Improving Chronic Disease Management with Pieces

A Pragmatic Trial to Improve Care of Patients with Chronic Kidney Disease, Diabetes and Hypertension
ICD - Pieces™

Study Core

UT Southwestern / Biostatistics Center

Parkland Center Clinic Innovation (PCCI)

SUNY of Buffalo

Health Care Systems

Parkland Health and Hospital System

Texas Health Resources

ProHealth

VA North Texas
Triad of CKD, Diabetes & Hypertension

Public health implications
- Progression to ESRD
- Excessive CV morbidity/mortality
- Vulnerable populations
- Gaps clinical practice

High Risk

Excess Risk
(larger excess mortality than sum each risk)
Experience with CKD at Parkland

Multidisciplinary team
Medical homes community

Identify patients using EHR
Implement optimal care

Collaborative primary-subspecialty care

Novel technology platform (Pieces™)
What is Pieces™?

Parkland Intelligent e-Coordination and Evaluation System
Pieces™

- Parkland Intelligent e-Coordination and Evaluation System
  - Sits on top of EHR/EPIC
  - Natural language processing to read EHR
  - Near real-time risk stratification
  - Automated protocol activation
  - Patient-tailored interventions
  - Electronic ascertainment of outcomes
Identification of HF patients in Real-Time Using NLP Processing and Data Mining

System ranks HF Patients into Risk Categories for readmission

System provides list of targeted high risk patients to intervention coordination teams

Intervention teams orders inpatient and outpatient interventions in EHR

Intervention teams conduct inpatient and outpatient interventions

Monitoring and evaluation of Heart Failure patient outcomes
Concentrated care management efforts on ¼ of the patients

- 26% relative reduction in odds of readmission
- Absolute reduction of 5 readmissions per 100 index admissions
Detection of CKD in a Primary Care Clinic

Community Oriented Primary Care Clinics (Medical Homes)

Pieces™ screens EHR
- eGFR < 60 ml/min/1.73m²
- Albuminuria
- Proteinuria

New cases CKD

Notification Confirmation Enrollment

Joint Primary Care – Nephrology Care

Primary outcome: Number of patients newly detected with CKD

Reference:
CKD in
- Problem List
- ICD-9
- Progress Note or CKD clinic referral
Undercoding: Patients Newly Detected with CKD by Pieces™

% Patients newly detected with CKD

- East Dallas Clinic: 64% (n=208)
- Family Medicine Clinic: 62% (n=105)
- Primary Care General Medicine Clinic: 46% (n=188)

From July 1, 2011 to August 31, 2012
Treatment of CKD and Associated Conditions by Pieces™

CKD patients
Primary care clinic

Pieces™ screens EHR

Tracks variables real time

eGFR >20% change
Hospital admissions
BP <140/90 mmHg
Use ACEI/ARBs
Use statins

Updates electronic dashboard

Notification investigators/clinicians
### Achievement Goals CKD Pieces Study

<table>
<thead>
<tr>
<th>Clinical Measurement</th>
<th>Screening % at Goal</th>
<th>Last follow-up visit % at Goal</th>
<th>P-value (McNemar’s test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow-up duration, month median [range]</td>
<td>n=107</td>
<td>n=107</td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>34.6%</td>
<td>43.0%</td>
<td>0.14</td>
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<tr>
<td>Diastolic blood pressure</td>
<td>57.9%</td>
<td>65.4%</td>
<td>0.17</td>
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<tr>
<td>ACEI/ARB</td>
<td>57.0%</td>
<td>86.9%</td>
<td>&lt;0.0001</td>
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<tr>
<td>Statin</td>
<td>43.9%</td>
<td>79.4%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

*if positive test for proteinuria or albuminuria, then goal BP <130/80; Otherwise goal BP < 140/90.*
Improving Chronic Disease Management with Pieces™: A Collaboration of Multiple and Diverse Healthcare Systems
Hypothesis

- Patients who receive care with a collaborative model of primary-subspecialty care enhanced by novel information technology (Pieces) will have fewer hospitalizations, readmissions, CV events and deaths than patients receiving standard medical care.
Specific Aim UH2

- Establish a Health Care Systems Collaboratory to conduct a pragmatic trial to improve care of patients with three chronic coexistent medical conditions: CKD, diabetes and hypertension.
# Diverse Participatory Healthcare Systems and EHRs

<table>
<thead>
<tr>
<th>HCS</th>
<th>Description</th>
<th>Location</th>
<th>EHR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parkland</td>
<td>Safety-net public</td>
<td>Dallas County</td>
<td>EPIC</td>
</tr>
<tr>
<td>Texas Health Resources</td>
<td>Private non-profit</td>
<td>North Texas</td>
<td>EPIC/All Scripts</td>
</tr>
<tr>
<td>ProHealth</td>
<td>Private non-profit</td>
<td>Connecticut</td>
<td>All Scripts</td>
</tr>
<tr>
<td>VA North Texas</td>
<td>Federal</td>
<td>North Texas</td>
<td>CPRS</td>
</tr>
</tbody>
</table>
Organization ICD - Pieces™

- Miguel Vazquez, MD, PI
- Robert Toto, MD, Co-PI
- Ruben Amarasingham, MD
- Adeola Jaiyeola, MD

PCCI  (Drs. Amarasingham, Jaiyeola, Oliver)

- Biostatistics Core (Dr. Chul Ahn and Dr. Song Zhang)
- Diabetes Core (Dr. Perry Bickel)
- SUNY (Dr. Chet Fox and Dr. Linda Khan)

Steering Committee

- Dr. Ruben Amarasingham  PHHS
- Dr. Susan Hedayati  THR
- Dr. Ferdinand Velasco  VA
- Mr. John Lynch  ProHealth
Specific Aim 1 UH3

- Conduct a randomized pragmatic clinical trial of management of patients with CKD, diabetes and hypertension with a clinician support model enhanced by technology support (Pieces) compared with standard of care.
Specific Aim 2 UH3

- Develop and validate predictive models for risks of hospitalizations, cardiovascular events and deaths for all patients with coexistent CKD, diabetes and hypertension and to predict risk of 30 day readmissions for patients who are hospitalized.
Pieces™ Identifies Patients with CKD and Diabetes and Hypertension

HCS

Parkland HHS
n=2,002

PCPs=32
Patients=373

Texas Health Resources
n=6,931

PCPs=30
Patients=1,271

ProHealth
n=6,813

PCPs=30
Patients=1,293

VA North Texas
n=5,478

PCPs=12
Patients=1,022

Clusters

Patients to enroll

CKD + Hypertension + Diabetes
n=3,959
Pieces™ Connects with Implementation Sites

- ProHealth Physicians
- Parkland
- Department of Veterans Affairs
- Texas Health Resources
- UT Southwestern Medical Center

Secure Database
Detection CKD, Diabetes and Hypertension

Eligible patients
CKD + Diabetes + Hypertension
CKD, Diabetes and Hypertension
Enhanced by Pieces™

Primary care provider notified → Patient consented and enrolled → Therapy plan activated

Primary care practitioner

Implementation facilitator

Pieces™ monitors

BP control
ACEI/ARBs
Statins
Glucose control
Avoidance NSAIDs/nephrotoxic drugs
Predictive Risk Model

Parkland Health Care System  Texas Health Resources  ProHealth Physicians  VA North Texas

CKD, Diabetes, HTN

Clinical factors  Behavioral factors
Demographic factors  Health care utilization factors

Hospitalizations, Readmissions, CV Events, Deaths
Improving Chronic Disease Management with Pieces

- Important public health problem
- Collaboration 4 large health care systems
  - Socioeconomic and ethnic diversity
  - Diverse geographic distribution
  - Different EHR
- Novel technology platform
- Prior experience with chronic conditions
- Potential for application to other diseases