

MERCER

Human Resource Consulting

Enhance Predictive Modeling by Improving Current Models that Create Better Solutions

IIR — Innovative Strategies in Predictive Modeling

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Marsh & McLennan Companies



Workshop Topics

- Predictive modeling overview
- Considerations in choosing a model
- Methodologies for identifying high cost individuals
 - Commercial results
 - Medicaid results
- Health plan use of predictive modeling techniques
 - Moving from theory to the real world
 - Alternative data sources
- Lessons learned



The \$64,000 Question

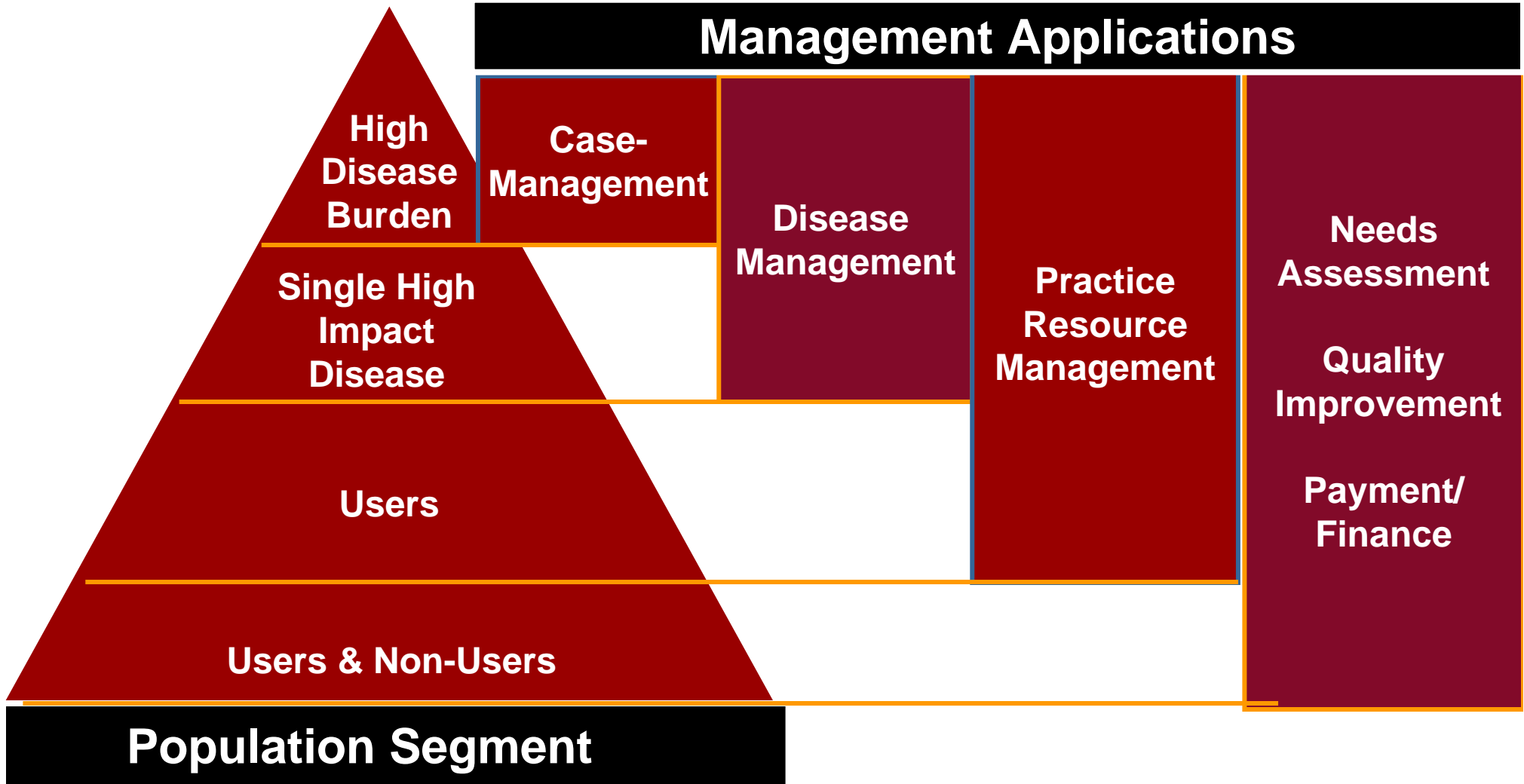
- Does predictive modeling work?
 - Definitely yes; predictive modeling techniques have proven to be very successful in identifying members that will be expensive in future time periods.
- Is predictive modeling perfect?
 - No, most models will generate some false positives, and identify people that will not be among the most expensive in the next time period.
- Are predictive modeling results improving?
 - Yes, the models are getting better, and health plans are developing more effective strategies to mine the data.



Predictive Modeling Objectives

- Identify members that are projected to be high cost in the future for additional interventions, in an effort to reduce their future expenditures.
 - Members must have ongoing health care needs.
- Stratify members by their projected health care needs to be able to determine the appropriate intervention.
- Identify members that are currently inexpensive and are at the early stages of a disease onset, that would have not been identified by more traditional risk adjustment techniques.

The Risk Measurement Pyramid

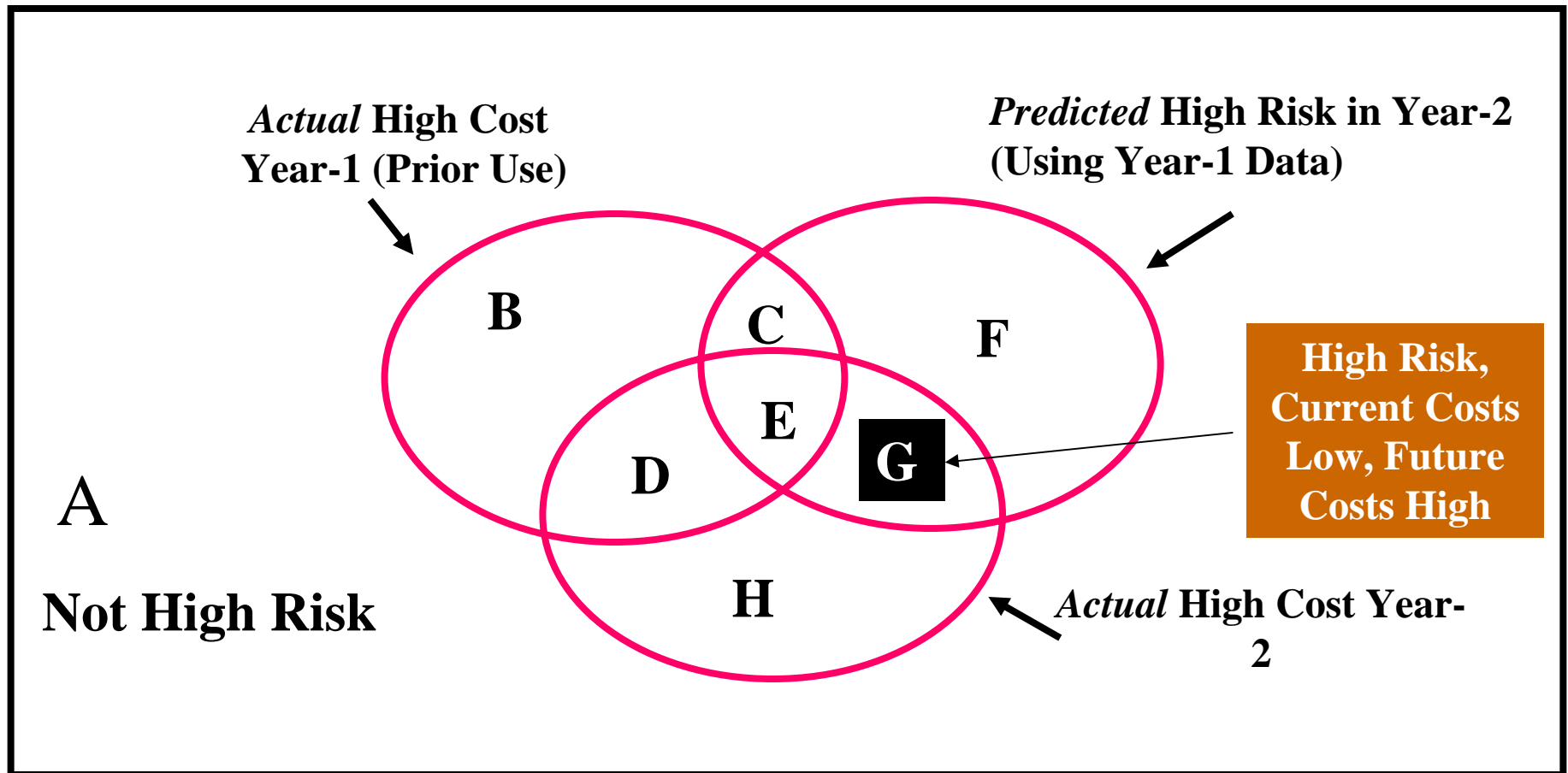




Predictive Modeling Objectives

- Several risk adjustment systems have been updated to include predictive modeling components that have been designed to maximize the identification of members whose expenses will increase significantly in the next time period.
- To the extent that the new models can do this accurately, health plans can case manage a group of members that otherwise would have not been identified.

The "Risk Prediction" Venn Diagram



Population of Persons Enrolled Across Two Year Period



Considerations in Choosing a Model

- The statistical performance of the most widely used risk adjustment models is comparable.
- All offer significant improvements over age-gender models.
- Some of the main factors to consider in choosing a model are:
 - Approach to measuring a members health status.
 - Categorical vs. Additive
 - Measures of a member's health status that are created by the model.
 - Does the model generate a predictive modeling score.
 - Acceptance amongst your constituents.



Considerations in Choosing a Model

- What are the data elements required by the model, and can then be supported by your data systems.
 - Encounter data may suffer from incomplete reporting.
 - Data systems may not store all of the diagnoses reported for a visit / stay.
- Does the model utilize pharmacy data in evaluating a member's health status?
- Does the model utilize procedure codes to evaluate a member's health status?



Predictive Modeling Techniques

- The Adjusted Clinical Groups (ACGs) and Diagnostic Cost Groups (DCGs) risk adjustment system have both developed predictive modeling components that are included in their risk adjustment models.
- Both of these models are recognized as being among the leaders of the risk adjustment systems that are currently available.
- Mercer has recently completed several projects that utilized the ACG system to evaluate the efficiency of managed care organizations (MCOs).
- The strategies we employed, and our findings for Medicaid and commercial clients are presented in the following slides.



Financial Performance

- The ACG system calculates a risk score for each member, and also assigns each member to one of 110 mutually exclusive risk groups.
- The ACG risk scores computed for the population are based upon a set of national normative weights developed using commercial data.
- The distribution of members across the risk groups can also be used to evaluate the health status of the members enrolled in each plan and identify members for care management programs.
- This comparison can be simplified by looking at the distribution of members across the 6 Resource Utilization Bands (RUBs) defined for the ACG system.
- RUBs group ACGs with similar expected costs into the same RUB category.

ACG Risk Scores Medicaid Population

Risk Score	Fiscal Year 04	Fiscal Year 05	Percent Change
ACG Concurrent	2.01	3.07	52.7%

RUB Group Distribution

RUB Group	FY 04 Members	FY 04 % Members	FY 05 Members	FY 05 % Members
Non User	3,332	19.6%	1,389	11.0%
Administrative	1,718	10.1%	1,047	8.3%
Low	4,479	26.3%	3,119	24.8%
Medium	5,435	31.9%	4,585	36.4%
High	1,557	9.1%	1,800	14.3%
Very High	507	3.0%	658	5.2%
Total	17,028		12,598	

RUB Group Expenditures

RUB Group	FY 04 Total \$ PMPM	FY 05 Total \$ PMPM	Percent Change
Non User	\$ 37.36	\$ 19.93	-46.7%
Administrative	\$ 38.54	\$ 43.70	13.4%
Low	\$ 116.48	\$ 125.66	7.9%
Medium	\$ 286.40	\$ 291.37	1.7%
High	\$ 812.48	\$ 842.48	3.7%
Very High	\$ 2,660.79	\$ 2,458.83	-7.6%
Total	\$ 282.38	\$ 399.54	41.5%



Prevalence of Chronic Conditions



Prevalence of Chronic Conditions

- The ACG grouper also identifies members with chronic conditions that are amenable to disease management interventions.
- These chronic condition markers can be used to evaluate the prevalence of chronic conditions within a population.
- The chronic conditions that are identified by the ACG grouper are:
 - Arthritis, Asthma, Back Pain, COPD, CHF, Diabetes, Depression, Hyperlipidemia, Hypertension, Ischemic Heart Disease, and Renal Failure.
- Members with multiple chronic conditions would have a marker for each condition.



Prevalence of Chronic Conditions

- To avoid counting a member in multiple disease categories, a chronic condition hierarchy was used to assign each member to 1 chronic disease category.
- The hierarchy that was used to assign members is as follows:
 - Renal Failure, CHF, COPD, Ischemic Heart Disease, Depression, Asthma, Diabetes, Hyperlipidemia, Hypertension, Arthritis, and Low Back Pain.
- The number of members identified with each chronic condition, after applying this hierarchy is provided on the next table.

Prevalence of Chronic Conditions Hierarchical Assignments

Chronic Condition	Fiscal Year 04		Fiscal Year 05	
	# of Members	Percent of Members	# of Members	Percent of Members
Arthritis	122	0.7	128	1.0
Asthma	1,060	6.3	1,052	8.4
Back Pain	629	3.7	618	4.9
CHF	77	0.5	96	0.8
COPD	182	1.1	242	1.9
Depression	494	2.9	578	4.6
Diabetes	324	1.9	290	2.3
Hylipidemia	292	1.7	346	2.7
Hypertension	357	2.1	355	2.8
Ischemic Heart Disease	116	0.7	176	1.4
No Chronic Conditions	13,339	78.3	8,669	68.8
Renal Failure	36	0.2	48	0.4
All Members	17,028		12,598	

Chronic Condition Total \$ PMPM Hierarchical Assignments

Chronic Condition	Fiscal Year 04		Fiscal Year 05		% Change
	Total \$ PMPM	Relative Cost	Total \$ PMPM	Relative Cost	\$ PMPM
Arthritis	\$ 541.51	1.9	\$ 548.60	1.4	1.3
Asthma	\$ 527.21	1.9	\$ 580.86	1.5	10.2
Back Pain	\$ 457.31	1.6	\$ 431.86	1.1	-5.6
CHF	\$ 2,506.05	8.9	\$ 2,086.84	5.2	-16.7
COPD	\$ 1,017.90	3.6	\$ 1,561.04	3.9	53.4
Depression	\$ 958.34	3.4	\$ 987.72	2.5	3.1
Diabetes	\$ 744.43	2.6	\$ 630.27	1.6	-15.3
Hypertension	\$ 523.75	1.9	\$ 517.56	1.3	-1.2
Ischemic Heart Disease	\$ 1,141.08	4.0	\$ 1,392.15	3.5	22.0
No Chronic Conditions	\$ 170.98	0.6	\$ 227.93	0.6	33.3
Renal Failure	\$ 4,964.67	17.6	\$ 3,475.30	8.7	-30.0
All Members	\$ 282.38		\$ 399.54		

Inpatient Utilization Hierarchical Assignments

Chronic Condition	Fiscal Year 04		Fiscal Year 05	
	Inpatient \$ PMPM	Inpatient Days Per 1,000 PY	Inpatient \$ PMPM	Inpatient Days Per 1,000 PY
Arthritis	\$ 70.36	479	\$ 114.02	1,049
Asthma	\$ 171.05	1,017	\$ 173.25	883
Back Pain	\$ 144.05	964	\$ 106.75	631
CHF	\$ 1,500.21	12,076	\$ 1,098.54	7,145
COPD	\$ 406.57	3,103	\$ 663.61	4,010
Depression	\$ 296.72	2,516	\$ 234.52	1,767
Diabetes	\$ 238.55	2,187	\$ 142.71	1,016
Hypertension	\$ 214.79	1,790	\$ 141.23	948
Ischemic Heart Disease	\$ 462.79	3,873	\$ 510.40	3,444
No Chronic Conditions	\$ 51.42	449	\$ 67.04	474
Renal Failure	\$ 3,069.77	25,987	\$ 1,943.59	14,347
All Members	\$ 93.79	763	\$ 122.48	815

Emergency Room Services Hierarchical Assignments

Chronic Condition	Fiscal Year 04		Fiscal Year 05	
	ER \$ PMPM	ER Visits Per 1,000 PY	ER \$ PMPM	ER Visits Per 1,000 PY
Arthritis	\$ 13.78	691	\$ 20.58	923
Asthma	\$ 19.45	1,078	\$ 19.91	1,015
Back Pain	\$ 29.16	1,410	\$ 26.59	1,291
CHF	\$ 26.43	971	\$ 48.11	1,602
COPD	\$ 25.97	1,192	\$ 31.16	1,343
Depression	\$ 32.54	1,602	\$ 36.53	1,634
Diabetes	\$ 16.45	754	\$ 18.47	815
Hypertension	\$ 12.63	576	\$ 10.88	520
Hypertension	\$ 16.28	808	\$ 17.59	825
Ischemic Heart Disease	\$ 28.77	1,107	\$ 38.94	1,518
No Chronic Conditions	\$ 6.38	355	\$ 8.29	442
Renal Failure	\$ 25.01	1,152	\$ 42.88	1,467
All Members	\$ 9.78	516	\$ 13.58	664



Chronic Conditions Expenditures

- The category of service profiles showed that the utilization of these services varied by chronic condition.
- Members with CHF and Renal Failure had significantly higher inpatient utilization.
- Members with CHF, Renal Failure, Ischemic Heart Disease, and COPD had the highest physician and pharmacy utilization.
- Members with Depression had the highest emergency room utilization rates.



Chronic Conditions Expenditures

- Utilization rates will vary among members within each chronic condition category depending upon their health status.
- The cost and complexity of caring for a patient with any of these chronic conditions will be affected by the number of comorbidities that each member has, which will impact their health status.
- These factors can be accounted for by examining the RUB group assignment for members with chronic conditions.
- The following slides profile the health care utilization of the members in each chronic condition category based upon their RUB group assignment.

Health Care Utilization Asthma

RUB Group	Total Members	Total \$ PMPM	Inpatient \$ PMPM	Physician \$ PMPM	Rx \$ PMPM	ER \$ PMPM	Inp Days 1,000 PY	Phy Serv 1,000 PY	Phar CI 1,000 PY	ER Vis 1,000 PY
Fiscal Year 2003–2004										
Low	162	\$125	\$18	\$15	\$33	\$3	98	2,967	8,439	241
Medium	640	\$262	\$52	\$50	\$64	\$16	253	8,763	15,870	985
High	209	\$870	\$393	\$144	\$103	\$36	2,196	17,671	25,464	1,910
Very High	49	\$3,892	\$1,286	\$369	\$333	\$36	9,074	30,949	42,629	1,623
Total	1,060	\$527	\$171	\$77	\$79	\$19	1,017	10,609	17,799	1,078
Fiscal Year 2004–2005										
Low	115	\$106	\$8	\$18	\$34	\$2	27	3,270	7,881	161
Medium	643	\$263	\$33	\$50	\$71	\$15	205	8,816	16,350	829
High	237	\$947	\$251	\$136	\$133	\$33	1,278	17,817	27,475	1,644
Very High	57	\$3,583	\$1,743	\$318	\$293	\$50	8,589	30,244	53,973	2,220
Total	1,052	\$580	\$173	\$80	\$93	\$19	883	11,402	19,975	1,015

Health Care Utilization Congestive Heart Failure

RUB Group	Total Members	Total \$ PMPM	Inpatient \$ PMPM	Physician \$ PMPM	Rx \$ PMPM	ER \$ PMPM	Inp Days 1,000 PY	Phy Serv 1,000 PY	Phar CI 1,000 PY	ER Vis 1,000 PY
Fiscal Year 2003–2004										
Medium	19	\$686	\$85	\$138	\$298	\$14	774	14,903	52,839	581
High	27	\$1,090	\$399	\$186	\$231	\$5	3,780	21,496	58,063	236
Very High	31	\$4,828	\$3,305	\$629	\$349	\$53	26,000	57,905	76,667	1,905
Total	77	\$2,506	\$1,500	\$354	\$291	\$26	12,076	34,762	64,476	971
Fiscal Year 2004–2005										
Low	1	\$27	-	\$7	\$4	-	-	2,000	2,000	-
Medium	15	\$433	\$70	\$100	\$177	\$22	316	10,342	37,737	474
High	21	\$1,278	\$610	\$246	\$153	\$39	3,580	21,731	38,118	1,160
Very High	59	\$2,875	\$1,579	\$495	\$337	\$58	10,465	46,444	73,616	2,101
Total	96	\$2,086	\$1,098	\$370	\$264	\$48	7,145	34,494	58,795	1,602

Health Care Utilization Depression

RUB Group	Total Members	Total \$ PMPM	Inpatient \$ PMPM	Physician \$ PMPM	Rx \$ PMPM	ER \$ PMPM	Inp Days 1,000 PY	Phy Serv 1,000 PY	Phar CI 1,000 PY	ER Vis 1,000 PY
Fiscal Year 2003–2004										
Low	24	\$385	-	\$11	\$95	\$1	-	2151	16,642	57
Medium	229	\$577	\$39	\$42	\$147	\$13	507	5,850	24,409	720
High	154	\$1,087	\$423	\$144	\$176	\$44	3,502	15,042	32,093	2,176
Very High	87	\$1,775	\$758	\$239	\$320	\$63	6,177	23,660	54,150	3,075
Total	494	\$958	\$296	\$110	\$187	\$32	2,516	11,995	32,128	1,602
Fiscal Year 2004–2005										
Low	22	\$590	-	\$10	\$87	\$1	-	1,909	15,218	55
Medium	217	\$581	\$57	\$61	\$189	\$16	632	8,807	30,179	741
High	226	\$996	\$237	\$148	\$224	\$36	1,690	16,777	40,123	1,606
Very High	113	\$1,773	\$588	\$277	\$342	\$78	4,282	30,479	58,085	3,577
Total	578	\$987	\$324	\$137	\$230	\$36	1,767	16,117	39,254	1,634

Health Care Utilization Diabetes

RUB Group	Total Members	Total \$ PMPM	Inpatient \$ PMPM	Physician \$ PMPM	Rx \$ PMPM	ER \$ PMPM	Inp Days 1,000 PY	Phy Serv 1,000 PY	Phar CI 1,000 PY	ER Vis 1,000 PY
Fiscal Year 2003–2004										
Low	36	\$389	-	\$19	\$146	-	-	3,034	29,434	-
Medium	182	\$384	\$35	\$63	\$188	\$10	258	7,700	40,508	500
High	70	\$869	\$326	\$170	\$167	\$21	2,254	16,545	40,169	995
Very High	36	\$2,217	\$1,066	\$328	\$395	\$44	11,368	28,288	52,620	1,895
Total	324	\$744	\$238	\$119	\$207	\$16	2,187	12,080	40,960	754
Fiscal Year 2004–2005										
Low	21	\$264	-	\$28	\$171	-	-	4,109	33,457	-
Medium	155	\$372	\$26	\$65	\$166	\$9	145	7,550	35,985	428
High	77	\$792	\$218	\$160	\$208	\$36	1,268	16,613	42,551	1,631
Very High	37	\$1,526	\$532	\$259	\$375	\$26	4,587	25,732	61,458	1,033
Total	290	\$630	\$142	\$114	\$205	\$18	1,016	12,190	40,916	815



Disease Management and Predictive Modeling



Disease Management and Predictive Modeling

- The chronic condition markers can be used to identify members that are candidates for disease management programs.
- The number of members with chronic conditions can be used to determine if there is sufficient membership to institute a disease management program.
- The challenge is to identify a subset of members within each chronic condition that would benefit from a disease management program.
- Members whose condition is stable and have few comorbidities may have moderate health care needs.
- Complex members with multiple comorbidities will have significant health care needs and would benefit from the focus on the care offered by a disease management program.



Disease Management and Predictive Modeling

- The ACG system offers multiple measures that can be used to identify the subset of members that would benefit the most from a disease management program.
- The ACG system calculates a predictive modeling (PM) score for each member.
- The PM score represents the probability that they will be in the top 5% most expensive members the following year.
- A PM score of .95 indicates that there is a 95% chance that a member will be among the top 5% most expensive members the next year.
- These scores can be used to identify a subset of members within each chronic condition that have significant health care needs.



Disease Management and Predictive Modeling

- The PM scores range from 0 to 1.
- Members with a PM score of .9 or higher will be very expensive the next year, but this score will identify a small number of members.
- Selecting a lower PM score will identify more members, but some of these members will have lower costs in the following year.
- The following chart identified members as high risk if they had a PM score of .6 or higher.
- The chart looks at a cohort of members that were enrolled in both FY04 and FY05.
- Their FY04 PM score is related to their FY05 expenditures.

FY 05 Health Care Utilization FY04 PM Score

Disease Category	Low PM Score in FY 04						High PM Score in FY 04					
	Total Members	Total \$ PMPM	Inpatient \$ PMPM	ER \$ PMPM	Inpatient Days 1,000 PY	ER Visits 1,000 PY	Total Members	Total \$ PMPM	Inpatient \$ PMPM	ER \$ PMPM	Inpatient Days 1,000 PY	ER Visits 1,000 PY
Arthritis	75	\$584	\$82	\$16	715	566	2	\$1497	-	\$15	-	1,000
Asthma	674	\$375	\$80	\$16	411	882	21	\$5,066	\$1,055	\$76	9,731	2,622
Back Pain	366	\$441	\$110	\$26	625	1,204	12	\$1,890	\$593	\$57	2,656	2,754
CHF	30	\$1,695	\$774	\$13	5,155	536	14	\$2,788	\$1,555	\$63	17,455	1,488
COPD	107	\$642	\$189	\$27	2,063	1,182	20	\$1,908	\$590	\$36	4,608	1,468
Depression	272	\$809	\$199	\$33	1,169	1,491	31	\$1,577	\$565	\$57	5,692	2,465
Diabetes	192	\$622	\$103	\$23	793	1,019	8	\$2,054	\$483	\$40	6,308	1,385
Hyper-lipidemia	185	\$408	\$86	\$13	780	620	4	\$3,393	\$1,595	\$100	12,766	4,851
Hypertension	214	\$484	\$153	\$13	889	674	7	\$1,946	\$1,087	\$77	5,440	3,360
Ischemic HD	66	\$902	\$265	\$18	1,934	751	12	\$956	\$26	\$38	105	1,579
Renal Failure	4	\$136	-	-	-	-	10	\$2,665	\$568	\$50	3,310	1,241
No Chronic	7,010	\$255	\$76	\$10	429	559	24	\$1,939	\$674	\$20	3,966	979
Total	9,195	\$318	\$88	\$13	523	654	165	\$2,368	\$728	\$51	6,123	2,011

Disease Management and Predictive Modeling

- The PM score identified a small subset of members within each chronic condition that had dramatically higher expenses in FY05.
- Asthmatics with a high PM score cost \$5,066 PMPM in FY05, members with a low PM score cost \$376.
- The separation between the PM groups is smaller for the CHF chronic condition group.
- All members with a high PM score cost \$2,368 in FY05, members with a low PM score cost \$318.
- The PM score offers one method for identifying an expensive subset of members within each chronic condition.
- Another alternative is to look at a member's RUB group assignment.
- The following chart relates a member's FY04 RUB group assignment to their FY05 expenditures.

FY 05 Total Expenditures FY 04 RUB Assignment

Disease Category	Non User RUB	Administrative RUB	Low RUB	Medium RUB	High RUB	Very High RUB
Arthritis	-	-	\$270	\$485	\$789	\$1,064
Asthma	-	-	\$178	\$329	\$575	\$3,279
Back Pain	-	\$31	\$232	\$406	\$620	\$1,641
CHF	-	-	-	\$1,192	\$1,756	\$2,994
COPD	-	-	\$30	\$488	\$897	\$1,285
Depression	-	-	\$742	\$663	\$841	\$1,759
Diabetes	-	-	\$663	\$581	\$746	\$1,137
Hyperlipidemia	-	-	\$169	\$422	\$409	\$1,293
Hypertension	-	-	\$176	\$395	\$554	\$2,092
Ischemia HD	-	-	-	\$946	\$412	\$1,299
Renal Failure	-	-	\$1,300	-	\$2,265	-
No Chronic	\$199	\$94	\$174	\$402	\$397	\$1,093



Disease Management and Predictive Modeling

- The RUB groups also identified a subset of members within each chronic condition that had dramatically higher expenses in FY05.
- Members in the High and Very High RUB group in FY04 were significantly more expensive in FY05 than members in the Low or Medium RUB groups within each chronic condition category.
- These observed differences were very large in some of the chronic condition groups like Asthma and Hypertension, smaller differences were observed in the CHF and Renal Failure groups.
- The variation between the RUB groups is smaller than the variation observed with the PM groups.
- The RUB groups identify a larger subset of high cost members.



Disease Management and Predictive Modeling

- Another measure created by the ACG system that can be used to identify a subset of high cost members is to look at the number of comorbidities that a member has.
- Members with multiple chronic conditions will be more complex to treat and generally have more significant health care needs.
- The chart on the following slide relates the number of chronic condition markers a member had in FY04 to their expenses in FY05.
- Members with 4 or more chronic conditions in FY04 were significantly more expensive than members with 0 or 1 chronic conditions.

FY 04 Number of Chronic Conditions FY 05 Utilization

# of Chronic Conditions	# of Members	Total \$ PMPM	Inpatient \$ PMPM	ER \$ PMPM	Inpatient Days 1,000 PY	ER Visits 1,000 PY
0	7,034	\$260	\$77	\$11	439	560
1	1,456	\$505	\$123	\$18	819	904
2	472	\$734	\$209	\$28	1,459	1,250
3	231	\$866	\$215	\$31	1588	1,331
4	98	\$1,041	\$275	\$37	2,114	1,466
5	43	\$1,387	\$348	\$33	3,645	1,038
6	19	\$1,546	\$474	\$37	3,587	1,304
7	4	\$2,166	\$735	\$43	10,957	1,304
8	1	\$1,717	-	\$69	-	2,000
9	1	\$639	-	-	-	-
10 +	1	\$3,324	\$1,223	-	11,000	-



Disease Management and Predictive Modeling

- Another measure created by the ACG system is the number of hospital dominant conditions that a member has.
- A hospital dominant condition is a diagnosis that has a high probability of requiring the member to be hospitalized in the following year.
- The higher the number of hospital dominant conditions a member has, the greater their health care needs will be in the following year.
- The following chart relates a members FY04 number of hospital dominant conditions to their FY05 expenditures.
- Members with 1 or more hospital dominant conditions were significantly more expensive the following year.

FY 04 Hospital Dominant Conditions FY 05 Utilization

# of Chronic Conditions	# of Members	Total \$ PMPM	Inpatient \$ PMPM	ER \$ PMPM	Inpatient Days 1,000 PY	ER Visits 1,000 PY
0	8,960	\$315	\$86	\$12	518	632
1	309	\$1,004	\$237	\$35	1,395	1,673
2	58	\$1,790	\$709	\$66	5,577	2,446
3	25	\$2,874	\$1,406	\$44	15,629	1,984
4	5	\$1,810	\$1,120	\$78	5,091	1,455
5	2	\$3,493	\$1,005	\$121	5,400	2,400
6 +	1	\$6,690	\$4,102	\$31	57,000	1,000



Disease Management and Predictive Modeling

- The combination of PM score, RUB group, number of chronic conditions, and number of hospital dominant conditions can be used to identify a subset of members that will be high cost in the following year.
- The following chart uses the Mercer Risk Index to identify high cost members based upon their FY04 ACG information.
- The Mercer Risk Index is then related to their FY05 health care utilization.


FY 05 Health Care Utilization FY 04 Mercer Risk Index

Disease Category	Low PM Score in FY 04						High PM Score in FY 04					
	Total Members	Total \$ PMPM	Inpatient \$ PMPM	ER \$ PMPM	Inpatient Days 1,000 PY	ER Visits 1,000 PY	Total Members	Total \$ PMPM	Inpatient \$ PMPM	ER \$ PMPM	Inpatient Days 1,000 PY	ER Visits 1,000 PY
Arthritis	68	\$561	\$59	\$16	446	529	9	\$960	\$223	\$17	2,423	923
Asthma	643	\$341	\$73	\$16	382	873	52	\$2,788	\$581	\$48	4,698	1,735
Back Pain	353	\$397	\$109	\$26	635	1,184	25	\$1,732	\$351	\$43	1,431	2,215
CHF	17	\$1,372	\$627	\$6	4,000	317	27	\$2,563	\$1,322	\$46	12,807	1,238
COPD	80	\$519	\$139	\$16	1,675	716	47	\$1,422	\$455	\$49	3,860	2,070
Depression	248	\$721	\$143	\$30	931	1,406	55	\$1,624	\$647	\$56	4,755	2,408
Diabetes	178	\$624	\$112	\$24	859	1,021	22	\$1,080	\$161	\$26	2,103	1,128
Hyper-lipidemia	171	\$390	\$89	\$12	852	552	18	\$1,246	\$411	\$42	2,913	2,155
Hypertension	200	\$401	\$90	\$13	526	647	21	\$1,795	\$1,087	\$37	5,943	1,886
Ischemic HD	44	\$640	\$186	\$15	843	618	34	\$1,265	\$285	\$30	2,724	1,215
Renal Failure	2	\$224	-	-	-	-	12	\$2,322	\$494	\$43	2,880	1,080
No Chronic	6,955	\$252	\$75	\$10	843	618	79	\$1,023	\$333	\$24	2,090	1,287
Total	8,959	\$297	\$81	\$12	477	633	401	\$1,621	\$508	\$39	3,869	1,699



Disease Management and Predictive Modeling

- Within each chronic condition category the Mercer Risk Index identifies a cohort of significantly more expensive members.
- High risk asthmatics had a total cost of \$2,788 in FY05, low risk asthmatics cost \$341.
- The relative cost of members in the high risk category was 5.5 times the cost of members in the low risk category.
- This relationship varied from a high relative cost of 10.4 in the Renal Failure category to a low of 1.71 in the Arthritis category.
- Mercer can vary the parameters of the Mercer Risk Index to identify more members, which will result in less separation between the high and low risk group, or identify a smaller subset that will have greater separation.



Predictive Modeling Results - Commercial Population

Prospective PM Results Commercial Population

PM Group	Asthma		CHF		Diabetes		Hypertension	
	Members	PMPM	Members	PMPM	Members	PMPM	Members	PMPM
0.00 - 0.010	44	\$ 91.29	0	0	0	0	1	\$ 92.90
0.011 - 0.020	254	\$ 117.33	0	0	0	0	55	\$ 83.45
0.021 - 0.100	754	\$ 386.63	0	0	595	\$ 369.90	1,371	\$ 295.82
0.110 - 0.600	171	\$ 959.88	289	\$ 565.76	333	\$ 747.94	372	\$ 553.06
0.610 - 1.00	6	\$ 6,934.96	23	\$ 3,494.31	9	\$ 2,144.41	6	\$ 1,814.58

Prospective RUB Results Commercial Population

	Asthma		CHF		Diabetes		Hypertension	
RUB Group	Members	PMPM	Members	PMPM	Members	PMPM	Members	PMPM
Low	119	\$ 98.41	0	0	110	\$ 312.74	222	\$ 142.52
Medium	883	\$ 333.86	60	\$ 474.95	600	\$ 420.22	1,204	\$ 310.27
High	187	\$ 835.93	102	\$ 572.44	147	\$ 746.90	263	\$ 514.24
Very High	40	\$ 1,708.71	150	\$ 1,030.17	80	\$ 1,142.23	116	\$ 742.02

Prospective # of Chronic Conditions Results- Commercial Population

Total Conditions	Asthma		CHF		Diabetes		Hypertension	
	Members	PMPM	Members	PMPM	Members	PMPM	Members	PMPM
1	788	\$ 300.89	15	\$ 326.19	184	\$ 420.00	1,272	\$ 314.63
2	284	\$ 452.67	41	\$ 572.04	322	\$ 530.98	448	\$ 370.13
3	97	\$ 1,220.41	84	\$ 955.85	330	\$ 530.48	85	\$ 741.79
4	48	\$ 801.66	67	\$ 458.33	81	\$ 615.48	0	0
5	11	\$ 805.61	60	\$ 1,179.37	20	\$ 775.36	0	0
6	1	\$ 233.89	33	\$ 613.83	0	0	0	0
7	0	0	11	\$ 949.70	0	0	0	0
8	0	0	1	\$ 524.97	0	0	0	0

Prospective # of Hospital Dominant Conditions Results

Commercial Population

Total Conditions	Asthma		CHF		Diabetes		Hypertension	
	Members	PMPM	Members	PMPM	Members	PMPM	Members	PMPM
0	1,214	\$ 400.70	248	\$ 583.91	884	\$ 469.44	1,769	\$ 341.00
1	8	\$ 4,434.76	56	\$ 522.34	46	\$ 1,256.65	30	\$ 784.36
2	5	\$ 1,315.41	6	\$ 10,545.15	6	\$ 2,440.55	6	\$ 413.92
3	2	\$ 2,125.03	2	\$ 1,785.95	1	\$ 799.99	0	0



Additional Predictive Modeling Strategies – Medicaid Results

Prospective PM Results by Method of Identification Diabetics

PM Group	Both Rx and ICD-9		ICD-9 Only		Rx Only	
	Members	PMPM	Members	PMPM	Members	PMPM
0 - 0.010	0	0	1	\$ 102.42	0	0
0.011 - 0.020	0	0	2	\$ 12.69	0	0
0.021 – 0.100	652	\$ 310.62	783	\$ 193.22	341	\$ 246.08
0.110 - 0.600	1,869	\$ 533.82	576	\$ 480.26	369	\$ 551.63
0.610 - 1.00	317	\$ 1,471.15	68	\$ 1,667.50	21	\$ 1,781.32
Total	2,838		1,430		731	
% high PM	11.17%		4.76%		2.87%	

Prospective PM Results by Method of Identification Asthmatics

PM Group	Both Rx and ICD-9		ICD-9 Only		Rx Only	
	Members	PMPM	Members	PMPM	Members	PMPM
0 - 0.010	2	\$ 112.65	5	\$ 126.44	1,780	\$ 56.72
0.011 - 0.020	19	\$ 53.28	646	\$ 55.17	5,466	\$ 77.74
0.021 - 0.100	18,078	\$ 143.52	3,017	\$ 136.14	14,935	\$ 146.29
0.110 - 0.600	4,179	\$ 503.78	891	\$ 473.28	3,666	\$ 548.02
0.610 - 1.00	428	\$ 1,593.40	82	\$ 1,255.75	370	\$ 2,340.77
Total	22,706		4,641		26,217	
% high PM	1.9%		1.8%		1.4%	

Prospective PM Results by Primary Chronic Condition Members with High PM Score by Hospital Dominant Condition

Primary Chronic Condition	Hospital Dominant Condition	Members	Total \$ PMPM	Inpatient \$ PMPM
Asthma	N	220	\$ 2,118.00	\$ 421.10
	Y	148	\$ 2,877.65	\$ 1,253.90
CHF	N	64	\$ 1,445.91	\$ 390.10
	Y	18	\$ 2,945.03	\$ 1,353.65
Diabetes	N	23	\$ 1,391.03	\$ 373.75
	Y	42	\$ 1,667.18	\$ 612.26
Hypertension	N	24	\$ 763.52	\$ 26.77
	Y	31	\$ 2,112.82	\$ 863.44

Questions

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