At a Glance

Practical Implications p xxx
Author Information p xxx
Full text and PDF www.ajpb.com
Web exclusive eAppendix

Factors Associated with Zostavax Abandonment

Osayi E. Akinbosoye, PhD, PAHM; Michael S. Taitel, PhD; James Grana, PhD; and Catherine Macpherson, MS, RD

ABSTRACT

Objectives: To determine patient and health plan factors associated with Zostavax abandonment, and to assess the responsiveness of Zostavax abandonment rates to patient out-of-pocket costs, among a community pharmacy's patients aged 50 years and older.

Study Design: Descriptive statistical analysis and econometric modeling of retrospective pharmacy claims data.

Methods: The study utilized data for patients who requested a prescription fill for a Zostavax vaccine at the community pharmacy in October 2014. The vaccine was considered abandoned if there was no evidence of it being administered to the patient within 30 days of the fill date. The outcome of interest was abandonment rate, calculated as the proportion of patients within a particular group of interest who abandoned the vaccine.

Results: During the study period, a total of 172,977 fills for Zostavax were initiated, and a total of 67,369 were abandoned; overall abandonment rate was 38.9%. Abandonment rate varied by patient demographics and health plan factors, but patient out-of-pocket cost (OOP) remained the most significant predictor of abandonment, after adjusting for other factors. While the odds of abandonment were 1.66 times higher for patients with OOP in the $15-$34 range compared with those with OOP ≤$14.99, odds were much higher—at 5.53 times—for those with OOP in the $105-$174.99 range.

Conclusions: Our study highlights the implications of patients' noncompliance with the use of in-network providers for immunization services and could be leveraged for value-based benefits design to promote access to recommended vaccinations.

Am J Pharm Benefits. 2016;8(4):84-89

According to the CDC, almost 1 in 3 people in the United States will develop shingles during their lifetime.[1] Zostavax is a vaccine approved to prevent shingles in adults aged 50 years and older. The vaccine may be administered by a physician, or by other licensed healthcare professionals, including pharmacists, where allowed by state law.

Although approved by the FDA in 2011 for adults aged 50 to 59 years,[2] the Advisory Committee on Immunization Practices (ACIP) recommends Zostavax for adults aged 60 years and older.[3] A large clinical trial that tested Zostavax versus placebo in 38,000 adults aged 60 years and older found Zostavax effective in reducing the overall incidence of shingles by about 51% and the incidence of post herpetic neuralgia by 67%.[4] Yet, the CDC reports that only 24.2% of adults aged 60 years and older received the vaccine in 2013.[5] Although this is an increase from previous years (eg, 20.1% in 2012), we still need to better understand the barriers to getting the shingles vaccine.

Under the Affordable Care Act (ACA), individuals enrolled in new group or individual health plans have access to all vaccines recommended by the ACIP prior to September 2009, with no co-payments or other cost-sharing requirements, when those vaccines are administered by in-network providers. For ACIP immunization recommendations that went into effect after September 23, 2009, these health plans are required to cover the recommended vaccines without cost sharing in the next plan year that occurs 1 year after the effective date of the recommendation.[6] Zostavax is on the list of vaccines recommended by the ACIP, to be administered without any cost-sharing requirements when provided by an in-network provider.[6]

Since health plans are required to cover the vaccine at no cost only under the ACIP recommendation, and as long as the vaccine is administered by an in-network provider, patients may face high co-pays if they don't meet the age recommendation requirement, if they don't get the vaccine in network, or if other health plan restrictions apply. For example, Hurley et al[7] suggest that for some Medicare Part D plans, patients have to pay the total cost of the vaccine and then seek

reimbursement afterwards. Thus, some patients may have to bear the entire cost burden of getting the vaccine before submitting claims for reimbursement.

According to a 2015 CDC price list, the private-sector cost of the vaccine is $187.89 for a single dose,[8] with administration fees driving the cost of providing the vaccine to patients much higher. Depending on the health plan, patients' co-pays or out-of-pocket costs (OOP) can be substantially higher than normal compared with other medications. These high co-pays and unexpected cost burdens, especially for patients with income constraints, can lead to abandonment—defined as a patient not receiving the vaccine despite evidence of an initiated fill.

Research suggests the rates of primary medication nonadherence is between 3% and 22%, depending on the drug class.[9] There is a need to examine the rates of abandonment for Zostavax to determine whether these rates fall within expected norms, and to examine the responsiveness of abandonment rates for the vaccine to patient out-of-pocket costs.

PRACTICAL IMPLICATIONS

- Abandonment rates varied by patient demographics and health plan characteristics.
- Patient out-of-pocket costs remained a significant predictor of abandonment rates, even after adjusting for patient demographics and plan characteristics.
- Our study highlights the implications of patients' noncompliance with the use of in-network providers for immunization services, as specified under the Affordable Care Act, and could be leveraged for value-based benefits design to sidestep these implications and promote access to recommended vaccinations.

METHODS

To determine patient and health plan factors associated with Zostavax abandonment, and to assess the responsiveness of Zostavax abandonment rates to patient out-of-pocket costs, among a community pharmacy's patients aged 50 years and older, the study utilized data for patients who requested a prescription fill for a Zostavax vaccine at Walgreens pharmacy in October 2014.

Due to its stringent storage requirements, the vaccine cannot be dispensed by the pharmacy to be administered off-site. Thus, a dispensed fill can be administered at the pharmacy either under protocol, under registered pharmacist prescriptive authority, or with a prescription from the patient's physician/provider. However, individual state regulations provide guidance and recommendations on pharmacists' authorization to administer the vaccine.[10]

To administer a vaccine under prescriptive authority, a pharmacist can prescribe the vaccine as long as they are immunization-certified and have independent prescribing privileges within a particular state. However, to administer a vaccine under protocol, a pharmacist generates a prescription with a standing order from the physician who signed the state-specific protocol. For this study, the prescriptions for the Zostavax vaccine were generated at the community pharmacy under protocol, received electronically from the patients' physicians/providers, or received directly from the patients in paper form.

The process of generating a prescription at the community pharmacy, or initiating a fill for a prescription requested by the physician/provider, involves entry of the patient's information into the pharmacy's proprietary computer system. This process triggers a prescription fill date in the system's claims database. Also as part of the process, the pharmacist verifies patient eligibility and benefits coverage and then communicates patient cost shares. After verification of all information, the vaccine is dispensed and administered to the patient, or the patient may decide not to receive the vaccine at that time if the communicated cost share is higher than expected. If the latter happens, the vaccine is considered abandoned if there is no evidence of it being administered to the patient within 30 days of the fill date—determined by a corresponding sold date for the prescription in the pharmacy's claims database.

The community pharmacy's claims database contains information on filled scripts, in addition to fill and sold dates. All prescriptions entered into the system have fill dates, but only prescriptions actually received by the patient, picked up by the caregiver, or mailed from the pharmacy are assigned sold dates—the date on which any of the above 3 events occurred, although only the first is applicable in this case of the Zostavax vaccine.

The claims database also has National Drug Codes, which identify the labeler, product, and trade package size for each medication approved by the FDA. Other elements of the database applicable to this research are patient cost shares (copay, coinsurance, etc), health plan information, payer type, patient demographics (gender, date of birth, 5-digit zip code), and plan cost-sharing indicator.

The outcome of interest was abandonment rate, calculated as the proportion of patients who abandoned the vaccine within a particular group of interest. At the patient level, a dichotomous variable was first created to indicate patient receipt or abandonment of the vaccine based on pharmacy claims data; abandonment rates were then calculated as the proportion of abandoned fills within a particular group of interest. A multivariable logistic model was used to assess the odds of patient abandonment, conditional on demographics and other health plan factors.

To assess the responsiveness of abandonment rates to patient OOP, the unit of analysis was the health plan, and only commercial and Medicare Part D plans were included. The proportion of patients who abandoned the vaccine was calculated at the health plan level, and the logarithmic transformation of the proportion was used as the dependent variable in a generalized linear models (GLM) estimation, adjusting for patient demographics and other factors. Two models of responsiveness were estimated:

Log (abandonment rate) = function (log [OOP], patient demographics, payer type)

Log (abandonment rate) = function (OOP, patient demographics, payer type)

The estimated coefficient of log (OOP) in the first model assesses the elasticity of abandonment rates to OOP—percentage change in abandonment rate associated with a percentage change in OOP—whereas the estimated coefficient of OOP in the second model assesses the percentage change in abandonment rate associated with a $1 change in OOP, on average.

All analysis—including descriptive statistical analysis of abandonment rates and econometric modeling of odds of abandonment, as well as responsiveness of abandonment rates to changes in patient OOP—were conducted using SAS Enterprise Guide 5.1 (SAS, Cary, NC). Patient demographics, health plan characteristics (payer type, and indicator of whether or not there was plan cost-sharing for the vaccine), and patient OOP were used as grouping variables in the descriptive analysis, and as covariates—with interaction terms—in the GLM estimation of abandonment rates responsiveness to patient OOP. Significance of estimated model coefficients were determined at $\alpha = 0.05$ level.

RESULTS

During the study period, a total of 172,977 fills for Zostavax were initiated, and a total of 67,369 were abandoned, for an overall abandonment rate of 38.9%. Of the 172,977 initiated fills, 53,857 were for patients aged 64 years and younger, of which 17,828 (33.1%) were abandoned; and 119,120 were for patients aged 65 years and older, of which 49,541 (68.1%) were abandoned. Descriptive statistics presented in Table 1 show the distribution of patients by demographics and payer types. The average age was 68.9 years, and 59.2% of the patients were female. The study sample was mostly representative of commercial and Medicare Part D patients—94.3%. Table 1 also shows patient OOP for administered and abandoned Zostavax. Median OOP among patients who received the vaccine was $6.35; among patients who abandoned the vaccine, however, this cost was $95 at the time of benefits verification.

Table 1. Descriptive Statistics of Patients Initiating Zostavax at Walgreens Pharmacy in October 2014.

Patient Demographics	Mean age, years (SD)	68.9 (8.2)
	Female (N, %)	102,344 (59.2%)
	Midwest (N, %)	48,751 (28.2%)
	Northeast (N, %)	16,925 (9.8%)
	Other (N, %)	2934 (1.7%)
	South (N, %)	74,221 (42.9%)
	West (N, %)	30,146 (17.4%)
Health Plan Characteristics	Cash (N, %)	8300 (4.8%)
	Commercial (N, %)	65,453 (37.8%)
	Medicare Part D (N, %)	97,691 (56.5%)
	Medicaid (N, %)	1166 (0.7%)
	Other (N, %)	367 (0.2%)
	Zero plan cost-sharing (N, %)	39,022 (22.6%)
Actual Out-of-Pocket (OOP) Cost of Administered Scripts	Mean (median)	$44.06 ($6.35)
	95% CI	$43.68-$44.44
Indicated (OOP) Cost of Abandoned Scripts	Mean (median)	$118.44 ($95.00)
	95% CI	$117.83-$119.05

A positive nonlinear relationship was observed between patient OOP and abandonment rates (Figure 1). Overall, abandonment rate was higher than average for patient OOP over $50. For example, while the abandonment rate associated with OOP in the $15-$34.99 range was 27.4%, this rate was 42.7% for OOP in the $50-$64.99 range. Zero health plan cost sharing was associated with much higher rate of abandonment—71% when patients had to pay 100% of the cost of the vaccine, compared with 29.6% when patients paid only a fraction of the cost.

Figure 2 shows abandonment rates across the different payer types represented in the study. As the figure suggests, higher-than-average rates were observed for Medicaid and

Medicare Part D. Although with a relatively small patient population compared with the other payers, abandonment rate—at 59.1%—was highest for Medicaid.

Figure 2 further breaks down abandonment rates by OOP for commercial and Medicare plans, since 94.3% of all patients in this study were in these plans. While the overall average abandonment rate associated with OOP in the $50-$64.99 range was 42.7%, this rate was higher at 44.0% for Medicare plans, for the same OOP range. **Figure 3** suggests variations in abandonment rates by patient demographics. Higher-than-average abandonment rates were observed for females across all age groups, but abandonment rates were higher for older patients compared with younger ones.

Results of the multivariable logistic regression of odds of abandonment (**Table 2**) suggest significantly increasing odds of abandonment associated with patient OOP, adjusted for patient demographics and health plan characteristics. Patients who had no plan cost sharing associated with their benefits were 8.3 times more likely to abandon the vaccine compared with patients who did. Moreover, while the odds of abandonment were 1.66 times higher for patients with OOP in the $15-$34 range compared with those with costs ≤$14.99, odds of abandonment were much higher at 5.53 times for those with costs in the $105-$174.99 range. Results of the additional models which assessed the elasticity of abandonment rates to patient OOP are not presented because the estimated coefficients suggested marginal effectiveness of changing OOP by 1 percentage point.

Figure 1. Abandonment Rates by Patient Out-of-pocket Costs (OOP)

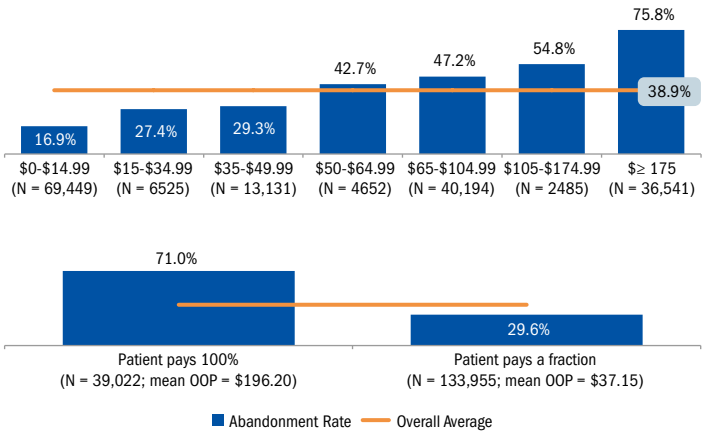
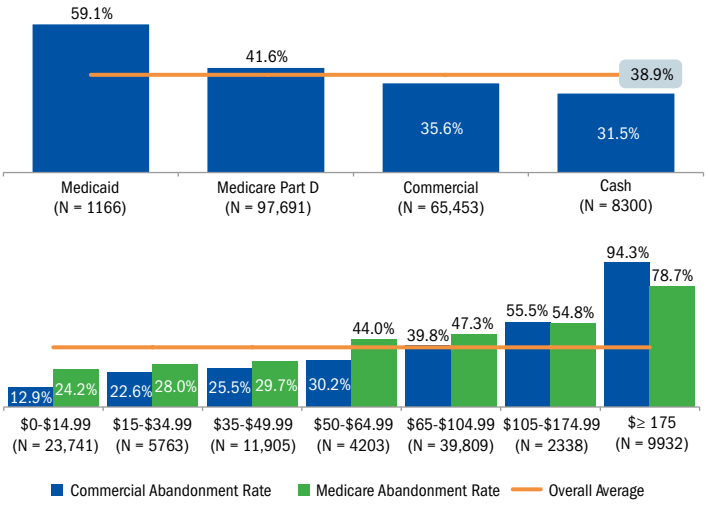


Figure 2. Abandonment Rates by Payer Type and Patient Out-of-Pocket Costs



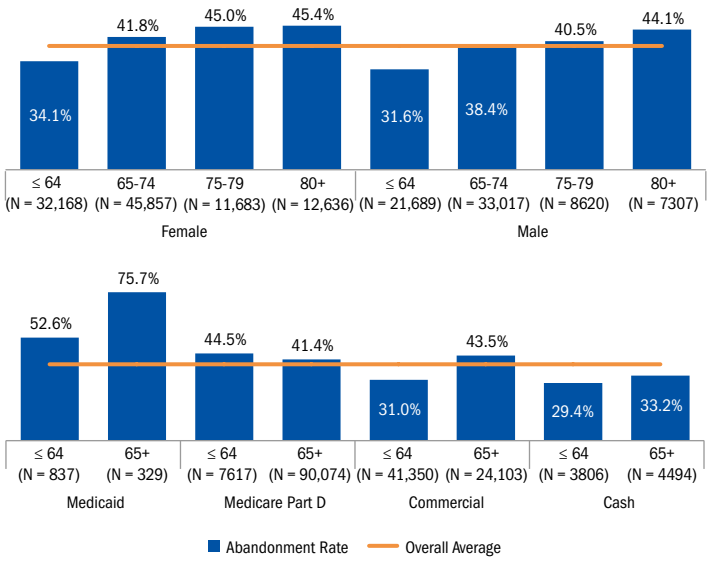
DISCUSSION

The study utilized data for patients who received or abandoned a Zostavax vaccine at a community pharmacy in October 2014. The study sample was mostly (94.3%) representative of commercial and Medicare Part D patients. During the study period, a total of 172,977 fills for Zostavax were initiated and a total of 67,369 were abandoned, for an overall abandonment rate of 38.9%. Higher out-of-pocket costs were associated with higher rates of abandonment—median out-of-pocket cost among patients who received the vaccine was $6.35, while it was $95, at the time of benefits verification, among patients who abandoned the vaccine.

Abandonment rates also varied by patient demographics and health plan factors; higher-than-average abandonment rates were observed for females across all age groups, but abandonment rates were higher for older patients compared with younger ones. Zero plan-sharing benefit design was associated with substantially high abandonment rates; and abandonment rate was highest for Medicaid compared with other payers. This result is expected since 1 of the eligibility criteria for Medicaid health coverage is low household income, and individuals with such income constraints would be more likely to abandon the vaccine when faced with high cost shares, due to their inability to pay. The models assessing the responsiveness of abandonment rates to patient OOP suggested that costs were a significant predictor of abandonment rates, even after adjusting for patient demographics and health plan characteristics.

The idea that patients abandon medications as a result of high cost burden is not novel, as there is research evidence supporting this notion, especially for high-cost drugs like specialty medications.[11,12] No previous study of which we are

Figure 3. Abandonment Rates by Patient Demographics



**Numbers ≤64, 65-74 etc. denote age in years

Table 2. Factors Associated With Patient Odds of Zostavax Abandonment (N = 172,977)

Effect	Point Estimate	95% Wald CI		$P > \chi^{2a}$
Cash vs commercial	0.063	0.060	0.067	<.0001
Medicare Part D vs commercial	1.337	1.288	1.389	<.0001
Medicaid vs commercial	1.920	1.633	2.258	<.0001
Age 65-74 years vs ≤64	0.818	0.79	0.846	<.0001
Age 75-79 years vs ≤64	0.936	0.896	0.978	0.0032
Male vs female	0.848	0.829	0.868	<.0001
Midwest vs South	0.876	0.852	0.901	<.0001
Northeast vs South	0.817	0.784	0.851	<.0001
Other vs South	0.817	0.746	0.895	<.0001
100% patient-paid vs plan-shared cost	8.303	6.440	10.706	<.0001
$15-$34.99 vs $0-$14.99 OOP	1.664	1.566	1.768	<.0001
$35-$49.99 vs $0-$14.99 OOP	1.831	1.748	1.919	<.0001
$50-$64.99 vs $0-$14.99 OOP	3.271	3.065	3.489	<.0001
$65-$104.99 vs $0-$14.99 OOP	3.809	3.678	3.945	<.0001
$105-$174.99 vs $0-$14.99 OOP	5.530	5.081	6.019	<.0001
≥$175 vs $0-$14.99 OOP	325.745	252.131	420.85	<.0001

[a]Only statistically significant model effects are presented in this table.
OOP indicates patient out-of-pocket costs.

aware, however, has particularly examined abandonment rates within the framework of vaccines and immunizations.

One previous study did examine the rates and correlates of prescription abandonment among drug classes related to several chronic conditions and, in line with findings from the present study, found that prescriptions with copayments in the $40-$50 range and over $50 were 3.40 times and 4.68 times more likely, respectively, to be abandoned than were prescriptions with no copayment (P <.001 in both instances).[13] As with our study, the study also suggested that cost was the strongest predictor of prescription abandonment.

Thus, the contribution of our research to the existing body of evidence is in the examination of abandonment rates from a preventive vantage point, by focusing on a vaccine. Our results show patient out-of-pocket costs and older age increase Zostavax abandonment. While the long-term implications of this might be unknown, research points to the cost-effectiveness and benefits of receiving the vaccine, especially for patients aged 60 years and older.[14] Thus, findings from this study could be leveraged for value-based benefits design to sidestep the implications of patients' noncompliance with the use of in-network providers for immunization services, as specified under the ACA, and, thus, promote access to recommended vaccinations.

Limitations

This study has several limitations. First, it utilized pharmacy claims data from 1 community pharmacy to determine abandonment rates. A patient was said to have abandoned the vaccine if a prescription was initiated for a fill, but the vaccine was not administered within a 30-day period of the initiated fill. Patients may react to the unexpected cost at the time of benefits verification at the pharmacy but, over time, may change their mind and decide to get the vaccine. Thus, placing this 30-day restriction may lead to an overestimation of actual abandonment rates. Moreover, patients may decide to get the vaccine elsewhere, and, as such, would not have truly abandoned the vaccine. That additional piece of information, however, would not be captured in this analysis, since the community pharmacy in this study is not a pharmacy benefits manager with a complete view of patient claims.

Second, focusing on pharmacy claims data alone limits the researchers' ability to investigate how the existence of other health conditions, like a weakened immune system from acquired immune deficiency syndrome or cancer, affect patients' eligibility for the vaccine. Since most states allow pharmacists to administer Zostavax under protocol, or under registered pharmacist prescriptive authority, a patient does not need a prescription from a physician/provider to request the vaccine from

the pharmacy. Thus, a patient who has other health conditions that precludes them from getting the vaccine may request the vaccine, unaware of the contraindications. The pharmacist, at the time of initiating the fill to verify eligibility and review other available health information, may become aware of the contraindications and decide against administering the vaccine at that time. Without additional medical information or flags in the pharmacy claims database to inform that the vaccine could not be administered due to the patient's ineligibility, that patient would be considered to have abandoned the vaccine in our analysis, when he/she should have been excluded.

Third, use of the community pharmacy claims data limits the researchers' ability to investigate the impact of other potential factors such as race and socioeconomic status. Although federal data could be leveraged for median household incomes by zip codes, for example, this information would still be inadequate for sufficiently addressing the effects of these variables at the patient level.

Fourth, this study assesses the association of patient OOP with abandonment rates for a single vaccine: Zostavax. The study does not examine a cause-effect relationship, nor does it attempt to address how the abandonment rates observed for the vaccine of interest might compare with rates observed for other vaccines. Thus, results might not be generalizable, and as such should be interpreted with caution.

Finally, one of the provisions of the ACA is that health insurance plans cover preventive services, like screenings and immunizations, at no cost to members, when those services are provided by in-network providers.[6] This requirement has the potential to mitigate the rates of abandonment observed in our study, and as such, might lead some to dispute the germaneness of our study in the light of health care reform. However, our research findings are applicable to determining the implications, for example, of patients not utilizing in-network providers for immunization services. Effective communication of health plan coverage benefits and patient education will be useful for sidestepping such implications and minimizing abandonment rate.

CONCLUSIONS

This study examined patient and health plan factors associated with Zostavax abandonment among a community pharmacy's patients aged 50 years and older, and found patient out-of-pocket cost was the most significant predictor of abandonment, after adjusting for other factors. Our findings highlight the implications of patients' noncompliance with the use of in-network providers for immunization services, as specified under the Affordable Care Act, and could be leveraged for value-based benefits design to promote access to recommended vaccinations.

Author Affiliations: Walgreen Co (OEA, MST, JG, CM), Deerfield, IL

Source of Funding: N/A

Author Disclosures: All authors were salaried employees and shareholders of Walgreens, a provider of the vaccine, at the time of this study. However, presented findings are based solely on scientific evidence.

Authorship Information: Concept and design (OA, CM, JG, MT); acquisition of data (OA, CM); analysis and interpretation of data (OA); drafting of the manuscript (OA); critical revision of the manuscript for important intellectual content (OA, CM, JG, MT); statistical analysis (OA); administrative, technical, or logistic support (OA); supervision (OA, CM, JG, MT)

Address correspondence to: Osayi E. Akinbosoye, PhD, PAHM, Walgreen Co, 200 Wilmot Rd, MS#2235, Deerfield, IL 60015. E-mail: osayi.akinbosoye@walgreens.com.

REFERENCES

1. National Center for Immunization and Respiratory Diseases Centers for Disease Control and Prevention. Shingles Surveillance. http://www.cdc.gov/shingles/surveillance.html. Accessed April 20, 2015.

2. Centers for Disease Control and Prevention. Update on herpes zoster vaccine: licensure for persons aged 50 through 59 years. *MMWR Morb Mortal Wkly Rep.* 2011;60(44):1528.

3. Hales CM, Harpaz R, Ortega-Sanchez I, Bialek SR; Centers for Disease Control and Prevention. Update on recommendations for use of herpes zoster vaccine. *MMWR Morb Mortal Wkly Rep.* 2014;63(33):729-731.

4. Oxman MN, Levin MJ, Johnson GR, et al; Shingles Prevention Study Group. A vaccine to prevent herpes zoster and postherpetic neuralgia in older adults. *N Engl J Med.* 2005;352(22):2271-2284.

5. Williams WW, Lu PJ, O'Halloran A, et al; Centers for Disease Control and Prevention. Vaccination coverage among adults, excluding influenza vaccination - United States, 2013. *MMWR Morb Mortal Wkly Rep.* 2015;64(4):95-102.

6. US Department of Health & Human Services. The Affordable Care Act and Immunization. http://www.hhs.gov/healthcare/facts/factsheets/2010/09/The-Affordable-Care-Act-and-Immunization.html. Accessed June 4, 2015.

7. Hurley LP, Lindley MC, Harpaz R, et al. Barriers to the use of herpes zoster vaccine. *Ann Intern Med.* 2010;152(9):555-560. doi: 10.7326/0003-4819-152-9-201005040-00005.

8. Centers for Disease Control and Prevention. CDC Vaccine Price List. http://www.cdc.gov/vaccines/programs/vfc/awardees/vaccine-management/price-list/. Accessed June 21, 2015.

9. Shin J, McCombs JS, Sanchez RJ, Udall M, Deminski MC, Cheetham TC. Primary nonadherence to medications in an integrated healthcare setting. *Am J Manag Care.* 2012;18(8):426-434.

10. American Pharmacist Association. Pharmacist administered vaccines: types of vaccines authorized to administer based upon APhA / NASPA survey of state IZ laws/ rules (effective October 1, 2013). http://www.pharmacist.com/sites/default/files/PharmacistIZAuthority.pdf. Accessed July 15, 2015.

11. Gleason PP, Starner CI, Gunderson BW, Schafer JA, Sarran HS. Association of prescription abandonment with cost share for high-cost specialty pharmacy medications. *J Manag Care Pharm.* 2009;15(8):648-658.

12. Streeter SB, Schwartzberg L, Husain N, Johnsrud M. Patient and plan characteristics affecting abandonment of oral oncolytic prescriptions. *J Oncol Pract.* 2011;7(3 Suppl):46s-51s. doi: 10.1200/JOP.2011.000316.

13. Shrank WH, Choudhry NK, Fischer MA, et al. The epidemiology of prescriptions abandoned at the pharmacy. *Ann Intern Med.* 2010;153(10):633-640. doi: 10.7326/0003-4819-153-10-201011160-00005.

14. Kawai K, Preaud E, Baron-Papillon F, Largeron N, Acosta CJ. Cost-effectiveness of vaccination against herpes zoster and postherpetic neuralgia: a critical review. *Vaccine.* 2014;32(15):1645-1653. doi: 10.1016/j.vaccine.2014.01.058. ajpb