Assessing over-immunization in North Dakota's adult population

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Introduction

- Over-immunization is the administration of more doses of a specified vaccine than are routinely recommended
- Defined according to the standard age-based recommendations by vaccine
- Understudied aspect of vaccine practice

Over-immunization

- Very little information on the impact or scope of over-immunization
- A 1997 study estimated the annual cost of over immunization in children at approximately $26.5 million per year
- No comparable study in adults
- Extra doses, most of the time, do not increase the risk of serious side effects

IIS Purpose

- Primarily seen as a tool to encourage immunization and make sure all individuals stay UTD
  - Preventing over-immunization is not a common focus
- Consolidate all immunizations administered to an individual into a single, complete record
- Rely on providers reporting immunization and checking IIS to assess needs
- When IIS are not used, unnecessary immunizations may be administered and necessary immunizations may be missed

NDIIS Usage

- NDIIS usage varies by region and provider type
- In North Dakota, all immunizations administered to individuals aged 18 years or less must be entered into the NDIIS
  - No mandate for adult immunization entry
- Providers who administer vaccines to children are more familiar with IIS compared to providers who primarily serve adults
  - Adult providers less likely to believe that IIS could tell them a patient's immunization needs
- In 2017, only one-third of surveyed providers reported adult immunizations to an IIS

NDIIS Background

- The North Dakota Immunization Information System (NDIIS) is a grantee-developed (i.e., homegrown) IIS
  - First established in 1988
  - The North Dakota Department of Health (NDDoH), now Department of Health & Human Services (DHHS), contracted with Blue Cross/Blue Shield of North Dakota (BCBSND) in 1996 to develop the current web-based system
  - The NDIIS is still currently hosted and supported by BCBSND
- The NDIIS is a lifespan system that includes infants/children, adolescents, and adults
  - Mandatory reporting for kids 18 and younger but not adults 19 years or older
  - Adults have the option to opt out (only 84 opt outs to date) but have 100% adult participation

NDIIS Background Cont.

- 99% of doses entered within 30 days
- 90% entered within 1 day
- 486 individual provider sites submitting data via HL7 using 26 different electronic health record (EHR) systems
  - 84% fully bi-directional
  - 71% connected to the NDIIS via statewide health information exchange (HIE)
- More than 80% of data comes in electronically

Definitions

Vaccination	Over-immunization Definition
Influenza	Two or more doses in the same influenza season
Zoster	Two or more doses of zoster vaccine live (ZVL) OR three or more doses of recombinant zoster vaccine (RZV) OR 4 or more total doses of any zoster vaccine in the 6 year study period
Pneumococcal	Two or more total doses of PCV13 vaccine OR two or more doses of PPSV23 vaccine with less than 5 years between doses OR less than one year between a dose of PCV13 and PPSV23 vaccine OR 3 or more total doses of any pneumococcal vaccine in the 6 year study period

Population

- Influenza: Adults 19 years of age or older in North Dakota
- Zoster: Adults 50 years of age or older in North Dakota
- Pneumococcal vaccine: Adults 65 years of age or older in North Dakota
- Only doses administered to individuals at the cut-off age or older between 2016 and 2021 were included
- Invalid doses included due to the NDIIS CDSi invalidating doses administered outside of recommended schedule

Cost

- Calculated using the private market price of the adult vaccines
- Administration costs were not included
- Zoster and pneumococcal vaccine costs calculated using the price of the presentation administered
- Influenza vaccines calculated using the average cost of all flu vaccines available for each flu season

Metrics

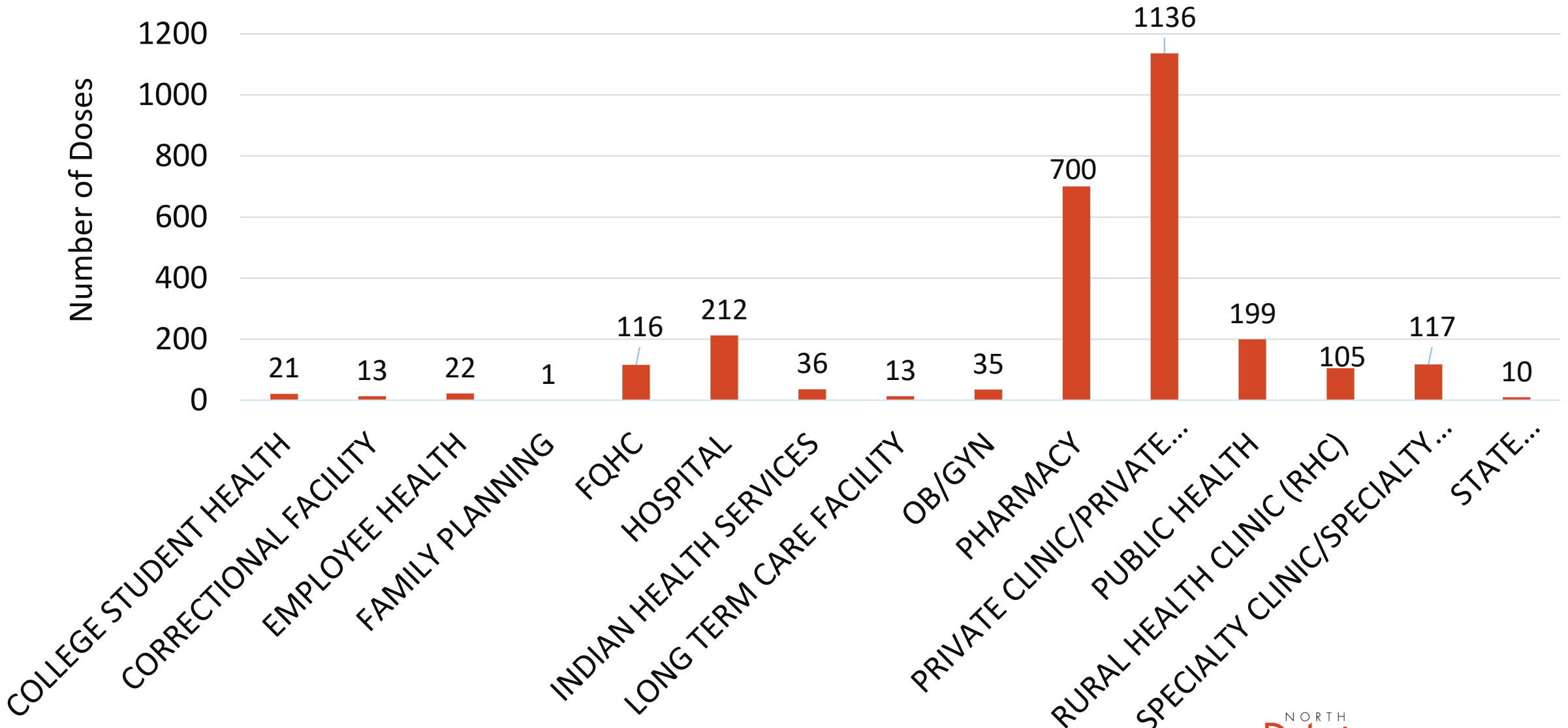
- Doses that met the over-immunization definitions were counted
- Counted both number of extra doses and number of people receiving extra doses
- Percent of doses administered that were identified as an extra dose
- Analyzed by provider type and vaccine type

Influenza Over-immunization

- 0.35% (2,736/782,171) of doses were identified as an extra dose over 5 flu season's assessed
  - 0.74% (2,432/326,287) of individuals received an extra dose in at least one flu season
- Estimated cost: $50,951

Flu Season	2016-2017 Season	2017-2018 Season	2018-2019 Season	2019-2020 Season	2020-2021 Season	All Seasons
Percent of extra doses (Number of extra doses)	0.27% (371)	0.33% (483)	0.42% (661)	0.32% (537)	0.39% (684)	0.35% (2736)

Extra Doses of Influenza Vaccine by Provider Type



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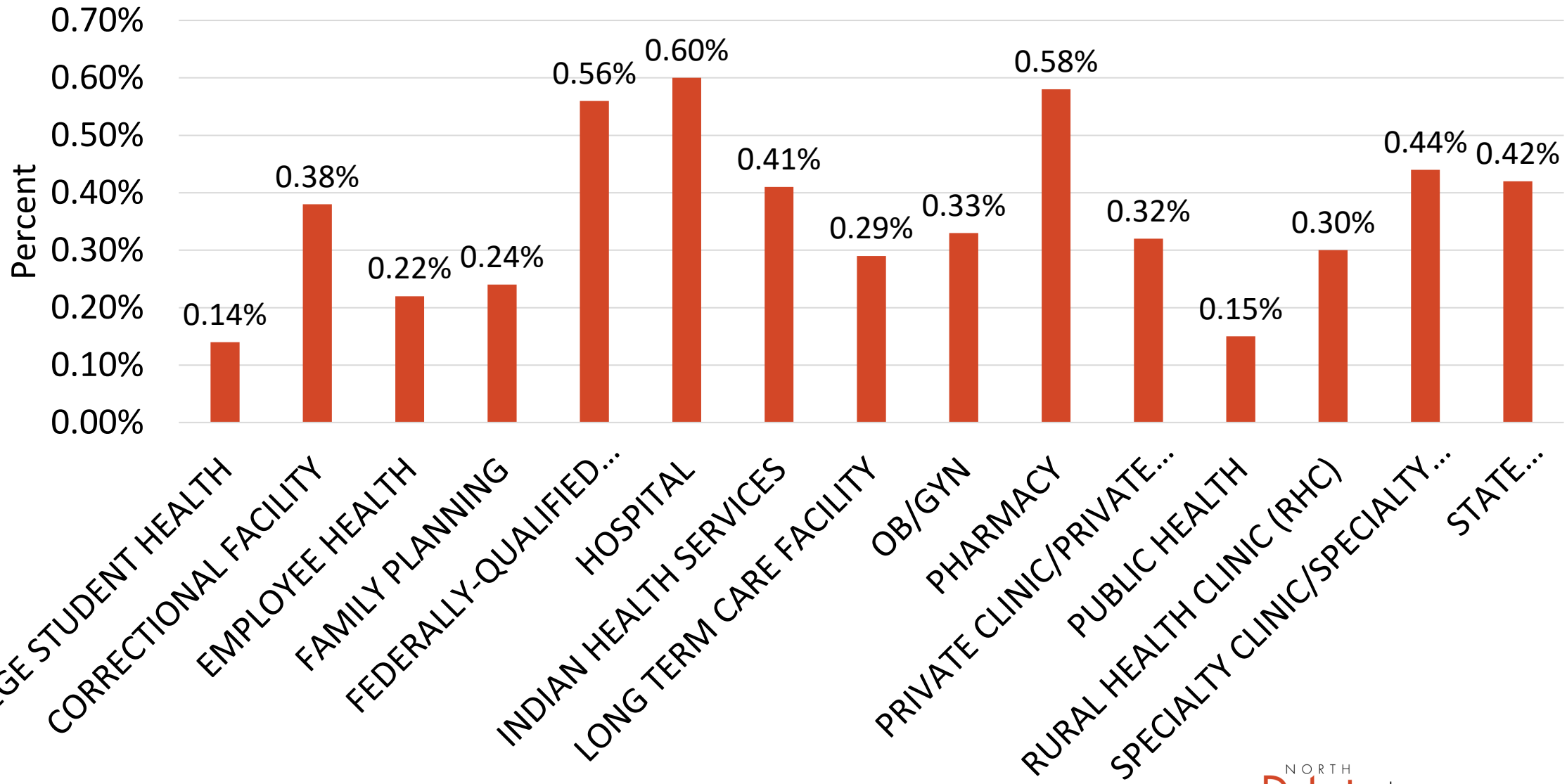
Percent of Influenza Doses Identified as an Extra Dose



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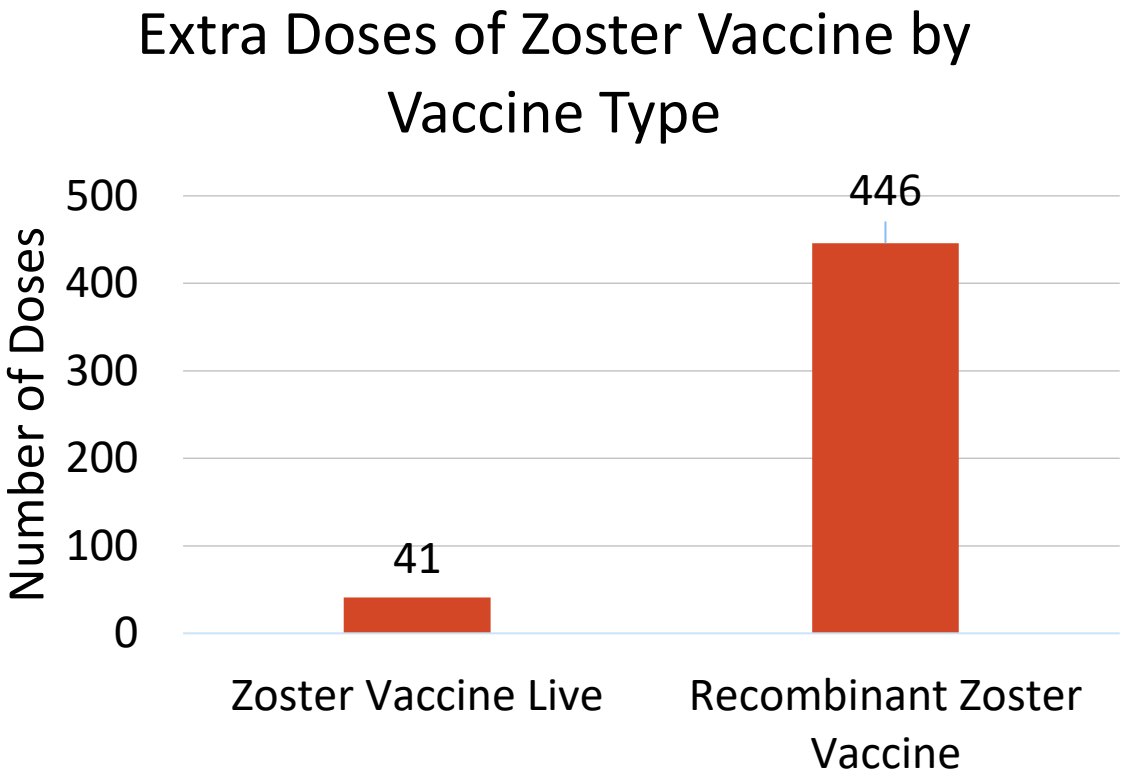
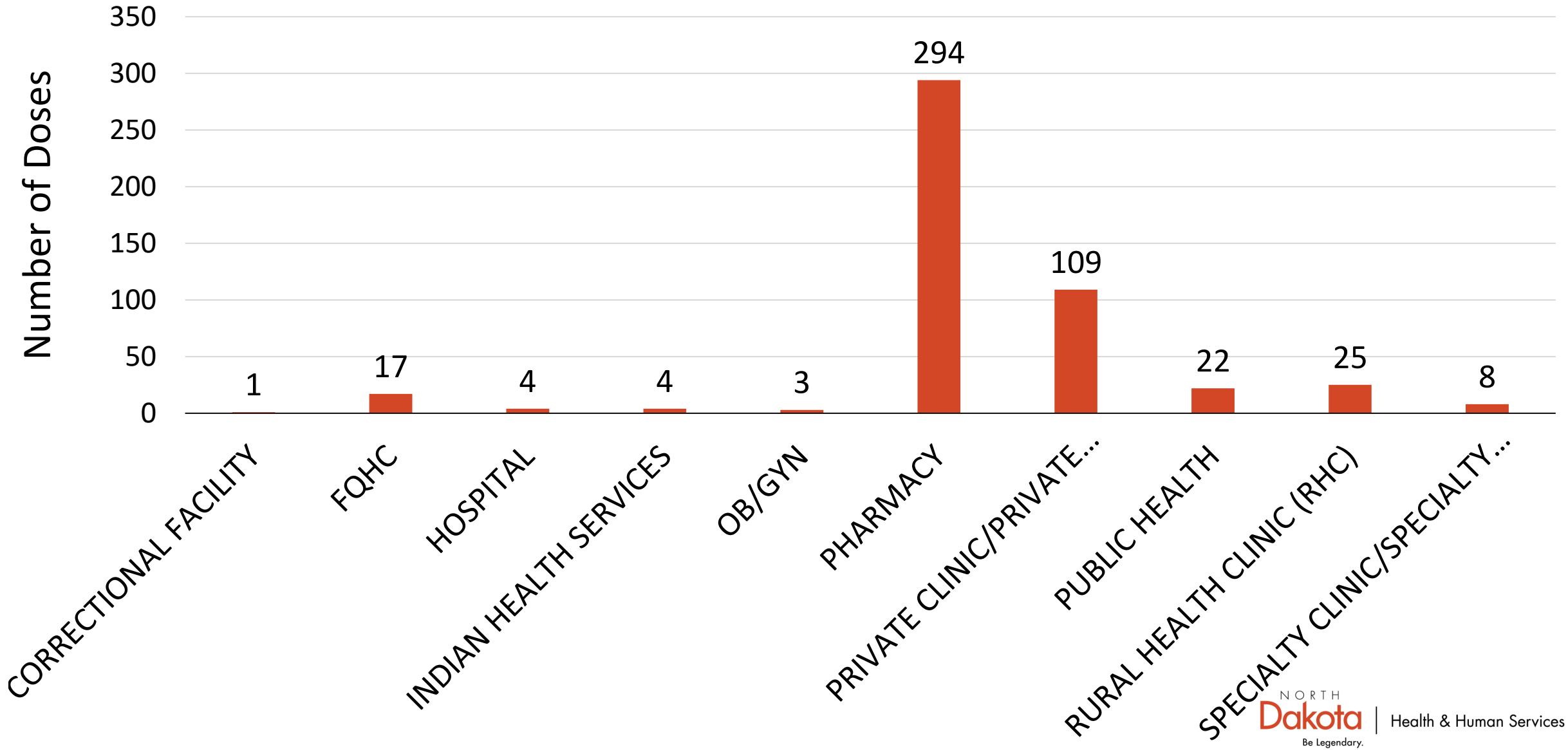
Zoster Over-immunization

- 0.32% (487/153,898) of doses identified as extra doses of zoster vaccine
  - 0.53% (460/86,969) unique individuals received extra doses
- Cost: $85,239



Extra Doses of Zoster Vaccine by Provider Type



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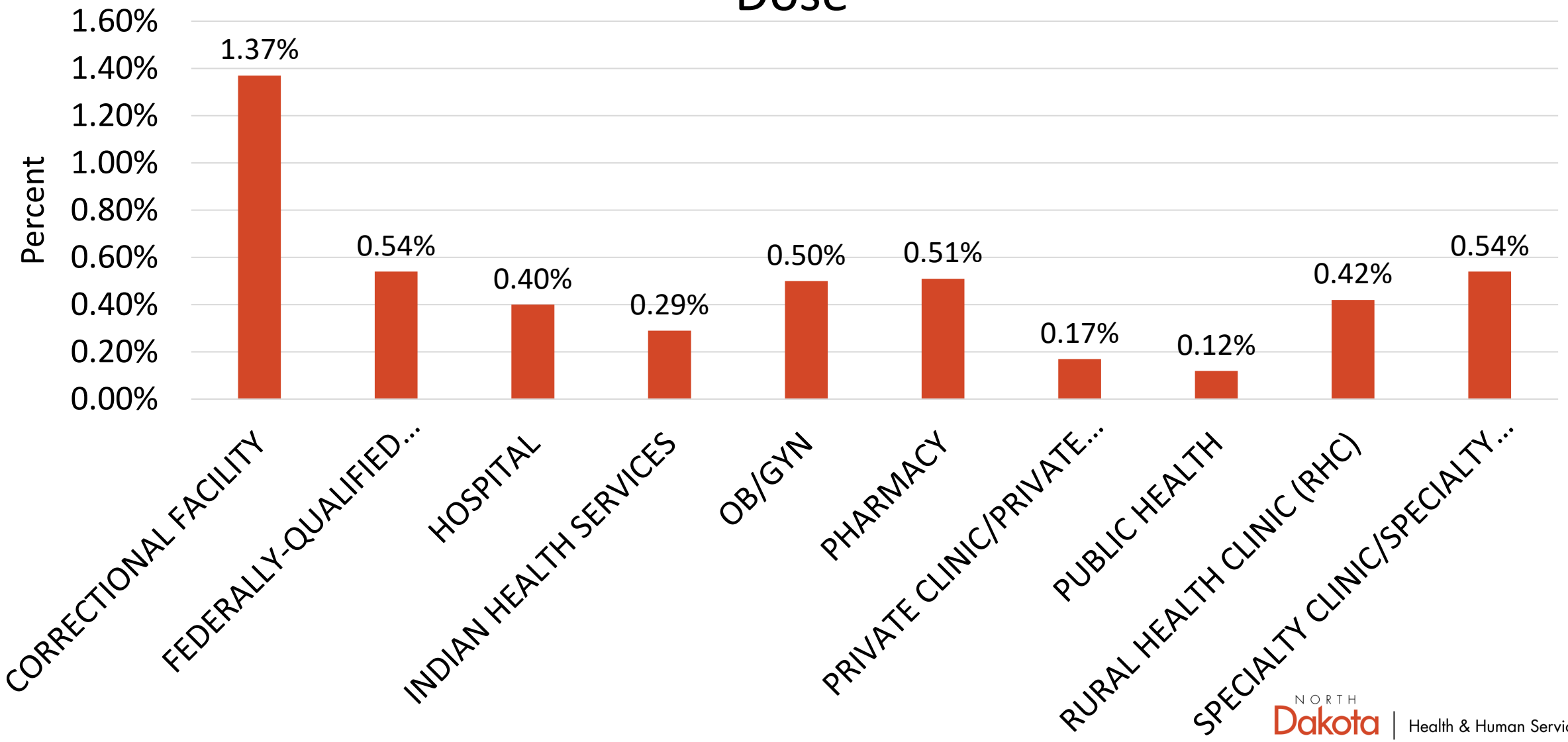
Percent of Zoster Vaccine Doses Identified as an Extra Dose



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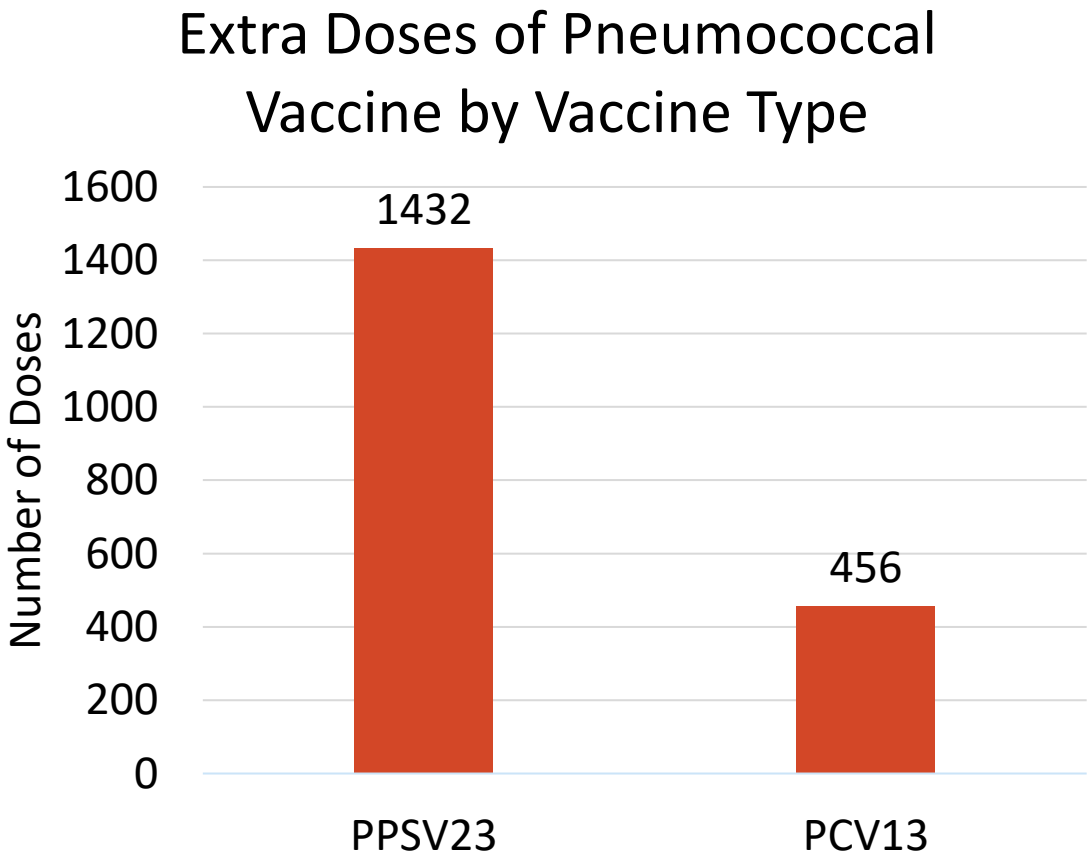
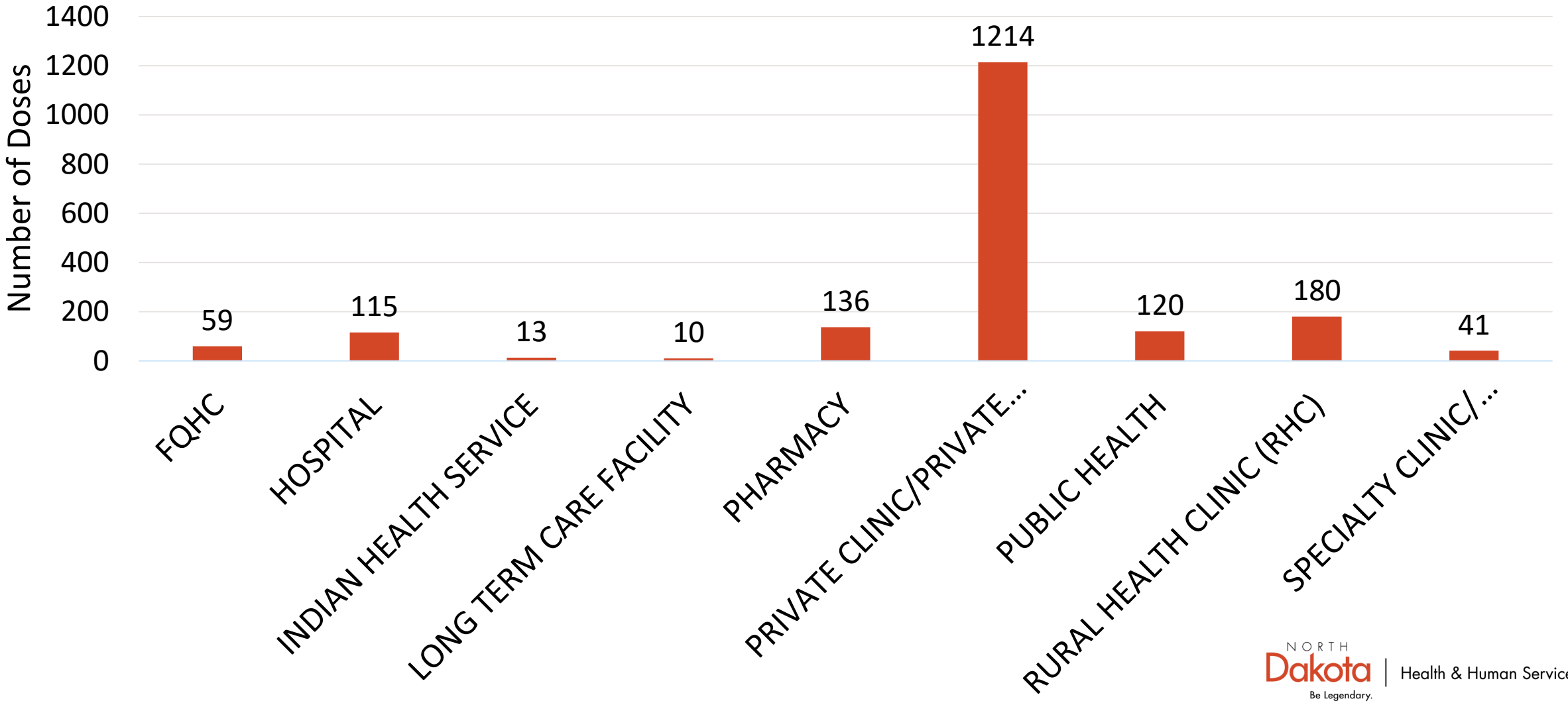
Pneumococcal Over-immunization

- 2.17% (1,888/86,946) of doses administered were identified as an extra dose of pneumococcal vaccine
  - 2.84% (1,836/64,670) of individuals received an extra dose of Pneumococcal vaccine
- Cost: $270,910



Extra Doses of Pneumococcal Vaccine by Provider Type



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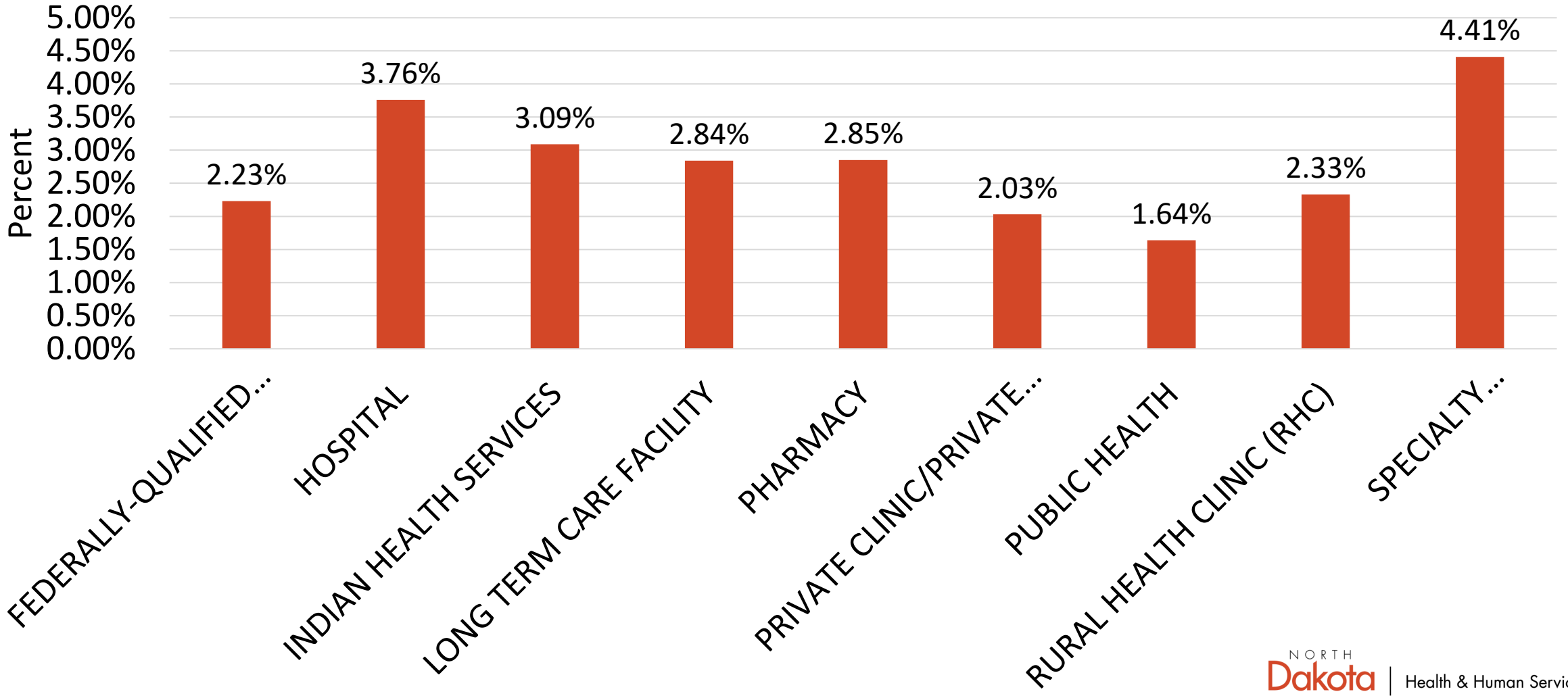
Percent of Pneumococcal Vaccine Doses Identified as an Extra Dose



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Key Findings

- Over-immunization is occurring, but only impacts a small number of North Dakota adults
- Over-immunization occurs when a patient's immunization history is not assessed prior to vaccine administration
- Total cost: $407,101
  - Small number of individuals impacted, but cost was high
- Influenza had the largest number of extra doses
- Pneumococcal vaccines had the highest percent of extra doses

Findings cont.

- Private practice/private clinics and pharmacies contributed the largest number of excess doses
  - Private practices/clinics administer the highest volume of vaccines to adults and make up a large portion of the providers in the NDIIS
- Pharmacies administer extra doses at a higher rate
  - Don’t typically query the NDIIS for vaccine history
- Local Public Health Units (LPHU) had the lowest rate of extra dose administration
  - Very familiar with NDIIS and vaccine schedules overall

Limitations

- Under reporting of adult immunizations
- Included valid and invalid doses
  - Doses invalidated due to storage and handling issues or expiration not separated
- Interoperability status not assessed
- Missed duplicates
  - Several steps in place to catch duplicates, but some may have been missed

Future Directions

- Adult under-immunization is occurring in North Dakota
  - Incidence is low but cost is high
- Provider education is still needed to promote usage of IIS
- Over-immunization is preventable with IIS

Acknowledgements

- This project was supported by the Centers for Disease Control and Prevention of the U.S. Department of Health and Human Services (HHS) as part of the cooperative agreement funding opportunity IP19-1901.
- Team: Molly Howell, MPH, Mary Woinarowicz, MA, Melissa Anderson, Olenka Aguilar, MPH, Ronda Kercher and North Dakota HHS Immunization Unit

Publication Coming

- The full paper covering this project will be published in an upcoming issue of the Journal of Public Health Management & Practice

Thank You!

Q&A Session

Following presentations

Contact Information

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References

- Centers for Disease Control and Prevention. Immunization Information Systems (IIS). Accessed June 15, 2022, 2022. https://www.cdc.gov/vaccines/programs/iis/about.html
- Development of community- and state-based immunization registries : CDC response to a report from the National Vaccine Advisory Committee, (2001). https://stacks.cdc.gov/view/cdc/6626
- Callahan JM, Reed D, Meguid V, Wojcik S, Reed K. Utility of an Immunization Registry in a Pediatric Emergency Department. *Pediatric Emergency Care*. 2004;20(5)
- Srivastav A, Black CL, Lutz CS, et al. U.S. clinicians' and pharmacists' reported barriers to implementation of the Standards for Adult Immunization Practice. *Vaccine*. 2018/10/29/ 2018;36(45):6772-6781. doi:https://doi.org/10.1016/j.vaccine.2018.09.024
- Kempe A, Hurley LP, Cardemil CV, et al. Use of Immunization Information Systems in Primary Care. *Am J Prev Med*. Feb 2017;52(2):173-182. doi:10.1016/j.amepre.2016.07.029
- Feikema SM, Klevens RM, Washington ML, Barker L. Extraimmunization among US children. *Jama*. Mar 8 2000;283(10):1311-7. doi:10.1001/jama.283.10.1311
- Stockwell MS, Natarajan K, Ramakrishnan R, et al. Immunization Data Exchange With Electronic Health Records. *Pediatrics*. Jun 2016;137(6)doi:10.1542/peds.2015-4335
- National Center for Immunization and Respiratory Diseases. Strategies for Increasing Adult Vaccination Rates. Centers for Disease Control and Prevention. Accessed June 15, 2022, 2022. https://www.cdc.gov/vaccines/hcp/adults/for-practice/increasing-vacc-rates.html#:~:text=Offer%20needed%20vaccines%20or%20refer,check%20with%20their%20EHR%20administrators