

# **Health Services & High Risk Admissions Registries**

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DHA | CEI Branch Chief

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# Introduction

- Background Information
- Variables of Interest (potential markers)
- ACG Use case – Readmissions
- Examples of ACG Use for Case Management by Other Health Plans

# Strategic Goal to Operational Target

- 1. Good Data**
- 2. Segmentation**
- 3. Differentiation**
- 4. Prediction**
- 5. Automation**





## Strategic Measure(s)

- On-Time Departure
- Right Person on Right Plane

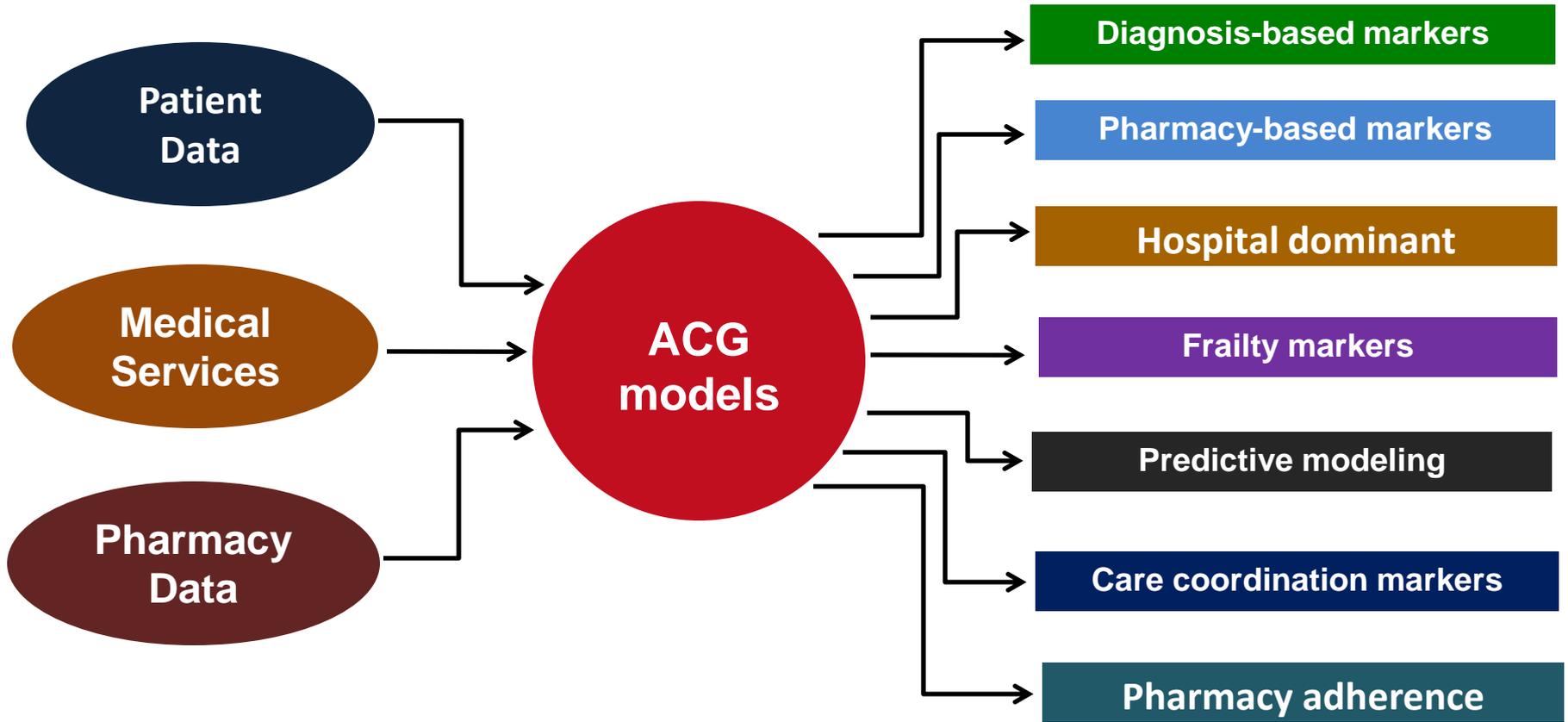


**Operational Target**

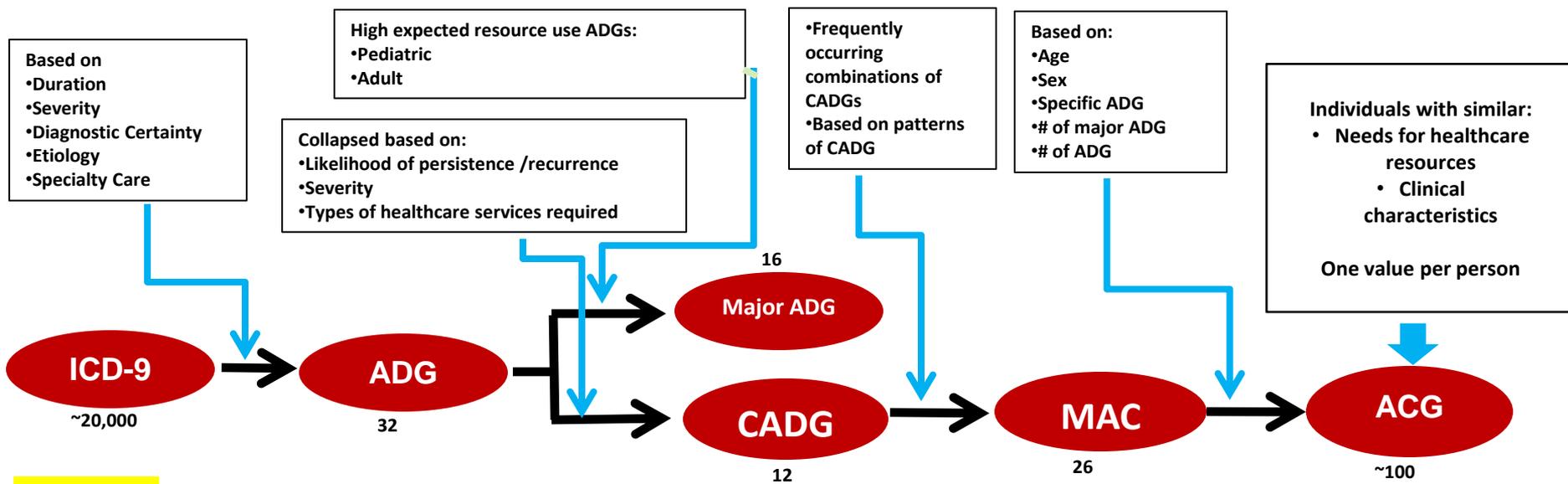
# Background

- Research hypothesis: *clustering of morbidity is a better predictor of health services resource use than the presence of specific disease*
- Conceptual Basis: *Assessing the appropriateness of care needs to be based on patterns of morbidity rather than on specific diagnoses*
  - Developed by the Johns Hopkins School of Public Health
  - A ‘person-focused’ comprehensive family of measurement tools (100 + measure outputs)
  - Adopted by 200+ healthcare organizations world-wide
  - Case-mix adjust more than 20 million covered lives
  - Most widely used & tested population-based risk-adjustment system

# Components



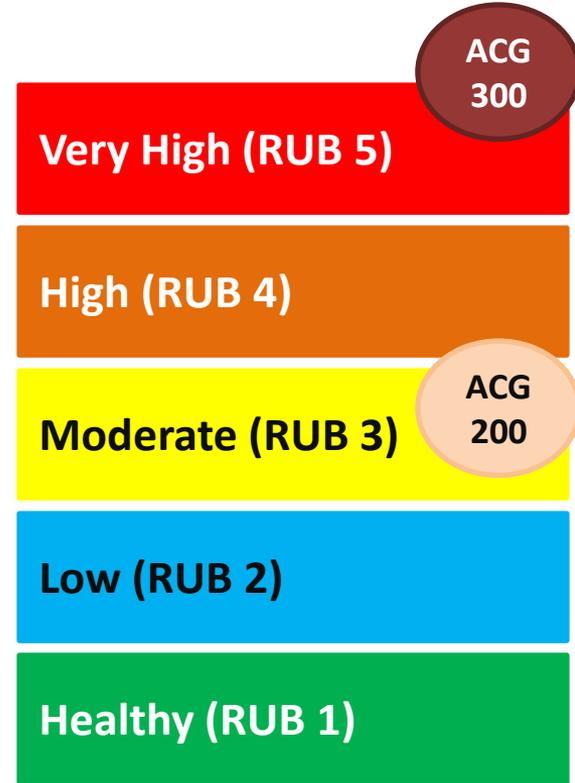
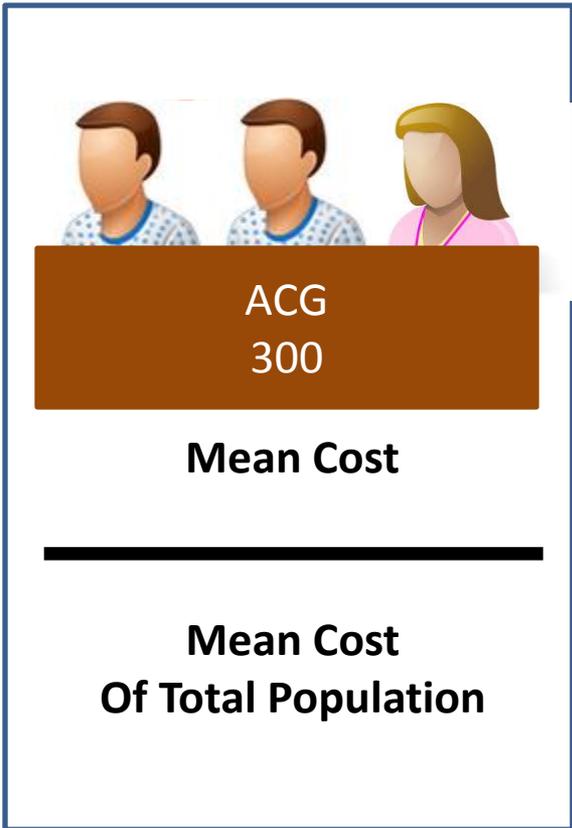
# Diagnosis-based markers: Morbidity view



**Examples:**

ADG	ICD-9	Major ADG (Adult)	ACG
Time limited: major	Appendicitis	Time limited: major	Acute minor / likely to recur, age 6+, w/o allergy
Likely to recur: discrete	Gout, Backache	Likely to recur: progressive	Pregnancy, 2-3 ADGs, no major ADGs
Likely to recur: progressive	DKA	Chronic medical: unstable	4-5 other ADG combinations, age 45+, 2+ major ADGs
Chronic medical: stable	DM, HTN	Chronic specialty: stable - ENT	6-9 other ADG combinations, male, age , no major ADGs
Chronic medical: unstable	HTN renal disease	Psychosocial: persistent/recurrent,	Infants: 0-5 ADGs, no major ADGs, low birth weight
Injuries/adverse effects: major	Intracranial injury	Malignancy	Chronic specialty: stable

# IBI versus RUB



Determines Cost  
Of Care in Past Year

Predict Future  
Resource Use in  
Next Year

# Diagnosis-based markers:

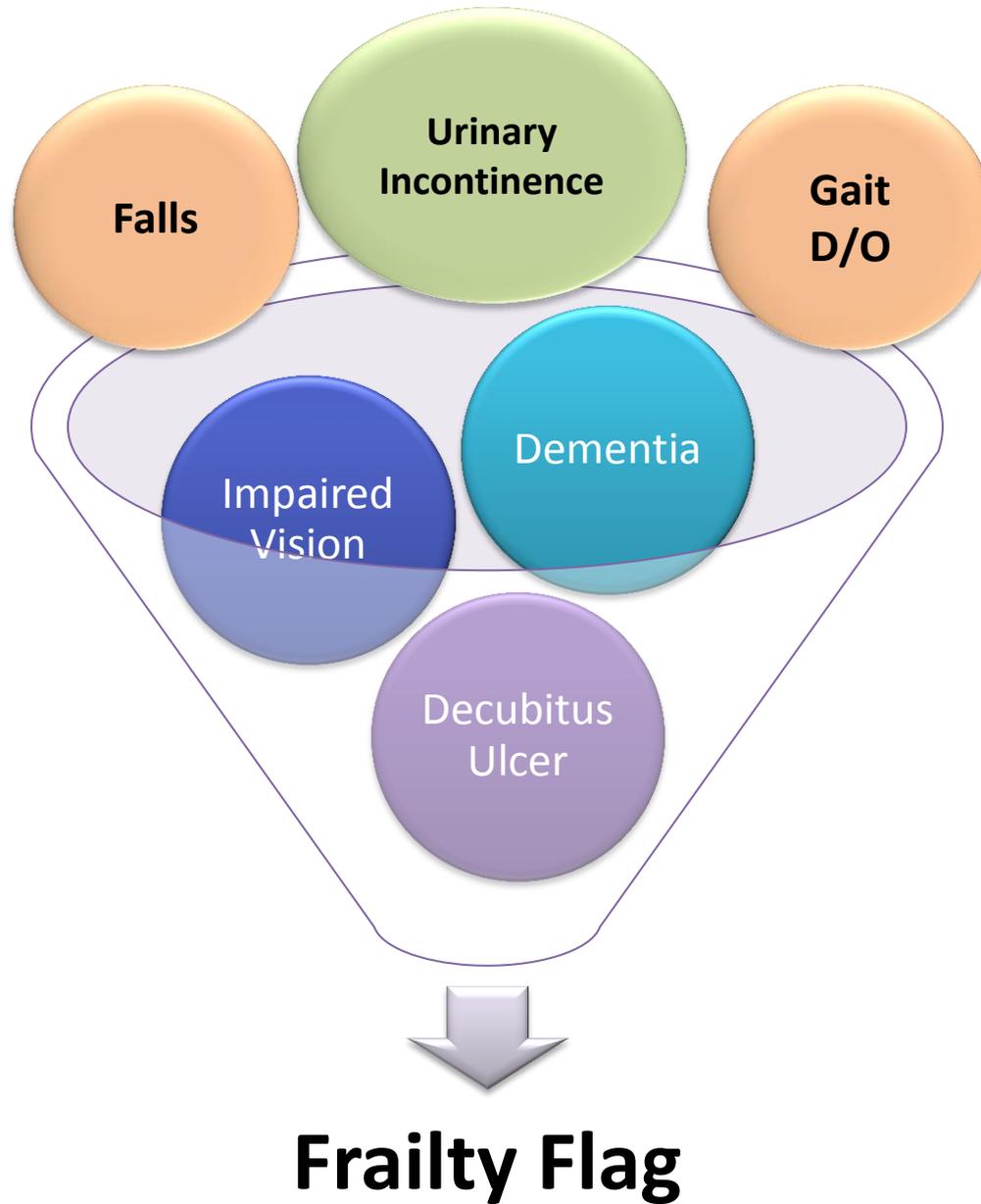
## ACG - Concurrent weight - RUB

ACG	Reference Concurrent Weight		RUB
	Commercial (0-64)	Medicare (≥65)	
Acute Minor, Age 6+	0.16	0.10	1
Chronic medical: stable	0.35	0.15	2
2-3 Other ADG combinations, age 1-17	0.50	0.15	2
Acute major/Likely to recur	0.53	0.24	3
Pregnancy, 2-3 ADGs, 1+ major ADG	2.64	0.79	4
10+ Other ADG combinations, age 18+, 0-1 major ADG	3.32	1.06	4
6-9 Other ADG combinations, age 35+, 3 major ADGs	6.89	1.87	5

# VARIABLES OF INTEREST – USE CASES

- *Frailty Flag*
- *Pharmacy / Total Cost*
- *Hospital Dominant Condition*
- *Coordination of Care*

**Most data in examples are MHS FY 2012**



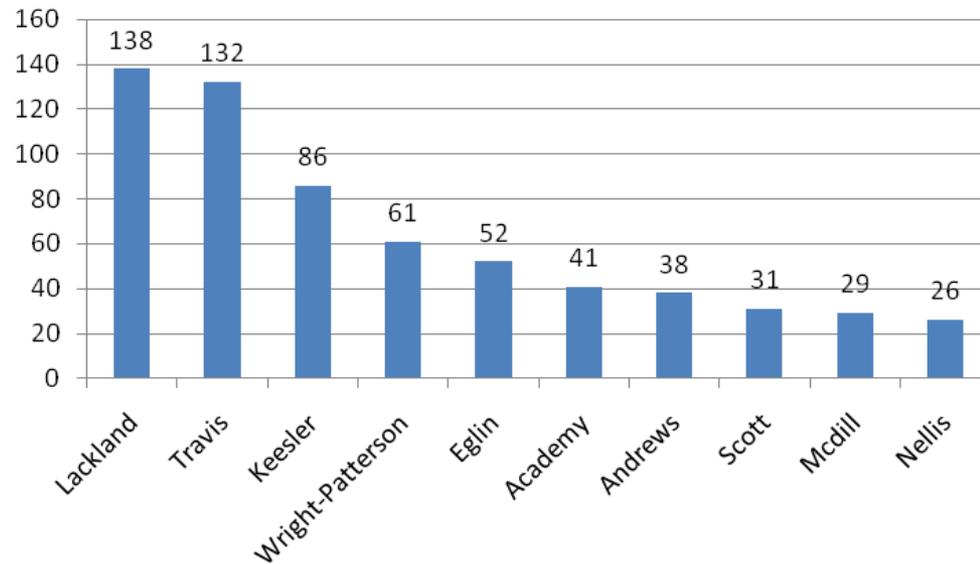
# Frailty Flag

<b>Outcome</b>	<b>Not Frail n=3,104,864</b>	<b>Frail n=121,801</b>
Outpt Visits	8.8	26.4
Inpt Stays	0.03	0.30
ER visits	0.4	1.14
Pharmacy Cost	518	1,790
Total Cost	3,472	18,055

# Frail & Risk of Injury Related Hospitalization

Identify Frail patients with Risk of Injury-related Hospitalization

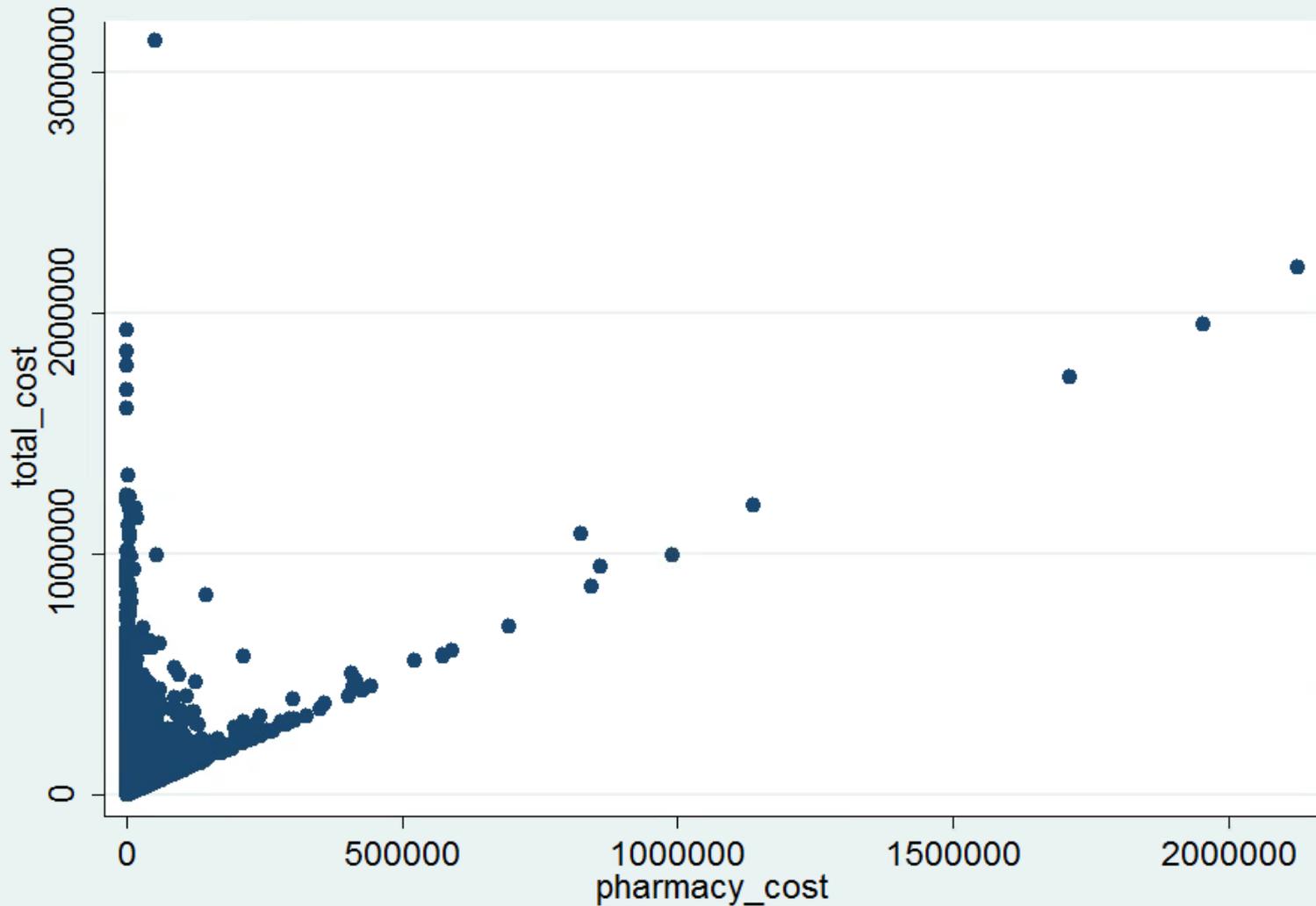
Number of Frail Patients  
with more than 20% risk of injury-related  
hospitalization



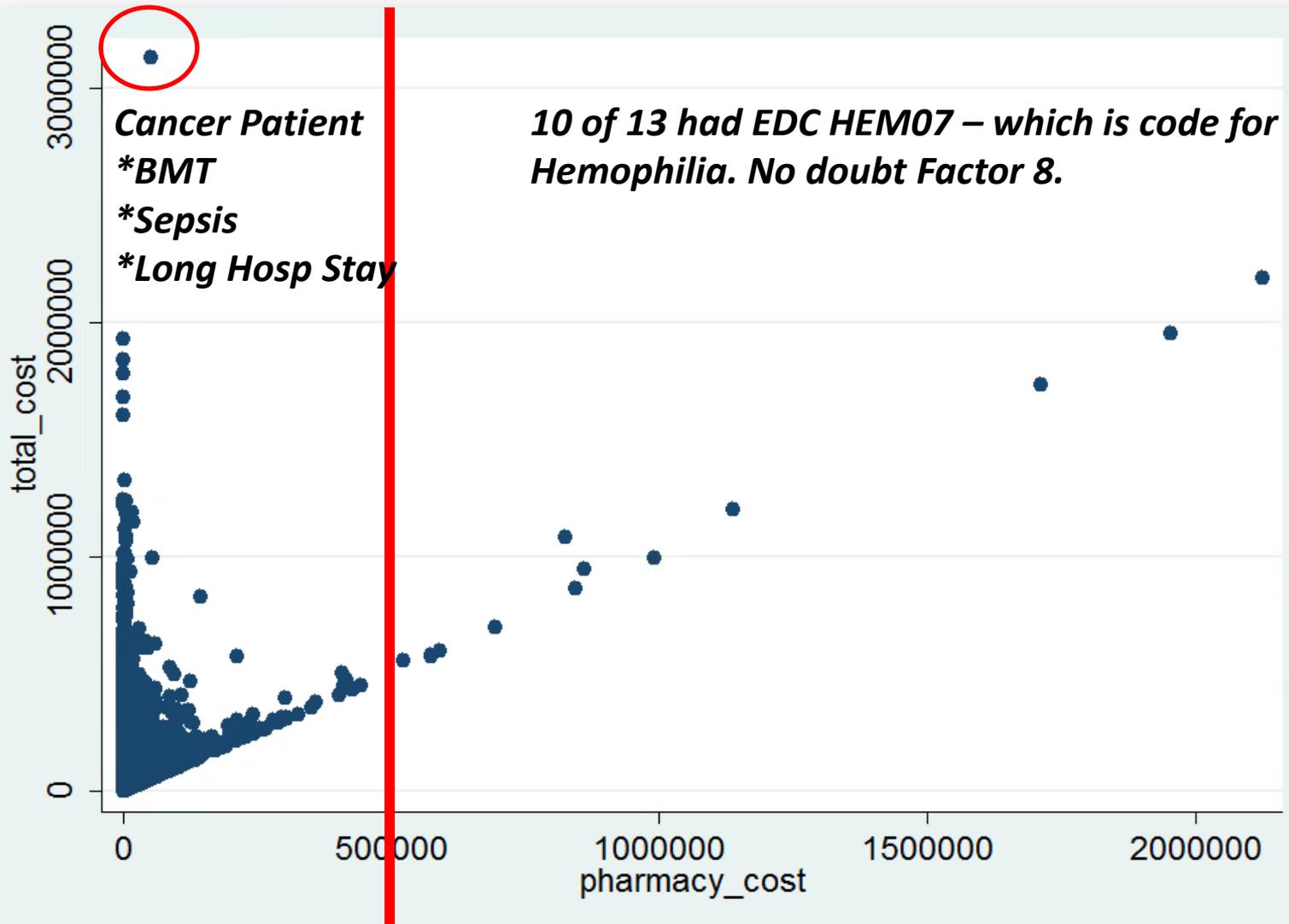
## Sample Patient Profile

Sex	F
Age	87
# Chronic Condition	9
# Hosp Dominant Condition	3
# ER visits	2
# IP admissions	2
# OP visits	65

# Pharmacy Cost & Total Cost Outliers



# Pharmacy Cost & Total Cost Outliers



# Hospital Dominant Condition (sample)

GI

- Hepatic Coma
- Malnutrition

Infectious

- Streptococcal Septicemia
- Pseudomonal Pneumonia

Hem/Onc

- Malignant Neoplasm, Lung
- Hypersplenism

Pulmonary

- COPD w/ acute exacerbation
- Acute Respiratory Failure

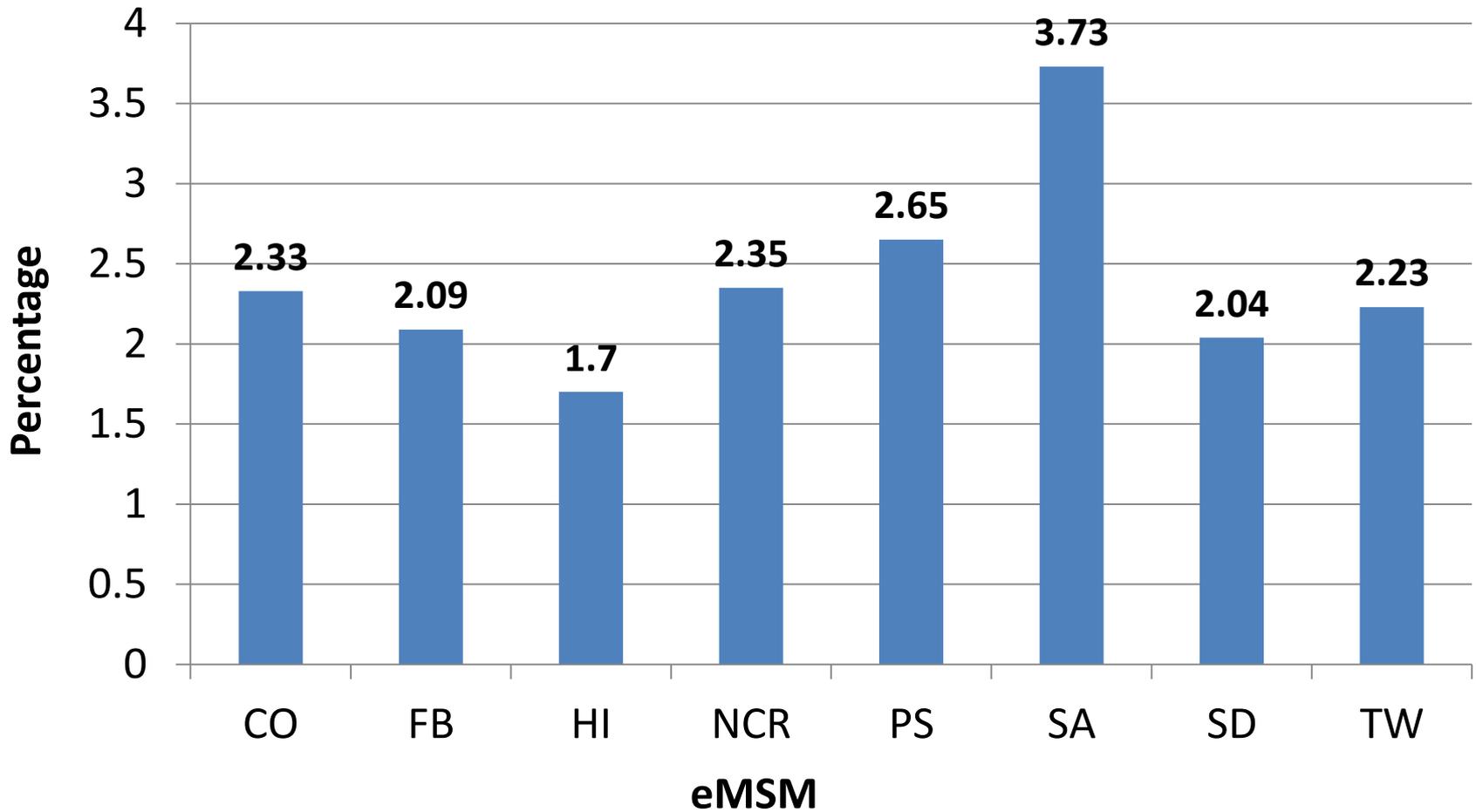
Cardiac

- Acute Cor Pulmonale

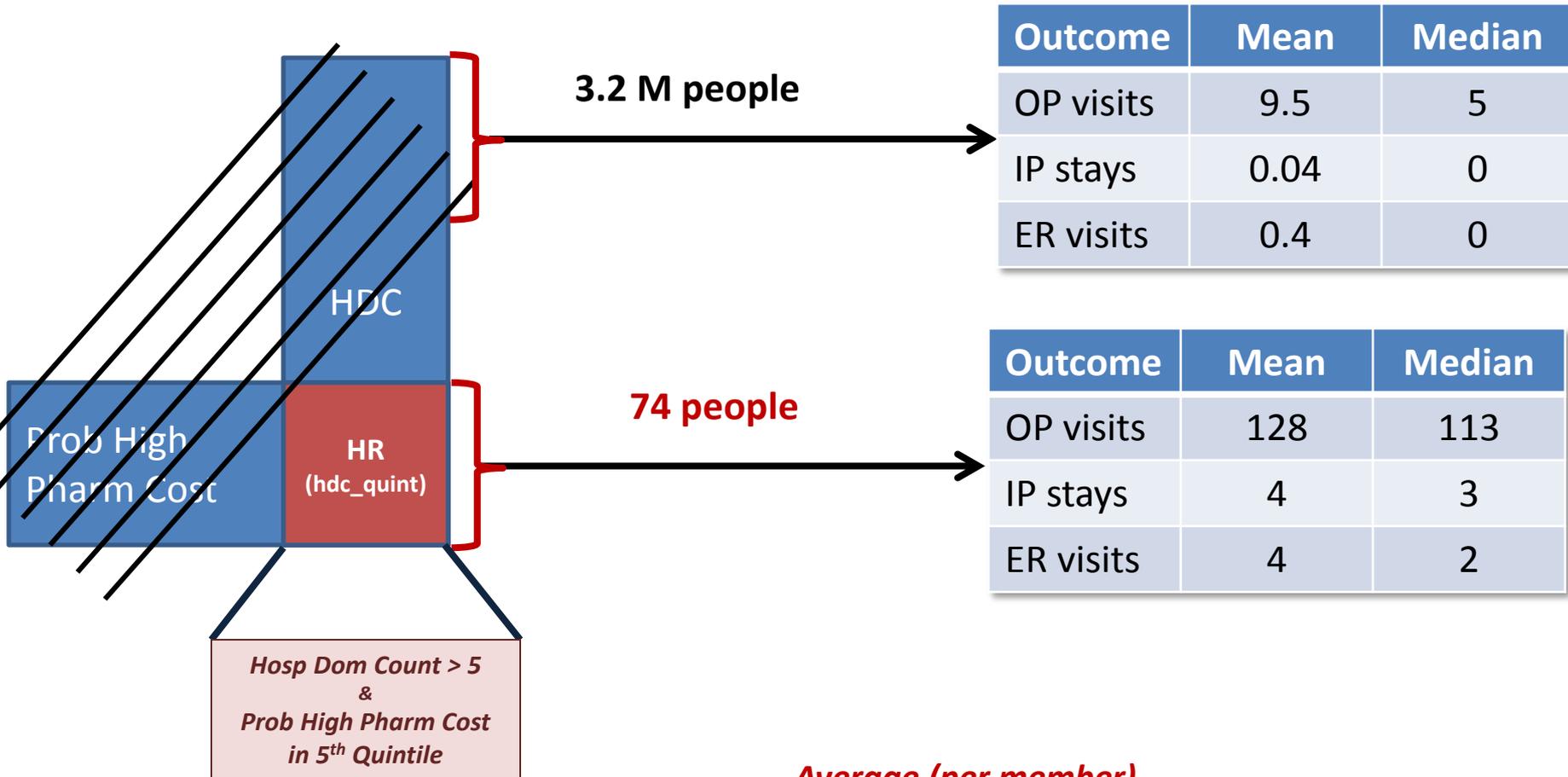
Psychological

- Bipolar Disorder
- Alcohol Withdrawal

# Hospital Dominant Condition Positive



<b>Total Population</b>	<b>112k</b>	<b>112k</b>	<b>115k</b>	<b>241k</b>	<b>153k</b>	<b>125k</b>	<b>177k</b>	<b>149k</b>
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*Average (per member)*

hdc(x)_quint	N	OP visits	IP stays	ER visits	Phrm Cost	Total Cost
2	4,539	69	1.8	2.1	12,332	94,461
3	1,544	87	2.4	2.4	12,787	133,601
4	562	100	2.9	2.8	11,626	172,155

### 3.2 M people

Outcome	Mean	Median
OP visits	9.5	5
IP stays	0.04	0
ER visits	0.4	0

### 74 people

Outcome	Mean	Median
OP visits	128	113
IP stays	4	3
ER visits	4	2

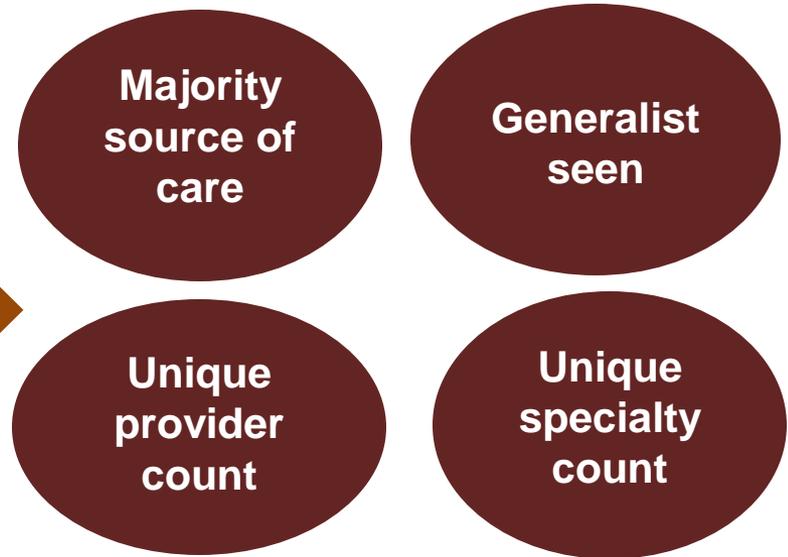
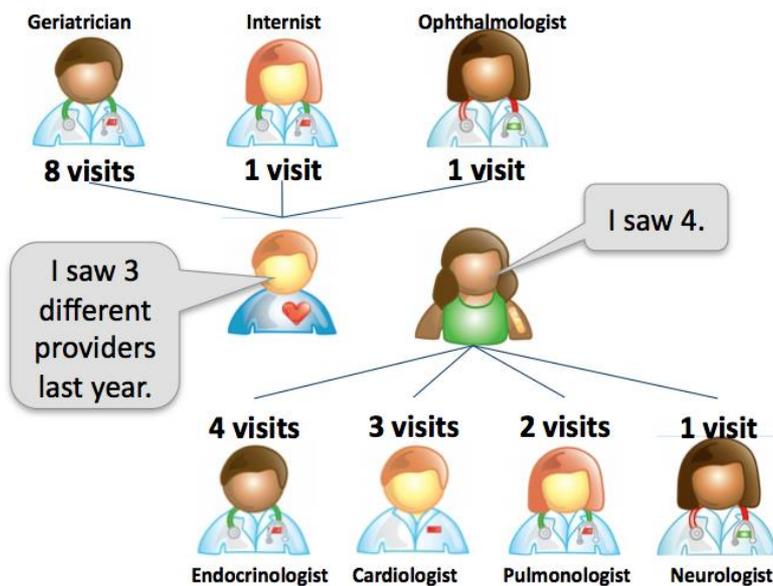
#### *Average (per member)*

Unique Provider Count	3
Specialty Provider Count	1.4
Chronic Condition	1.5
Pharmacy Cost	\$566
Total Cost	\$4,017

#### *Average (per member)*

Unique Provider Count	11
Specialty Provider Count	5
Chronic Condition	4.7
Pharmacy Cost	\$10,025
Total Cost	\$27,211

# Coordination of care markers

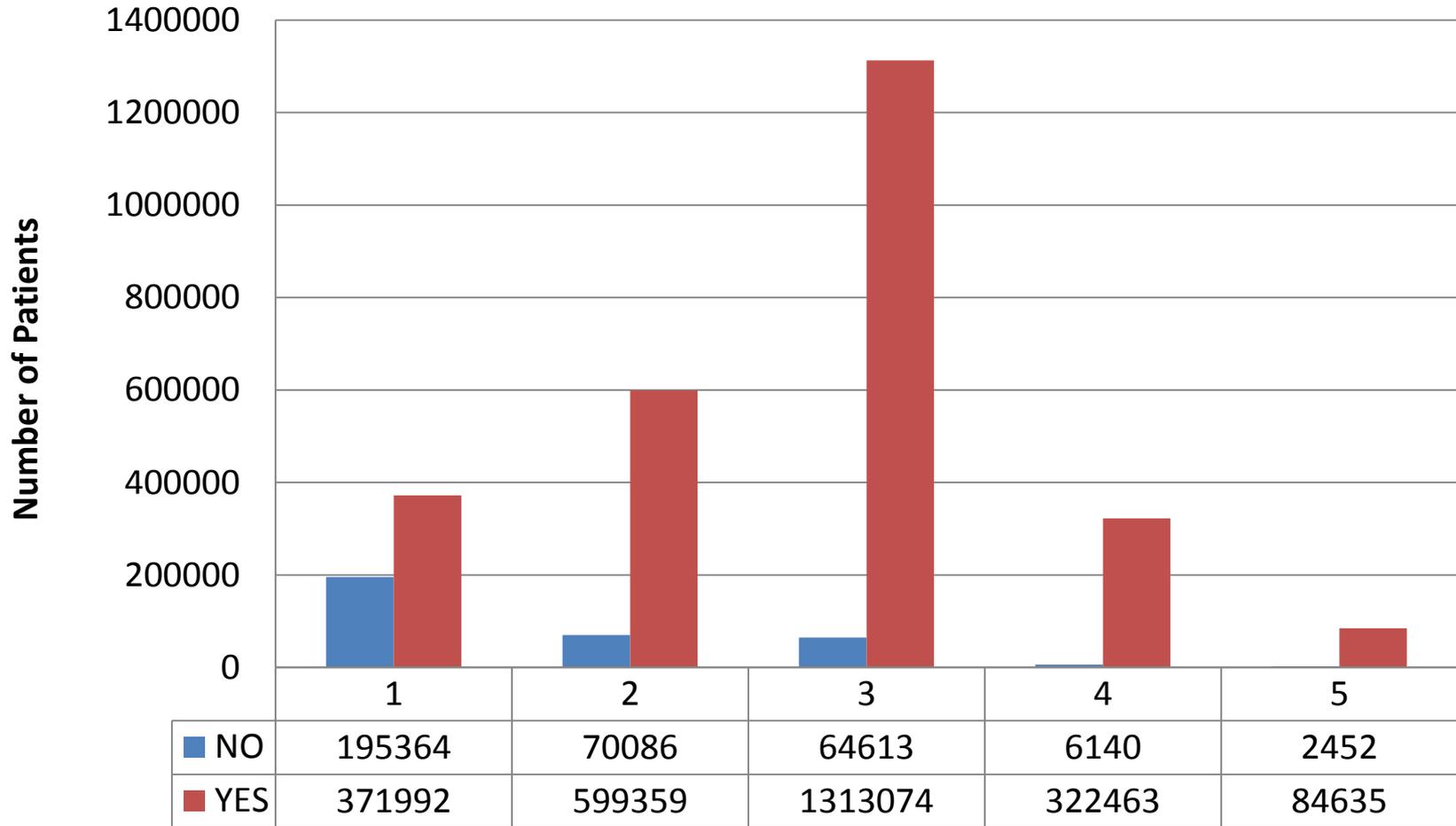


## Example:

Rx-MG	Number of visits
Endocrinologist	4
Cardiologist	3
Pulmonologist	2
Neurologist	1

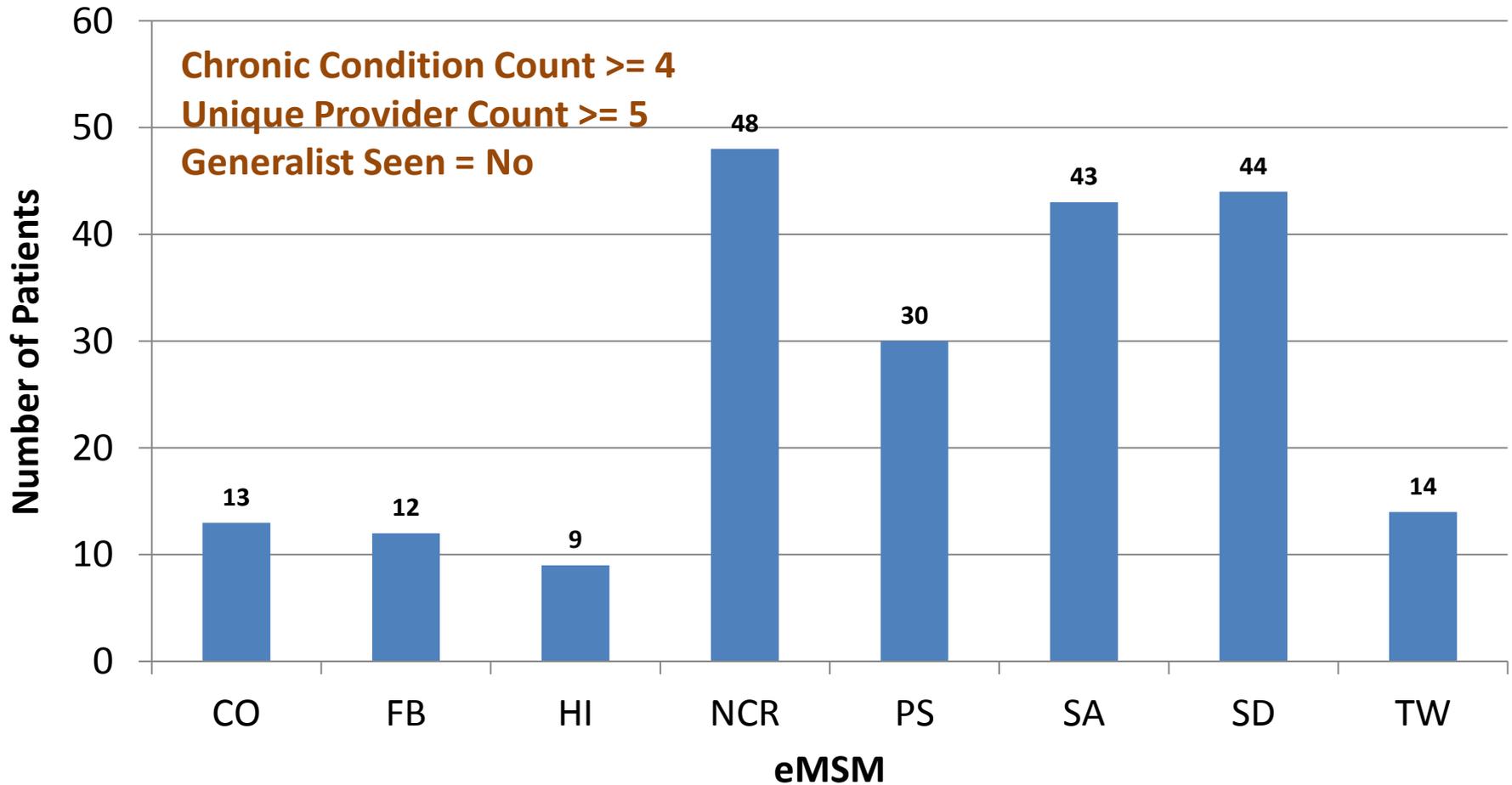
Marker	Value
Majority source of care	40%
Generalist seen	No
Unique provider count	4
Unique specialty count	4

# Generalist Seen



Resource Utilization Band

# High Risk for Coordination of Care Issues



Total Population	112k	112k	115k	241k	153k	125k	177k	149k
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# **ACG USE CASE IN PRACTICE: READMISSIONS**

# Using ACG in Readmissions Risk

	Past	Present	Future
<i>Information</i>	Reports & Description <i>Outcome</i>	Alerting <i>Trigger</i>	Extrapolation (Trends) <i>Outcome</i>
<i>Insight</i>	Models & Explanation <i>Profile</i>	Recommendations <i>Target</i>	Prediction <i>Profile</i>

60+ yo  
 RUB  $\geq$  3  
 3+ Chronic Conditions



**F/U**

**RR**

**Profile**

**Trigger  
Event**

**Target  
Event**

**Outcome**

# Readmissions

## FY2010 Regression Results

### Descriptive Analytics: Explanatory Model

Covariate	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<b>Branch of service</b>		
Army	Referent	Referent
Air Force	1.19 (0.86-1.65)	1.08 (0.90-1.29)
Navy	1.04 (0.77-1.41)	1.07 (0.91-1.27)
<b>Peer Group</b>		
Medium	Referent	Referent
Large	1.56 (1.22-1.98)	1.26 (1.08-1.47)
Small	0.73 (0.55-0.95)	0.89 (0.72-1.11)
<b>Gender</b>		
Female	Referent	Referent
Male	0.97 (0.93-1.02)	0.98 (0.92-1.03)
<b>Age group</b>		
20-29	Referent	Referent
1-19	0.81 (0.73-0.89)	0.84 (0.75-0.95)
40-59	1.13 (1.05-1.20)	1.05 (0.97-1.14)
60-79	2.03 (1.90-2.17)	1.34 (1.22-1.47)
>=80	2.93 (2.70-3.18)	1.44 (1.29-1.61)
<b>Race group</b>		
Caucasian	Referent	Referent
Black	0.86 (0.80-0.92)	0.89 (0.82-0.96)
Other	0.80 (0.76-0.85)	0.98 (0.92-1.06)
<b>DRG group</b>		
Surgical	Referent	Referent
Medical	1.69 (1.61-1.79)	1.97 (1.82-2.14)

Covariate	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<b>MS DRG weight</b>		
0-0.84	Referent	Referent
>=0.84	1.05 (1.01-1.11)	1.30 (1.21-1.39)
<b>Gagne score</b>		
-1-0	Referent	Referent
1-2	1.68 (1.59-1.79)	1.34 (1.25-1.43)
3-4	3.03 (2.80-3.28)	1.68 (1.52-1.86)
>=5	5.23 (4.87-5.61)	2.37 (2.15-2.62)
<b># of Chronic condition</b>		
0	Referent	Referent
1	1.07 (0.98-1.18)	1.09 (0.98-1.20)
2	1.29 (1.16-1.42)	1.20 (1.08-1.34)
>=3	2.56 (2.39-2.73)	1.66 (1.52-1.82)
<b>Admission within 6mn</b>		
No	Referent	Referent
Yes	2.76 (2.62-2.90)	1.74 (1.63-1.86)
<b>30-Day follow-up visit</b>		
Yes		Referent
No	3.20 (3.05-3.36)	4.48 (4.23-4.74)
<b>Length of stay</b>		
1-3	Referent	Referent
4-7	1.75 (1.65-1.86)	1.54 (1.44-1.65)
>=8	2.38 (2.20-2.58)	1.92 (1.74-2.12)
<b>ICU stay</b>		
No	Referent	Referent

# Readmissions

*FY2009 to 2010 Results*

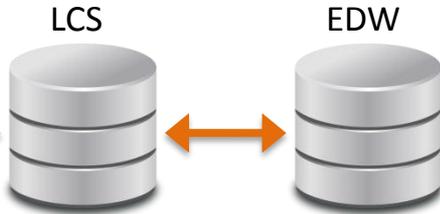
**Predictive Analytics**

Number of Predictive Factors	% Readmissions	% Patients	Cumulative % Patients
0	4.5	7.6	7.6
1	4.9	29	36.6
2	6.9	29.6	66.2
3	9.7	17.2	83.4
4	13.8	13.6	97
5	25.6	3	100

***4 factors will account for 40% of the readmissions but only 16% of the admissions cohort***

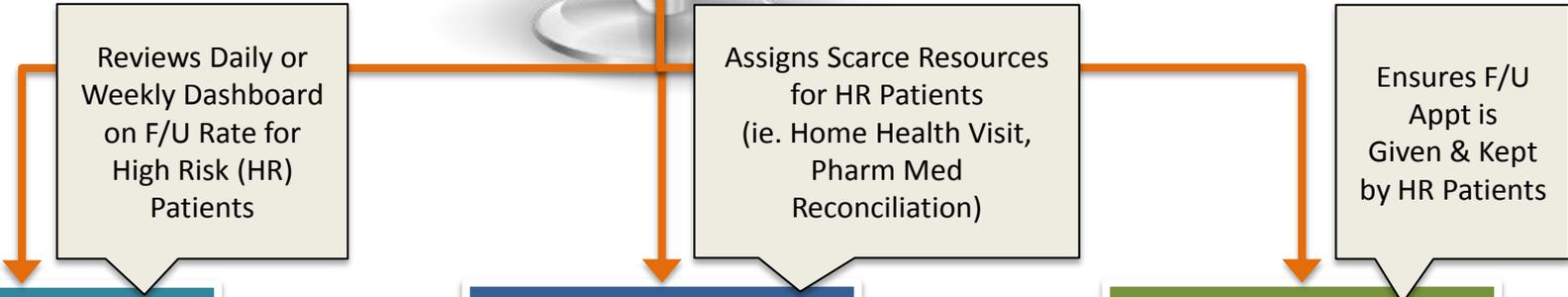


**PATIENT ADMITTED**



High risk criteria:

- Age  $\geq$  60
- Gagne  $\geq$  5
- RUB  $\geq$  3
- Chronic Condition Count  $\geq$  3



**LEADERSHIP DASHBOARD**

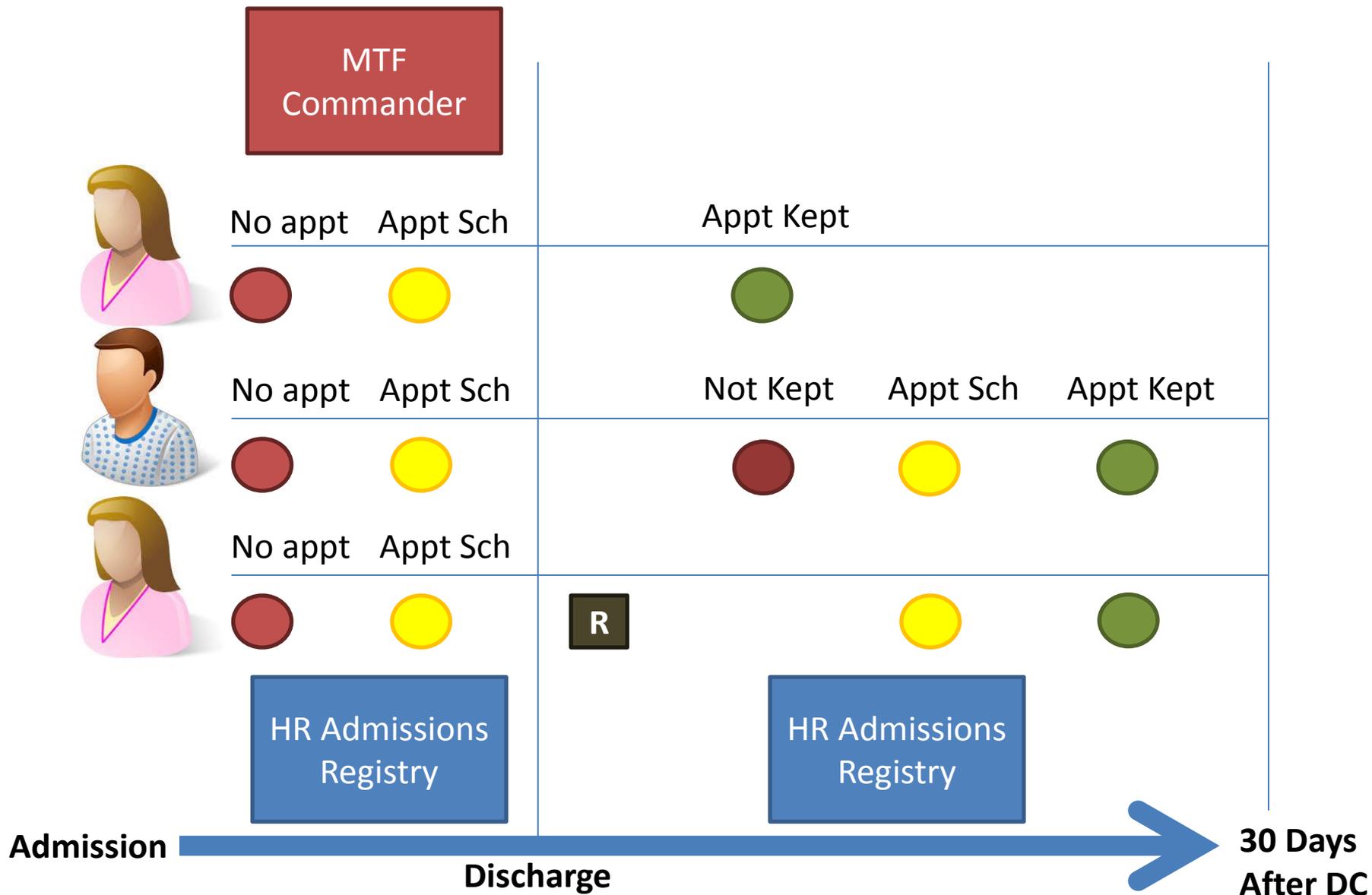


**CASE MGMT READMISSIONS REGISTRY**



**PCMH READMISSIONS REGISTRY**

# Readmissions



SAS Web Report Studio • READMISSIONS

MEDICAL ADMISSIONS / READMISSIONS BY TREATMENT FACILITY

Leadership Dashboard  
HR Admissions Updated Nightly

NAVY

NMC SAN DIEGO ( 0029 )

ADMISSIONS / RISK OF READMISSION

Applied filters: (NOT ( FACILITY is missing value OR FACILITY equal to . )) AND M/S FLAG RISK equal to M

RISK CATEGORY	TOTAL COUNT
HIGH	5
MODERATE	1

ADMISSIONS / RISK OF READMISSION - data updated nightly

Applied filters: (NOT ( FACILITY is missing value OR FACILITY equal to . )) AND M/S FLAG RISK equal to M AND NOT ( RISK is missing value OR RISK equal to . )

RISK	GENDER	AGE	ADM DX	ADM DX CCS	ADM PROV NAME	ADMIT PROV SPEC CODE	ADMIT PROV NPI	ATTENDING PROV NAME
	M	79	576.3	OTHER BILIARY TRACT DISEASE	DUTTON,WILLIAM D	108	1720103187	DUTTON,WILLIAM D
	M	71	486	PNEUMONIA (EXCEPT THAT CAUSED BY TB OR STD)	DOAN,ANDREW P	120	1033272372	DOAN,ANDREW P
	F	82	959.9	OTHER INJURIES AND CONDITIONS DUE TO EXTERNAL CAUSES	KIM,CHRISTINE YOUNG	011	1770787558	KIM,CHRISTINE YOUNG
	F	60	285.8	DEFICIENCY AND OTHER ANEMIA	CHOPRA,SHAGUN	024	1356312219	CHOPRA,SHAGUN
	M	78	443.89	OTHER CIRCULATORY DISEASE	CASEY,KEVIN MICHAEL	100	1487844304	CASEY,KEVIN MICHAEL
	F	61	239.5		SHANK,JESSICA J	152	1982767810	SHANK,JESSICA J

READMISSION RATES - data updated monthly



OTHER LIVER DISEASES  
 OTHER NERVOUS SYSTEM SYMPTOMS AND  
 DISORDERS  
 RESIDUAL CODES; UNCLASSIFIED; ALL E  
 CODES [259. AND 260.]  
 SCHIZOPHRENIA AND OTHER  
 PSYCHOTIC DISORDERS  
 SUBSTANCE-RELATED  
 DISORDERS

**AMI RR was 31% (7/22)**  
**About ½ of total patients kept their F/U appt**  
**About ¼ of readmitted patients kept F/U appt**

25.00%  
 25.93%  
 21.74%  
 22.73%  
 22.50%  
 23.08%

**FOLLOW UP TOP 10 DX CONDITIONS – data updated monthly**

Applied filters: (NOT ( FACILITY is missing value OR FACILITY equal to . )) AND M/S FLAG FOLLOW UP equal to M AND RANK F/U equal to TOP 10

DX CONDITION	TOTAL ADMISS	SCHED F/U	SCHED F/U %	KEPT F/U	KEPT F/U %	=====	TOTAL READM	READM SCHED F/U	READM SCHEDULED F/U %	READM KEPT F/U	READM KEPT F/U %
ACUTE BRONCHITIS	20	21	85.71%	10	75.00%		5	1	80.00%	0	75.00%
<b>ACUTE MYOCARDIAL INFARCTION</b>	<b>22</b>	<b>16</b>	<b>72.73%</b>	<b>12</b>	<b>75.00%</b>		<b>7</b>	<b>3</b>	<b>42.86%</b>	<b>2</b>	<b>66.67%</b>
ACUTE PANCREATITIS	37	30	81.08%	21	70.00%		8	4	50.00%	4	100.0%
CONGESTIVE HEART FAILURE; NONHYPERTENSIVE	92	72	78.26%	56	77.78%		30	19	63.33%	13	68.42%
CORONARY ATHEROSCLEROSIS AND OTHER HEART DISEASE	47	32	68.09%	22	68.75%		14	8	57.14%	4	50.00%
DISEASES OF WHITE BLOOD CELLS	29	14	48.28%	8	57.14%		6	2	33.33%	1	50.00%
OTHER CIRCULATORY DISEASE	39	30	76.92%	21	70.00%		9	6	66.67%	1	16.67%
OTHER NERVOUS SYSTEM SYMPTOMS AND DISORDERS	39	21	53.85%	14	66.67%		8	2	25.00%	0	0.00%
RESIDUAL CODES; UNCLASSIFIED; ALL E CODES [259. AND 260.]	23	15	65.22%	12	80.00%		5	2	40.00%	2	100.0%
SCHIZOPHRENIA AND OTHER PSYCHOTIC DISORDERS	40	14	35.00%	12	85.71%		9	0	0.00%	0	.



# Readmissions

## PCMH / CM / UM Registry

- Registry has patient on list from day 0 to day 30 after discharge
- Only HR admissions will be on list

- Icons that could show up:

- High Risk (red)
- Moderate Risk (yellow)
- Lowest Risk (green)
- Death – pt died during hosp stay
- Readmission
- Transfer to LTAC facility

Home Overview Patient Management Administration Reporting Webiology Documents

Patient Management > High Risk Admissions

Filters My Filters

Available Data Sources Choose a data source Available Fields Choose a field Search Clear

Facility: 0109 - JOINT (AF) SAN ANTONIO LAF-RAF-FSH - SAN ANTONIO MMC-FT. SAM HOUSTN

Data current as of 1/15/2014 07:44:16

Change page: 1 2 3 4 5 6 7 8 9 10 ... | Displaying page 1 of 128, items 1 to 25 of 3180

Change page: 1 | Page size: 25

Indicator Flag	ACG RUB	Name	Hospital Location Description	Risk Flag	Admitting Time	Discharge Time	Followup Appointment Date	Followup Appointment DMIS	Overdue
▲	No Data		2T SURGICAL ICU	No	3/29/2014 19:52				
▲	No Data		INPATIENT BURN SERVICE	No	3/31/2014 10:24				
▲	No Data		2N SURGICAL ICU	No	4/1/2014 00:31				
▲	Moderate			No	4/2/2014 12:00				
▲	No Data		WARD 6T PSYCH WARD	No	4/2/2014 13:11				
▲	High			No	4/4/2014 12:00				
▲	High		WARD 6T PSYCH WARD	No	4/4/2014 14:57				
▲	Moderate		PEDS WARD	No	4/4/2014 17:45				
▲	No Data		BURN ICU	No	4/4/2014 18:29				
▲	No Data		ST HEMONC BMT	No	4/4/2014 20:14				
▲	High		ST HEMONC BMT	No	4/8/2014 13:33				Colono
▲	No Data		WARD 6T PSYCH WARD	No	4/9/2014 16:23				

# Summary

- ACG is a validated tool that will allow case managers (and disease managers) identify high risk, and high cost patients
- ACG has both pragmatic and predictive variables that can be used for identification and stratification for targeted intervention
- ACG enables better use of scarce resources – to improve outcomes while mitigating staffing limitations

**QUESTIONS OR COMMENTS**