The purpose of this research brief is to provide an update of the outcomes research conducted by the Walgreens Outcomes & Health Services Research team, while using external data and references to provide insight to the topic. The Walgreens research herein has been published in a peer-reviewed journal or accepted for publication in the near future or presented at a professional conference. This research brief will be updated as new information becomes available.
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Introduction

The development of safe and effective immunizations is one of the greatest accomplishments in the history of public health.\(^1\) Despite this, 50,000 Americans die annually in the United States from vaccine-preventable diseases and their complications, with influenza-related illnesses accounting for 72% of these deaths.\(^2\) Despite the demonstrated effectiveness\(^3\) and cost savings,\(^4\) fewer than one-half of Americans recommended to be vaccinated for seasonal influenza are immunized.\(^5\) Reasons people fail to receive annual influenza vaccinations include cost and lack of access to primary care.\(^6,7\)

Finding viable, cost-effective ways to expand access to preventive care is critical. In particular, immunizations are one aspect of preventive care that can be expanded significantly through community pharmacies and the provision of adult immunizations by pharmacists.

Pharmacists have begun to play an expanding role in comprehensive patient care, including the delivery of a wide range of CDC-recommended immunizations (including flu, Tdap, shingles, pneumonia, meningitis, HepB and travel vaccines) that can be provided within the pharmacy setting. Walgreens not only offers access and convenience to many of these services* with over 8,000 points of care, but also a high-value customer experience that allows the pharmacist to go beyond the traditional role of the dispensing pharmacist to one of an advocate who works on behalf of the patient to ensure they are well cared for.

This differentiator, along with strategic partnerships with physicians, health plans, insurers and other providers can help achieve the goal of increasing patient satisfaction, improving health outcomes and lowering overall health costs.

*Based on state privilege
Vaccine subject to availability. State, age, and health condition-related restrictions may apply.
See pharmacy or clinic for details
**Study Objective**
To investigate uptake of seasonal influenza and pneumococcal disease vaccinations among persons with diabetes utilizing a community pharmacy chain.

**Background**
- Individuals living with diabetes mellitus are six times more likely to be hospitalized with influenza during flu epidemics.⁹
- People with diabetes are highly recommended to receive a seasonal influenza and pneumococcal disease vaccination to reduce the risk of health complications, hospitalization, and mortality.¹⁰
- Influenza vaccination has been associated with a 54% reduction in hospitalizations and a 58% reduction in deaths among patients with diabetes.¹¹
- The CDC refers to pharmacies as nontraditional locations for receiving vaccines, offering advantages such as community-based locations, access, and convenience.¹²
- Community pharmacies are uniquely positioned to increase immunization rates among these high-risk individuals. Pharmacists may be especially effective in immunizing diabetes patients who are more likely to utilize pharmacy services for prescription medication than the general population.¹³
- In addition, pharmacists may conduct a comprehensive immunization assessment at the time of vaccination to assist patients with determining which other immunizations they may need based upon recommendations from the U.S. Centers for Disease Control and Prevention (CDC).

**Study Design**
- A retrospective data review was conducted on all vaccinations administered at the Walgreens pharmacy chain between August 2012 and July 2013.
- Diabetes patients were defined as those having one or more prescriptions for diabetes medication filled at the pharmacy.
- The volume of influenza and pneumococcal disease vaccinations among diabetes patients was determined.

**Study Results**
- During the study period, there were 361,609 influenza and 34,924 pneumococcal vaccinations administered to diabetes patients at the community pharmacy.
- Most (29,544 or 84.6%) of the diabetes patients receiving a pneumococcal vaccination also received an influenza vaccination (Figure 1).
- 86.2% of the influenza vaccinations administered to diabetes patients were between August and December, offering maximum protection early in the influenza season (Figure 2). The 2012-2013 influenza season peaked in December, when the rate of influenza-like illness (ILI) was 4.8% - more than twice the national baseline rate of 2.2%, which is the threshold at which flu activity is considered above normal (determined by the CDC).¹⁴
Conclusions

- Community pharmacies provide additional access and convenience as well as immunization counseling in order to maximize essential care for diabetes patients, who are at increased risk for health complications due to influenza and pneumococcal disease.
- This study highlights the important role of community pharmacies in immunizing the population, including high-risk patients, before the peak of influenza season.
**Study Objective**

To investigate the uptake of herpes zoster vaccinations in community pharmacies and the influence of state-authorized pharmacist immunization privileges on vaccination uptake rates.

**Program Description**

- Herpes zoster (shingles) is a disease characterized by a painful skin rash and blistering.\(^\text{16}\)
- One million cases are estimated to occur annually in the United States, half of which are among the elderly.\(^\text{16}\)
- If untreated, 50% of persons ≥ 60 years old develop post-herpetic neuralgia (PHN), a debilitating syndrome that can persist for years.\(^\text{17}\)
- The Centers for Disease Control and Prevention recommends the herpes zoster vaccine to persons aged ≥ 60 years to reduce the risk of shingles and PHN; however, coverage levels are estimated at only 15.8%.\(^\text{18}\)
- Physicians typically do not stock the vaccine due to cost, storage requirements, and limited shelf life.\(^\text{19,20}\)
- Pharmacists at retail pharmacies are well positioned to administer these vaccinations and to share vaccination records with patients’ physicians.\(^\text{21}\)
- Traditionally, pharmacists provided vaccinations only per physician’s order.\(^\text{22}\)
- Recently, Massachusetts (May 2012), Florida (July 2012), and New York (October 2012) passed legislation allowing pharmacists to administer herpes zoster vaccinations per protocol or with a patient-specific prescription.\(^\text{22}\)

**Study Design**

- This cross-sectional study analyzed herpes zoster vaccination records from the Walgreens pharmacy chain.
- Vaccination rates were calculated as the number of patients aged ≥ 60 who received a herpes zoster vaccine per 1,000 pharmacy patients ≥ 60 years filling a prescription at Walgreens.
- Rates of vaccinations were examined three months before and after implementation of pharmacist immunization privilege for herpes zoster in Massachusetts (May 2012), Florida (July 2012), and New York (October 2012).

**Study Results**

- In Massachusetts, the rate of herpes zoster vaccinations per 1,000 pharmacy patients increased from 3.3 to 28.1 after pharmacists were authorized to administer vaccinations under a protocol, a 745% increase (P<.001).
- In Florida, the vaccination rate increased from 3.4 to 16.2, a 377% increase (P<.001). In New York, vaccination rate increased 803% from 1.3 to 11.6 (P<.001). These states authorized pharmacists to administer vaccinations with a patient-specific prescription.
Conclusions

- After the legislation, study pharmacies had a significantly higher rate of herpes zoster vaccinations than prior to the legislation. Uptake rate was highest in Massachusetts, which granted pharmacists full authorization to administer the vaccinations.
- Results suggest that community pharmacists provided additional access and convenience to herpes zoster vaccinations for high-risk populations, resulting in increased uptake.
- Given the suboptimal vaccination rate of herpes zoster, states with limited or no immunization authorization for pharmacists should consider expanding pharmacist privileges.
Study Objective
To investigate how state-authored pharmacist immunization privileges influence pharmacist intervention effectiveness in delivering pneumococcal and herpes zoster vaccinations and assess the implications these privileges have on vaccination rates.

Program Description
Community pharmacies are uniquely positioned to increase immunization rates in the United States for vaccine-preventable diseases. Evidence in published medical literature suggests that pharmacies have the capacity to influence previously difficult-to-reach populations. Pharmacists may be especially effective in immunizing high-risk, older adults who are more likely to utilize pharmacy services for prescription medication than the general population. Pharmacists are also able to leverage their ability to identify people with key risk factors (eg, diabetes, heart disease), encourage them to receive their Centers for Disease Control and Prevention (CDC)-recommended vaccinations, and administer the required vaccine.

Study Design
- Cross-sectional study of Walgreens vaccination records from August 2011 to March 2012.
- A random sample of patients having a claim for influenza vaccination in the study period was selected. Vaccination uptake rates for pneumococcal disease and herpes zoster were calculated for previously unvaccinated patients at high risk for these conditions.
- Rates were examined by state-level pharmacist privileges.

Study Results
- For states authorizing immunization by protocol or prescriptive authority, the 1-year pneumococcal vaccination uptake rate for previously unvaccinated, high-risk persons was 6.6%, compared with 2.5% for states requiring a prescription ($P < .0001$), and 2.8% for states with no authorization ($P < .0001$).
- For herpes zoster, the 1-year vaccination uptake rate was 3.3% for states authorizing per protocol/prescriptive authority, compared with 2.8% (not significant, $P > .05$) for states authorizing by prescription, and 1.0% for states with no authorization ($P < .0001$).
- A 148% increase of pneumococcal vaccination and a 77% increase of herpes zoster vaccination would result if all states granted pharmacists full immunization privileges.

Conclusions
This analysis demonstrates that states that offer pharmacists full immunization privileges have higher vaccination uptake rates than states with restricted or no authorization. Considering the suboptimal vaccination rates of pneumonia and shingles and the public health goals of 2020, states with limited or no immunization authorization for pharmacists should consider expanding pharmacist privileges for these vaccinations.
Study Objective
To analyze the types of vaccines administered and patient populations receiving vaccinations during off-clinic hours in a national community pharmacy and its implications on vaccination access and convenience.

Program Description
Community pharmacies, such as Walgreens, often offer expanded hours that allow patients to receive vaccinations at more convenient times.

Study Design
- A retrospective data review was conducted on all vaccinations administered at the Walgreens pharmacy chain between August 2011 and July 2012.
- The time of vaccination was categorized as traditional (9:00am-6:00pm weekdays) or off-clinic hours, consisting of weekday evenings, weekends, and federal holidays.
- Demographic characteristics and type of vaccine were described.
- A logistic regression model was used to estimate the likelihood of patients receiving vaccinations during off-clinic hours.

Study Results
- During the study period, there were 6,250,402 vaccinations administered by pharmacists.
- Of these 30.5% were provided during off-clinic hours: weekends (57.0%), evenings (33.4%), and holidays (9.6%).
- Patients most likely to receive off-clinic vaccinations were younger (less than 65 years old), male, residing in an urban area, and without chronic conditions.

Conclusions
A large proportion of adults receive vaccinations during evening, weekend, and holiday hours at the pharmacy when traditional vaccine providers are likely unavailable. Younger, working-aged adults accessed a variety of immunizations during off-clinic hours. With the low rates of adult and adolescent vaccination in the United States, community pharmacies are creating new opportunities for vaccination that expand access and convenience.
Study Objective
To compare cost benefit of various influenza strategies from employer, employee and societal perspectives.

Program Description
Until recently, immunizations were typically delivered via three channels:

- Physicians in their offices.
- Public health systems in a number of settings such as community health clinics and schools.
- Hospitals.

Since the mid-1990’s, national programs have been developed to train pharmacists to provide immunization services. The H1N1 pandemic in 2009 and the call for universal vaccination in 2010 further highlighted the need for immunization providers and the value of pharmacy-based vaccinations.

Study Design
- Actuarial model based on published literature to estimate costs and benefits of influenza immunization programs.
- Customized by population age and risk-level, potential pandemic risk and projection year.
- Various immunization scenarios modeled for a fictitious company with 15,000 members vaccinated in pharmacies or MD office during 2011-12 flu season.
- Primary outcome measure reported net cost savings per vaccinated (PV).

Study Results
Given a typical U.S. population:

- Influenza immunization program will be cost beneficial for employers when more than 37% of individuals receive vaccine in non-traditional settings such as pharmacies.
- Baseline scenario, where 50% of persons would be vaccinated in non-traditional settings (such as pharmacies):
  - Estimated net savings of $6 PV ($3 Per Member Per Year (PMPY)).
  - Programs that limited to pharmacy setting ($31), targeted persons with high-risk comorbidities ($83 PV) or seniors ($107 PV) were found to increase cost benefit.

Conclusions
Both universal and targeted vaccination programs can be cost beneficial. Proper planning with cost models can help employers and policy makers develop strategies to improve the impact of immunization programs.

Walgreens Research (Publication): Study 5
“Planning influenza vaccination programs: a cost benefit model” (2012)31
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3453509/
Study Objective
To demonstrate the extent to which a community pharmacy can expand access to influenza immunizations in communities designated as medically underserved.

Program Description
Walgreens pharmacies provide immunization services in communities designated as medically underserved. The term medically underserved area (MUA) describes a geographic area that meets published criteria and is administered by the Health Resources and Services Administration (HRSA). The 2009-2010 Walgreens influenza immunization program consisted of pharmacies providing vaccines with no appointment necessary 7 days a week from 10:00 a.m. to 4:00 p.m. (except in North Dakota, where appointments were required). The influenza immunization program was delivered by more than 18,000 trained and certified immunizing pharmacists.

Study Design
- The study examined the number of influenza immunizations administered and populations served by Walgreens pharmacies in areas with limited access to health care during the 2009-2010 influenza season.
- The method for determining a MUA includes the ratio of primary medical care physicians per 1,000 population, percentage of population below the poverty line, percentage of the population 65 years or older, and infant mortality rate.
- Pharmacy claims were used to identify seasonal influenza vaccinations.
- 6,936 community pharmacies were included in the analysis.

Study Results
- 43% of the U.S. population resides in a MUA.
- During the study period, Walgreens had 2,838 locations in a MUA, representing 40.9% of all its pharmacies.
- These pharmacies administered 38% of Walgreens total immunizations during the 2009-2010 flu season, providing a much needed access point for prevention in MUAs.

Walgreens Research (Publication): Study 6
“Pharmacy Provision of Influenza Vaccinations in Medically Underserved Communities” (2012)

Study Objective
To demonstrate the extent to which a community pharmacy can expand access to influenza immunizations in communities designated as medically underserved.

Program Description
Walgreens pharmacies provide immunization services in communities designated as medically underserved. The term medically underserved area (MUA) describes a geographic area that meets published criteria and is administered by the Health Resources and Services Administration (HRSA). The 2009-2010 Walgreens influenza immunization program consisted of pharmacies providing vaccines with no appointment necessary 7 days a week from 10:00 a.m. to 4:00 p.m. (except in North Dakota, where appointments were required). The influenza immunization program was delivered by more than 18,000 trained and certified immunizing pharmacists.

Study Design
- The study examined the number of influenza immunizations administered and populations served by Walgreens pharmacies in areas with limited access to health care during the 2009-2010 influenza season.
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- Pharmacy claims were used to identify seasonal influenza vaccinations.
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Study Results
- 43% of the U.S. population resides in a MUA.
- During the study period, Walgreens had 2,838 locations in a MUA, representing 40.9% of all its pharmacies.
- These pharmacies administered 38% of Walgreens total immunizations during the 2009-2010 flu season, providing a much needed access point for prevention in MUAs.
Conclusions

- Community pharmacies are well positioned across the country, including in MUAs, making them convenient and accessible venues at which patients can obtain the influenza vaccine and other immunizations.
- By removing barriers to access, community pharmacies have the potential to become crucial instruments in helping the nation achieve vaccination rate goals and improving the overall health status of the population.
Study Objective
To evaluate the impact of pharmacists educating at-risk patients on the importance of receiving a pneumococcal vaccination (PPSV). The study hypothesis was that PPSV coverage would be greater for patients who were identified by pharmacists during influenza vaccination as at-risk for invasive pneumococcal disease compared to patients receiving traditional primary care.

Program Description
When patients received influenza immunizations at a pharmacy, the pharmacist asked patients about their risk of pneumococcal disease (e.g., age, smoking status, co-morbid conditions). Pharmacists recommended PPSV if any risk factor was identified and the patient had not previously been vaccinated. For every immunization administered, a physician notification letter was generated and either given to the patient or sent to their primary care physician.

Study Design
- Used de-identified claims data from a large, national pharmacy chain.
- Included all patients who had received an influenza vaccination between August 1, 2010 and November 14, 2010 and who were eligible for PPSV.
- Based on recommendations of the Advisory Committee on Immunization Practices, at-risk patients were identified as over 65 years of age or as aged 2-64 with a co-morbid condition.
- A benchmark medical and pharmacy claims database of commercial and Medicare health plan members was used to derive a PPSV vaccination rate typical of traditional care delivery.

Study Results
- Among the 1.3 million at-risk patients who were vaccinated by a pharmacist during the study period, 4.88% (65,598 patients) also received a PPSV vaccination. This was significantly higher (68%) than the benchmark rate of 2.90% (p<.001).
- This 68% higher rate of PPSV vaccinations observed in the populations immunized at Walgreens demonstrates the significant impact that pharmacists can have in identifying high-risk populations and administering appropriate immunizations.

Walgreens Research (Publication): Study 7
“Pharmacists as providers: Targeting Pneumococcal Vaccinations to High Risk Populations” (2011)
Conclusions

- Pharmacists are successful at identifying at-risk patients and providing additional immunization services.
- Concurrent immunization of PPSV with influenza vaccination by pharmacists has potential to improve PPSV coverage.
- These results support the expanding role of community pharmacists in the provision of wellness and prevention services.
Study Objective
To assess patient satisfaction with their influenza vaccination experiences at a large chain pharmacy.

Program Description
Walgreens provides influenza immunization services throughout the United States.

Study Design
An independent survey research vendor conducted a weekly telephonic satisfaction survey of patients 18 years and older who had received flu shots in the prior week at one of the more than 7,500 Walgreens pharmacies nationwide.

Study Results
Over 90% of the 2,502 respondents indicated that they are “extremely satisfied” regarding:

- Flu shot hours fitting their schedule (95%).
- The courtesy and friendliness of the person giving the flu shot (94%).
- Flu shot being a good value (90%).

Conclusions
Influenza remains a significant public health burden, and increasing immunization coverage continues to be a challenge for the U.S. health system. Community pharmacies are uniquely positioned to meet this challenge. Patient acceptance of the expanded role of the pharmacist as health care provider may be influential in increasing capacity and access to primary health care.
Study Objective
To evaluate the increase in the rate of Tdap vaccination among fathers and other close contacts of neonates in a local women’s hospital as a result of a pilot program in a community pharmacy to provide Tdap vaccinations to those in close contact with neonates.

Program Description
Pertussis can cause severe illness and death in infants. Immunization of family members with the combined Tdap vaccine can decrease risk of pertussis infection among infants; however, vaccination rates are low. Walgreens conducted a pilot program in a community pharmacy to provide Tdap vaccinations to close contacts of infants. The pilot entailed development of educational and marketing materials, training of hospital personnel, arrangement of standing orders, and initiation of a weekday vaccination clinic. In the hospital, program-related materials were added to existing admissions packets given to delivering families. Delivery unit personnel explained the risks of pertussis, advocated the benefits of vaccination, and encouraged family members to be vaccinated.

In the on-site clinic or in the pharmacy, pharmacists screened patients for potential contraindications to Tdap and administered vaccine to eligible patients.

Study Design
- Descriptive statistics compared rates of Tdap vaccinations (per month per pharmacy) in the pilot pharmacy to rates in a control group of non-pilot pharmacies in the same district, both before and after program initiation.
- The study period was from program initiation 12/9/2010 to 8/10/2011.

Study Results
- More Tdap vaccinations were given in the pilot pharmacy (mean = 89.0/month) compared to the pre-study period (12/9/09-12/8/2010, mean = 1.6/month).
- In both pre-study and study periods, average monthly vaccination rates were higher in the pilot pharmacy (1.6 and 89.0, respectively) compared to non-pilot pharmacies (0.6 and 1.3, respectively).
- Compared to non-pilot pharmacies, the pilot pharmacy vaccinated a greater proportion of males (87% vs. 67%; p<0.002).

Conclusion
This project illustrates how health-systems and community pharmacists can collaborate to improve patient care.
Study Objective

To investigate the rate of influenza vaccinations for patients visiting converted food oasis pharmacies compared to a matched sample of patients from traditional pharmacies.

Program Description

In 2010, Walgreens launched an initiative to convert select stores into food oases and began providing access to fresh fruits and vegetables in urban neighborhoods of Chicago located in or adjacent to food deserts. Food deserts are defined by the United States Department of Agriculture (USDA) as communities with limited access to grocery stores.44

Study Design

- Ten Walgreens pharmacies that converted to food oases were matched with ten control Walgreens pharmacies based on geographic proximity and population demographics.
- Vaccination rates were calculated as the number of patients who received an influenza vaccine per 1,000 pharmacy patients.
- Percent change was calculated as the difference in vaccination rates from the 2009-10 (pre-conversion) to 2010-11 (post-conversion) influenza seasons.
- Z-tests were used to compare the percent change in seasonal vaccination rates between test and control pharmacy patients.

Study Results

- In pharmacies that converted to food oases, the rate of influenza vaccinations increased from 15.9 to 28.0 per 1,000 pharmacy patients (increase of 75%).
- This rate was significantly higher (p<0.001) than the rate of increase observed in control stores: 15.5 to 23.2 per 1,000 pharmacy patients (increase of 50%).
- The percent increase between seasons in both food oasis and control stores were higher than the 24% increase observed nationally in all pharmacies of this chain offering immunization services.

Conclusions

- Expanding access and convenience to immunization services in underserved areas can increase the rate of influenza vaccination among pharmacy patients.
- The introduction of food oasis pharmacies, as healthy destinations near food deserts, has further contributed to the observed increase in the rate of influenza vaccinations.
Study Objective
To evaluate the impact of a pharmacist-led meningitis vaccination program implemented to support a state mandate.

Program Description
In the United States, an estimated 1,400 to 2,800 cases of meningitis occur annually, causing severe illness and death. College students, especially those residing in dormitories, are at increased risk for meningococcal disease. In May 2011, the state of Texas issued a mandate requiring all entering college students younger than 30 years of age to be immunized for meningitis before the 2012 semester. Walgreens implemented a program offering meningitis vaccine services in over 700 locations throughout the state to help students comply with the mandate.

Study Design
- The program entailed development of educational and marketing materials, training of personnel, arrangement of standing orders, and initiation of an “all-day, everyday” offering of the meningitis vaccine.
- The study population included patients aged 16 to 29 years, with a meningitis vaccination administered in Texas, and a date of service from January 2011 through January 2012.
- We analyzed Walgreens pharmacy claims data to calculate the total number of meningitis vaccinations administered, and the penetration of the program into medically underserved areas.

Study Results
- The pharmacy provided 16,604 meningitis vaccinations to the study population. The number of vaccinations increased dramatically year-over-year from 41 in January 2011 (pre-mandate) to 11,229 in January 2012 (post-mandate).
- The proportion of meningitis vaccinations provided in medically underserved areas increased from 12.2 % in January 2011 to 39.6% in January 2012 (p<0.01).

Conclusions
- This pharmacist-led meningitis vaccination program expanded convenient access to immunization services to assist college students in complying with a Texas state mandate.
- The significant increase in the proportion of vaccinations provided in medically underserved areas demonstrates that the program provided services where access is most limited.
- The above findings illustrate how community pharmacies can support state governments and improve public health.
References:

Infection Control Practices Advisory Committee (HICPAC), for use of Tdap among health care personnel. MMWR Recomm Rep 2006;55(December (RR-17)):1–37.


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