Experiences Using the National Provider Identifier (NPI) for Health Workforce Research

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Goals for Discussion Today

- What is an NPI?

- Using the NPI in health workforce research: examples –

  - Advanced practice registered nurse supply
  - Tracking physician practice after residency

- Summary of findings from using NPI for research

- Remaining questions about using the NPI

What is an NPI?

- National Provider Identifier - NPI
  - Unique health provider identifier for association with claims and billing

- Part of the National Plan and Provider Enumeration System (NPPES)
  - Required by Congress in 1996 HIPAA (Health Insurance Portability and Accountability Act)
  - Centers for Medicare and Medicaid Services (CMS) is responsible for administering
  - Administrative simplification – 10-digit provider identifier for standard transactions
  - Identifies providers and groups who directly bill Medicare, Medicaid and many insurers (and therefore NOT providers and provider types who do not bill directly)
  - Individuals: name, credentialing degree, gender, DOB, birth location, SSN, business tax ID/address/phone, license #/state, provider taxonomy code(s)
  - CMS only verifies provider SSN and business address; data updates encouraged by CMS, but left to provider to follow through

Accessing NPI Data

- Data location and file size:
  - NPI data can be downloaded from http://nppes.viva-it.com/NPI_Files.html
  - 2014 file contains 4.2 million observations and the uncompressed file is about 5 GB
- Selecting provider type:
  - 10-character NPI indicates type and (for some) specialty
- Selecting provider specialty:
  - one primary and up to two secondary provider taxonomy codes available (for some provider types)
- Healthcare Provider Taxonomy codes are available at http://www.wpc-edi.com/reference/

First Study Example

Using 2010 National Provider Identifier Data for Studies of the U.S. Advanced Practice Registered Nurse (APRN) Workforce

Experiences from:

Understanding APRN distribution in the United States using NPI data

Funded by the American Nurses Association

Skillman SM, Kaplan L, Fordyce MA, McMenamin PD, Doescher MP. *Understanding advanced practice registered nurse distribution in urban and rural areas of the United States using National Provider Identifier data.* Final Report #137. Seattle, WA: WWAMI Rural Health Research Center, University of Washington; Apr 2012.

http://depts.washington.edu/uwrhrc/uploads/RHRC_FR137_Skillman.pdf

Kaplan L, Skillman SM, Fordyce MA, McMenamin PD, Doescher MP. **Understanding APRN distribution in the United States using NPI data**. *J Nurse Pract*. Sep 2012;8(8):626-635.

Study Purpose

- Assess the extent to which NPI data for Advanced Practice Registered Nurses (APRNs) could be used to quantify and describe the distribution of APRNs in the US.

- Subsequently,
  - Compare the rural/urban distribution of Certified Registered Nurse Anesthetists (CRNAs) and nurse practitioners (NPs) in the U.S.
  - Identify factors associated with rural practice location

APRNs from NPI Data in 2010*

- APRNs identified using Health Care Provider Taxonomy Codes in "taxonomy" fields of NPI data
  - first 4 characters of the 10-character NPI indicates type of APRN, subsequent numbers/letters indicate specialty (where relevant)

NPI Provider Taxonomy codes
Download from http://www.wpc-edi.com/reference/

Physician Assistants & Advanced Practice Nursing Providers [definition]
    Advanced Practice Midwife - **367A00000X** [definition]
    Anesthesiologist Assistant - **367H00000X** [definition]
    Clinical Nurse Specialist - **364S00000X** [definition]
      Acute Care - **364SA2100X** [definition]
      Adult Health - **364SA2200X** [definition]
      Chronic Care - **364SC2300X** [definition]
        etc. (long list of other specialties)
    Nurse Anesthetist, Certified Registered - **367500000X** [definition]
    Nurse Practitioner - **363L00000X** [definition]
      Acute Care - **363LA2100X** [definition]
      Adult Health - **363LA2200X** [definition]
        etc. (long list of other specialties)

*Data refinement and cleaning completed by P. McMenamin of the ANA

Individual vs. Organizational NPIs

Problems with using organizational NPIs in research

- Organizations can identify up to 15 provider types associated with an organization NPI, but do not report how many providers of a particular type are represented by the organization's listed taxonomies

- Providers listed under an organization's umbrella may have their own individual NPI, raising the possibility of double-counting between individuals and organizations or not being able to account for individual providers' activities

APRN NPI Data (2010)

162,610 total APRNs originally identified

Exclusions:

- Organizational NPIs (6%)
- Address outside US (<1%)
- Practice state not matching ZIP state (<1%)

APRN NPI Data (2010)

162,610 total APRNs originally identified ➔ 152,185 APRNs with individual NPIs in the US in 2010, of which:

Exclusions:

- Organizational NPIs (6%)
- Address outside US (<1%)
- Practice state not matching ZIP state (<1%)

- 106,113 were Nurse Practitioners (NPs)
- 35,973 were Certified Registered Nurse Anesthetists (CRNAs)
- 5,187 were Advanced Practice Nurse Midwives
- 4,912 were Clinical Nurse Specialists (CNSs)

Findings: NPs

2010 NPI

- 106,113 NPs with individual NPIs

Comparison data:

2008 National Sample Survey of RNs (NSSRN)

- 158,348 nurses with NP preparation
  - 19,134 prepared both as NPs and CNSs or CNMs
- 138,186 NPs employed in nursing in 2008
  - Some may have been working as RNs

2010 American Association of NPs (AANP)

- approximately 140,000 NPs in database

New since original study

2012 National Sample Survey of NPs (NSSNP)

- 154,057 licensed NPs in the US in 2012
- 132,368 NPs worked in a position requiring an NP credential
- 127,210 NPs provided patient care
  - 60,407 worked in primary care

Conclusions: NPs using NPI data

- Estimates of NP supply derived from NPI data likely underestimates the number of practicing NPs in the US, but is in the right ballpark

- Our study used the data to compare rural with urban supply across the US

Findings: CRNAs

2010 NPI

- 35,973 were Certified Registered Nurse Anesthetists (CRNAs)

Comparison data:

American Association of Nurse Anesthetists

- Estimated similar supply size

2008 National Sample Survey of RNs (NSSRN)

- 34,821 CRNAs

Conclusions: CRNAs using NPI data

- Estimates of CRNA supply derived from NPI data appears to be very similar to other estimates of the number of practicing CRNAs in the US
- Our study used the data to compare rural with urban supply across the US

Findings: CNMs

- 2010 NPI:
  - 5,187 Certified Nurse Midwives (CNMs)

- Comparison:
  - American Midwifery Certification Board estimated in 2011 there were 10,332 CNMs in the US

Conclusions: CNMs using NPI data

- CNMs are significantly undercounted in the NPI data
- Our study did not proceed with NPI CNM workforce analyses

Findings: CNSs

- 2010 NPI
  - 4,912 Clinical Nurse Specialists (CNSs)

- Complication:
  - CNSs are not licensed or recognized by statute or regulation in all states. Consequently, nurses educated as CNSs may refer to themselves as such without legal recognition

- Comparison:
  - 2008 NSSRN estimated there were nearly 60,000 CNSs, of which a little more than 20,000 were estimated to have state board recognition

Conclusions:

- CNSs identified from the NPI data are not likely to be representative of the total CNS population
- Our study did not proceed with NPI CNS workforce analyses

Second Study Example

Assessing Rural-Urban Nurse Practitioner Supply and Distribution in 12 States Using Available Data Sources

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‡ St Martin's University.

Methods and Objective

- Compare workforce supply estimates from 2010 NP professional license data from each of 12 states (available from another study) with 2010 NPI data from each state (also available from another study)

- **Explore the expectation**: More NPs will be identified from license files than from NPI data, unless license records include practice status information, because:
  - NPI data is more reflective of providers in active practice and seeking to bill for services using their NPI
  - most license files do not collect data on whether or not the provider is currently in active clinical practice

Rural NPs: Percent Difference Between Number of NPs Identified from License Compared with NPI Data Sources in 2010 for 12 States
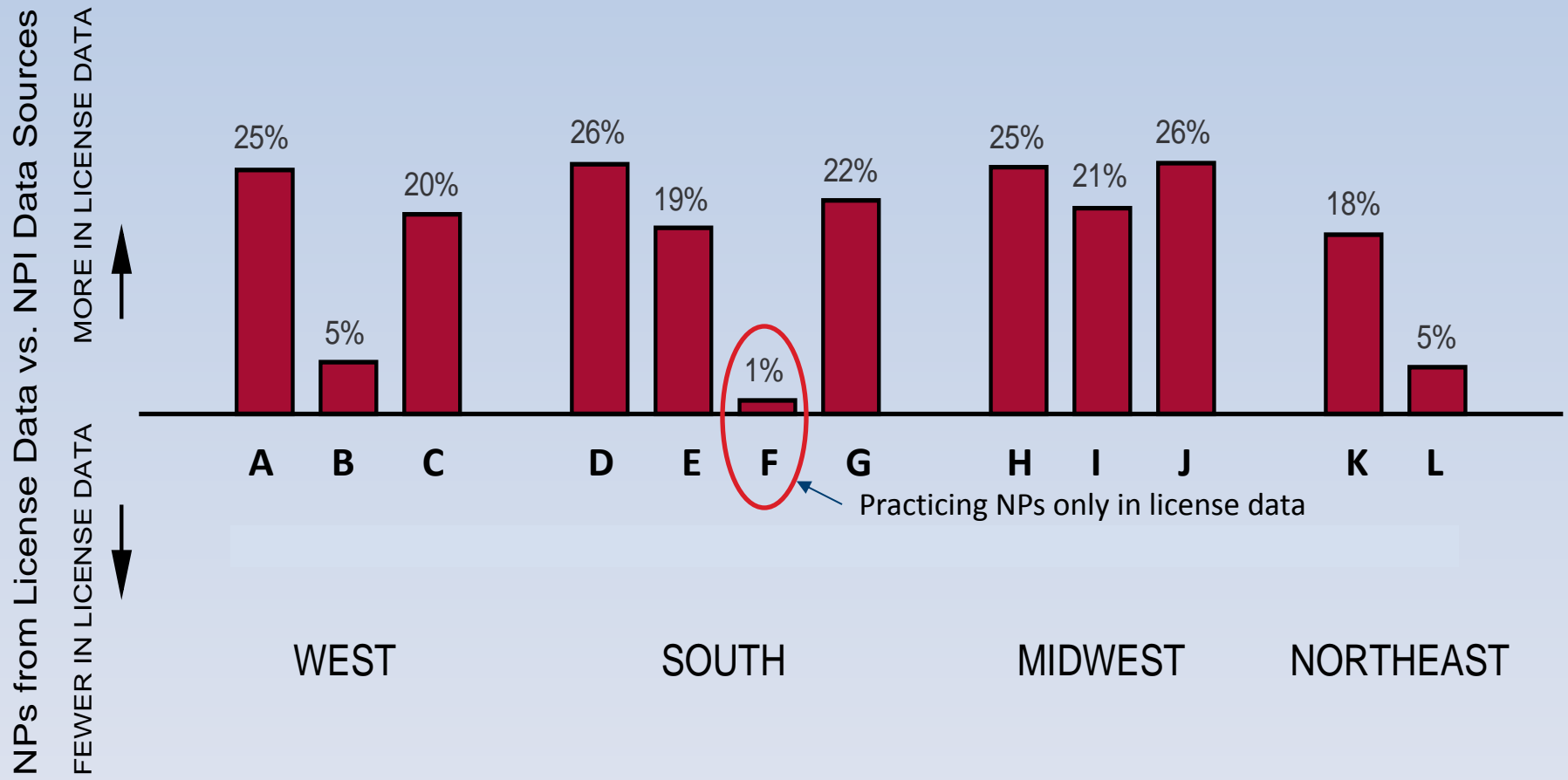
Urban NPs: Percent Difference Between Number of NPs Identified from License Compared with NPI Data Sources in 2010 for 12 States
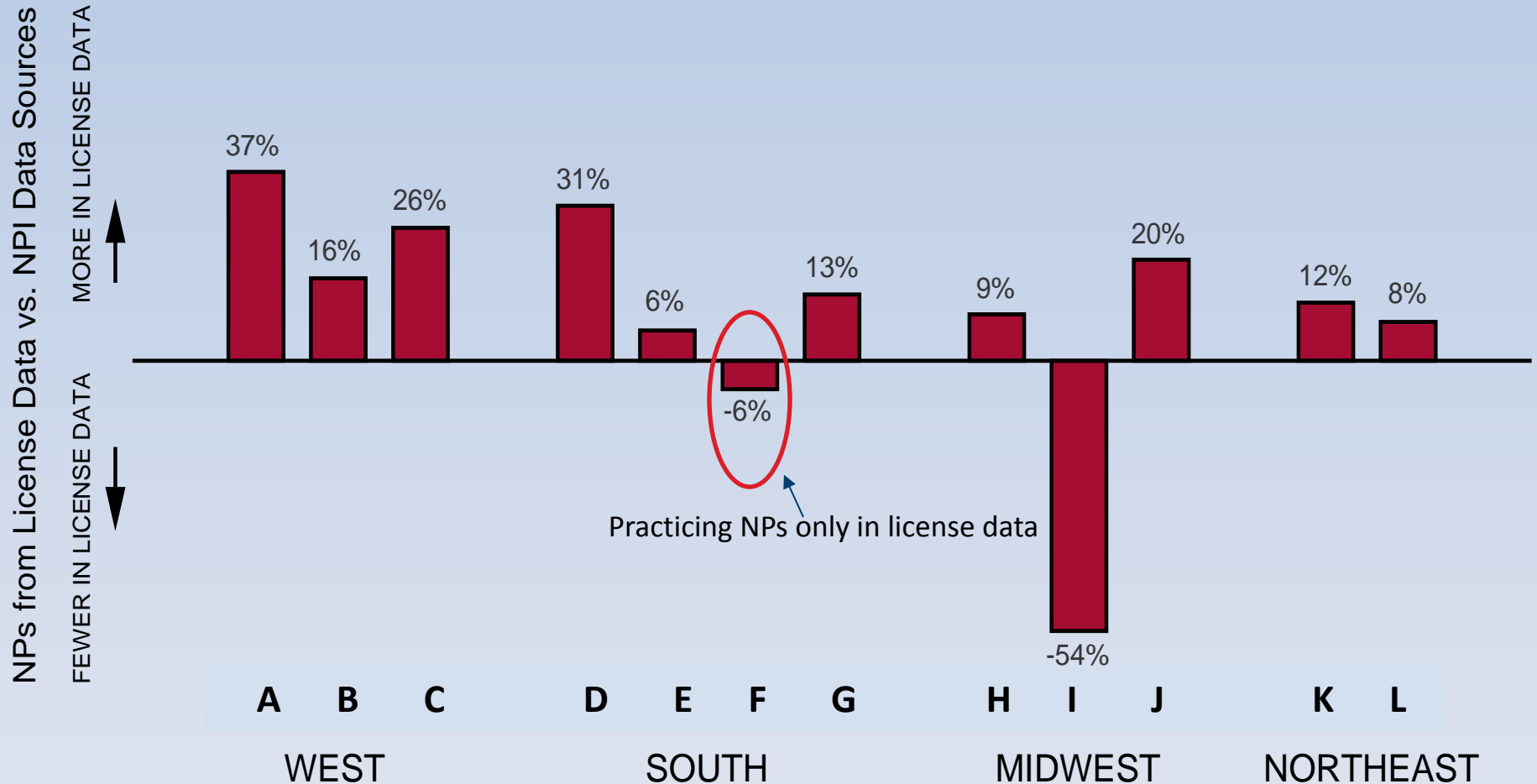
Key Findings

- When license data could not distinguish licensed NPs who were in active clinical practice
    - Estimates of state NP supply derived from license data were higher than estimates derived from National Provider Identifier (NPI) data (for most states), although not consistently higher
- When license data included information that allowed estimates of NP supply in active clinical practice
    - NPI estimates more closely resemble the actively practicing licensed provider estimates for states
- NPI data anomalies (for NP workforce estimates) exist

Third Study Example
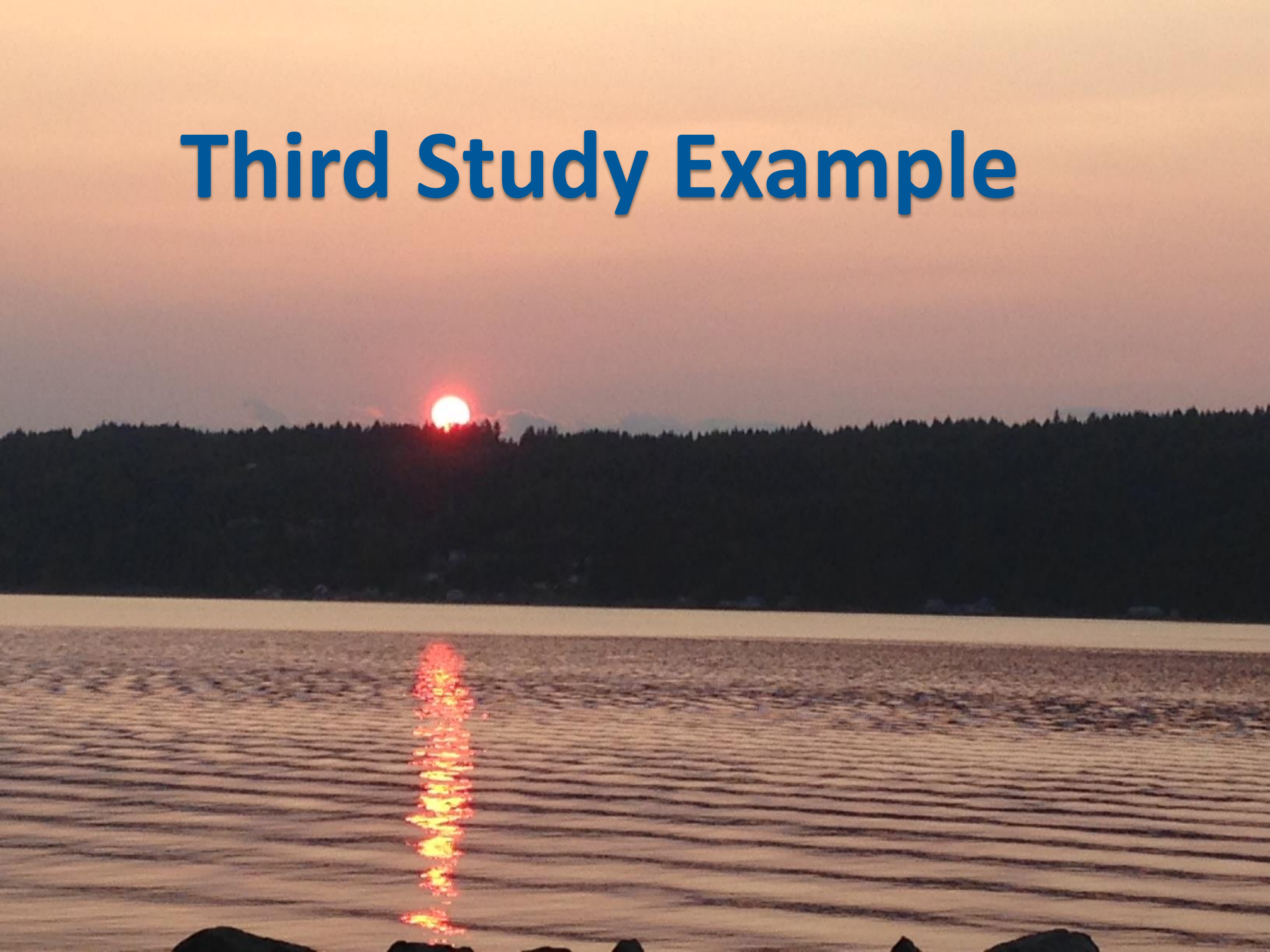
Person, Program, or Place?
Family Physicians
Choosing Rural Practice

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Family Physician Early Career Choices Study: Purpose

- What leads family physicians to choose rural vs. urban practice?
  - Individual factors
  - Social factors
  - Educational programs and experiences
  - Practice and community settings
- Focus on physicians completing residency training in rural places

Methods

- We surveyed family medicine physician residency programs, who identified their 2008-2013 graduates.

- Graduates were matched to NPI data* and American Medical Association (AMA) Masterfile data.

- We updated the address found in NPI through Web searches.

- We surveyed 342 graduates (62% response rate) in 2014

* from Robert Graham Center

Methods

[Not part of original study aims]

- We compared practice ZIP codes across data sources (n=212):

  - 2013 NPI: business practice location ZIP

  - 2013 AMA: primary office ZIP

  - 2014 survey responses: main practice site ZIP

Findings using NPI data for early career physicians

- Prior to survey mailing, we checked the NPI address against physicians' addresses found on the Web

- More than half of NPI addresses required updating prior to sending survey:

  - NPI data listed the residency program as the practice address for many physicians after they had already graduated.

  - 53% of NPI practice ZIP codes did not match the practice address found on the Web.

Locations of study physicians in 2014 by residency graduation cohort: % match between data sources*
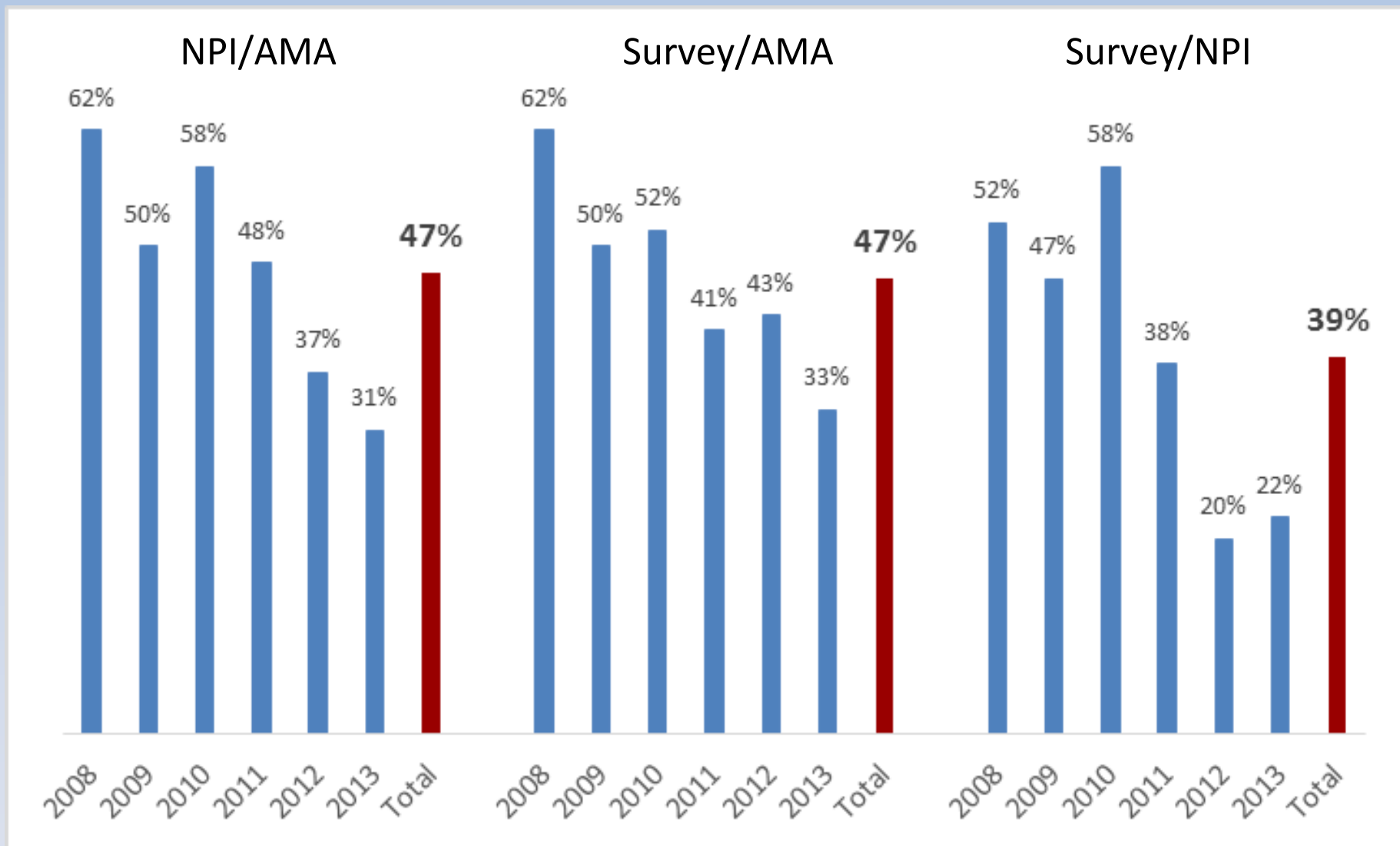
*National Provider Identifier (NPI), 2013; American Medical Association Masterfile (AMA), 2013; Family Physician Early Career Choices Study (survey), 2014

Findings using NPI data for early career physicians

- Less than 50% match overall in practice site ZIP codes between any two data sources (39%-47%)

  - Limitation: comparing 2013 databases with 2014 survey

- NPI and AMA data matched better with survey responses of earlier cohorts – those who graduated longer ago.

  - Generally better than 50% match for 2008-2010 residency graduation cohorts, i.e., those who graduated at least 3 years prior to the 2013 NPI/AMA databases that we consulted

Summary of Findings

Photo by Scott Cooper

NPI Summary of Findings

- NPI data are only available for providers that are eligible to bill for services.
  - E.g., physicians, PAs, NPs, CNSs, CRNAs, CNMs, clinical psychologists and social workers
- Among APRNs, NPs and CRNAs are better represented in NPI data than CNMs or CNSs.
  - Using NPI data to quantify supply of NPs still results in a likely undercount.
- NPI generally conforms with our expectation that the data represent practicing providers, compared with licensure data which usually include non-practicing providers.
  - Exception: where licensure data are limited to practicing providers

NPI Summary of Findings

Benefits

- NPI data are comparable nationally.

- NPI data are free and easy to access, with good documentation.

- Many provider types have an NPI (required for billing).

- NPI data can be used with CMS claims data to examine connections between the healthcare workforce, healthcare services delivery patterns, and patient/system outcomes.

NPI Summary of Findings

Cautions:

- Updating NPI practice information is not required and there may be significant lag in the time between provider practice change and updates to the database.

- Validity (accuracy) decreases when examining more recent time periods or smaller geographic areas.

- When studying recent workforce entrants and others that are highly mobile, proceed with caution!

Remaining Questions

- Does CMS plan to require providers to update their NPI information?

- Whom do we lose in organizational NPI data?

- For physicians, what accounts for the differences between NPI and AMA Masterfile data on practice locations?

- Your questions?

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