

## **Barriers to the Effective Implementation of Immunization Information Systems in a Private Provider Setting**

### **Private Providers and Immunization Registries**

Author Information:

**Echezona E. Ezeanolue MD, MPH.** (Corresponding Author) is Assistant Professor of Pediatrics & Clinical Epidemiology, Division of Infectious Diseases, University of Nevada School of Medicine, 2040 W. Charleston Blvd. Ste 402, Las Vegas, NV 89102, Phone: 702 – 671 – 2252; email: [eezeanolue@medicine.nevada.edu](mailto:eezeanolue@medicine.nevada.edu)

**Ineada Jack, M.D.** is a Research Coordinator at University of Nevada School of Medicine, Las Vegas.

**William Downey M. D.** is Medical Director of the Desert Valley Pediatrics, Las Vegas.

**Benjamin Hart, M.D.** Medical Director of Lied Clinic, University Medical Center, Las Vegas

**Chad L. Cross, Ph.D.** is Associate Professor of Epidemiology & Biostatistics, School of Community Health Sciences, University of Nevada Las Vegas.

### **Abstract**

One of the goals of Healthy People 2010 is to increase the proportion of children less than 6 years of age with two or more vaccinations recorded in a fully operational population-based immunization information system to 95%. In 2008, we piloted the Nevada web-based immunization information system (WEBIZ) in a large private pediatric clinic in north-west Las Vegas. Our objectives were: (1) to determine compliance with the recommendation that all vaccine providers report immunization activities to the WEBIZ without a state mandate and (2) to determine perceived barriers to compliance and suggestions on how to overcome expressed barriers. We documented the number of newly created and updated immunization records as outcome measures of compliance following initial training, ongoing technical support and feedback to the clinic staff on the use of WEBIZ. We found low compliance with the recommendation to document immunization activities and clinic staffs were more likely to document immunization activities when there is an established record in WEBIZ compared to when a new record had to be created by the staff. Our survey of participating clinic staff, identified time to create new records as the most common reported barrier to

compliance with recommendation. We concluded that without a state mandate, compliance with the recommendation would remain low and that documentation of hepatitis B birth dose in WEBIZ, thus creating an initial record, could potentially reduce barriers to compliance with recommendation to document immunization activity in WEBIZ.

**Key Words:** Immunization Information Systems, Private Providers, Barriers to IIS

### **Introduction**

Immunization is a proven intervention that has reduced certain childhood preventable diseases by 98 – 100% (Linkins et al., 2006). Although vaccination rates for children in the United States have increased dramatically over the last decade, substantial disparities in vaccination rates still exist (Dombkwocki, 2006). In 2006, Nevada ranked 50<sup>th</sup> in the nation on childhood immunization coverage rates at 59.5% for the 4:3:1:3:3:1 vaccine series (4 doses of diphtheria, tetanus and pertussis vaccine, 3 doses of polio vaccine, 1 or more doses of measles, mumps and rubella vaccine, 3 doses of *Haemophilus influenzae* type b vaccine, 3 doses of hepatitis B vaccine and 1 or more doses of varicella vaccine) and 71.5% for 4:3:1:3 vaccine series (Centers for Disease Control and Prevention, 2007)

Immunization information systems (IIS) have been shown to help ensure high childhood immunization coverage by recording vaccines administered, generating reminders when immunizations are due and identifying pockets of the population that needs expanded immunization services (Linkins et al., 2006). When such registries are population-based and include all patients in a given area, they consolidate immunization records that are scattered among multiple providers, facilitating targeted recall of children who are truly under immunized and improve vaccine safety through reduction of duplicate immunization and providing data for post-licensure vaccine safety studies (Szilagyi et al., 2000).

Despite substantial resources directed towards registry development in the U.S., only 48% of children were enrolled in a registry in 2004 (Linkins et al., 2006). In the last six months of 2004, only 39% of private provider sites reported administered immunizations to a registry ("Immunization information system progress--United States, 2004.," 2005). Although evidence suggests that implementing the standards for pediatric immunization practices improves immunization rates (Lieu, Black, Sorel, Ray, & Shinefield, 1996), physicians often fail to

implement such preventive care guidelines (Pierce et al., 1996), and physician education strategies alone often fail to prompt practice change (Haynes, Davis, McKibbin, & Tugwell, 1984).

Private sector involvement is critical to the success of IIS as approximately 68% of children receive their immunizations in the private sector (Rodewald, Peak, Ezzati-Rick, Zell, & Thompson, 1997). The success of an IIS depends on broad participation of vaccine providers and comprehensive documentation of persons vaccinated (Dombkowski, 2006). This provider participation is critical for achieving the Healthy People 2010 objective of increasing to 95% the proportion of children less than 6 years of age with two or more vaccinations recorded in fully operational population-based immunization registries (Clark, Cowan, & Bartlett, 2006). These registries must be fully operational and contain complete immunization records in order for their full potential to be wholly realized (Linkins, et al., 2006). Many states including Nevada have established IIS and the web-based IIS in Nevada is known as WEBIZ.

Limited studies of barriers to effective implementation of IIS in a private provider setting have organized barriers into four major categories: (1) amount of time required to send and receive data from the system, (2) direct and indirect costs to practices, (3) accuracy of the information in the central data base, and (4) security and access to the data (Bordley, Freed, Dempsey-Tanner, & Lister, 1997). Barriers involving time ranged from the length of time required for submitting immunization data into the system, the prospect of entering immunization data in a busy clinic as well the duplication of efforts (double entry into billing software as well as the IIS) to concerns about the amount of time it would take to access the system (e.g. logging on, receiving busy signals during peak hours). Concerns over the potential costs to practices were also closely linked to time: staff time to enter the data, availability of technical support, and disproportionately high cost for small practices with limited staffs. Private providers also indicated concerns about the accuracy of the data and who would be liable for incorrect data as well as internet security against computer hackers (Bordley, et al., 1997). Although a study in 2004, indicated that participation in an IIS can provide net benefits by making the vaccination process more efficient (Glazner, Beaty, Pearson, Elaine Lowery, & Berman), the use of the IIS among private providers has been met with skepticism.

In considering strategies to improve the effective use of IIS in private provider settings, it is important to take into account possible barriers that will affect its functionality in every day clinical practice. AFIX (Assessment, Feedback, Incentive, and eXchange of information) is a well tested, proven and effective intervention to improve immunization practices at the clinic level (Hambidge et al., 2004). The purpose of this study was to determine compliance to recommendation that immunization activities be documented in WEBIZ without a state mandate and to determine barriers to compliance after effective implementation of WEBIZ in a large private provider office using the AFIX method of improving IIS utilization.

## Methods

### Study Setting and Participants

Our pilot site was a suburban general pediatrics clinic located in Southern Nevada that provides care to over 20, 000 patients annually. This site provides care to a diverse patient population that closely represents the general population in Clark County and with a total of 16 staffs (7 full time pediatricians and 9 medical assistants), closely resembles a mid-sized pediatric practice in Southern Nevada. Approval for the study was obtained from the University of Nevada Reno, Biomedical Institutional Review Board.

### Procedure

A descriptive analysis of a prospective intervention program to increase the use of IIS in a private medical office setting through implementation of the CDC AFIX model (we assessed the immunization practices in the clinic; provided feedback to the clinic of results of the immunization practices; provided a financial incentive and exchanged healthcare information and resources to facilitate improvement). Data was collected on pediatric patients who received care at this clinic facility from January through September 2008 and the number of newly created and/or updated immunization activity in WEBIZ were collected. Feedback on these documented activities was provided to the medical office staff. The medical office received \$3, 000 as an incentive to achieve 95% documentation. Training and information necessary to facilitate improved documentation were exchanged with medical office staff. Participating medical office staff completed a self administered survey at completion of the study to determine perceived benefits of WEBIZ, barriers and suggestions to improve documentation of immunization activities in WEBIZ.

The nine month study period from January through September 2008 was divided into 3 quarters. In

month 1 of the first quarter, an overview of the study was presented to the clinic staff and training on the use of WEBIZ was provided. In months 2 and 3 of the first quarter, data on entries into the WEBIZ were collected with no further intervention. In month 4 of the second quarter, assessment, feedback and exchange of information were provided once to the medical office staff during ongoing data collections on documentation of immunization activities. In months 5 & 6 of the second quarter, ongoing data collection on documentation of immunization activities progressed without further intervention. In months 7, 8 and 9 of the third quarter, continuous assessment, feedback, and exchange of information were provided twice, three and four times respectively to the medical office staff (Table 1).

Table 1 showing the intervention process

Study Period	Study Month	Intervention
First Quarter	Month 1	Staff Training & Education <u>I</u>
	Month 2	Data Entry <u>A</u>
	Month 3	Data Entry <u>A</u>
Second Quarter	Month 4	Data Entry <u>A F X</u>
	Month 5	Data Entry <u>A</u>
	Month 6	Data Entry <u>A</u>
Third Quarter	Month 7	Data Entry 2 sessions of <u>A F</u> <u>X</u>
	Month 8	Data Entry 3 sessions of <u>A F</u> <u>X</u>
	Month 9	Data Entry 4 sessions of <u>A F</u> <u>X</u> Staff Surveys

A-Assessment; F – Feedback; I-Incentive; X – eXchange of information

**Data Analysis**

The state immunization program utilized a unique identification number assigned to all facilities with access to the WEBIZ to determine the number of entries made into the registry at this location during the study months. Monthly reports were generated by the state program. All analyses were conducted using statistical software (Minitab 15.0). We generated frequencies for the surveys due to the small sample size which made it inadequate for formal statistical testing. We tested differences in proportions for the record data using a normal approximation of the binomial, which was justified by the relatively large sample size. A descriptive analysis was performed on the surveys due to a small sample size and was used to generate frequencies

**Results**

During the study period, 18,000 children between the ages of 0 – 9 years received care at the clinic facility. 1.4% (246/18,000) new records were created in the WEBIZ. A significantly higher percentage of these new records were created in the months when the interventions were implemented: 93% as compared to 7% in non-intervention months ( $z = 19.12, p < .001$ ). The greatest number of entries, 110 (45%), was noted in April, which was one of the months during which the physician investigator provided feedback directly to the physicians during a clinic presentation. The short survey provided to two physicians and five medical assistants indicated that 71% viewed WEBIZ as beneficial as a means to having point-of-care access to immunization records. All medical assistants completed the survey and indicated time to create new records as the most common barrier to effective documentation of immunization activity in WEBIZ.

Another major barrier indicated by the medical assistants was their perception of unnecessary duplication of effort as they had to complete the documentation of immunization activities in their electronic medical records. When asked to suggest methods to decrease or eliminate barriers to documentation of immunization activity in WEBI, six respondents (86%) indicated establishing initial immunization records using Hepatitis B vaccine given soon after delivery to infants in the hospital. They also suggested a system where the vaccines can be scanned into WEBIZ and potential for a system compatible with their electronic medical record to avoid duplication of effort. Four of the respondents indicated the financial incentive motivated their

documentation of immunization activity in WEBIZ and all respondents indicated constant reminders by the physicians would increase such activities.

### Discussion

Our study examined compliance with recommendation to enter all immunization activity into a statewide web based immunization information system (WEBIZ) without a state mandate. It also sought to determine perceived barriers and the impact of pre-training and utilization of the Center for Disease Control and Prevention (CDC) assessment, feedback, incentive and exchange (AFIX) strategy on provider compliance with WEBIZ recommendation. Although this strategy has been shown previously to improve immunization rates in public clinics from 20% to 40% (Standards for pediatric immunization practices, 1993 & Szilagyi et al. 2000), our study found low compliance in utilization of WEBIZ using this strategy in the absence of a state mandate.

Staffs who participated in our survey, indicated that a financial incentive (e.g. paying for at least an hour for staff to input data into the WEBIZ) would improve the use of WEBIZ, but the low number of new records (1.4%) established during our study despite a financial incentive of \$3000 to the practice shows that financial incentive alone without a mandate does not consistently lead to compliance with recommendation consistent with other studies (Glickman SW, Peterson ED. Innovative health reform models: pay-for-performance initiatives).

Our finding that time to create new records is the most common barrier to utilization of WEBIZ is also consistent with other studies (Clark et al, 2006, American Immunization Registry Association, 2009). The success of any strategy to improve utilization of a program depends upon how users of the program view its potential effectiveness and how well it resolves existing problems. Our pilot medical practice already has an electronic medical record and a method for tracking childhood immunization records such that the staff saw using WEBIZ as a time consuming duplication of effort.

Our study provides an insight into how effective the WEBIZ would be without a state mandate in Nevada. Providers in our study want a user friendly system which will not disrupt their clinic flow. The suggestions by participants, to establish initial immunization record in WEBIZ using either birth record or initial hospital hepatitis B vaccination as a method to reduce time needed to create new record warrant further evaluation. Such a system would allow providers to update their immunization activity

in WEBIZ without the process of establishing initial records that involves the documentation of demographic data considered time consuming by these providers.

This study has limitations that warrant consideration. First, although our pilot site resembles a mid-sized pediatric practice in Southern Nevada and provided care to a diverse patient population it may differ from other private provider settings in some regards. This is a one site study conducted in one region of the state and hence must be conservatively generalized.

### Conclusion

Immunization providers are unlikely to comply with the recommendation to document their activities in a statewide immunization registry without a state mandate. Practice incentives should be combined with frequent feedback and a state mandate to achieve optimal compliance. Utilizing hospital initial hepatitis B vaccination to establish initial record in WEBIZ could potentially reduce time to establish record in provider office identified as a major barrier to compliance.

### References

- American Immunization Registry Association (2009). Reminder/recall in immunization information systems. Retrieved September 5, 2009 from [http://www.immregistries.org/pdf/AIRA\\_MI\\_ROW\\_RR\\_041009.pdf](http://www.immregistries.org/pdf/AIRA_MI_ROW_RR_041009.pdf)
- Bordley, W. C., Freed, G. L., Dempsey-Tanner, T., & Lister, M. E. (1997). Challenges to Private Provider Participation in Immunization Registries. *American Journal of Preventive Medicine, 13*(2), 66 - 70.
- Centers for Disease Control and Prevention (2007). Estimated Vaccination Coverage\* with Individual Vaccines and Selected Vaccination Series Among Children 19-35 Months of Age by State and Local Area US, National Immunization Survey. Retrieved May 2, 2009, from [http://www2a.cdc.gov/nip/coverage/nis/nis\\_iap.asp?fmt=v&](http://www2a.cdc.gov/nip/coverage/nis/nis_iap.asp?fmt=v&)
- Clark, S., Cowan, A., & Bartlett, D. (2006). Private provider participation in statewide immunization registries. *BMC Public Health, 6*, 33.
- Dombkowski, K. (2006). Enhancing Private Provider Immunization Recall. Retrieved May, 2, 2009, from <http://www.med.umich.edu/mott/research/projects/Enhancing%20Private%20Provider%20Imm%20Dombkowski.pdf>

Glickman SW, Peterson ED. Innovative health reform models: pay-for-performance initiatives. *Am J Manag Care*. 2009 Dec; 15(10 Suppl):S300-5.

Glazner, J., Beaty, B., Pearson, K., Elaine Lowery, N., & Berman, S. Using an immunization registry: effect on practice costs and time. *Ambul Pediatr*, 4(1), 34-40.

Hambidge, S., Davidson, A., Phibbs, S., Chandramouli, V., Zerbe, G., LeBaron, C., et al. (2004). Strategies to improve immunization rates and well-child care in a disadvantaged population: a cluster randomized controlled trial. *Arch Pediatr Adolesc Med*, 158(2), 162-169.

Haynes, R., Davis, D., McKibbon, A., & Tugwell, P. (1984). A critical appraisal of the efficacy of continuing medical education. *JAMA*, 251(1), 61-64.

Immunization information system progress--United States, 2004. (2005). *MMWR Morb Mortal Wkly Rep*, 54(45), 1156-1157.

Lieu, T., Black, S., Sorel, M., Ray, P., & Shinefield, H. (1996). Would better adherence to guidelines improve childhood immunization rates? *Pediatrics*, 98(6 Pt 1), 1062-1068.

Linkins, R., Salmon, D., Omer, S., Pan, W., Stokley, S., & Halsey, N. (2006). Support for immunization registries among parents of vaccinated and unvaccinated school-aged children: a case control study. *BMC Public Health*, 6, 236.

Pierce, C., Goldstein, M., Suozzi, K., Gallaher, M., Dietz, V., & Stevenson, J. (1996). The impact of the standards for pediatric immunization practices on vaccination coverage levels. *JAMA*, 276(8), 626-630.

Rodewald, L., Peak, R., Ezzati-Rick, T., Zell, E., & Thompson, K. (1997). Who are the Immunization Providers for U.S. children: findings from the 1994 National Health Interview Survey Provider Record Check. *Ambulatory Child Health*, 2, 168.

Szilagyi, P., Bordley, C., Vann, J., Chelminski, A., Kraus, R., Margolis, P., et al. (2000). Effect of patient reminder/recall interventions on immunization rates: A review. *JAMA*, 284(14), 1820-1827.

Wyeth Pharmaceuticals. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the funding agency.

The authors would like to acknowledge the efforts of Tanya Plotnick-Vega, WebIZ data analyst with the Nevada State Health Division for her assistance with generating reports.

### **Competing Interests**

The author(s) declare they have no competing interests.

### **Acknowledgements**

This study was funded by Every Child By Two (ECBT) in Washington DC through a grant from