



Testing the Re-Engineered Discharge

Principal Investigator: Brian Jack MD
Associate Professor and Vice Chair

Department of Family Medicine
Boston Medical Center /
Boston University School of Medicine







Plan for Today

- I. The Problem
- II. How We Got Started
- III. NQF 'Safe Practice'
- IV. RCT: Is 'Safe Practice' Safer?
- V. Can Health IT Deliver?

“Perfect Storm” of Patient Safety“



Loose Ends - workups NOT completed

Communication - DC summary not available

Poor Quality Info - DC summary lack results

Poor Preparation - few pts know meds/dx

Fragmentation - who is in charge?

There are Many Discharges and they are Costly



- In 2003 there were over 38 million discharges
 - That's over \$753 BILLION
- 13% of patients are recurrently hospitalized – and use 60% of resources

Patients Are Not Prepared?



ORIGINAL ARTICLE

**Patients' Understanding of Their Treatment Plans
and Diagnosis at Discharge**

AMOAD N. MAKARYUS, MD, AND ELI A. FRIEDMAN, MD

Mayo Clinic Proceedings
August 2005; 80(8):991-994

At Discharge:

- 37.2% able to state purpose of all their medications
- 14% knew their medication's common side effects
- 41.9% able to state their diagnosis

Little Time Spent on DC



- Audiotaped 97 Discharge Encounters
- 8 Elements - Roter Interactional Analysis
 - Nurse, Pharmacist, Physician, Nurse Case Manager
- Averaged 8 minutes (range of 2 to 28.5 min)
- No teachback 84% of the time
- Patient is a passive participant
 - Two initiated questions
- Not comprehensive
 - 4 or fewer elements covered 50%

Pending Tests not Followed



Ann Intern Med
2005;143(2):121-8

IMPROVING PATIENT CARE

Patient Safety Concerns Arising from Test Results That Return after Hospital Discharge

Christopher L. Roy, MD; Eric G. Poon, MD, MPH; Andrew S. Karson, MD, MPH; Zahra Ladak-Merchant, BDS, MPH; Robin E. Johnson, BA; Saverio M. Maviglia, MD, MSc; and Tejal K. Gandhi, MD, MPH

1095 of 2644 (41%) inpatients discharged with a test result pending

- 9.4% potentially required action
- 2/3 of MDs unaware of results
- 37% actionable and 13% urgent

Work-ups Not Completed



Tying Up Loose Ends

Arch Intern Med. 2007;167:1305-1311

Discharging Patients With Unresolved Medical Issues

Carlton Moore, MD; Thomas McGinn, MD, MPH; Ethan Halm, MD, MPH

- $\frac{1}{4}$ of discharged patients require additional outpatient work-ups;
- $> \frac{1}{3}$ not completed

Communication



Impact of patient communication problems on the risk of preventable adverse events in acute care settings

Gillian Bartlett, PhD, Régis Blais, PhD, Robyn Tamblyn, PhD, Richard J. Clermont, MD and Brenda MacGibbon, PhD

CMAJ

June 3, 2008; 178 (12)
Canada's leading medical journal

Patients with communication problems:

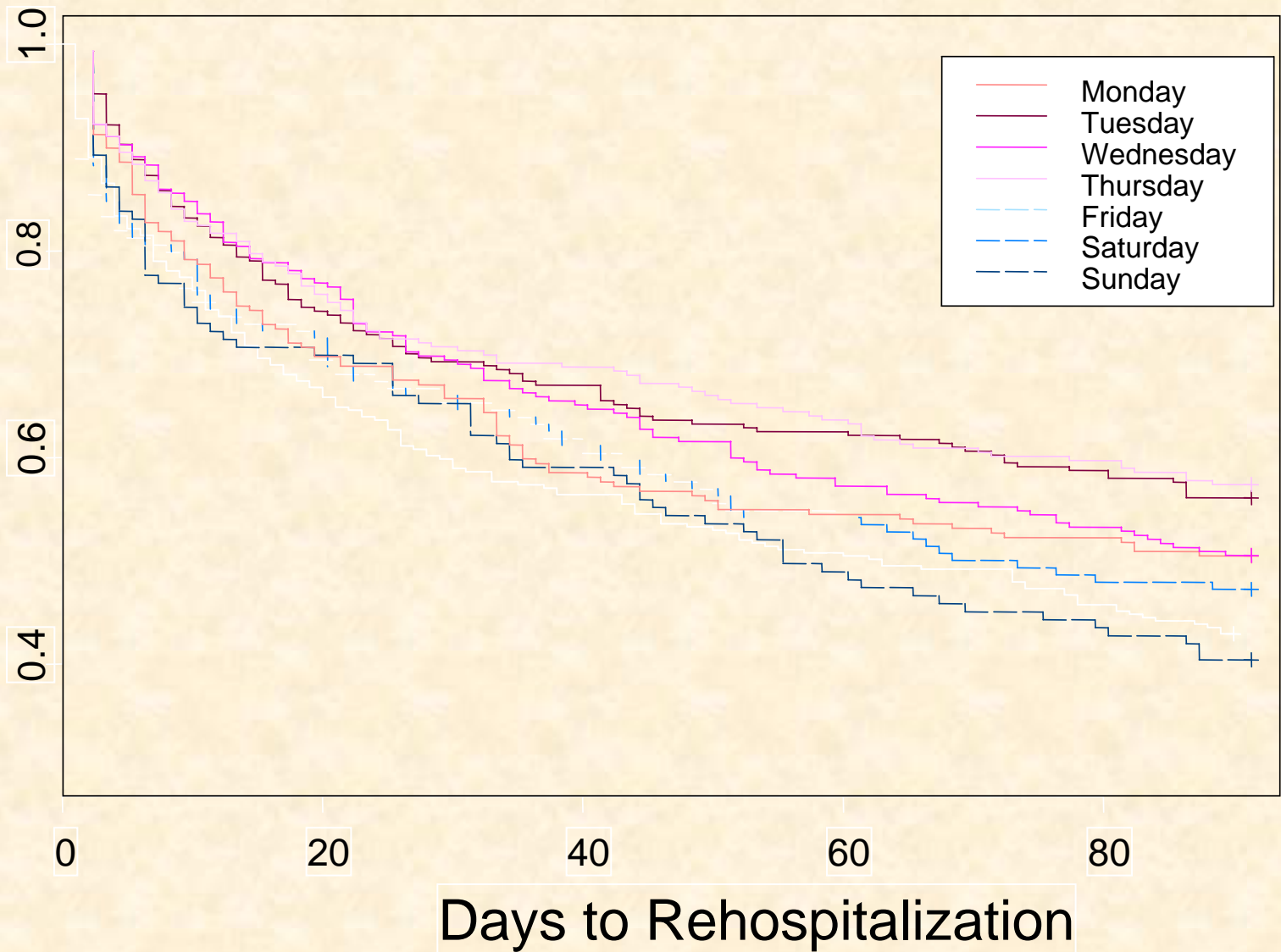
- 3X more likely to have adverse event
- 46% had multiple adverse events

Communication Deficits at Hospital Discharge are *common*

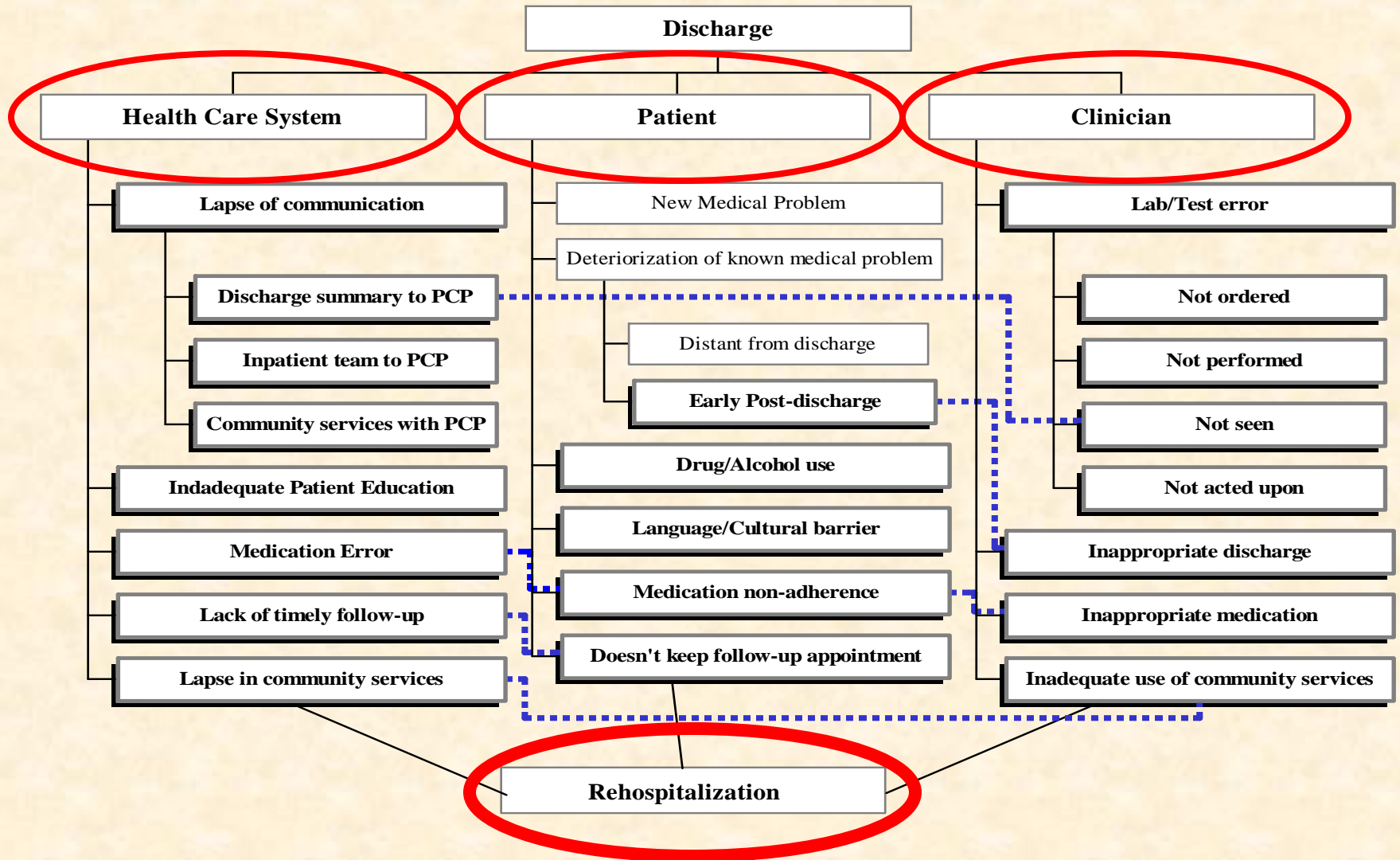


- **Discharge summary availability**
 - 1st post-discharge appt 12-34%;
 - 51-77% at 4 weeks
- **Discharge summaries often lack**
 - Test results (33-63%)
 - Hospital course (7-22%)
 - Discharge meds (2-40%)
 - Pending test results (65%)
 - Follow-up plans (2-43%)
- **Direct communication 3-20%**

Discharges are Variable by Day of the Week



An Etiologic Classification of Adverse Events at Hospital 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

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

Arch Intern Med 2003;138

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

Adverse events among medical patients after discharge from hospital

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

CMAJ 2004;170(3)

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

Two Questions



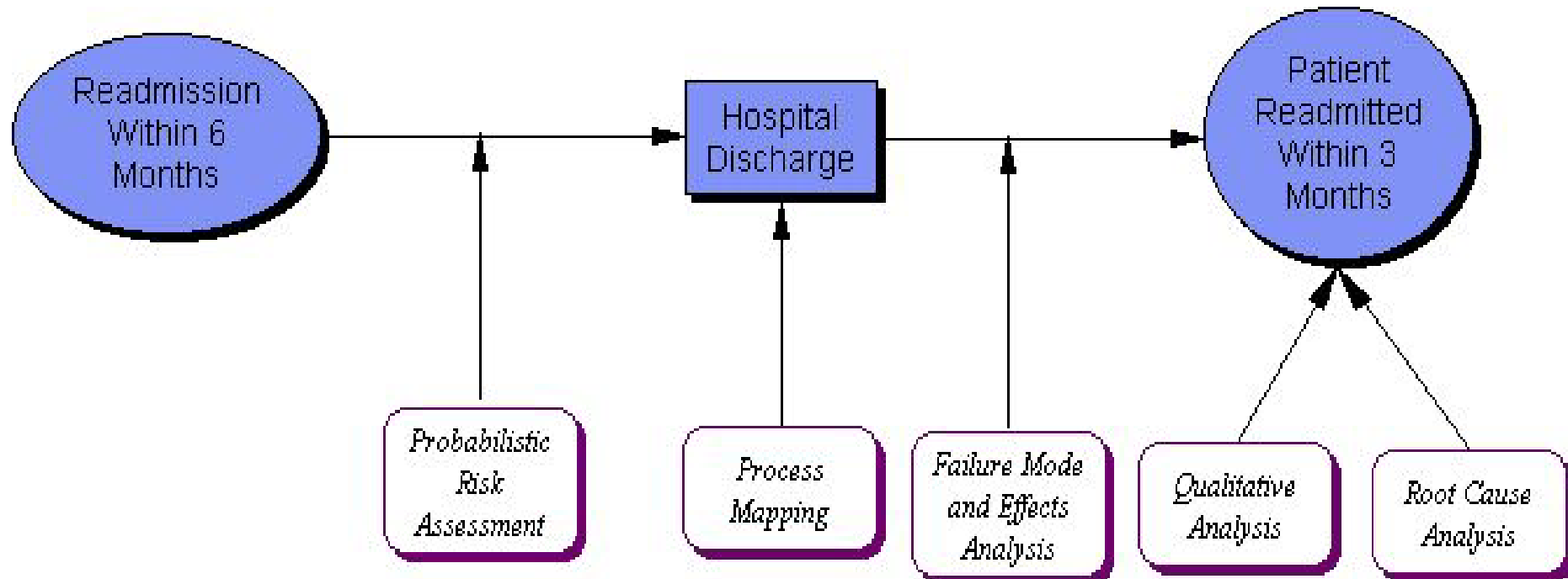
We asked:

- Can improving the discharge process reduce adverse events and unplanned hospital utilization?

Grant reviewer asked:

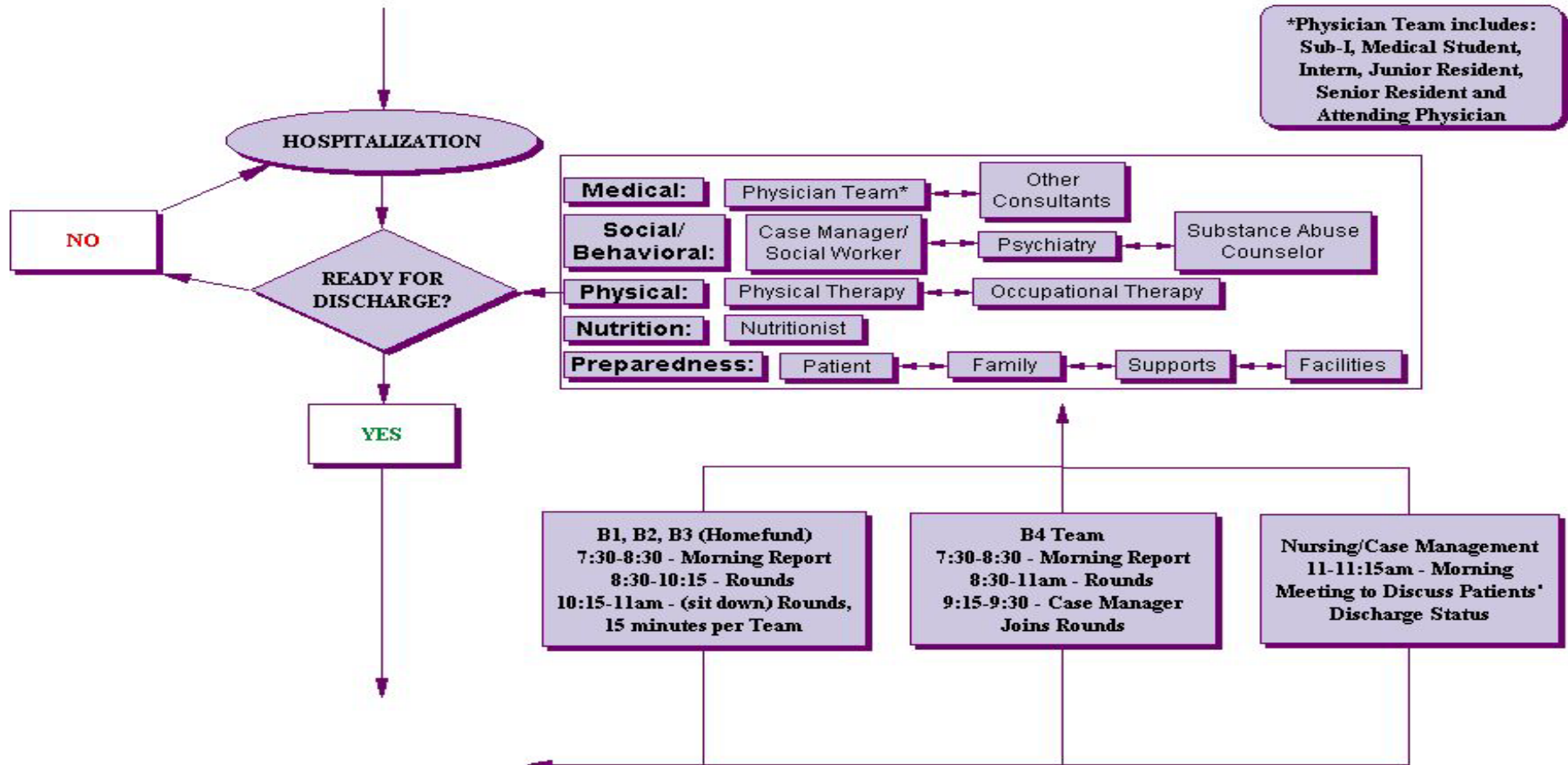
- What is the “discharge process?”

Principles of the RED: Creating the Toolkit



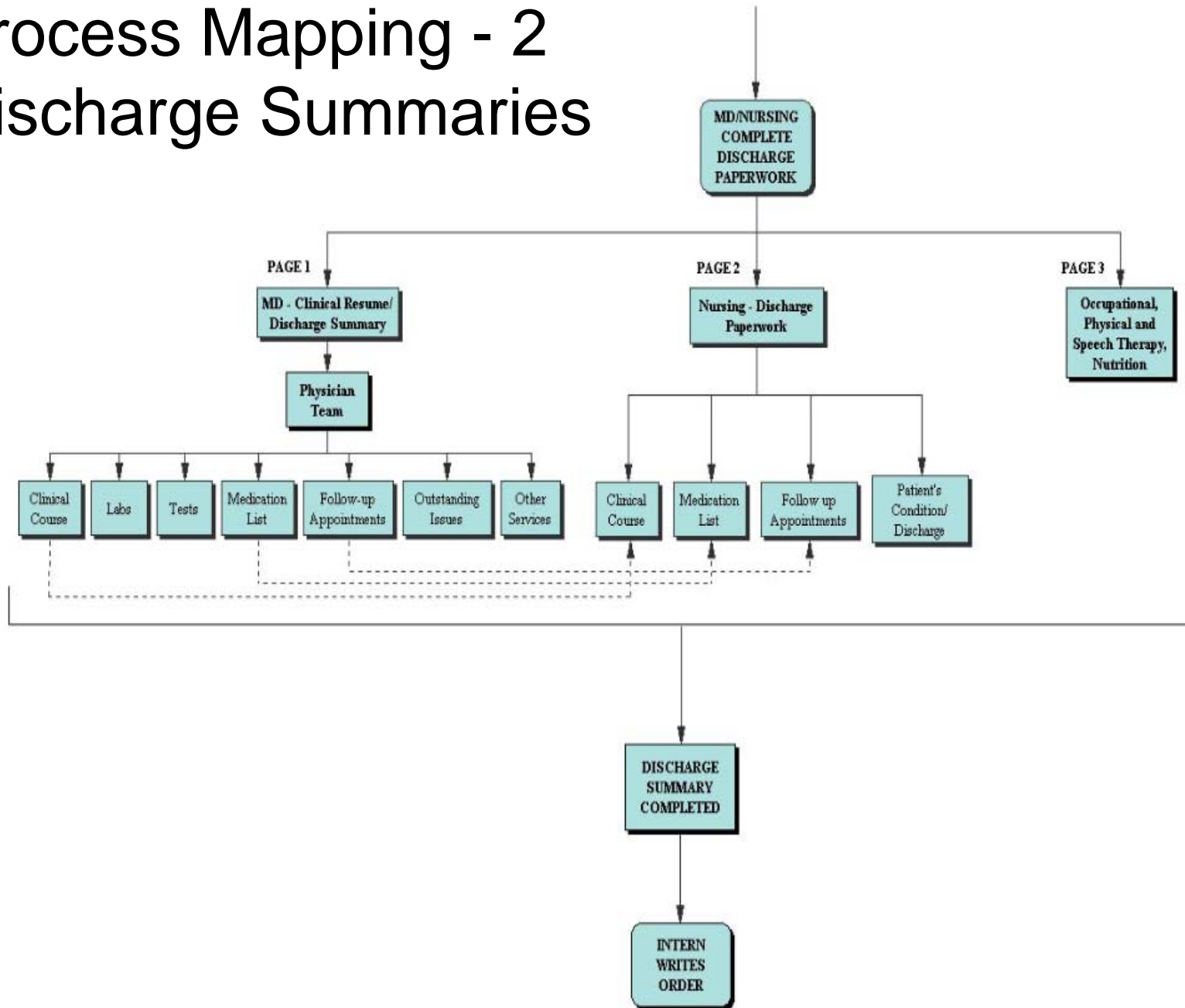
Process Mapping-1

Ready for Discharge?



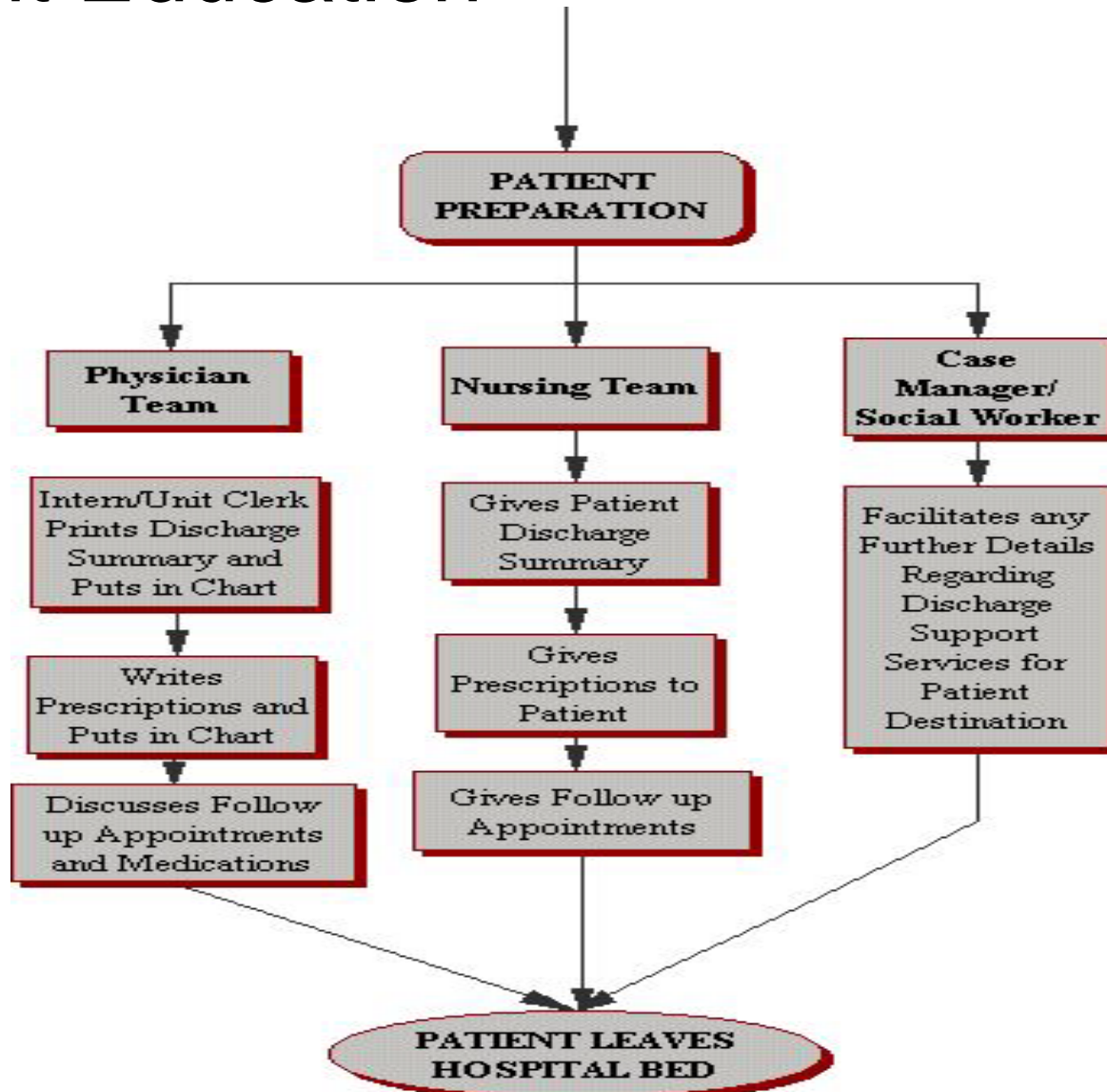
Process Mapping - 2

Discharge Summaries



Process Mapping – 4

Patient Education



Re-engineering the Discharge

- Iterative Group Process
- Identification of Potential Failures
- Prioritization



Re-engineering the Discharge-2

- Brainstorming of Alternatives
- Re-design of Process Map



Principles of the Newly Re-Engineered Hospital Discharge



- **Explicit delineation of roles and responsibilities**
- **Patient education throughout hospitalization**
- **Easy Information flow**
 - from PCP
 - among hospital team
 - back to PCP
- **Written Discharge Plan**
- **All information organized and delivered to PCP**
- **Waiting until discharge order is written before beginning discharge process is error-prone**
- **Efficient and safe hospital discharge is significantly more challenging if discharge personnel work only 7AM to 3 PM shift**
- **All patients have access to their discharge information in their language and at their literacy level**
- **Those at-risk have discharge plan re-enforced after discharge**
- **Discharge processes benchmarked, measured and subject to continuous quality improvement programs**

RED Checklist



Eleven mutually reinforcing components:

- ① Medication Reconciliation
 - ② Reconcile Plan with National Guidelines
 - ③ Follow-up Appointments
 - ④ Outstanding Tests and Studies
 - ⑤ Post-discharge Services
 - ⑥ Written discharge plan
 - ⑦ What to do if a problem arises
 - ⑧ Patient Education
 - ⑨ Assess patient understanding
 - ⑩ Dc summary to PCP
- > Telephone Reinforcement

**Adopted by
National Quality
Forum
as one of 30 "Safe
Practices" (SP-11)**

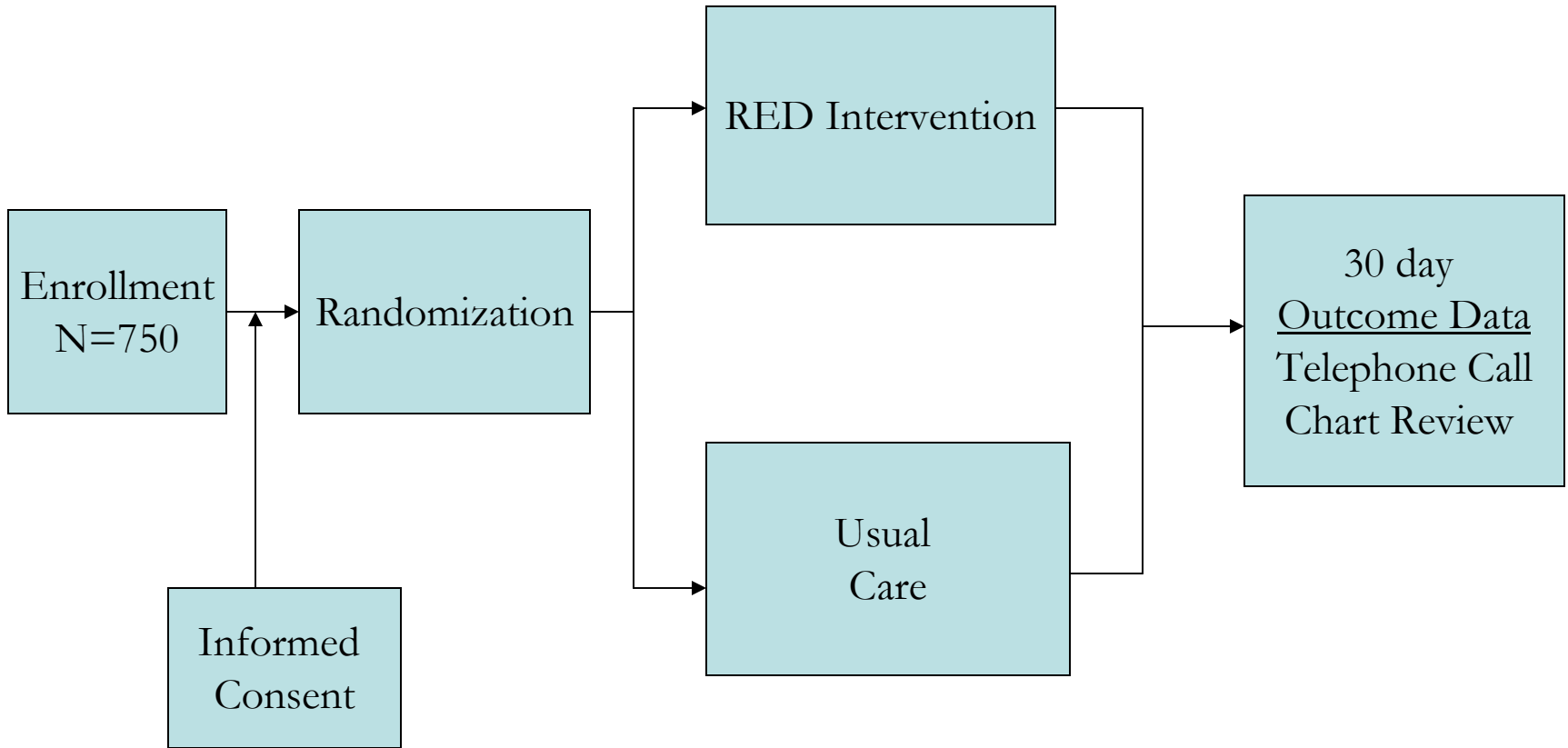
Should the **NQF/RED** be Done
at Discharge at Every Hospital?

Hypotheses

The RED will:

- Improve readiness for discharge
- Lower adverse events
- Lower hospital utilization
- The intervention will be especially effective for those with limited health literacy

Testing the RED Schematic



Intervention to Administer RED



- In Hospital - Discharge Advocate (DA)
 - Nurse
 - Interact with care team – med rec and guidelines
 - Prepare the After Hospital Discharge Plan (AHCP)
 - Teach the AHCP

- After Discharge – Clinical Pharmacist
 - Follow-up call @ 2-3 days

- The DA and Pharm manual
 - Scripts for each task



**** Bring this Plan to ALL Appointments ****



After Hospital Care Plan for:

John Doe

Discharge Date: October 20, 2006



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


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





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	blood pressure	PROCARDIA XL NIFEDIPINE 90 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

 Morning	heart	ASPIRIN EC 325 mg	1 pill	By mouth
	to stop smoking	NICOTINE 14 mg/24 hr	1 patch (for 4 weeks)	On skin
	Then, after 4 weeks use →	NICOTINE 7 mg/24 hr	1 patch	On skin
	Blood pressure	COZAAR LOSARTAN POTASSIUM 50 mg	1 pill	By mouth
	Infection in eye	VIGAMOX MOXIFLOXACIN HCl 0.5 % soln	1 drop	In your left eye
 Noon	Blood pressure	ATENOLOL 75 mg	1 pill	By mouth
	Blood pressure	LISINOPRIL 40 mg	1 pill	By mouth
	Infection in eye	VIGAMOX MOXIFLOXACIN HCl 0.5 % soln	1 drop	In your left eye

**** Bring this Plan to ALL Appointments****

John Doe

What is my main medical problem?

Chest Pain

When are my appointments?

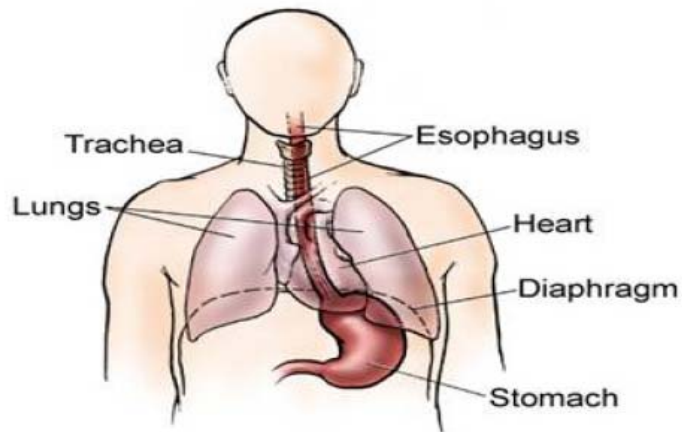
Tuesday, October 24 th at 11:30 am	Thursday, October 26 th at 3:20 pm	Wednesday November 1 st at 9:00 am
Dr. Brian Jack Primary Care Physician (Doctor)	Dr. Jones Rheumatologist	Dr. Smith Cardiologist
at Boston Medical Center ACC – 2 nd floor	at Boston Medical Center Doctor's Office Building 4 th floor	at Boston Medical Center Doctor's Office Building 4 th floor
For a Follow-up appointment	For your arthritis	to check your heart
Office Phone #: (617) 414-2080	Office Phone #: (617) 638-7460	Office Phone #: (617) 555-1234

October 2006

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20 Left hospital	21
22	23 Pharmacist will call today or tomorrow	24 Dr. Jack at 11:30 am at Boston Medical Center ACC – 2 nd floor	25	26 Dr. Jones at 3:20 pm at Boston Medical Center Doctor's Office Building – 4 th floor	27	28
29	30	31				

Noncardiac Chest Pain

Noncardiac chest pain is chest pain that is not caused by a heart problem.



- If your chest pain gets different or worse, call your doctor.
- Take your medications as prescribed.
- Carry your medicine with you.
- See your doctor and ask questions.

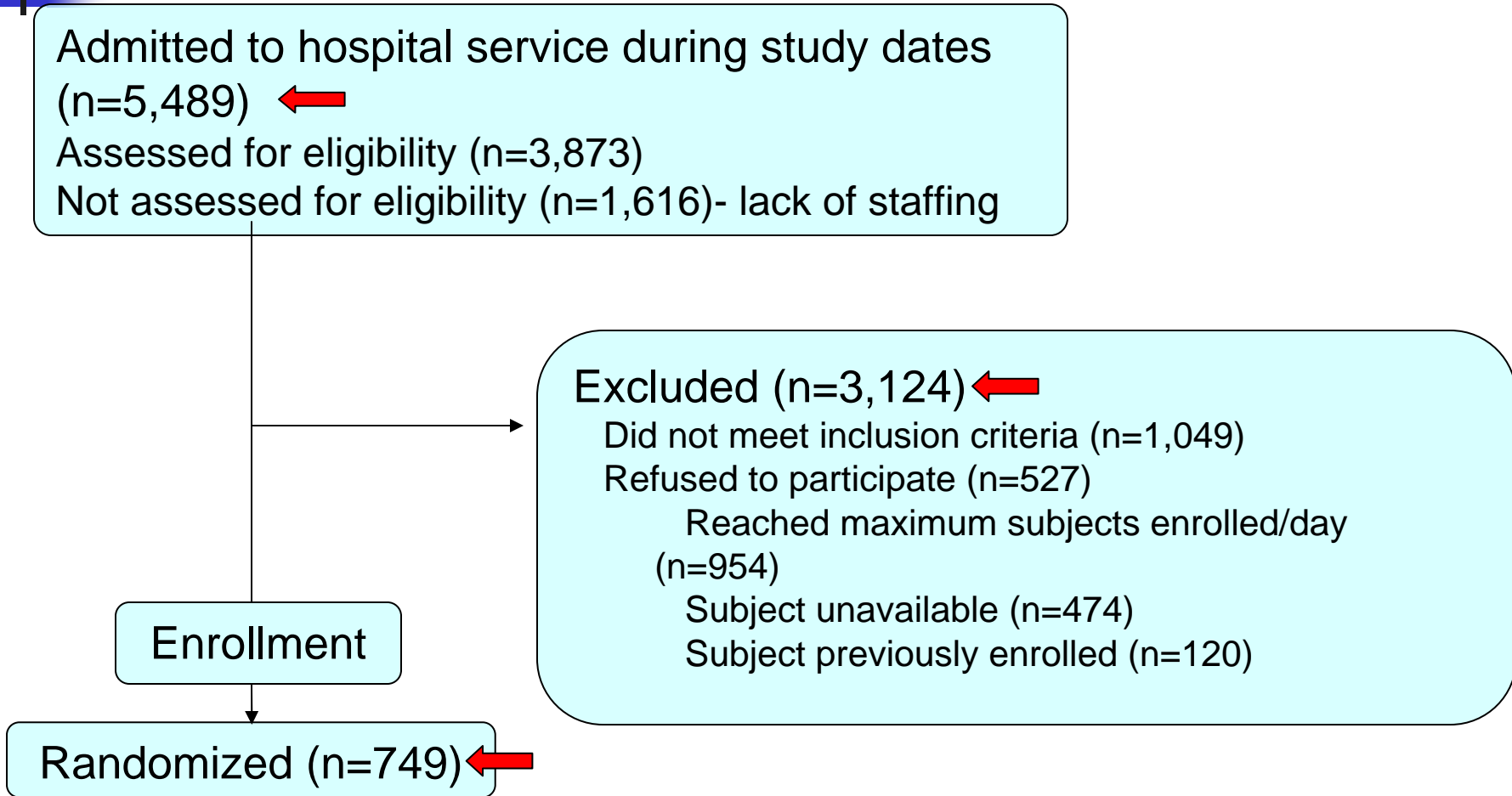
Picture adapted from The Society of Thoracic Surgeons' Website

Enrollment Criteria

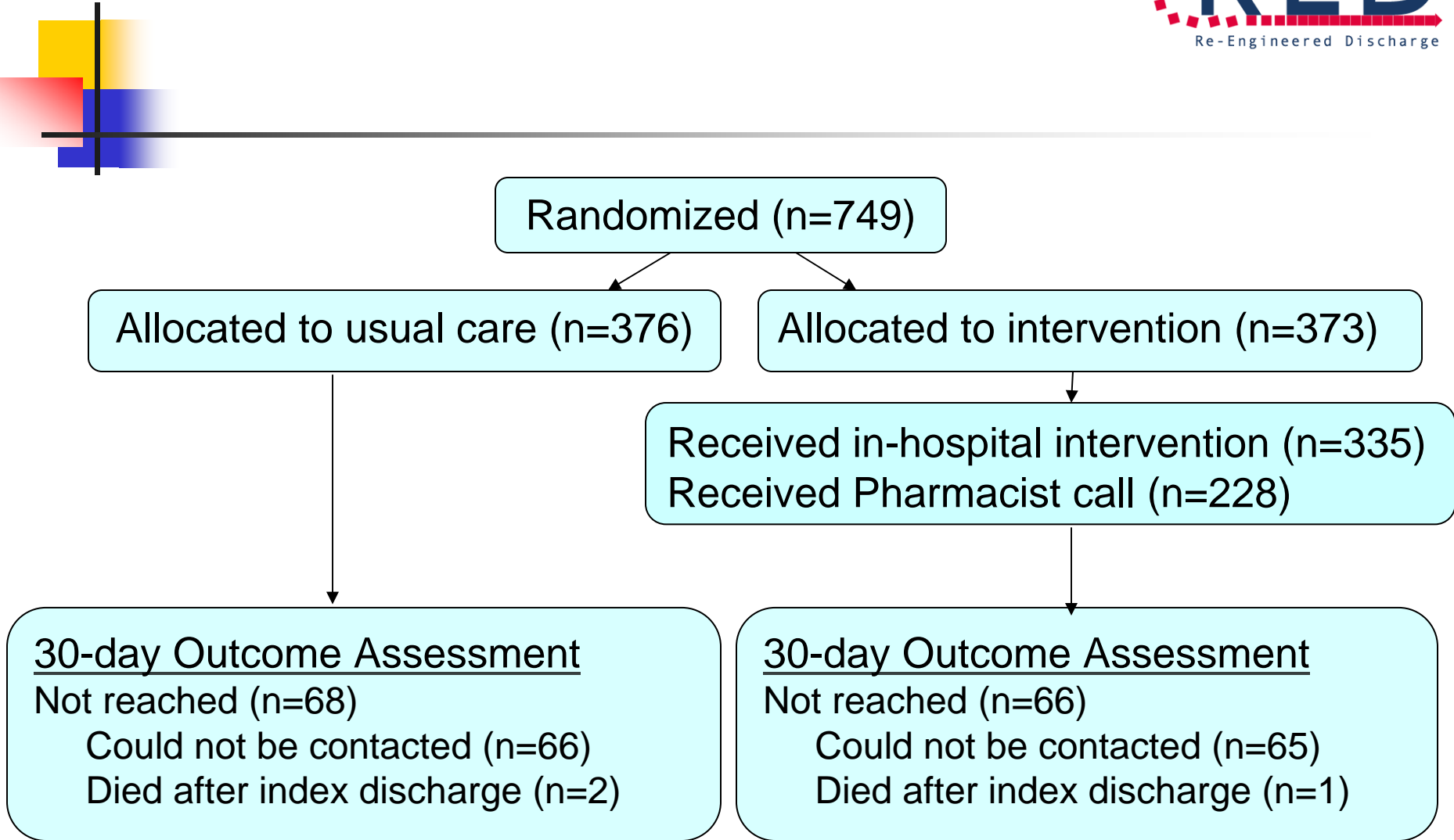


- Admitted to Boston Medical Center
- \geq 18 years old
- English speaking
- Not on precautions
- Does not live in an institutionalized setting
- Has telephone
- Able to consent
- Not previously enrolled

Enrollment



Allocation



Randomization Worked



- **No significant differences by group (n=749)**

	Control	Intervention	P-value
Gender, % F	53	47	0.15
Age	49.6 (15.3)	50.1 (15.1)	0.61
Race, % Black	52	51	0.80
Homeless, % in last 3m	11	9	0.65
% Medicaid	49	47	0.58

- Income, Education Level, Literacy, Employment

Randomization Worked



■ No Significant differences by group (n=749)

	Control	Intervention	P-value
Charlson	1.2 (2.0)	1.2 (1.8)	0.91
PCP at enrollment	81	80	0.96
SF-12			
PCS	40.7 (7.4)	40.1 (7.3)	0.25
MCS	46.3 (9.8)	46.7 (9.3)	0.53
Prior Admissions 12m	0.71 (1.4)	0.64 (1.1)	0.44

■ Prior ED visits, LOS (2.7), PHQ-9

How Successfully was the Intervention Applied?



	Intervention Group (#,%) (n=373)
PharmD TC at 2-4 days	61%
PCP appointment scheduled	349 (94%)
Discharge plan sent to PCP	338 (91%)
Medications reconciled with EMR	145 (47%)
AHCP given to patient	306 (82%)
AHCP included:	
Appointment schedule	291/300 (97%)
Appointment calendar	298/300 (99%)
Diagnosis information	276/300 (82%)

How Successfully were Outcomes Collected?



Outcome Assessment:

Telephone Contact at 30 days	82%
Chart Review at 30 days	100%

Average Clinical Time Required:

- DA 121 minutes
- PharmD 30 minutes

Medication Errors (MEs)

PharmD Telephone Call

2-4 days after discharge (n=169)



MEs due to failure to take medication:

Patient does not think s/he needs med	19 (15%)
Patient did not fill because of cost	20 (16%)
Patient did not pick up from pharmacy	14 (11%)
Patient did not get prescription on discharge	15 (12%)
Patient self-discontinued due to side effects	12 (10%)
Patient did not fill because of insurance	10 (8%)
Patient states MD instruction to stop	4 (3%)
Patient misunderstood direction on discharge	3 (2%)
Patient did not fill (unknown reason)	3 (2%)
Patient forgot to take	2 (2%)
Patient d/c secondary to MD recommendation	2 (2%)
Inaccurate/incomplete med list	1 (1%)
Perscribed PRN only, pt doesn't know when to take	1 (1%)
Other	19 (15%)
Number of subjects with ME due to failure to take medication	71 (36%)

Medication Errors (MEs)

PharmD Telephone Call

2-4 days after discharge (n=169)



MEs due to incorrect self-administration:

Medication not on discharge sheet or dc summary	83 (45%)
Wrong frequency/interval	39 (21%)
Wrong dose	33 (18%)
Medication not on discharge sheet, but in Logician	15 (8%)
Medication not in Logician, but on discharge sheet	3 (2%)
Other	11 (6%)
Number of subjects with MEs due to incorrect self-administration	87 (45%)

Medication Errors (MEs)

PharmD Telephone Call

2-4 days after discharge (n=169)



MEs due to system error:

Patient not given prescription for most current regimen on discharge	5 (29%)
Duplication on medication list (same drug, same class, same indication)	3 (18%)
Conflicting information	4 (24%)
Patient has allergy/intolerance to medication	1 (6%)
Patient does not know how to use device	2 (12%)
Other	2 (12%)
# of subjects with MEs due to system error	12 (6%)

Interventions

PharmD Telephone Call

2-4 days after discharge (n=169)



PharmD Interventions	Frequency (%) of Intervention*
Sent flag to PCP via Logician	55 (38%)
RPh calls PCP, pharmacy, etc in order to solve problem	24 (16%)
Instruct to take med after picking up from pharmacy	15 (10%)
Instruct to take medication; patient has supply	10 (6%)
Instruct on proper dose/frequency	9 (6%)
Instruct not to take medication	3 (2%)
RPh confirmed patient-stated change with Logician	3 (2%)
Take med until PCP gives alternative, then d/c med	1 (1%)
Other	26 (18%)
# requiring at least 1 intervention	103 (53%)

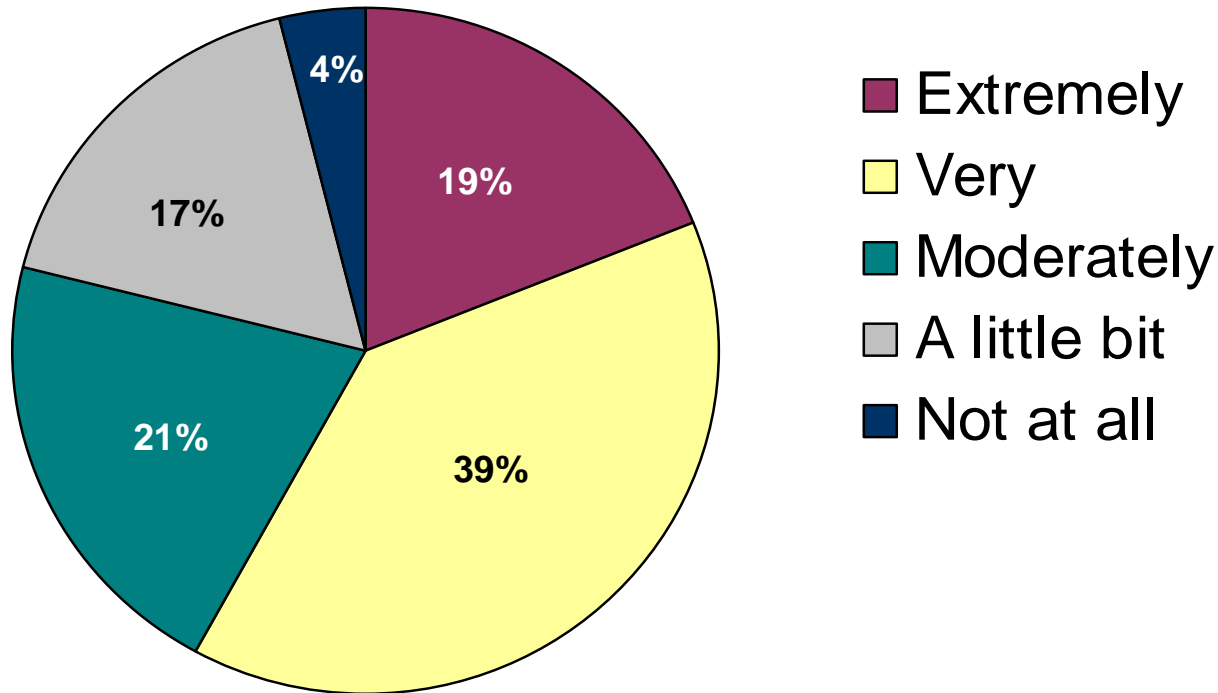
Results

AHCP Evaluation:

30 days post-discharge



How useful was the booklet to you?

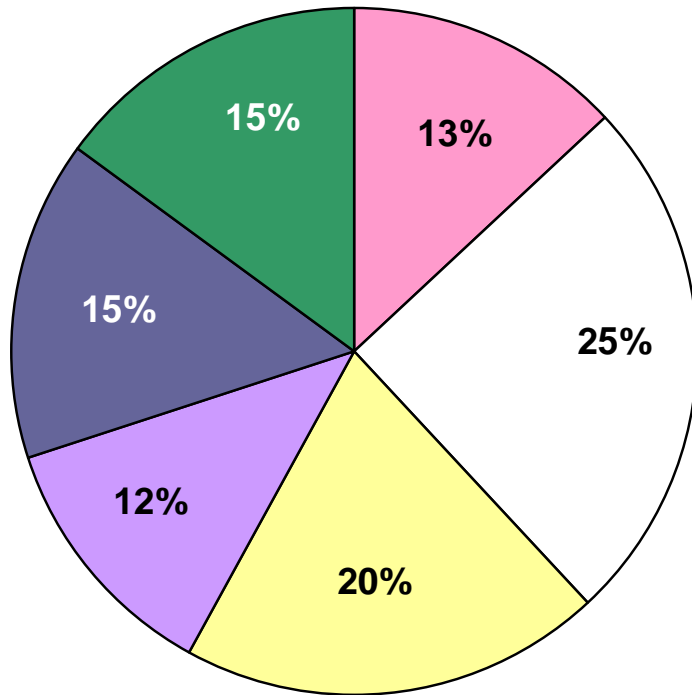


AHCP Evaluation:

30 days post-discharge



What was the most helpful part of the booklet?

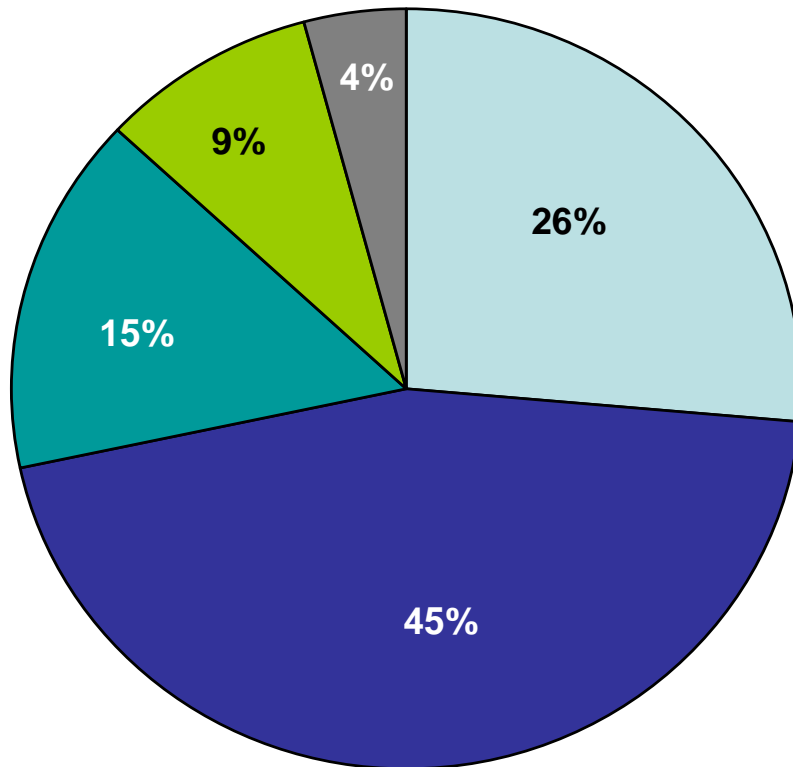


- Medical Provider Information
- RED Medication Schedule
- Appointment Page
- Appointment Calendar
- Diagnosis Information
- Other

AHCP Evaluation:

30 days post-discharge

How helpful was the RED medication calendar?



- Extremely
- Quite a bit
- Moderately
- A little bit
- Not at all

Knowledge of Diagnosis and Making PCP visit

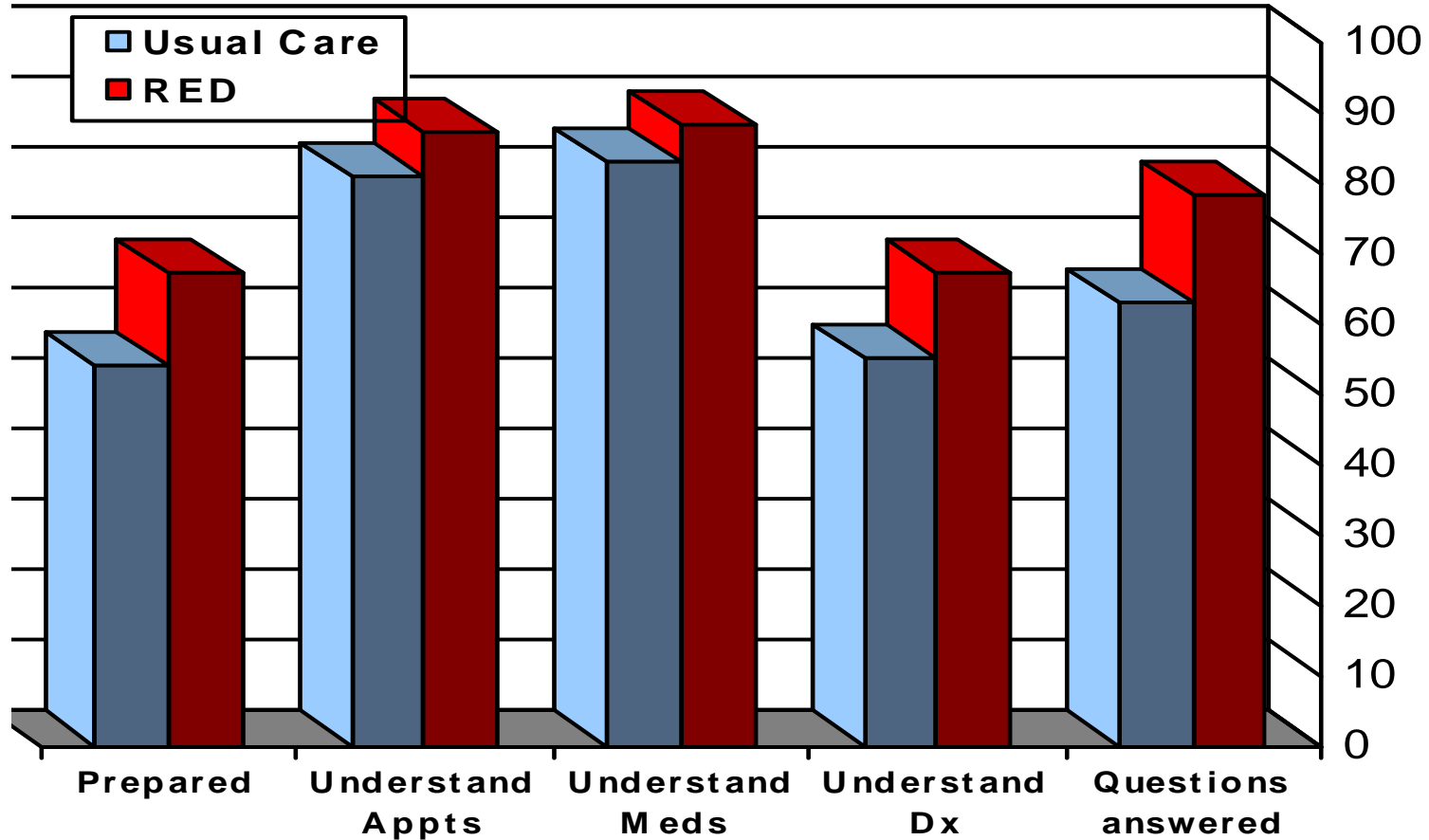
30 days post-discharge



	Intervention (n=373)	Control (n=376)	P - Value
Can identify discharge diagnosis	249 (79%)	217 (70%)	0.02
Saw PCP within 30 days	190 (62%)	135 (44%)	<0.001

Self-Perceived Readiness for Discharge

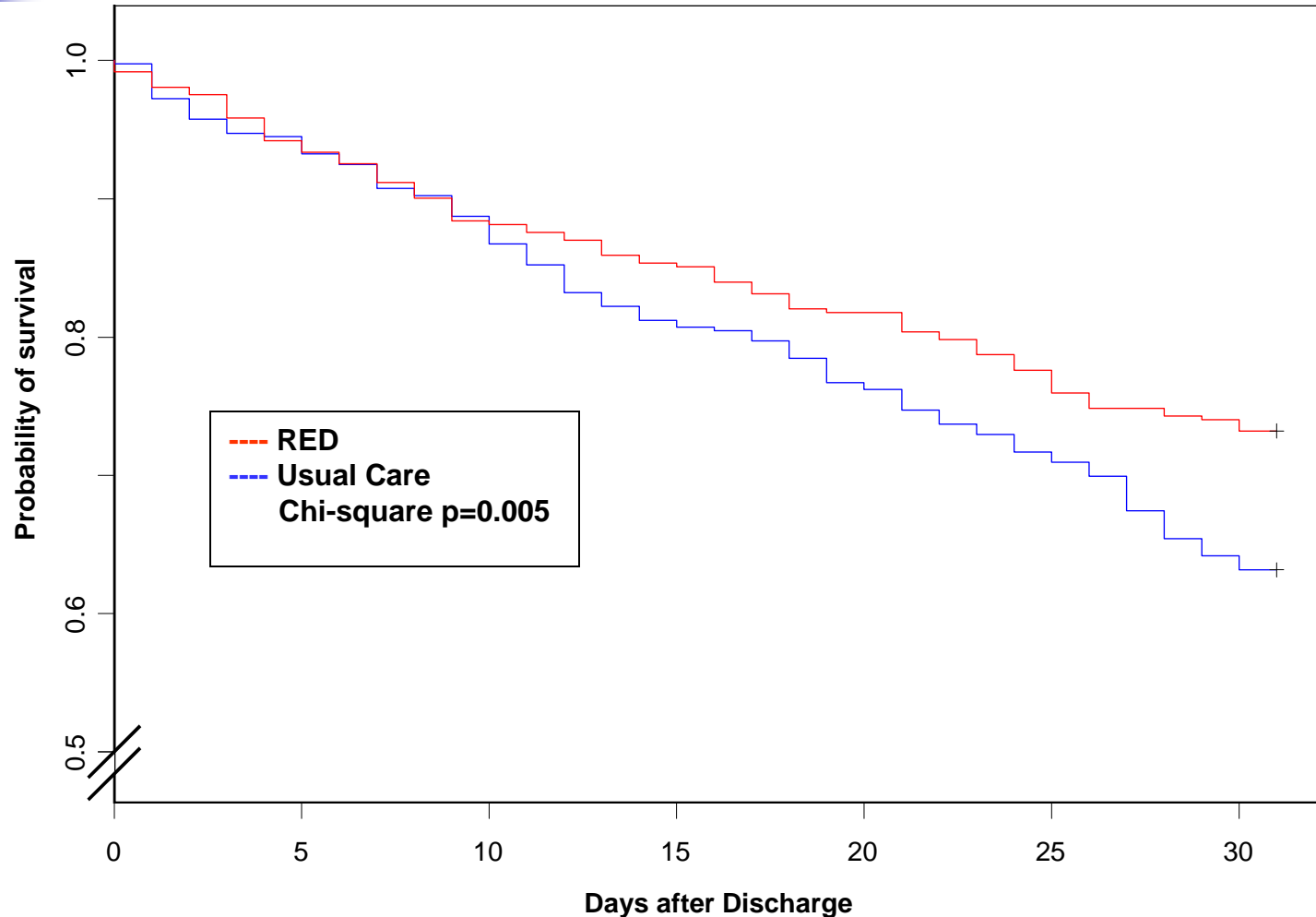
30 days post-discharge



Primary Outcome

	Control (n=376)	Intervention (n=373)	P-value
Hospital Utilization Total # of visits Rate	167 44/100 subjects	116 31/100 subjects	<0.001
ED Total # of visits Rate	90 24/100 subjects	61 16/100 subjects	0.01
Rehospitalization Total # of visits Rate	77 21/100 subjects	55 15/100 subjects	0.05

Cumulative Hazard of Patients Experiencing an Hospital Utilization in 30d After Index Discharge



Cost

Cost (dollars)	Control (376)	Intervention (373)	Difference
Hospital visit	412,544	268,942	+143,602
ED visit	21,389	11,285	+10,104
RED intervention	-	104,188	-104,188
Total/study group	433,933	384,415	49,518
Total/1000 patients	1,154,077	1,030,603	+123,474

Adjusted Rate Ratio of Hospital Utilization within Subgroups



	Adjusted Incidence Rate Ratio (95% CI)	
	IRR	95% CI
Health literacy ‡		
Grade 3 and below	1.47	1.07, 2.0
Grade 4 to 6	1.07	0.71, 1.62
Grade 7 to 8	0.98	0.72, 1.32
Grade 9 and above	REF	REF
Prior hospital utilization		
Frequent hospital utilizer	2.83	2.16, 3.72
Gender		
Male	1.78	1.39, 2.29
Depression		
Any depression diagnosis	1.74	1.37, 2.22
Prior hospital utilization x Study group (Interaction term)		
Frequent hospital utilizer, intervention	0.65	0.46, 0.92
Frequent hospital utilizer, control	REF	REF

Conclusions from the RCT



RED:

- Successfully delivered using
 - RED protocols
 - AHCP
- Improves ‘Readiness for Discharge’
- Decreases hospital use
 - 32% reduction
 - NNT = 7.9
- Helps high hospital utilizers
 - 35% reduction
- Is Cost-Effective
 - \$329 / patient
 - 38 million discharges @ \$753 billion x 32% eligible = 4 billion

Policy Implications



The components of the RED should be provided to all patients as recommended by the National Quality Forum Safe Practice #11.

Major Problem: RN Time

Can Health IT Help?



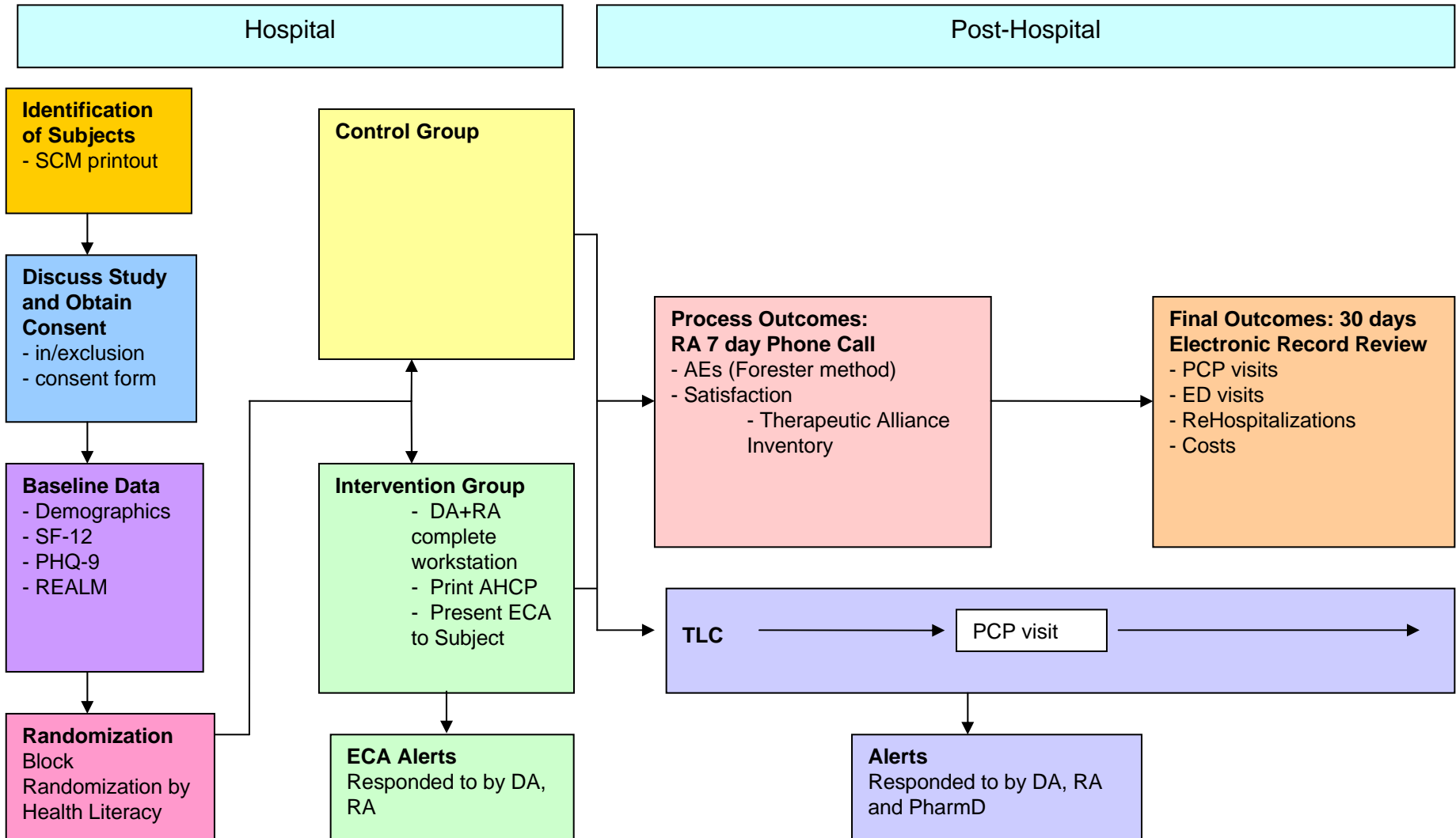
- Embodied Conversational Agent to Teach the AHCP
 - Emulate face to face communication
 - Develop therapeutic alliance
 - Empathy
 - Gaze, posture, gesture
- Workstation database to automatically print AHCP and “feed” Louise
- Connect hospital IT to workstation
- Kiosk for patient access

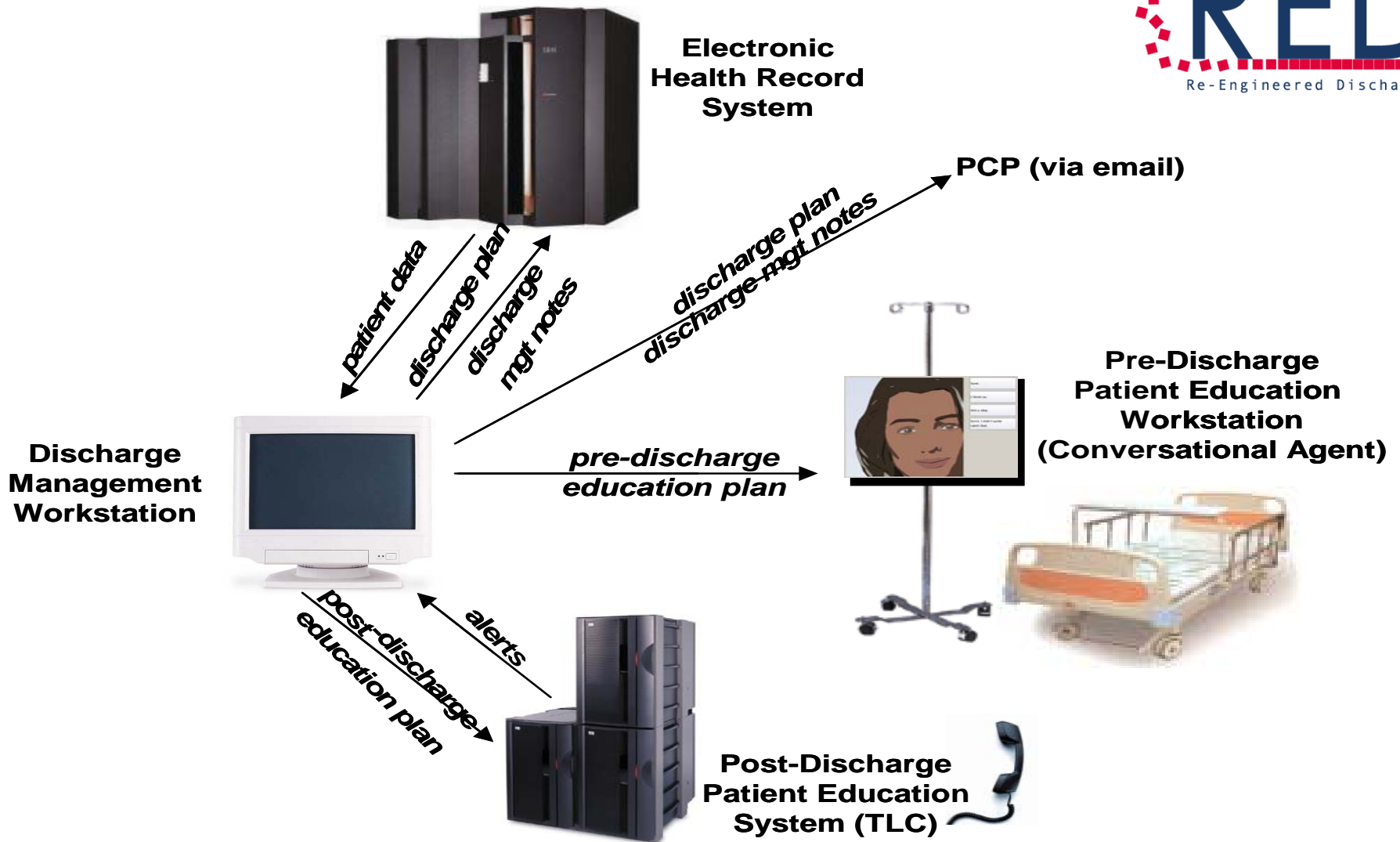


Louise

RED-lit Proposed Methods

November 29, 2007







Skills of the Agent



- Teach the AHCP
- Competency Questions
 - We know what they know
- Can drill down in med education
- Maps of test sites and CHCs
- Instructions
 - Lovenox
 - Glucometer
 - Incentive spirometer
- Concordancy Studies
 - Race/ethnicity
 - Gender
 - Empathic styles

Social Chat

Cover

Medications

Appointments

Diagnosis

Closing

Thank You! AHRO



- PI: Brian Jack, MD
- Caroline Hesko, MPH
- Irina Kushnir
- Fiana Gershengorina
- Kim Visconti, RN
- Jared Kutzin, RN, MPH
- Alison Simas, RN
- Mary Goodwin, RN
- Lynn Schipelliti, RN
- Lindsey Hollister
- Maggie Jack
- Kacie Fyrberg, RN
- Vimal Jhaveri
- Laura Pfeifer
- Juan Fernandez
- David Anthony, MD, MSc
- Tim Bickmore PhD
- Gail Burniske, PharmD
- Kevin Casey, MPH
- VK Chetty, PhD
- Allyson Correia, RN
- Larry Culpepper, MD, MPH
- Shaula Forsythe, MPH, MS
- Rob Friedman, MD
- Jeffrey Greenwald, MD
- Anna Johnson
- Anand Kartha, MD
- Christopher Manasseh, MD
- Julie O'Donnell

PA-PSRS: Problems Reported after at discharge

Since June 2004 to December 2007, more than 800 reports have been submitted through PA-PSRS identifying problems at discharge.

30% of all reports indicated patients left the facility prior to receiving verbal and/or written discharge instructions.

The narratives below illustrate some of the issues reported through PA-PSRS:

- *Patient discharged to Nursing Home. Discharge orders for 50 mg fentanyl but were written as 500 mg. The Nursing home did not catch error until patient became very drowsy. Narcan was administered.*
- *Patient was discharged with the wrong discharge medication list. The discharge medication list was for another patient.*
- *Patient admitted with diagnosis of DK A. An x-ray of left elbow was ordered. Patient was discharged to an extended care facility via ambulance before left elbow x-ray done. Orthopedic doctor notified of x-ray not being done.*
- *Patient was discharged to another facility with the right femoral triple lumen catheter still in place. Staff from the other facility called asking how long and how much pressure to hold on the femoral site when removing the catheter.*
- *Patient's daughter called this nursing unit stating the discharge instructions were unclear. The nurse discovered the medication discharge instructions were not completed. The patient had received a coronary artery stent and the booklet was still with the chart. The daughter was also unclear of the pacemaker Patient had a 5 second pause on the cardiac monitor. The monitor strip was placed on the medical record but the physician was not notified. The patient was discharged the following morning. The patient's spouse called to report the patient passed out on the way home. As instructed, they returned to the ED and the patient was admitted. The patient had a dual chamber pacemaker inserted the next day.*
- *Pt resumed Coumadin post-op tonsillectomy and developed bleeding requiring admission to the hospital and return to the OR for cauterizing of bleeding site. Dr. signed standard discharge instruction sheet of surgery center stating pt. to resume medication unless otherwise instructed and did write for pt to not resume Coumadin.*
- *Discharge instructions for decadron tapering not clearly written. Patient stopped taking medication abruptly and required readmission.*