

Bridging Disparity: A Multidisciplinary Approach for Influenza Vaccination in an American Indian Community

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Influenza accounted for approximately 36 000 deaths annually in the United States during 1990–1999.¹ Only *Streptococcus pneumoniae* resulted in more vaccine-preventable deaths.² Death rates for pneumonia and influenza in American Indians/Alaskan Natives of all ages were 70% greater than the overall US rate of 12.9 per 100 000 population during 1997,³ and American Indians/Alaskan Natives aged 65 years and older were 20% more likely to die of pneumonia and influenza than the US population as a whole during 1992–1994.⁴ Diabetes has a substantial impact on deaths associated with pneumonia and influenza,⁵ and American Indian/Alaskan Native (AIAN) adults have an age-specific prevalence of diabetes 2 to 3 times higher than that for US adults as a whole.⁶ American Indians/Alaskan Natives have lower education and income levels than the US population as a whole,⁷ characteristics associated with lower rates of influenza vaccination.^{8,9} Other disparities of health indicators between American Indians/Alaskan Natives and other racial/ethnic groups have been documented in recent years.^{7,10}

The *Healthy People 2000* goal for influenza vaccination coverage among noninstitutionalized persons aged 65 years and older was 60%,^{11(p287)} and the goal was increased to 90% in *Healthy People 2010*.¹² Influenza vaccination coverage among American Indians/Alaskan Natives aged 65 years and older was 51.2% during the 2002–2003 influenza season according to a nationwide Indian Health Service (IHS) performance evaluation assessment.¹³ In comparison, the median percentage of adults reporting receipt of influenza vaccine in 2002 was 68.4% (range 32.2% to 76.6%) among persons aged 65 years and older in 50 states, the District of Columbia, and 3 US territories¹⁴ determined through

Objectives. The Whiteriver Service Unit (WRSU) used proven effective methods to conduct an influenza vaccination campaign during the 2002–2003 influenza season to bridge the vaccination gap between American Indians and Alaska Natives and the US population as a whole.

Methods. In our vaccination program, we used a multidisciplinary approach that included staff and community education, standing orders, vaccination of hospitalized patients, and employee, outpatient, community, and home vaccinations without financial barriers.

Results. WRSU influenza vaccination coverage rates among persons aged 65 years and older, those aged 50 to 64 years, and those with diabetes were 71.8%, 49.6%, and 70.2%, respectively, during the 2002–2003 influenza season. We administered most vaccinations to persons aged 65 years and older through the outpatient clinics (63.6%) and public health nurses (30.0%). The WRSU employee influenza vaccination rate was 72.8%.

Conclusions. We achieved influenza vaccination rates in targeted groups of an American Indian population that are comparable to or higher than rates in other US populations. Our system may be a useful model for other facilities attempting to bridge disparity for influenza vaccination. (*Am J Public Health*. 2006;96:921–925. doi:10.2105/AJPH.2004.049882)

Behavioral Risk Factor Surveillance System analysis. Other target groups of persons who are at increased risk for complications from influenza have been identified,^{15(pp7–8)} but vaccination rates among American Indians/Alaskan Natives in most target groups have not been well established. Behavioral Risk Factor Surveillance System analyses indicate a median influenza vaccination rate among persons aged 50 to 64 years in US states/areas of 38.4% (range 15.9% to 49.0%). Vaccination rates among persons with diabetes were reported at 51.5% and 72.6% in persons aged 50 to 64 years and aged 65 years and older, respectively.¹⁴

Eliminating racial and ethnic health disparities, including disparities in vaccination coverage, is an overarching goal of *Healthy People 2010*.¹² The Whiteriver Service Unit (WRSU) has met this goal for influenza vaccination coverage for adults older than 50 years and in persons with diabetes. We describe the influenza vaccination program used to eliminate this disparity in this American Indian community.

METHODS

Health Facility and Service Population

The Whiteriver Service Unit (WRSU) is a rural, 25-bed IHS hospital and outpatient facilities complex on the White Mountain Apache Tribe reservation in eastern Arizona, with a user population of more than 15 000 persons. Health services are provided to American Indians/Alaskan Natives through IHS at no charge. The hospital provides adult and pediatric inpatient care, a birthing center and obstetric services, ambulatory surgery, and multiple support services. Outpatient services include a hospital-based clinic and urgent care facility, an emergency department, a satellite clinic, and dental, optometry, physical therapy, pharmacy, and other support services. The primary care staff at WRSU includes 18 physicians and 5 nurse practitioners, representing 20 full-time-equivalent providers. Ten public health nurses provide public health support and services in the community. There are approximately 1700 WRSU hospital admissions, 950 transfers to

other facilities, and 140 000 ambulatory visits at WRSU annually. More than 96% of ambulatory visits are from Apache, Navajo, or Hopi tribal members.

Analysis, Data, and Definitions

We analyzed data using Government Performance and Results Act (GPRA) analysis queries of patient visits. GPRA analyses are used for performance improvement and federal reporting throughout the IHS to assess progress in many areas of health care provision including influenza vaccination coverage, as mandated by federal law for facilities receiving federal funds.

The data are assembled through a query of WRSU provider visits using the Resource and Patient Management System. This is a non-commercially available IHS software package (Office of Information Technology, Indian Health Service, Albuquerque, NM) used to compile the WRSU patient registry and electronically record information from patients' medical records after every patient encounter. The Resource and Patient Management System also produces an updated individualized health summary for medical records with provider prompts to immunize persons who lack influenza or other recommended vaccinations.

GPRA analyses used Resource and Patient Management System queries for all indicators. Influenza vaccination indicator analysis used 3 population definitions. For WRSU, these were as follows:

GPRA user population, defined as American Indians/Alaskan Natives alive throughout the evaluation period residing in a community within the WRSU "catchment area" (which includes the 2500-square mile reservation and nonreservation communities up to 75 miles from the hospital) who had a WRSU visit during the period from the 3 years before to the end of the report period.

GPRA active clinical population, defined as persons who met the criteria for the GPRA user population and had 2 visits to medical clinics in the 3 years before the end of the report period.

GPRA active diabetic population, defined as persons among the active clinical population who had a diabetes diagnosis confirmed at

least 1 year before the report period and had at least 2 WRSU visits in the past year and 2 diabetes-related visits ever.

Groups analyzed by the GPRA influenza vaccination indicator included persons within the GPRA active diabetic population and persons aged 65 years and older and 50 to 64 years within the GPRA user and active clinical populations. Those with a documented influenza vaccination during the year before the end of the report period were identified as vaccinated against influenza, and because GPRA was tracking persons offered vaccine, refusals were categorized as vaccinated. All others were considered unvaccinated. Persons with egg allergy (a contraindication to influenza vaccination) were excluded from immunization to influenza analysis. GPRA analyses of health indicators were performed using data from up to 594 health care facilities throughout the Indian health delivery network, although not all facilities participated in each health indicator analysis. We used the report period July 1, 2002, through June 30, 2003. We used GPRA user population groups to characterize the WRSU vaccination delivery method and to compare WRSU rates to those of US states and territories because the user population may reflect the actual residential population more closely than the active clinical population. Because the national IHS coverage rates are reported among active clinical population groups, we used the WRSU active clinical population groups to compare WRSU rates to IHS aggregate rates.

We performed GPRA population electronic queries and manual chart reviews to determine the vaccine delivery mechanism (administration through outpatient clinics and emergency departments, inpatient vaccinations, public health nursing community sites, employee health services, or outside facilities) and the number of refusals. Manual chart reviews were also used to adjust for inaccurate or incomplete electronic information.

The WRSU employee vaccination rate, provided by the infection control officer, included all employees and was not limited to American Indians/Alaskan Natives.

Vaccination Campaign

The WRSU annual influenza vaccination campaign has evolved over more than a decade and is similar year to year, subject to departmental modifications based on previous years' experience. We used Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) recommendations for the prevention and control of influenza^{15(pp7-8)} as a guide for our campaign. The 2002–2003 campaign operated from October 2002 to April 2003 through inpatient, outpatient, emergency department, community field clinics, and home visits. Targeted vaccination groups were adults aged 65 years and older, persons with diabetes, and persons with other chronic illnesses. Persons in other target groups and household members of persons in these groups were offered vaccination. Although our objective was vaccination of persons in all target groups, our focus was primarily on those aged 65 years and older and those with chronic medical conditions, especially diabetes, because death and complications of influenza are highest in these groups^{15(pp7-8)} and diabetes is a common condition among persons cared for at WRSU.

Health Staff and Public Information

Influenza and vaccine information were provided to WRSU employees with message boards, verbal communications, and e-mail that promoted education and vaccination. The WRSU providers and infection control officer encouraged staff vaccination and provided influenza updates and the CDC influenza Web site link. Selected WRSU outpatient nurses and public health nurses attended a 2-day statewide immunization conference and workshop during November 2002 that addressed influenza vaccination extensively.

We provided public information through radio broadcasts and brochures. When the vaccine arrived, we broadcast information on the tribal radio station about vaccine availability, groups at increased risk for influenza complications, and recommendations and mechanisms for acquiring vaccination. The information was translated and announced in the Apache language during the broadcast. A vaccine information statement¹⁶ was provided to all persons interested in vaccination, and

translation or further explanation was available on request. Public health nurses provided the same information to school administrators and to community members during home visits and community health classes (e.g., childbirth and parenting classes), a tribal elder conference, and health screening clinics. Outpatient clinical staff and public health nurses also provided information during individual visits or telephone calls.

Vaccination

Vaccination began immediately after influenza vaccine was available and was provided to American Indians/Alaskan Natives and WRSU employees without charge. Standing orders and prompts on patients' medical records permitted nurses to identify persons in targeted groups and to vaccinate them immediately, including persons without appointments requesting vaccination in outpatient clinics or the public health nurse's office. Unvaccinated patients in targeted groups seen by medical providers were counseled and vaccinated in clinics, the emergency department, and the hospital. Hospitalized patients usually received vaccination immediately before discharge. The infection control officer and outpatient nurses vaccinated WRSU employees.

Public health nurses provided influenza vaccinations in the community. Before the vaccination campaign, public health nurses queried the WRSU registry to identify patients in target groups within public health nurse coverage areas. Public health nurses provided home visits and vaccinations, and vaccination information and instructions were left for targeted individuals if they were not home. When time and workload constraints precluded contact with all targeted persons during home and community vaccinations, priority was given to persons aged 65 years and older and those with diabetes. Public health nurses provided influenza vaccinations at 1 community's elder conference, at 3 locations during a November White Mountain Apache Tribe employee health fair, and in community clinics at 14 other reservation locations including group homes, day care centers, an elderly meal site, tribal businesses, and the jail. Public health nurses coordinated efforts with other departments by documenting vaccination or referral for vaccination in patients' medical

record and through direct communication with departments when patients were admitted to outpatient or inpatient departments.

Vaccinations were documented electronically, and this automatically updated health summaries so that a patient's vaccination status was subsequently available throughout the service unit.

Recent Changes in the Influenza Vaccination Campaign

Changes over the 2 previous influenza seasons included increased community vaccination clinics and public information through the local newspaper and broadcasts; the recommendation that healthy children (in addition to children with chronic medical conditions) aged 6 to 23 months receive vaccination; provision of vaccine with reduced thimerosal content primarily for obstetric populations; influenza vaccination provided in patients' examination rooms and during nursing screening instead of exclusively in a separate treatment room; primary care team dialysis center visits that resulted in vaccination status documentation and referral of those who were not yet vaccinated; increased influenza testing; and influenza vaccination refusal documentation in patients' medical records.

RESULTS

GPRA User Population and Persons With Diabetes

The WRSU influenza vaccination coverage rate was 71.8% among persons aged 65 years and older in the GPRA user population during the 2002–2003 influenza season (Table 1). Our analysis revealed that 63.6% were vaccinated in the outpatient clinics (hospital-based and satellite clinics and the emergency department), 30.0% were vaccinated by public health nurses, 1.3% were vaccinated during hospitalization, and the remaining 5.1% were vaccinated by the WRSU employee health program and providers outside WRSU. Most of the vaccinations outside WRSU were administered at a dialysis center operating on the reservation. Influenza vaccination coverage was 49.6% among persons aged 50 to 64 years. Three persons (0.5%) among those aged 65 years and older and 3 persons (0.2%) among those aged 50 to 64

years had documented vaccination refusal. Among 1091 persons in the active diabetes population, 766 (70.2%) were vaccinated, including 77.8% and 82.3% among persons aged 50 to 64 years and aged 65 years and older, respectively (Table 2).

Indian Health Service Vaccination Rate Comparison

WRSU GPRA active clinical population analysis revealed that 355 of 484 (73.3%) persons aged 65 years and older were vaccinated against influenza, compared with 21578 of 42110 (51.2%) vaccinated among IHS facilities nationwide (risk ratio for WRSU vaccination=2.18; 95% confidence interval [CI]=2.06, 2.30, $P<.0001$). Vaccination coverage rates for aggregate national IHS rates were not available for the GPRA user population.

Health Care Workers

Among 375 WRSU employees, 273 (72.8%) were vaccinated against influenza (Table 1).

DISCUSSION

We achieved influenza vaccination rates in targeted groups of an American Indian population and among WRSU health care workers that are comparable to or higher than rates in other US populations. We attribute these accomplishments to the multidisciplinary approach used in our vaccination program that includes staff and community education, standing orders, vaccination of employees and hospitalized patients, and community and home vaccinations without financial barriers. We exceeded the *Healthy People 2000* goal of a 60% influenza vaccination rate among those aged 65 years and older in our community and met the overarching *Healthy People 2010* goal of eliminating the health disparity for influenza vaccination in this American Indian population.

Public Health Nursing

Public health nurses played a significant role in our vaccination campaign, accounting for 30.0% and 24.5%, respectively, of vaccinations among persons aged 65 years and older and aged 50 to 64 years in the GPRA user population. Other investigators have

TABLE 1—Influenza Vaccination Coverage Rates and Delivery Method in the GPRA User Population by Age Groups and in Whiteriver Service Unit Employees: Whiteriver Service Unit, Indian Health Service, 2002–2003

	GPRA User Population, y		WRSU Employees, All Ages
	50–64	≥ 65	
Subjects, No.	1277	547	375
Vaccinated, No. (%)	633 (49.6)	393 (71.8)	273 (72.8)
Vaccination delivery, No. (%)			
Outpatient	416 (65.7)	250 (63.6)	...
Public health nurse	155 (24.5)	118 (30.0)	...
Hospitalized	6 (1.0)	5 (1.3)	...
WRSU employee health service	42 (6.6)	2 (0.5)	...
Outside facility	14 (2.2)	18 (4.6)	...

Note. WRSU = Whiteriver Service Unit; GPRA = Government Performance and Results Act.

TABLE 2—Influenza Vaccination Coverage Rates and Delivery Method in the Active Diabetes Population by Age Groups: Whiteriver Service Unit, Indian Health Service, 2002–2003

	<50 y	50–64 y	≥ 65 y	All Ages
Subjects, No.	484	387	220	1091
Vaccinated, No. (%)	284 (58.7)	301 (77.8)	181 (82.3)	766 (70.2)
Vaccination delivery, No. (%)				
Outpatient	220 (77.5)	241 (80.1)	129 (71.3)	590 (77.0)
Public health nurse	42 (14.8)	37 (12.3)	45 (24.9)	124 (16.2)
Hospitalized	3 (1.1)	3 (1.0)	3 (1.6)	15 (2.0)
WRSU employee health service	10 (3.5)	9 (3.0)	1 (0.6)	20 (2.6)
Outside facility	3 (1.1)	11 (3.7)	3 (1.6)	17 (2.2)

Note. WRSU = Whiteriver Service Unit.

reported that public health nurses improved influenza vaccination rates through home visits,^{17,18} although public health nurse–operated community vaccination clinics were not a component of those programs. Our experience suggests that public health nurse vaccinations in homes and in community vaccination clinics may be an important and effective component of a vaccination program.

Standing Orders

The use of standing orders and vaccination of hospitalized persons are effective and recommended tools for influenza vaccination.^{19,20} We found that standing orders greatly facilitated immunization in clinics. Patients vaccinated during nurse screening provided efficient patient flow and opportunities for clinicians to explore patients’ reasons for

vaccination refusals. This may contribute to improved vaccination coverage because studies have found that the most important factor in vaccine acceptance is recommendation by a health care provider,^{21,22} and individuals occasionally accept vaccination on their provider’s recommendation after initial refusal.

Health Care Worker Vaccination

An important component of our campaign was employee vaccination. WRSU employee coverage was 72.8%, more than double the 36% coverage reported for health care workers in the 2001 National Health Interview Survey.^{15(pp7–8)} The employee vaccination rate may reflect ease of access and no-fee vaccination and may indicate that WRSU health care workers understood the importance and responsibility of influenza vaccination. Such a

message was likely projected to the population served, promoting higher vaccination coverage.

Vaccination Rates Among American Indians/Alaskan Natives

Influenza vaccination rates similar to those achieved at WRSU have been reported among American Indians/Alaskan Natives aged 65 years and older,²³ accomplished through the Racial and Ethnic Approaches to Community Health project, although the project’s vaccination program methods were not described in the cited report. The coverage rates among American Indians/Alaskan Natives aged 65 years and older included persons from 2 communities in Oklahoma and North Carolina. However, other IHS communities achieve significantly lower rates, as demonstrated by the GPRA data showing 51.2% coverage among persons from IHS facilities across the United States. Despite advances in influenza coverage rates and programs, some disparity in influenza vaccination still exists in the American Indian population. Differences in vaccination rates may reflect some of the inherent differences and wide diversity among AIAN tribes, AIAN health systems, and their service availability across the nation, as described elsewhere.^{3,24}

Limitations

Our findings are subject to at least 2 limitations. First, an underestimate of vaccination rates would result if user population members acquired vaccinations outside IHS that were not documented in IHS medical records. Inaccurate vaccination or user information might exist in records of American Indians/Alaskan Natives who received care outside the IHS or moved from the catchment areas without updating their address, or whose death was unrecognized by IHS. This applies particularly to nursing home residents, who were typically vaccinated at their nursing home and were identified as unvaccinated unless a historical vaccination was documented. Second, vaccination rates might not be accurate if significant or disproportionate segments of the population were not included in the database. However, comparison of WRSU registry and census figures indicated that most if not all residents on the White Mountain Apache Tribe reservation were in the WRSU registry. Our database indicated that a large majority of the population

visited WRSU at least once every 3 years (a GPRA user population criterion), likely because of the availability of a wide range of health services without charge and a lack of other medical facilities nearby (30- to 60-mile distances for most local residents).

Refusals

Rates used in comparing WRSU to aggregate IHS totals with the GPRA active clinical population included refusals among those vaccinated (because this indicator evaluated rates of persons offered vaccine), which resulted in an overestimate of vaccination rates. However, very few refusals were documented at WRSU. Among American Indians/Alaskan Natives aged 65 years and older, only 3 of 547 (0.5%) refusals were documented, and among persons aged 50 to 64 years only 3 of 1277 (0.2%) refusals were documented. We did not include refusals among persons vaccinated in the WRSU user population coverage rates (Table 1). We included refusals among those vaccinated in the active clinical population figures to compare WRSU and aggregate IHS rates, because refusal numbers among the aggregate IHS totals were not available and could not be excluded.

Conclusions

Other disparities in the health status of American Indians/Alaskan Natives across the United States remain.^{11(pp9–11)} Additional strategies are needed for all races and ethnic groups to achieve 90% influenza vaccination coverage and other *Healthy People 2010* objectives. WRSU has made a significant advancement toward these goals in bridging the gap for influenza vaccination coverage through our vaccination program. Our program may be a useful model for other facilities attempting to bridge the influenza vaccination gap and a foundation to use to reach other *Healthy People 2010* objectives. ■

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Contributors

M.S. Traeger originated the study, supervised all aspects of its implementation, led the writing, and performed computer queries and chart reviews. A. Thompson set up and administered the quality improvement systems and preliminary analyses and assisted with the study. E. Dickson participated in the program described, researched manuscript components especially pertaining to public health nursing activities, and performed chart reviews. A. Provencio participated in the program described, performed chart reviews, and analyzed risk group information. All authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

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Human Participant Protection

This study was approved by the Indian Health Service institutional review board and by the White Mountain Apache Tribe Health Board and Tribal Council.

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