Reducing Preventable 30-Day Readmissions for Sub-Populations based on Dominant Psychosocial and Clinical Risk Factors

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Contents

30-Day Readmissions – Rising Burden on Patients, Providers and Payors

- Nearly 1 in 4 Elderly patients are readmitted to hospital

- Over 50% of the 30-Day readmissions are preventable [CMS][JAMA, 2013]

- Nearly 17 Billion in costs for Medicare per year on unplanned 30-Day readmissions [CMS]

- 30-Day excessive readmissions penalty
  - Who is at risk for 30-Day readmits?
  - All-condition and All-Cause, HF, AMI and Pneumonia

- Studies have shown that timely interventions, medication reconciliation, post-discharge support and handling psychosocial , financial and mental health needs critical for reducing readmissions

Modified Transitional Care Model Initiative

- History with the Naylor Transitional Care Model (TCM)
- Baylor Awarded a $3million grant to "mature" TCM
- Patients-65 and older with PNE or HF at 3 hospitals
- Risk stratify with annual edits (initial plan)
- Low risk patients (followed for 1-6 months)
  - Tele-monitoring with RN support
  - APRN follow in hospital
- Medium risk patients (followed for 1-6 months)
  - Above
  - Remote support from RN, clinical pharmacists, social work
- High risk patients
  - Above
  - Home visits with APRN for 1-3 months

Care Management Experience

- 90% of the patients in the program required social worker intervention
  - <u>Caregiver, Transportation and obtaining medication</u>
  - Community resources
  - Understanding benefits
  - Coordinating multiple home health agencies
  - Food and housing
- Patients need support from pharmacist
  - Medication Management
  - Medication Simplification. Avg 14 medications/pt
- Education and Management
  - RN and APRN provide education on disease process, self-care
  - Establish realistic patient goals

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Early Challenges

- Enrolling patients
  - New APRNs
  - Charging for services
  - Care coordination, nursing and physician engagement
- Enrolled highest risk patients
- Process
  - Takes time to hardwire
  - Reasonable part of workflow
- Poor patient identification
- Risk Stratification – "Home Grown"
  - Manual tool. All high risk.
  - Not real time
 - Annual edits
  - No Dashboard

Risk Stratification Results

- Automated the patient chart review in real-time
- Streamlined care coordination dashboard and workflows
- Real time prediction and more rapid edits
- Patient identification moved from 50-90% accurate
- More accurate risk stratification
- Helped align patient with most appropriate provider/resource
  - APRN 15 patients vs 48

Interim Results: Heart Failure

Quarterly Readmission Rates:
Heart Failure

N= 343

- 19.6 (Jul-Sep 12)
- 17.9 (Oct-Dec 12)
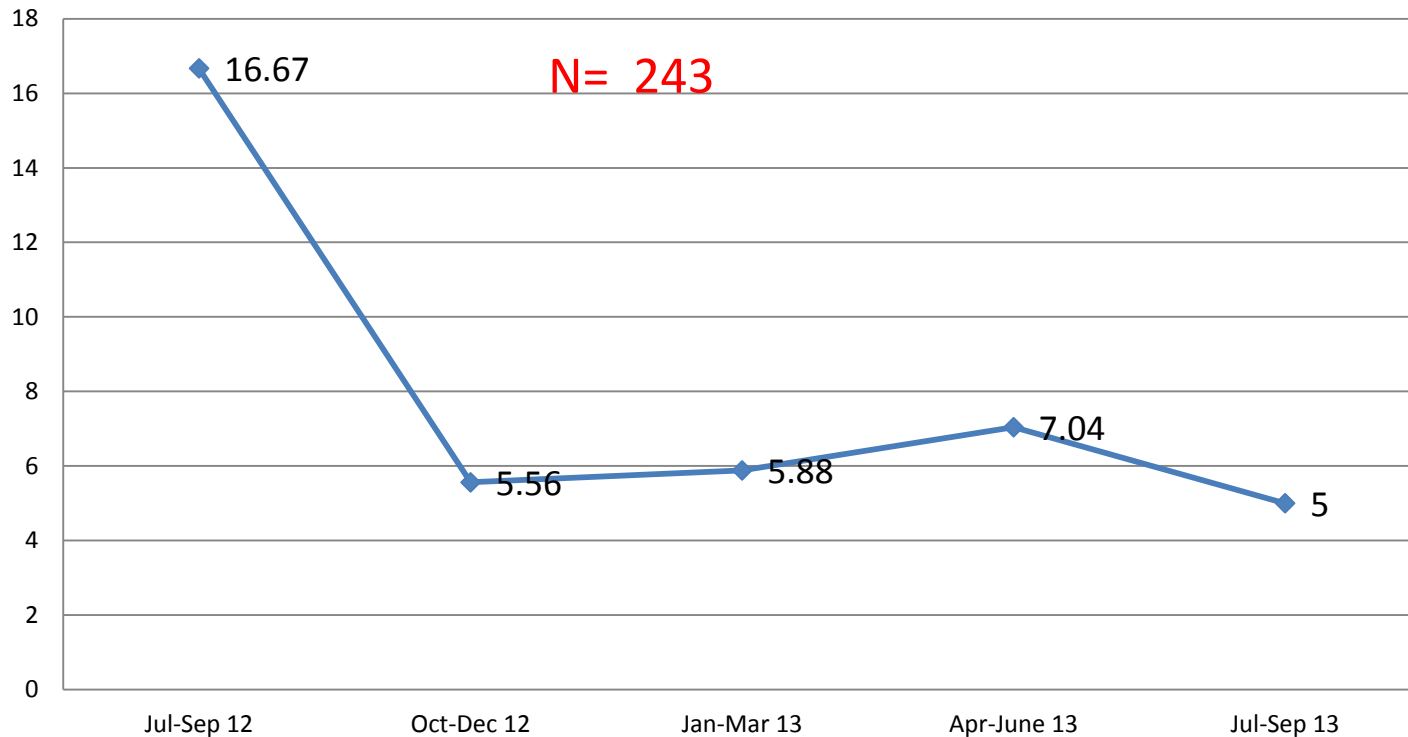- 17.39 (Jan-Mar 13)
- 16.6 (Apr-June 13)
- 16.4 (Jul-Sep 13)
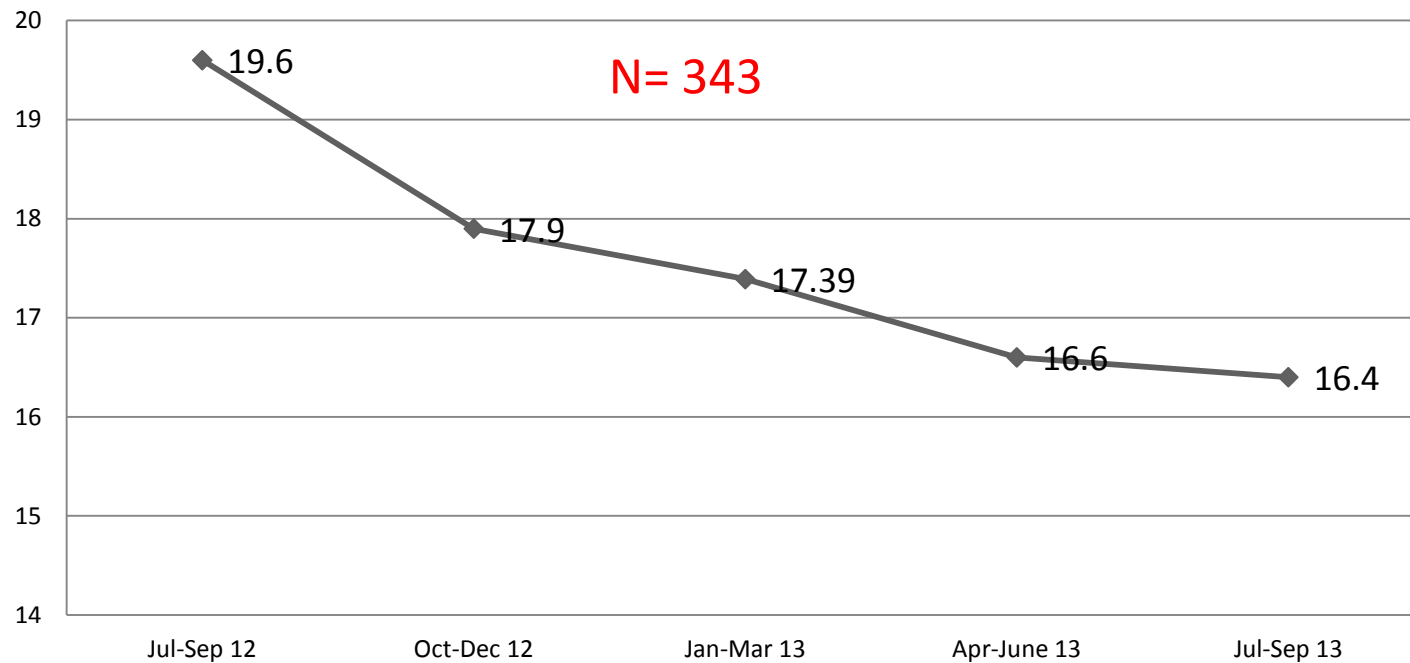
16 % relative reduction

- CMS HF National Readmission Rate: July 2009 to June 2012 = 22.9%
- BHCS HF Readmission Rate: July 1, 2012 to June 30, 2013 = 18%
-

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Interim Results: Pneumonia

Quarterly Readmission Rates: Pneumonia

N= 243

16.67
5.56
5.88
7.04
5

70 % relative reduction

CMS PNE National Readmission Rate: July 2009 to June 2012 = 17.6%
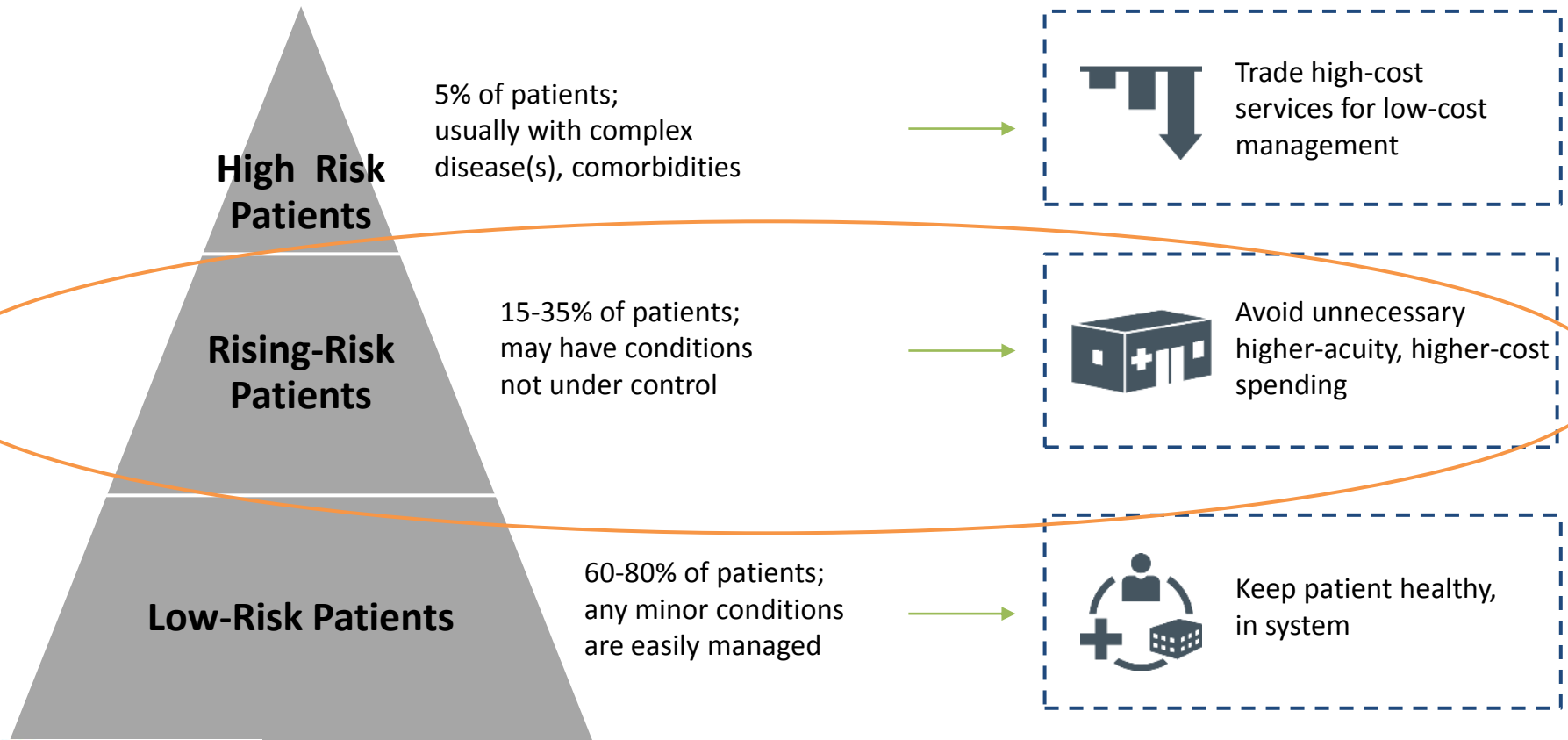BHCS PNE Readmission Rate: July 1, 2012 to June 30, 2013   = 13%

Hypotheses for Targeted Interventions

- Psychosocial factors (IOM) in combination with severity of illness as likely causes for 30-Day readmissions

- Elderly care based on psychosocial needs and preventable conditions as main drivers for interventions and timely support

- Dominant <u>psychosocial</u> risk factors impacting 30-Day readmissions: depression, malnutrition, homelessness, forgetfulness, dementia, lack of support, medication non-adherence and co-pay factors

- Dominant <u>clinical</u> risk factors: illness level, total utilization (e.g. total bed days), past history of heart disease, comorbid conditions, acute conditions (e.g. Heart Failure, Renal Failure, Liver Failure, Respiratory Failure) and medication events
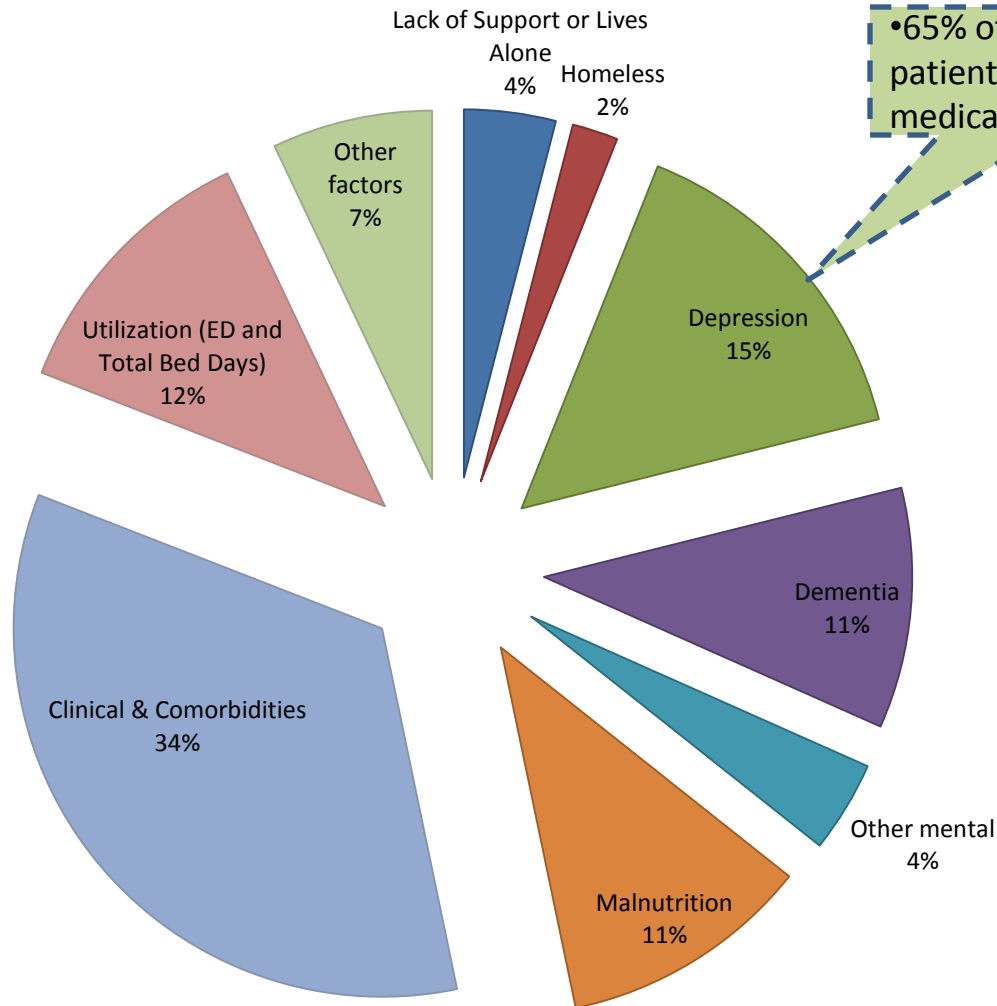
The Pyramid of Risk Stratification: Identifying the Rising Risk Populations that can Transition to a High Risk Group

Often Factors Beyond Disease State that Drive Rising Risk

High Risk Patients

5% of patients; usually with complex disease(s), comorbidities

→ Trade high-cost services for low-cost management

Rising-Risk Patients

15-35% of patients; may have conditions not under control

→ Avoid unnecessary higher-acuity, higher-cost spending

Low-Risk Patients

60-80% of patients; any minor conditions are easily managed

→ Keep patient healthy, in system

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Dominant Risk Factors for 30-Day Readmissions: Psychosocial, Mental and Clinical Areas. 1 in 5 Patients Readmitted within 30 Days Post-Discharge (Total N=4900). Ages: 65 and Above.
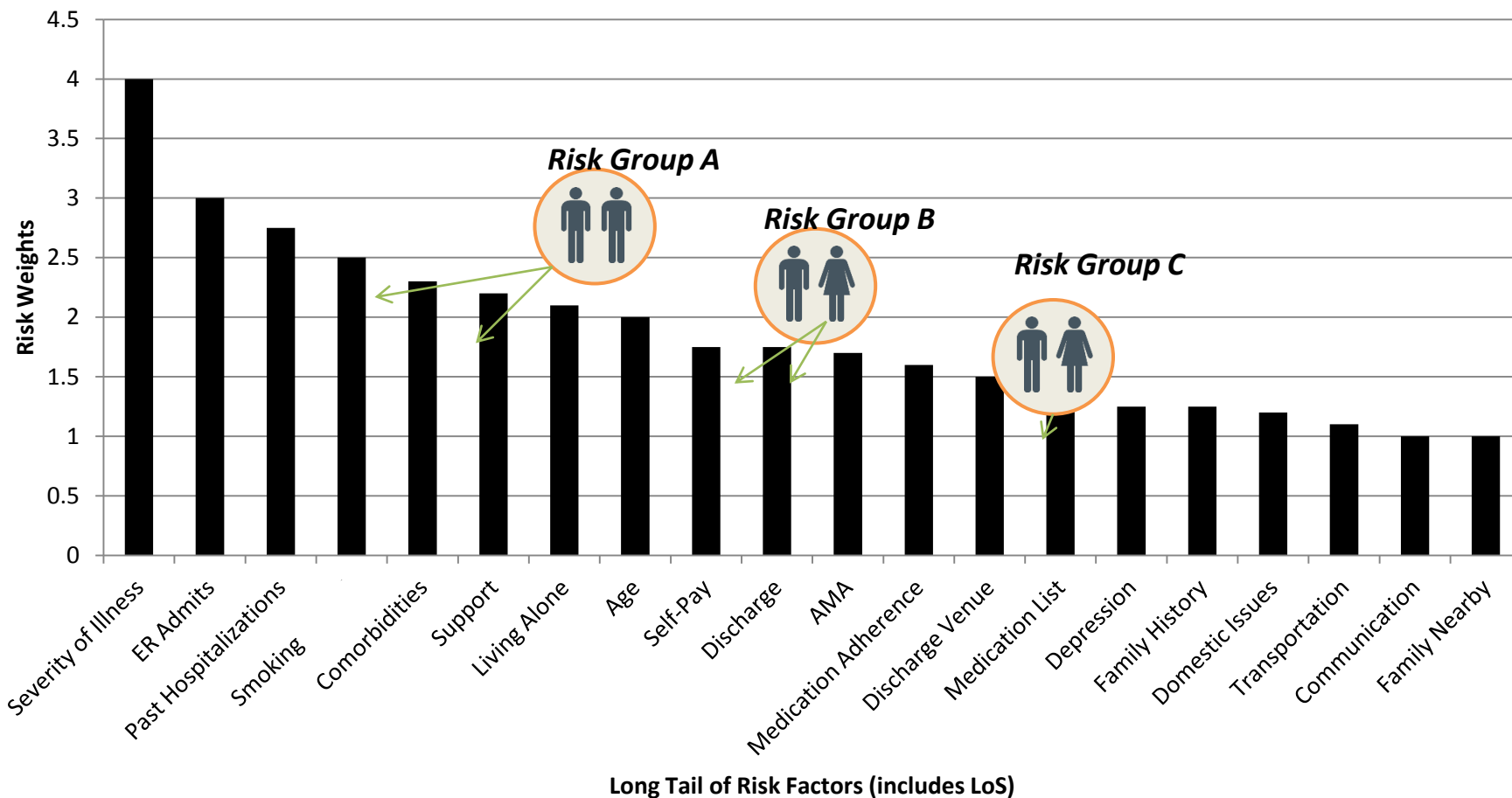

Distribution of Risk Factors

- Lack of Support or Lives Alone 4%
- Homeless 2%
- Other factors 7%
- Utilization (ED and Total Bed Days) 12%
- Depression 15%
- Dementia 11%
- Clinical & Comorbidities 34%
- Other mental 4%
- Malnutrition 11%

•65% of the identified patients on depression medications

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A Long Tail of Risk Factors enabling Patient Risk Stratification for 30-Day Readmissions. Ages: 65 and Above

Example: CHF 30-Day Readmissions Risk Factors

Risk Group A

Risk Group B

Risk Group C

Y-axis: **Risk Weights** (0 to 4.5)

X-axis categories: Severity of Illness, ER Admits, Past Hospitalizations, Smoking, Comorbidities, Support, Living Alone, Age, Self-Pay, Discharge, AMA, Medication Adherence, Discharge Venue, Medication List, Depression, Family History, Domestic Issues, Transportation, Communication, Family Nearby

Long Tail of Risk Factors (includes LoS)

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# A FOCUS ON DEPRESSION AND MALNOURISHED PATIENTS AT-RISK FOR 30-DAY READMISSIONS

Patients with Conditions of Depression, Identified through Clinical documentation (Text Analysis)

- Based on current and past Medications
  - Medication therapy for depression patients
  - Other psychotherapeutic agents
  - Medications associated with depression (e.g. Ropinrole for Parkinsons)

- Environmental and mood issues captured in clinical text
  - Comments on mood, lack of support, complex medications
  - Adverse events due to severity of illness

- Impact due to social factors
  - Domestic and socio-economic issues

- Psychological factors
  - Mental health conditions, sadness, loss of loved one

- Financial and Co-Pay related factors
  - Loss of job, low income, under-served

Over 1 in 5 Patients Identified as Depressed. Total N=4900, & Depressed Patients: 997. Over 1 in 8 being on Depression Medications (Ages: 65 and above)
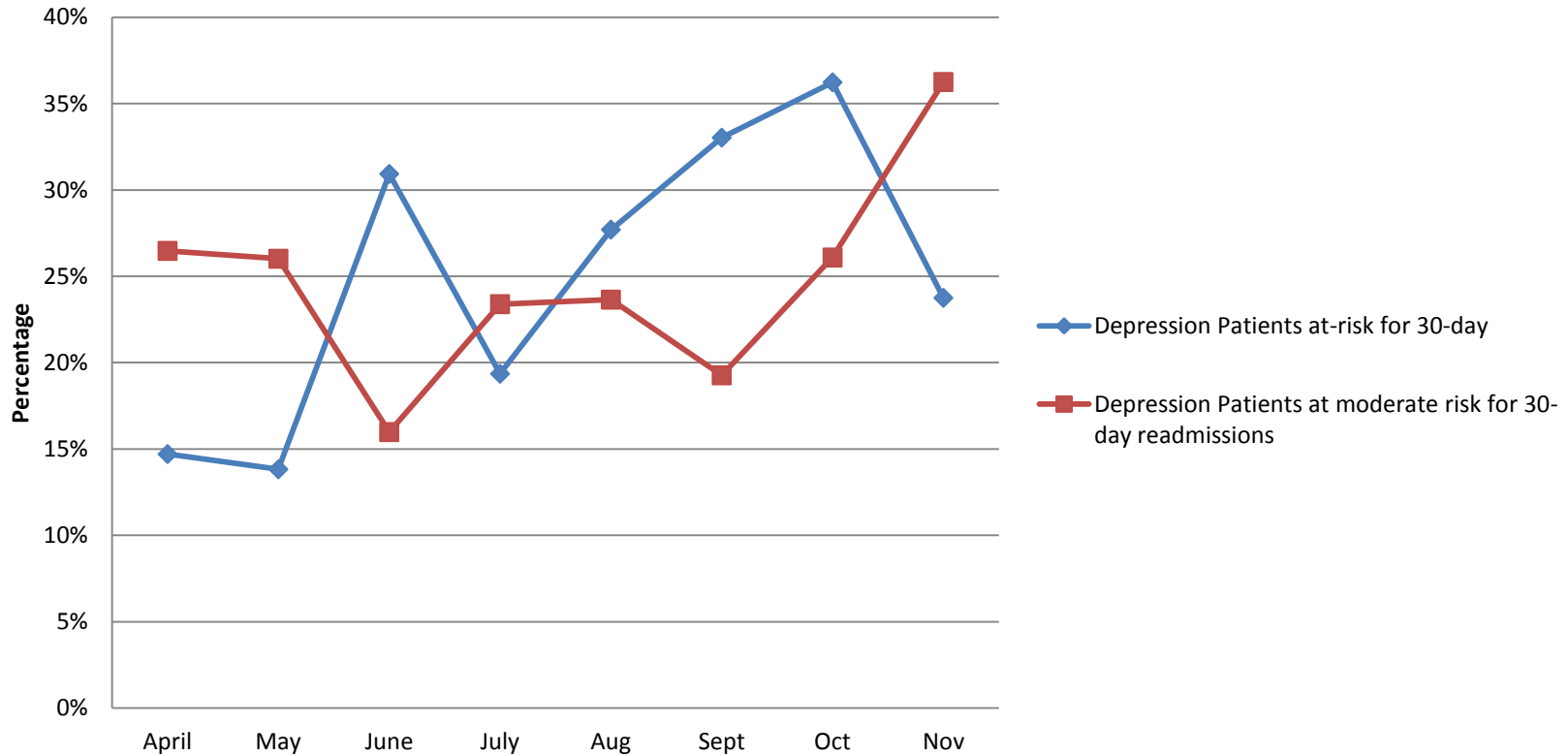

Depression Patient Population across Multiple Facilities (ages 65 and above)
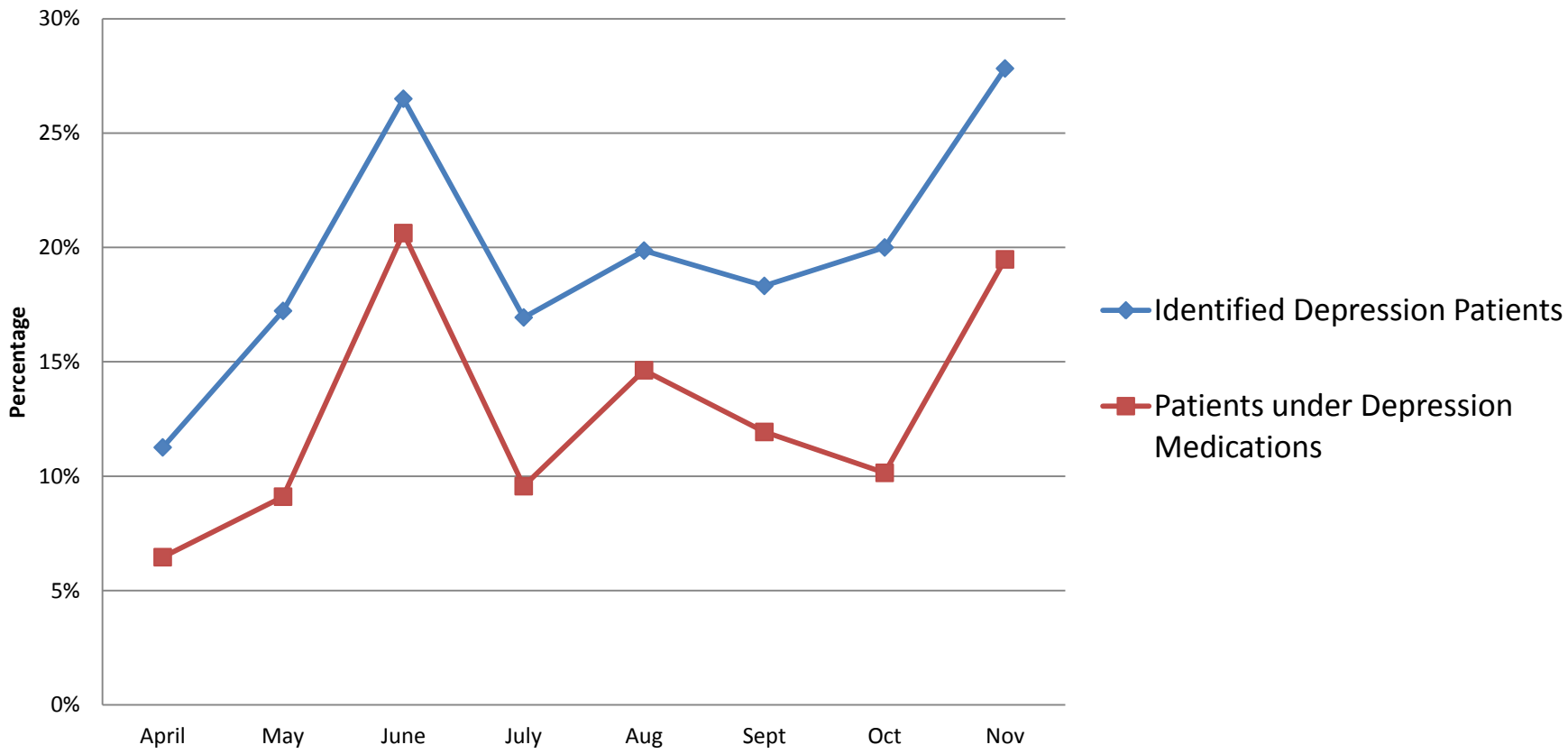
1 in 4 Depressed Patients at High Risk for 30-Day Readmissions (N for Depressed Patients = 997). Ages: 65 and Above

Percentage of Patients under Depression Conditions (amongst all depression patients)

Patients Identified at Risk for Depression

- Assessment:
  - Complete PHQ-9
- Intervention:
  - Notify Physician
    - Plan of Care and medications
  - Notify APRN
  - Notify Social Worker
    - Identify Community Resources
- Hand off to outpatient physician and transitional care team

Criteria for Identification of Malnutrition Conditions

- Criteria
  - All cause readmissions with HF and PN as index admission
  - Narrow definition: Nutritional conditions (Poor diet, low Albumin, lack of support, limited meals per day, homelessness and financial, living in a shelter and minimal food)
  - Broader definition: nutritional conditions (adding strong signs of anorexia, obesity and other unintended weight gain and weight loss, adverse events related to nutrition).
- Methodology on Population data
  - Analysis done on patient visit notes (e.g. text data in encounters) in combination with clinical data (e.g. labs and medications)
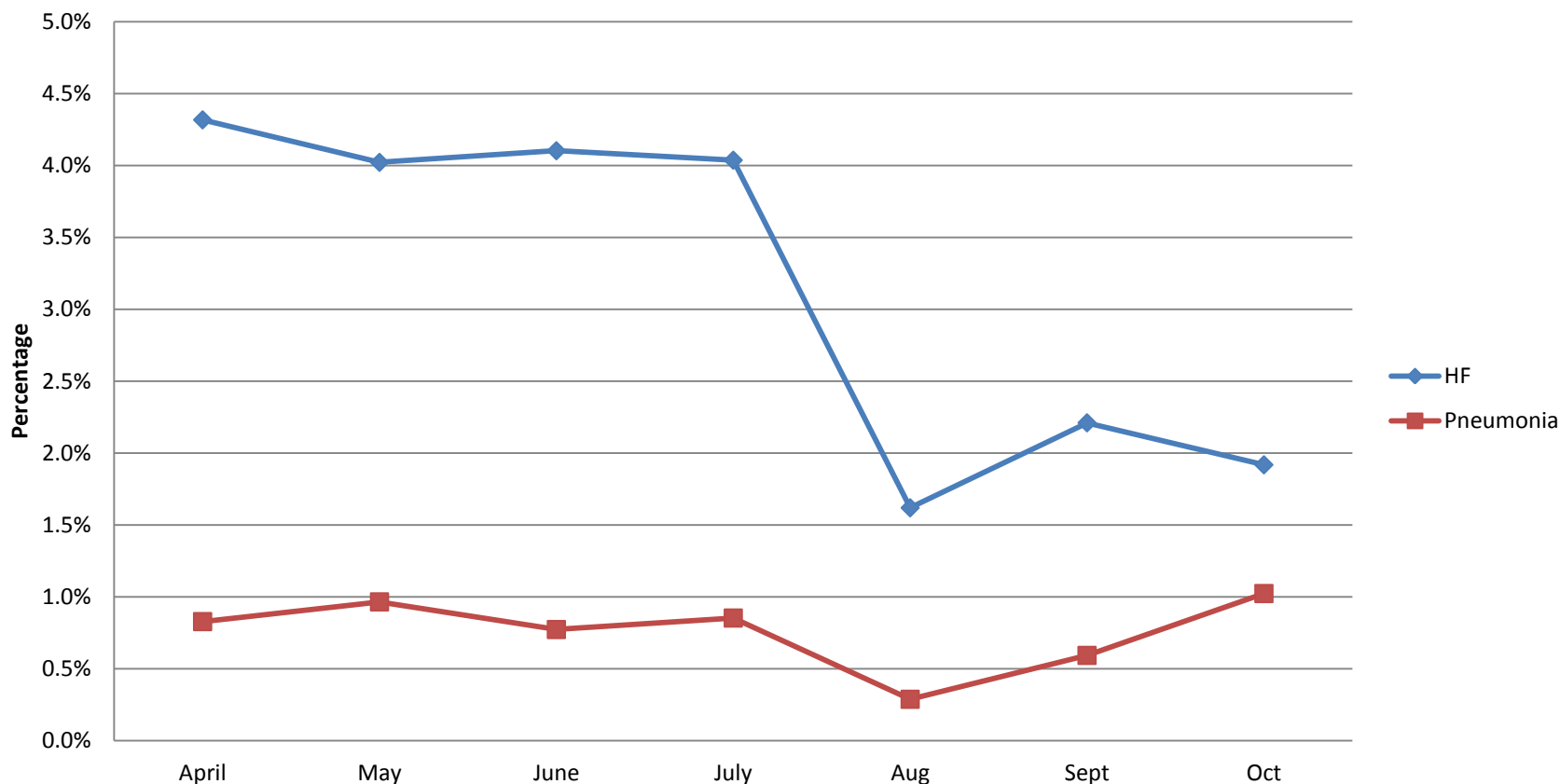
1 in 5 patients Malnourished using the Broader Definition of Malnutrition (N=4,900+, 2013, Ages: 65 and Above)

Malnutrition Trends by Month (across facilties)
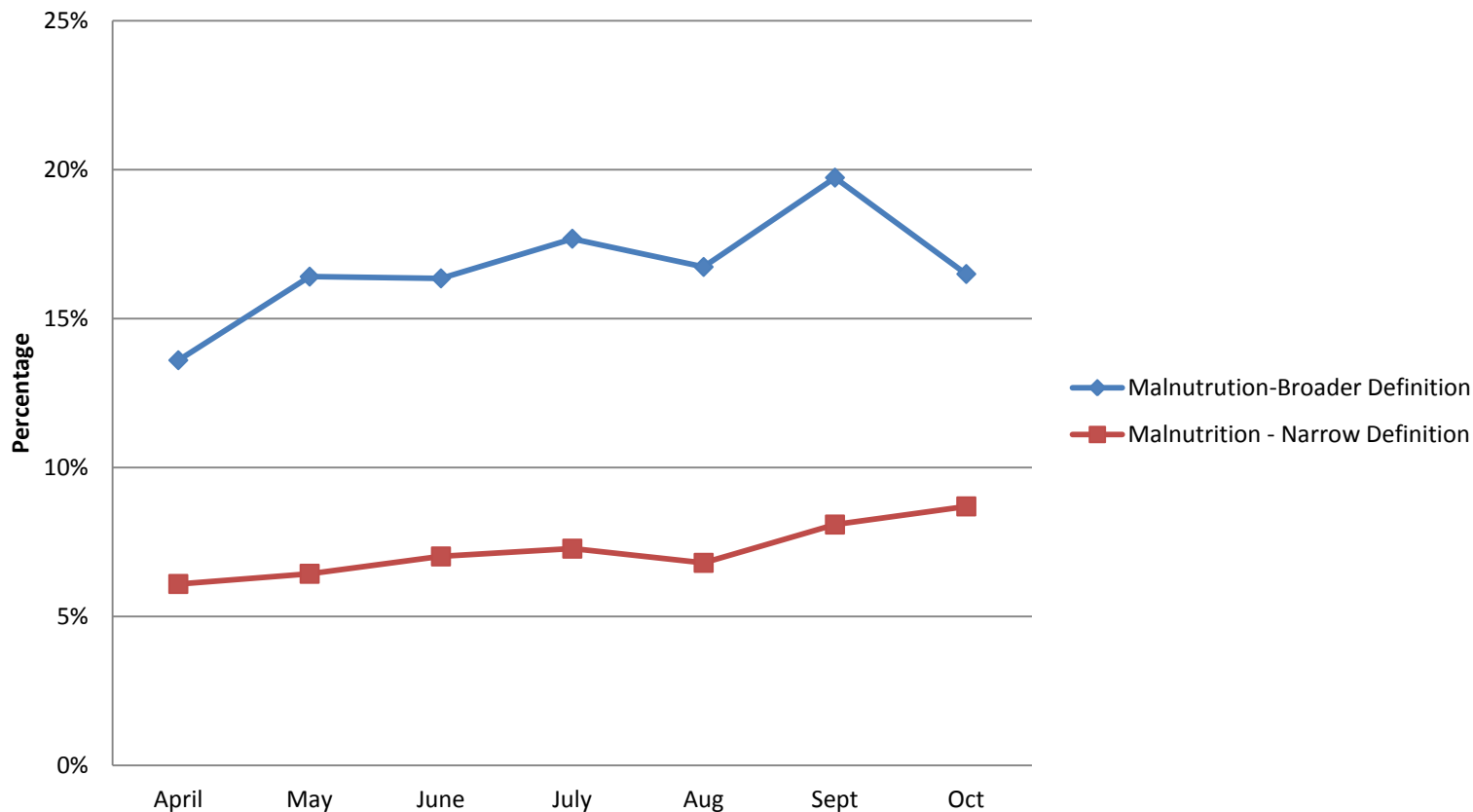
Higher percentage of Heart Failure Patients Malnourished when compared to Pneumonia Patients (Using the Narrow Definition of Malnutrition). Ages: 65 and Above.

Malnutrition Percentage by disease area

30-Day Readmission Risk Scores of Patients with Malnutrition Conditions (April-Oct 2013). Ages: 65 and Above.

Risk Scores - High-to-Low of Patients with Malnutrition Conditions

High Risk

Medium Risk

Low Risk

Risk Scores - High-to-Low
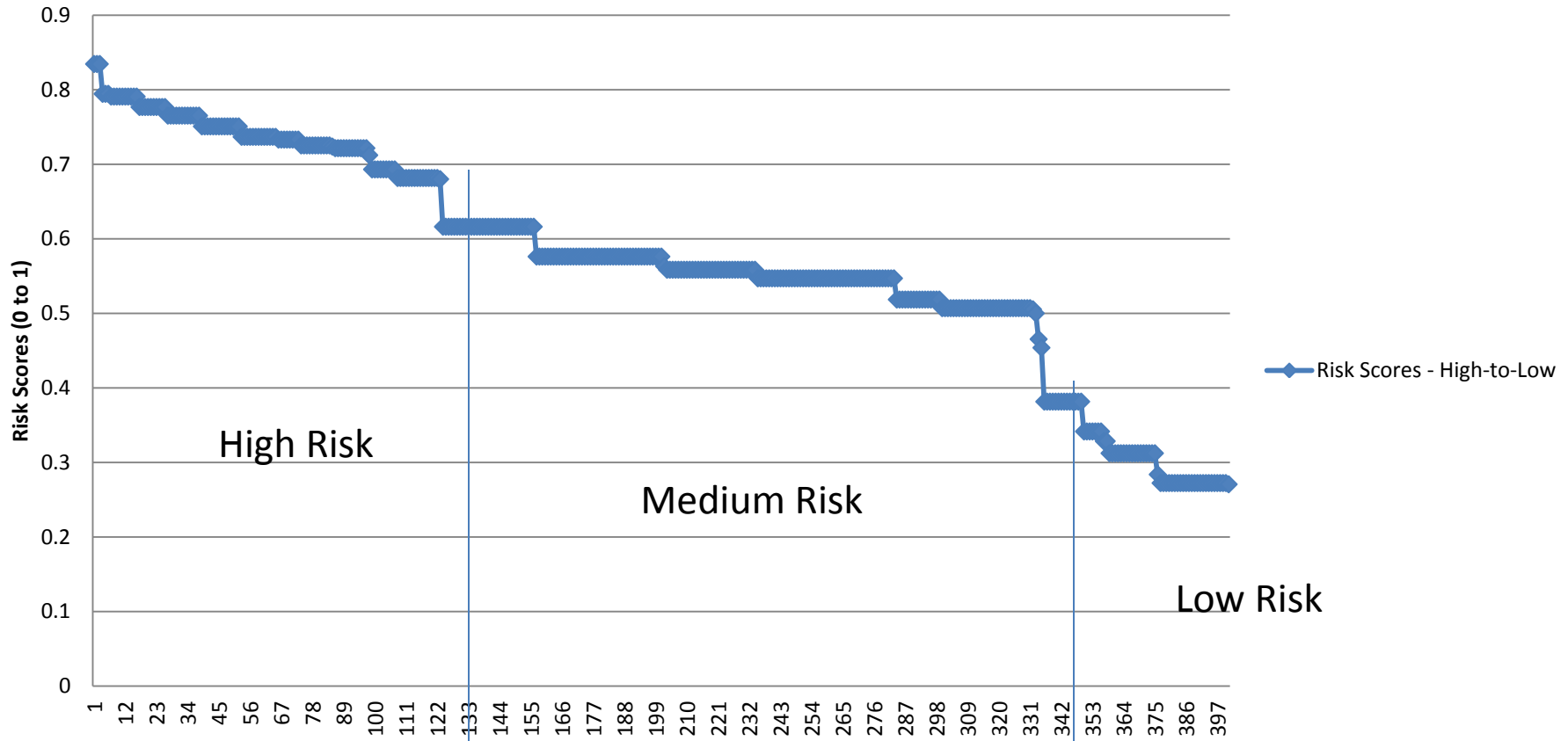
Patients Identified at Risk for Malnutrition

Assessment:
- Registered Dietitian (RD) assess patient using nutrition status classification (NSC) scoring and malnutrition criteria

Intervention:
- Mild, moderate or severe NSC risk score and/or meet malnutrition criteria
  - Receive appropriate interventions from the RD
  - Assessment of post-discharge nutritional concerns/needs
- Patients who do not meet the malnutrition criteria and are not at risk per the NSC score
  - Monitored by a diet technician who will communicate the patient's progress to the RD and hand-off to the RD if the status changes.
- Hand-off to outpatient physician and transitional care team

STUDY METHODOLOGY

Inclusion of Text Analytics Critical for Precise Risk Estimation and Identification

Disproportionate Value Embedded in Clinician Notes, Unstructured Text

Example: Identifying Risk Factors for CHF Readmission

HISTORY OF PRESENT ILLNESS: The patient is a 41-year-old African-American male previously well known to me. He presents with dyspnea, weakness, and confusion. He has a history of aortic valve disease, status post aortic valve replacement on 99/99/9999, for which he has been on chronic anticoagulation. There is a previous history of paroxysmal atrial fibrillation and congestive heart failure, which has been rather unstable prior to this admission. He has a previous history of transient ischemic attack with no residual neurologic deficits.

The patient has undergone surgery by Dr. X for attempted nephrolithotomy. The patient has experienced significant postoperative bleeding, for which it has been necessary to discontinue all anticoagulation. The patient is presently seen at the request of Dr. X for management of anticoagulation and his above heart disease.

FAMILY HISTORY: There are no family members with coronary artery disease. His mother has congestive heart failure.

SOCIAL HISTORY: The patient is widowed, living alone. He has "a friend" who helps with care "once in a while." He is employed as a barber. He does not use alcohol, tobacco, or illicit drugs.

MEDICATIONS PRIOR TO ADMISSION:
1. Clonidine 0.3 mg b.i.d.
2. Atenolol 50 mg daily.
3. Simvastatin 80 mg daily.
4. Furosemide 40 mg daily.
5. Metformin 1000 mg b.i.d.
6. Hydralazine 25 mg t.i.d.
7. Diovan 320 mg daily.
8. Lisinopril 40 mg daily.
9. Amlodipine 10 mg daily.
10. Lantus insulin 50 units q.p.m.
11. KCl 20 mEq daily.
12. NovoLog sliding scale insulin coverage.
13. Warfarin 7.5 mg daily.
14. Levothyroxine 0.2 mg daily.
15. Folic acid 1 mg daily.

ELECTROCARDIOGRAM: Normal sinus rhythm. Right bundle-branch block. Findings compatible with old anteroseptal and lateral wall myocardial infarction. Nonspecific ST-T abnormality.

HEART FAILURE is **UNSTABLE**. Risk factor for 30-day readmission.

Potential **COMPLICATIONS** (TIAs)

LITTLE OR NO SUPPORT: strong risk factor for noncompliance & 30-day readmission

LIVES ALONE: strong risk factor for noncompliance

SOCIOECNOMIC RISK: can't afford care, afford transportation to come to clinic visits, etc.

POLYPHARMACY, DOSAGE VARIATION / FREQUENCY, DRUG COST: risk factors for noncompliance, 30-day readmission, adverse events

> **Curating Clinician Notes to Drive Insights**
>
> *"Until now, most of the benefit of EMRs have come from clinical decision support – avoiding two drugs with serious drug-drug interactions. Yet, there is so much more that they could do....Much of the value resides in unstructured clinician notes rich in detail about signs and symptoms, patients response to treatment, and other details key to understanding the patient's condition."*
>
> *JAMA, 2012*

A Dynamic Identification Method Enabled by Digitized Data

"Automatic Chart Reviews" Facilitate Risk-Based Resource Allocation

Heterogeneous Data	Real-Time Insight	Match Resources to Risk

Heterogeneous Data

- **EMR** (Inpatient, Outpatient, Home Care)
- **Ancillary** systems, (Labs, Meds, Vitals, Radiology)
- **ADT** (Admission / Discharge / Transfer) systems
- **Billing** and revenue cycle data
- **Free text clinician notes** (progress notes, nursing notes, surveys, etc.)
- **Physician Office** and other Ambulatory Data
- **Non-traditional** survey, tele health, home care data
- *Consumer data*

Real-Time Insight

CURRENTLY SHOWING HIGH RISK OF INFECTION

LIKELY TO BE 30-DAY CHF READMISSION

LIKELY TO BE NONCOMPLIANT

IS DEVIATING FROM HER CLINICAL TRIAL PROTOCOL

WILL MISS HIS QUALITY MEASURE(S)

HAS INSUFFICIENT DOCUMENTATION

LIKELY TO HAVE AN ADVERSE EVENT

HAS DEVIATED FROM HIS CLINICAL PATHWAY

Match Resources to Risk

- ✓ Improve Efficiency
- ✓ Amplify Productivity
- ✓ Deploy patient-specific interventions
- ✓ Reduce redundancies
- ✓ Improve quality reporting
- ✓ Deliver targeted, impactful patient care
- ✓ Streamline technologies, create unified patient view
- ✓ Understand patient characteristics and needs at individual and aggregate levels

All cause readmission with a HF as a previous index admission

Identification
- 65 years of age
- **ROC: 0.89 (Adv) and 0.83(Logit)**
- Over 50+ variables (meds, land, status, demographics, illness stage, etc.)
- 8000+ records for test
- Precision=0.89
- Recall = 0.87
- TP rate= 0.87

Highly Dominant

LoS (total stay) > 7 and < 3

Prior ER Visit and hospitalization

Complex collection of Meds > 10

Comorbid conditions (e.g. CoPd)

Elevated Sodium > 150, Potassium, hematocrit and others

BNP > 1000

Meds: ACEI, ARBs & Diuretics

Comorbid conditions > 2

Mental: Depression, Mood disorder and Dementia

Poor nutrition and diet (including Obesity)

Social: Homeless, Financial, co-pay

HF 30-day Prediction with **Clinical and Psychosocial risk factors**
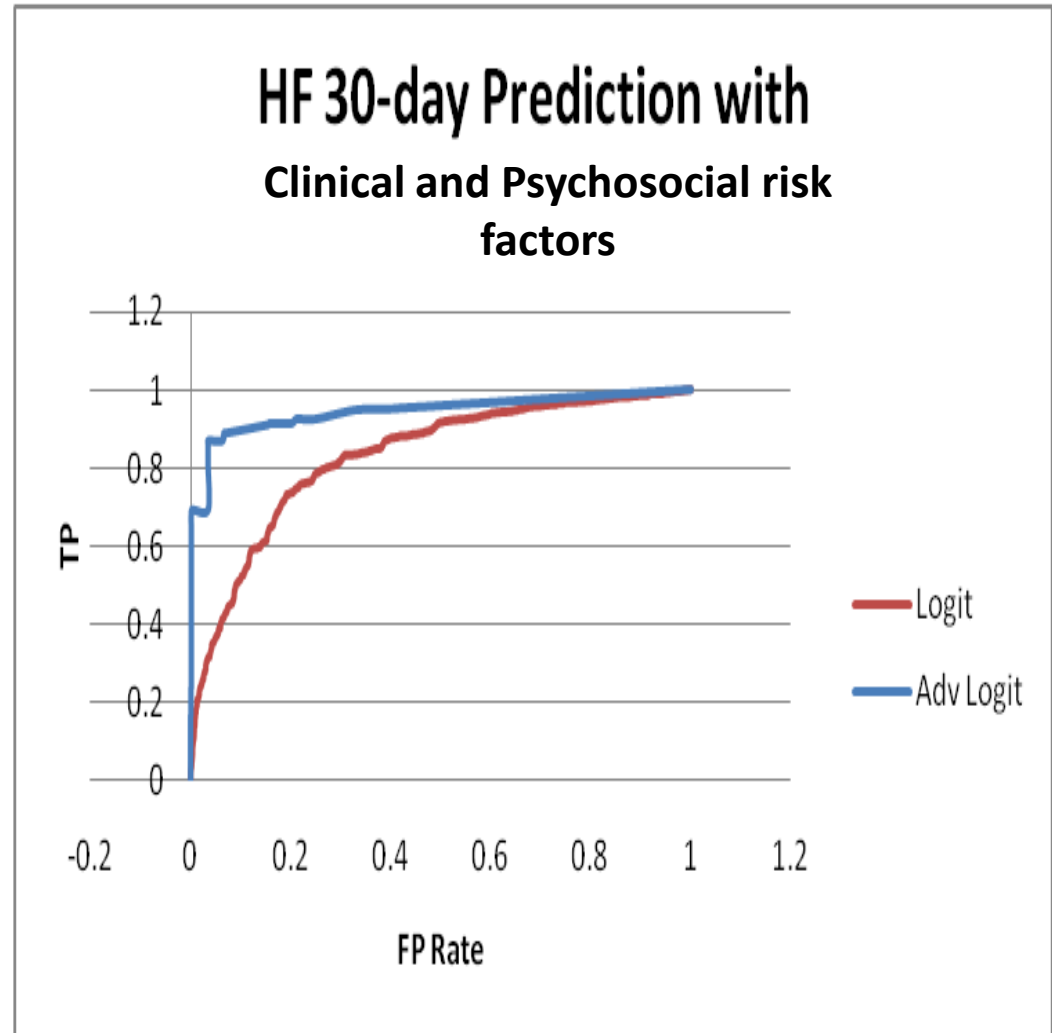
Summary

- Psychosocial and mental health risk factors are playing a dominant role in 30-Day readmissions. Nearly 40% of the contribution to 30-Day readmissions.

- Elderly care support for sub-populations to be based on a combination of limited guided care to patients with either Telephonic or TeleHealth based support.

- Interventions to not only target illness level and medications, but also to target post-discharge support at home based on the dominant risk factors identified by the automated risk tools

- 360Fresh's tools automated the patient chart review in real-time (on a minute by minute basis) and predicted 30-Day readmissions and mortality outcomes based on incoming clinical and progress notes.
  - The tools leveraged advanced text analytics and predictive methods to reduce the chart review time for clinical staff
  - Streamlined patient reviews and care coordination workflows