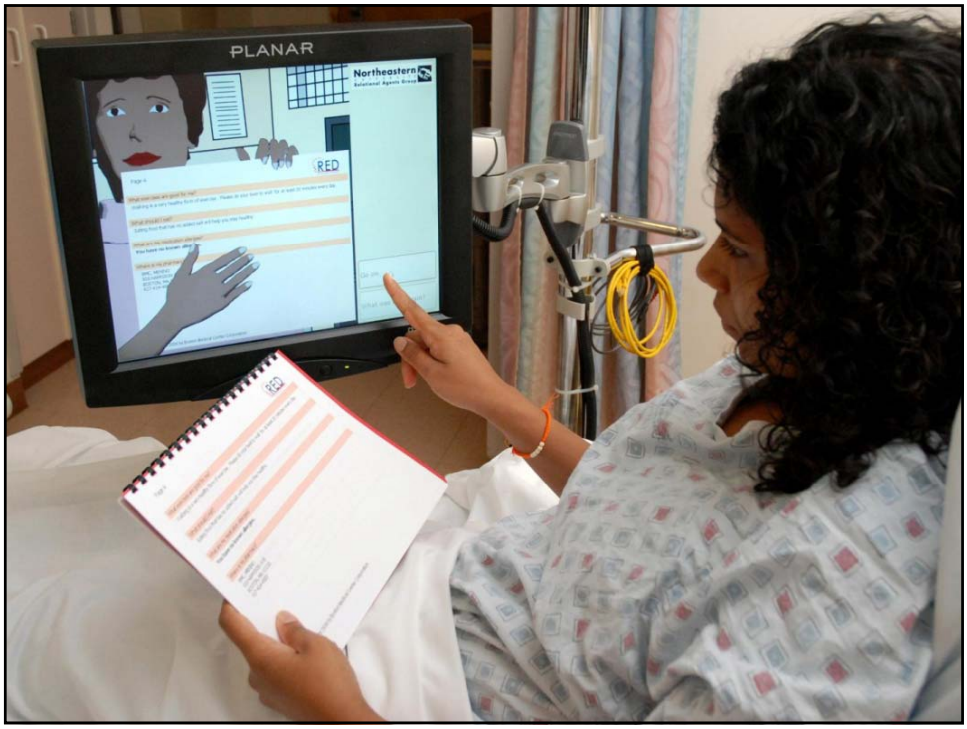
Conversational Agents Reduce Post-discharge Hospital Utilization for Patients with Inadequate Health Literacy

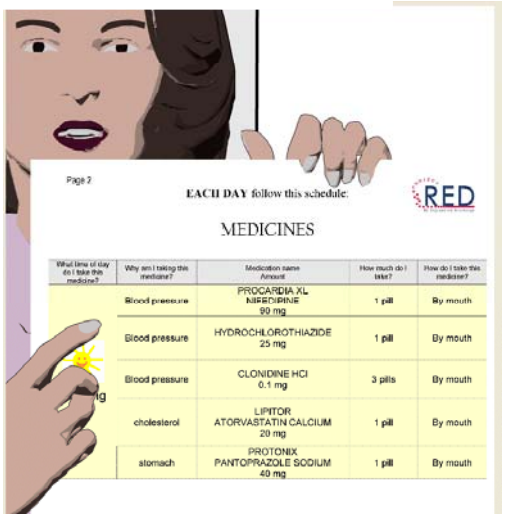
Timothy Bickmore

Michael Paasche-Orlow, MD
Brian Jack, MD

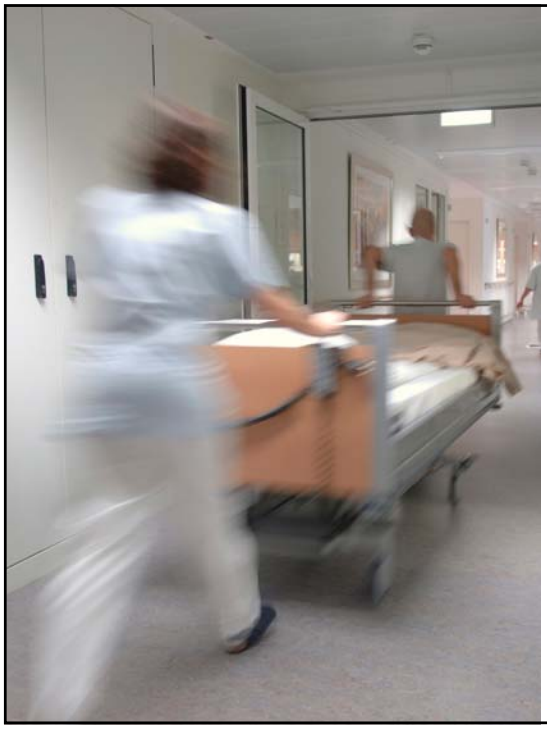




Advantages



- Approachability
- Relationship
- Health Literacy



Hospital Discharge

- 40M per year
- 8 minutes
- No standards

- 42% know diagnosis
- 37% know medications

Discharge Errors Lead to Adverse Events

Annals of Internal Medicine | ARTICLE

The Incidence and Severity of Adverse Events Affecting Patients after Discharge from the Hospital *Arch Intern Med* 2003;138:pp.

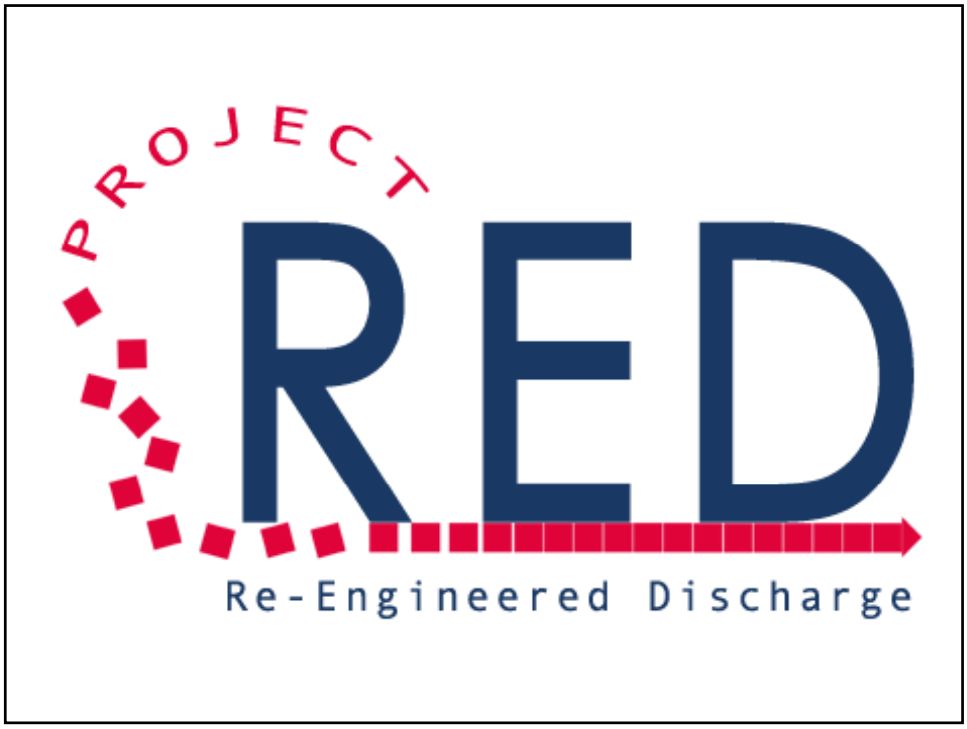
Alan J. Forster, MD, FRCPC, MSc; Harvey J. Murff, MD; Josh F. Peterson, MD; Tejal K. Gandhi, MD, MPH; and David W. Bates, MD, MSc

- 19% of patients had a post-discharge AE
- 1/3 preventable and 1/3 ameliorable

Adverse events among medical patients after discharge from hospital *CMAJ* 2004;170(3):pp.

Alan J. Forster, Heather D. Clark, Alex Menard, Natalie Dupuis, Robert Chernish, Natasha Chandok, Asmat Khan, Carl van Walraven

- 23% of patients had a post-discharge AE
- 28% preventable and 22% ameliorable



RED Checklist

1. Medication reconciliation
2. Reconcile discharge 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. Discharge summary to PCP
11. Telephone Reinforcement

Page 1

** Bring this Plan to ALL Appointments**



After Hospital Care Plan for:

John Smith

Discharge Date : September 19, 2008



Question or Problem about this Packet? Call your Discharge Advocate: (617) 414-6822



Serious health problem? Call Brian Jack: (617)-414-2080

Page 2

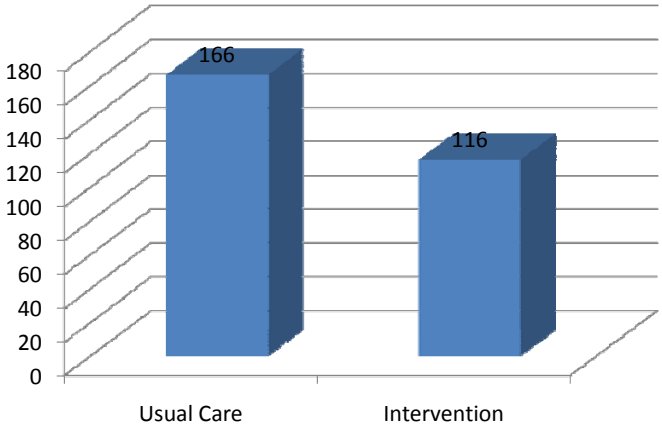
EACH DAY follow this schedule:
MEDICINES

What time of day do I take this medicine?	Why am I taking this medicine?	Medication Name Amount	How much do I take?	How do I take this medicine?
 Morning	Stomach	PROTONIX PANTOPRAZOLE 40 mg	1 pill(s)	by mouth
	Blood Pressure	ATENOLOL 50 mg	1 tablet(s)	by mouth
 Bedtime	Stomach	PROTONIX PANTOPRAZOLE 40 mg	1 pill(s)	by mouth



Primary Outcome:

Hospital Utilization within 30d after discharge

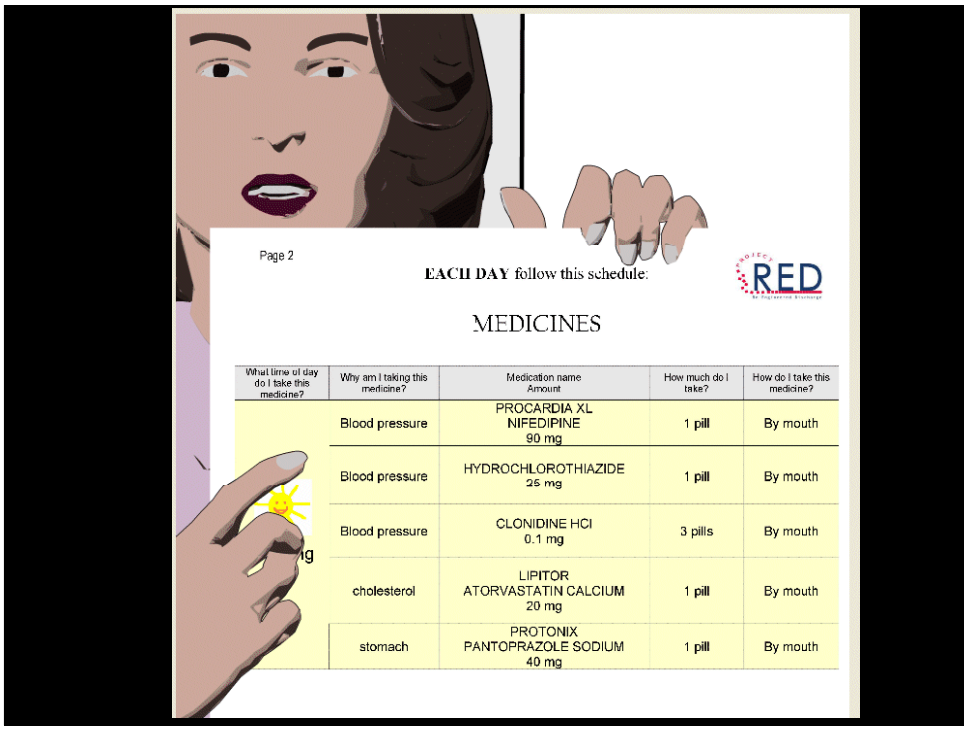


N=750
p=.009

Jack, et al. 2009. The Re-Engineered Hospital Discharge Program to Decrease Rehospitalization: A Randomized, Controlled Trial. ***Annals of Internal Medicine***

Dissemination





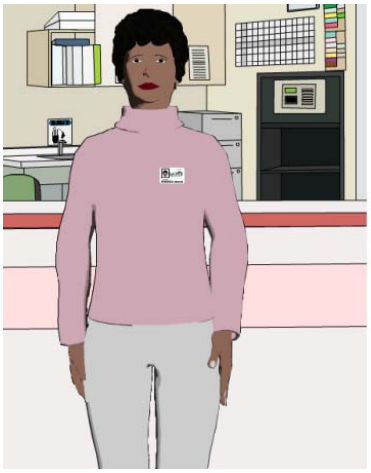


Development

- 3 years
- 2,254 medications
- 48 diagnoses
- 32,000 lines of dialogue script



Virtual Nurse Characters



Louise



Elizabeth

Designing for Patients with Low Health Literacy

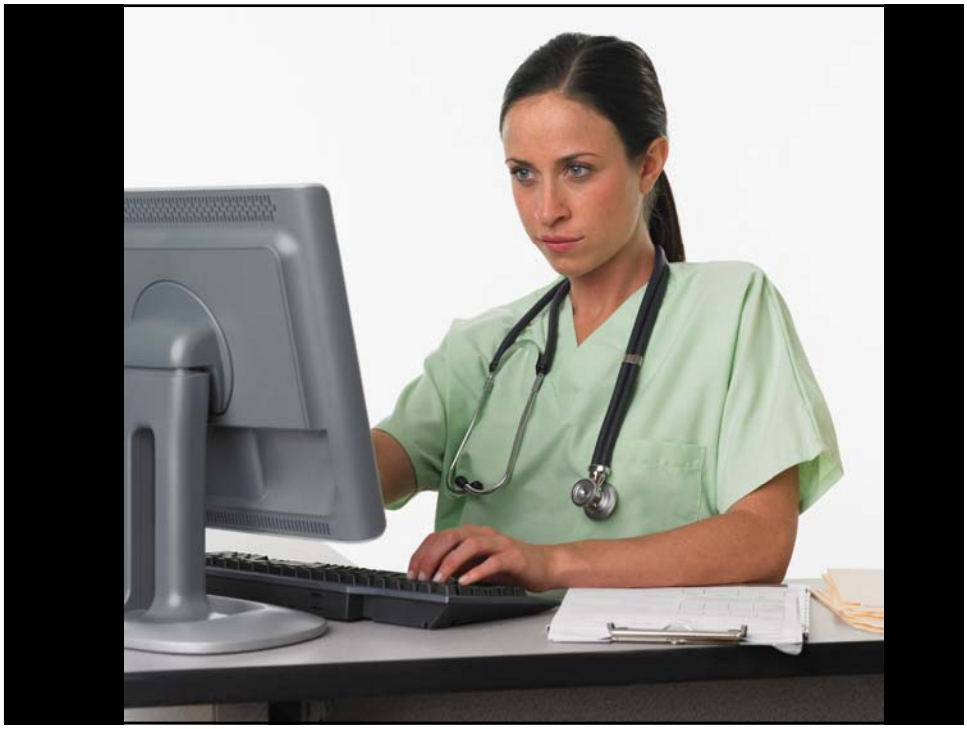
- Simple language
- Pictographs
- Face-to-face explanation by provider
- Scaffold
- Teach back & Comprehension checks



Designing for Therapeutic Alliance

- Empathy
- Social dialogue
- Close form of greeting
- Humor
- References to past and future
- Nonverbal immediacy





Page 1

** Bring this Plan to ALL Appointments**



After Hospital Care Plan for:

John Smith

Discharge Date : September 19, 2008

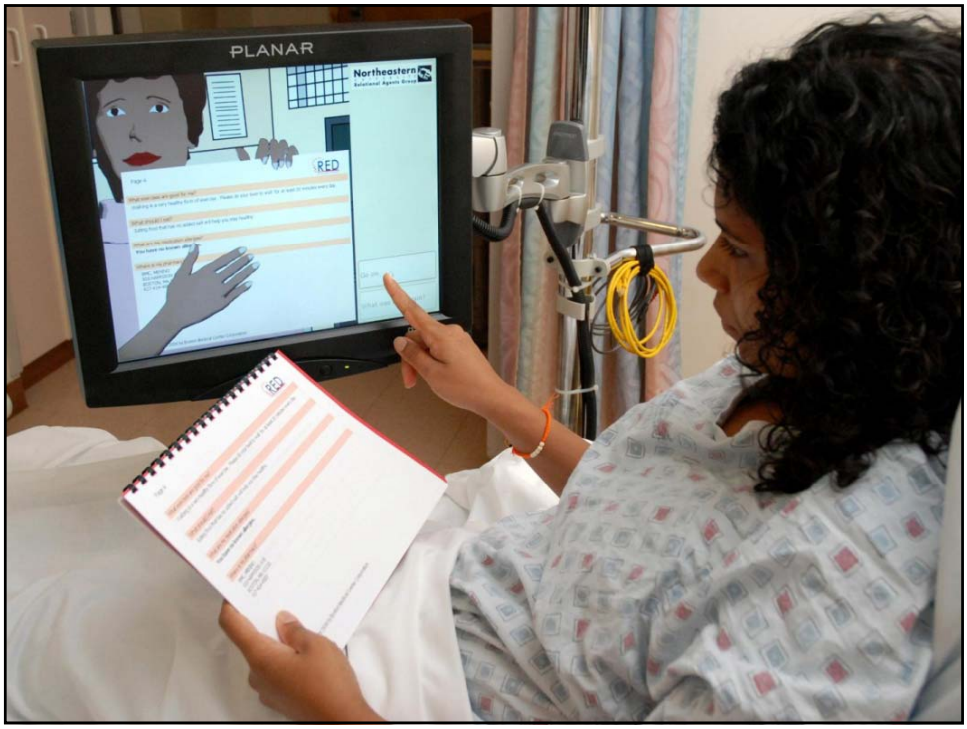


Question or Problem about this Packet? Call your Discharge Advocate: (617) 414-6822



Serious health problem? Call Brian Jack: (617)-414-2080




PLANAR
Northeastern
RED





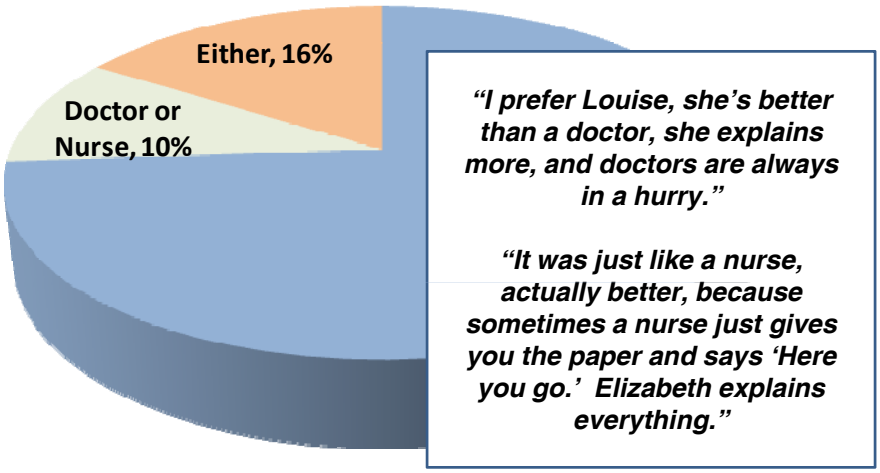
PROJECT RED
Re-Engineered Discharge

Evaluation

- HCI Lab Studies
- Pilot studies with non-patients
- **Pilot studies with patients**
- **Clinical trial I – agent +IVR**
- **Clinical trial II – agent+PharmD**
- Pilot study – agent+agent



Pilot: "Who would you rather receive discharge instructions from?"



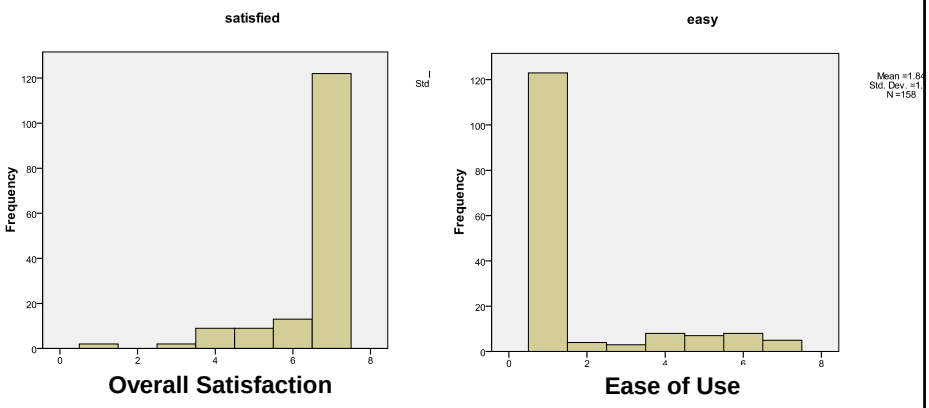
"I prefer Louise, she's better than a doctor, she explains more, and doctors are always in a hurry."

"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."

RED Clinical Trial I

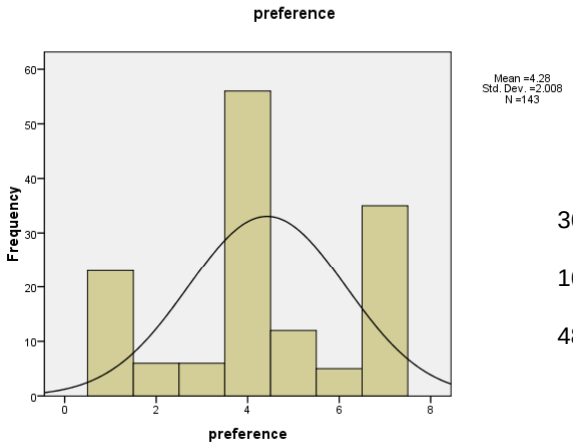
- Relational Agent + IVR (telephony)
- Started October 14, 2008
- 417 pts, randomized to RED vs. usual care
  - 55% adequate HL
- Primary outcome measures:
  - 30 day hospital utilization
  - Process measures (satisfaction, etc)

RED Clinical Trial I



Preference over Doc or Nurse

(1=definitely prefer doc, 4=neutral, 7=definitely prefer virtual nurse)



36% prefer agent

16% prefer doc or nurse

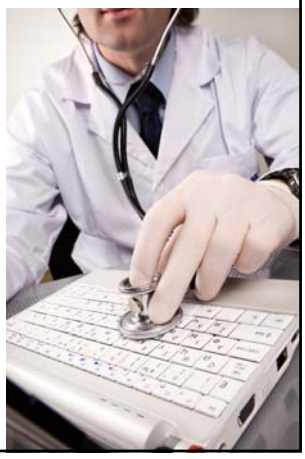
48% neutral

RED Clinical Trial I
Primary Outcomes

- No significant differences in utilization
- Reasons
  - Usual care group improved (wrt RED RCT)
  - IVR was ineffective at reaching pts (<20%)

RED Clinical Trial II

- Relational Agent + Clinical pharmacist @ 72hrs
- 386 pts, randomized to RED vs. usual care
  - 62% Adequate HL
- ***Hot off the press… preliminary results***



Process Measures @ 30 days

Secondary outcomes	Usual Care	Intervention	P-value
Patient knows diagnoses	(N=98)	(N=86)	
Yes	75 (74.3%)	78 (83.0%)	0.0104*
No	23 (62.16%)	8 (80.00%)	
Patient has primary care physician	(N=150)	(N=152)	
Yes	134 (89.3%)	148 (97.4%)	0.0053*
No	16 (10.7%)	4 (2.6%)	
Patient knows primary care physician	(N=85)	(N=86)	
Yes	80 (94.1%)	84 (97.7%)	0.2774
No	5 (5.9%)	2 (2.3%)	
Patient visited primary care physician	(N=139)	(N=146)	
Yes	75 (54.0%)	105 (71.9%)	0.0017*
No	64 (46.0%)	41 (28.1%)	

30-day Incidence Rates of Hospital Utilization

Primary outcomes (30 days after index discharge)	Usual Care (N=184)	Intervention (N=172)	P-value
Incidence rate of hospital utilizations *	0.3224	0.3023	0.7353
Rate Ratio (95% CI)	0.9377 (0.6459, 1.3614)		
Total number of hospital utilizations	59	52	
Incidence rate of readmissions	0.1311	0.1570	0.5216
Rate Ratio (95% CI)	1.1976 (0.6907, 2.0743)		
Total number of readmissions	24	27	
Incidence rate of ED visits	0.1902	0.1453	0.3042
Rate Ratio (95% CI)	0.7639 (0.4574, 1.2766)		
Total number of ED vistis	35	25	

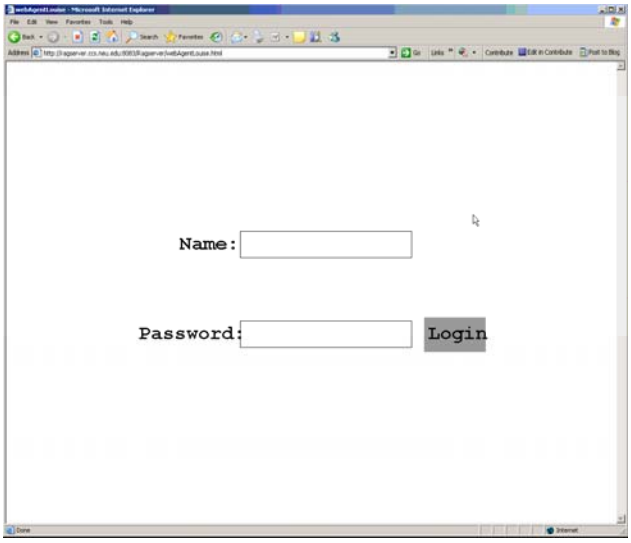
30-day Incidence Rates of Hospital Utilization by HL

Primary outcomes (30 days after index discharge)		Usual Care (N=170)	Intervention (N=160)	P-value
Health Literacy Levels	**Incidence rates of**			
Grade 8 or below*		(N=68)	(N=58)	
	Hospital utilizations	0.4265	0.2414	0.0803
	Readmissions	0.1618	0.1207	0.5446
	ED visits	0.2609	0.1207	0.0836
Grade 9 or above		(N=102)	(N=102)	
	Hospital utilizations	0.2549	0.2941	0.5933
	Readmissions	0.1275	0.1471	0.7057
	ED visits	0.1275	0.1471	0.7057

Intervention Reduces Disparities due to HL

Primary outcomes (30 days after index discharge)		Grade 8 or below (N=126)	Grade 9 or above (N=204)	P-value
Group Assignment	**Incidence rates of**			
Intervention		(N=58)	(N=102)	
	Hospital utilizations	0.2414	0.2941	0.5415
	Readmissions	0.1207	0.1471	0.6660
	ED visits	0.1207	0.1471	0.6660
Usual Care		(N=68)	(N=102)	
	Hospital utilizations	0.4265	0.2549	0.0567
	Readmissions	0.1618	0.1275	0.5606
	ED visits	0.2609	0.1275	0.0491*

Current Work: Post-discharge Follow-up



- Web-based
- Promotes medication adherence
- Screens for medication adverse events
- Mediates communication with clinicians

Thanks!

- Northeastern
  - Laura Pfeifer
  - Juan Fernandez
  - Daniel Schulman
  - Ishraque Nazmi
  - Jon Lawitts
  - Lazlo Ring
  - Langxuan Yin
- Sponsors
  - NIH/NHLBI
  - AHRQ
- BU/Boston Medical
  - Michael Paasche-Orlow, MD, MPH
  - Jeffrey Greenwald, MD
  - Anna Johnson, RN
  - Julie O'Donnell
  - Caroline Hesko, MPH
  - Lindsey Hollister
  - Maggie Jack
  - Lynn Schipelliti, RN
  - Jessica Martin

relationalagents.com

