

Re-examining Facility-level Effects on Diabetes Care Quality for Veterans

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Poll Question

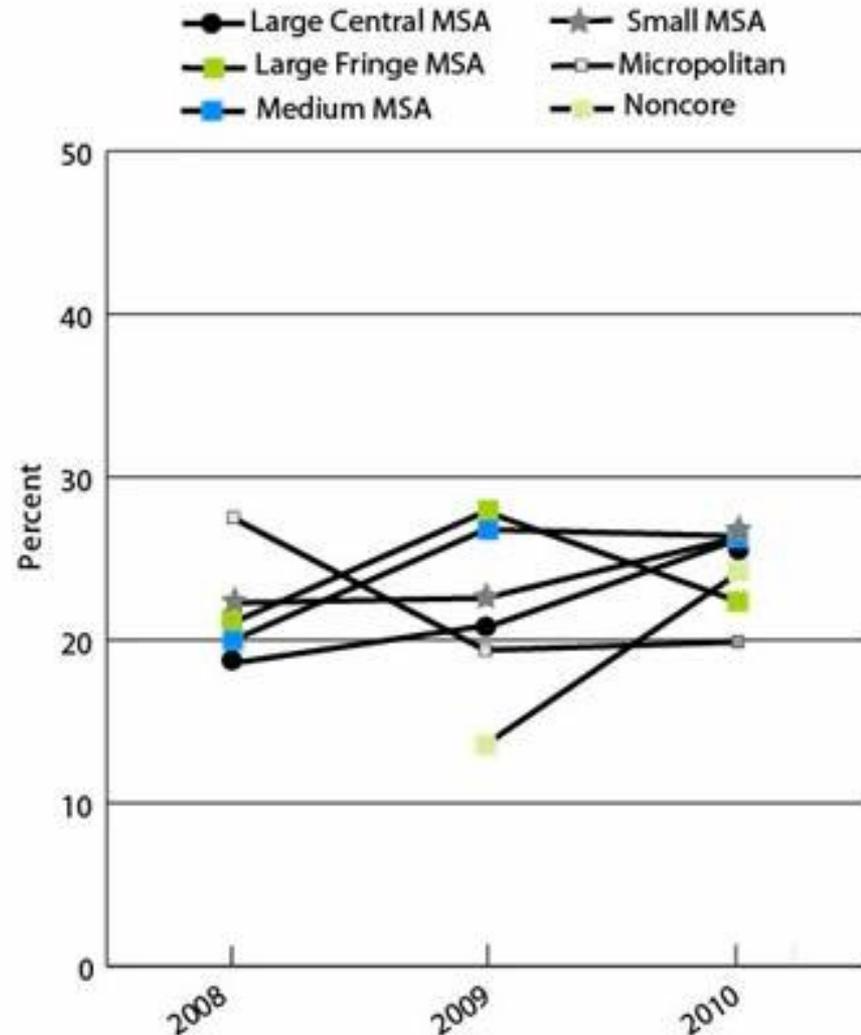
What is your principal interest in this work – examining facility and peer effects on diabetes care quality?

(Pick one answer.)

- Interested in improving the quality of clinicians' diabetes care
- Interested in how physicians influence one another's care patterns
- Interested in identifying and enhancing patients' roles in diabetes self-care
- Interested in multilevel (e.g., physician and facility) health economics methods
- Other

Diabetes Care Quality Overall

Adults age 40+ with diabetes receiving four recommended services for diabetes in calendar year (2+ HbA1c tests, foot exam, dilated eye exam, and flu shot), by residence location and age, 2008-2010



Source: AHRQ (2013).

Background and Motivation

- Quality improvement—across high- and low-performing providers both—is paramount
- Accountability is increasing...
 - Pay for Performance
 - Hospital Value-Based Purchasing
 - Physician Quality Reporting System
- At the population level, quality improvement is often slow and uneven^{1,2}
- Increasingly, clinicians are employed

Sources: ¹Griffith et al. (2006); ²Peterson et al. (2008)

Background and Motivation (ctd.)

- Facilities are looking for ways to improve their employee clinicians' quality
- The literature (VA setting only):
 - Facility-level factors appear to be playing a large role in driving quality^{1,2}
 - Key facility characteristics may include sufficiency or availability of care resources³⁻⁷

Sources: ¹Krein et al. (2002); ²Thompson et al. (2005); ³Ward et al., (2004); ⁴Jackson et al. (2005); ⁵Kirsh et al. (2012); ⁶Chou et al. (2015); ⁷Rose et al. (unpublished)

Limitations of the Literature

- Use traditional measures of diabetes care quality
- Cross-sectional designs limit causal inference
- In the few studies with longitudinal designs, no effort to identify relevant facility characteristics

Conceptual Framework

- Physician Learning and Peer Effects¹
 - Initial practice patterns established in training
 - Evolve over time to resemble peers' patterns
- Resource constraints and tight coordination may accelerate assimilation
- Evidence from medical school students' specialty choices,² c-section rates,³ and prescribing⁴

Sources: ¹ Phelps and Mooney (1993); ²Arcidiacono and Nicholson (2005); ³Epstein and Nicholson (2009); ⁴Nair, Manchanda, and Bhatia (2010)

Research Questions

1. How do health care facilities and peers affect the care patterns of individual clinicians?

Hypothesis (peer effects):

More Intensive Care Among Peers →

More Intensive Care by Individual Physician

Research Questions (ctd.)

2. Do facility resource levels mediate peer effects?

Hypothesis:

Stronger Resource Constraints →

Stronger Peer Effects (Hyp. 1)

Research Questions (ctd.)

3. How do peer effects identified through panel data differ from peer effects identified in cross-sectional analyses?

Hypothesis:

Panel estimates < cross-sectional estimates

Data Sources

- Diabetes episode and physician data:
 - VA Clinical Data Warehouse, FY2008-FY2011
 - Vital Status
- Facility characteristics – diabetes-relevant clinical/non-clinical staff, IT, space resources:
 - VA Clinical Practice Organization Survey, Primary Care Director Module, 2007
 - VA Primary Care Survey, 2008-09
- Area Health Resource File

Diabetes Care Quality

- Measure: Assessing blood pressure control therapy (BPC) among veterans with diabetes
- Based on Kerr and colleagues' (2012) clinical action measure

Category	Criteria
(5) Highly intensive treatment	DBP < 60
(4) Intensive treatment	SBP ≤ 130 and DBP ≤ 65, AND Not (5) + 3+ antihypertensive medications OR active intensification of Rx
(3) Appropriate care	Not (4) or (5) + SBP < 140 and DBP < 90, OR SBP < 150 and DBP < 65, OR SBP < 150 and 3+ antihypertensive medications OR Other appropriate clinical action* within 90 days
(2) Potential undertreatment	Not (1), (3), (4) or (5)
(1) Almost certain undertreatment	SBP ≥ 160 OR DBP ≥ 100

SBP = Systolic blood pressure DBP = Diastolic blood pressure

* Patient has normal blood pressure at follow-up appointment, increased dosage, changed drug class, or new class of antihypertensive drug added to regimen

Category	Criteria	
(5) Highly intensive treatment	DBP < 60	
(4) Intensive treatment	Not (5) + SBP ≤ 130 and DBP ≤ 65, AND 3+ antihypertensive medications OR intensification of Rx	Dummy = 0
(3) Appropriate care	Not (4) or (5) + SBP < 140 and DBP < 90, OR SBP < 150 and DBP < 65, OR SBP < 150 and 3+ antihypertensive medications	
(2) Potential undertreatment	Not (1), (3), (4) or (5)	
(1) Almost certain undertreatment	SBP ≥ 160 OR DBP ≥ 100	Dummy = 1

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(3) Appropriate care	Not (4) or (5) + SBP < 140 and DBP < 90, OR SBP < 150 and DBP < 65, OR SBP < 150 and 3+ antihypertensive medications	Dummy = 1 Other appropriate clinical action* within 90 days
(2) Potential undertreatment	Not (1), (3), (4) or (5)	Dummy = 0
(1) Almost certain undertreatment	SBP ≥ 160 OR DBP ≥ 100	

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Category	Criteria	
(5) Highly intensive treatment	DBP < 60	Dummy = 1
(4) Intensive treatment	Not (5) + SBP ≤ 130 and DBP ≤ 65, AND 3+ antihypertensive medications OR active intensification of Rx	Dummy = 0 Other appropriate clinical action* within 90 days
(3) Appropriate care	Not (4) or (5) + SBP < 140 and DBP < 90, OR SBP < 150 and DBP < 65, OR SBP < 150 and 3+ antihypertensive medications	
(2) Potential undertreatment	Not (1), (3), (4) or (5)	Dummy = missing
(1) Almost certain undertreatment	SBP ≥ 160 OR DBP ≥ 100	

SBP = Systolic blood pressure DBP = Diastolic blood pressure

* Patient has normal blood pressure at follow-up appointment, increased dosage, changed drug class, or new class of antihypertensive drug added to regimen

Identifying Physician “Movers”

Model identification based on physician exposure to different facilities/peers over time

- 60%+ of diabetes care episodes at a single VA facility in a given year, min. 10 episodes
- 60%+ of diabetes care episodes at a *different* VA facility the next year,* min. 10 episodes
- Physician records linked across VA facilities by Data Access Request Tracker (DART) staff
- 326 unique physician movers (0.5%)

* Non-consecutive years allowed if intervening year had < 10 episodes

Empirical Framework

$$\begin{aligned} & (BP \text{ Control Overall Measure mean})_{pt} \\ & = \beta_0 + \beta_1 FAC\Delta_{pft} + \beta_X X_{pft} + Y_t \\ & + \varepsilon_{nt} \end{aligned}$$

- Fixed effects regression models
- Physician (p) - Year (t) level of analysis
 - Regressions also include variables for facilities f
- Double-dot notation for physician fixed effects: variables demeaned using p -level variable means across years
- Dependent variable treated as “continuous” scale

Empirical Framework (ctd.)

$$\begin{aligned} & (BP \text{ Control Overall Measure mean})_{pt} \\ & = \beta_0 + \beta_1 FAC\Delta_{pft} + \beta_X X_{pft} + Y_t \\ & + \varepsilon_{nt} \end{aligned}$$

- Key independent variable $FAC\Delta$ = difference between
 - the average* performance of the physician's home facility in the current year, and
 - the average* performance of the physician's home facility in the most recent pre-move year
- Control variables X_{pft} include patient mix (age, sex), practice stress, resident training, veteran density, HPSA, county diabetes burden (death rate, income, Medicaid)
- Year fixed effects Y_t

* Averages computed exclusive of physician p 's care episode data

Empirical Framework (ctd.)

- Other dependent variables:
 - Almost certain undertreatment (Measure = 1) vs. all other outcomes
 - Appropriate care (Measure = 3) vs. all other outcomes
 - Highly intensive management (Measure = 5) vs. all other outcomes
- Interacting $FAC\Delta$ independent variable with current-year facility resource measures
 - *Results not shown*

Results (Sample Descriptives)

Variable	Mean	Std. Dev.
<i>Dependent Variables</i>		
BP Control Measure Value (1 to 5)	3.12	(0.48)
Almost Certain Undertreatment (Measure = 1)	5.0%	
Appropriate Care (Measure = 3)	68.2%	
Highly Intensive Management (Measure = 5)	12.9%	
<i>n</i>	1,016	

Note: statistics computed at provider-year level. Percentages add to < 100% because Measure = 2 and Measure = 4 groups are omitted.

Results (Overall BPC Measure [1-5])

Model	Key Independent Variable	Est. (SE)
i)	Difference in Facility-year-level Performance,† Current Facility-year Minus Pre-move Facility-year	0.263 (0.101)**
ii)	Current Facility-year-level Performance,† Moving Physicians	0.254 (0.066)**
iii)	Current Facility-year-level Performance,† All Physicians	0.092 (0.020)**

* $p < 0.10$. ** $p < 0.05$. † Variable computed exclusive of index physician episodes.

Additional control variables (results not shown) include provider-year-level averages of the following variables: Female, Age 18-40, Age 41-65, Age 66-80, and Age 81+, as well as Facility's PCPs Also Make Rounds, Facility's PCPs Also Attending Physicians, Facility's Clinicians Express Feeling Overwhelmed, Residents Trained On-site (Academic Facility), Total Episodes (1,000s) at Facility, County's Veteran Population in 2010, County's Veteran Hospital Beds in 2008, Health Professional Shortage Area, County's PCPs in Patient Care in 2010, County's Diabetes Deaths in 2004-2006, County's Per Capita Income in 2008 (\$1,000s), County's Medicaid Eligible Population in 2007, and year fixed effects.

Results (BPC Measure = 1, 3, or 5)

BPC Meas. = 1 BPC Meas. = 3 BPC Meas. = 5

Model	Key Independent Variable	Est. (SE)	Est. (SE)	Est. (SE)
i)	Difference in Facility-year-level Performance,† Current Facility-year Minus Pre-move Facility-year	0.335 (0.121)**	0.493 (0.109)**	0.394 (0.104)**
ii)	Current Facility-year-level Performance,† Moving Physicians	0.264 (0.119)**	0.169 (0.091)*	0.181 (0.065)**
iii)	Current Facility-year-level Performance,† All Physicians	0.121 (0.029)**	0.096 (0.018)**	0.087 (0.020)**

* p < 0.10. ** p < 0.05. † Variable computed exclusive of index physician episodes.

Additional control variables (results not shown) include provider-year-level averages of the following variables: Female, Age 18-40, Age 41-65, Age 66-80, and Age 81+, as well as Facility's PCPs Also Make Rounds, Facility's PCPs Also Attending Physicians, Facility's Clinicians Express Feeling Overwhelmed, Residents Trained On-site (Academic Facility), Total Episodes (1,000s) at Facility, County's Veteran Population in 2010, County's Veteran Hospital Beds in 2008, Health Professional Shortage Area, County's PCPs in Patient Care in 2010, County's Diabetes Deaths in 2004-2006, County's Per Capita Income in 2008 (\$1,000s), County's Medicaid Eligible Population in 2007, and year fixed effects.

Results Summary

- Strong evidence of peer effects. For a one-point increase in peers' overall BPC measure score (versus pre-move peers), physician movers increase their overall BPC score 0.263 points
 - Facility resources do not mediate effects
- Panel effects for physician movers typically larger than cross-sectional effects for movers or for all sample physicians
 - Particularly in analysis of dichotomous outcomes

Limitations

- Peer effects model results must be interpreted with caution¹
- Movers may not be representative of VA physicians, non-VA physicians
- Examining one quality measure only
- Examining diabetes care-relevant resources only

Sources: ¹Mansky (1993)

Conclusions

In managing the blood pressure of veterans with diabetes, physician practice patterns tend to coalesce quickly at the facility level.

If facility and care team factors drive these peer effects, researchers must look to mechanisms other than resources to explain how.

Comments and questions
are welcome!

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