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U.S. clinicians' and pharmacists' reported barriers to implementation of the Standards for Adult Immunization Practice

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Abstract

Background: The Standards for Adult Immunization Practice (Standards), revised in 2014, emphasize that adult-care providers assess vaccination status of adult patients at every visit, recommend vaccination, administer needed vaccines or refer to a vaccinating provider, and document vaccinations administered in state/local immunization information systems (IIS). Providers report numerous systems- and provider-level barriers to vaccinating adults, such as billing, payment issues, lower prioritization of vaccines due to competing demands, and lack of information about the use and utility of IIS. Barriers to vaccination result in missed opportunities to vaccinate adults and contribute to low vaccination coverage. Clinicians' (physicians, physician assistants, nurse practitioners) and pharmacists' reported barriers to assessment, recommendation, administration, referral, and documentation, provider vaccination practices, and perceptions regarding their adult patients' attitudes toward vaccines were evaluated.

Methods: Data from non-probability-based Internet panel surveys of U.S. clinicians (n = 1714) and pharmacists (n = 261) conducted in February-March 2017 were analyzed using SUDAAN. Weighted proportion of reported barriers to assessment, recommendation, administration, referral, and documentation in IIS were calculated.

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Author's contribution

AS conceived the study, carried out the data analyses, wrote the first draft of the manuscript, and led revisions of the subsequent versions. He had access to all data and takes the responsibility for their integrity. CLB and CSL also contributed to the data analyses, and participated in data interpretation and revising of the manuscript. APF, SWB, RD, LJP, WWW, and DKK participated in data interpretation and revising of the manuscript. DKK also contributed to the conception of the study and supervised the study. All authors have reviewed and approved the submitted version of the manuscript.

Conflict of interest statement

We declare that we do not have conflicts of interest relating to this study.

Results: High percentages (70.0%—97.4%) of clinicians and pharmacists reported they routinely assessed, recommended, administered, and/or referred adults for vaccination. Among those who administered vaccines, 31.6% clinicians' and 38.4% pharmacists' submitted records to IIS. Reported barriers included: (a) *assessment barriers*: vaccination of adults is not within their scope of practice, inadequate reimbursement for vaccinations; (b) *administration barriers*: lack of staff to manage/administer vaccines, absence of necessary vaccine storage and handling equipment and provisions; and (c) *documentation barriers*: unaware if state/city has IIS that includes adults or not sure how their electronic system would link to IIS.

Conclusion: Although many clinicians and pharmacists reported implementing most of the individual components of the Standards, with the exception of IIS use, there are discrepancies in providers' reported actual practices and their beliefs/perceptions, and barriers to vaccinating adults remain.

Keywords

Clinician; Pharmacist; Standards for Adult Immunization Practice; Vaccination implementation; Adult vaccination; Vaccination barriers

1. Introduction

Though modest progress has been made in increasing some vaccine uptake among adults, adult vaccination in general remains low for vaccines routinely recommended for adults [1–8]. In 2014, in response to low adult vaccination coverage, the National Vaccine Advisory Committee revised the Standards for Adult Immunization Practice (Standards) [9]. The revised Standards emphasize the responsibility of all providers to assess vaccination status of their adult patients at every visit, recommend needed vaccinations, offer and administer needed vaccines or refer to a vaccine provider, and document vaccinations administered in medical records and immunization information systems (IIS), where available. Many healthcare organizations such as the American Academy of Family Physicians, American College of Physicians, American Pharmacists Association, American Academy of Physician Assistants, and American College of Obstetricians and Gynecologists have endorsed routine assessment and vaccination of adults and support the use of the Standards [10].

Adult-care providers report numerous systems- and provider-level barriers to vaccinating adults, such as vaccine coding, billing, and payment issues; lower prioritization of vaccines due to competing demands; not having the infrastructure and trained staff in place to administer vaccines; complexity in coordination and communication among the multiple providers of adult patients; lack of information about the use and utility of IIS in clinical settings; interoperability issues between electronic health records (EHR) and IIS [9,11–13]. The barriers that providers face in implementing the Standards have a cascade effect [14] and should be addressed to enable routine implementation of the Standards. Barriers to vaccination result in missed opportunities to vaccinate adults, even among providers supportive of vaccinations and patients desiring vaccination [11,15].

Although previous studies have reported on perceptions, practices, and barriers to adult vaccination among primary care physicians [16–22], obstetricians/gynecologists (OB/GYN)

[23–28], and pharmacists [29–32], the present study also assessed perceptions, practices, and barriers faced by clinicians and pharmacists, but in the context of implementing the individual components of the Standards.

This study examined the clinicians' and pharmacists' self-reported implementation of the individual components of the Standards for adult patients seen at their practices, evaluated reported barriers to vaccination assessment, recommendation, administration, referral, and documentation, provider vaccination practices, and perceptions regarding their adult patients' attitudes toward vaccines.

2. Methods

2.1. Survey description

Two cross-sectional non-probability-based Internet panel surveys were conducted in February-March 2017 among U.S. clinicians (physicians, physician assistants, nurse practitioners) and pharmacists, recruiting participants from the current membership roster of Medscape, a medical website managed by WebMD Professional Network. The National Survey of Healthcare Providers Regarding Vaccination Practices for Adults (Clinician Survey) was administered to clinicians who provide care for adults aged ≥ 19 years in outpatient settings in general internal medicine, family medicine, OB/GYN, and non-OB/GYN specialties, such as cardiology. The National Survey of Pharmacists Regarding Vaccination Practices for Adults (Pharmacist Survey), which was modified from the Clinician Survey to account for different practice settings and patient flow, was administered to pharmacists who dispensed pharmaceuticals directly to adults in outpatient settings. Among eligible respondents who started the clinician survey, the survey completion rate was 89.6% (1768 completed out of 1973 that began the survey). Post screening, 54 (3%) of these respondents who provided verbatim responses that indicated they did not work in the practice settings and/or work locations of interest for this study were found ineligible and were excluded, bringing the sample size for the clinician analysis to 1714. The completion rate for the pharmacist survey was 89.1% (261 completed out of 293 that began the survey). Additional details on the survey methodology are available elsewhere [33].

2.2. Measures

The clinician and pharmacist respondents were asked whether they or the staff in their practice routinely implemented each component of the Standards, i.e., vaccination assessment, recommendation, administration, referral, and documentation in IIS; and respondents who reported not implementing any component of the Standards were asked to provide reasons for not doing so. Only respondents who reported administering vaccines were asked about documenting in IIS. Respondents were also asked about their vaccination practices and perceptions regarding their adult patients' attitudes toward vaccines.

2.3. Statistical analysis

Analyses were conducted from March to August 2017. To produce estimates more reflective of the national clinician and pharmacist populations, each sample was balance-weighted using a raking calibration procedure that aligned the responding sample to national

benchmarks for respondents' age, sex, race/ethnicity, occupation, work setting, and Census region as described elsewhere [33]. All survey estimates were computed using these final weights. We calculated weighted estimates (percentages) using SAS, version 9.3 (SAS Institute, Cary, NC) and SAS-callable SUDAAN, version 11.01 (Research Triangle Institute, Research Triangle Park, NC). Because the data were from non-probability samples, statistical measures are not reported.

2.4. Ethical approval

The Clinician and Pharmacist Surveys were designated as non-research by CDC and Abt Associates.

3. Results

3.1. Demographics and outpatient practice characteristics

3.1.1. Clinicians—Clinician (n = 1714) demographics and their outpatient practice characteristics are reported in Table 1. Among clinicians, 97.0% (n = 1657) reported assessing vaccination, 94.7% (n = 1620) recommending vaccinations, 83.5% (n = 1392) administering vaccines, 79.7% (n = 1397) referring adults to another provider/location for vaccination (among clinicians who reported not stocking vaccines, 87.4% referred adults to another provider/location for vaccination [data not shown]), and 31.6% (n = 428) reported submitting adult vaccination records to IIS (Table 1).

3.1.2. Pharmacists—Pharmacist (n = 261) demographics and their outpatient practice characteristics are reported in Table 1. Among pharmacists, 97.4% (n = 253) reported assessing vaccination, 87.3% (n = 227) recommending vaccinations, 93.3% (n = 243) administering vaccines, 70.0% (n = 180) referring adults to another provider/location for vaccination (among pharmacists who reported not stocking vaccines, 77.6% referred adults to another provider/location for vaccination [data not shown]), and 38.4% (n = 98) reported submitting adult vaccination records to IIS (Table 1).

3.2. Barriers to implementing the Standards

3.2.1. Clinicians—Among clinicians who *reported not conducting routine vaccination assessments* (n = 57), barriers most commonly identified were: vaccinations are not considered within the scope of practice (68.9%), inadequate vaccination expertise at the practice (41.1%), inadequate time or staffing to routinely talk about vaccines with adults (37.1%), inadequate reimbursement for vaccinations (30.7%), and vaccinations are not considered high priority by the practice (23.1%) (Table 2). Among clinicians who *reported not recommending vaccinations* to their adult patients (n = 94), most frequently cited barriers were: vaccinations are not considered within the scope of practice (47.0%), inadequate expertise to talk about vaccines with adults (32.0%), inadequate time or staffing to routinely talk about vaccines with adults (25.7%), inadequate reimbursement for vaccinations (24.1%), and vaccinations are not considered high priority by the practice (21.8%). Among clinicians who *reported not administering vaccines* (n = 319), commonly identified barriers were: lack of necessary vaccine storage and handling equipment and provisions (54.4%), vaccinations are not considered within the scope of practice (53.0%),

lack of staff to manage and administer vaccines (48.1%), and inadequate reimbursement for vaccinations (28.0%) (Table 2). Among providers who *did not document vaccinations in IIS* (n = 376), commonly identified reasons were: not sure how their electronic system would link to IIS (52.8%) and not aware that state/city has IIS that included adults (47.2%) (Table 3).

3.2.2. Pharmacists—Among pharmacists who *reported not conducting routine vaccination assessments* (n = 8), barriers most commonly identified were: lack of time or staff at the pharmacy to assess vaccines (69.4%), inadequate reimbursement for vaccinations (54.8%), vaccinations are not considered within the scope of practice (34.5%), vaccinations are not considered high priority by the practice (24.4%), and inadequate vaccination expertise at the pharmacy (24.4%) (Table 2). Among pharmacists who *reported not recommending vaccinations* to their adult patients (n = 34), most frequently cited barriers were: lack of time or staff at the pharmacy to recommend vaccines (65.2%) and inadequate vaccination expertise at the pharmacy (18.2%). Among pharmacists who *reported not administering vaccines* (n = 18), commonly identified barriers were: lack of staff to manage and administer vaccines (44.2%), inadequate reimbursement for vaccinations (28.8%), lack of necessary vaccine storage and handling equipment and provisions (25.9%), and being an out-of-network provider for vaccination (22.1%) (Table 2). Among pharmacists who *did not document vaccinations in IIS* (n = 83), commonly identified reasons were: not aware that state/ city has IIS for adults (51.6%) and not sure how their electronic system would link to IIS (44.2%) (Table 3).

3.3. Vaccination practices and perceptions about adult patients' attitudes toward vaccines

3.3.1. Clinicians—Among clinicians, 74.7% (n = 1240) reported that vaccines for adults were one of the top priorities in overall patient management, 61.0% (n = 1021) reported having a systematic process to assess vaccination status of adults at every visit, and 89.7% (n = 1533) reported having the ability to administer or refer patients to specific locations for them to get all recommended vaccines (Table 4). However, 40.2% (n = 672) reported that their practice cannot afford to assess adults for vaccination because of inadequate reimbursement for the time it takes to counsel and educate patients about vaccines and 66.3% (n = 1148) reported that their practice prioritizes acute and complicated chronic problems and cannot assess the vaccination status of adults on every visit. Being an in-network provider as an important factor in vaccinating adults was reported by 60.4% (n = 1018) of clinicians (Table 4).

Less than half (46.4%, n = 801) of clinicians reported that their adult patients are aware of vaccines they need. While 68.4% (n = 1175) believed that adults know where to get vaccines, 69.0% (n = 1186) believed that adults are resistant to getting vaccinated (Table 4).

3.3.2. Pharmacists—Among pharmacists, 89.3% (n = 232) reported that vaccines for adults were one of the top priorities in overall patient management, 96.3% (n = 251) considered vaccinations of adults within their scope of practice, and 85.5% (n = 222) reported having the ability to administer or refer patients to specific locations for them to get

all recommended vaccines, 95.1% (n = 249) reported having staff trained to administer vaccines, and 78.0% (n = 199) reported having space to administer vaccinations privately (Table 4). However, 20.7% (n = 53) reported that their practice cannot afford to assess adults for vaccination because they will lose money by stocking and administering adult vaccines, 53.6% (n = 134) reported that their pharmacy does not have access to systematic process to assess vaccination of adults at every visit, and 71.9% (n = 185) reported that their practice prioritizes acute and complicated chronic problems and cannot assess the vaccination status of adults on every visit. Being an in-network provider as an important factor in vaccinating adults was reported by 82.3% (n = 215) of pharmacists (Table 4).

About two in five (41.0%, n = 110) pharmacists reported that their adult patients are aware of vaccines they need. While 77.2% (n = 199) believed that adults know where to get vaccines and 94.8% (n = 247) believed that adults are receptive to being vaccinated by a pharmacist, 68.3% (n = 179) believed that adults are resistant to getting vaccinated (Table 4).

4. Discussion

Most clinicians and pharmacists generally reported that they routinely implement one or more of the components of the Standards. When probed further with follow-up questions about their actual vaccination practices, this study found that the majority of clinicians and pharmacists may not be practicing their reported practices. For example, 97% of clinicians reported that they routinely assess vaccination status of adult patients. But when probed further about their knowledge, awareness, opinions, and clinical practices, only 61% of clinicians reported that they have a systematic process in place to assess vaccination status of adults at every visit. Additionally, 40.2% of clinicians reported they could not afford to assess adult for vaccination because of inadequate reimbursement for the time it takes to counsel and educate patients about vaccines. Furthermore, even though the majority of providers reported they consider adult vaccination a top priority and have a process to assess vaccination status at every visit, nearly two-thirds (66.3%) also reported that they do not, because they prioritize acute and chronic medical problems. This discrepancy and possible contradiction between clinicians' and pharmacists' reported vaccination practices should be investigated further. Despite some positive practice characteristics, there may be missed opportunities to vaccinate adults, because many adults do not seek health care unless they have an acute medical problem that is prioritized over preventive services such as vaccination by providers. Nevertheless, clinicians and pharmacists generally report routinely assessing, recommending, and administering vaccines for adults, providing additional evidence that healthcare providers believe that vaccinations are an important part of preventive care for adults [11,15,17,34]. At present, though all 50 states, the District of Columbia, and Puerto Rico allow for pharmacist-provided immunization in some capacity [35,36], the variability in state laws and regulations that govern vaccine administration by pharmacists such as which vaccines are permitted, which age groups of patients can be immunized, and which practice model pharmacists may operate under [37], pose a challenge to every pharmacy becoming an access point for vaccination, even though present in most neighborhoods [38].

Among clinicians and pharmacists who did not perform the individual components of the Standards, we identified several systems- and provider-level barriers, similar to barriers reported previously [9,11,14–16,19,21–23,26,28,39]. In this study, the most common reported barrier was that providers did not consider vaccination within the scope of their practice. More than one-quarter of adults do not have a primary care physician and rely on a subspecialist for primary care services [40], so it is important for all adult-care providers to recommend and refer adults for vaccinations, even if administering vaccination is not in the scope of their practice. Not having the necessary vaccine storage and handling equipment and provisions, and lack of adequate staff were other commonly reported barriers. Though these are barriers to vaccine administration, providers without adequate staff or equipment to administer vaccines at their practices can still refer patients elsewhere for vaccination.

Only about one third of the clinicians and pharmacists who administered vaccines reported using IIS. The most commonly reported barriers to using IIS fell into three categories: (1) lack of awareness of whether their state had IIS or knowing how to report to the registry, (2) lack of interoperability between EHR and IIS along with extensive time and costly technology required for submission of records to IIS, and 3) use of IIS not being required by law or not their standard of practice. Similar barriers to IIS use have been previously reported and increasing the ability to upload immunization data electronically has been suggested to increase IIS use [13]. There is variation in IIS functionalities and policies on adult vaccination across states [41] along with substantial variation by state and region in the level of completeness of IIS vaccination records and in the level of participation by providers [42]. All U.S. states have implemented the IIS, except for New Hampshire where an IIS is currently being developed. All IIS except those in Connecticut and Rhode Island include adult vaccination information. Thirty four states have opt-in policies for adult vaccination data to be included in IIS [43]. That is, providers are required to obtain patient consent before submitting patient vaccination data to IIS, which adds an additional hurdle and time demands. Enrollment of adult-care providers by state/local IIS and improving interoperability between EHR and IIS may help increase IIS use [13]. Even if not required by law, the use of IIS should be a clinical standard of practice. The Community Preventive Services Task Force recommends IIS use to increase vaccination rates [44]. The use of IIS-supported functionalities such as client reminder and recall systems, provider assessment and feedback systems, provider reminder systems that provide a readily available system to assess vaccination needs, and vaccine management support systems that help manage stock are recommended [44].

Findings in this study indicate that provider practices, cost and other barriers, and staffing constraints likely contribute to missed opportunities to vaccinate and low vaccination among adults. In addition, more than 60% of clinicians and pharmacists reported that being an in-network provider was an important factor in vaccinating adults, signifying that many providers who are not part of a health plan’s network of providers might not be vaccinating patients who do not have health insurance or whose health insurance does not cover the cost of vaccinations. Not surprisingly, adults with health insurance are more likely to be vaccinated compared with those without; but even among adults with health insurance who have had multiple health care visits in the past year, vaccination rates are low, and as many as 18.2%−85.6% reported not having received vaccinations that were recommended either

for all persons or for those with some specific indication [2,3]. These findings show the importance of implementing evidence-based interventions to improve vaccination [45], regardless of enabling factors such as having health insurance and having multiple provider contacts.

Fewer than half of clinicians and pharmacists reported they believe adults are aware of vaccines they need and more than two thirds of providers reported believing that adult patients are resistant to getting vaccinated (though not specifically asked, we assume that providers might have been referring to patient resistance to influenza vaccination), while most reported they routinely recommend vaccines. Provider recommendations for vaccination are strongly associated with a patient's receipt of vaccines [46–49]. Providers should not assume that adult patients are resistant to vaccines, and should give strong, meaningful, and convincing recommendations in an attempt to overcome any resistance that may exist. Also, even if a patient is resistant to a specific vaccine, like influenza vaccine, other vaccines may be accepted [50,51]. Incorporating routine assessment of adult vaccination needs, recommendation, and offer of needed vaccinations into routine clinical care of adults can help improve vaccination rates [9,44]. Improving implementation of the Standards, including reporting adult vaccinations to IIS, will require concerted efforts from adult immunization stakeholders to overcome barriers to routine vaccination of adults.

4.1. Strengths and limitations

The major strength of this study is that it is the first study to report on barriers faced by clinicians' and pharmacists' in their practices in the course of implementing the individual components of the Standards, thus providing a baseline on which to compare future studies. This study also highlights the discrepancy between providers' actual vaccination practices and their reported practices. There were several limitations in this study as well. First, the sample used in this study was a non-probability sample, i.e., estimates of sampling error were not computed [52]. The sample consisted of clinician and pharmacist members of the Medscape Internet panel who were self-selected to participate in this panel. Estimates of implementation of the Standards may be biased if the selection processes for entry into the panel and participants' decision to participate in the survey were related to their practice of implementing the Standards. Second, the results based on these non-probability samples might not represent the U.S. clinicians and pharmacists as non-coverage and non-response bias may still remain even after weighting adjustments. Third, the surveys relied on self-report rather than observation of practice, and the results were not validated. Respondents were asked about assessment, recommendation, administration, referral, and IIS documentation practices of the main outpatient practice or pharmacy where he or she worked, not their individual behaviors. Fourth, the question asking about vaccination referrals was asked generally and not in context of specific situations (i.e., when vaccine is not available). Therefore, responses should be interpreted with caution. Fifth, clinicians and pharmacists were asked whether they ''*routinely*" implemented the Standards. This might have resulted in an overestimation depending on the respondents' interpretation of the term.

4.2. Conclusions

This study examined barriers faced by U.S. clinicians and pharmacists in implementing the individual components of the Standards. Although providers reported implementing vaccination assessment, recommendation, and administration components of the Standards at high rates, barriers remain and adult vaccination is low. Only about one third of clinicians and pharmacists reported using IIS to document adult vaccinations. As documentation in IIS is a key component of the Standards and would facilitate broader access to adult vaccination records at points of service, efforts are needed to enroll adult-care providers by state/local IIS and improve interoperability between EHR and IIS along with promotion of routine IIS use in clinicians' and pharmacists' workflow as a standard of practice. Along with provider- and systems-level modifications to support vaccinating adults, the possible use of provider incentives for administering adult vaccines as quality measure, pay for performance, and strategies to encourage prioritization of adult vaccination in provider practices as healthcare system-based interventions [53] such as interventions to enhance access to vaccinations (expanded access in healthcare settings, reduced client out-of-pocket costs, home visits) and interventions directed at vaccination providers or systems (provider reminders, standing orders, provider assessment and feedback) implemented in combination also are needed.

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Abbreviations:

Standards	Standards for Adult Immunization Practice
IIS	immunization information systems
EHR	electronic health records
OB/GYN	obstetricians/gynecologists

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Table 1

Clinicians' and pharmacists' demographic and outpatient practice characteristics and implementation of Standards for Adult Immunization Practice, United States, Internet Panel Surveys, 2017.

	Clinicians[a] (n = 1,714)		Pharmacists[b] (n = 261)	
Characteristic	**Unweighted n**	**Weighted %**	**Unweighted n**	**Weighted %**
Clinician type				
Physicians[c]	824	71.6	NA[d]	NA
Physician assistants	431	12.8	NA	NA
Nurse practitioners	459	15.5	NA	NA
Clinician specialty				
Internal medicine/primary care physician	370	25.5	NA	NA
Family medicine physician	479	30.7	NA	NA
Obstetrician/gynecologist	445	23.6	NA	NA
Specialty care physician[e]	408	20.2	NA	NA
Sex				
Male	652	47.5	130	48.8
Female	1062	52.5	131	51.2
Age (years)				
<40	501	28.1	99	42.3
40–49	555	28.7	66	20.9
50–59	399	24.2	52	18.1
60+	252	18.9	43	18.7
Race/ethnicity				
Non-Hispanic white	1290	68.0	200	75.1
Non-Hispanic black	65	7.8	7	6.0
Hispanic	80	5.6	10	4.8
Non-Hispanic other or multiple races	270	18.6	40	14.1
Clinician practice size				
Small (1–2 physicians)	525	29.7	NA	NA
Medium (3–5 physicians)	471	27.8	NA	NA

Characteristic	Clinicians[a] (n = 1,714)		Pharmacists[b] (n = 261)	
	Unweighted n	Weighted %	Unweighted n	Weighted %
Large (6 or more physicians)	682	42.5	NA	NA
Pharmacist practice size				
Small (1–2 pharmacists)	NA	NA	105	39.5
Medium (3–5 pharmacists)	NA	NA	140	54.6
Large (6 or more pharmacists)	NA	NA	16	5.9
Years practicing				
<10 years	497	30.2	75	35.7
10–19 years	602	30.5	71	21.5
20–29 years	365	22.8	43	14.1
30 + years	248	16.5	71	28.7
Employment status				
Owner/part owner	315	25.7	14	5.5
Direct hire	1268	64.7	239	92.4
Other	131	9.6	6	2.2
Specialty practice type				
Single-specialty practice	1143	63.6	NA	NA
Multi-specialty practice	571	36.4	NA	NA
Clinician's main outpatient practice site				
Private practice office	808	47.6	NA	NA
Office practice owned by a hospital or healthcare system	633	36.4	NA	NA
Urgent care clinic	42	2.5	NA	NA
Community health center	105	6.2	NA	NA
Public health clinic	26	1.4	NA	NA
Veterans administration clinic	29	1.9	NA	NA
Other practice site[f]	71	4.1	NA	NA
Pharmacist's primary work location				
Chain drug store pharmacy	NA	NA	102	40.6
Retail store pharmacy	NA	NA	31	11.2
Supermarket pharmacy	NA	NA	56	20.2
Independent community pharmacy	NA	NA	56	21.9

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Characteristic	Clinicians[a] (n = 1,714)		Pharmacists[b] (n = 261)	
	Unweighted n	Weighted %	Unweighted n	Weighted %
Other[g]	NA	NA	16	6.1
Region				
Northeast	453	19.9	59	16.2
Midwest	330	22.6	58	24.0
South	599	37.8	91	39.7
West	332	19.6	53	20.2
Routinely assess vaccination status of adult patients				
Yes	1657	97.0	253	97.4
No	57	3.0	8	2.6
Routinely recommend vaccines to adult patients, whether stock vaccines or not				
Yes	1620	94.7	227	87.3
No	94	5.3	34	12.7
Routinely administer vaccines to adult patients				
Yes	1392	83.5	243	93.3
No	319	16.5	18	6.7
Routinely refer adult patients to another provider or location for vaccination				
Yes	1397	79.7	180	70.0
No	317	20.3	81	30.0
Routinely submit vaccination records for adult patients to the state/city vaccine registry[h]				
Yes	428	31.6	98	38.4
No	376	27.5	83	33.7
Not sure	588	40.9	62	27.9

[a]Data for clinicians (physicians, physician assistants, and nurse practitioners) were obtained from National Survey of Healthcare Providers Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017. Among eligible respondents who started the clinician survey, 1768 completed out of 1973 that began the survey. Post screening, 54 (3%) of these respondents who provided verbatim responses that indicated they did not work in the practice settings and/or work locations of interest for this study were found ineligible and were excluded, bringing the sample size for the clinician analysis to 1714.

[b]Data for pharmacists were obtained from National Survey of Pharmacists Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017.

[c]Includes physicians working as internal medicine/primary care physicians, family medicine physicians, obstetricians/gynecologists, and specialty care physicians.

[d] Not applicable.

[e] Includes medical and surgical specialties and subspecialties such as general surgery, dermatology, and cardiology.

[f] "Other practice site" refers to any of these sites for clinicians: clinic within pharmacy, clinic within a retail or grocery store, military clinic, occupational health clinic, student health clinic in college or university, and other practice setting.

[g] "Other" refers to any of these work locations for pharmacists: hospital or healthcare system pharmacy, private outpatient practice-affiliated pharmacy, federal government-affiliated pharmacy, military clinic pharmacy, internet-based pharmacy, other type of pharmacy or practice setting.

[h] Among respondents who reported administering vaccines to adult patients.

Table 2

Clinicians' and pharmacists' reported barriers for not conducting vaccination assessments, recommending vaccines, administering vaccines, or making vaccination referrals to adult patients aged > 19 years, United States, Internet Panel Surveys, 2017.

	Clinicians[a]				Pharmacists[b]			
Barriers	**Assessment[c] (n = 59) %[g]**	**Recommendation[d] (n = 94) %**	**Administration[e] (n = 319) %**	**Referral[f] (n = 321) %**	**Assessment[c] (n = 9) %**	**Recommendation[d] (n = 34) %**	**Administration[e] (n = 18) %**	**Referral[f] (n = 81) %**
Practice/pharmacy where I work does not believe there is interest in vaccines among adult patients	9.9	14.9	5.1	5.8	0.0	5.8	3.9	0.0
Practice/pharmacy where I work does not consider vaccination of adults within its scope of practice	68.9	47.0	53.0	12.6	34.5	7.6	9.6	1.5
Practice/pharmacy where I work does not consider adult vaccination to be a high priority	23.1	21.8	8.1	6.8	24.4	5.6	18.1	0.0
Practice/pharmacy where I work is not reimbursed adequately for the time it takes to talk about vaccines with adult patients	30.7	NA[h]	NA	NA	54.8	NA	NA	NA
Practice/pharmacy where I work does not have adequate time or staffing to routinely talk about vaccines with adult patients	37.1	25.7	NA	NA	69.4	NA	NA	NA
Practice/pharmacy where I work does not have adequate expertise to talk about vaccines with adult patients	41.1	32.0	NA	NA	24.4	18.2	NA	NA
Practice where I work is not reimbursed adequately for the time it takes to counsel adult patients and recommend vaccines they need	NA	24.1	NA	NA	NA	NA	NA	NA
Pharmacy where I work does not have the adequate time or staffing it takes to counsel adult patients and recommend vaccines they need	NA	NA	NA	NA	NA	65.2	NA	NA
Practice/pharmacy where I work is not an in-network provider for vaccination	NA	NA	15.2	NA	NA	NA	22.1	NA
Practice/pharmacy where I work lacks the staff to manage and administer vaccines to adult patients	NA	NA	48.1	NA	NA	NA	44.2	NA
Practice/pharmacy where I work is not reimbursed adequately for the time	NA	NA	28.0	NA	NA	NA	28.8	NA

Barriers	Clinicians[a]				Pharmacists[b]			
	Assessment[c] (n = 59) %[g]	Recommendation[d] (n = 94) %	Administration[e] (n = 319) %	Referral[f] (n = 321) %	Assessment[c] (n = 9) %	Recommendation[d] (n = 34) %	Administration[e] (n = 18) %	Referral[f] (n = 81) %
associated with administering vaccines to adult patients								
Practice/pharmacy where I work does not have the expertise to manage or administer vaccines to adult patients	NA	NA	22.7	NA	NA	NA	0.0	NA
Practice/pharmacy where I work does not have the necessary vaccine storage and handling equipment and provisions	NA	NA	54.4	NA	NA	NA	25.9	NA
Practice/pharmacy where I work does not have a system in place for appropriate referrals for adults to get vaccinated	NA	NA	NA	16.6	NA	NA	NA	18.8
Practice/pharmacy where I work is not reimbursed for the time it takes to refer adults to get vaccines	NA	NA	NA	9.7	NA	NA	NA	13.7
Practice/pharmacy where I work does not have adequate time or staffing to refer adults to get vaccines	NA	NA	NA	9.3	NA	NA	NA	12.8
All recommended vaccines for adults are stocked at the practice/pharmacy where I work so there is no need to refer	NA	NA	NA	63.3	NA	NA	NA	63.7

[a] Data for clinicians (physicians, physician assistants, and nurse practitioners) were obtained from National Survey of Healthcare Providers Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017. Among eligible respondents who started the clinician survey, 1768 completed out of 1973 that began the survey. Post screening, 54 (3%) of these respondents who provided verbatim responses that indicated they did not work in the practice settings and/or work locations of interest for this study were found ineligible and were excluded, bringing the sample size for the clinician analysis to 1714.

[b] Data for pharmacists were obtained from National Survey of Pharmacists Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017.

[c] Among respondents who reported that their practice did not assess vaccination of adult patients.

[d] Among respondents who reported that their practice did not recommend vaccination to adult patients.

[e] Among respondents who reported that their practice did not administer vaccination to adult patients.

[f] Among respondents who reported that their practice, if they did not stock the vaccines, did not refer vaccination of adult patients to other providers.

[g] Weighted Percentage.

[h] Not applicable, as not all barrier questions were asked for each elements of the Standards for Adult Immunization Practice.

Table 3

Clinicians' and pharmacists' reported barriers for not documenting vaccinations in state/local immunization information system, United States, Internet Panel Surveys, 2017.

Barriers	Clinicians[a] Documentation[c] (n = 376) %[d]	Pharmacists[b] Documentation[c] (n = 83) %[d]
Difficulty in use of electronic health record system[e]	20.8	NA[f]
Practice/pharmacy where I work is unaware if the state/city has a vaccine registry for adults	47.2	51.6
Practice/pharmacy where I work is not sure how its electronic system would link to the state/city vaccine registry	52.8	44.2
Vaccine registry in the state/city requires individual patient consent and this is burdensome to collect for the practice/ pharmacy where I work	17.2	14.0
Vaccine registry in the state/city requires individual patient consent and adult patients refuse to give consent	10.8	8.6
State/city vaccine registry does not accept adult vaccination records	15.5	17.3
Decision makers in the practice/pharmacy where I work do not want to link to the state/city vaccine registry	24.3	17.6
Process to submit records to the state/city vaccine registry takes too much time	32.3	18.2
Technology needed to submit records to the state/city vaccine registry costs too much money	23.1	21.3
State/city vaccine registry does not benefit my patients	16.4	8.6
State/city vaccine registry does not benefit the practice/pharmacy where I work	21.5	10.5
Use of the state/city vaccine registry is not required by law	44.2	65.2
Use of the state/city vaccine registry is not clinical standard of practice	39.9	61.1

[a] Data for clinicians (physicians, physician assistants, and nurse practitioners) were obtained from National Survey of Healthcare Providers Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017. Among eligible respondents who started the clinician survey, 1768 completed out of 1973 that began the survey. Post screening, 54 (3%) of these respondents who provided verbatim responses that indicated they did not work in the practice settings and/or work locations of interest for this study were found ineligible and were excluded, bringing the sample size for the clinician analysis to 1714.

[b] Data for pharmacists were obtained from National Survey of Pharmacists Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017.

[c] Among respondents who administered vaccines but reported that their practice did not report the vaccination of adult patients to the immunization information system.

[d] Weighted Percentage.

[e] Difficulty in use of electronic health record system includes those who answered ''somewhat difficult to use" or ''very difficult to use". This question was asked to all clinician respondents.

[f] Not applicable, as not all barrier questions were asked for each elements of the Standards for Adult Immunization Practice.

Table 4

Clinicians' and pharmacists' reported vaccination practices and perceptions about their adult patients' attitudes toward vaccines, United States, Internet Panel Surveys, 2017.

	Clinicians[a]		Pharmacists[b]	
	Unweighted n[c]	Weighted %	Unweighted n[c]	Weighted %
Clinicians'/pharmacists' vaccination practices				
The practice/pharmacy where I work considers vaccines for adults as one of the top priorities in overall patient management				
Agree	1240	74.7	232	89.3
Disagree	473	25.3	28	10.7
The pharmacy will lose money by stocking and administering adult vaccines				
Agree	NA[d]	NA	53	20.7
Disagree	NA	NA	207	79.3
The practice/pharmacy where I work has a systematic process to assess vaccination status of adults at every visit				
Agree	1021	61.0	127	46.4
Disagree	686	39.0	134	53.6
The practice/pharmacy where I work has the ability to administer or refer patients to specific locations for them to get all the vaccines recommended for adults				
Agree	1533	89.7	222	85.5
Disagree	173	10.3	39	14.5
The practice where I work cannot afford to assess adult patients for vaccination because of inadequate reimbursement for the time it takes to counsel and educate patients about vaccines				
Agree	672	40.2	NA	NA
Disagree	1039	59.8	NA	NA
The practice/pharmacy where I work prioritizes acute and complicated chronic problems/provision of medications and cannot assess vaccination status of adult patients on every visit				
Agree	1148	66.3	185	71.9
Disagree	566	33.7	76	28.1
The practice/pharmacy where I work considers being an in-network provider an important factor in vaccinating adult patients				
Agree	1018	60.4	215	82.3
Disagree	689	39.6	45	17.7
The pharmacy considers vaccinations of adults within its scope of practice				
Agree	NA	NA	251	96.3

	Clinicians[a]		Pharmacists[b]	
	Unweighted n[c]	Weighted %	Unweighted n[c]	Weighted %
Disagree	NA	NA	10	3.7
The pharmacy has staff trained to administer vaccines				
Agree	NA	NA	249	95.1
Disagree	NA	NA	12	4.9
The pharmacy has space to administer vaccinations privately				
Agree	NA	NA	199	78.0
Disagree	NA	NA	62	22.0
Clinicians'/pharmacists' perceptions about their adult patients' attitudes toward vaccines				
Adult patients are aware of vaccines they need				
Agree	801	46.4	110	41.0
Disagree	911	53.6	151	59.0
Adult patients know where to get vaccines				
Agree	1175	68.4	199	77.2
Disagree	537	31.6	61	22.8
Adult patients are resistant to getting vaccinated				
Agree	1186	69.0	179	68.3
Disagree	528	31.0	82	31.7
Adult patients are receptive to being vaccinated by a pharmacist				
Agree	NA	NA	247	94.8
Disagree	NA	NA	14	5.2

[a] Data for clinicians (physicians, physician assistants, and nurse practitioners) were obtained from National Survey of Healthcare Providers Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017. Among eligible respondents who started the clinician survey, 1768 completed out of 1973 that began the survey. Post screening, 54 (3%) of these respondents who provided verbatim responses that indicated they did not work in the practice settings and/or work locations of interest for this study were found ineligible and were excluded, bringing the sample size for the clinician analysis to 1714.

[b] Data for pharmacists were obtained from National Survey of Pharmacists Regarding Vaccination Practices for Adults, conducted for Centers for Disease Control and Prevention by Abt Associates, Inc. in February-March 2017.

[c] Total respondents who agreed or disagreed with each statement.

[d] Not applicable.