EVALUATION OF THE NEBRASKA STATE IMMUNIZATION INFORMATION SYSTEM (NESIIS)

January 2016

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EXECUTIVE SUMMARY

As part of a development project for a surveillance system evaluation protocol, the University of Nebraska Public Policy Center conducted an evaluation of the Nebraska State Immunization Information System (NESIIS) – the statewide vaccination registry – for the Nebraska Department of Health and Human Services (NDHHS). Key findings from the evaluation include the following:

- There are trends for growing enrollment and reporting by private providers.
- Timeliness of providers in reporting a vaccine administration is good.
- Data capture rates above 100% indicate that the relationship between NESIIS data and population data and estimates from Nebraska Vital Records and the U.S. Census Bureau procedures and protocols should be examined to determine the best definitions to use for this metric. NDHHS may want to consider calculating this measure separately from the method used by the CDC.
- Dramatic changes were seen in demographic data capture rates after 2010. Any changes in protocols and procedures should be examined to determine their impact on data capture.
- Using data for disease surveillance is difficult; the following changes are recommended to improve the utility of the surveillance system:
    - Nebraska does not have mandatory reporting of immunizations. Legislative changes are needed to implement mandatory reporting.
    - Application interfaces make data difficult to extract, either as summary data or person-level data. The contracted database manager should make changes to ensure this data is easily and directly accessible.

INTRODUCTION

This evaluation is part of an evaluation protocol development project conducted for the Nebraska Department of Health and Human Services (NDHHS). The goal of the overall project is to create a brief evaluation protocol based on the Centers for Disease Control and Prevention's (CDC) guidelines for evaluating public health surveillance systems[1]. The CDC's guidelines provide a general, task-oriented framework for evaluating surveillance systems, and are based on the recognition that surveillance system evaluations should be relevant and adapted to the specific surveillance system and questions of interest. This evaluation is conducted alongside construction of the evaluation protocol, with the intent of informing its composition. The evaluation protocol developed in this project is for a brief evaluation that emphasizes making choices about the highest priorities for the evaluation, rather than completing the entire evaluation outlined in the CDC guidelines.

This evaluation is of the Nebraska State Immunization Information System (NESIIS). The Nebraska State Immunization Information System is a statewide vaccination registry for both public and private vaccine providers, and tracks immunization information across the lifespan. The data collected is used by many stakeholders in a variety of ways. NDHHS uses NESIIS primarily for determining immunization coverage rates, disease surveillance, tracking vaccine doses in the event of a recall, and to inform strategic planning and program outreach in the Vaccines for Children and Immunization programs.

STAKEHOLDERS

EVALUATION TEAM

The evaluation design includes a participatory approach to ensure that the needs of project sponsors are incorporated in the technical approach as the project unfolds over time. This design is particularly useful for complex projects that are collaborative in nature.[2] The participatory approach involves an evaluation team that includes multiple stakeholders. The team framework creates greater knowledge and support within the client organization and substantially improves project process and outcomes by providing a regular setting for researchers, organizational leadership, and key stakeholders to develop shared goals, expectations, needs, and knowledge. The team is able to review progress on project activities, discuss challenges, identify and solve problems, explore options, share knowledge and insights, and request feedback and advice.

[1] Centers for Disease Control and Prevention (2001). Updated guidelines for evaluating public health surveillance systems: Recommendations from the guidelines working group. *MMWR, 50(13),* 1-35. Retrieved from http://www.cdc.gov/mmwr/PDF/rr/rr5013.pdf.

[2] Greene, J. C. (1988). Stakeholder participation and utilization in program evaluation. *Evaluation Review, 12(2),* 91-116. Mark, M.M., & Shotland, R. L. (1985).Stakeholder-based evaluation and value judgments. *Evaluation Review, 9,* 605-626.

The NDHHS Office of Health Statistics, within the Epidemiology and Informatics Unit of the Division of Public Health, administers the NESIIS system. In addition to representatives from The Evaluation Team consisted of the Epidemiology and Informatics Unit Administrator and representatives from: the Office of Health Statistics, Epidemiology and Health Alert Network, Maternal Child Health Epidemiology, and the Office of Community Health and Performance Management. Representatives from the University of Nebraska Public Policy Center lead the evaluation team through the evaluation process, and analyzed the evaluation data. Each office had at least two representatives involved on the Evaluation Team at some point during the evaluation process.

DESCRIPTION OF THE SYSTEM

PURPOSE

The general purpose of NESIIS is to track all vaccines given in Nebraska. This information is used to:

1. Track general vaccination coverage among the State's population,
2. Interface with other surveillance and tracking systems, specifically the Vaccine Tracking System (VtrckS) and the Vaccine Adverse Event Reporting System (VAERS), in order to identify and notify people who may have received a faulty vaccine dose,
3. Provide information to schools and early childhood programs which require vaccines for children who are enrolled,
4. Provide individuals with information about their own vaccine history, and
5. Track vaccine doses available in the event of bioterrorism or other public health emergency, when the event or disease has a possible vaccine.

STANDARDS

The Centers for Disease Control and Prevention (CDC) sets functional standards that all state Immunization Information Systems (IIS) are expected to meet. All states with an IIS are required to submit an annual report to the CDC which measures compliance with and/or progress toward meeting these standards. Appendix A contains a table of the current IIS functional standards.

In addition to the functional standards required by the CDC, the American Immunization Registry Association (AIRA) formed the Modeling of Immunization Registry Operations Workgroup (MIROW) to analyze and improve IIS operations. MIROW develops and publishes best practice recommendations for IIS operations and processes. NESIIS follows these guidelines in addition to the CDC functional standards. Some of the CDC functional standards apply to questions addressed by the current evaluation (see Evaluation Design section of this document), and NESIIS was evaluated against the goals set by the CDC for these functional standards.

STRUCTURE AND USE

NESIIS has several sources that report data into the system, as well as several users of various data outputs (Figure 1). Data is submitted into the electronic system by any organization which administers vaccine in Nebraska. All data submission is voluntary except for vaccine administered with funding from the Vaccines for Children Program, which requires reporting for vaccinations given to youth in schools and early childhood programs. Organizations that submit data include:

- Public Immunization Clinics (run by local public health departments and/or community action programs)
- Medical Clinics
- Urgent Care Clinics
- School-based clinics
- Hospitals
- Pharmacies
- Nursing Homes / Long-term Care Facilities
- Potentially anyone else who administers any vaccines in Nebraska, as these organizations can voluntarily input data into the system, and in doing so can use the system to track vaccine inventory.

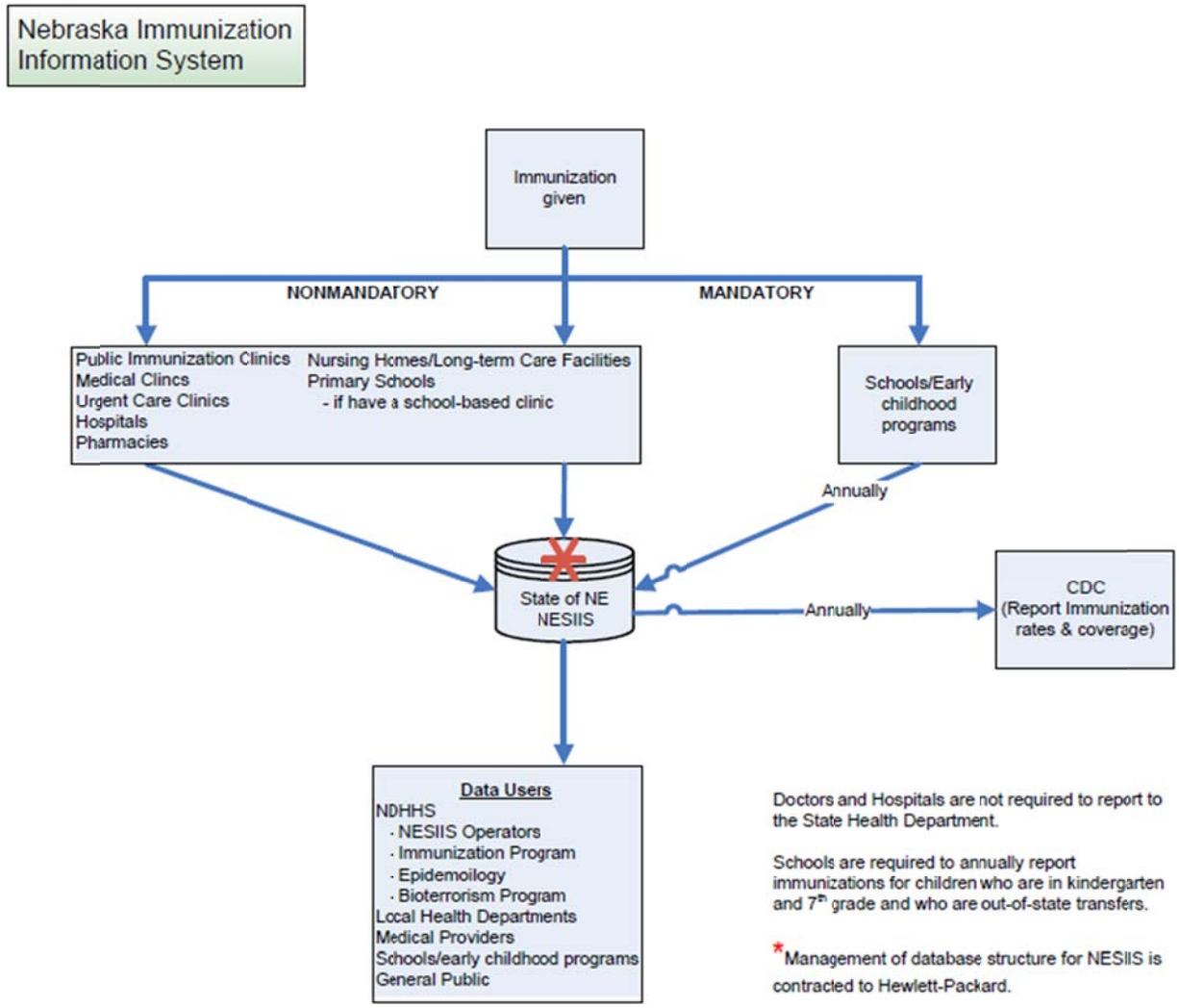
Data is reported into a relational electronic database, and undergoes automated quality checks which include patient matching protocols, and checks for proper administration of a vaccine. In addition to three full-time program staff who can work with submitters and edit data if corrections are needed, Hewlett-Packard (HP) is contracted to manage the database structure, making changes required by the CDC and providing data for reports.

There are numerous users of the NESIIS data, and variety of ways in which they use the data. NESIIS data users include:

- NDHHS – various programs
    - NESIIS
        - Immunization Information System Annual Report (IISAR) to CDC
        - Additional grant-driven reporting
    - Other NDHHS surveillance systems (VTrckS and VAERS)
    - Immunization Program, and Vaccines for Children (VFC) Program
        - Vaccine management and distribution tracking
        - Vaccination rates
        - Vaccine uptake information for disease prevention outreach
    - Epidemiology
        - Examine vaccine uptake and disease rate for vaccine preventable diseases

        - Examine inappropriate use of vaccines
    - Bioterrorism Preparedness Program
        - Track vaccines in Strategic National Stockpile if event requires them
- Local health departments
    - Track administration of vaccine in their own programs
    - Investigations into disease outbreaks
    - Determining vaccine rates within their districts
- Medical Providers
    - Look up patient records
    - Track patient vaccines due
    - Track vaccine inventory
- Schools/early childhood programs
    - Verify that children have vaccines required for enrollment
    - Set up watch list of children who cannot be verified
    - Produce letters to parents requesting proof of vaccination
- General Public
    - Any individual can:
        - Look up their own vaccine record
        - See when their next vaccines are recommended (based on national ACIP vaccination schedule)

Figure 1. General Structure of NESIIS



EVALUATION DESIGN

The brief evaluation protocol being developed alongside this evaluation emphasizes setting evaluation priorities to fit the time, funding, and other constraints faced by surveillance systems. A critical step in this evaluation is determining the key questions of interest, which then define the subsequent evaluation activities.

The Evaluation Team met several times to discuss the system, its benefits and potential enhancements, and used this information to develop the questions of interested that should be addressed in the evaluation of the NESIIS. The three principle evaluation questions the Team

was interested in all relate to CDC IIS Functional Standard 3: Maintain data quality (accurate, complete, timely data) on all immunization and demographic information in the IIS:

1. How complete is the data for surveillance purposes?
2. How timely is data reporting?
3. Are vaccinations reported to NESIIS under-represented for identifiable areas around the state (counties)? (Note that due to non-mandatory reporting of vaccine administration in Nebraska, if under-representation is found it cannot be known whether the vaccinations were not given, or were given and not reported. If deficiencies are found related to this question, further investigation to determine the reason for under-representation will be recommended.)

A fourth question arose during the process of collecting information for the above 3 questions:

4. How well does the system function in providing data to answer surveillance questions?

Although other populations have information recorded in NESIIS, a priority population for the tracking of vaccine administration is children aged 0-5 years for NDHHS. This evaluation focuses on the priority population for measures of completeness, timeliness, and representativeness.

Quantitative measures of completeness timeliness and representativeness were selected based on data that is available in the IISAR, and were examined over the past 5 years (2010 through 2014). The same measures, broken out by county, and by the demographic variables of gender, race, and ethnicity, were requested from the organization contracted to maintain the electronic database. This information was then compared to Nebraska Vital Records or U.S. Census Bureau data. Measures used are:

- Data completeness
    - Birth population capture
        - Defined as number of births in each year with a record in the data within 6 weeks of birth
        - Compare to Nebraska Vital Records number of births through the most recent year available (calendar year 2013; to calculate number of births with a record out of total number of births)
    - Core data capture
        - Percent of children with data in the fields: gender, race, ethnicity, and date of birth
        - Percent of cases with data in the fields: vaccine product type, and vaccine administration date
    - Provider site participation
        - Defined as number of public and private vaccine provider sites reporting data to NESIIS

        - Compare to number of public and private vaccine provider sites enrolled in NESIIS (to calculate a percentage of sites that report out of those enrolled)
- Timeliness
    - Vaccines reported in a given timeframe
        - Defined as vaccines administered to children at least 4 months through 5 years at the date of administration (2010 through 2012) or children 0 through 18 years at the date of administration (2013 and 2014), reported within specified timeframes:
            - One day or less
            - Two through seven days
            - Eight through fourteen days
            - Fifteen through 30 days
            - More than 30 days
    - Geographic and demographic breakdowns of the data will be compared to the statewide data
- Representativeness
    - Several definitions:
        - Percent of children 0 through 5 years old with a record in the system (based on U.S. Census Bureau population data for the same age group)
        - Percent of children 0 through 5 years with two or more immunizations recorded in NESIIS (based on U.S. Census Bureau population data for the same age group to calculate rate of child participation in NESIIS)
        - Percent of children 19 through 35 months with complete 4:3:1:3:3:1:4 immunization series (based on U.S. Census Bureau population data for the same age group to calculate rate of complete data in NESIIS)
        - Frequencies for the fields: gender, race, and ethnicity for children 0 through 5 years of age
            - Compare frequencies to Census Bureau data on the gender, race, and ethnicity populations of children 5 and under

Data will be collected from the NESIIS system, with comparison data from Nebraska Vital Statistics Reports and/or the U.S. Census Bureau. A limitation of NESIIS data is that immunization providers are not required to submit information on immunizations administered to the system, and therefore it is unknown how many immunizations are actually given in Nebraska. The NESIIS staff is continually working with new providers to register with the system and provide immunization data. A barrier to this effort is that it is also unknown how many immunization providers are in Nebraska; no complete list of all providers exists. However, as Nebraska's statewide immunization registry, there is no better source of immunizations in Nebraska than NESIIS.

RESULTS

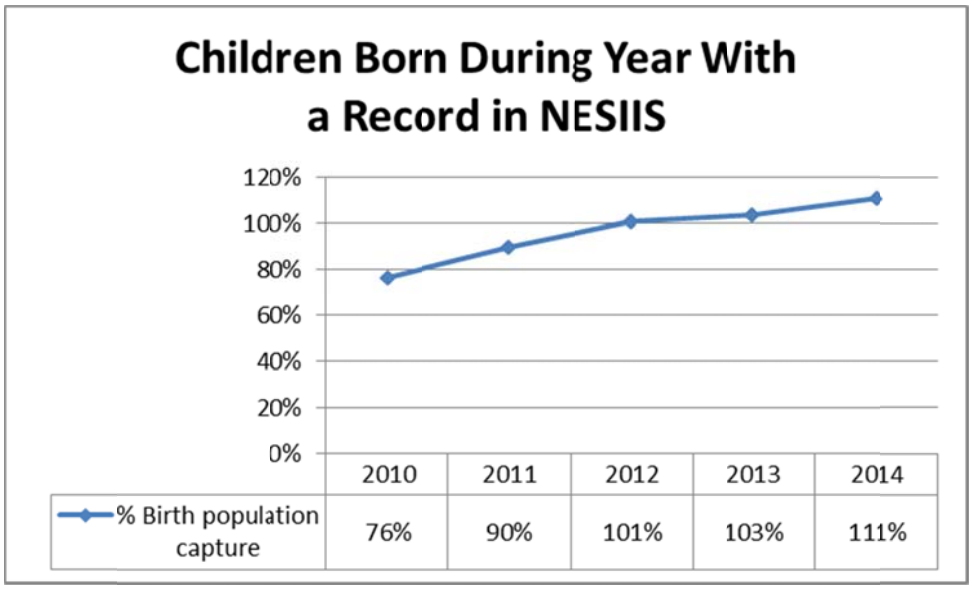
Most of the selected measures are not broken out in the IISAR by gender, race, ethnicity, or county. This data was requested by the evaluators, however, one of the three full-time NESIIS staff resigned at the start of the evaluation process, and the short-handed staff was not able to work with the database contractor to provide this data while still performing their regular duties. Therefore, none of the planned demographic or geographic analyses can be evaluated. The IISAR does not report variance measures for the data examined, thus statistical significance tests cannot be conducted using this data. Definition of measures is limited to those used in the IISAR.

HOW COMPLETE IS THE DATA FOR SURVEILLANCE PURPOSES?

BIRTH POPULATION CAPTURE

Based on the 2010 through 2014 IISAR reports to the CDC, the completeness of NESIIS birth population capture has been increasing (Figure 2). This measure uses the number of children born in the calendar year with a record in NESIIS, compared to the number of children born in Nebraska during the calendar year. Because the numerator uses children with a record in the system residing in Nebraska either at birth or currently (whether they were born in Nebraska or not – such as children who moved into the state when they were very young) and the denominator uses only children born in Nebraska, this indicator may be over 100%.

Figure 2. Children Born During Year With a Record in NESIIS

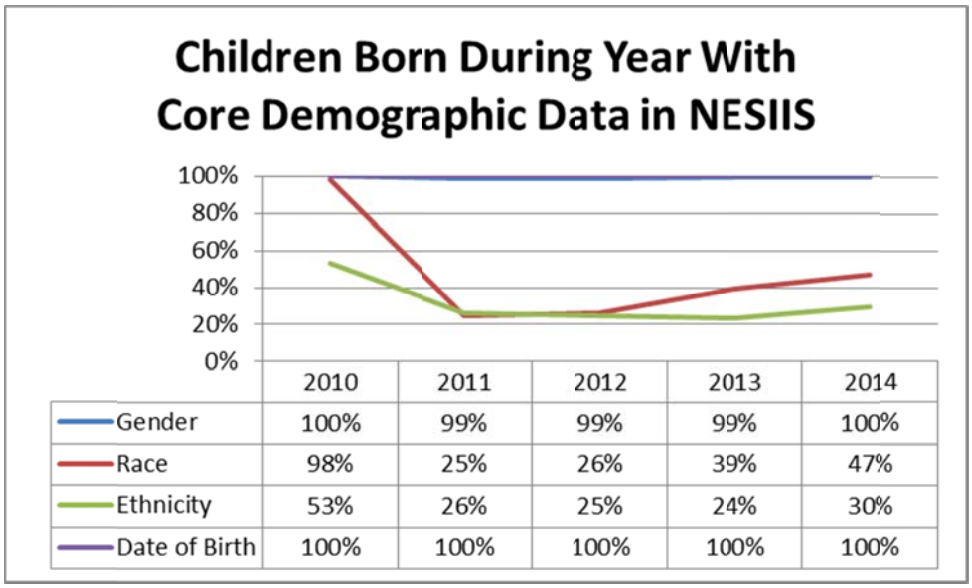


Source: 2010 through 2014 Nebraska IISAR reports, and Nebraska Vital Statistics Reports, except 2014 which uses U.S .Census Bureau data as the 2014 Nebraska Vital Statistics report is not yet publicly available.
Notes: Data is for children born during each calendar year. In 2013 the measure changed from records established within 6 weeks of birth to children born in that year with a record in NESIIS with no timeframe specified.

Core Data Capture

For children born during the calendar year with a record in NESIIS, there is excellent capture of gender data (Figure 3). 2010 also had excellent to very good data capture for race and ethnicity, but the proportion of records with data in these fields dropped dramatically in 2011 and has remained low. Date of birth is a required field, so age can be calculated for all cases.

Figure 3. Children Born During Year With Core Demographic Data in NESIIS



	2010	2011	2012	2013	2014
Gender	100%	99%	99%	99%	100%
Race	98%	25%	26%	39%	47%
Ethnicity	53%	26%	25%	24%	30%
Date of Birth	100%	100%	100%	100%	100%

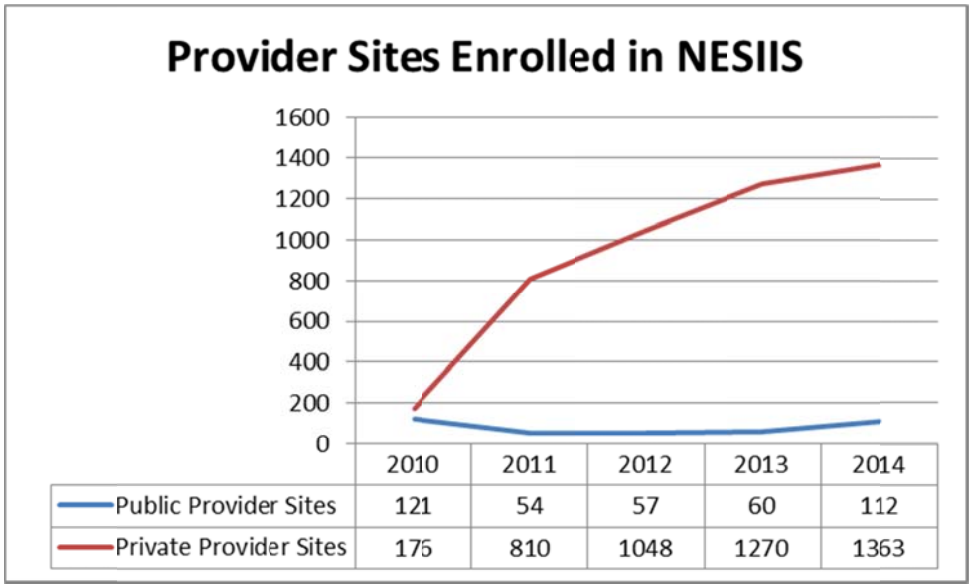
Source: 2010 through 2014 Nebraska IISAR reports.
Note: Data is for children born during each calendar year.

The type of vaccination and date of administration is required data for all records submitted to NESIIS. Thus, like date of birth, this information is available for 100% of cases.

Provider Site Participation

Provider site enrollment in NESIIS has varied since 2010 (Figure 4). Private provider enrollment has been steadily growing.

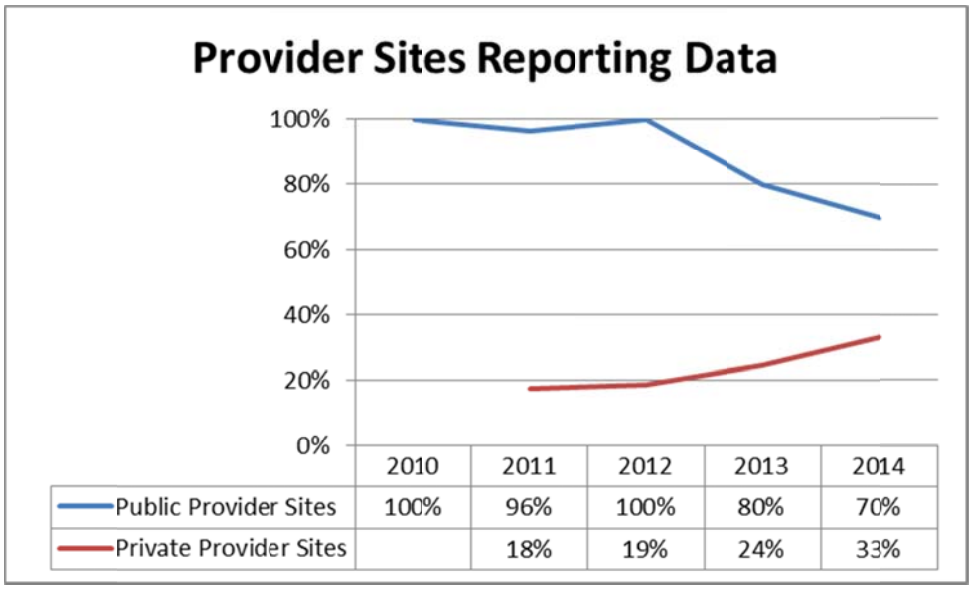
Figure 4. Provider Sites Enrolled in NESIIS



Source: 2010 through 2014 Nebraska IISAR reports.
Note: Data is for provider sites as of December 31 of each calendar year. Restructuring of the public immunization program in Nebraska accounts for the decrease in public providers from 2010 to 2011.

Provider reporting has also varied since 2010 (Figure 5). The percent of public sites reporting data appears to be dropping, while the percent of private sites reporting data is slowly increasing.

Figure 5. Provider Sites Reporting Data

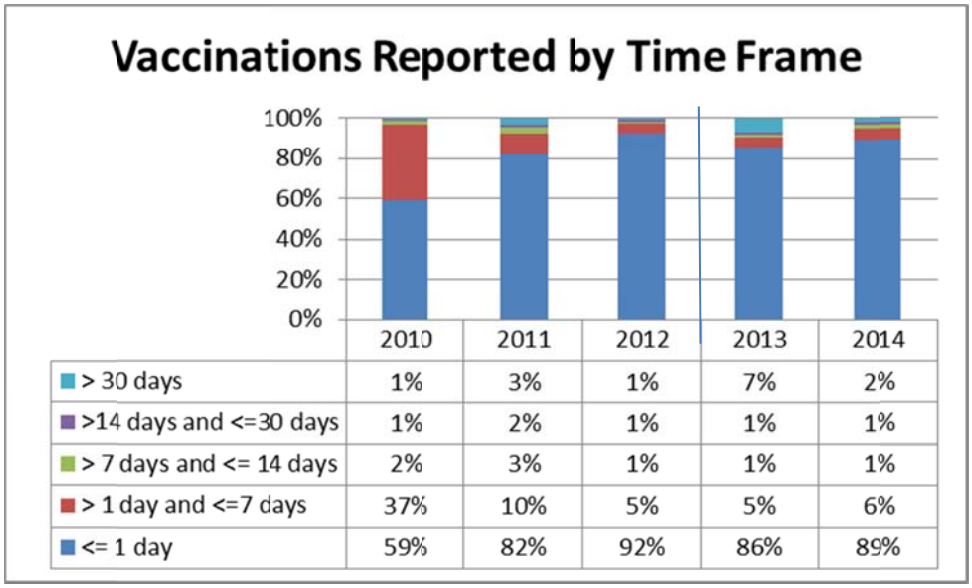


Source: 2010 through 2014 Nebraska IISAR reports.
Note: Data is for provider sites as of December 31 of each calendar year. The 2010 IISAR report data is unreadable for this measure.

How timely is data reporting?

Data reporting appears relatively timely (Figure 6). In 2012, 92% of doses reported for persons age 0 through 18 years were recorded within one day of administration, and 97% were reported within one week. The most recent standard found on the CDC website summarizing state IISAR reports[3] mentions a goal for 2012 data of 70% of doses reported within 30 days of administration, which 76% of states met in 2012. Tracking data on this measure is not consistent from 2010 through 2014, as the IISAR reporting changed between 2012 and 2013. Data collected in 2010 through 2012 was for children 4 months through 5 years of age, while data from 2013 and 2014 is for children 0 through 18 years of age. Given the non-comparability of data from the 2010 through 2012 and the 2013 through 2014 report years, data for determining trends is limited.

Figure 6. Vaccinations Reported by Time Frame



	2010	2011	2012	2013	2014
> 30 days	1%	3%	1%	7%	2%
>14 days and <=30 days	1%	2%	1%	1%	1%
> 7 days and <= 14 days	2%	3%	1%	1%	1%
> 1 day and <=7 days	37%	10%	5%	5%	6%
<= 1 day	59%	82%	92%	86%	89%

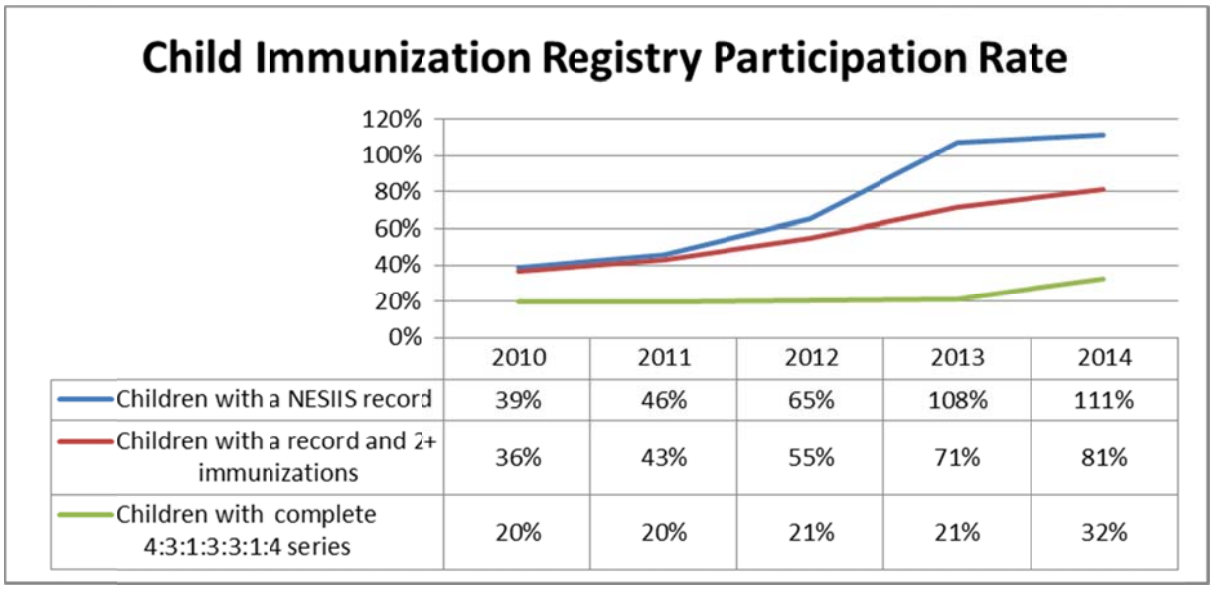
Source: 2010 through 2014 Nebraska IISAR reports.
Note: Data from 2010 through 2012 are not comparable to data from 2013 and 2014 for this measure. 2010 through 2012 data is for children 4 months through 5 years of age. Data from 2013 and 2014 is from children 0 through 18 years of age.

[3] Centers for Disease Control and Prevention (2013). Progress in Immunization Information Systems – United States, 2012. *MMWR*, *62*(49), 1005-1008. Retrieved 12/29/2015 from: http://www.cdc.gov/vaccines/programs/iis/annual-report-iisar/mmwr.html

ARE VACCINATIONS UNDER-REPRESENTED FOR IDENTIFIABLE AREAS AROUND THE STATE?

The percentage of children 4 months through 5 years of age overall with a record in NESIIS has increased in the past 5 years, as has the proportion of children receiving 2 or more immunizations before the age of 6 (Figure 7). A Healthy People 2020[4] objective is for 95% of children under 6 years of age to have an immunization record in a state-maintained IIS. In 2014, Nebraska's rate was 111%. (This proportion of greater than 100% is partly due to population estimates available from the Census Bureau being lower than the number of young children with an active record in NESIIS – records remain active for a period of time after a child may no longer be living in Nebraska.) A good indication of having an active record in NESIIS is that a child has 2 or more immunizations recorded; in 2014, 81% of children 4 months through 5 years have this record. Nationally, 86% of children under 6 years of age had an immunization record in 2012.[5] Data by geographic area, which would directly answer this question, was not provided.

Figure 7. Child Immunization Registry Participation Rate



	2010	2011	2012	2013	2014
Children with a NESIIS record	39%	46%	65%	108%	111%
Children with a record and 2+ immunizations	36%	43%	55%	71%	81%
Children with complete 4:3:1:3:3:1:4 series	20%	20%	21%	21%	32%

Source: 2010 through 2014 Nebraska IISAR reports, and U.S. Census Bureau.
Note: Data for children with a record in NESIIS and with 2+ immunizations is for children 4 months through 5 years of age. Data for children with a complete 4:3:1:3:3:1:4 series of immunizations is for children age 19 through 35 months.

[4] US Department of Health and Human Services. Healthy people 2020. Washington, DC: US Department of Health and Human Services; 2010. Available at: http://healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicid=23

[5] Centers for Disease Control and Prevention (2013). Progress in Immunization Information Systems – United States, 2012. *MMWR, 62*(49), 1005-1008. Retrieved 12/29/2015 from: http://www.cdc.gov/vaccines/programs/iis/annual-report-iisar/mmwr.html

How well does the system function in providing data to answer surveillance questions?

In addition to other uses, NESIIS is intended to be used as a surveillance system. During Evaluation Team meetings, representatives from Epidemiology noted the difficulty of pulling data from NESIIS for monitoring purposes due to limitations in application interfaces. (e.g., using SQL and Excel to extract and receive person-level data from the electronic database maintained by a contractor). During this evaluation, we also ran into barriers in trying to get data from the system. Data analysts for this evaluation did not have direct access to the system, and therefore requested summary statistics, both statewide numbers and broken down by selected demographic and geographic categories. This data was never received. An inability to easily access data in a usable format impairs the use of NESIIS as a surveillance system.

Because reporting the administration of a vaccine in NESIIS is largely voluntary for most vaccine providers, measures of vaccine coverage can only be calculated based on reported vaccines, not actual vaccines given. It is difficult to use the system for surveillance purposes because it cannot be known how many vaccines were actually administered, unless reporting is legislatively mandated. Several successful models of mandatory IIS reporting exist, as nearly half of all states have mandatory IIS reporting requirements.[6]

Discussion

NESIIS is a large surveillance system with many different entities reporting into and using the system for numerous purposes. In this evaluation, we asked four main questions about the system.

How complete is the data for surveillance purposes?

General population capture measures for children born during the calendar year, and for children under 6, particularly for 2013 and 2014, are higher than 100%. This was the case whether using Nebraska Vital Statistics Reports or U.S. Census Bureau population estimates. The reason for this is the numerator uses children with a record in the system residing in Nebraska either at birth or currently (whether they were born in Nebraska or not – such as children who moved into the state when they were very young) and the denominator uses only children born in Nebraska; it is, therefore, possible for this indicator to be over 100%. This is not an ideal measure, but is what is available from the IISAR. The definitions of the population groups for the numerator and denominator could have been better matched if data were available directly from the NESIIS data system, but that was not available for this evaluation.

[6] Martin, D.W., Lowery, E., Brand, B., Gold, R., & Horlick, G. (2015). Immunization Information Systems: A decade of progress in law and policy. *Journal of Public Health Management & Practice, 21(3),* 296-303.

General demographic data capture is excellent for gender and date of birth, as well as type of vaccine administered and date of vaccine, which are all central to the systems surveillance purpose. For other purposes, such as identifying potential healthcare disparities, additional demographic data for race and ethnicity is not well captured, at least not since 2010, when data capture for these fields was relatively good. Starting in 2011there was a large increase in private providers transmitting electronic health records (EHRs) to the system, and these records were less likely to include data on race and ethnicity that earlier paper records. Starting in 2013 increased efforts to ensure inclusion of this and other information in EHR submissions has improved the availability of this data in NESIIS.

There are trends for growing enrollment and reporting by private providers. In 2014, one-third of private providers who had enrolled in NESIIS reported administering vaccine. There are two unknowns in determining what this means: 1) the total number of private providers in the state, and 2) the number of vaccines delivered but unreported. There is no current system within NDHHS that can provide a total count for either of these numbers.

Reporting of vaccine administration by public vaccine providers has declined. The reason for this is unclear. Discussions with public providers could help to discover perceptions or procedures that could be contributing to this decline in reporting.

HOW TIMELY IS DATA REPORTING?

Timeliness of data reporting also appears to be good as of 2012, the most recent year for which a reported standard could be found. The goal in 2012 was for a minimum of 70% of all vaccines to be reported in 30 days or less.[7] In Nebraska, 99% of vaccines for children under 6 years of age were reported within this timeframe, substantially surpassing this goal.

ARE VACCINATIONS REPORTED TO NESIIS UNDER-REPRESENTED FOR IDENTIFIABLE AREAS AROUND THE STATE (COUNTIES)?

All data about NESIIS reported here was gathered from Nebraska IISARs to the CDC. IISAR data is not broken out by county. This data was requested by the lead evaluators but was not received. Representativeness by geographic area therefore could not be evaluated. Statewide, Nebraska is meeting the Healthy People 2020[8] objective for 95% of children under 6 years of age to have an immunization record in a state-maintained IIS.

[7] Centers for Disease Control and Prevention (2013). Progress in Immunization Information Systems – United States, 2012. *MMWR, 62*(49), 1005-1008. Retrieved 12/29/2015 from: http://www.cdc.gov/vaccines/programs/iis/annual-report-iisar/mmwr.html

[8] US Department of Health and Human Services. Healthy people 2020. Washington, DC: US Department of Health and Human Services; 2010. Available at:

How well does the system function in providing data to answer surveillance questions?

Summary data was requested on several evaluation measures to examine questions related to demographic and geographic completeness and representativeness. This data was not received by the evaluators, however. One of the three full-time NESIIS staff members left NDHHS employment early in the evaluation, and remaining staff were focused on ensuring all regular duties for the system were performed, rather than additional requests for the evaluation. The scope of the evaluation was therefore scaled back to account for the demands on the time of remaining NESIIS staff members.

Changes over time in the IISAR questions asked by the CDC makes examining trends across time difficult for some measures (i.e., population data capture, vaccinations reported within specified timeframes). Because of this, additional data not available in every year of the IISAR was requested for statewide measures so that trends could be examined using data consistent from year-to-year. This data also was not received. In Evaluation Team meetings, DHHS epidemiologists noted the difficulty of gaining access to NESIIS data for surveillance purposes.

An additional barrier for using NESIIS for monitoring purposes is non-mandatory data reporting. Nearly half (23) of all U.S. States have mandatory IIS reporting requirements for at least some providers other than public providers and schools (e.g., private providers, pharmacies).[9] Several models for successful mandatory reporting exist.

Recommendations

NESIIS Recommendations

1. Consider calculating birth population capture rates independent of definitions used in the IISAR. Basing both the numerator and denominator of this measure on children born in Nebraska, for example, would remove the possibility of rates greater than 100%.
2. Examine policies and procedures to understand what may have caused dramatic changes in data trends (e.g., race and ethnicity data capture from 2010 to 2011 and later). Use this information to improve data quality.
3. Discuss the decline in reporting of vaccine administration with public vaccine providers to identify reasons for this decline, and to determine ways to increase reporting by public providers. A formal data-gathering technique such as focus groups would help structure this discussion.

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http://healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicid=23

[9] Martin, D.W., Lowery, E., Brand, B., Gold, R., & Horlick, G. (2015). Immunization Information Systems: A decade of progress in law and policy. *Journal of Public Health Management & Practice, 21(3),* 296-303.

4. Discuss the current requirements for a person's data to remain an "active" record in NESIIS. Consider whether the requirements need to be changed, since records are currently active for people who may no longer be Nebraska residents or receiving immunizations from Nebraska providers.
5. Develop mandatory reporting to NESIIS (this would require changes to current Nebraska law).
    a. Absent a change in Nebraska law, consider additional enhancements to the system (such as the recent addition of a vaccine inventory tracking module) to attract more private providers to register with and report to the system. Consult with private providers through focus groups or other formal methods to gather information about what enhancements they would like to see to the system, what is important to capture in the system, and how and when they would like to receive data. This will continue to leverage the existing NESIIS system to provide value beyond vaccine registration.
6. Work with database contractor to make data easily accessible for disease surveillance and monitoring purposes.

Recommended Use of Evaluation Results

A key reason for conducting evaluation is to ensure surveillance systems do what they are intended to, and to identify improvements to increase usability and/or efficiency of the system. Thus, it is essential that the results and recommendations from this evaluation be carried forward to inform future NESIIS and NDHHS endeavors.

Recommended next steps for the use of these evaluation results are:

1. Use this evaluation to inform NESIIS strategic planning, develop a quality improvement (QI) plan, and/or a plan for future ongoing evaluation. Document changes resulting from the plans.
2. Share this evaluation report and discuss results within NDHHS and with NESIIS stakeholders.
3. Use this evaluation to help inform development of an overall vision and strategy for evaluation of surveillance systems for the NDHHS.

APPENDIX A: IMMUNIZATION INFORMATION SYSTEM FUNCTIONAL STANDARDS

IIS Functional Standards, 2013-2017

General considerations:

A. These functional standards are intended to identify operational, programmatic, and technical capacities that all IIS should achieve by the end of 2017.
B. Some standards are environmental, and can only be implemented in conjunction with the broader Department of Health or State/Local infrastructure. The Functional Standards are intended to reflect necessary functions, whether those functions are implemented by the IIS program or others.
C. In some cases, current law or policy may preempt full implementation unless changed. In these instances, an unmet standard may serve as a suggestion for possible revisions to such law or policy.
D. Metrics must capture IIS progress toward achieving the programmatic goals and functional standards in accurate and meaningful ways. CDC will define the metrics with input from immunization programs.

Programmatic Goals and Functional Standards	
1.	**Support the delivery of clinical immunization services at the point of immunization administration, regardless of setting.**
1.1	The IIS provides individual immunization records accessible to authorized users at the point and time where immunization services are being delivered.
1.2	The IIS has an automated function that determines vaccines due, past due, or coming due ("vaccine forecast") in a manner consistent with current ACIP recommendations. Any deficiency is visible to the clinical user each time an individual's record is viewed.
1.3	The IIS automatically identifies individuals due/past due for immunization(s), to enable the production of reminder/recall notifications from within the IIS itself or from interoperable systems.
1.4	When the IIS receives queries from other health information systems, it can generate an automatic response in accordance with interoperability standards endorsed by CDC for message content/format and transport.
1.5	The IIS can receive submissions in accordance with interoperability standards endorsed by CDC for message content/format and transport.
2.	**Support the activities and requirements for publicly-purchased vaccine, including the Vaccines For Children (VFC) and state purchase programs.**
2.1	The IIS has a vaccine inventory function that tracks and decrements inventory at the provider site level according to VFC program requirements.
2.2	The IIS vaccine inventory function is available to direct data entry users and can interoperate with EHR or other inventory systems.
2.3	The IIS vaccine inventory function automatically decrements as vaccine doses are recorded.
2.4	Eligibility is tracked at the dose level for all doses administered.
2.5	The IIS interfaces with the national vaccine ordering, inventory, and distribution system (currently VTrckS).

2.6	The IIS can provide data and/or produce management reports for VFC and other public vaccine programs.
Programmatic Goals and Functional Standards	
3. **Maintain data quality (accurate, complete, timely data) on all immunization and demographic information in the IIS.**	
3.1	The IIS provides consolidated demographic and immunization records for persons of all ages in its geopolitical area, except where prohibited by law, regulation, or policy.
3.2	The IIS can regularly evaluate incoming and existing patient records to identify, prevent, and resolve duplicate and fragmented records.
3.3	The IIS can regularly evaluate incoming and existing immunization information to identify, prevent, and resolve duplicate vaccination events.
3.4	The IIS can store all IIS Core Data Elements (see Appendix B).
3.5	The IIS can establish a record in a timely manner from sources such as Vital Records for each newborn child born and residing at the date of birth in its geopolitical area.
3.6	The IIS records and makes available all submitted vaccination and/or demographic information in a timely manner.
3.7	The IIS documents active/inactive status of individuals at both the provider organization/site and geographic levels.
4. **Preserve the integrity, security, availability and privacy of all personally-identifiable health and demographic data in the IIS.**	
4.1	The IIS program has written confidentiality and privacy practices and policies based on applicable law or regulation that protect all individuals whose data are contained in the system.
4.2	The IIS has user access controls and logging, including distinct credentials for each user, least-privilege access, and routine maintenance of access privileges.
4.3	The IIS is operated or hosted on secure hardware and software in accordance with industry standards for protected health information, including standards for security/encryption, uptime and disaster recovery.
5. **Provide immunization information to all authorized stakeholders.**	
5.1	The IIS can provide immunization data access to healthcare providers, public health, and other authorized stakeholders (e.g., schools, public programs, payers) according to law, regulation or policy.
5.2	The IIS can generate predefined and/or ad hoc reports (e.g., immunization coverage, vaccine usage, and other important indicators by geographic, demographic, provider, or provider groups) for authorized users without assistance from IIS personnel.
5.3	With appropriate levels of authentication, IIS can provide copies of immunization records to individuals or parents/guardians with custodial rights.
5.4	The IIS can produce an immunization record acceptable for official purposes (e.g., school, child care, camp).
6. **Promote vaccine safety in public and private provider settings**	
6.1	Provide the necessary reports and/or functionality to facilitate vaccine recalls when necessary, including the identification of recipients by vaccine lot, manufacturer, provider, and/or time frame
6.2	Facilitate reporting and/or investigation of adverse events following immunization.