North Dakota Interoperability and IIS Data Quality

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Background

NDIIS Background

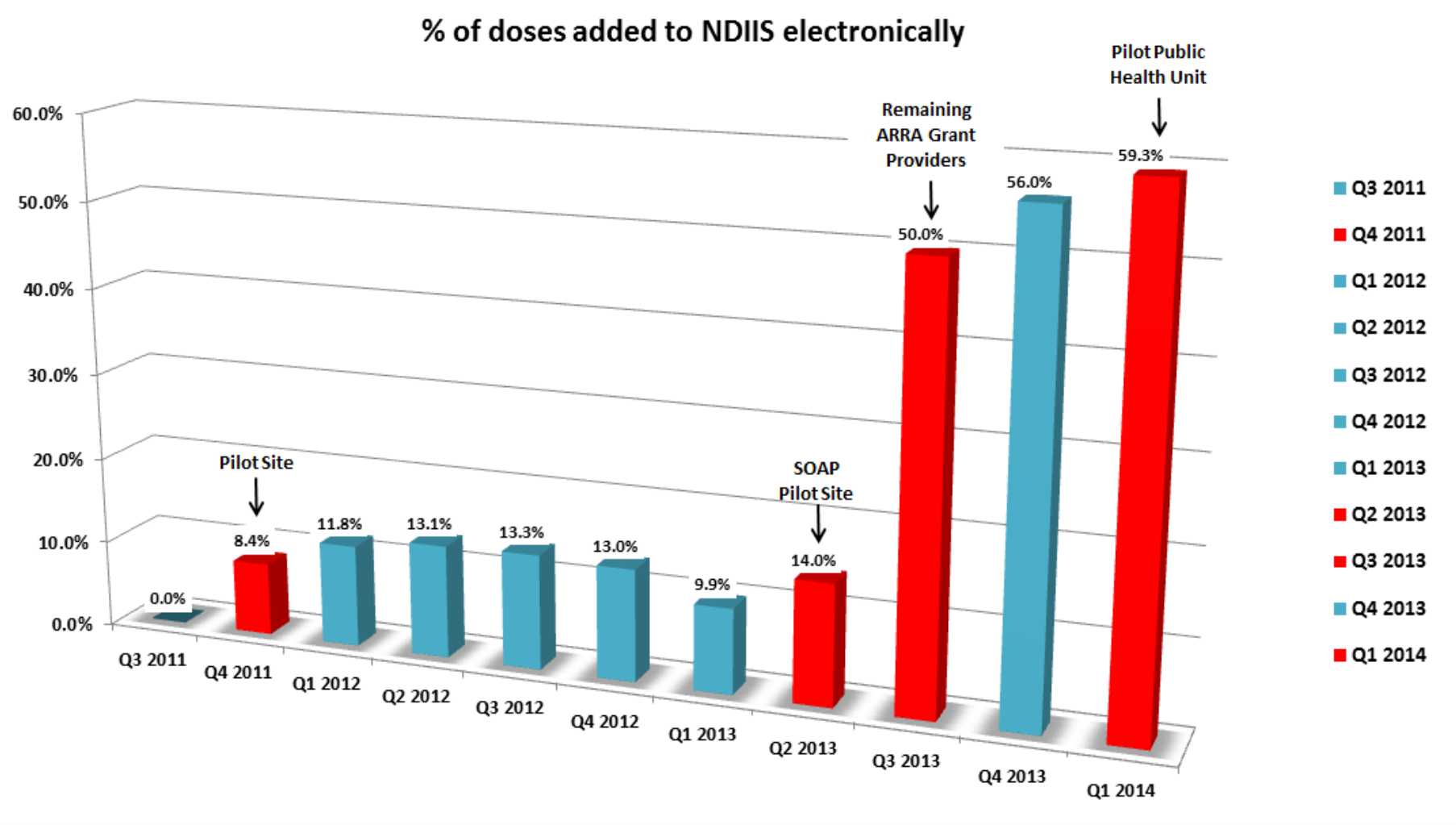
- The North Dakota Immunization Information System (NDIIS) is a confidential, population-based, computerized information system that attempts to collect vaccination data for all North Dakotans.
- Established in 1988 as a modem, dial-up system.
- The North Dakota Department of Health (NDDoH) contracted with Blue Cross/Blue Shield of North Dakota (BCBSND) in 1996 to develop the current web-based system.
  - NDIIS is located on their THOR (The Healthcare Online Resource) network.
- In May 2013, the NDIIS went through a technical upgrade that moved the system to dot net technology.
- ND Century Code requires North Dakota providers enter all childhood (under 18 years of age) immunizations into the NDIIS within 4 weeks of administration.
- There are 960,960 active client records in the NDIIS
- There are 9,302,948 dose records in the NDIIS

Current Status

Interoperability Overview

- In 2011, North Dakota received American Recovery and Reinvestment Act (ARRA) grant funds to establish interoperability between provider electronic health record (EHR) systems and the NDIIS.
- In 2012, North Dakota received additional interoperability grant funding through the Prevention and Public Health Fund (PPHF).
- Baseline measure for number of providers submitting data to the NDIIS electronically was zero
  - All providers were doing direct data entry
- As of May 2014 the NDIIS is interoperable with 203 individual provider locations and the North Dakota Health Information Network (NDHIN).
  - 175 providers are connected to the NDIIS via the NDHIN
  - The providers already connected represent 63% of all transactions reported to the NDIIS.
- By August 2015, the NDIIS will be connected to an additional 66 providers.

Interoperability Overview



Interoperability Transport

- The NDIIS supports a SOAP/HTTPS connection.
  - 28 providers directly connected via SOAP
  - 175 providers connected to NDHIN
    - 189 - connection is VPN to the NDHIN and SOAP from the NDHIN to the NDIIS
    - 15 – connection is SOAP to the NDHIN and from the NDHIN to the NDIIS
- NDIIS can connect using HL7 versions 2.3.1 and 2.5.1.
  - 87 providers connected using version 2.3.1
  - 117 providers connected using version 2.5.1

Future of NDIIS Interoperability

- **30 additional provider locations currently in differing stages of on-boarding with the NDHIN and NDIIS**
- **Utilize NDHIN for consumer access to own immunization records**
- **Receive electronic data on adult immunizations from pharmacies**
  - CVS has 6 North Dakota locations
  - Two additional local pharmacy chains

Data Quality Challenges & Lessons Learned

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Challenge

- **NDIIS interoperability requires dose level Vaccines For Children (VFC) eligibility and vaccine funding source**
  - EHR systems can be certified without having this functionality.
  - EHR systems are set up to infer funding source based on VFC eligibility.
  - EHR systems have VFC eligibility at the patient or visit level, not dose level.
  - Cannot effectively manage vaccine inventory in the NDIIS without both data fields submitted

Lesson Learned

- **Developed initial on-boarding questionnaire**
  - Conduct conference call with programmatic and technical staff from NDIIS interoperability project, provider site, provider EHR and NDHIN
  - Allows NDIIS project staff to quickly evaluate EHR readiness
    - Make "Go/No Go" decision to move to Phase 2 On-boarding (technical testing)
- **Prior to user acceptance testing, EHR vendor must demo immunization entry for NDDoH staff to ensure fields have been added at dose level and are required fields**

Initial On-Boarding Questionnaire

- **13 questions to help determine EHR readiness**

1. Does your EMR support HL7 version 2.5.1 Rev 1.4?
2. Does your EMR support the NDIIS spec/CDC HL7 version 2.5.1 Rev 1. implementation guide?
3. Does your EMR support both QBP and VXU messages?
4. Does your EMR display and/or consume RSP messages?
    a. Do you intend to use the NDIIS forecasting information?
5. Do you have procedures to handle message responses with errors?
    a. CR10 errors?
6. Does your EMR support TCP/VPN or SOAP/HTTPS message transport?
    a. For SOAP transport, can your system implement the NDIIS WSDL?
7. Does your EMR support bi-directional, real-time messaging?
8. Does your EMR support VFC accountability at the dose level?
    a. Is it a required field?
    b. Is "UNKNOWN" an option?
9. Does your EMR support dose level financial class (i.e. vaccine funding source)?
    a. Is this a required field?
    b. Is "UNKNOWN" an option?
10. Does your EMR support facility code mapping?
11. Does your EMR support the use of CVX codes?
12. Does your EMR have the capability to differentiate between historical and administered doses?
13. Does your EMR support the use of production data in the test environment?

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Challenge

- **EHR not consuming, only displaying historical immunization information from NDIIS**
  - End users are having to enter all NDIIS historical doses in to their EHR system which creates duplicate doses in NDIIS
- **EHR using their own immunization forecaster instead of NDIIS forecasting information being returned after EHR query**
  - End users are having to enter all NDIIS historical doses in to their EHR system so the internal forecaster has all necessary doses to make recommendations for future doses
  - EHR system forecaster may be out of sync with NDIIS forecaster due to new, updated and/or changing recommendations

Lesson Learned

- **Require EHR to be able to submit query messages and to display NDIIS data in the EHR for the end user**
  - QBP/RSP capability part of initial on-boarding questionnaire
- **NDIIS sends forecasting information to EHR in RSP message**
  - EHR system is screened for QBP/RSP capability and intended use of NDIIS forecasting information as part of initial on-boarding questionnaire
- **Implementing vaccine level deduplication system**
  - In April 2014, NDIIS implemented vaccine level deduplication which evaluates all doses entered manually and via HL7 interface
    - 17,479 doses manually deduplicated
    - 8,506 doses automatically deduplicated

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Challenge

- **Provider site not having plan in place prior to production "go live" to monitor and respond to VXU messages that receive an error or that do not receive an acknowledgement (ACK) back from the NDIIS**
  - Messages are not resubmitted and data is not added to the NDIIS compromising data quality
  - End users notice missing data and contact NDDoH
    - Requires NDDoH and BCBSND staff time to investigate issue
    - Malformed messages are not caught immediately for correction by EHR

Lesson Learned

- **Discussing process for after go live during initial on-boarding**
- **NDIIS technical staff simulate lack of ACK message situation with EHR to test resubmission process during technical testing phase**
- **Include testing messages with an error notice in the ACK as part of technical testing phase**

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Additional Challenges

- **Lack of internal communication at the provider sites**
  - End-user does not know who their internal technical contacts are
  - Technical staff don't know or fully understand the programmatic implications of decisions made
  - NDDoH and BCBSND staff are the "middle-men" between the end-user and provider technical staff
- **Lack of research by provider site**
  - When a potential issue is identified by a provider site, their first step is to call the NDDoH or BCBSND
  - Need to research the issue from their side first to make sure that the problem is not originating from their system
  - NDDoH and BCBSND staff spend a lot of time helping technical contacts at the provider site researching and resolving issues on the provider side of the interface
- **Lack of response from provider sites when necessary updates are needed**
  - CVX code changes made at the national level are not made in a timely manner by the EHR vendor and/or provider site

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Additional Challenges continued…

- **Provider sites not responding to post-production issues in a timely manner**
  - No longer considered high priority once connection is live
  - EHR vendor and provider technical resources moved to other projects immediately post production
- **Ongoing data quality analysis**
  - Common data quality issues:
    - Newborns with invalid first name (i.e. Baby Boy, Girl A)
    - Newborn records coming in to NDIIS with baby's birthdate, baby's birth dose Hep B but mom's name
    - Duplicate Clients (inconsistent naming conventions in EHR systems)
- **Client Opt Out**
  - Clients can choose to opt out of the NDHIN, but doses for kids under 18 still have to be sent through the NDHIN to the NDIIS
  - Adults can choose to opt out of the NDIIS
  - EHR does not have field to indicate client opt out
  - Field in HL7 message used incorrectly by provider sites

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Additional Lessons Learned

- **Developing and maintaining good partnership with HIN to create a more seamless on-boarding process**
- **Maintain list of provider technical contacts to work with when issues do arise**
- **Provider ID mapping on NDIIS side of interface, not on provider side**
- **Do not allow generic baby name in first name segment of HL7 message**
- **Ongoing data quality**
  - The NDDoH runs a monthly error report that look for 26 potential data entry and vaccine administration errors for doses entered in to the NDIIS during the previous calendar month
    - Staff assess the report and follow-up with primary vaccine contact at provider sites with errors that exceed the determined threshold for each error
  - NDDoH runs a quarterly interoperability report card that evaluates quality of data coming in through each provider/health system interface
    - Data is evaluated for health system/provider group as a whole and individual provider locations
    - Report card only evaluates data entered in the NDIIS during that quarter
    - Report card is sent to technical staff from provider site as well as provider project sponsor

Monthly Error Report

- **VFC errors**
  - doses of VFC vaccine administered to "NOT ELIGIBLE" kids 0 – 18 years of age
  - dose of VFC vaccine administered to adults 19 years of age or older
  - client marked VFC eligible, but lot number not entered
- **Forecaster Errors**
  - minimum interval violations between inactivated vaccines
  - minimum interval violations between live virus vaccines
  - potential duplicate doses
  - dose date equals birth date
  - expiration date has been exceeded for the lot number
  - vaccine not on the market
  - HPV2 administered to male
- **Forecaster Errors continued…**
  - minimum/maximum age violations
    - DTaP after 6yrs of age
    - Hep A before age 1
    - Hib after 5yrs of age
    - HPV after 26 yrs of age
    - HPV before age 9
    - MMR before age 1
    - MCV4 before 9 months of age
    - PCV after 5 years of age
    - PPV23 before age 2
    - TD before age 7
    - Varicella before age 1
    - Zoster before age 50
    - Rotavirus after 8 months of age

Interoperability Report Card

- **Summary Data** (health system/provider group)
  - number of query messages submitted
  - number of VXU messages submitted
  - percent of VXU messages returned with error
  - infant 4:3:1:3:3:1 series, adolescent MCV4 and Tdap and adult PPV23 and Zoster immunization rates
- **Comparison Data** (to other health systems, non-interoperable providers & by individual provider within health system)
  - average number of days between dose administration and entry in to NDIIS
  - number of duplicate clients added to NDIIS
  - number of newborns added to NDIIS with invalid first name
- **Completeness & Accuracy Data** (health system & individual provider)
  - doses administered per month
  - doses administered per month by age group
  - percent completeness for dose data elements
    - Only show providers with less than 90% completeness for one of more data elements
  - percent completeness for client data elements
    - only show providers with less than 90% completeness for one of more data elements
  - matching lot number not found in IIS
  - private vaccine given to VFC eligible kids
  - public vaccine given to not eligible kids

Questions?