

The Intersection of Technology, HAART Adherence, and Drug Abuse Treatment

CFAR

Network of Integrated Clinical
Systems(CNICS):

The Use of Real-Time, Patient-Centered,
Clinical Metrics

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President & CEO, Fenway Health

Assistant Professor of Medicine, Harvard Medical School

CNICS

CFAR Network of Integrated Clinical Systems



CNICS

- 9 Sites (UAB, UW, UCSD, UCSF, CWRU, Harvard/Fenway, Johns Hopkins, UNC, Vanderbilt)
- Research elements:
 - Merged data from clinical EMR systems (diagnoses, meds, labs, etc.)
 - Vital statistics (currently active, lost to follow-up, deceased [augmented by US Social Security Death Index])
 - Clinical specimen repository (PBMC's, cell pellets, plasma)
 - Patient reported outcomes (also called patient-based metrics)

Fenway Health

- Founded 1972
- One of the Largest Providers of Out-Patient HIV services in New England (1500 primary care HIV patients)
- Primary care, HIV care, OB/GYN , mental health (psychiatry, individual and group therapy), substance abuse, dental, optometry, pharmacy
- The Fenway Institute (HIV Prevention Research, Data Center (CNICS, LGBT Population Research Center), LGBT Health Policy, Training (medical students, residents and fellows, mental health professionals, dental, optometry)
- First installed an EMR in July 1997 – Logician/Centricity

Fenway's EMR

GE/Centricity

Centricity Physician Office - Chris Grasso @ Fenway Health (fenway) - 2/17/2010 1:08 PM - [Chart]

Go Actions Options Help

Desktop Chart Appts Reg Reports New View Print Help EXIT

KERMIT FROG Patient MRN: 113357 Home: None Work: None
 29 Year Old Male (DOB: 12/01/1980) PCP: Alex Gonzalez MD Insurance: AMERIBEN (597) Group:

Find Pt. Protocols Graph Handouts

Summary Problems Medications Alerts Flowsheet Orders Documents Update

Problems

- EMBOLISM&THROMBOSIS ARTERIES LOWER EXTREMIT
- OTHER COMPLICATED HEADACHE SYNDROME
- OTHER COMPLICATED HEADACHE SYNDROME
- OTHER CHEST PAIN
- COUMADIN THERAPY - GOAL INR 2-3
- ATRIAL FIBRILLATION
- BREAST CANCER
- GERD
- HIV
- HYPERGLUCEMIA

Medications Drug interactions

- LISINOPRIL 10 MG TABS (LISINOPRIL) 1 tab po qam
- ASPIRIN TAB 81MG EC (ASPIRIN) 1 TAB PO QDAY
- FENOFIBRATE 160 MG TABS (FENOFIBRATE) 1 tab by r
- NAPROSYN 500 MG TABS (NAPROXEN)
- KALETRA CAPS 133.3-33.3 MG (LOPINAVIR-RITONAVIR)
- LORATADINE 10 MG TABS (LORATADINE) 1 tab po eve
- ALLEGRA 60 MG CAP (FEXOFENADINE HCL) 1 tab po b
- * SKIN DYE use as directed

Allergies

- PENICILLIN G SODIUM
- VANOCIN HCL (VAN)
- PEANUT OIL (PEANUT)
- KEFLEX

Directives

- INFORMED CONSENT FOR REF
- C-NICS INFORMED CONSENT (
- INFORMED CONSENT FOR CHI

Registration Notes

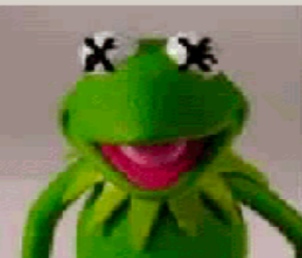
- 1. 9/08: new phone 617.555.0808

Flowsheet: Enterprise/Medicine/HIV-male

	Date	Value
ELISA HIV		
HIV AB	05/14/2009	Negative
HIV 1 AB	07/31/2006	NEG
WEIGHT	02/03/2010	175
BMI	02/03/2010	19.29
TEMPERATURE	02/03/2010	98.6
BP SYSTOLIC	02/03/2010	120
BP DIASTOLIC	02/03/2010	80
T-HELPER CD4	02/23/2007	55 #/uL
CD4 %	02/23/2007	66
HIV 1 RNA	09/19/2007	< 50 copies/ml
HIV1 DNA PCR		

Documents: All

Date	Summary	Status
02/17/2010	Ofc Visit	In Progre
02/17/2010	Pt En Data: Patient Metric	Unsigne
02/12/2010	Rx Refill: KALETRA CAP:	Signed
02/11/2010	Ofc Visit	Signed
02/11/2010	Rx Refill	Signed
02/04/2010	Hosp Prog: MED: BIDMC I	Signed
02/03/2010	Ofc Visit: MED: HIV follo	Signed
01/28/2010	Int Oth: TRANS: Transge	Signed
01/27/2010	Letter: Blank Letter to Pa	Signed



Help, press F1

Fenway's EMR

GE/Centricity

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Find Pt. Protocols Graph Handouts Web Lookup

Summary Problems Medications Alerts Flowsheet Orders Documents Update

Active Only All Lookup problems with: View Problem Details

Description	Code	Onset Date	End Date	Entry Date	
HYPERGLYCEMIA	ICD-790.6	06/01/2009	<No End Date>	06/01/2009 10:57 A	Elizabeth
ENDOMETRIOSIS, UTERUS	ICD-617.0	04/15/2009	<No End Date>	04/15/2009 2:27 PM	Alex C
HIV	ICD-042	02/02/2009	<No End Date>	02/02/2009 1:09 PM	Chris C
POST TRAUMATIC STRESS DISORDER	ICD-309.81	11/18/2008	<No End Date>	11/18/2008 4:32 PM	Melinda
MASTODYNIA	ICD-611.71	09/17/2007	<No End Date>	11/18/2008 3:55 PM	Melinda
HX OF BRONCHOGENIC MALIGNANCY	ICD-V10.11	10/2008	<No End Date>	10/23/2008 10:58 A	Chris C
REYE'S SYNDROME	ICD-331.81	10/10/2008	<No End Date>	10/10/2008 1:57 PM	Patricia
DEPRESSIVE DISORDER, NOS	ICD-311	09/18/2008	<No End Date>	09/18/2008 3:52 PM	Phyllis
SCABIES	ICD-133.0	01/23/2008	<No End Date>	01/23/2008 6:12 PM	Kathryn
BACK PAIN	ICD-724.5	11/06/2007	<No End Date>	11/06/2007 6:59 PM	Jose C
EATING DISORDER	ICD-307.50	11/02/2007	<No End Date>	11/02/2007 4:01 PM	Ana M
SHOULDER PAIN	ICD-719.41	11/01/2007	<No End Date>	11/01/2007 9:33 AM	Richard
PENILE DISCHARGE	ICD-788.7	10/31/2007	<No End Date>	10/31/2007 7:54 AM	Terese

Assessment

10/09/2008 - Unchanged - Patricia Raney MD

For Help, press F1

Fenway's EMR

GE/Centricity

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Summary Problems Medications Alerts Flowsheet Orders Documents Update

Active Only All Lookup medications with: Lexi-Drugs Online ! Drug interactions

Description (* = uncoded)	Instructions	BMN?
LISINOPRIL 10 MG TABS (LISINOPRIL)	1 tab po qam	
ASPIRIN TAB 81MG EC (ASPIRIN)	1 TAB PO QDAY	
DILTIAZEM HCL ER BEADS 180 MG CP24 (DILTIAZEM HCL ER BEADS)	1 po every day	
FENOFIBRATE 160 MG TABS (FENOFIBRATE)	1 tab by mouth daily as needed for blah b	
NAPROSYN 500 MG TABS (NAPROXEN)		
KALETRA CAPS 133.3-33.3 MG (LOPINAVIR-RITONAVIR)	2 po bid	
LORATADINE 10 MG TABS (LORATADINE)	1 tab po every day	
ALLEGRA 60 MG CAP (FEXOFENADINE HCL)	1 tab po bid	
* SKIN DYE	use as directed	
ATENOLOL 100 MG TAB (ATENOLOL)	1 TAB PO QDAY	
OXYCODONE-ACETAMINOPHEN 5-325 MG TABS (OXYCODONE-ACETAMINOPHEN)	1-2 TABS PO Q4-6 HRS PRN PAIN	
IBUPROFEN TAB 800MG (IBUPROFEN)	1 tab po tid with food	
THORAZINE 100 MG SUPP (CHLORPROMAZINE)		
FEXOFENADINE HCL 180 MG TABS (FEXOFENADINE HCL)	1 TAB PO daily	
ASTELIN 137 MCG/SPRAY SOLN (AZELASTINE HCL)	2 puffs per nostril twice daily	
TRIAMCINOLON CRE 0.5% (TRIAMCINOLONE ACETONIDE (TOP))	apply to affected areas bid	
* PREZISTA 400 MG TABS	2 TABS by mouth daily WITH FOOD	
* 7.5 R EYE, 6.5 L EYE 3MM OFF CENTER		
* 7.5 R EYE, 6.5 LEFT EYE		
ESTRING 2 MG RING (ESTRADIOL)	insert one pv once every 12 weeks	
ESTRING 2 MG RING (ESTRADIOL)	insert one PV every 12 weeks.	
LISINOPRIL 40 MG TABS (LISINOPRIL)	1 tab po every day	
FOSAMAX TAB 10MG (ALENDRONATE SODIUM)	1 tab po daily	
COZAAR 25 MG TABS (LOSARTAN POTASSIUM)	1 tab po daily	
COZAAR 50 MG TABS (LOSARTAN POTASSIUM)	1 tab po daily	
COZAAR 100 MG TABS (LOSARTAN POTASSIUM)	1 tab po daily	
ACETAMINOPHEN-CODEINE #3 300-30 MG TAB (ACETAMINOPHEN-CODEINE)	1-2 TABS PO Q4-6H PRN PAIN	
CALCITRIOL 0.25 MCG CAPS (CALCITRIOL)	1 tab po daily	
TAMIFLU 75 MG CAPS (OSELTAMIVIR PHOSPHATE)	1 tab po bid for 5 days	
DELENTA DISINTEGRABLE MCHLISTER AERO (ZANAMIVIR)	2 inhalations bid for 5 days	

Details

Start Date: 05/01/2007
 Stop Date: <No Stop Date>
 Entry Date: 05/01/2007 11:14 AM
 Entered By: Alex Gonzalez MD
 Responsible: Alex Gonzalez MD

Instructions:
 1 tab po qam

Comments:

Prescriptions / Refills

#30 x 0, 01/04/2010, Jerry Feuer PA-C, RxID: 157822185
 #30 x 0, 01/04/2010, Jerry Feuer PA-C, RxID: 157822185
 #30 x 0, 12/15/2009, Thomas Kane, RxID: 157650448301
 #30 x 0, 10/20/2009, James Bonanno MD, RxID: 15716709
 #30 x 0, 10/08/2009, Thomas Kane, RxID: 157063327106
 #30 x 0, 10/07/2009, Thomas Kane, RxID: 1570535658516
 #30 x 0, 10/06/2009, Reyna Labor, RxID: 1570466218216

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Fenway's EMR

GE/Centricity

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Desktop Chart Appts Reg Reports New View Print Help EXIT

KERMIT FROG Patient MRN: 113357 Home: None Work: None
 29 Year Old Male (DOB: 12/01/1980) PCP: Alex Gonzalez MD Insurance: AMERIBEN (597) Group:

Find Pt. Protocols Graph Handouts Organize

Summary Problems Medications Alerts Flowsheet Orders Documents Update

View <Attached - HIV-male> Set Attached View Use Date Range To

Days	07/05/2006	07/03/2006	07/01/2006	06/28/2006	06/27/2006	06/26/2006	06/21/2006	06/20
HIV 1 AB								
WEIGHT								
BMI								
TEMPERATURE								
BP SYSTOLIC								
BP DIASTOLIC								
T-HELPER CD4	◆ 308 #U/L			◆ 33 #U/L	◆ 22 #U/L	●		
CD4 %	14			44	33	●	7	
HIV 1 RNA								
HIV1 DNA PCR								
HIV1 RNA PCR								
HIV-1RNA-LOG								
HIV GENOTYPE								
WBC							9.0	
HCT			◆ 28.0				◆ 30	40.3
PLATELETS							◆ 215 K/U/L	
BG RANDOM		73	●					83
BUN								13
CREATININE								0.7
LDH SERUM								
LACTATE								
SGOT (AST)								
SGPT (ALT)								
BILI TOTAL							◆ 1.6	1

Date: Value: Tag: Comment:
 By: Range: State: Name:

For Help, press F1

Patient Reported Outcomes Collection

- Tablet PC with touch screen or in-room wired PC
 - Web-based, survey software application over wireless network
 - SSL/TLS encryption
- Interface with one item presented at a time
 - Large, easy to read type and navigation buttons
 - Program prevents duplicate/ambiguous answers, permits mistakes to be easily corrected
 - Automated skip patterns incorporated into questionnaire to omit a sections that are not applicable
 - Spanish version now functioning

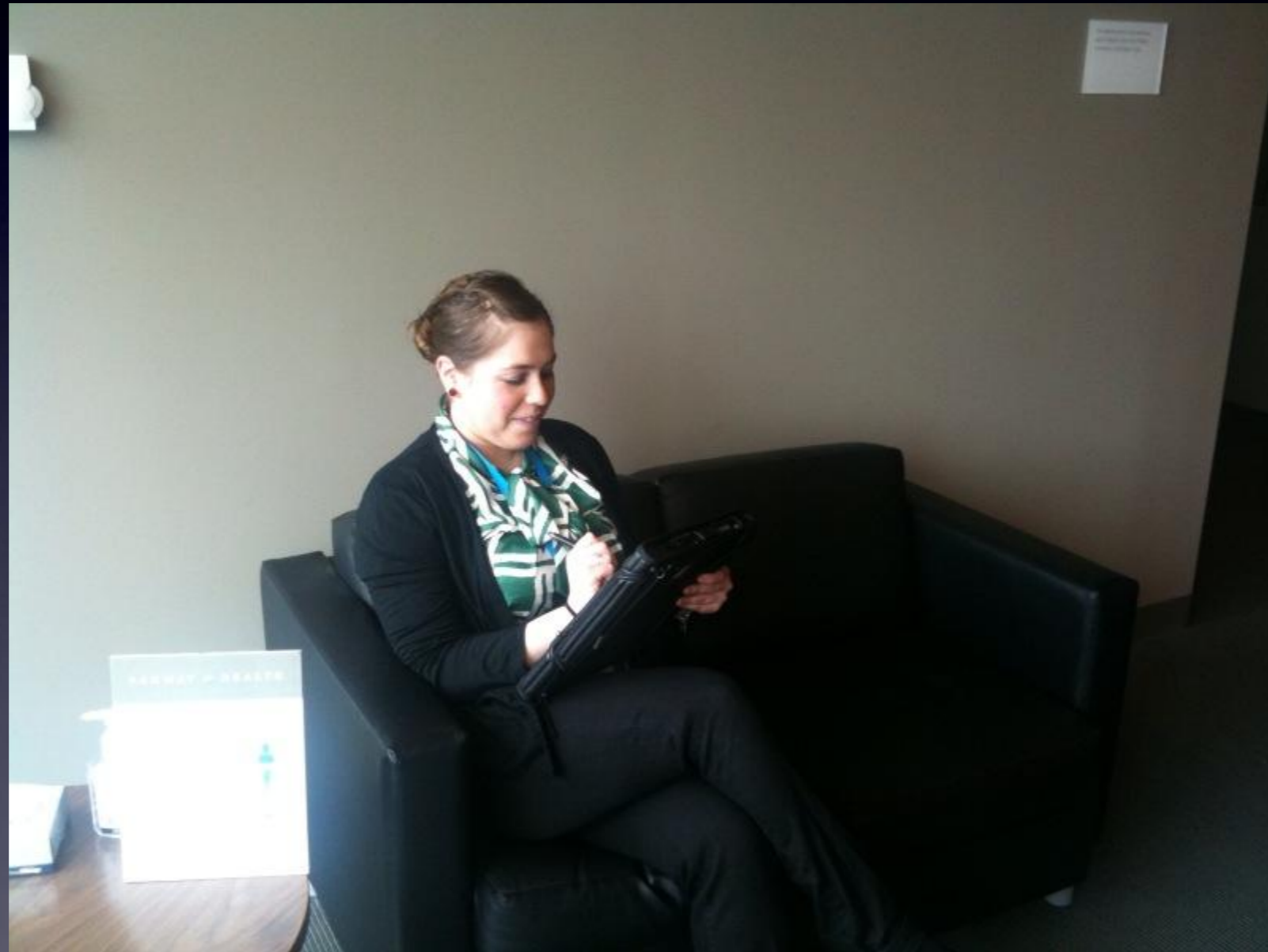
Patient Reported Outcomes Collection



Patient Reported Outcomes Collection



Patient Reported Outcomes Collection



Key Domains

- Body Morphology (FRAM)
- Depression (PHQ-9)
- Anxiety (PHQ)
- Medication adherence
- Drug and alcohol use (AUDIT-C, ASSIST)
- Quality of life (EUROQOL)
- Symptoms
- Risk Behavior

Patient Based Measures Feedback to Providers

Patient-Based Measures Provider Feedback

Name:

Date Completed: 2010-01-13 08:54

Instrument	Interpretation
PHQ-9 Overall depression score last 2 weeks 6	Mild depression (5-9)
PHQ-9 Suicidal ideation score last 2 weeks 1	Not at all
Substance use within last 3 months Marijuana	
Tobacco use: No	
Alcohol Score (AUDIT-C) 1	Not at-risk alcohol consumption (<5)
Antiretroviral adherence Adherence in the past 4 weeks Last missed	Good I never skip medications
High risk behavior-last 6 months Anal sex condom use: All the time Vaginal sex condom use: never had vaginal sex Sharing needles or injection equipment: never used non-medical drugs by injection	

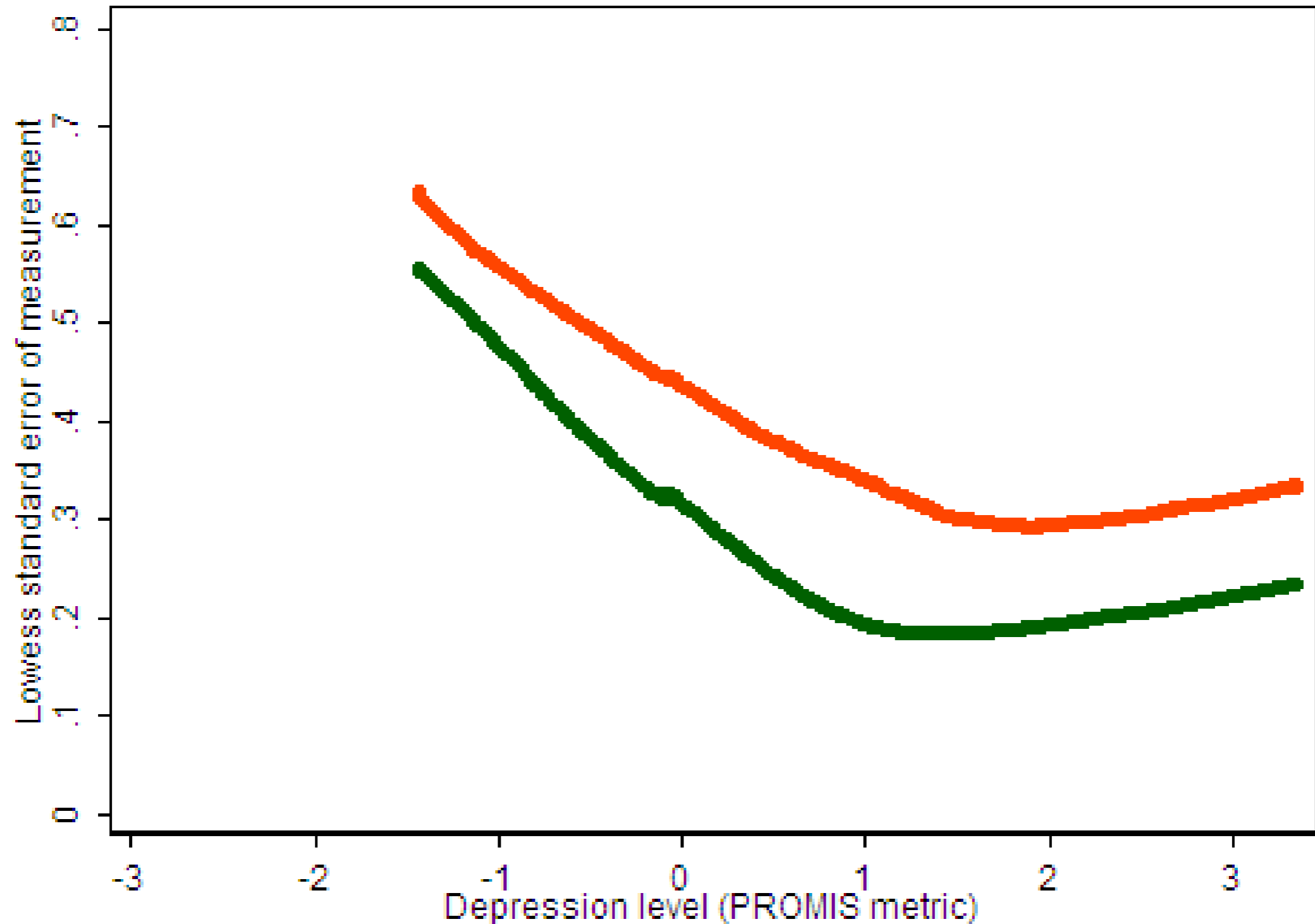
Upcoming Changes

- Computer adaptive testing (CAT)
 - Selects questions based on patient's response to prior items
 - Iteratively estimates a patient's standing on a domain
 - Administers the most informative items
 - Desired level of precision can be obtained using the minimal number of questions
 - Decreased response burden with greater precision

Why do we care about CAT?

- Selects questions based on patient's response to prior items
- Iteratively estimates a patient's score
- Administers the most informative items
- Desired level of precision can be obtained using the minimal number of questions
- Decreased response burden with greater precision!

Precision of PHQ-9 versus PROMIS CAT



Data Quality Assurance

Individual Site Responsibilities

- Each site conducts a detailed audit of data types collected
- Inter-site comparison of data to look for inconsistencies
- Random chart audits
- On-going training of clinicians with EMR access informed by chart audits

Data Quality Assurance

Central Site Responsibilities

- Centralized data mapping specifies how data are being integrated into CNICS standard codes with known and comparable meanings
 - This enables us to integrate comparable data across cohorts with known meaning and content
 - Creates the bridge between CNICS and cohorts in NA- ACCORD and other leDEA regions•
- Collect measures of certainty for diagnoses and treatment that includes data source and reliability defined hierarchically
- Conduct centralized audits to identify data quality issues
- Feedback loop with cohorts to reconcile data exceptions
- Creation and maintenance of cohort data dictionaries to track meaning of cohort codes and to document their data quality issues

CNICS Data Submission Activity (2009)

- Medications – Diabetes, Hypertension, Hepatotoxic, Lipid lowering
- Diagnoses
 - Substance Use (alcohol, tobacco, etc.)
 - Anxiety, mood disorders
 - Liver and Kidney disease
- Malignancy – comprehensive data collection
- Insurance

Study Aim 2

- To determine the effect on care processes and patient outcomes of integrating PROMIS II CAT PROs into routine clinical care
- Data provided with individually tailored treatment recommendations using a comprehensive health improvement (chronic care) model
- Quality improvement initiatives to involve stakeholders and overcome barriers to routine PRO collection and feedback
- Randomized controlled trial to determine the intervention's impact on process outcomes and clinical outcomes

CNICS Patients by Site (Nov 2009)

CNICS Sites	Patients
CWRU	1,627
Fenway	1,544
Johns Hopkins	4,539
UAB	2,624
UCSD	3,604
UCSF	2,860
UNC	1,278
UW	2,903
Vanderbilt	-
Total	20,979

Questions

- How feasible is it to use such a system among drug-abusing populations with HIV in various settings, e.g. outpatient, FQHC's, NGOs, etc.)
- What principles should guide research priorities on technology in order to achieve a balance between the costs of research and the need to mount interventions
- Do we have a “gold standard” for measuring ART adherence?
- Which groups and approaches are the best candidates for the efficacious use of these technologies?
- What secondary benefits and innovative applications may be developed as a result of adherence-related technologies?

Questions

- What incentives (social/moral, economic) exist for developers/distributors of this technology for use with marginalized populations or in resource-limited settings?
- How do we handle the fact that effective programs and applications which target behavior change often are not operable across other platforms?
- How do we begin to tackle some of the ethical issues inherent in using technologies to affect health behaviors (e.g. HIPAA, surveillance data, and reporting of illegal behavior)