Clinical quality and the Patient-centered Medical Home
Results from the national PACT evaluation

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Seattle, WA
Overview

• Patient centered medical home (PCMH) model
• PCMH & clinical quality in non-VHA clinics
• VHA PACT national evaluation regarding PCMH model and clinical outcomes
  - Association of PACT implementation
  - Elements of PACT most associated with improved quality
  - Improvements in quality related to PACT implementation
Poll Question #1

What is your primary role in VA?

– student, trainee, or fellow
– clinician
– researcher
– administrator, manager or policy-maker
– other
Poll Question #2

- What if any is your involvement with PACT?
  - Provider (Physician, NP, PA)
  - RN Case Manager
  - Mental Health Provider (psychologist, psychiatrist)
  - Other staff
  - Not involved with PACT
The Patient Centered Medical Home (PCMH)

• Tackle the “Triple aim”
  ➢ Restructure primary care practice
  ➢ Improve chronic disease care

• PCMH elements
  ➢ Team-based care
  ➢ Enhance access to care
  ➢ Coordinate care
  ➢ Comprehensiveness
  ➢ Systems approach to quality and safety
  ➢ Sustained partnership with patients

• Most major health plans, FQHC and VHA have PCMH models

Jackson, *Annals of Internal Medicine*, 2013, 158 (3)
Prior Non-VA research on clinical outcomes

- FQHC clinics: better performance with PCMH recognition 9/16 measures
  - Asthma meds, diabetes control, pap testing, prenatal care, tobacco cessation
  - Example - diabetes A1c < 9%: 71.1 in PMCH certified clinic vs. 68.4% clinic without PCMH certification
- Pennsylvania Chronic care initiative: multi-payor with shared savings
  - PCMH practices had better control on 4 out of 6 process measures (e.g. testing for A1c: 92.1% in pilot vs. 83.9% control clinic)
- Recent meta-analysis on 11 initiatives noted only small benefits
  - 1.2% increase in cervical cancer screening; 1.4% increase in breast cancer screening
  - No differences in 4/6 quality measures (colorectal cancer screening, diabetes)

Friedberg, *JAMA IM*, 2015
Sinaiko, *Health Affairs*, 2017
Veterans Health Administration (VHA)
Integrated Health Care System

> 5 million primary care patients
> 16 million primary care encounters annually
160 Medical centers, 802 community base outpatient clinics (CBOCs)

• Capitated payment system
• Regional networks
• Salaried medical staff
PCMH in VHA

• Patient Aligned Care Team (PACT) initiative: reorganization of VHA primary care practice into patient centered medical homes

• PACT national evaluation outcomes
  ➢ Clinical outcomes
  ➢ Staff experience
  ➢ Cost and health care use
  ➢ Patient satisfaction
Other Team Members

Clinical Pharmacy Specialist
± 3 panels

Social Work
± 2 panels

Team:
Assigned to 1 panel (±1200 patients)
- Provider: 1 FTE
- RN Care Manager: 1 FTE
- Clinical Associate (LPN, Medical Assistant): 1 FTE
- Clerk: 1 FTE

Integrated Behavioral Health
Psychologist ± 3 panels
Social Worker ± 5 panels
Care Manager ± 5 panels
Psychiatrist ± 10 panels

Patient Caregiver

Team-Based Care
Challenges to measuring PACT Implementation

• Simultaneous rollout of national initiative across VHA
  – No control group
• No gold standard to measure PCMH
  – Widely used NCQA recognition not as relevant to VHA; emphasis on infrastructure and QI programs
• VHA already had in place many features of the medical home
  ✓ Patient assigned to a primary care provider
  ✓ Universal Electronic Medical Record
  ✓ Performance & quality improvement system
  ✓ Panel management tools, e.g. disease registries
  ✓ National programs for care coordination
  ✓ Integrated behavioral and mental health services
Development of the PACT Implementation Progress Index

• Goal
  ➢ Utilizes existing patient, provider and administrative data
  ➢ Reflects processes & attributes essential to effective primary care

• Describes variation in implementation across clinic sites

• Examines the relationship between Pi² and key associations: patient satisfaction, staff burnout, clinical quality, and health care use
PACT implementation progress index ($Pi^2$)

<table>
<thead>
<tr>
<th>8 Domains</th>
<th>Source of Data</th>
<th># of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensiveness</td>
<td>Patient surveys</td>
<td>3</td>
</tr>
<tr>
<td>Self-management support</td>
<td>(Consumer Assessment of Health Plans=CAHPS-PCMH)</td>
<td>2</td>
</tr>
<tr>
<td>Patient-centered care &amp; communication</td>
<td>n = 75,101</td>
<td>6</td>
</tr>
<tr>
<td>Shared decision making</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Access</td>
<td>Corporate Data Warehouse (CDW)</td>
<td>11</td>
</tr>
<tr>
<td>Continuity</td>
<td>n = &gt;5.6 million &amp; Patient surveys</td>
<td>3</td>
</tr>
<tr>
<td>Coordination of care</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Team-based care</td>
<td>Primary care personnel survey</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>53</td>
</tr>
</tbody>
</table>

Nelson et al, *JAMA Internal Medicine*, 2014
PACT Implementation Progress Index (PI\(^2\)) Scores

- Clinic-level rankings generated for each domain
  - Sum of the standardized means for each variable
  - Variables were standardized using national means

- PI\(^2\) score calculated for each clinic:
  \[
  \text{PI}^2 \text{ score} = (\# \text{ of domains in the top quartile}) - (\# \text{ of domains in the bottom quartile})
  \]
  Range from 8 to -8:
  - High implementation: 5 to 8
  - Low implementation: -7 to -5
Is PACT implementation associated with improved Clinical Quality?

Methods:
• Cross sectional analysis of Pi\textsuperscript{2} measure and clinical quality
• Non-parametric test of trend for differences in clinical quality by Pi\textsuperscript{2}
• Percentage of patients meeting each clinical quality indicators

Measure of clinical quality: External Peer Review Program (EPRP)
• Random selection among a clinic’s patients who meet ‘denominator’ criteria from FY2012
• Manual abstraction of clinic records by an independent external contractor
• 48 quality indicators for chronic disease management and prevention
### Example of EPRP quality indicators

**High Clinical Quality at baseline (2012)**

<table>
<thead>
<tr>
<th>Chronic disease measures</th>
<th>% of patients meeting measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAD</strong></td>
<td></td>
</tr>
<tr>
<td>LDL level &lt; 100</td>
<td>70.5%</td>
</tr>
<tr>
<td>LDL cholesterol measured</td>
<td>96.5%</td>
</tr>
<tr>
<td>Aspirin Prescription</td>
<td>92.9%</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td></td>
</tr>
<tr>
<td>LDL level &lt; 100</td>
<td>70.1%</td>
</tr>
<tr>
<td>HbA1c &lt; 9%</td>
<td>82.2%</td>
</tr>
<tr>
<td>BP &lt; 160/100</td>
<td>96.0%</td>
</tr>
<tr>
<td>BP &lt; 140/90</td>
<td>80.6%</td>
</tr>
<tr>
<td><strong>Hypertension</strong></td>
<td></td>
</tr>
<tr>
<td>BP &lt; 160/100</td>
<td>95.3%</td>
</tr>
<tr>
<td>BP &lt; 140/90</td>
<td>78.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevention measures and screening</th>
<th>% of patients meeting measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual screening for depression</td>
<td>96.6%</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>84.3%</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>92.6%</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>82.0%</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>62.0%</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>99.4%</td>
</tr>
<tr>
<td>Obesity</td>
<td>95.1%</td>
</tr>
<tr>
<td>Vaccinations, pneumococcal</td>
<td>93.2%</td>
</tr>
<tr>
<td>Vaccinations, influenza</td>
<td>76.6%</td>
</tr>
</tbody>
</table>
**Higher Implementation Sites Had Higher Clinical Quality**

48 clinical quality indicators

- Significantly higher (p<0.05) for 19/48 by high vs. low PI²

- Random effects model: significant increase in average outcomes for facilities with higher PI² scores as compared to facilities with lower PI² scores (p <0.001).

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### Figure 1: Difference in the % of patients meeting quality criteria between high and low implementation sites

<table>
<thead>
<tr>
<th>Quality Indicators</th>
<th>High Implementation Sites</th>
<th>Low Implementation Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>Slightly above normal</td>
<td>Slightly below normal</td>
</tr>
<tr>
<td>Blood sugar</td>
<td>Slightly above normal</td>
<td>Slightly below normal</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>Slightly above normal</td>
<td>Slightly below normal</td>
</tr>
<tr>
<td>Smoking cessation</td>
<td>Slightly above normal</td>
<td>Slightly below normal</td>
</tr>
<tr>
<td>Exercise</td>
<td>Slightly above normal</td>
<td>Slightly below normal</td>
</tr>
<tr>
<td>Healthy diet</td>
<td>Slightly above normal</td>
<td>Slightly below normal</td>
</tr>
</tbody>
</table>
**Higher Implementation Sites Had Higher Clinical Quality**

48 clinical quality indicators

- Significantly higher (p<0.05) for **19/48** by high vs. low PI²
- Random effects model: significant increase in average outcomes for facilities with higher PI² scores as compared to facilities with lower PI² scores (p < 0.001).

Range of differences 1 to 6%
Implementation of PACT associated with higher clinical quality – example indicators

19/48 indicators significantly higher at sites with higher scores

<table>
<thead>
<tr>
<th>Patient cohort</th>
<th>Pi² Score</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>n</td>
<td>5 to 8</td>
<td>2 to 4</td>
<td>-1 to 1</td>
<td>-4 to 2</td>
</tr>
<tr>
<td>Aspirin in current meds</td>
<td>49,811</td>
<td>81.1%</td>
<td>79.3%</td>
<td>79.3%</td>
<td>74.4%</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosis of HTN &amp; BP &lt; 140/90 mm Hg</td>
<td>107,033</td>
<td>80.2%</td>
<td>79.4%</td>
<td>79.1%</td>
<td>77.9%</td>
</tr>
<tr>
<td>Prevention and Screening</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol misuse w/ timely counseling</td>
<td>8,957</td>
<td>86.8%</td>
<td>79.4%</td>
<td>80.7%</td>
<td>78.4%</td>
</tr>
<tr>
<td>Cervical cancer screening women age 21-64</td>
<td>29,302</td>
<td>92.8%</td>
<td>91.8%</td>
<td>91.6%</td>
<td>91.6%</td>
</tr>
</tbody>
</table>

Which elements of the model were the most important for clinical quality

• Study Goal: To assess the association between elements of the PCMH model and clinical quality
• To estimate an overall population health benefit, if results from high performing clinics were achieved at all VHA primary care clinics

Methods

• Patient-level observational study of 422,125 veterans who received VHA primary care from 2012 – 2014
  • AND had chart abstracted by an independent, external contractor for the External Peer Review Program (EPRP)
  • ~10% sample of the overall primary care population
Measures – PACT implementation

• Each clinic received a standardized domain score (mean of 0) for each of the 8 Pi² domains
• Categorized into quartiles
• For individual domains, clinics received
  ➢ -1 if domain score in lowest quartile
  ➢ +1 if domain score in highest quartile
  ➢ 0 all others
• Used scores from FY2012
Statistical analysis

• Modeled the association between quartile of each Pi² component and the 48 clinical quality indicators using Generalized Estimating Equations (GEE) for binary outcomes
  – accounting for within-patient correlation across quality measures and adjusting for multiple comparisons.

• Calculated average marginal effects to report differences in probability of meeting clinical quality between the highest and lowest quartile Pi² component scores
Methods

• Calculated the number additional measures expected to have met quality criteria had the low- and middle-scoring clinics performed similarly to clinics in the highest domain scores
  
  ➢ Used differences in probability of between low and middle $P_i^2$ clinic compared to high scoring clinics
  
  ➢ Generated population estimates for each EPRP measure for the VHA primary care population in 2014
% of 48 quality indicators associated with significantly better performance in highest quartile clinics compared to lowest quartile clinics, n = 909 clinics

Nelson, et al, JAMA Internal Medicine, 2017
Difference in percentage meeting EPRP criteria between sites with high vs. low continuity clinics

- Osteoporosis screening for women >= 65
- CVD LDL-C < 100 mg/dL
- Diagnosis of hypertension and blood pressure < 140/90 mm Hg
- Diabetes - Blood pressure < 140/90 mm Hg
Clinical Quality indicators with population estimates

<table>
<thead>
<tr>
<th>Chronic disease management</th>
<th>% of patients meeting measure</th>
<th>Population with chart abstracted</th>
<th>Estimate population of primary care patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes - HbA1c &lt; 9%</td>
<td>82.2%</td>
<td>48,685</td>
<td>996,531</td>
</tr>
<tr>
<td>Hypertension - BP &lt; 160/100</td>
<td>95.3%</td>
<td>112,429</td>
<td>2,528,286</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Screening</th>
<th>% of patients meeting measure</th>
<th>Population with chart abstracted</th>
<th>Estimate population of primary care patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>96.6%</td>
<td>109,628</td>
<td>4,613,649</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>82.0%</td>
<td>115,048</td>
<td>3,127,987</td>
</tr>
</tbody>
</table>
Population estimates for additional clinical quality indicators met if all patients cared for at a high performing facilities, n= 909 clinics

<table>
<thead>
<tr>
<th>Domain of PACT Implementation</th>
<th>Number of quality indicators if all patients at highest quartile clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care coordination</td>
<td>310,468</td>
</tr>
<tr>
<td>Access</td>
<td>258,999</td>
</tr>
<tr>
<td>Continuity</td>
<td>253,816</td>
</tr>
<tr>
<td>Communication</td>
<td>285,193</td>
</tr>
<tr>
<td>Shared decision making</td>
<td>193,429</td>
</tr>
<tr>
<td>Team-Based Care</td>
<td>96,054</td>
</tr>
<tr>
<td>Self Management</td>
<td>100,961</td>
</tr>
<tr>
<td>Comprehensiveness</td>
<td>128,206</td>
</tr>
</tbody>
</table>
Conclusions

• All components of the PCMH model contributed to better performance on clinical quality indicators
• Those with the greatest association were care coordination, access, continuity and communication
• Significant number of quality indicators could have been met if adoption of PACT at all clinics was similar to high-quartile clinics
Improvements in quality related to PACT

Did VHA primary care clinics with more extensive PACT implementation have more improvement in chronic disease quality measures?

Rosland AM, et al. Manuscript under review
Methods

- Clinic-level longitudinal analysis
- All primary care clinics with complete data (N=808)
- Linear regression models of change from 2009 (Pre-PACT) to 2013 (PACT) for individual clinical quality measures
- Main predictor - Extent of PACT implementation
EPRP Quality Measure Selection for Study

- Outpatient quality of care in chronic diseases directly impacted by primary care
- Clinical process and outcome measures
- Available and measured in same form from 2009 to 2013

→ 15 Clinical Quality Measures Selected
→ Coronary Artery Disease, Diabetes, Hypertension
Analysis

<table>
<thead>
<tr>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-PACT</td>
<td>PACT Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Covariate:**
- 2009 Clinic % Meeting Quality Measure

**Predictor:**
- 2012 Clinic Pi² score

**Outcome:**
- 2013 Clinic % Meeting Quality Measure

**Clinic Type**
- Rural v. Urban
- Hosp v. Community

**Clinic Area**
- SES
- Area
- Unemployment %
## Results: Clinical Process Quality Measures

<table>
<thead>
<tr>
<th>Measure – Clinical Group</th>
<th>Mean 2009 Clinic Score</th>
<th>Adjusted Difference in 2013 Quality Highest Pi² vs. Lowest Pi² categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL cholesterol measured - CAD</td>
<td>95%</td>
<td>+2.4%*</td>
</tr>
<tr>
<td>Aspirin Prescription - CAD</td>
<td>92%</td>
<td>+3.9%*@</td>
</tr>
<tr>
<td>Aspirin Prescription - Diabetes</td>
<td>75%</td>
<td>+0.9%</td>
</tr>
<tr>
<td>HbA1c measured annually - Diabetes</td>
<td>98%</td>
<td>+0.8%*</td>
</tr>
<tr>
<td>ACE-inhibitor /ARB prescription - Diabetes</td>
<td>79%</td>
<td>-3.0%*</td>
</tr>
<tr>
<td>Foot Exam - Diabetes</td>
<td>92%</td>
<td>+1.4%</td>
</tr>
<tr>
<td>Retinal Exam - Diabetes</td>
<td>88%</td>
<td>-0.05%</td>
</tr>
<tr>
<td>Renal Function Testing - Diabetes</td>
<td>95%</td>
<td>-0.8%</td>
</tr>
</tbody>
</table>

*P value <0.05

®P <0.05 for 4th Pi² category (-4 to -2) vs. 1st (+5 to +8)

All others for 5th Pi² category (-5 to -8) vs. 1st
## Results: Clinical Outcome Quality Measures

<table>
<thead>
<tr>
<th>Measure – Clinical Group</th>
<th>Mean 2009 Clinic Score</th>
<th>Adjusted Difference in 2013 Quality Highest Pi² vs. Lowest Pi² categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL level &lt; 100 – CAD</td>
<td>67%</td>
<td>+5.4%*</td>
</tr>
<tr>
<td>LDL level &lt; 100 – Diabetes</td>
<td>70%</td>
<td>+3.8%*</td>
</tr>
<tr>
<td>HbA1c &lt; 9% - Diabetes</td>
<td>85%</td>
<td>+0.8%</td>
</tr>
<tr>
<td>Blood Pressure &lt; 160/100 - Diabetes</td>
<td>96%</td>
<td>+1.4%*</td>
</tr>
<tr>
<td>Blood Pressure &lt; 140/90 - Diabetes</td>
<td>80%</td>
<td>+1.9%</td>
</tr>
<tr>
<td>Blood Pressure &lt; 160/100 - Hypertension</td>
<td>95%</td>
<td>+1.9%*</td>
</tr>
<tr>
<td>Blood Pressure &lt; 140/90 - Hypertension</td>
<td>78%</td>
<td>+2.6%*@</td>
</tr>
</tbody>
</table>

*P value <0.05

@P <0.05 for 4th Pi² category (-4 to -2) vs. 1st (+5 to +8)

All others for 5th Pi² category (-5 to -8) vs. 1st
Model-Based Predicted 2009-2013 Change in Statistically Significant Process Measures

- LDL Measured CAD: 2.3% (Highest Pi2 Category), -0.1% (Lowest Pi2 Categories)
- Aspirin Prescription CAD@: 3.0% (Highest Pi2 Category), -0.9% (Lowest Pi2 Categories)
- HbA1c Measured DM: 1.2% (Highest Pi2 Category), 0.4% (Lowest Pi2 Categories)
- ACEI/ARB - DM: 0.3% (Highest Pi2 Category), -2.7% (Lowest Pi2 Categories)

@Low Pi2 Category (-2 to -4). All others Pi2 (-5 to -8).
Model-Based Predicted 2009-2013 Change in Statistically Significant Outcome Measures

- LDL < 100 CAD: 2.0%
- LDL < 100 DM: 0.2%
- BP < 160/100 DM: -1.2%
- BP < 160/100 HTN: -1.1%
- BP < 140/90 HTN@: -0.1%

@Low Pi2 Category (-2 to -4). All others Pi2 (-5 to -8).
Conclusions

• Clinics with PACT most extensively in place by 2012 had significantly larger improvements in more than half of the chronic disease quality measures examined than clinics with least PACT
  ➢ Both clinical processes and outcomes
  ➢ Among high and low starting

• PCMH-aligned changes in care delivery across all patients could realize downstream improvements in chronic disease quality measures
Limitations for all analyses

• Observational studies
  – no control group
  – association can not imply causality

• Do not have comparable measure of PACT implementation prior to 2012

• Performance in clinical quality measures does not always reflect actual quality of care

• Several domains scores rely on self-report from patients and providers
Conclusions

- Evidence that PCMH can improve clinical quality is mixed
- Effective implementation of the PACT model in VHA associated with small differences in clinical quality
- Clinics with more effective implementation of PACT had larger improvements in chronic disease care measures
- Domains of the model associated with the biggest differences: care coordination, access, continuity and communication
  - When applied to large populations of patients in the VHA, there were a significant number of care processes completed in higher performing clinics
Acknowledgements

PACT National Evaluation Team
Philip Sylling, MA
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Ann-Marie Rosland, MD, MPH (Lead, High risk subgroup)
Resources

Published articles
http://jamanetwork.com/journals/jamainternalmedicine/fullarticle/1881931

Nelson KM, et al, Clinical quality and the patient-centered medical home. *JAMA Internal Medicine, online May, 2017*
http://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2623525

Patient care services website about PACT
https://www.patientcare.va.gov/primarycare/PACT.asp
QUESTIONS OR COMMENTS?

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THANKS!