

Technology-Enhanced Implementation of Evidence-Based Care in the Primary Care Setting: Case for Computable CKD Phenotype in Improving Chronic Disease Management with Pieces™ (ICD-Pieces)

Adeola Jaiyeola, MD, MHSc.¹, George Oliver, MD, PhD¹, Anthony Waddimba, MD, MSc, DSc.,¹ Robert Toto, MD² and Miguel Vazquez, MD²



¹Parkland Center for Clinical Innovation, Dallas, TX, ²UT Southwestern, Dallas, TX

ABSTRACT

Technology-Enhanced Implementation of Evidence-Based Care in the Primary Care Setting: Case for Computable CKD Phenotype in Improving Chronic Disease Management with Pieces™ (ICD-Pieces)

Background

Patients with a triad of chronic kidney disease (CKD), diabetes, and hypertension frequently experience sub-optimal care. ICD-Pieces is a pragmatic clinical trial designed to improve management of these patients in partnership with four large disparate healthcare systems (HCS). The primary objective is to test the hypothesis that a collaborative model of primary care and subspecialty care intervention enhanced by technology and practice facilitators, when compared to standard clinical practice, reduces all-cause hospitalizations among patients with co-existing CKD, type 2 diabetes, and hypertension.

Parkland Center for Clinical Innovation established the technology infrastructure and workflow logic integrating evidence-based care pathways for eligible patients at primary care clinics, with prospects for large-scale adoption/dissemination.

Methods

The Pieces™ software was integrated with the EPIC™ electronic health record systems, and a Pieces™-like algorithm deployed to non-EPIC™ systems through FTPS sites. Pieces™ identifies eligible patients attending clinics randomized to intervention arm and notifies providers of upcoming visits through EHR-embedded 'Best Practice' Alerts or Pharmacist notes, linked to medical order sets and CKD protocols. Practice facilitators assist Primary Care Providers (PCPs) to implement six 'Kidney Disease Improving Global Outcome' guideline-concordant interventions: 1) medication titration to maintain BP below 140/90mmHg, 2) use of angiotensin-converting-enzyme inhibitor or angiotensin receptor blocker, 3) treatment with statins, 4) meeting hemoglobin A1C targets for patients' comorbidities, 5) avoiding nephrotoxic medications, 6) CKD education.

Findings

At the end of the 3rd year of this 5-year study, 1142 patients (>20% of the target) are enrolled. Preliminary analysis of data from one HCS show the proportion of CKD documentation according to CKD stage G2 - 23%, G3a - 62%, G3b - 88%, G4 - 98%. Gaps in consistent documentation of early stage CKD demonstrated the benefit of a technology assisted efforts to implement evidence based care for reducing progression of CKD.

Implication for D & I Research

1. Persistent gaps in documenting early stage CKD are barriers to long term strategies for reducing CKD progression.
2. Achieving recommended care standards for multi-morbid chronic disease patients requires process-of-care improvements
3. Technology support for PCPs could potentially optimize care for comorbid chronic illnesses

BACKGROUND

- The co-existence of CKD, type 2 diabetes and hypertension is associated with excess risk of CV morbidity and mortality, and rapid progression towards end stage renal disease^{1,2}
- Appropriate care for these patients includes early detection and institution of strategies to slow progression of CKD and treatment of associated complications and cardiovascular risks³
- The ICD-Pieces trial aims to improve care for these patients at the primary care clinics in four large disparate HCS including Parkland Health & Hospital Systems, Texas Health Resources, ProHealth Physicians of CT and the VA of North Texas.
- The hypothesis is that patients with a triad of CKD, Diabetes and hypertension who receive care with a collaborative model of primary care-subspecialty care enhanced by novel information technology (Pieces) and practice facilitators will have a lower one year all-cause hospitalization rate
- Secondary outcomes are readmissions, disease-specific hospitalizations, ER visits, cardiovascular events and deaths

METHODS

- ICD-Pieces (NCT02587936) uses a stratified cluster randomized trial design with HCS as strata.
- Pieces™ facilitates identification of eligible patients, randomization into intervention and control groups, notification of providers, establishment of management plan including provision of evidence based intervention, monitoring of care provided to patients and progress towards treatment goals.
- Practice Facilitators support eligible patient care planning, patient education, and monitoring to ensure that patients receive the necessary intervention within the course of normal clinic operations and that they progress to care targets.
- Technologic infrastructure and workflow integrating evidenced based care pathways were tailored to the electronic medical record (EMR) available at each site, as well as to the cadre of Practice Facilitator



- Safety-net
- Public
- Dallas County
- EPIC
- Practices – HCS
- Private Non-profit
- North Texas
- EPIC
- ACO
- Private for profit
- Connecticut
- Allscripts
- Veterans
- Federal
- North Texas
- CPRS

Figure Two. Features of the four HCS participating in the ICD-Pieces trial

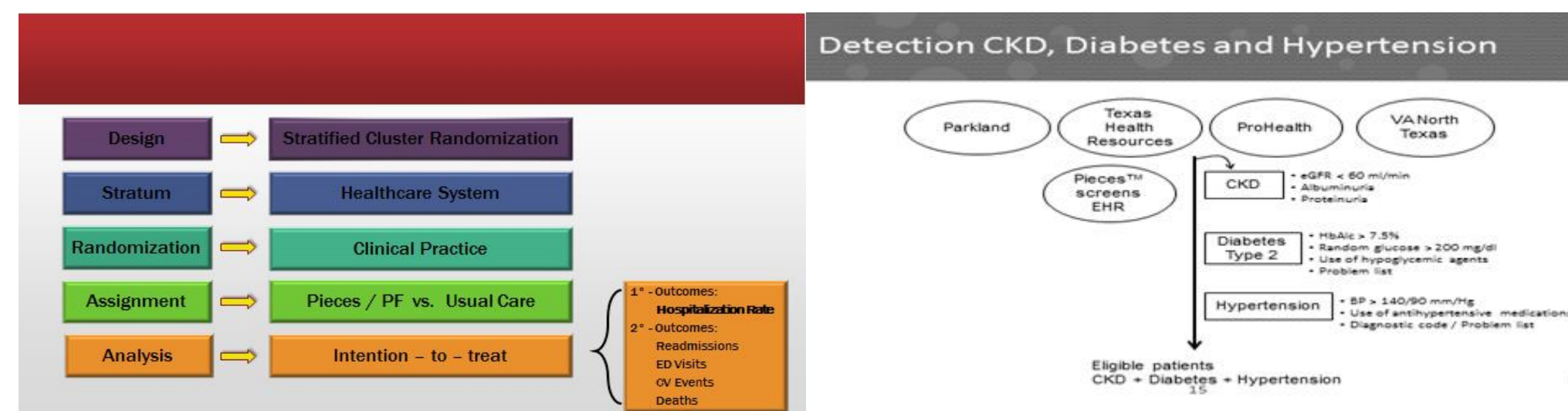


Figure Three. Study Design

DATA WORKFLOW

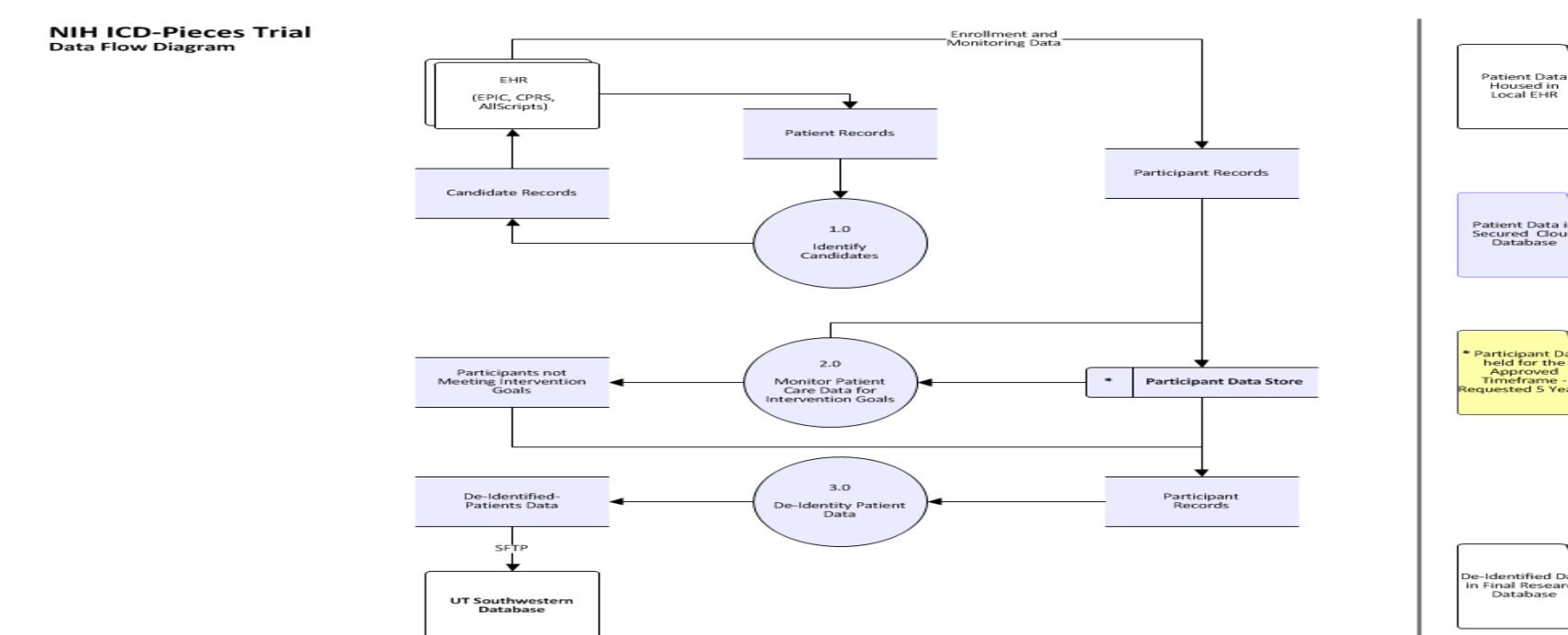


Figure Four. Data Flow

CLINICAL WORKFLOWS

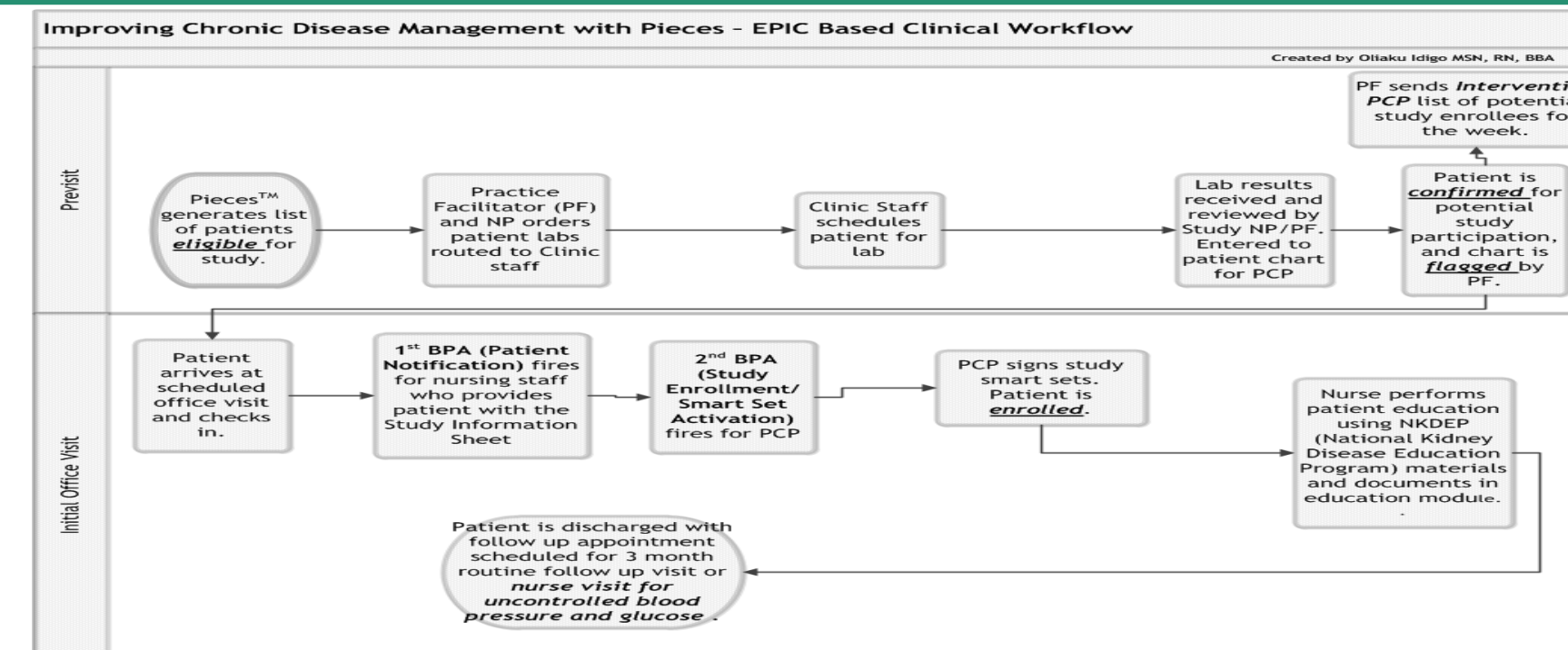


Figure Five. Two Types of Work Flows Depending on Practice Facilitator's Credentials

RESULTS

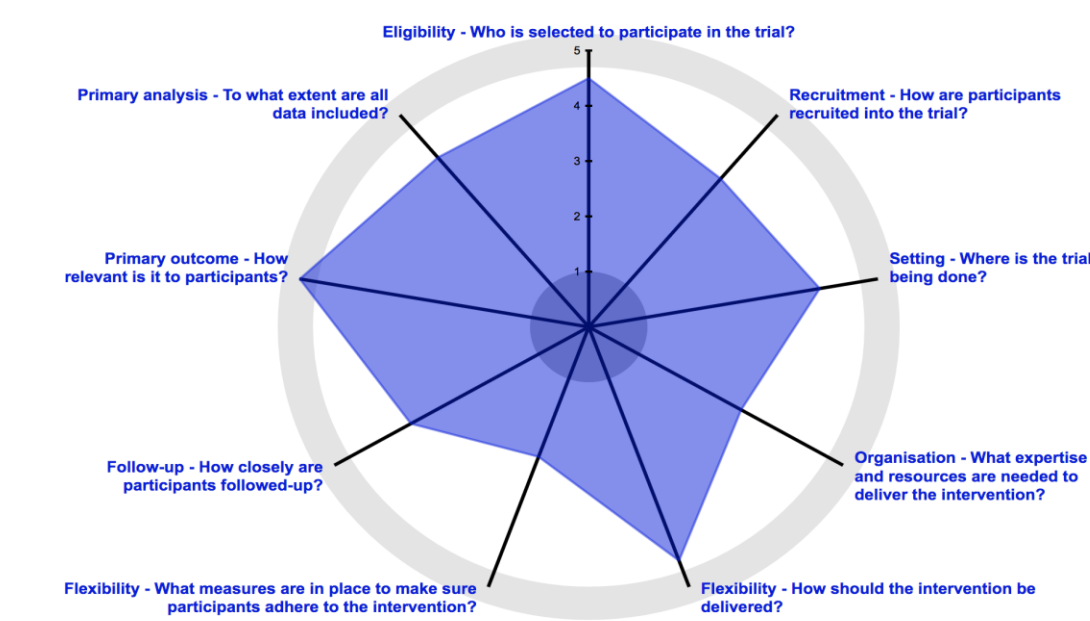


Figure Six. Self scored design of the trial using the PRECIS-2 paradigm⁴

GFR categories (ml/min/1.73m ²)	Persistent albuminuria categories Description and range		
	A1 Normal to mildly increased <30 mg/g <3 mg/ mmol	A2 Moderately increased 30-300 mg/g 3-30 mg/ mmol	A3 Severely increased >300 mg/g >30 mg/ mmol
G1 Normal or high	≥90	-	-
G2 Mildly decreased	60-89	35	8
G3a Mildly to moderately decreased	45-59	81	11
G3b Moderately to severely decreased	30-44	58	17
G4 Severely decreased	15-29	24	8
G5 Kidney failure	<15	-	-

Figure Seven. Distribution of Intervention Patients on the KDOQI 2012 Progression Paradigm and Frequency of Problem List Documentation⁵

CONCLUSION

1. The use of an IT-enhanced collaborative model of primary subspecialty care was successfully implemented and well received in all clinics/practices randomized to intervention in four diverse health care systems.
2. Technology enhanced detection of early stage CKD in patients with type 2 diabetes and hypertension has a potential for improving care for these patients

Acknowledgements

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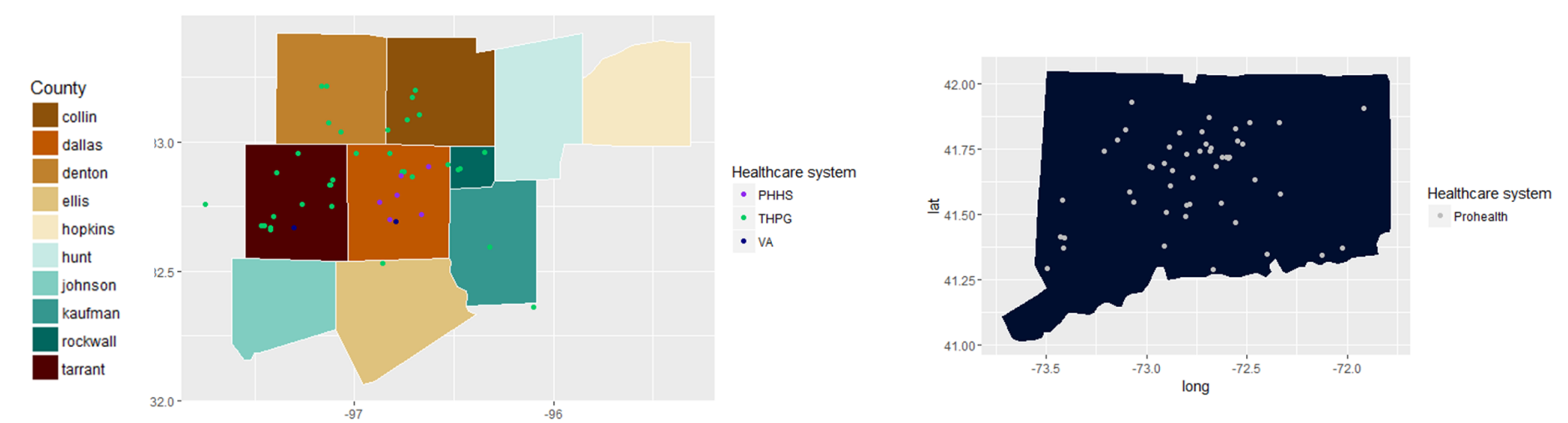


Figure One. Distribution of clusters in the four HCS within Two States: Texas and Connecticut

References

1. Ravera M, Noverasco G, Re M, Filippi A, Gallina AM, Weiss U, Cannavo R, Ravera G, Ricelli C, and Deferrari G. Chronic kidney disease and cardiovascular risk in hypertensive type 2 diabetics: a primary care perspective. Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association. 24(5): p. 1528-33 2009.
2. Tangri N, Kitisos GD, Inker LA, Griffith J, Naimark DM, Walker S, Rigatto C, Uhlig K, Kent DM, and Levey AS. Risk prediction models for patients with chronic kidney disease: a systematic review. Annals of internal medicine. 158(8): p. 596-603 2013.
3. Hoerger TJ, Simpson SA, Yarnoff BO, Pavkov ME, Rios Burrows N, Saydah SH, Williams DE, and Zhuo X. The Future Burden of CKD in the United States: A Simulation Model for the CDC CKD Initiative. American journal of kidney diseases : the official journal of the National Kidney Foundation. 65(3): p. 403-11 2015.
4. Loudon K, Treweek S, Sullivan F, Donnan P, Thorpe K, Zwarenstein M. The PRECIS-2 tool: designing trials that are fit for purpose. BMJ. 2015; 350(2147).
5. National Kidney Foundation. KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Vol 3 | Issue 1 | January (1) 2013