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## Vaccination Capability Inventory of Community, Migrant, and Homeless Health Centers: A Survey Report

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### Abstract

**Context:** Federally funded Community, Migrant and Homeless Health Centers provide health services to the most vulnerable communities in the US. However, little is known about their capabilities and processes for providing vaccinations to adults.

**Program:** We conducted the first national survey of health centers assessing their inventory, workflow, capacity for, and barriers to provision of routinely recommended adult vaccines. Additionally, we asked health center leaders' perceptions regarding best practices and policy recommendations for adult vaccinations

**Implementation:** A survey was developed based on domains elicited from advisory panels and focus groups, and was sent electronically to leaders of 762 health centers throughout the US and its territories; data were collected and analyzed in 2018

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**Conflicts of Interest:** No conflicts of interest were reported by the authors of this paper

**Human Participant Compliance Statement:** This project was evaluated and determined to be research not involving human subjects by the Centers of Disease Control and Prevention and the A.T. Still University of Health Sciences' Institutional Review Board.

**Evaluation:** A total of 319 survey responses (42%) were obtained. Health centers reported stocking most routinely recommended vaccines for adults; zoster vaccines were not stocked regularly due to supply and storage issues. Respondents most commonly reported adequate reimbursement for vaccination services from private insurance and Medicaid. Most vaccinations were provided during primary care encounters; fewer than half of health centers reported providing vaccines during specialist visits. Vaccinations administered at the health center were most commonly documented in an open field of the electronic health record (96%) or in an immunization information system (IIS) (72%). Recommendations for best practices related to better documentation of vaccinations and communication with IISs were provided.

**Discussion:** Health centers provide most adult vaccines to their patients despite financial and technological barriers to optimal provisioning. Further studies at point of care could help identify mechanisms for system improvements.

### Keywords

adult vaccines; Immunization Information Systems; health centers

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### Introduction

Vaccines are among the most cost-effective clinical preventive treatments. While significant progress has been made in improving pediatric vaccination rates, adult vaccinations have received comparatively less attention. As a result, adult vaccination rates in the United States remain well below Healthy People 2020 targets, with substantial racial and ethnic disparities for most vaccines.<sup>1</sup> Approximately 50,000 adults die each year in the United States from vaccine-preventable diseases.<sup>2</sup>

Patients, providers, and health systems face barriers to the provision of adult vaccinations.<sup>3-6</sup> Missed vaccination opportunities, miscommunication, and misperceptions due to language, health literacy, culture, and social determinants of health are among patient-provider challenges.<sup>7-10</sup> Clinicians may lack a thorough understanding of vaccine efficacy and may not promote certain adult vaccinations.<sup>8,10</sup> Health system-level barriers may include inappropriate stocking and distribution of vaccines at health centers, missing or insufficient reminder and tracking systems, and less-than-ideal vaccination storage locations.<sup>8,11</sup>

Federally funded Community, Migrant and Homeless Health Centers (health centers) serve 27 million Americans, including more than 18.5 million adults, in over 10,400 communities across all 50 states, regardless of ability to pay.<sup>12,13</sup> It is estimated that approximately 60% of health center patients are from racial or ethnic minority groups.<sup>12</sup> By statute, federally funded health centers serve primarily low-income uninsured and other medically underserved patients, making them an important partner in providing access to vaccinations for hard-to-reach populations. Health centers are often discussed as part of the vaccination neighborhood, but little is known about the extent to which they currently provide vaccination services to their patient panels. A baseline inventory of practices and capabilities of health centers could inform future efforts to increase vaccination access for underserved populations.

The A.T. Still University, School of Osteopathic Medicine in Arizona, with funding and advisement from the National Association of Community Health Centers (NACHC) and the Centers for Disease Control and Prevention (CDC) conducted the first nationwide assessment of health centers' capabilities around provision of vaccines recommended for adults by the CDC's Advisory Committee on Immunization Practices (ACIP).<sup>14</sup>

## Methods

This mixed-methods study consisted of three phases: an advisory panel, focus groups, and a survey. This project was evaluated and determined to be research not involving human subjects by CDC and the ATSU Institutional Review Board.

The research team conducted video conference discussions with an advisory panel of individuals whom NACHC identified as having expertise with adult vaccinations in one of three areas: public health, community/migrant/homeless health centers, and data/informatics including electronic health records (EHR) and vaccine databases. The 9 panel members took part in one of six meetings over four weeks. These were high-level experts who had specific expertise in state public health vaccination programs, international health centers and diverse populations, federal public health service data, federal public health agency work, regional and state health center associations and large data management. Recorded knowledge and insights collected elicited themes and domains used to develop the focus group moderator's guide.

Focus groups were conducted with stakeholders identified by NACHC leadership. The 14 focus group members had significant expertise related to adult immunizations. Representatives were from federal and state programs. The groups had three main areas of focus. These areas overlap and include public health, community/migrant/homeless health centers, and data/informatics (electronic health records and vaccine databases). Focus group discussions explored in-depth themes/domains to include in the survey based on advisory panel input. These groups also discussed survey distribution and format, reviewed early survey drafts to evaluate clarity and coverage of key themes and identify additional topic areas for inclusion in the survey. An electronic survey tool was created using Qualtrics™. Content analysis of advisory panels and focus groups resulted in six themes or domains which guided survey questionnaire construction: vaccine procurement and inventory, payment for vaccination services, clinical procedures and workflow, communication and outreach, documentation of vaccination, and overall performance in providing vaccines to adults. The survey asked about practices related to the pneumococcal conjugate (PCV 13), pneumococcal polysaccharide (PPSV 23), influenza, tetanus-diphtheria-acellular pertussis (Tdap), tetanus-diphtheria (Td) booster, zoster vaccine live (ZVL), recombinant zoster vaccine (RZV), hepatitis A, hepatitis B, human papillomavirus (HPV), and measles-mumps-rubella (MMR) vaccines.

## Sampling Frame and Dissemination

The project team pulled a random sample from the full universe of 1367 federally funded health centers. To have 95% +/- 5% confidence, and assuming a 40% response rate, the project required that at least 762 surveys be distributed. The final sample was nationally

representative of all health centers based on key characteristics such as size, urban or rural location, and the percentages of patients served with Medicaid and uninsured. Over the course of the survey period, 50 health centers were removed and 50 were added to the original sample due to either incorrect center classification (i.e. location was not a health center which provided primary care clinical services), or inability to reach any center personnel by phone or email. The replacements were matched on selection characteristics. A comparison of the population of health centers and the final sample is provided in supplemental digital content 1.

NACHC provided contact information, where available, for the chief medical officers (CMO) of selected health centers. For others, project team members phoned to obtain contact information for the CMO or other officer with knowledge about vaccination practices. A leader from each health center was invited to complete the online survey; survey completion indicated consent to participate. To increase inventory completion and accuracy of results, we conducted follow-up calls with centers that didn't respond within a week from each contact. Up to three calls were made to each potential respondent during April through September of 2018.

### Survey Measures

The research team designed survey questions to measure items in the six identified domains. From the procurement and inventory domain, we asked respondents about which vaccines they stocked, reasons for stocking or not stocking them, their sources of vaccine procurement (state or local health authority, state Vaccines for Adults [VFA] program, direct purchasing from manufacturer or distributor, group purchasing organizations, ordered by in-house pharmacy, or other) and adequacy of supply (inadequate, adequate without surplus, adequate with surplus). In reference to the payment domain, respondents were asked if they faced challenges with reimbursement (none, major, minor) and adequacy of reimbursement by payer type (private insurance, Medicare Part B, Medicare Part D, Medicaid). In reference to the clinical procedures and workflow domain, we measured responses on seven specified opportunities when vaccines were offered at health centers, and nine vaccination-related processes to determine which staff performed these. In the communication and outreach domain, we measured health centers' conduct of patient outreach (yes/no) and evaluation of patient attitudes (yes/no) for the vaccines examined. In the documentation domain, we asked how health centers document vaccines received at the center and outside, and about use of immunization information systems (IIS). In the overall performance domain, respondents were asked to rate how well they felt their health centers were performing on items related to the NVAC standards<sup>5</sup> for adult immunizations (5-point Likert scale from Not well at all to Extremely well) and their perceived importance of selected systems changes or practices which could potentially improve health centers' abilities to provide adult vaccinations (5-point Likert scale from Not important to Extremely important). The survey was reviewed by the project team as well as NACHC and CDC leadership. Input was incorporated.

## Results

There were 286 completed and 33 partially completed surveys for a total of 319 surveys (42% response rate) from 48 states, 2 territories, and the District of Columbia. No statistically significant difference was found between the distribution of health centers by state in respondents versus sampled centers ( $p=0.9-1.00$ ). Not all completed surveys had all questions answered; the number of responses analyzed for each survey item varies.

### Procurement and Inventory

A total of 263 health centers responded to our structured query on which of the vaccines were stocked. Most health centers reported stocking the influenza (100%), Tdap (95%), PPSV23 (90%), Hepatitis B (85%), PCV 13 (84%), Hepatitis A (81%), MMR (79%), Td booster (77%) and HPV (75%) vaccines. Health centers were provided a list of potential reasons for stocking vaccines. They reported factors aiding stocking of vaccines included: vaccine availability, reasonable cost to health center for vaccine, high patient demand for vaccine, ability to store vaccine and patient population included an adequate mix of adults eligible for the vaccine. Zoster vaccines were stocked less regularly than other vaccines evaluated (29% for ZVL and RZV). The most common reasons for not stocking these were high cost to the health center to purchase vaccine (ZVL: 40%; RZV: 46%), inadequate reimbursement for vaccination (ZVL: 28%; RZV: 30%), and high out-of-pocket costs for patients (ZVL: 27%; RZV: 30%).

A total of 237 health centers reported on our structured query on ways of procurement of vaccines. Most health centers reported direct purchasing from the manufacturer or distributor as the most common way of procuring vaccines, e.g., 44% reported procuring influenza, PCV13, and PPSV23 vaccines this way (Figure 1). The next most common modality of procuring all vaccines but influenza was specifically detailed as a VFA Program; for influenza it was receipt from a state or local health authority (20%).

Two hundred thirty six responded to our query on whether they had adequate supply for each vaccine. The majority of health center respondents reported stocks for all non-zoster vaccines were adequate over the past 12 months (with or without surplus). Tdap and Influenza vaccines were the most adequately stocked, with 211 respondents reporting adequate stocks, with or without surplus. Few health centers reported their stocks for ZVL (44 health centers) and RZV (40 health centers) were adequate without surplus (see figure, supplemental digital content 2).

### Payment

A total of 222 health centers responded to our query on whether they experienced challenges with payment and reimbursements for vaccines. The majority of health centers reported either not experiencing challenges (44%) or experiencing minor challenges (41%) with payment and reimbursement for vaccines over the past 12 months. A total of 225 health centers responded to the question about adequacy of payment for vaccine dose and 221 responded related to administration. Most health centers reported adequate reimbursement for vaccine dose and administration from private insurers (73% and 68%, respectively) and

Medicaid (60% and 63%, respectively). All 17 respondents from eight states reported reimbursement received from Medicaid was adequate for both dose and administration. All 9 respondents from five states reported reimbursement received from Medicaid for both dose and administration was not adequate. All other states had variable responses related to adequacy of Medicaid reimbursement. In these states approximately 34% to 86% of respondents felt that Medicaid reimbursement was adequate. In contrast, close to half of respondents reported Medicare Part D reimbursements for vaccine dose and administration were inadequate (Figure 2).

### **Clinical Procedures, Workflow and Documentation**

A total of 219 health centers responded to our structured query on opportunities when vaccines are provided to their patients. Nearly all health centers (95%) reported vaccines are made available to patients during any appointment with a primary care provider (PCP). Other opportunities commonly reported were wellness exams with a PCP (79%) and other encounters with primary care staff (74%). Only 42% of health centers stated that vaccines were offered during visits with specialists (see figure, supplemental digital content 3).

A total of 219 health centers responded to our structured query on staff performing various vaccine-related activities. Nurses were reported to perform most vaccination-related activities, closely followed by physicians and physician assistants (PA) or nurse practitioners (NP). The most common vaccination-related activity which nurses are authorized to perform was vaccine administration (91% of health centers), followed by patient education (73%). Vaccine recommendation was most commonly performed by physicians (78%) (see table, supplemental digital content 4).

A total of 220 health centers responded to our structured queries on how vaccines were documented and how staff were reminded of recommended vaccinations. The majority of health centers reported the most common way of documenting adult vaccinations given at the center was using the open-text field of their EHRs (96%). The second most common response (72%) was documenting adult vaccinations in a vaccine registry or immunization information system (IIS). The majority of health centers reported the most common way of reminding providers when to administer vaccines (81%) was through reminders in EHRs (Figure 3). Team huddles were also reported as useful for reminding providers when vaccines are needed (60%). Only 32% of responding health centers reported using an IIS to generate lists of patients needing vaccines.

### **Communication and Outreach**

A total of 216 health centers reported on our query on their outreach activities for each vaccine. Forty three percent of respondents reported they conducted patient and/or community outreach activities for influenza vaccines. Conducting outreach for non-influenza adult vaccines was far less common, ranging from 2%–17%.

### **Overall Performance**

Out of the 214 who responded to this metric, most health centers self-reported high levels of achievement related to most Standards (Table 1).<sup>5</sup> For ease of comparison the responses for

extremely and very well are combined, as are the responses for moderately and slightly well, the third column shows the responses for not well at all. In particular, health centers believe they sufficiently document vaccine administration in an EHR (94% extremely or very well) or report to an IIS (73%) and provide needed vaccines (73%). Health centers reported less success in their ability to assess vaccination needs at every encounter (46%) and to follow up on patients who were referred out for vaccinations (28%).

Health centers were asked to rate the potential importance of a series of 9 suggested policy recommendations developed based on advisory panel and focus group discussions. Out of the 158 health centers who responded to this question, an overwhelming majority (>85%) agreed standardization of patient data collection for reporting to an IIS, full EHR and IIS integration, developing bidirectional querying and reporting between EHRs and IISs, instituting national standards for state IIS, requiring reporting for all vaccines to an IIS and having the ability to bill all payers for vaccination-only visits, would be extremely or moderately important for systemic improvements in vaccination practices. In general, health center leaders felt all suggested systemic improvements were important, with somewhat less enthusiasm for a requirement to report adult vaccinations as part of UDS reporting (see table, supplemental digital content 5).

## Discussion and Conclusion

Vaccine administration, which is integral to population health, is a complicated task for health centers to execute and achieve optimal results. Health centers report a number of challenges related to documentation, and have varying responses related to vaccine supply and payment structures. Many factors affect the ability of health centers to provide vaccinations. Health center leaders' perceptions related to performance and improvements on adult vaccination practices could inform policy for instituting a more efficient system for adult vaccination.

Health centers report adequate stocks of the majority of vaccinations evaluated, with the exception of zoster vaccines, which were not stocked due to perceived high cost and low reimbursement. Despite the unique patient populations served by health centers, our findings are consistent with research in other settings showing that the primary barriers to zoster vaccination are financial.<sup>15</sup> Also consistent with prior research, respondents in our survey voice the most concern about adequacy of payment for vaccination services from Medicare Part D, which covers zoster vaccination for eligible adults. This survey was conducted less than one year after RZV was licensed for U.S. use, and health centers may have had limited experience with this vaccine. Health centers unable to stock zoster vaccine should consider establishing referral networks for patients to receive zoster vaccination elsewhere.

Prior studies show the most common barriers to adequate provision of most adult vaccines are finance-related.<sup>16–18</sup> The majority of health centers reported receiving adequate reimbursement from most payers. Consistent with the literature, we found private insurance was most commonly identified as providing adequate reimbursement for vaccination services.<sup>15,19</sup> However, the payer next most commonly identified as providing adequate reimbursement in our study was Medicaid. This finding showed more satisfaction with

Medicaid coverage than other reports, but we found coverage is not consistently adequate for all.<sup>15,18</sup>

While most state Medicaid agencies cover at least some adult immunizations, not all state programs cover all adult vaccines detailed by the ACIP recommendations,<sup>20</sup> which can explain the less than adequate coverage reported in prior research. In contrast, federally qualified health centers (FQHCs) focus on providing comprehensive and affordable care to low-income and vulnerable populations and thus Medicaid payment rules for FQHCs differ from those for other providers. The focus on payment for preventive services and comprehensive care with encounter fees covering all qualified services provided during a visit is likely the underlying reason approximately 60% of the health centers reported adequate reimbursement from Medicaid.<sup>21</sup>

We identified some states where all of the respondent health centers felt the Medicaid reimbursement was adequate and some states where all respondents felt the Medicaid reimbursement was not adequate. Further investigations into state variation in reimbursement is called for given the high rates of Medicaid as the insurance of record for health center patients. Inadequate reimbursements were reported from 36–52% of the respondents for coverage other than private insurance, with Medicare Part D most commonly reported. Medicare Part D coverage can be difficult to utilize because some plans may have rules like prior authorization, step therapy and quantity limits, which creates need for additional workflows and delays reimbursement.<sup>22</sup>

Health centers serve many adults without insurance; thus, in some instances there is no direct reimbursement for vaccine services. Health centers may charge patients a flat fee for vaccinations but when patients cannot afford the fee, vaccines are still provided. An important survey finding was the role of state VFAs in procurement of adult vaccines. Because not all states may have or utilize a VFA program, states which reported procuring at least one vaccine through a VFA program were identified. Respondents were not specifically asked whether or not their state had a VFA or similar program. Respondents from 30 states reported procuring at least one vaccine from a VFA program. Despite not being available in every state, VFA programs accounted for a noticeable portion of vaccine procurement in our sample. Reporting of use of a VFA program varied for health centers within the same state. Forty percent of respondent health centers from the 30 states where any VFA program use was reported noted that they used a VFA program, this leave room for increased use in many states.

Administration of vaccines was mainly the task of nurses, while referrals and recommendations were mainly the tasks of physicians. Primary care providers, not specialists, were predominantly tasked with adult vaccination activities in respondent health centers. Consistent with other literature,<sup>23</sup> our findings highlight the opportunity for specialists to get more involved in adult vaccination practices. Specialty clinician visits are underutilized opportunities for the recommendation and administration of adult vaccinations, as vaccination can reduce complications from certain chronic conditions treated by specialists.<sup>24,25</sup>



Our study identified a disconnect between the methods used to document vaccinations and those used to identify need for vaccines. Specifically, health centers report primarily documenting vaccinations in the open-text entry field of their EHRs; by contrast, only 10% reported documenting this information in a vaccine-specific EHR field. However, they also predominantly rely on their EHRs for reminders about patients' vaccination needs. Open-text fields cannot be used to generate 'vaccination due' reminders, nor are they useful for conducting assessments of vaccination coverage in patient panels. Systematic vaccine documentation in portions of the EHR which are searchable by data queries can allow health centers to better evaluate individual and population health needs.

We observed inconsistencies in the use of IIS: 72% of health centers reported entering vaccines administered into an IIS, but only 32% reported generating lists of patients needing vaccines via the IIS. This disconnect may be due to dissatisfaction with IIS and EHR connectivity: IIS-EHR integration and bidirectional data exchange were endorsed by nearly all respondents as important to improve delivery of adult vaccinations. Similarly, 73% of health centers felt they did well at recording vaccines administered in the IIS, but reported far less success with documenting immunizations received from other providers, assessing immunization status at every encounter and following up with patients referred out for vaccinations. An integrated bi-directional IIS could help address these shortcomings. While desirable, this technology can be costly and health centers may not have the resources to implement this type of exchange on their own. Even in areas where IIS capabilities are not fully developed, there is an opportunity for states to promote IIS use by evaluating current practices and resources for reporting adult vaccinations. Accurate, centralized data measures are crucial for adult vaccination needs assessments for both patient care and population health. Future endeavors should include evaluation of adult IIS for best practices to improve reporting and integration with EHR systems. Current efforts by CDC and the IIS community to develop national standards for IIS and a certification or other standardization process will likely be welcomed by health centers.

As anticipated, the response rate for this survey was relatively low. While there were not statistically significant differences identified, respondents may differ systematically from non-respondents. Respondents may be from health centers which are more engaged in adult vaccinations and therefore our findings would represent the best-case scenario. In addition, respondent activities surrounding adult vaccination services were self-reported and may not represent actual practice. Thus, the results of this study may not be generalizable to all health centers.

Health centers are positive about their abilities to meet vaccination standards, despite challenges. Lack of standardized documentation and reporting for adult vaccinations was a significant type of barrier identified by most respondents; continued improvements in IIS and EHR integration may improve health centers' ability to vaccinate their adult patients. While health centers report they are meeting many of the NVAC standards, there is room for improvement, particularly in documenting and following up on vaccinations given outside the center. Further study of clinical practices at the point-of-care is needed. Future research could identify health centers with exemplary adult immunization practices, which could be

shared with other health centers. Health centers are key players to help improve immunization rates for vulnerable populations.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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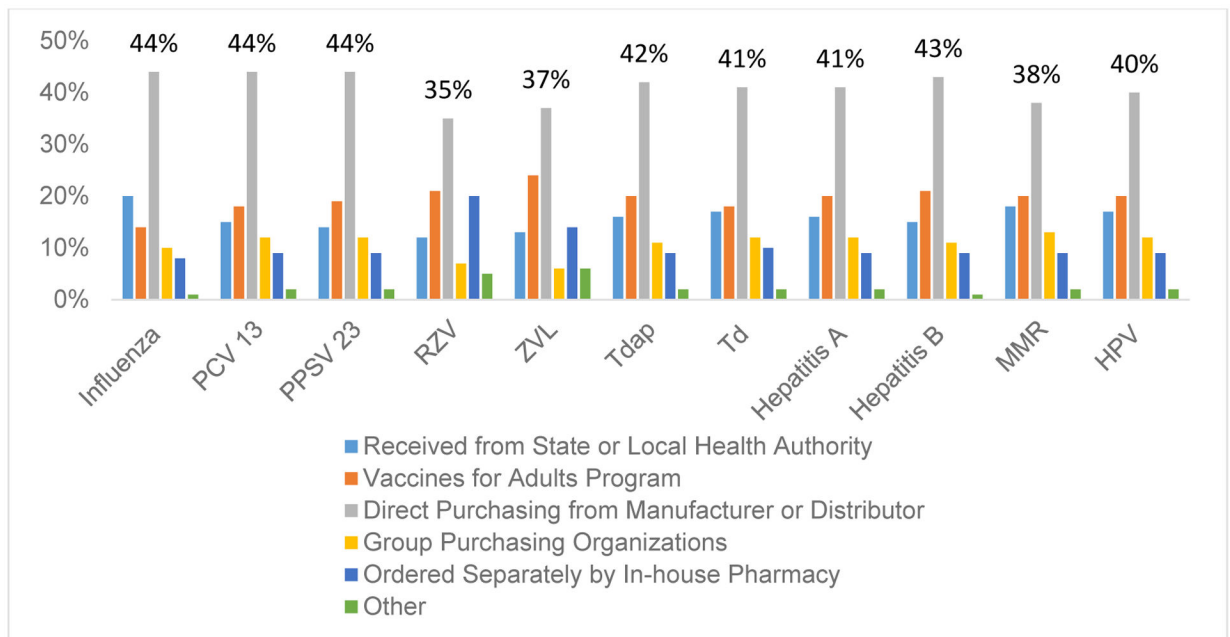
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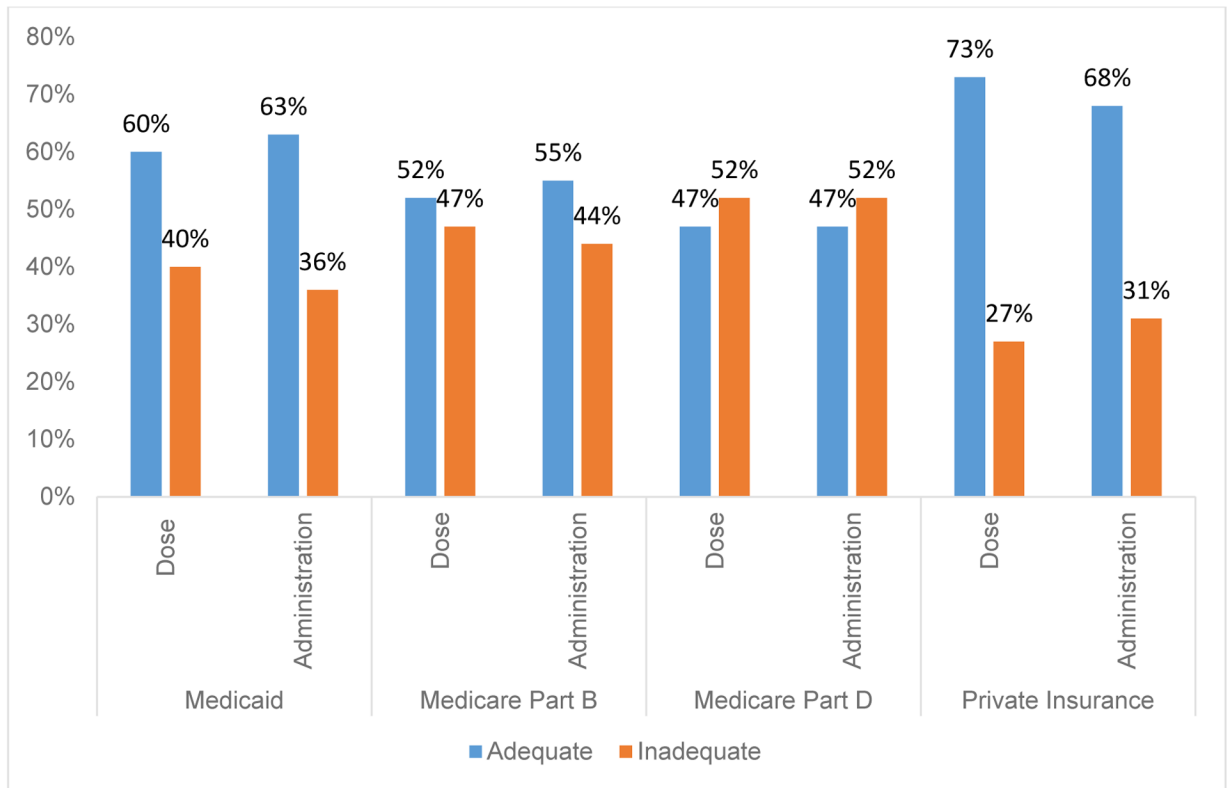
### Implications for Policy and Practice

- Standard practices for labeling vaccines and for documenting vaccinations can improve accuracy of data related to utilization of vaccines and population covered by vaccinations.
- National standards for State IIS and State policies requiring the reporting of all adult vaccinations to an IIS could improve health center ability to determine vaccination coverage and to provide vaccinations to all adults served.
- Improved universal bi-directional query and reporting capability between EHRs and IIS can improve information sharing and access to up to date information regarding vaccination status for individuals and populations.
- Standardization of patient data collection for accurate identification in IIS could improve health center ability to identify patient vaccination status.
- Health centers may benefit from training related to best practices for available IIS.
- Health center may benefit from training on the use of EHR vaccine tables for recording vaccine administration.
- Health centers could benefit from better education for patients related to how to use their insurance coverage for vaccinations and additional help with covering costs of vaccines for uninsured adults.
- Health center specialty providers should be encouraged to recommend and provide adult vaccinations to increase adult vaccination opportunities.
- The development and sharing of adult vaccination education resources for patients and providers can improve outreach to patients and communities for adult vaccines.



N=237

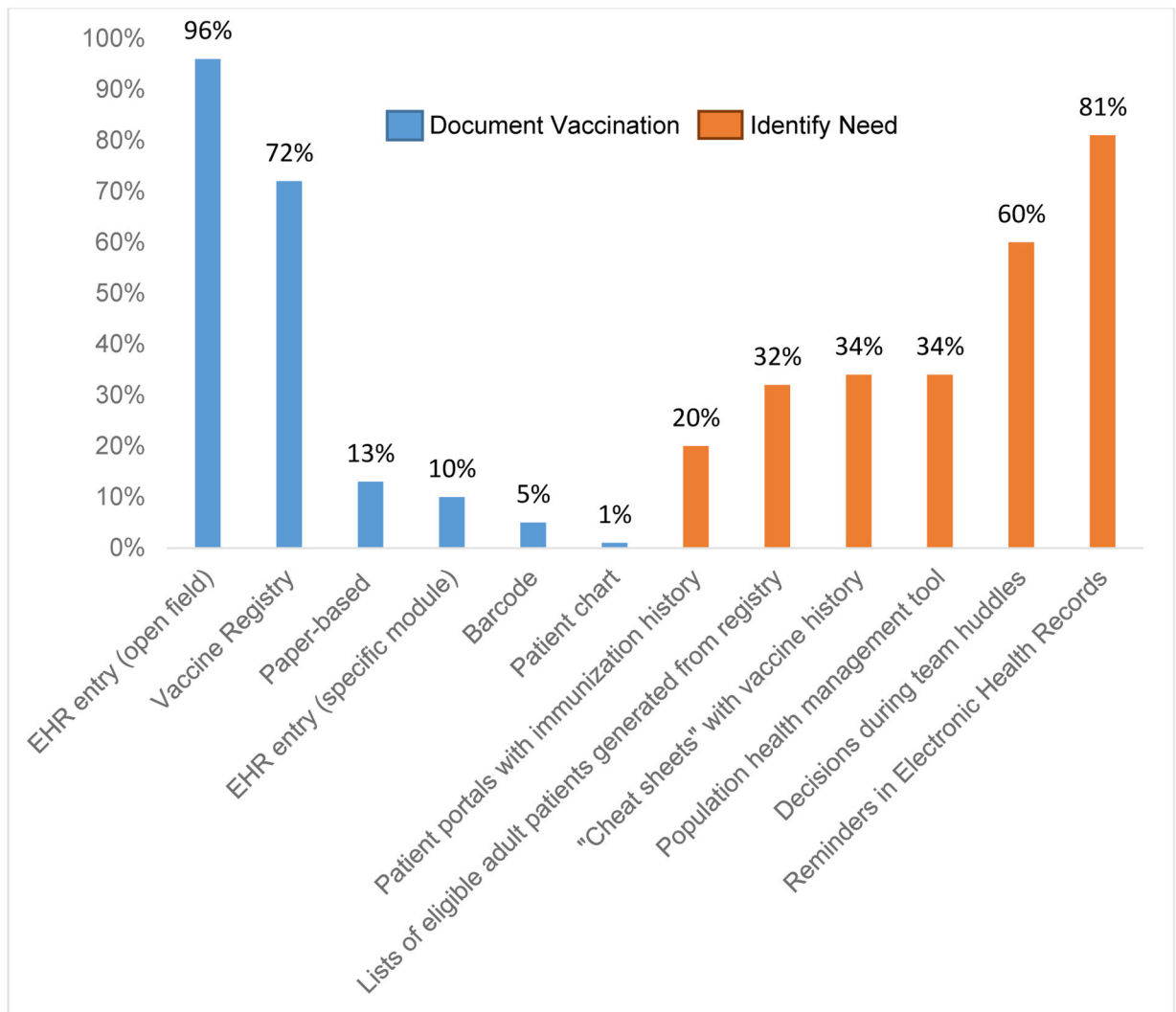
**Figure1.**  
Percentages for Methods of Vaccine Procurement



N = 225 Dose

N = 221 Administration

**Figure 2.** Percentages for Adequacy of Payment by Payer for Dose and Administration



N=220

**Figure 3.**  
Adult Vaccination Documentation and Techniques used to identify need for Vaccinations

**Table 1.**

Percentages for Respondents' Perceptions of Their Health Center's Performance

NVAC Adult Immunization Standard	Extremely or Very Well (%)	Moderately or Slightly Well (%)	Not Well at All (%)
Document vaccines administered to your patients within your EHR	94	4	2
Administer needed vaccines that your health center provides	73	26	1
Report vaccines administered to your patients to an IIS	73	11	16
Share a strong recommendation for vaccines that patients need	72	26	2
Refer patients to other providers for needed vaccines you do not stock or administer	59	36	5
Document vaccines received by your patients from external providers	58	36	6
Assess the immunization status of all patients in every clinical encounter	46	50	4
Follow-up with patients referred to receive vaccinations administered elsewhere	28	48	24
			N=214

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