7	53.2	58.5	58.7	<.001
Immunization recording					
Electronic medical record	36.4	51.4	50.6	54.4	0.001
Progress notes, paper chart	57.7	45.8	48.3	41.5	0.004
Electronic patient reminders	6.2	8.5	13.8	16.8	0.001
Computer-generated provider reminders	16.2	17.6	29.1	31.8	<0.001

Note: Column percentages are shown for type of practice.

ACIP, Advisory Committee on Immunization Practices; CRNP, certified registered nurse practitioner; LPN, licensed practical nurse; MA, medical assistant; PA, physician assistant; RN, registered nurse; SOP, standing orders program

more clinical staff per physician. Other important factors were being a family physician, having an office staff that works well together and is open to innovation, having an electronic medical record (EMR) system, and having an immunization champion in the practice. Including additional indicators of variation in tracking influenza immunization (paper chart vs EMR) or type of patient reminder did not change these

results; hence they are not included in Table 2 (results available on request).

Discussion

In 2000–2001, Szilagyi et al.¹² reported that 33% of a national sample of 220 physicians who reported providing adult vaccinations were using SOPs. Nearly a decade

Table 2. Correlates of use of SOPs from logistic regression

Survey variables	Physicians reporting consistent use of SOPs for influenza immunization vs all others (<i>n</i> =880; OR [95% CI])	<i>p</i> -value
INDIVIDUAL PHYSICIAN FACTORS		
Family medicine (ref=internal medicine)	1.35 (0.99, 1.84)	0.056
Aware of ACIP recommendations or Medicare regulations	3.02 (2.22, 4.11)	<0.001
Agrees that standing orders are effective	2.69 (1.90, 3.81)	<0.001
PRACTICE FACTORS		
Number of physicians in practice (ref=solo)		
2–4	1.08 (0.71, 1.66)	0.710
≥5	1.22 (0.77, 1.95)	0.390
Clinical staff (ref=<1 helper/provider)		
1	1.90 (1.20, 3.03)	0.007
2	2.52 (1.44, 4.38)	0.001
Primary assistant (ref=Medical assistant)		
	1.16 (0.84, 1.58)	0.370
RN, LPN, PA, CRNP		
Practice staff very open or open to innovation or change	1.60 (1.13, 2.26)	0.008
Teamwork in practice excellent or very good	1.57 (1.06, 2.33)	0.026
Electronic medical record used	1.47 (1.06, 2.03)	0.021
Immunization champion on site	1.40 (1.00, 1.97)	0.049
Type of practice (ref=independent)		
Large corporate/health system	1.29 (0.87, 1.91)	0.210
Other	0.85 (0.56, 1.27)	0.510

Note: Boldface indicates significance. Model $R^2=0.24$.

ACIP, Advisory Committee on Immunization Practices; CRNP, certified registered nurse practitioner; LPN, licensed practical nurse; PA, physician assistant; RN, registered nurse; SOP, standing orders program

later, only 42% of primary care physicians were consistently using SOPs for influenza vaccination of adults. This finding raises the question of how to improve use of SOPs in primary care.

Factors associated with consistent use of SOPs include awareness about the CDC/Centers for Medicare and Medicaid Services (CMS) stance on standing orders policies, strength of agreement about the power of SOPs, staffing (i.e., number of assistants to help each clinician), and use of EMRs. The CDC⁹ has recommended SOPs for adult vaccination since 2000. However, the CMS prohibited SOPs for all medications until 2002, when the CMS allowed SOPs for influenza and pneumococcal polysaccharide vaccines.^{13,17} These changing policies may have left some physicians unsure about using SOPs for adult vaccination.

The strength of agreement about the effectiveness of SOPs was a key predictor for their adoption in these data. SOPs have resulted in larger increases in vaccination rates

than either patient-oriented strategies such as education or provider-oriented strategies such as physician reminders.^{8,18} Two aspects of the Awareness-to-Adherence model of physician adoption of vaccines¹⁴—awareness of and agreement with the effectiveness of the SOPs—were associated with use of SOPs, suggesting a need for wider and more intentional dissemination of this information.

Two practice characteristics that indicate level of resources available to practices were also associated with SOPs: the number of helpers per clinician and EMR usage. Given the fact that influenza vaccination rates are frequently lower among practices in disadvantaged neighborhoods, SOPs may help reduce these disparities. Use of SOPs by nursing personnel is facilitated by EMR functions that ease record keeping and tracking of vaccination status.¹⁹ The CMS plans incentives for EMR usage,²⁰ which may further facilitate use of SOPs and eliminate one source of resource disparity. Further, targeting those who adopt EMRs for also implementing SOPs may

be an efficient way to increase their use and increase adult immunization rates.

Strengths/Limitations

This survey is national in scope and had a high response rate for a physician survey. The questionnaire was based on theoretic models designed around physician adoption of vaccines.¹⁴ However, the survey may be subject to the limitations of self-report and it may not have captured the breadth of possible correlates of use of SOPs.

Conclusion

Standing orders programs are underused but can have a great public health impact. Further national efforts at clinician education should be considered, with particular emphasis on those practices already using or adopting an EMR. Practical toolkits to facilitate adoption of SOPs need to be evaluated.

This publication was made possible through the CDC and the Association for Prevention Teaching and Research (APTR) Cooperative Agreement, No. 5U50CD300860, Project TS-1432. The findings and conclusions in this publication are those of the authors and do not necessarily represent the views of the CDC or the Association for Prevention Teaching and Research.

The authors thank Litjen Tan, MD, for his assistance in procuring the AMA Master File database used in the study.

Results were presented in part at the 44th National Immunization Conference April 19–22, 2010 in Atlanta GA.

RKZ has received research support from and is a consultant for Merck & Co, Inc. and has received research support from MedImmune, LLC. MPN has received research support from MedImmune, LLC.

No other authors reported financial disclosures.

References

1. Thompson MG, Shay DK, Zhou H, et al. Estimates of deaths associated with seasonal influenza - United States, 1976-2007. *MMWR Morb Mortal Wkly Rep* 2007;59:1057–62.
2. CDC. Self-reported influenza vaccination coverage trends 1989–2008 among adults by age group, risk group, race/ethnicity, health-care worker status, and pregnancy status, U.S., National Health Interview Survey (NHIS). www.cdc.gov/flu/professionals/vaccination/pdf/NHIS89_08fluvaxtrendtab.pdf.
3. Nowalk MP, Zimmerman RK, Feghali J. Missed opportunities for adult immunization in diverse primary care office settings. *Vaccine* 2004;22:3457–63.
4. Nowalk MP, Zimmerman RK, Cleary SM, Bruehlman RD. Missed opportunities to vaccinate older adults in primary care. *J Am Board Fam Pract* 2005;18:20–7.
5. Loughlin SM, Mortazavi A, Garey KW, Rice GK, Birtcher KK. Pharmacist-managed vaccination program increased influenza vaccination rates in cardiovascular patients enrolled in a secondary prevention lipid clinic. *Pharmacotherapy* 2007;27:729–33.
6. Goebel LJ, Neitch SM, Mufson MA. Standing orders in an ambulatory setting increases influenza vaccine usage in older people. *J Am Geriatr Soc* 2005;53:1008–10.
7. Bond TC, Patel PR, Krishner J, et al. Association of standing-order policies with vaccination rates in dialysis clinics: a U.S.-based cross-sectional study. *Am J Kidney Dis* 2009;54:86–94.
8. Task Force on Community Preventive Services. Recommendations regarding interventions to improve vaccination coverage in children, adolescents, and adults. *Am J Prev Med* 2000;18:92–6.
9. CDC. Use of standing orders programs to increase adult vaccination rates. *MMWR Morb Mortal Wkly Rep* 2000;49:15–26.
10. Task Force on Community Preventive Services. Guide to Community Preventive Services. Vaccinations for preventable diseases: universally recommended vaccines. www.thecommunityguide.org/vaccines/universally/index.html.
11. Health Care Financing Administration. Evidence report and evidence-based recommendations: interventions that increase the utilization of Medicare-funded preventive service for persons age 65 and older. Baltimore MA: Health Care Financing Administration, 1999.
12. Szilagyi PG, Shone LP, Barth R, et al. Physician practices and attitudes regarding adult immunizations. *Prev Med* 2005;40:152–61.
13. Centers for Medicare and Medicaid Series H. Medicare and Medicaid programs; conditions of participation: immunization standards for hospitals, long-term care facilities, and home health agencies: final rule with comment period. *Fed Reg* 2002;67:61808–14.
14. Pathman DE, Konrad TR, Freed GL, Freeman VA, Koch GG. The awareness-to-adherence model of the steps to clinical guideline compliance. *Med Care* 1996;34:873–89.
15. Green LW, Gottlieb NH, Parcel GS. Diffusion theory extended and applied. In: Ward WB, ed. *Advances in health education and promotion*. Greenwich CT: JAI Press, 1987.
16. Rogers EM. *Diffusion of innovations*. 3rd edition. New York: Free Press, 1983.
17. CMS influenza and pneumonia activities. www.cdc.gov/vaccines/programs/vfc/downloads/flu_pneumo_stand_orders.pdf.
18. Gyorkos TW, Tannenbaum TN, Abrahamowicz M, et al. Evaluation of the effectiveness of immunization delivery methods. *Can J Pub Health* 1994;85:S14–30.
19. Nowalk MP, Zimmerman RK, Lin CJ, et al. Raising adult vaccinations over four years among racially diverse patients at inner-city health centers. *J Am Geriatr Soc* 2008;56:1177–82.
20. Medicare and Medicaid health information technology: Title IV of the American Recovery and Reinvestment Act. www.cms.hhs.gov/apps/media/press/factsheet.asp?Counter=3466.