



Tools & Technology for Improving Care Post Treatment

Lipika Samal, MD, MPH
Jason Broad, MBA & Cecile Davis, MSN RN-BC
Brian Jack, MD

July 25, 2012

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Agenda

- Welcome
 - Rachel Kell, AHRQ NRC TA Team, Massachusetts eHealth Collaborative
 - Vera Rosenthal, AHRQ NRC, Health IT Program Manager
- Speaker Presentations
 - Lipika Samal, MD, MPH
 - Jason Broad, MBA & Cecile Davis, MSN RN-BC
 - Brian Jack, MD
- Questions & Discussion

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Technical Assistance Overview

- Goal: To support grantees in the meaningful progress and on-time completion of Health IT Portfolio-funded grant projects
- Technical Assistance (TA) is delivered in three ways:
 - One-on-one individual TA
 - Multi-grantee webinars
 - Multi-grantee peer-to-peer teleconferences
- Ongoing evaluation to improve TA offerings

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Key Resources

- AHRQ National Resource Center for Health IT
 - <http://www.healthit.ahrq.gov>
- AHRQ Point of Contact
 - Vera Rosenthal, vera.rosenthal@ahrq.hhs.gov
- AHRQ NRC TA Team
 - Nalini Ambrose and Allyson Miller: Booz Allen Hamilton; ambrose_nalini@bah.com; miller_allyson@bah.com
 - Mark Belanger and Rachel Kell: Massachusetts eHealth Collaborative, NRC-TechAssist@AHRQ.hhs.gov

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Grantee Roll Call

- Name, Organization, Project PI

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Today's Presentation

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Facilitators: Rachel Kell & Mark Belanger, AHRQ
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- Provide an overview of the current health IT landscape as it pertains to care transitions and health services research
- Discuss some specific health IT tools and technologies used for improving care post treatment
- Share experiences and best practices amongst grantees

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Today's Presenters

- Lipika Samal, MD, MPH, Brigham & Women's Hospital, Boston, MA
 - *Health Information Technology to Support Care Coordination and Care Transitions*
- Jason Broad, MBA, & Cecile Davis, MSN RN-BC, Sharp Healthcare, San Diego, CA
 - *Remote Patient Monitoring Program: Congestive Heart Failure (CHF)*
- Brian Jack, MD, Boston Medical Center, Boston, MA
 - *Louise: A Virtual Patient Advocate for Hospital and Post Hospital Care*

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Health Information Technology to Support Care Coordination and Care Transitions

Lipika Samal, MD, MPH
Brigham and Women's Hospital

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Background: Data Elements

- Core clinical data elements
 - Problem list
 - Allergies
 - Medication list

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Data Needs

- Functionality to support specific tasks
 - Medication reconciliation
 - Tracking laboratory tests
 - Tracking referrals
- Population-oriented tools
- Aspects of high quality discharge summaries
 - Comprehensive, brief, legible
 - Record of patient education
 - Patient-specific data elements
 - Site-specific data elements

O'Malley AS et al, JGIM
Motamedi SM et al, BMJ Qual Safe

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Data Element Survey

- 46 Organizations completing evaluation
- ~300 Data elements evaluated
- 1135 Transition surveys completed

		From Acute Care Hospital	From Emergency Department	From Skilled Nursing Facility
6				
72	Chief Complaint	Required	Required	Required
73	Reason Patient is being referred	Required	Required	Required
74	Reason for Transfer	Not needed/No	Not needed/No	Not needed/No
75	Sequence of events proceeding patient's disease/condition	Optional	Optional	Required
76	History of Present Illness	Required	Required	Required

Courtesy of O'Malley and Garber at Partners

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Findings from UTF Survey

- Largest survey of Receivers' needs
- Identified for each transition which data elements are required, optional, or not needed
- Each of the 300+ data elements is valuable to at least one type of Receiver
- Many data elements are not valuable in certain care transitions
- Paper form cannot represent these needs

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Current Capabilities - Ambulatory Settings

- Continuity with PCP - identified by searching a separate scheduling system
- Referrals - Even in fully electronic practices referral requests and consultation reports are often transmitted by fax and scanned in as a .pdf
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Barriers: Technical

- Lack of data standards
- Legacy homegrown systems or older versions of commercial electronic health records
- Clinical decision support tools do not support audit and feedback and do not provide risk stratification
- Encounter-based documentation instead of longitudinal, collaborative documentation
- Measurement bias due to pre/post care transition data stored in different systems

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- Mediating care plans between disciplines for co-management
- Clinician training and support - providers describe workarounds for tasks that could be accomplished with existing functionality
- Challenges around workflow redesign and change management

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Approaches: Technical

- Data standards – HITSP at the federal level and alignment with state level and private sector approaches
- List of everyone on the care team available to patients electronically
- Population management tools with electronic tracking of tasks
- Integrated information from insurance claims, i.e. prescription refills
- Personal health portals and bidirectional communication

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- Define responsibility of each member of the care team with a service agreement
- Incentivize health information exchange
- Provide ongoing training and support to clinicians

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Conclusions

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- Approaches to improving capabilities
 - Interactive and longitudinal care plan
 - Tools for medication reconciliation and co-management
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Remote Patient Monitoring Program Congestive Heart Failure (CHF)

Jason Broad & Cecile Davis
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December 2010 - August 2011

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Sharp HealthCare

- Not-for-profit Integrated Delivery System
- Largest health care system in San Diego
 - 4 Acute Care Hospitals
 - 3 Specialty Hospitals
 - 2 Affiliated Medical Groups
 - Health Plan & 3 Philanthropic Foundations
 - Full range of programs and services
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CHF - Remote Patient Monitoring

Overview

■ Goals:

- Reduce unnecessary admissions (and readmissions)
- Keep patients well-managed at home
- Teach/empower patients to take care of their heart failure

■ Target Population:

- Medi-Cal
- Medi-Cal with HMO
- CMS/Self-pay
- Medicare (FFS)
- High utilizers of the ED
- Patients with history of readmissions

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■ Intervention:

- Assessment in hospital by program coordinator (recruitment / enrollment), CHF “toolkit” given to patient. This consisted of education and plan of care at home to manage heart failure symptoms.
- Home visit at start of program to admit patient.
- 90 days of remote patient monitoring using tele-health scale supplied by Cardiocom®.
- As-needed phone calls to/from program coordinator and/or vendor’s remote monitoring nurses.
- Home visit at end of program to graduate patient.

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Technology Used for Remote Monitoring of CHF

- Machines for transmitting data (subjective and biometric) daily from patients.
- Data uploads to the CardioCom-hosted database that can be accessed via the web from anywhere in the USA.
- When the patient's symptoms reach 20% severity, alerts are generated and a phone call is made to the patient.
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We chose Cardiocom for several reasons:

- Already in use with Sharp Rees-Steely Medical Group for CHF patients with great results.
- Cardiocom has a history of successful outcomes and client base continues to grow.
- Cardiocom nurses are very professional and caring, fantastic communicators with patients and staff.
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Results

30-Day Readmissions: Results for patients enrolled for at least 30 days (Sharp's Baseline: @ 20%)

<u>Status</u>	<u>Readmits/ Total Pts</u>	<u>30-Day Readmit Rate</u>
Dis-enrolled*:	3 / 15	20%
Graduated:	5 / 65	7.8%

Overall: 8 / 80 10%

* Disenrollment reasons: Surgery, admit to SNF, moved out of region, worsening CHF, patient/family request, death, admit to hospice)

Comparison to baseline indicates that that the intervention is working and that patient selection is accurate; however, success of program will come from comparing enrolled patients to a natural control group comprised of similar patients who did not enroll in program.

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Patient Activation

- Objective:
 - Establish baseline related to patients' needs
 - Evaluate effectiveness of the education/coaching program intervention
- Tool Selection Criteria:
 - Evidence based
 - Easy for patients to use, self-administered
 - Available, low or no cost
 - Available in multiple languages (primarily Spanish)
 - Helped target patient specific needs
 - Can be used to assess patient's growth in program
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- Tool Selected:
 - Self Care Heart Failure Index (SCHFI)
 - http://www.self-careofheartfailureindex.com/?page_id=6
- Use in Program:
 - Baseline (pre-intervention): Administered to patients by program coordinator in hospital upon acceptance or in home during 1st home visit
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CHF – Remote Patient Monitoring

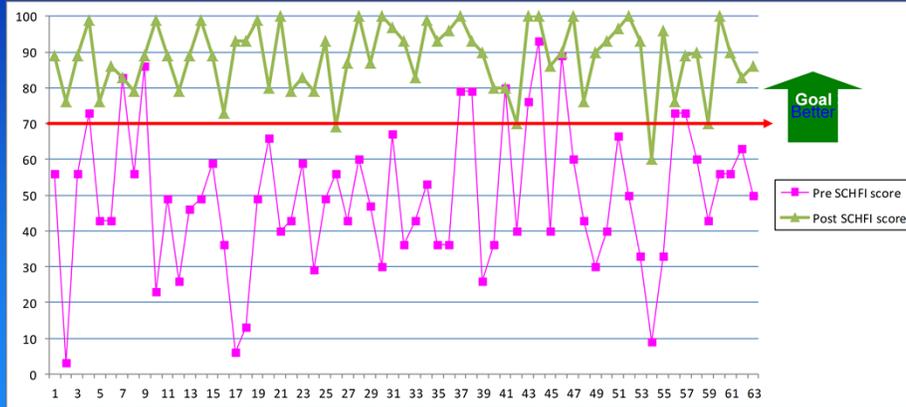
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System Chronic Care Management

Self-Care of Heart Failure Index (SCHFI) Maintenance Score



**Patient scores above 70% - indicative of self activation.
98% of patients scored above the target of 70% on the maintenance domain of the SCHFI survey after completing the program.**

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System Chronic Care Management

SCHF Maintenance Score

QUALITY OF LIFE OUTCOMES				
Self-Care Heart Failure Index				
N=63 [patients who (a) completed 90-day program and (b) completed discharge surveys]				
	Pre score	Post score	PRE % activated	POST % activated
Maintenance Score	50.25 (19.58)	88.77 (9.62)	2%	98 %
Management Score (scored only if symptomatic, N listed)	13 (12.26) N=61	68.75 (23.23) N=4	3%	97%
Confidence Score	54.79 (27.59)	92.41 (11.27)	19%	92%

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SCHF Maintenance Score



CHF - Remote Patient Monitoring

Patient Activation

■ Lessons Learned:

- Challenge balancing good survey administration protocols with the program's demographic
- Patients have a false sense of confidence in their self-management
- Initially pursued as a measurement tool but became a way of understanding each patient's specific needs

■ Role in Future Programs:

- Incorporating 'Patient Activation' strategies and measurement in programs where outcomes are reliant on patient behavior/compliance, particularly new/enhanced post-acute and transitional care programs

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Louise: A Virtual Patient Advocate for Hospital and Post Hospital Care

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Professor and Vice Chair
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Boston University School of Medicine



Timothy Bickmore, PhD
Associate Professor of Computer Science
Northeastern University



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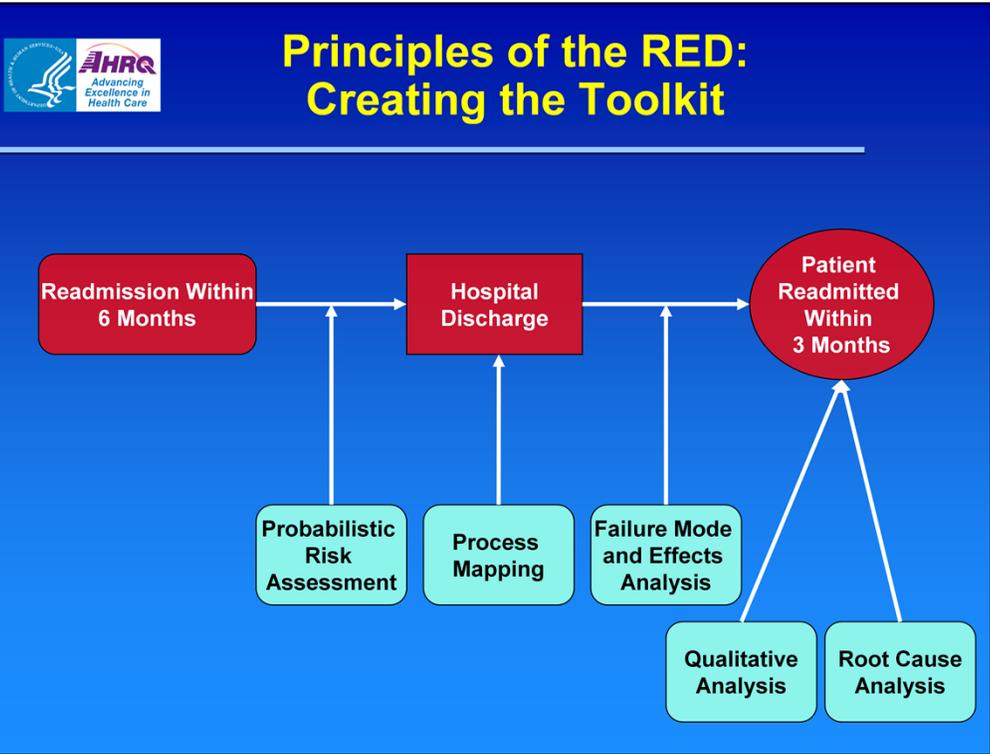


Plan for Today

- Quick background
- What is an Embodied Conversational Agent (ECA)?
- Clinical Applications of Conversational Agents
 - Project 1: “Louise” completes Re-engineered Hospital Discharge (RED)
 - Project 2: Post Discharge Online “Louise”
- Where do we go from here?

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Principles of the RED: Creating the Toolkit



RED Checklist

Eleven mutually reinforcing components:

1. Medication reconciliation
2. Reconcile DC plan with National Guidelines
3. Follow-up appointments
4. Outstanding tests
5. Post-discharge services
6. Written discharge plan
7. What to do if problem arises
8. Patient education
9. Assess patient understanding
10. DC summary to PCP
11. Telephone Reinforcement



Adopted by
National Quality Forum
as one of 30
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RED Checklist

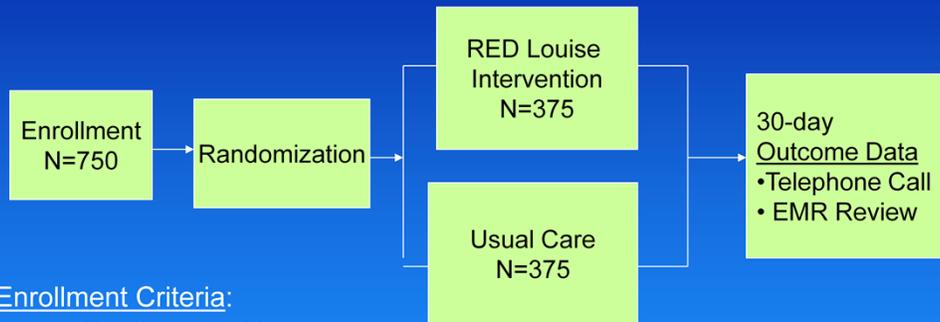
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RCT of ECA Teaching Hospital Discharge



Enrollment Criteria:

- English speaking
- Have telephone
- Able to independently consent
- Not admitted from institutionalized setting
- Adult medical patients admitted to Boston Medical Center
- (urban academic safety-net hospital)

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Primary Outcome: Hospital Utilization within 30d after DC

	Usual Care (n=368)	Intervention (n=370)	P-value
Hospital Utilizations *			
Total # of visits	166	116	
Rate (visits/patient/month)	0.451	0.314	0.009
ED Visits			
Total # of visits	90	61	
Rate (visits/patient/month)	0.245	0.165	0.014
Readmissions			
Total # of visits	76	55	
Rate (visits/patient/month)	0.207	0.149	0.090

* Hospital utilization refers to ED + Readmissions

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Conversational Agents Project 1: Comprehensive Discharge

- Emulate face-to-face communication
- Develop therapeutic alliance using
 - Empathy
 - Gaze
 - Posture
 - Gesture
- Teach RED
- Determine competency
- Can drill down
- High Risk Meds
 - Anticoagulants
 - Insulin
 - Prednisone taper
- Print a report

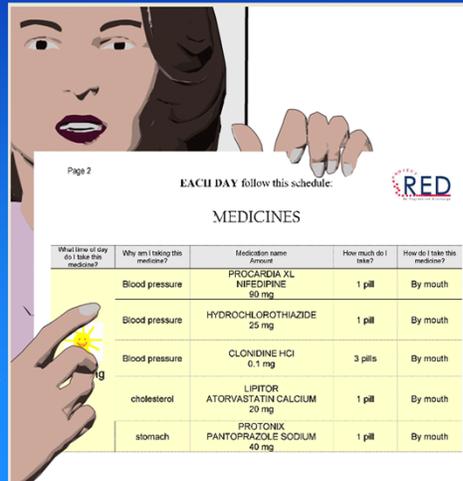


Characters: Louise (L) and Elizabeth (R)

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Studies of Nurse-Patient Interaction

Page 2

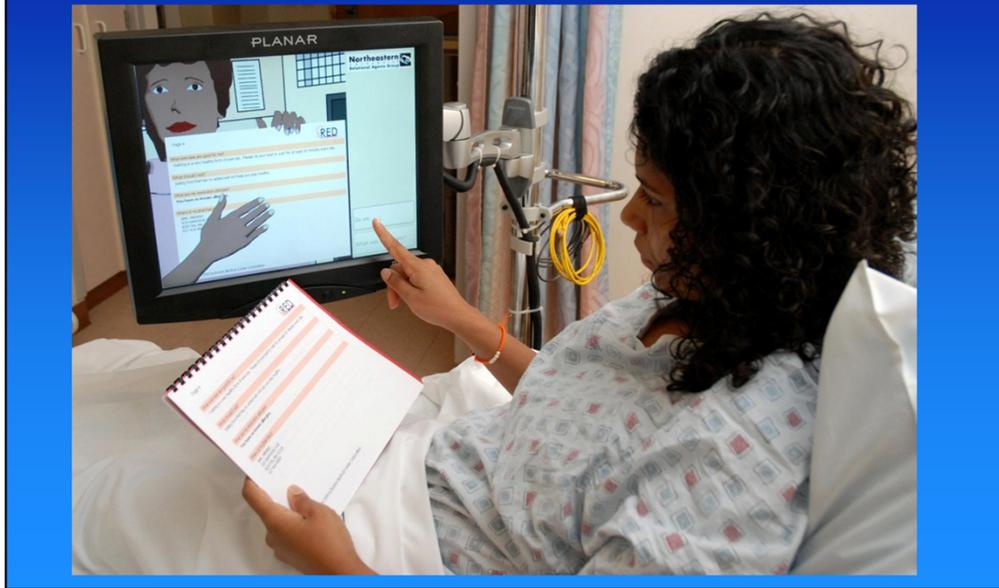
EACH DAY follow this schedule.

RED

What law of gravity do I take this medicine?	Why am I taking this medicine?	Medication name and amount	How much do I take?	How do I take this medicine?
	Blood pressure	PROCARDIA XL NIFEDIPINE 60 mg	1 pill	By mouth
	Blood pressure	HYDROCHLOROTHIAZIDE 25 mg	1 pill	By mouth
	Blood pressure	CLONIDINE HCl 0.1 mg	3 pills	By mouth
	cholesterol	LIPITOR ATORVASTATIN CALCIUM 20 mg	1 pill	By mouth
	stomach	PROTONIX PANTOPRAZOLE SODIUM 40 mg	1 pill	By mouth

Studies of Nurse-Patient Interaction

Patient Using Louise



Patient Using Louise



Interdisciplinary Collaboration- 3 Year Development



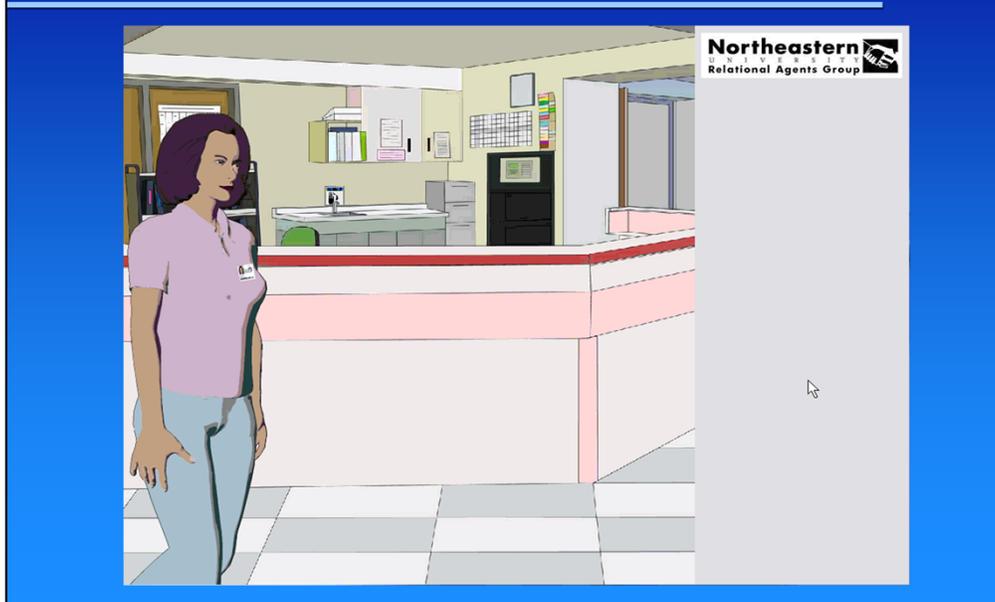
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- 48 diagnoses
- 32,000 lines of dialogue script

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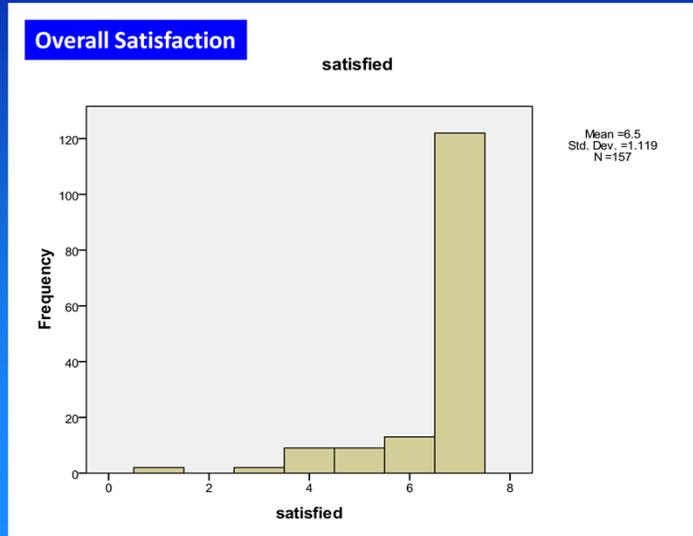


Demonstration of the Louise and Online Louise System



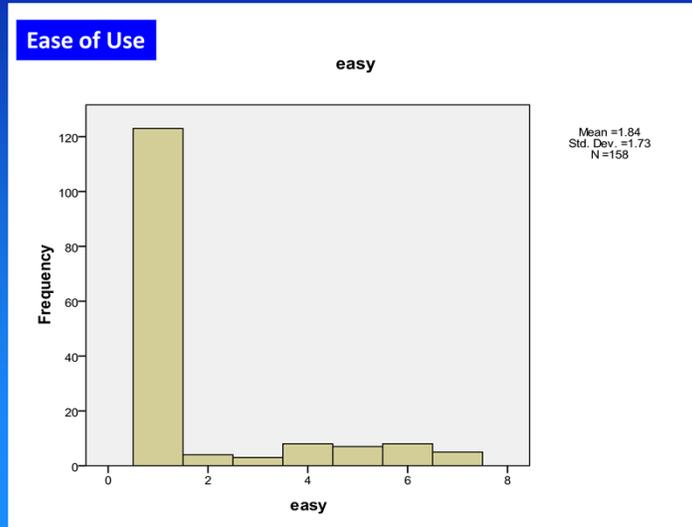
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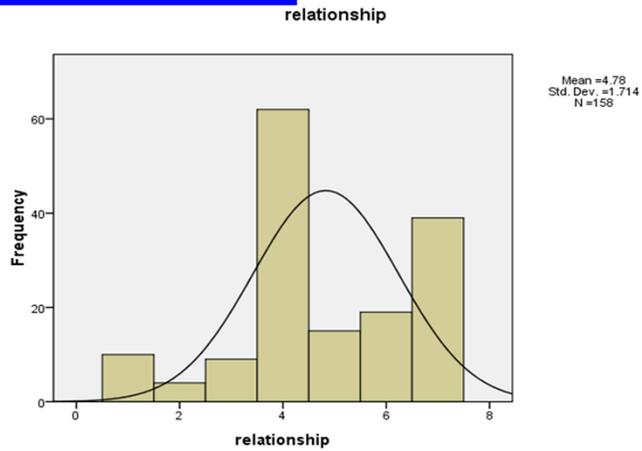
Overall Usability



Overall Usability

Overall Attitudes

Relationship with Agent

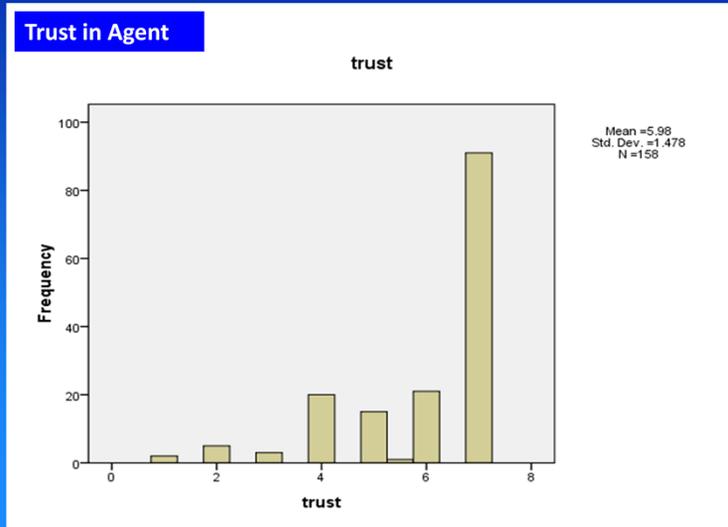


1=stranger, 4=neutral, 7=close friend

Overall Attitudes

Overall Attitudes

Trust in Agent

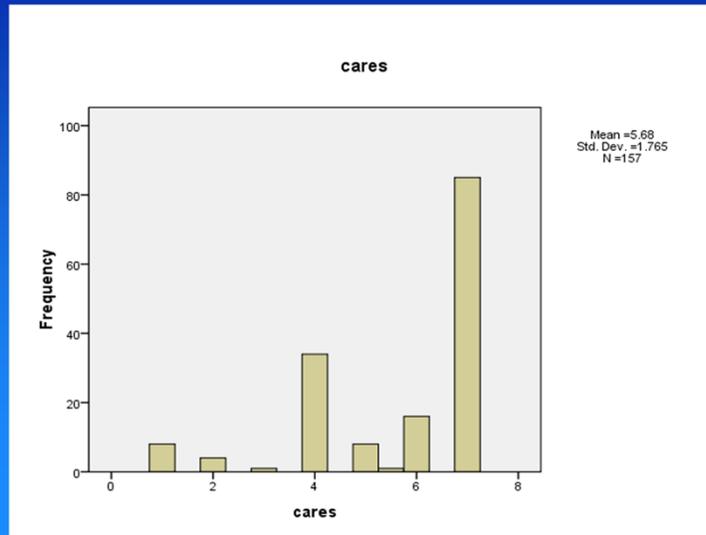


Overall Attitudes



Overall Attitudes

How much do you feel that Elizabeth cares about you?



1=not at all, 7= very much

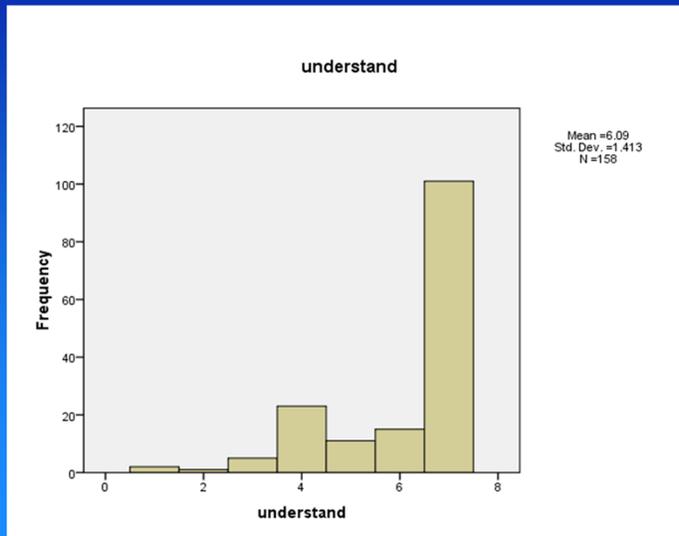
Overall Attitudes

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Overall Attitudes

How much do you feel that you and Elizabeth understand each other?



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Overall Attitudes

How much do you feel that you and Elizabeth understand each other?

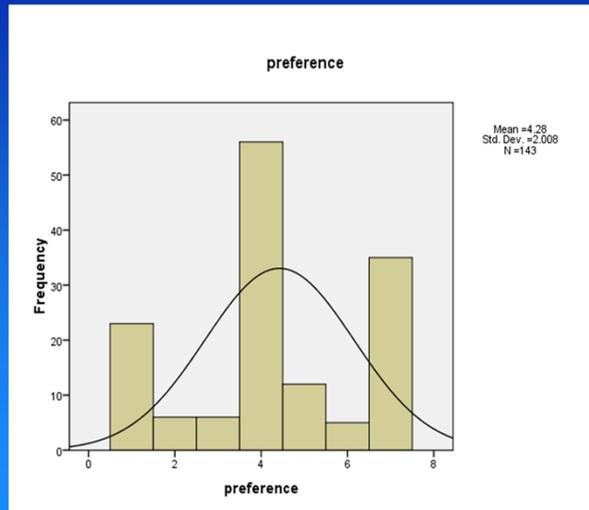


Who Would You Rather Receive Discharge Instructions From?

36% prefer agent
48% neutral
16% prefer doctor or nurse

"I prefer Louise, she's better than a doctor, she explains more, and doctors are always in a hurry."

"It was just like a nurse, actually better, because sometimes a nurse just gives you the paper and says 'Here you go.' Elizabeth explains everything."



1=definitely prefer doc, 4=neutral, 7=definitely prefer agent

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Original Randomization

	Frequency	Percent
Intervention	376	49.28%
Control	387	50.72%

Original Randomization



RED-lit Intervention

- Those randomized to the intervention group received
 - Initial interaction with Louise to get acquainted with the virtual discharge advocate
 - Final interaction with Louise – an interactive explanation of the discharge plan and medications
 - Follow-up phone call from an automated system for RED-lit I and a pharmacist for RED-lit II

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RED-lit Intervention – As Treated

	Frequency	Percent
Final ECA and Phone Call	150	19.63%
Final ECA no Phone Call	152	19.90%
First ECA Only	75	9.82%
Control	387	50.65%

RED-lit Intervention – As Treated



As-Treated Intervention: Crude Associations with Outcome Variables

<u>Poisson Regression Model Results</u>	Reutilization IRR (95% CI)	Readmission Only IRR (95% CI)	Return to ED Only IRR (95% CI)
Final ECA and Phone Call	0.58 (0.40,0.85)	0.52 (0.28,0.98)	0.62 (0.39,1.00)
Final ECA, no Phone Call	1.22 (0.92,1.62)	1.17 (0.74,1.84)	1.26 (0.87,1.84)
First ECA Only	1.34 (0.94,1.92)	2.10 (1.31,3.37)	0.83 (0.47,1.46)
Control	Reference	Reference	Reference

As-Treated Intervention Crude Associations with Outcome Variables



As-Treated Intervention: Adjusted Associations with Outcome Variables

- When the Poisson Regression Model with the combined reutilization outcome is corrected for:
 - age, gender, depression, substance abuse, frequent utilizer status, mean length of stay, employment, race and patient activation (PAM)
- Those who received the full intervention have times 0.64 (95% CI 0.42-0.97) the rate of 30-day reutilization when compared to the control group
- Thus, a 36% lower risk of coming back to the hospital

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Conversational Agents - Project 2 Post Hospital Online “Louise”

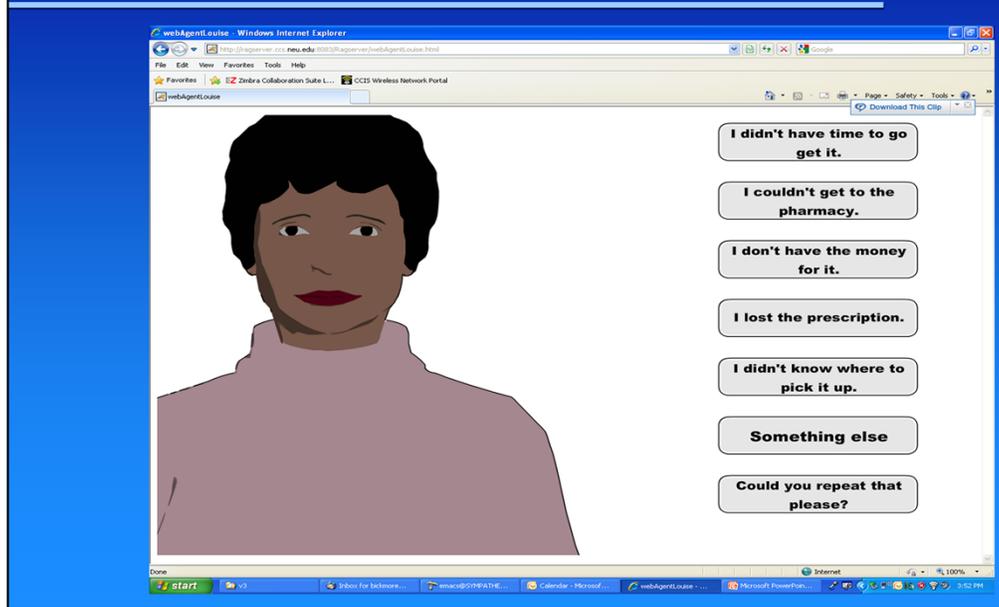
- Post-discharge web-based system designed to emulate the post-hospital phone call
 - Promote Medication Adherence
 - Promote Appointment Adherence
 - Adverse Event Screening
- Posts “alerts” to nurse who follows-up each morning
- Tracks patient status over time

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Post-hospital Louise Asking About Post-Discharge Medications



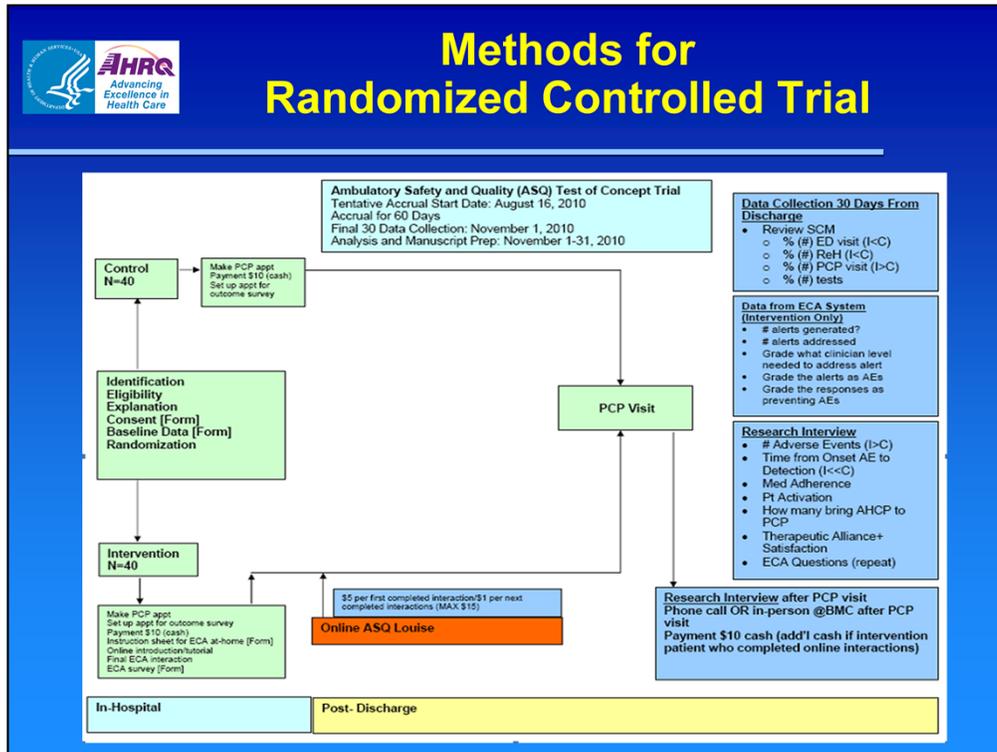
Post-hospital Louise Asking About Post-Discharge Medications

Screenshot shows seven possible scenarios/questions:

- 1-I didn't have time to go get it.
- 2-I couldn't get to the pharmacy.
- 3-I don't have the money for it.
- 4-I lost the prescription.
- 5-I didn't know where to pick it up.
- 6-Something else
- 7-Could you repeat that please?



Methods for Randomized Controlled Trial



Methods for Randomized Controlled Trial



Reutilization by Group Assignment and Post-hospital Louise (PHL) Usage

Number of Cumulative Reutilizations	0	1	2	3	4	5	6
Control (n=23)	14(61%)	3(13%)	3(13%)	3(13%)	0(0%)	0(0%)	0(0%)
PHL, didn't use (n=20)	12(60%)	6(30%)	0(0%)	1(5%)	0(0%)	0(0%)	1(5%)
PHL Users (n=4)	4(100%)						
Number of Cumulative Re-hospitalizations	0	1	2	3			
Control	18(78%)	3(13%)	1(4.5%)	1(4.5%)			
PHL, didn't use	16(80%)	4(20%)	0(0%)	0(0%)			
PHL Users	4(100%)						
Number of Cumulative Returns to ED	0	1	2	3	4	5	
Control	16(70%)	4(17%)	3(13%)	0(0%)	0(0%)	0(0%)	
PHL, didn't use	14(70%)	4(20%)	1(5%)	0(0%)	0(0%)		
PHL Users	4(100%)						

Reutilization by Group Assignment and Post-hospital Louise (PHL) Usage



Alerts Generated by PHL

- Related to: Side Effects = 71%
- Related to Medications = 29%

Alert Rating:	Frequency	%
Not clinically needed, but patient wanted call(social)	6	19.35
Minor problem, unlikely to lead to a clinically important issue	8	25.81
Minor problem, could potentially become a more serious problem	4	12.90
Potential problem that needs follow-up	6	19.35
Problem, needs response in a timely way	7	22.58

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Adverse Events

Adverse Event Preventable? (if alert rated as a potential problem or problem needing timely response) n=13	Frequency	%
Undetermined	6	46.15
Preventable	3	23.08
Ameliorable	4	30.77
Neither preventable or ameliorable	0	0
Type of Adverse Event (if alert rated as a potential problem or problem needing timely response) n=13	Frequency	%
Undetermined	6	46.15
Adverse Drug event	4	30.77
Procedure related injury	0	0
Nosocomial infection	0	0
Fall	0	0
Therapeutic-error (AE due to treatment, other than meds)	3	23.08
Diagnostic error	0	0

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Implications for Online “Louise”

- Implication within Patient-Centered Medical Home (PCMH) and Accountable Care Organizations (ACOs)
 - Patients want to be able to contact clinicians
 - Doctors can bill online interactions and see fewer pts
 - The system wins if pts not in EDs
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 - More than one interaction – up to PCP visit
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 - Improve fidelity of health messages
 - Well accepted by patients
 - Usable with wide range of computer and health literacy
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 - 36% reduction the rate of hospital use
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For his work relating to improving patient safety at hospital discharge (Project RED), he received the "Excellence in Patient Education Innovation" and the AHRQ "Patient Safety Investigator of the Month". In 2009, he was selected as one of 20 nationally to HealthLeaders magazine's "People Who Make Healthcare Better" list. He has also received the CDC "Partner in Public Health Improvement" award and was listed as among "Boston's Best Doctors" for 2010 and 2011. His Annals of Internal Medicine article is described in the book "50 Studies Every Physician Should Know".

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