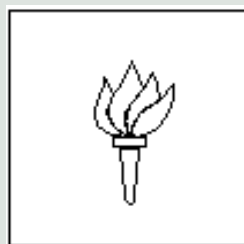


PREDICTIVE MODELING FOR HIGH COST MEDICAID PATIENTS IN NEW YORK

August 2008



John Billings, JD
NYU Robert F. Wagner Graduate School of Public Service
NYS Office of Health Insurance Programs

SOME ASSUMPTIONS ABOUT INTERVENTIONS FOR HIGH COST MEDICAID PATIENTS

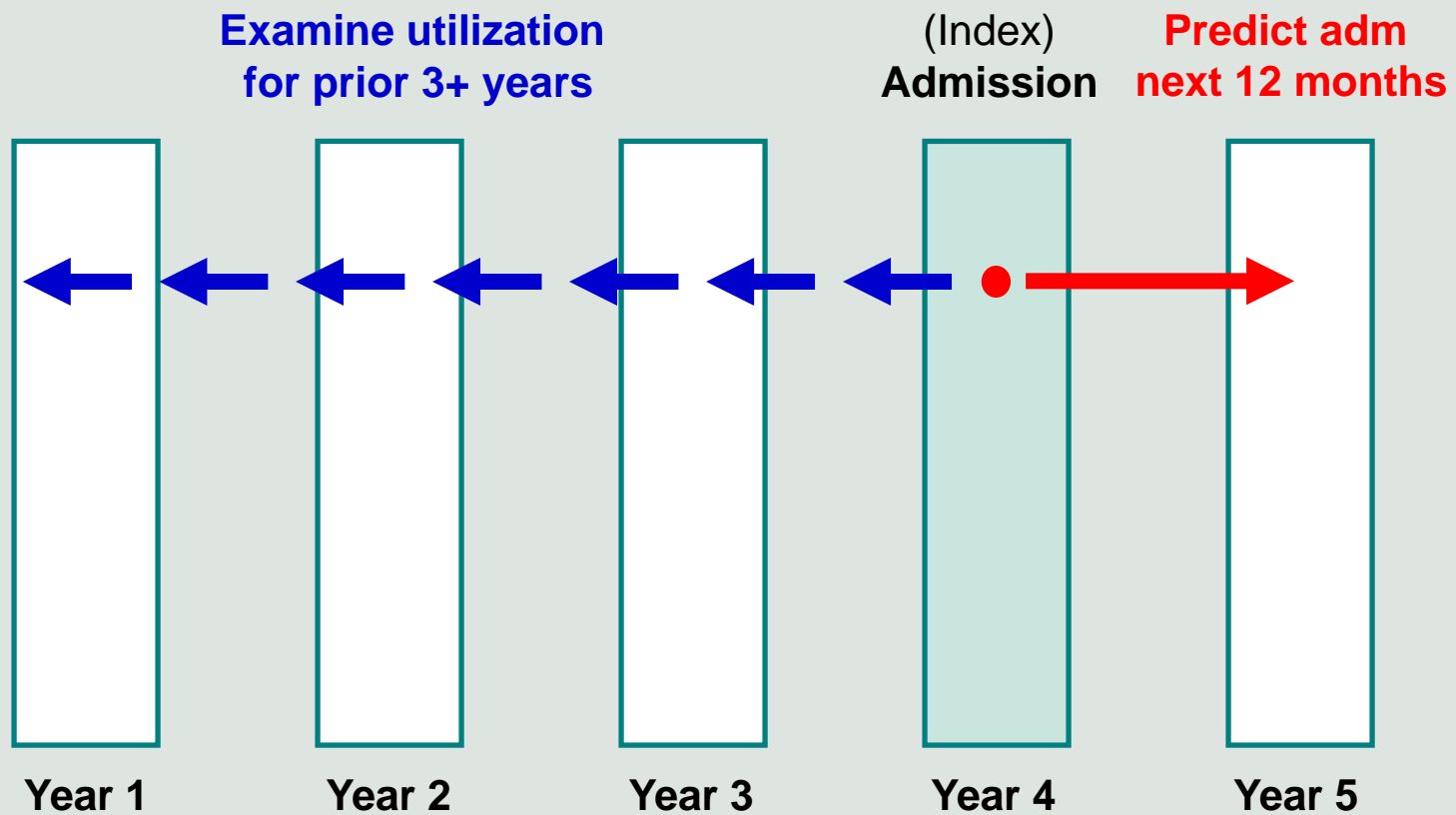
- There is no new money – the intervention will have to pay for itself
- Predictive modeling/case finding will be critical
- The focus should be on predicting high cost events that something can be done about
- That means focusing on hospitalizations
 - It's where a lot of the money is
 - It comes in big chunks, so avoiding a single admission yields large savings
 - There is plenty of evidence that some admission are “unwarranted” or “preventable/avoidable”
- There are huge unknowns about the needs of these patients and what will work for them
 - Medicaid patients present special needs/circumstances
 - Interventions/approaches that have shown “promise” for commercial patients are likely to be less effective

ONE APPROACH TO IDENTIFYING HIGH RISK PATIENTS AND TARGETING INTERVENTIONS*

- Take 5 years of claims/encounter data or hospital/ED records
- Look for an admission in the 4th year of the data
- Use information from the prior 3 years of records to predict patients at high risk for re-hospitalization
 - Use logistic regression techniques [not rocket science]
 - Create a predictive model that produces a “Risk Score” of 1-100 for each patient
- Learn as much as possible about the characteristics of these patients from the data
- Apply coefficients to current data to identify high risk patients

* See Billings J, Mijanovich T. “Improving the Management of Care for High Cost Medicaid Patients” *Health Affairs* 26 no 6 (2007) 1643-1655.

GENERAL APPROACH FOR DEVELOPMENT OF A CASE FINDING ALGORITHM



GENERAL APPROACH

TYPES OF VARIABLES IN ALGORITHM

- Prior hospital utilization by type
 - Admissions/LOS
 - Intervals/recentness
- Prior emergency department utilization
- Prior outpatient utilization
 - By type of visit (primary care, specialty care, substance abuse, etc)
 - Number of different specialty types
- Diagnostic information from prior utilization
 - Chronic disease/other conditions with high rates of subsequent admission
 - Multiple conditions/hierarchical grouping
- Underlying re-hospitalization rates at hospital of most recent admission
- Long term care/rehab utilization
- Ancillary use/costs – Medication use/costs
- Patient characteristics: Age, gender, race/ethnicity
- Contextual information about zip code of residence

CURRENT NEW YORK FOCUS

[DEVELOPMENT OF CASE FINDING ALGORITHM FOR CHRONIC ILLNESS DEMONSTRATION PROJECT]

- Excluded/exempted from mandatory managed care
- Adults and NOT...
 - SNF resident
 - State psychiatric facility resident
 - ICF/MR
 - Dual eligible

CHARACTERISTICS OF PATIENTS FLAGGED BY CASE FINDING ALGORITHM

Excluded/Exempted Adults

Demographic Characteristics

	Risk Score > 50	Risk Score > 75	Risk Score > 90	All Patients With Adm
N	33,363	8,713	2,176	64,446
Age	45.1	44.8	44.3	47.6
Female	43.9%	38.5%	34.7%	49.7%
NYC Fiscal County	72.2%	80.0%	84.4%	69.1%
White	28.2%	23.6%	22.9%	32.7%
Black	40.7%	48.1%	49.4%	33.1%
Hispanic	15.0%	14.2%	12.2%	14.6%
Other/Unknown	16.1%	14.2%	15.4%	19.5%

CHARACTERISTICS OF PATIENTS FLAGGED BY CASE FINDING ALGORITHM

Excluded/Exempted Adults

Diagnoses Reported in Claims Records

	Risk Score > 50	Risk Score > 75	Risk Score > 90	All Patients With Adm
Cereb Vasc Dis	2.8%	3.4%	4.1%	3.0%
AMI	5.3%	8.2%	11.3%	4.5%
Ischemic Heart Dis	17.2%	22.3%	27.3%	15.8%
Congestive Heart Failure	13.5%	18.9%	22.0%	9.9%
Hypertension	46.4%	54.9%	61.1%	44.1%
Asthma	32.3%	43.7%	49.0%	23.5%
COPD	16.6%	25.6%	33.2%	11.8%
Diabetes	27.0%	32.0%	36.2%	24.2%
Renal Disease	4.4%	7.4%	9.1%	2.8%
Sickle Cell Dis	2.5%	5.2%	9.3%	1.5%
Any Chronic Disease	71.2%	82.5%	88.6%	65.5%
Multiple Chronic Disease	45.4%	57.5%	67.0%	39.5%
Cancer	8.1%	7.9%	9.1%	9.2%
HIV/AIDS	17.1%	23.7%	24.0%	11.3%
Alcohol/Substance Abuse	71.7%	86.1%	90.3%	50.1%
Any Mental Illness	61.4%	73.1%	81.4%	48.4%
Schizophrenia	23.6%	30.0%	34.4%	16.5%
Psychosis	15.0%	23.3%	32.3%	10.3%
BiPoloar Disorder	29.4%	40.1%	47.1%	20.8%
MH or Substance Abuse	85.3%	93.3%	96.4%	68.2%
MH and Substance Abuse	47.8%	66.0%	75.3%	30.3%

CHARACTERISTICS OF PATIENTS FLAGGED BY CASE FINDING ALGORITHM

Excluded/Exempted Adults

Diagnoses Reported in Claims Records

Prior Diagnostic History
Patients with Risk Scores 50+
NYC Residents

	Percent of Patients With Condition	Percent of Patients with Co-Occurring Condition												
		CVD	AMI	Ischemic Heart Dis	CHF	Hyper-tension	Diabetes	Asthma	COPD	Renal Disease	Sickle Cell	Alc/Subst Abuse	Mental Illness	HIV/AIDS
Cereb Vasc Dis	5.0%	100.0%	15.0%	49.5%	36.2%	81.6%	51.7%	35.3%	24.8%	13.7%	2.9%	56.4%	62.7%	13.7%
AMI	6.0%	12.5%	100.0%	80.9%	53.3%	90.1%	56.6%	40.4%	31.5%	17.4%	2.1%	55.2%	56.2%	13.5%
Ischemic Heart Dis	22.4%	11.1%	21.7%	100.0%	45.3%	86.9%	54.0%	42.0%	30.2%	13.2%	2.1%	53.5%	58.4%	14.0%
CHF	16.2%	11.2%	19.8%	62.8%	100.0%	89.5%	56.9%	42.7%	34.9%	20.7%	2.7%	48.4%	48.0%	13.4%
Hypertension	50.9%	8.0%	10.6%	38.3%	28.4%	100.0%	46.2%	41.0%	25.4%	11.6%	1.8%	63.1%	62.9%	20.0%
Diabetes	29.0%	8.9%	11.7%	41.8%	31.7%	81.3%	100.0%	41.2%	23.9%	13.0%	1.4%	55.4%	62.7%	15.6%
Asthma	36.3%	4.9%	6.7%	25.9%	19.0%	57.5%	32.9%	100.0%	32.5%	4.3%	2.3%	72.9%	70.0%	29.6%
COPD	20.8%	6.0%	9.1%	32.5%	27.2%	62.2%	33.3%	56.7%	100.0%	6.0%	1.7%	74.2%	65.6%	29.9%
Renal Disease	6.3%	10.8%	16.5%	46.7%	52.8%	93.3%	59.6%	24.3%	19.8%	100.0%	2.2%	36.6%	37.4%	18.0%
Sickle Cell	2.9%	5.0%	4.2%	15.7%	14.9%	31.3%	14.0%	28.2%	12.3%	4.7%	100.0%	48.9%	50.7%	15.0%
Alc/Subst Abuse	72.8%	3.9%	4.5%	16.5%	10.7%	44.1%	22.0%	36.4%	21.2%	3.2%	2.0%	100.0%	70.9%	33.4%
Mental Illness	66.2%	4.7%	5.1%	19.7%	11.7%	48.3%	27.4%	38.4%	20.6%	3.6%	2.2%	77.9%	100.0%	24.7%
HIV/AIDS	28.2%	2.4%	2.9%	11.1%	7.7%	36.1%	16.1%	38.2%	22.1%	4.1%	1.6%	86.3%	58.1%	100.0%

CHARACTERISTICS OF PATIENTS FLAGGED BY CASE FINDING ALGORITHM

Excluded/Exempted Adults

Selected Ambulatory Care Use Prior 12 Months

	Risk Score > 50	Risk Score > 75	Risk Score > 90	All Patients With Adm
Any primary care visit	71.7%	72.9%	68.3%	64.8%
Any specialty care visit	39.2%	40.8%	39.9%	35.6%
No primary care visit	28.3%	27.1%	31.7%	35.2%
No PC/spec care visit	24.2%	22.6%	26.7%	31.3%
No PC/spec/OBGYN visit	23.7%	22.1%	26.1%	30.7%
Any psych visit	35.3%	35.8%	36.9%	29.6%
Any alcohol/drug visit	29.5%	38.8%	38.8%	19.5%
Any dental visit	37.3%	39.6%	37.5%	32.4%
Any home care	12.8%	17.2%	18.6%	8.5%
Any transportation	45.9%	61.1%	70.2%	32.2%
Any pharmacy	88.0%	89.5%	85.6%	78.3%
Any DME	18.7%	20.9%	20.5%	15.2%
Any comp case mgt	7.6%	10.8%	10.3%	5.2%
Any community rehab	1.1%	1.3%	0.8%	0.8%

CHARACTERISTICS OF PATIENTS FLAGGED BY CASE FINDING ALGORITHM

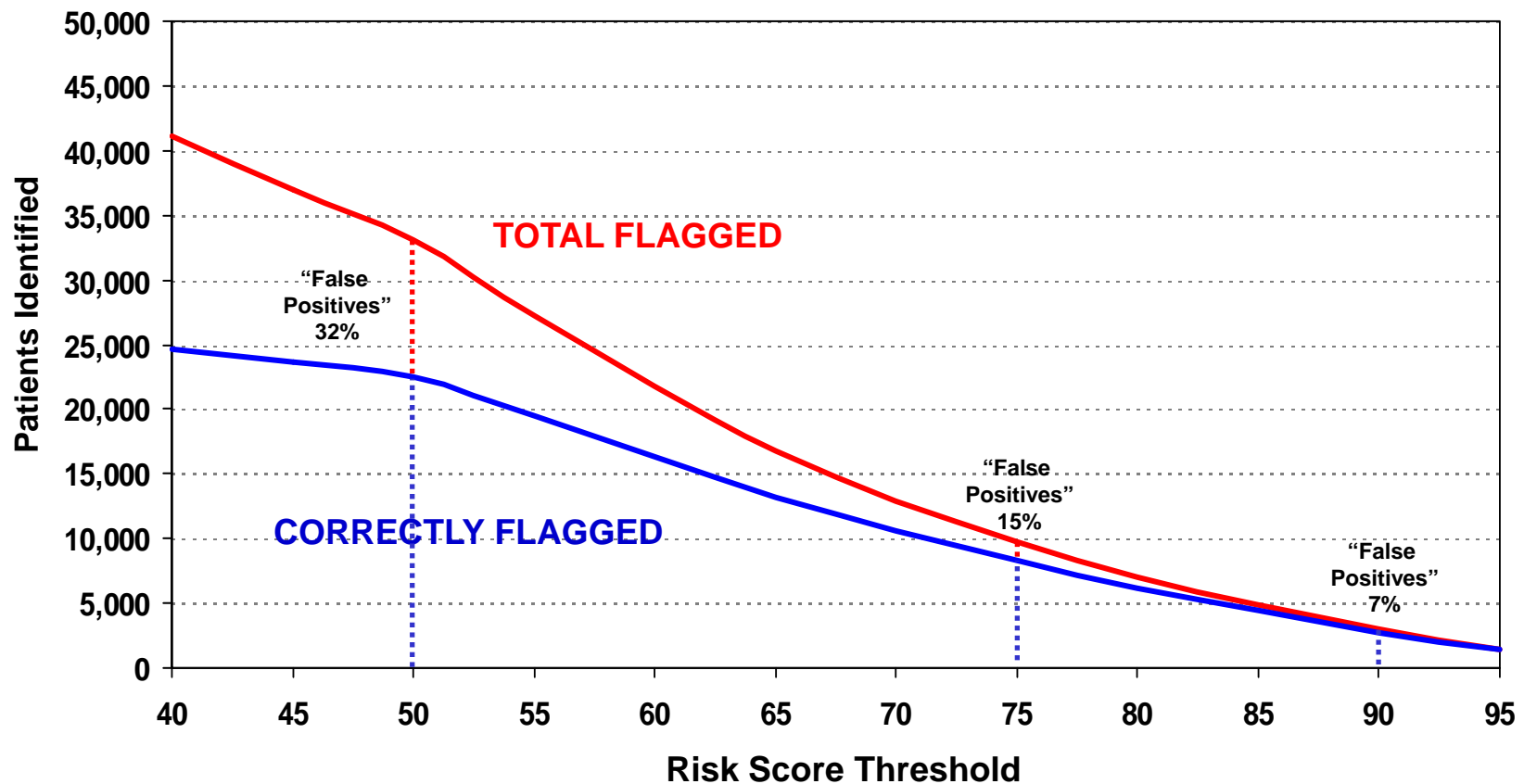
Excluded/Exempted Adults

	Risk Score > 50	Risk Score > 75	Risk Score > 90	All Patients With Adm
Costs Prior 12 Months				
Inpatient	20,973	42,357	75,221	12,442
Emergency Department	306	576	1,040	199
Primary Care Visit	489	535	495	416
Specialty Care Visit	80	83	75	71
Psychiatric Care Visit	1,045	862	693	899
Substance Abuse Visit	1,129	1,342	1,070	748
Other Ambulatory	1,989	2,746	3,223	1,494
Pharmacy	6,470	7,711	7,545	4,905
Transportation	427	658	810	289
Community Rehab	109	112	57	73
Case Management	349	544	554	230
Personal Care	853	914	755	754
Home Care	875	1,201	1,357	601
LTHHC	49	116	214	29
All Other	2,388	3,500	3,738	1,738
Total Cost	37,530	63,259	96,848	24,885
Cost Index Admission	N/A	N/A	N/A	N/A
Costs Next 12 Months				
Inpatient	26,777	45,513	70,491	16,791
Emergency Department	299	527	921	198
Primary Care Visit	415	394	360	375
Specialty Care Visit	52	44	34	55
Psychiatric Care Visit	1,041	786	582	964
Substance Abuse Visit	1,155	1,320	1,061	796
Other Ambulatory	2,183	2,831	2,987	1,678
Pharmacy	7,246	7,726	7,194	5,834
Transportation	548	752	794	389
Community Rehab	170	184	59	173
Case Management	392	547	533	267
Personal Care	1,017	1,023	795	918
Home Care	1,229	1,327	1,392	986
LTHHC	117	117	63	110
All Other	3,895	5,071	5,409	3,089
Total Cost	46,537	68,162	92,674	32,622

CASE FINDING ALGORITHM

NUMBER OF PATIENTS IDENTIFIED

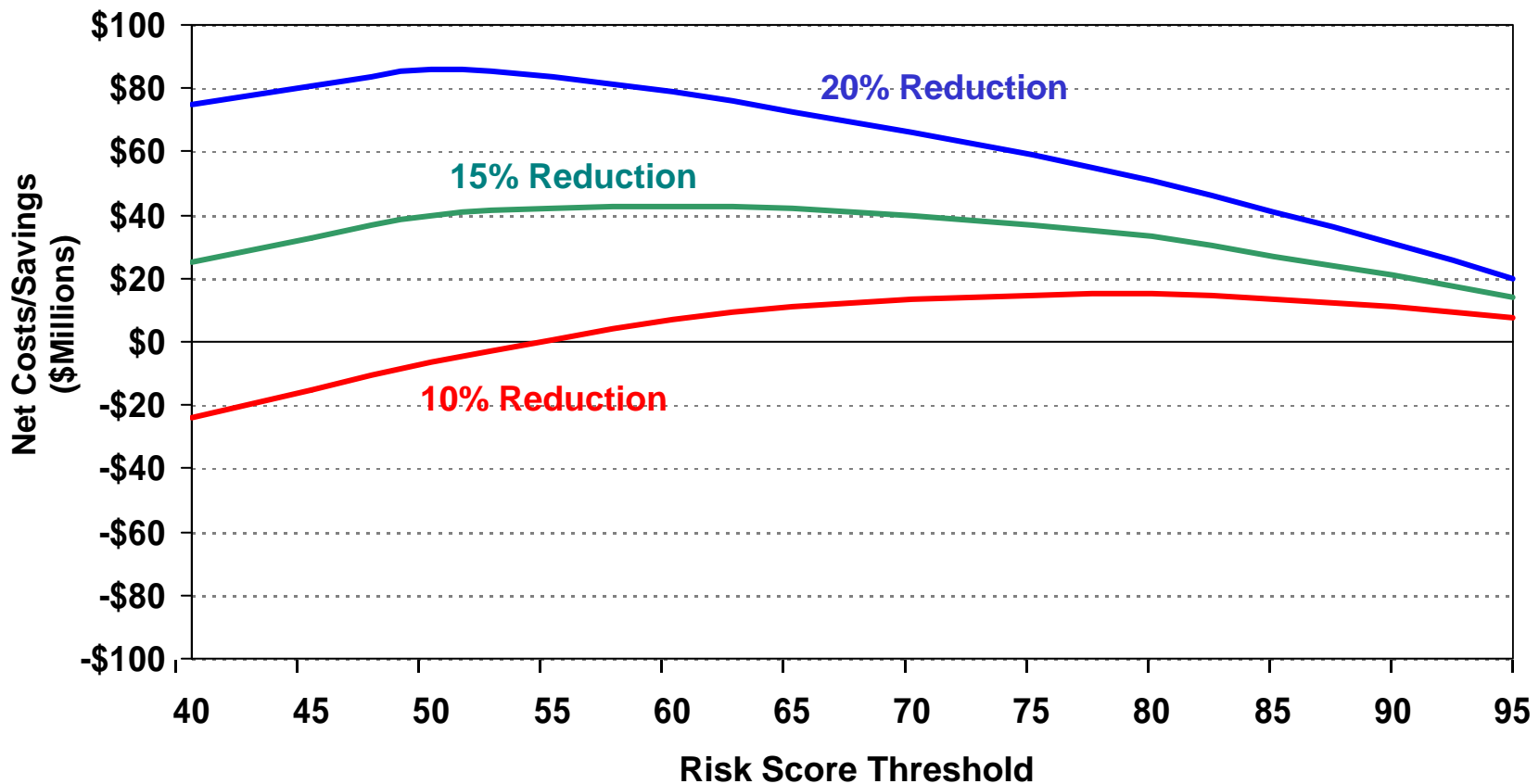
Excluded/Exempted Adults



CASE FINDING ALGORITHM

ANALYSIS OF NET COSTS/SAVINGS

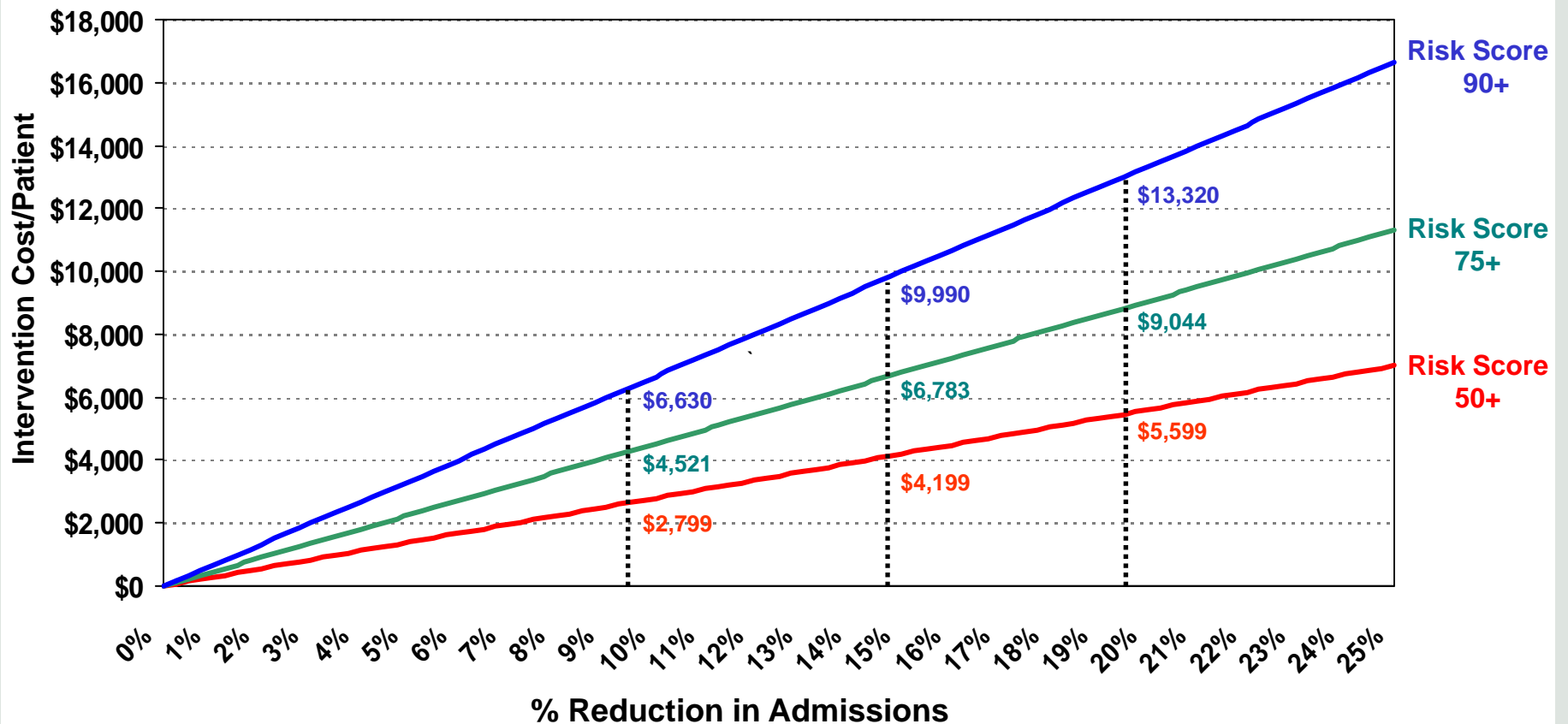
Excluded/Exempted Adults
(INTERVENTION COST = \$3,000/PATIENT)



CASE FINDING ALGORITHM

MAXIMUM EXPENDITURE/PATIENT FOR BREAK EVEN

Excluded/Exempted Adults



RESULTS FROM APPLICATION OF CASE FINDING ALGORITHM

WHAT WE DON'T KNOW ABOUT THESE PATIENTS

- All the factors that contribute to their hospital admissions
- The social context of patients flagged by the algorithm
- Is it really possible do anything that would reduce future admissions?
- What would an intervention look like?
- What would the intervention actually cost?

SOME RESULTS FROM APPLICATION THE CASE FINDING ALGORITHM BY BELLEVUE HOSPITAL*

- Using its own hospital, ED, and clinic records, Bellevue Hospital applied a similar algorithm to its patients
- They interviewed 50 at random with risk scores of 50+, finding:
 - 42% considered the ED as their “usual source of care”
 - Substantial mental health and alcohol/drug problems
 - Patients were socially isolated
 - 52% lived alone
 - 56% had never been married
 - 48% had 2 or fewer close friends/relatives
 - Housing was a major issue
 - 36% were homeless or living in a shelter
 - 24% were staying with families or friends

NEW YORK'S CHRONIC ILLNESS DEMONSTRATION PROJECT

- Will fund five geographically diverse providers in the form of a monthly care coordination fee to assess and coordinate the care of participants
- Each project is required to have an integrated *network of providers* to assure facilitated access to medical, mental health and substance abuse services for participants and collaboration with community based social service providers
- Projects will provide participants with comprehensive care coordination and work toward improving patient self-management and caregiver/family involvement
- Projects must also have provider engagement strategies to assure disenfranchised patients are linked to needed resources
- Each project will have a randomly assigned or other form of control group to assist in the evaluation of cost containment and utilization