DIFFERENCES IN DIABETES OUTCOMES AMONG VA PATIENTS WITH NP, PA, AND PHYSICIAN PRIMARY CARE PROVIDERS

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Background – Primary Care Challenges

• Estimates of primary care physician shortfalls range as high as 35,000 by 2025\(^1\)

• Primary care providers face high levels of burnout

• Expanded roles of NPs and PAs have been proposed as ways of addressing primary care provider shortages
  ➢ Greater utilization of NPs and PAs as PCPs
  ➢ Expanding NP and PA workforce and training programs
  ➢ Expanding practice authority

Background – Significant Role of NPs and PAs

• 2013: 113,000 employed NPs and 88,000 employed PAs in the United States¹

• ~1/3 of people in the United States with a regular provider have seen a PA or advanced practice nurse in the last year²

• ~1/3 of primary care visits in the VA are with an NP or PA³

• Expanded authority of NPs to serve as independent providers in the VA and many states

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Roles of NPs and PAs Vary Significantly in the VA

• Significant variation in the utilization of NPs and PAs in the VA
  ➢ % of VA PC encounters with a NP varies by VISN from ~8% to ~41%
  ➢ % of VA PC encounters with a PA varies by VISN from ~2% to ~16%

• Greater levels of NP staffing has been associated with better HbA1c control among VA primary care patients
  ➢ HbA1c lower by ~1/4 to ~1/3 of a percentage point for NP staffing levels compared to no NPs in the practice
  ➢ Not the case for levels of PA staffing

Addressing a Frequently Raised Question

- Concerns have long been expressed by physicians about whether the outcomes achieved by NPs and PAs are equivalent to those of physicians.

- Discussion of whether NPs and PAs should be used to supplement physician care or to serve as primary care providers managing their own patient panels.

**Objective** of the present analysis is to examine whether there are differences in intermediate diabetes outcomes among physician, NP, and PA primary care providers.
Why Diabetes? – Prevalent and Complex

• Highly prevalent condition with opportunity to improve outcomes
  ➢ 12% of adults in the United States
  ➢ ~1/4 of VA patients
  ➢ Opportunity to improve outcomes, including intermediate outcomes
    ❖ Blood sugar control (HbA1c)
    ❖ Blood pressure
    ❖ LDL-cholesterol

• Requires extensive medication management on the part of providers

• Requires self-management support on the part of providers and care teams

• Valid method of identifying diabetes in secondary data
Advantages of VA Data

• Can determine the specific PCP who sees a patient during the clinical encounter and see the provider type code indicating the provider's profession.

  In Medicare claims data, NP and PA work may have billed services as “incident to” the supervising physician, meaning that it may look like a patient's encounter was with a physician instead of an NP or PA.

  - 29% of NPs who work with physicians always bill Medicare under the supervising physician.
  - 40% of NPs bill some portion of Medicare services under the supervising physician.

  Evidence that large national surveys also may not fully capture roles of NPs and PAs.

• VA “stop codes” allow us to more accurately define visits as occurring in primary care.


Advantages of VA Data

• Clinical and patient specific information often not available to researchers in “claims” data
  ➢ Intermediate diabetes outcomes
  ➢ Enhanced demographics / patient information

• Sites of care in all 50 states and DC

• Enough patients treated by NPs and PAs to separate out care provided by these professions
  ➢ In other words, do not need to “lump” NPs and PAs into one group
Addressing Methodologic Challenges

• Large number of patients and providers
  Ø Well done clinical trials that found equivalent chronic illness outcomes for patients treated by NPs and physicians done in very limited setting with a small number of providers delivering care

• Accurately identify professionals providing care as opposed to the provider under whom care is billed

• Propensity score weighting to analyze comparable groups across provider type

• Accounting for clustering of patients within facilities and providers

• Few previous outcome comparisons of NPs vs. PAs and PAs vs. physicians
Methods – Overall Data Source and Population

• Data are from FY 12 and FY 13 VA data originating in the VA electronic health record

• Goal was to build cohort of pharmaceutically treated VA patients with a diabetes diagnosis who were assigned to the same clinic and PC provider in FY 12 and FY 13
Provider Type and “Home” VA Variables

• Primary care provider was defined as the provider with whom the patient had the most primary care clinic visits over each year, two years in a row (FY 12 and FY 13)

• Primary care provider type
  ➢ Nurse practitioner
  ➢ Physician assistant
  ➢ Physician

• “Home” VA is the VA facility (medical center, health care center, or community clinic) where the patient had the most primary care clinic visits over each year, two years in a row (FY 12 and FY 13)
Inclusion Criteria

• Pharmaceutically treated adult patients with diabetes
  ➢ ≥2 outpatient encounters with ICD-9 code for diabetes (250.xx) and/or ≥1 inpatient encounter with a diabetes diagnosis code in FY 12
  ➢ VA filled prescription for oral antihyperglycemic or insulin in FY 12 (VA drug classes HS501 or HS502)
  ➢ ≥ age 18

• ≥1 primary care visit in both FY 12 and FY 13 (based on VA stop codes)
  ➢ 322 – Comprehensive women’s primary care
  ➢ 323 – Primary care medicine
  ➢ 342 – Family practice
  ➢ 348 – Primary care shared appointment

• ≥1 outpatient visit with a diabetes ICD-9 code in FY 13
Inclusion Criteria

• Patients of facilities with ≥100 unique diabetes patients in FY 12

• Same primary care provider and “home” VA facility in FY 12 and FY 13
Exclusion Criteria

- Physician resident as PCP
- Not being assigned to a VA in the 50 states or DC (because of need to calculate certain variables)
- Patient lives ≥1000 miles from the “home” VA
- No BMI information
- “Home” VA has only one provider type
Cohort Construction

1. Unique Veterans seen in VA in outpatient or inpatient in FY 12
   \[ n = 5,774,903 \]

2. At least 2 outpatient or 1 inpatient visit with 250.xx diagnosis code in FY 12 and one pharmacy fill of diabetes medication
   \[ n = 830,602 \]

3. Assigned to the same station in FY 12 and FY 13
   \[ n = 664,908 \]

4. Assigned to the same unique non-resident provider in FY 12 and FY 13
   \[ n = 453,757 \]

5. Assigned to a facility with patients assigned to at least 2 provider types, one of which is a physician
   \[ n = 368,481 \]
Outcomes

• Continuous level and dichotomous control of
  ➢ Hemoglobin A1C  <7%
  ➢ Blood pressure  <130/80 mm Hg
  ➢ LDL cholesterol  <100 mg/dl

• Simultaneous control of HbA1C, BP and LDL-C

• Measured as the mean of FY 13 values

• Clinically meaningful differences were defined a priori:
  ➢ HbA1C  <0.3%
  ➢ SBP   <3 mm Hg
  ➢ LDL-C  <5 mg/dl
  ➢ Odds ratios ≥1.2 (or ≤0.8)
Propensity Score Analysis

• Weighted propensity score method used to “balance” characteristics of patients seen by NPs, PAs, and physicians
  ➢ Inverse probability of PCP type weighting (i.e., inverse probability of “treatment” weighting)
  ➢ Based on measured patient characteristics potentially associated with diabetes outcomes and access to care.

• Standardized mean differences were examined to assess balance of propensity-score adjusted patient characteristics
  ➢ Standardized difference of <10 considered to be “balanced”
Variables for Propensity Score Weighting

• Patient level
  ➢ Demographic
    ✷ Age
    ✷ Sex
    ✷ Race
    ✷ Ethnicity
  ➢ Social complexity
    ✷ Marital status
    ✷ Homelessness
    ✷ Copay status (some indication of poverty and disability)
    ✷ Travel distance to VA
    ✷ Mental health diagnoses
  ➢ Medical complexity
    ✷ BMI
    ✷ Diagnostic cost groups (DCGs)

• VA facility level
  ➢ Availability of endocrine/specialty diabetes services (correlates with facility size)
  ➢ Rural-urban location
  ➢ Region
Analysis: Outcome Models

- Hierarchical linear mixed models were used to analyze continuous outcomes.

- Logistic regression models fit with generalized estimating equations and an exchangeable correlation structure and empirical standard errors were used for dichotomous outcomes.

- Standard errors were adjusted for clustering by facility and PCP.
Sensitivity Analyses

• Analysis limited to the most medically complex patients (DCG ≥2)

• Analysis limited to patients with more complex diabetes medication regimens (on insulin)
Results – VA Facilities

- Physicians, NPs and PAs  139
- Physicians and NPs  346
- Physicians and PAs  83
- Total Facilities in Analyses  568
Provider Type

Proportion of patients with each type of primary care provider

Total patients N = 368,524
Physician patients N = 276,009
NP patients N = 67,120
PA patients N = 25,352
## Summary of Overall Patient Characteristics (unweighted)

<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>NPs</th>
<th>PAs</th>
<th>Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>95.0%</td>
<td>97.1%</td>
<td>97.0%</td>
</tr>
<tr>
<td>Age ≥65</td>
<td>48.1%</td>
<td>49.2%</td>
<td>47.7%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>72.3%</td>
<td>74.7%</td>
<td>69.9%</td>
</tr>
<tr>
<td>Non-white</td>
<td>19.4%</td>
<td>17.5%</td>
<td>21.9%</td>
</tr>
<tr>
<td>Unknown</td>
<td>8.3%</td>
<td>7.8%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.8%</td>
<td>3.6%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Baseline BMI ≥30</td>
<td>61.8%</td>
<td>61.8%</td>
<td>61.1%</td>
</tr>
<tr>
<td>Diagnostic Cost Group (DCG)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1.0</td>
<td>69.2%</td>
<td>69.5%</td>
<td>66.5%</td>
</tr>
<tr>
<td>1.0 to &lt;2.0</td>
<td>19.5%</td>
<td>19.4%</td>
<td>20.2%</td>
</tr>
<tr>
<td>≥2.0</td>
<td>11.3%</td>
<td>11.1%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Homeless</td>
<td>1.9%</td>
<td>1.4%</td>
<td>1.8%</td>
</tr>
</tbody>
</table>
Patient and Facility Characteristics - Well Balanced Groups

• Standardized differences between groups of <10.0 are considered “well balanced”

• No weighted differences in characteristics are >4.14

• Differences in key patient characteristics are <1.0
  ➢ Gender
  ➢ Age
  ➢ Race
  ➢ BMI
  ➢ Overall health (Diagnostic Cost Group score)
  ➢ Mental health diagnoses
  ➢ Homelessness
  ➢ Copay status
  ➢ Marital status
Difference in HbA1c

Continuous HbA1c
- NP vs. physician: -0.05% (95% CI = -0.07 to -0.03)
- PA vs. physician: 0.01% (95% CI = -0.02 to 0.03)
- PA vs. NP: 0.05% (95% CI = 0.03 to 0.08)

In Control (odds ratio)
- NP vs. physician: 1.06 (95% CI = 1.02 to 1.10)
- PA vs. physician: 0.99 (95% CI = 0.95 to 1.04)
- PA vs. NP: 0.93 (95% CI = 0.88 to 0.99)
Difference in Blood Pressure

Continuous Systolic
- NP vs. physician: -0.27mmHg (95%CI = -0.46 to -0.08)
- PA vs. physician: -0.28mmHg (95%CI = -0.54 to -0.03)
- PA vs. NP: -0.01mmHg (95%CI = -0.30 to 0.27)

BP In Control (odds ratio)
- NP vs. physician: 1.01 (95% CI = 0.97 to 1.05)
- PA vs. physician: 1.02 (95% CI = 0.97 to 1.07)
- PA vs. NP: 1.01 (95% CI = 0.94 to 1.08)
Difference in LDL-Cholesterol

**Continuous LDL-C**
- NP vs. physician: 1.04mg/dl (95%CI = 0.60 to 1.48)
- PA vs. physician: 1.81mg/dl (95%CI = 1.22 to 2.41)
- PA vs. NP: 0.77mg/dl (95%CI = 0.11 to 1.43)

**LDL-C In Control (odds ratio)**
- NP vs. physician: 0.95 (95% CI = 0.90 to 0.99)
- PA vs. physician: 0.90 (95% CI = 0.85 to 0.95)
- PA vs. NP: 0.95 (95% CI = 0.89 to 1.02)
Simultaneous Control of Intermediate Outcomes

Simultaneously In Control (odds ratio)

- NP vs. physician: 0.95 (95% CI = 0.90 to 0.99)
- PA vs. physician: 0.90 (95% CI = 0.85 to 0.95)
- PA vs. NP: 0.95 (95% CI = 0.89 to 1.02)
Summary of Results

• We found no substantive differences in intermediate diabetes outcomes across the three primary care provider types.

• This finding held for sensitivity analyses examining only the most complex patients.

• Rigorous case-mix adjustment methods suggest that our findings are not the result of NPs or PAs caring for less complex patients.
Discussion

• We found no evidence for differences in outcomes of care by PCP provider type

• Our findings support the use of NPs and PAs as primary care providers for Veterans, including complex patients
What this Project Adds

• Propensity score weighting for many factors that might affect PCP type
  ➢ Adjusted for both medical and social complexity

• Outcomes analyzed at the patient (rather than visit) level over one year

• Accurate identification of provider type

• Analyzed NPs and PAs separately

• A nationwide sample of 369,000 patients

• A large sample of providers in 568 clinical settings
Limitations

• Generalizability to non-VA settings?
  ➢ Fee for service environments?
  ➢ Non-PCMH settings?

• Propensity score techniques reduce the possibility of selection bias, they do not eliminate the possibility

• We did not examine long-term, patient-centered outcomes

• We could not assess the degree to which NPs and PAs consulted physicians regarding patient care
Additional Ongoing Steps

• We are using the same sample to compare
  ➢ Cost and utilization outcomes
    ◆ Total cost of care (2013)
    ◆ Use of subtypes of care (PC visits, ED visits, admissions, labs, medications)

  ➢ Outcomes based on the roles of NPs, PAs, and physicians in caring for panels of patients
    ◆ Treating primarily chronic vs. acute care patients
    ◆ Level of patient acuity
    ◆ Potentially having providers from different professions as supplemental providers
Conclusions

• Physicians, NPs, and PAs as primary care providers had similar intermediate diabetes outcomes

• When using very large datasets, it is important to define clinically and/or policy significant differences before looking at the results

• Outcomes were also similar among the most complex patients

• This study supports the use of NPs and PAs in primary provider roles for patients with chronic disease
Contact Information and Disclaimer

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