

Iowa Health Home Program

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October 1, 2019

Objectives

- Welcome and Introductions
- Message from Director Randol
- Recap
- Review of the Health Home (HH) and Integrated Health Home (IHH) Programs Feedback
- Next Steps

Recap

Processes Not People

Processes not people

Reflect on what each of us can do better

Goal to improve the program

First meeting

- Review SPA
- Discuss Iowa's Health Home model
- Overview of system review
- System review findings – being discussion
 - File reviews offer snap shot of systemic strengths and weaknesses
 - Will save value analysis discussion for deeper dive at second meeting

System Review

- Donabedian model of quality assessment
 - Structure – file review of agency files
 - Process – file review of member files
 - Outcomes – bio statistical value analysis

Recommendations

- Further data analysis was recommended to better understand the value and outcomes generated by the Health Home programs.
- Continued work to improve communication between the MCO's, Health Home providers, and Medicaid.
 - Development of guidance materials for Health Home providers,
 - Increased technical assistance
 - provider oversight
 - establishment regular meetings between providers, MCO's and Medicaid
- Additional work to align the two SPAs to improve the ability of the State to gather the data needed to illustrate SPA compliance.

Lance's Slides

Next Steps

- Putting together a provider workgroup to have feedback on the Learning Collaboratives and Performance Measures.
- By November MCOs will have a plan for 2020 for providers
- Increased oversight of providers and MCOs by the State.

Questions?



Iowa Health Home Programs Analytical Review

Lance Roberts
October 1, 2019

Healthcare Intelligence

Objectives

- Review General Analytic Approach
 - Integrated Health Homes (IHH and IHH-ICM)
 - Chronic Condition Health Home (CCHH Tiers 1 – 4)
- Review General Analytic Methods
- Review Analytic Results
 - Top 10 primary diagnosis (DX) conditions
 - Cost (Allowed Amounts, Expenditures)
 - Utilization
 - Inpatient Hospitalizations
 - Emergency Department (ED) Visits
 - Observation Room Visits

6 Analytical Target Populations

IHH – ICM	Tier 7 – IHH-ICM	Adult ICM
	Tier 8 – IHH-ICM	Child ICM
IHH	Tier 5 – IHH	Adult Non-ICM
	Tier 6 – IHH	Child Non-ICM
4 CCHH Tiers	Tier 1 - CCHH	1 – 3 chronic conditions
	Tier 2 - CCHH	4 – 6 chronic conditions
	Tier 3 - CCHH	7 – 9 chronic conditions
	Tier 4 - CCHH	10+ chronic conditions

General Methods

– Quasi-Experimental Design

- 2 Cohorts - Treatment and Control
- Time Periods
 - 15-Month Pre/Baseline period
 - 21-Month Post/Evaluation period
- PRE/BASELINE Period - \$PMPM average (15-month average)
- POST/EVAL Period – Monthly Difference in \$PMPM costs

“Change” or “Difference” = (Current \$PMPM – Baseline \$PMPM)

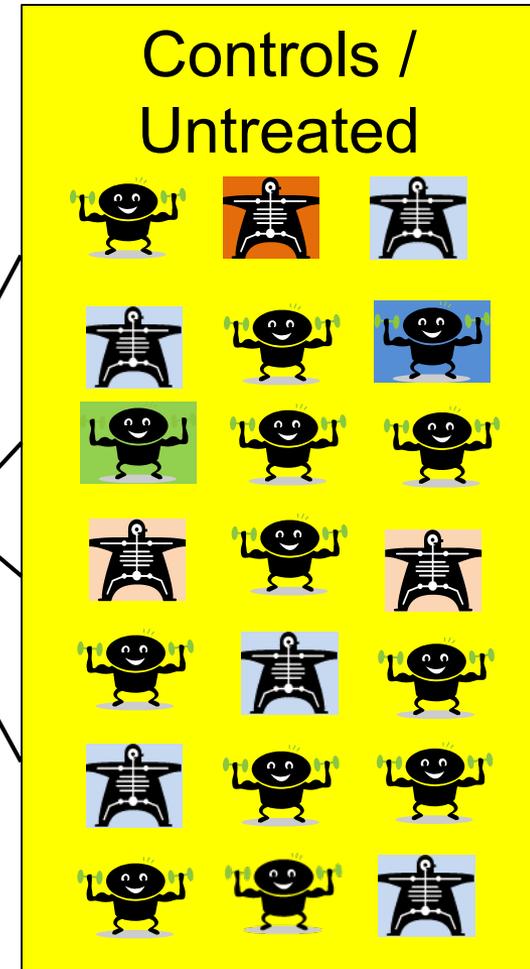
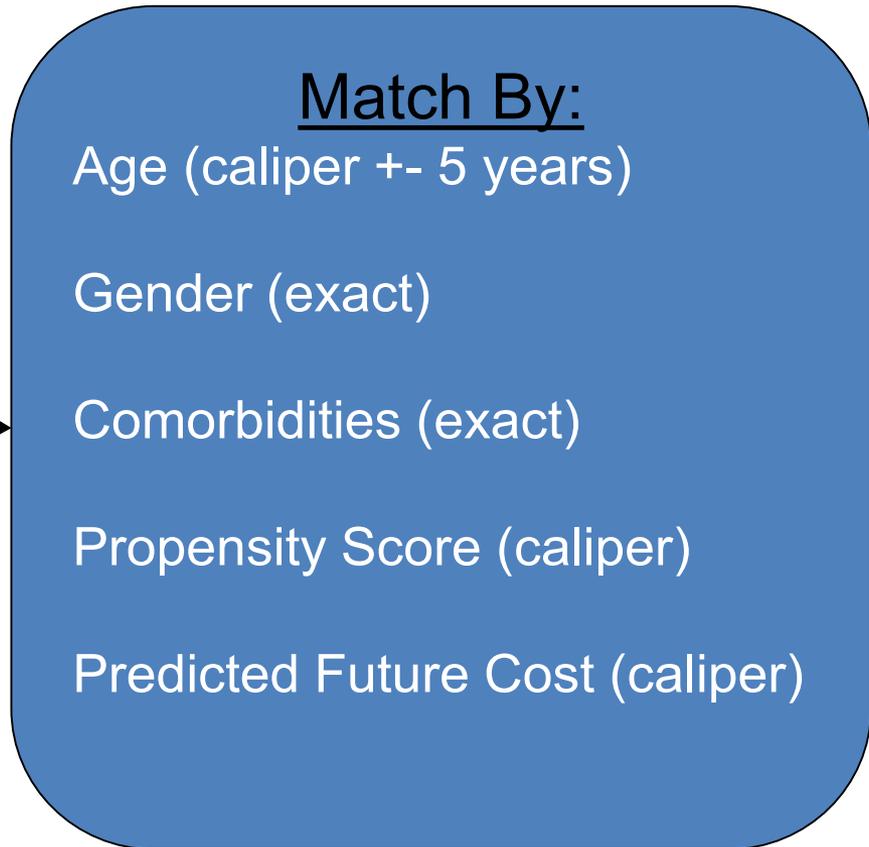
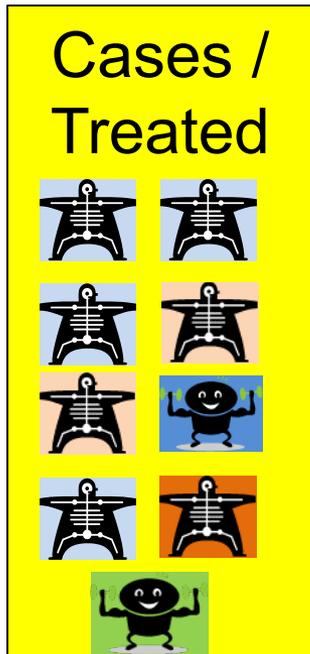
PRE – BASELINE Period

POST – EVALUATION Period

Magellan												MCO / FFS																							
Magellen End >>>												>>> FFS Span >>>																							
2015												2016												2017											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Case/Trmt BASELINE Period (up to 15 months)												Case/ Trmt POST Period (up to 21 months)																							
Control BASELINE Period (up to 15 months)												Control POST Period (up to 21 months)																							

General Methods – Cohort Construction

Matching - Propensity Scoring - Predictive Modeling



General Methods

Key Exclusions:

- Age < 2 at end of baseline period
- Medicare/Medicaid dual-eligible (no Medicare data available)
- Members w/o ≥ 15 months Pre and Post period enrollment

Dose Criteria:

- “Pure”/“Strong” dose:
- TRMT and CNTL members could not switch Tiers
- TRMT cohort 15 months treatment status in PRE period and $\geq 50\%$ months treatment status in POST period

IHH Analyses – Comparability Criteria:

- IHH and IHH-ICM CNTL cohort – must have SMI/SED diagnoses
- IHH-ICM CNTL cohort must have ≥ 1 inpatient hospitalization or ≥ 1 ED visit during PRE period

CCHH Analyses - Comparability Criteria:

- TRMT and CNTL count of chronic conditions must match CCHH Tier criteria (among 28 nationally salient chronic conditions)

Risk Adjustment

Outcomes = f (treatment, demographics, health status, setting)

“Case mix” “risk” “intensity” “severity” “sickness”
“complexity” “comorbidity” “health status” “controlled”

Contextual Use – risk adjustment used to isolate the relationship between the outcome of interest and the treatment provided by controlling for the effects of other relevant material

Sources:

Iezzoni L (Ed.). Risk Adjustment for Measuring Health Outcomes (3rd ed.). (2003). Chicago, Illinois: Health Administration Press.

Kane RL (Ed). (2006). Understanding Health Care Outcomes Research (2nd ed.). Sudbury, Massachusetts: Jones and Bartlett Publishers.

General Methods – Cost-based Analyses

Repeated measures linear multiple regression

Dependent / Response Variable:

Change in \$PMPM (Current PMPM – Baseline PMPM)

Independent Variables:

Cohort Group (TRMT or CONTROL)

Month

Cohort Group * Month

Baseline \$PMPM

Age

Gender

LTSS – Long-term Services & Support

County of Residence

Multiple Chronic Conditions, Severity Indicator, and several Emergent Health Status risk adjustment variables

General Methods – Utilization-based Analyses

Cross-sectional (POST/EVAL period) multiple regression. Count-based models.

Key Exclusions - Counts of Primary DX1-diagnosed Mat/OB and Neonatal events

Dependent / Response Variables:

- Count of Inpatient Hospitalizations

- Count of ED Visits

- Count of Observation Room Visits

Independent Variables:

- Cohort Group (TRMT or CONTROL)

- Baseline \$PMPM

- Age

- Gender

- Long-term Services & Support indicator (≥ 1 month LTSS)

- County of Residence in an Iowa metropolitan area (most common county of residence)

IHH (Tiers 5 and 6)



IHH (Tiers 5 and 6)

N = 4,087

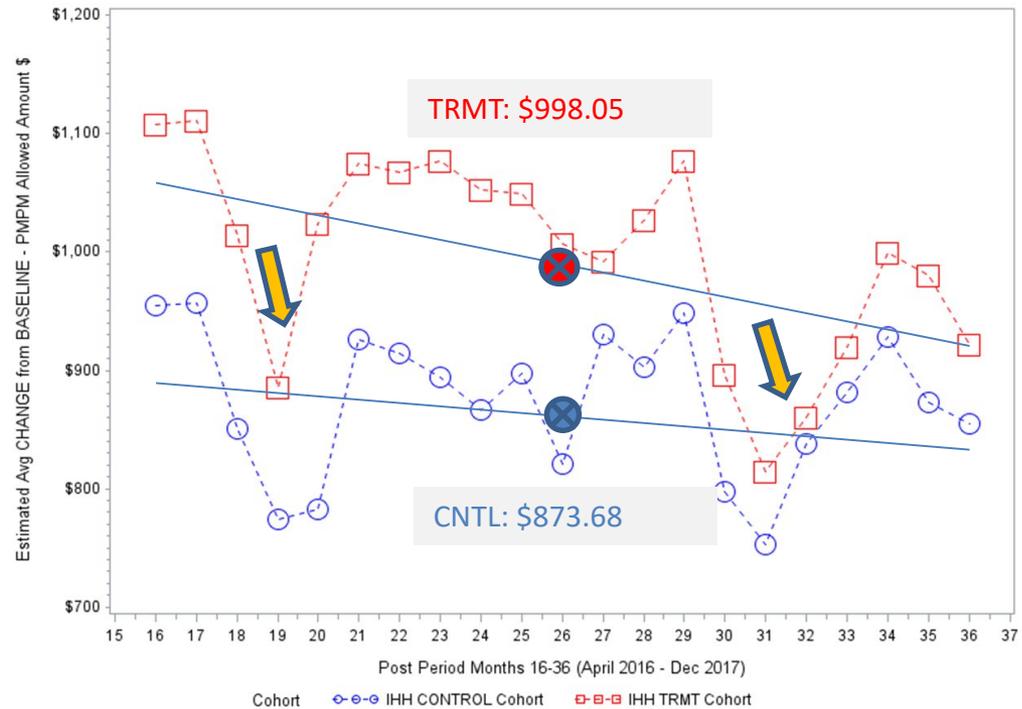
Rank	Chronic Condition	N	Prevalence (%)
1	Attention Deficit/Conduct/Disrupt Behavior	2,703	66.1%
2	Mood (Depression) Disorder	1,940	47.5%
3	Anxiety Disorder	1,893	46.3%
4	Adjustment Disorder	1,184	29.0%
5	Back Problems	987	24.1%
6	Mental Health Disorders in Child/Infancy/Adolesc	635	15.5%
7	Asthma	612	15.0%
8	Screen/Hist of Mental Health and Subst Abuse	514	12.6%
9	Substance-related Disorder	503	12.3%
10	Obesity	473	11.6%

IHH (Tiers 5 and 6) - Cost

Cohort	N
TRMT	3,969
CONTROL	3,969

TRMT Cohort compared to CONTROL Cohort		
LCL (95% C.I.)	Diff in Means	UCL (95% C.I.)
\$84	\$124	\$165

IHH – Run 13



Other Notes:

Response profiles are different

TRMT - \$7.76 CONTROL - \$1.45 [Linear trends “cross” in Oct 2018]

IHH (Tiers 5 and 6) - Cost

Sensitivity Analyses

Program / Sensitivity Analysis	Difference in Average Change in PMPM cost (Treatment – Control)	95% C.I.
<i>IHH</i>		
Sensitivity Dataset #2	\$174	\$135 - \$212
Primary Dataset #1 – With Acute/Severe Members Excluded	\$195	\$135 - \$255
Sensitivity Dataset #2 – With Acute/Severe Members Excluded	\$186	\$124 - \$247
Primary Dataset #1 – Adults Only (>= 18 yrs. old)	(\$2)	(\$87) - \$82
Sensitivity Dataset #2 – Adults Only (>= 18 yrs. old)	\$24	(\$65) - \$112
Primary Dataset #1 – Adults Only (>= 18 yrs. old) and With Acute/Severe Members Excluded	\$182	\$31 - \$333
Sensitivity Dataset #2 – Adults Only (>= 18 yrs. old) and With Acute/Severe Members Excluded	\$32	(\$169) - \$232
Primary Dataset #1 – Children Only (< 18 yrs. old)	\$167	\$112 - \$222
Sensitivity Dataset #2 – Children Only (< 18 yrs. old)	\$197	\$153 - \$241
Primary Dataset #1 – Children Only (< 18 yrs. old) and With Acute/Severe Members Excluded	\$209	\$143 - \$275
Sensitivity Dataset #2 – Children Only (< 18 yrs. old) and With Acute/Severe Members Excluded	\$204	\$137 - \$270

IHH (Tiers 5 and 6) - Utilization

Control Cohort			Treatment Cohort		
Total Count - Inpatient Hospitalizations	Frequency	Percent	Total Count - Inpatient Hospitalizations	Frequency	Percent
0	3,611	90.98	0	3,346	84.3
1	271	6.83	1	394	9.93
2	56	1.41	2	118	2.97
3	18	0.45	3	58	1.46
4	6	0.15	4	18	0.45
5	4	0.1	5	11	0.28
6	2	0.05	7	4	0.1
7	1	0.03	8	4	0.1
			9	2	0.05
			11	1	0.03
			12	1	0.03
			13	1	0.03
			14	2	0.05
			16	1	0.03

IHH (Tiers 5 and 6) - Utilization

Cohort	Inpatient Event Sum	Inpatient LOS Sum	Total Days Eligibility	Rate - Inpatient Events per 1,000 Days	Rate - Inpatient LOS per 1,000 Days
Control	500	6,504	249,1350	0.20069	2.61
Treatment	1,137	27,713	251,2281	0.45258	11.03
<i>Maternal/OB-related Events and LOS</i>					
Control	35	84	249,1350	0.01405	0.03372
Treatment	53	190	251,2281	0.02110	0.07563
<i>Neonatal-related Events and LOS</i>					
Control	0	0	249,1350	0	0
Treatment	0	0	251,2281	0	0
<i>Mental Health-related Events and LOS</i>					
Control	243	4,179	249,1350	0.09754	1.68
Treatment	764	22,817	251,2281	0.30411	9.08
<i>External Cause of Injury-related Events and LOS</i>					
Control	0	0	249,1350	0	0
Treatment	0	0	251,2281	0	0

764/1,137 = 67.2% of events are primary DX1 mental health-related conditions

22,817/27,713 = 82.3% of LOS days are primary DX1 mental health-related conditions

IHH (Tiers 5 and 6) - Utilization

Percent Difference in Expected Count of Inpatient Stay Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>IHH</i>		
91.06%	63.26%	123.56%

IHH (Tiers 5 and 6) - Utilization

Control Cohort			Treatment Cohort		
Total Count - ED Visits	Frequency	Percent	Total Count - ED Visits	Frequency	Percent
0	2,323	58.53	0	1,703	42.91
1	870	21.92	1	873	22
2	410	10.33	2	497	12.52
3	189	4.76	3	283	7.13
4	79	1.99	4	175	4.41
5	50	1.26	5	120	3.02
6	16	0.4	6	88	2.22
7	7	0.18	7	41	1.03
8	11	0.28	8	44	1.11
9	6	0.15	9	24	0.6
10	2	0.05	10	28	0.71
11	2	0.05	11	24	0.6
12	2	0.05	12	8	0.2
14	1	0.03	13	10	0.25
25	1	0.03	14	11	0.28
			15	7	0.18
			16	7	0.18
			17	2	0.05
			18	3	0.08
			19	2	0.05
			20	2	0.05
			21	5	0.13
			23	1	0.03
			24	2	0.05
			25	1	0.03
			26	2	0.05
			29	1	0.03
			35	1	0.03
			40	1	0.03
			45	1	0.03
			47	1	0.03
			57	1	0.03

IHH (Tiers 5 and 6) - Utilization

Cohort	ED Visit Event Sum	Total Days Eligibility	Rate - ED Visit Events per 1,000 Days
Control	3,215	2,491,350	1.29
Treatment	7,212	2,512,281	2.87
<i>Maternal/OB-related Events</i>			
Control	42	2,491,350	0.01686
Treatment	111	2,512,281	0.04418
<i>Neonatal-related Events</i>			
Control	0	2,491,350	0
Treatment	0	2,512,281	0
<i>Mental Health-related Events</i>			
Control	393	2,491,350	0.15775
Treatment	877	2,512,281	0.34909
<i>External Cause of Injury-related Events</i>			
Control	4	2,491,350	0.00161
Treatment	5	2,512,281	0.00199

877/7,212 = 12.2% of events are primary DX1 mental health-related conditions

IHH (Tiers 5 and 6) - Utilization

Percent Difference in Expected Count of ED Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>IHH</i>		
97.25%	83.82%	111.64%

IHH (Tiers 5 and 6) - Utilization

Control Cohort			Treatment Cohort		
Total Count – Observation Room Visits	Frequency	Percent	Total Count – Observation Room Visits	Frequency	Percent
0	3905	98.39	0	3895	98.14
1	52	1.31	1	65	1.64
2	8	0.2	2	6	0.15
4	1	0.03	3	3	0.08
9	3	0.08			

IHH (Tiers 5 and 6) - Utilization



Cohort	Observation Room Event Sum	Total Days Eligibility	Rate - Observation Room Events per 1,000 Days
Control	99	2,491,350	0.03974
Treatment	86	2,512,281	0.03423
<i>Maternal/OB-related Events</i>			
Control	3	2,491,350	0.00120
Treatment	11	2,512,281	0.00438
<i>Neonatal-related Events</i>			
Control	0	2,491,350	0
Treatment	0	2,512,281	0
<i>Mental Health-related Events</i>			
Control	7	2,491,350	0.00281
Treatment	19	2,512,281	0.00756
<i>External Cause of Injury-related Events</i>			
Control	0	2,491,350	0
Treatment	1	2,512,281	0.00040

IHH (Tiers 5 and 6) - Utilization

Percent Difference in Expected Count of Observation Room Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>IHH</i>		
(10.58%)	(38.30%)	29.62%

IHH (Tiers 5 and 6) – Observations

Observations:

- Higher expenditures
 - Expenditure trend was decreasing
 - Expenditures “lower” during summer months (both cohorts)
 - Children – incurred higher expenditures on average compared to adults
- Incidence of hospitalizations was higher (almost double)
- Incidence of ED visit events was higher (almost double)
- Several “high” hospitalization and ED visit utilizers
- Hospitalization events – “high” proportion mental health related
- ED visit events – “moderately high” proportion mental health related

IHH-ICM (Tiers 7 and 8)



IHH-ICM (Tiers 7 and 8)

N = 770

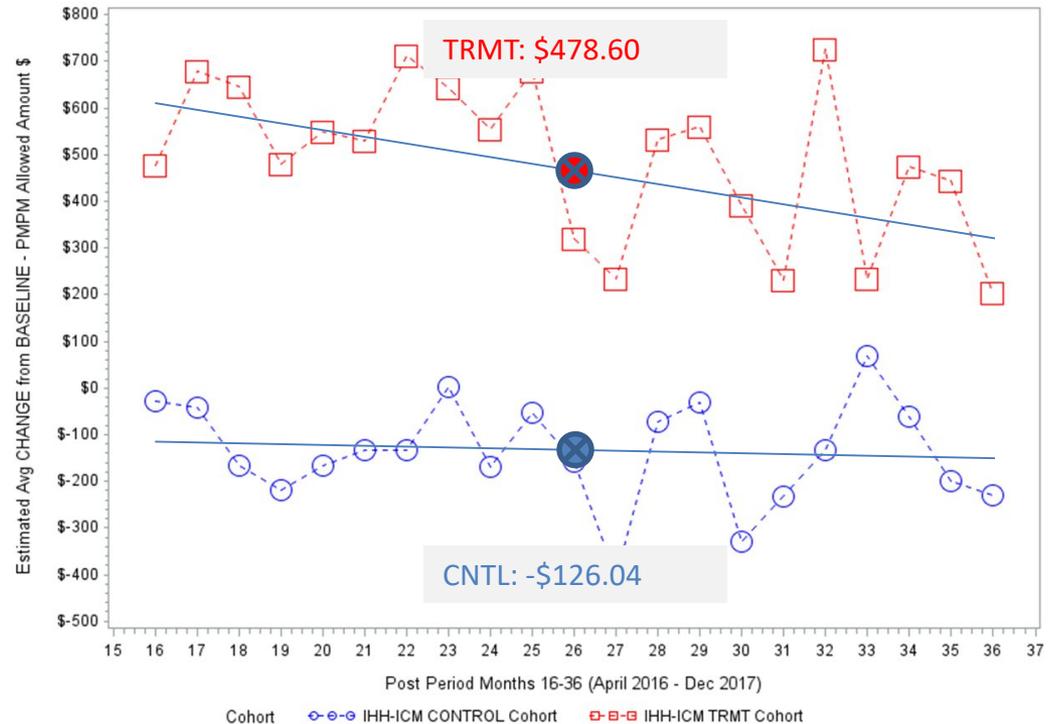
Rank	Chronic Condition	N	Prevalence (%)
1	Anxiety Disorder	456	59.2%
2	Mood (Depression) Disorder	411	53.4%
3	Schizophrenia	380	49.4%
4	Attention Deficit/Conduct/Disrupt Behavior	286	37.1%
5	Back Problems	285	37.0%
6	Hyperlipidemia	248	32.2%
7	Screen/Hist of Mental Health and Subst Abuse	246	31.9%
8	Hypertension - Essential	236	30.6%
9	Substance-related Disorder	225	29.2%
10	Obesity	207	26.9%

IHH-ICM (Tiers 7 and 8) - Cost

IHH-ICM – Run 4

Cohort	N
TRMT	525
CONTROL	525

TRMT Cohort compared to CONTROL Cohort		
LCL (95% C.I.)	Diff in Means	UCL (95% C.I.)
\$415	\$605	\$794



Other Notes:

Response profiles not different

TRMT - \$13.46 CONTROL - \$2.50 [Linear trends “cross” in Dec 2021]

IHH-ICM Treatment cohort are individuals, by definition, receiving either 1915(i) Habilitation Services or 1915(c) Children’s Mental Health Waiver Services that individuals in the Control group are not receiving. These costs are reflected in the total costs in these data.

IHH-ICM (Tiers 7 and 8) - Cost

Sensitivity Analyses

Program / Sensitivity Analysis	Difference in Average Change in PMPM cost (Treatment – Control)	95% C.I.
<i>IHH-ICM</i>		
Sensitivity Dataset #2	\$455	\$264 - \$647
Primary Dataset #1 – With Acute/Severe Members Excluded ¹	\$545	\$208 - \$881
Sensitivity Dataset #2 – With Acute/Severe Members Excluded ²	\$761	\$333 - \$1,190
Primary Dataset #1 – With Habilitation/CMH Waiver Costs Excluded	\$295	\$136 - \$455
Primary Dataset #1 – With Habilitation/CMH Waiver Costs Excluded ¹	\$291	\$132 - \$449
Sensitivity Dataset #2 – With Habilitation/CMH Waiver Costs Excluded ²	\$352	\$211 - \$493
Primary Dataset #1 – With Habilitation/CMH Waiver Costs Excluded and Acute/Severe Members Excluded ¹	\$274	\$8 - \$541
Sensitivity Dataset #2 – With Habilitation/CMH Waiver Costs Excluded and Acute/Severe Members Excluded ²	\$615	\$260 - \$971

IHH-ICM (Tiers 7 and 8) - Cost

Sensitivity Analyses

Primary Dataset #1 – Adults Only (>= 18 yrs. old)	\$851	\$604 - \$1,099
Sensitivity Dataset #2 – Adults Only (>= 18 yrs. old)	\$629	\$277 - \$980
Primary Dataset #1 – Adults Only (>= 18 yrs. old) and With Acute/Severe Members Excluded	\$671	\$277 - \$1,066
Sensitivity Dataset #2 – Adults Only (>= 18 yrs. old) and With Acute/Severe Members Excluded	\$509	(\$289) - \$1,307
Primary Dataset #1 – Adults Only (>= 18 yrs. old) and With Habilitation/CMH Waiver Costs Excluded	\$283	\$89 - \$476
Sensitivity Dataset #2 – Adults Only (>= 18 yrs. old) and Habilitation/CMH Waiver Costs Excluded	\$275	\$37 - \$513
Primary Dataset #1 – Adults Only (>= 18 yrs. old) and With Habilitation/CMH Waiver Costs Excluded and With Acute/Severe Members Excluded	\$149	(\$135) - \$433
Sensitivity Dataset #2 – Adults Only (>= 18 yrs. old) and With Habilitation/CMH Waiver Costs Excluded and With Acute/Severe Members Excluded	\$535	\$177 - \$893

IHH-ICM (Tiers 7 and 8) - Cost

Sensitivity Analyses

Primary Dataset #1 – Children Only (< 18 yrs. old)	\$211	(\$46) - \$468
Sensitivity Dataset #2 – Children Only (< 18 yrs. old)	\$279	\$53 - \$503
Primary Dataset #1 – Children Only (< 18 yrs. old) and With Acute/Severe Members Excluded	\$250	(\$390) - \$890
Sensitivity Dataset #2 – Children Only (< 18 yrs. old) and With Acute/Severe Members Excluded	\$541	(\$72) - \$1,154
Primary Dataset #1 – Children Only (< 18 yrs. old) and With Habilitation/CMH Waiver Costs Excluded	\$297	\$87 - \$506
Sensitivity Dataset #2 – Children Only (< 18 yrs. old) and With Habilitation/CMH Waiver Costs Excluded	\$369	\$157 - \$582
Primary Dataset #1 – Children Only (< 18 yrs. old) and With Habilitation/CMH Costs Excluded and With Acute/Severe Members Excluded	\$221	(\$308) - \$750
Sensitivity Dataset #2 – Children Only (< 18 yrs. old) and With Habilitation/CMH Waiver Costs Excluded and With Acute/Severe Members Excluded	\$638	\$9 - \$1,267

Notes: Acute/Severe Members excluded analyses excluded entire matched

Pairs/sets of members in which at least one of the members had an acute/severe condition.

- 1 = analysis also excluded 4 treatment cohort member months with unusually “high” change in PMPM costs.
- 2 = analysis also excluded 1 treatment cohort member month with an unusually “high” change in PMPM cost.

IHH-ICM (Tiers 7 and 8) - Utilization



Control Cohort			Treatment Cohort		
Total Count - Inpatient Hospitalizations	Frequency	Percent	Total Count - Inpatient Hospitalizations	Frequency	Percent
0	404	76.95	0	396	75.43
1	78	14.86	1	76	14.48
2	23	4.38	2	22	4.19
3	10	1.9	3	12	2.29
4	5	0.95	4	8	1.52
5	4	0.76	5	5	0.95
7	1	0.19	6	1	0.19
			7	2	0.38
			8	2	0.38
			10	1	0.19

IHH-ICM (Tiers 7 and 8) - Utilization



Cohort	Inpatient Event Sum	Inpatient LOS Sum	Total Days Eligibility	Rate - Inpatient Events per 1,000 Days	Rate - Inpatient LOS per 1,000 Days
Control	201	14,507	329,586	0.60986	44.02
Treatment	259	11,176	334,776	0.77365	33.38
<i>Maternal/OB-related Events and LOS</i>					
Control	9	29	329,586	0.02731	0.08799
Treatment	4	11	334,776	0.01195	0.03286
<i>Neonatal-related Events and LOS</i>					
Control	0	0	329,586	0	0
Treatment	0	0	334,776	0	0
<i>Mental Health-related Events and LOS</i>					
Control	72	8,001	329,586	0.21846	24.28
Treatment	163	8,586	334,776	0.48689	25.65
<i>External Cause of Injury-related Events and LOS</i>					
Control	0	0	329,586	0	0
Treatment	0	0	334,776	0	0

163/259 = 62.9% of events are primary DX1 mental health-related conditions

8,586/11,176 = 76.8% of LOS days are primary DX1 mental health-related conditions

IHH-ICM (Tiers 7 and 8) - Utilization



Percent Difference in Expected Count of Inpatient Stay Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>IHH-ICM</i>		
13.70%	(14.54%)	51.26%

IHH-ICM (Tiers 7 and 8) - Utilization



Control Cohort			Treatment Cohort		
Total Count - ED Visits	Frequency	Percent	Total Count - ED Visits	Frequency	Percent
0	160	30.48	0	256	48.76
1	118	22.48	1	100	19.05
2	72	13.71	2	51	9.71
3	54	10.29	3	31	5.9
4	36	6.86	4	13	2.48
5	15	2.86	5	15	2.86
6	15	2.86	6	17	3.24
7	8	1.52	7	6	1.14
8	11	2.1	8	1	0.19
9	6	1.14	9	3	0.57
10	4	0.76	10	4	0.76
11	6	1.14	11	5	0.95
12	4	0.76	12	4	0.76
13	3	0.57	13	1	0.19
14	3	0.57	14	1	0.19
15	1	0.19	15	3	0.57
16	1	0.19	16	1	0.19
17	2	0.38	17	3	0.57
18	2	0.38	18	1	0.19
19	2	0.38	19	2	0.38
23	2	0.38	20	1	0.19
			21	1	0.19
			22	1	0.19
			28	1	0.19
			37	1	0.19
			38	1	0.19
			41	1	0.19

IHH-ICM (Tiers 7 and 8) - Utilization



Cohort	ED Visit Event Sum	Total Days Eligibility	Rate - ED Visit Events per 1,000 Days
Control	1,351	329,586	4.10
Treatment	1,146	334,776	3.42
<i>Maternal/OB-related Events</i>			
Control	12	329,586	0.03641
Treatment	36	334,776	0.10753
<i>Neonatal-related Events</i>			
Control	0	329,586	0
Treatment	0	334,776	0
<i>Mental Health-related Events</i>			
Control	143	329,586	0.43388
Treatment	229	334,776	0.68404
<i>External Cause of Injury-related Events</i>			
Control	1	329,586	0.00303
Treatment	0	334,776	0

229/1,146 = 20.0% of events are primary DX1 mental health-related conditions

IHH-ICM (Tiers 7 and 8) - Utilization



Percent Difference in Expected Count of ED Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>IHH-ICM</i>		
(24.62%)	(36.99%)	(9.82%)

IHH-ICM (Tiers 7 and 8) - Utilization



Control Cohort			Treatment Cohort		
Total Count – Observation Room Visits	Frequency	Percent	Total Count – Observation Room Visits	Frequency	Percent
0	507	96.57	0	508	96.76
1	14	2.67	1	10	1.9
2	2	0.38	2	6	1.14
4	1	0.19	3	1	0.19
6	1	0.19			

IHH-ICM (Tiers 7 and 8) - Utilization



Cohort	Observation Room Event Sum	Total Days Eligibility	Rate - Obs Room Events per 1,000 Days
Control	28	329,586	0.08496
Treatment	25	334,776	0.07468
<i>Maternal/OB-related Events</i>			
Control	0	329,586	0
Treatment	3	334,776	0.00896
<i>Neonatal-related Events</i>			
Control	0	329,586	0
Treatment	0	334,776	0
<i>Mental Health-related Events</i>			
Control	3	329,586	0.00910
Treatment	4	334,776	0.01195
<i>External Cause of Injury-related Events</i>			
Control	0	329,586	0
Treatment	0	334,776	0

IHH-ICM (Tiers 7 and 8) - Utilization



Percent Difference in Expected Count of Observation Room Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>IHH-ICM</i>		
(45.36%)	(73.49%)	12.63%

IHH-ICM (Tiers 7 and 8) – Observations



Observations:

- Higher expenditures
 - Adults – incurred higher expenditures on average compared to children
- Incidence of ED visits was lower
- A few “high” hospitalization and ED visit utilizers
- Hospitalization events – “high” proportion mental health related
- ED visit events – “moderately high” proportion mental health related

CCHH (Tier 1)



CCHH (Tier 1)

N = 120

Rank	Chronic Condition	N	Prevalence (%)
1	Asthma	70	58.3%
2	Obesity	32	26.7%
3	Mood (Depression) Disorder	21	17.5%
4	Back Problems	20	16.7%
5.5	Hypertension - Essential	4	3.3%
5.5	Cardiac Dysrhythmia	4	3.3%
7	Autism	4	3.3%
8	Hyperlipidemia	3	2.5%
9.5	Substance-related Disorder	2	1.7%
9.5	Severe/Acute Conditions	2	1.7%

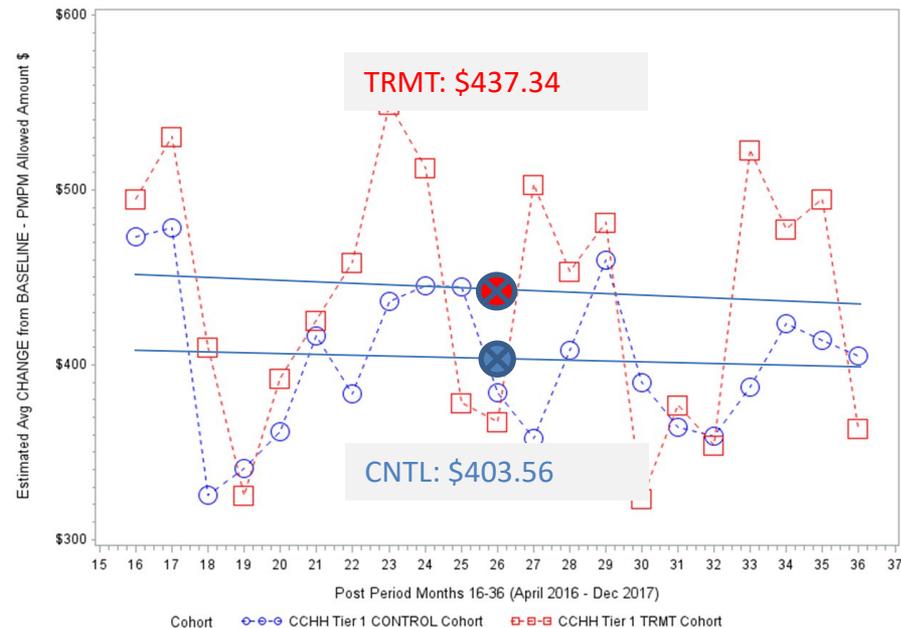
Note: Severe/Acute Conditions include any one or more of the following events/conditions: septicemia, shock, peritonitis/intestinal abscess, pulmonary embolism (PE)/deep vein thrombosis (DVT), gastrointestinal hemorrhage, epilepsy/convulsions, coma/stupor/brain damage, respiratory failure and cardiac arrest/ventricular fibrillation.

CCHH (Tier 1) - Cost

CCHH Tier 1 – Run 1

Cohort	N
TRMT	117
CONTROL	578

TRMT Cohort compared to CONTROL Cohort		
LCL (95% C.I.)	Diff in Means	UCL (95% C.I.)
-\$33	\$34	\$100



Other Notes:

1 TRMT Member-month “outlier” removed

Response profiles not different

TRMT - \$1.21 CONTROL - \$0.64 [Linear trends “cross” in May 2022]

CCHH (Tier 1) - Cost

Sensitivity Analyses

Program / Sensitivity Analysis	Difference in Average Change in PMPM cost (Treatment – Control)	95% C.I.
<i>CCHH Tier 1</i>		
Primary Dataset #1 – With Acute/Severe Members Excluded	###	###
Primary Dataset #1 – Adults Only (>= 18 yrs. old) ¹	\$210	(\$331) - \$751
Primary Dataset #1 – Children Only (< 18 yrs. old)	\$24	(\$45) - \$94

Notes: ### - Sensitivity analysis not conducted as only 8 of 117 (6.8%) of matched pairs in the analysis had no acute/severe events.

1 = only 9 of 117 (7.7%) of dataset were adults.

CCHH Tier 1 - Utilization

Control Cohort			Treatment Cohort		
Total Count - Inpatient Hospitalizations	Frequency	Percent	Total Count - Inpatient Hospitalizations	Frequency	Percent
0	532	92.04	0	113	96.58
1	37	6.4	1	4	3.42
2	7	1.21			
3	2	0.35			

CCHH Tier 1 - Utilization



Cohort	Inpatient Event Sum	Inpatient LOS Sum	Total Days Eligibility	Rate - Inpatient Events per 1,000 Days	Rate - Inpatient LOS per 1,000 Days
Control	57	1485	362,862	0.15708	4.09
Treatment	4	11	73,871	0.05415	0.15
<i>Maternal/OB-related Events and LOS</i>					
Control	17	42	362,862	0.04685	0.11575
Treatment	2	6	73,871	0.02707	0.08122
<i>Neonatal-related Events and LOS</i>					
Control	0	0	362,862	0	0
Treatment	0	0	73,871	0	0
<i>Mental Health-related Events and LOS</i>					
Control	22	707	362,862	0.06063	1.9484
Treatment	2	5	73,871	0.02707	0.0677
<i>External Cause of Injury-related Events and LOS</i>					
Control	0	0	362,862	0	0
Treatment	0	0	73,871	0	0

CCHH Tier 1 - Utilization

Percent Difference in Expected Count of Inpatient Stay Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 1</i>		
(75.44%)	(97.12%)	(5.29%)

CCHH Tier 1 - Utilization

Control Cohort			Treatment Cohort		
Total Count - ED Visits	Frequency	Percent	Total Count - ED Visits	Frequency	Percent
0	308	53.29	0	68	58.12
1	115	19.9	1	26	22.22
2	56	9.69	2	10	8.55
3	48	8.3	3	5	4.27
4	20	3.46	4	2	1.71
5	15	2.6	5	1	0.85
6	3	0.52	6	2	1.71
7	5	0.87	7	2	1.71
8	3	0.52	11	1	0.85
9	2	0.35			
10	2	0.35			
18	1	0.17			

CCHH Tier 1 - Utilization



Cohort	ED Visit Event Sum	Total Days Eligibility	Rate - ED Visit Events per 1,000 Days
Control	659	362,862	1.82
Treatment	111	73,871	1.50
<i>Maternal/OB-related Events</i>			
Control	10	362,862	0.02756
Treatment	2	73,871	0.02707
<i>Neonatal-related Events</i>			
Control	0	362,862	0
Treatment	0	73,871	0
<i>Mental Health-related Events</i>			
Control	36	362,862	0.09921
Treatment	6	73,871	0.08122
<i>External Cause of Injury-related Events</i>			
Control	0	362,862	0
Treatment	0	73,871	0

CCHH Tier 1 - Utilization

Percent Difference in Expected Count of ED Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 1</i>		
(23.67%)	(45.21%)	6.34%

CCHH Tier 1 - Utilization

Control Cohort			Treatment Cohort		
Total Count – Observation Room Visits	Frequency	Percent	Total Count – Observation Room Visits	Frequency	Percent
0	571	98.79	0	115	98.29
1	5	0.87	1	2	1.71
2	2	0.35			

CCHH Tier 1 - Utilization



Cohort	Observation Room Event Sum	Total Days Eligibility	Rate - Observation Room Events per 1,000 Days
Control	9	362,862	0.02480
Treatment	2	73,871	0.02707
<i>Maternal/OB-related Events</i>			
Control	4	362,862	0.01102
Treatment	1	73,871	0.01354
<i>Neonatal-related Events</i>			
Control	0	362,862	0
Treatment	0	73,871	0
<i>Mental Health-related Events</i>			
Control	0	362,862	0
Treatment	0	73,871	0
<i>External Cause of Injury-related Events</i>			
Control	0	362,862	0
Treatment	0	73,871	0

CCHH Tier 1 - Utilization

Percent Difference in Expected Count of Observation Room Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 1</i>		
(1.76%)	(97.92%)	777.96%

CCHH Tier 1 – Observations

Observations:

- No difference in expenditures
- Incidence of hospitalizations was lower

CCHH (Tier 2)



CCHH (Tier 2)

N = 41

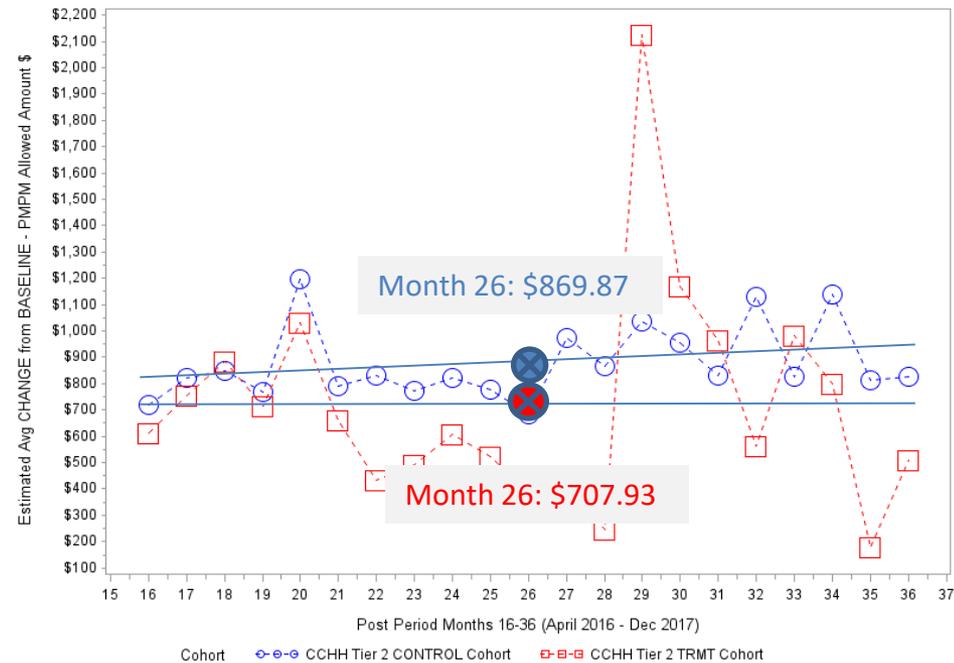
Rank	Chronic Condition	N	Prevalence (%)
1.5	Hypertension - Essential	26	63.4%
1.5	Mood (Depression) Disorder	26	63.4%
3	Substance-related Disorder	23	56.1%
4	Back Problems	22	53.7%
5	Hyperlipidemia	20	48.8%
6	Obesity	18	43.9%
7	Diabetes Without Complications	11	26.8%
8.5	COPD	9	22.0%
8.5	Asthma	9	22.0%
10	Schizophrenia	8	19.5%

CCHH (Tier 2) - Cost

CCHH Tier 2 – Run 11

Cohort	N
TRMT	41
CONTROL	325

TRMT Cohort compared to CONTROL Cohort		
LCL (95% C.I.)	Diff in Means	UCL (95% C.I.)
- \$392	- \$162	\$69



Other Notes:

Response profiles not different

TRMT \$0.92 CONTROL \$6.67 [Linear trends diverge]

CCHH (Tier 2) - Cost

Sensitivity Analyses

Program / Sensitivity Analysis	Difference in Average Change in PMPM cost (Treatment – Control)	95% C.I.
<i>CCHH Tier 2</i>		
Primary Dataset #1 – With Acute/Severe Members Excluded	***	***
Primary Dataset #1 – Remove “high” cost outliers ²	(\$210)	(\$411) - (\$9)
Sensitivity Dataset #2	(\$380)	(\$779) - \$19
Primary Dataset #1 – Adults Only (>= 18 yrs. old)	(\$158)	(\$402) - \$85
Sensitivity Dataset #2 – Adults Only (>= 18 yrs. old)	(\$368)	(\$808) - \$73
Primary Dataset #1 – Children Only (< 18 yrs. old)	+++	+++

Notes: *** - Sensitivity analysis not conducted as 41 of 41 (100%) of matched Treatment/Control sets in the analysis had no acute/severe events.

+++ - Sensitivity analysis not conducted as no children met the “child” inclusion criteria for the analysis.

2 = removed 2 Treatment cohort-related “high” cost member months (Month 29) from analysis.

CCHH Tier 2 - Utilization



Control Cohort			Treatment Cohort		
Total Count - Inpatient Hospitalizations	Frequency	Percent	Total Count - Inpatient Hospitalizations	Frequency	Percent
0	264	81.23	0	34	82.93
1	47	14.46	1	3	7.32
2	11	3.38	2	2	4.88
3	1	0.31	3	1	2.44
5	1	0.31	4	1	2.44
8	1	0.31			

CCHH Tier 2 - Utilization



Cohort	Inpatient Event Sum	Inpatient LOS Sum	Total Days Eligibility	Rate - Inpatient Events per 1,000 Days	Rate - Inpatient LOS per 1,000 Days
Control	85	521	203,639	0.41741	2.56
Treatment	14	69	26,056	0.53730	2.65
<i>Maternal/OB-related Events and LOS</i>					
Control	4	9	203,639	0.01964	0.04420
Treatment	1	2	26,056	0.03838	0.07676
<i>Neonatal-related Events and LOS</i>					
Control	0	0	203,639	0	0
Treatment	0	0	26,056	0	0
<i>Mental Health-related Events and LOS</i>					
Control	11	38	203,639	0.05402	0.18660
Treatment	3	12	26,056	0.11514	0.46055
<i>External Cause of Injury-related Events and LOS</i>					
Control	0	0	203,639	0	0
Treatment	0	0	26,056	0	0

CCHH Tier 2 - Utilization



Percent Difference in Expected Count of Inpatient Stay Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 2</i>		
40.52%	(29.71%)	180.92%

CCHH Tier 2 - Utilization



Control Cohort			Treatment Cohort		
Total Count – ED Visits	Frequency	Percent	Total Count - ED Visits	Frequency	Percent
0	117	36	0	17	41.46
1	70	21.54	1	10	24.39
2	51	15.69	2	4	9.76
3	27	8.31	3	2	4.88
4	14	4.31	4	1	2.44
5	14	4.31	5	1	2.44
6	8	2.46	7	2	4.88
7	10	3.08	8	1	2.44
8	2	0.62	9	1	2.44
9	2	0.62	11	1	2.44
10	1	0.31	39	1	2.44
11	4	1.23			
13	1	0.31			
14	2	0.62			
29	2	0.62			

CCHH Tier 2 - Utilization



Cohort	ED Visit Event Sum	Total Days Eligibility	Rate - ED Visit Events per 1,000 Days
Control	684	203,639	3.36
Treatment	114	26,056	4.38
<i>Maternal/OB-related Events</i>			
Control	6	203,639	0.02946
Treatment	0	26,056	0
<i>Neonatal-related Events</i>			
Control	0	203,639	0
Treatment	0	26,056	0
<i>Mental Health-related Events</i>			
Control	39	203,639	0.19152
Treatment	2	26,056	0.07676
<i>External Cause of Injury-related Events</i>			
Control	2	203,639	0
Treatment	0	26,056	0

CCHH Tier 2 - Utilization



Percent Difference in Expected Count of ED Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 2</i>		
21.23%	(21.93%)	88.25%

CCHH Tier 2 - Utilization

Control Cohort			Treatment Cohort		
Total Count – Observation Room Visits	Frequency	Percent	Total Count – Observation Room Visits	Frequency	Percent
0	311	95.69	0	40	97.56
1	11	3.38	1	1	2.44
2	3	0.92			

CCHH Tier 2 - Utilization



Cohort	Observation Room Event Sum	Total Days Eligibility	Rate - Observation Room Events per 1,000 Days
Control	17	203,639	0.08348
Treatment	1	26,056	0.03838
<i>Maternal/OB-related Events</i>			
Control	1	203,639	0.00491
Treatment	0	26,056	0
<i>Neonatal-related Events</i>			
Control	0	203,639	0
Treatment	0	26,056	0
<i>Mental Health-related Events</i>			
Control	2	203,639	0
Treatment	0	26,056	0
<i>External Cause of Injury-related Events</i>			
Control	0	203,639	0
Treatment	0	26,056	0

CCHH Tier 2 - Utilization

Percent Difference in Expected Count of Observation Room Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 2</i>		
(51.15%)	(93.52%)	268.33%

CCHH Tier 2 – Observations

Observations:

- No difference in expenditures
 - Sensitivity analysis – lower expenditures when 2 “high-cost” member-months removed from the analysis.

CCHH (Tier 3)



CCHH (Tier 3)

N = 19

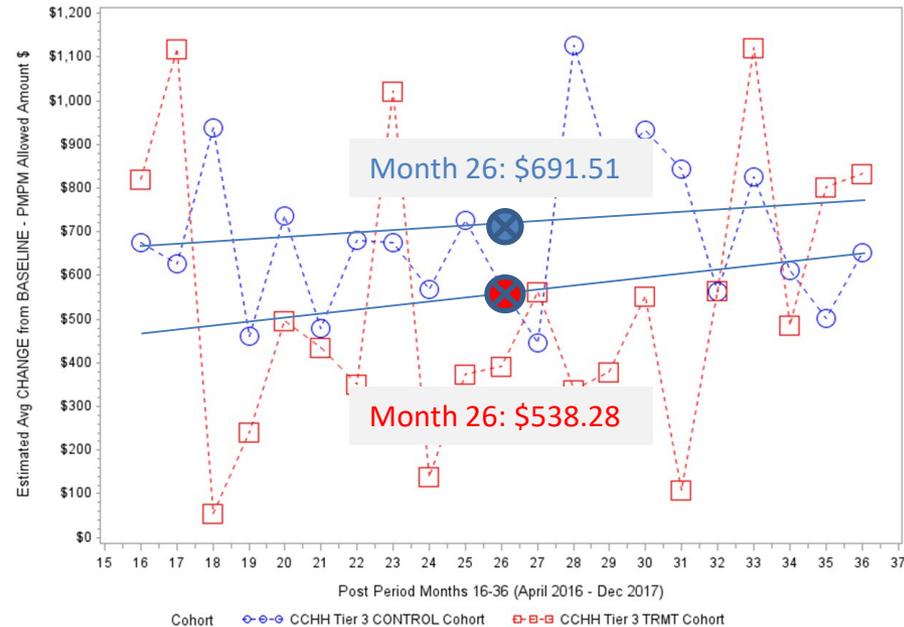
Rank	Chronic Condition	N	Prevalence (%)
1	Hypertension - Essential	15	78.9%
3	Hyperlipidemia	14	73.7%
3	Back Problems	14	73.7%
3	Obesity	14	73.7%
5	Mood (Depression) Disorder	12	63.2%
6	Substance-related Disorder	10	52.6%
7.5	Diabetes Without Complications	8	42.1%
7.5	Asthma	8	42.1%
9	COPD	7	36.8%
10	Cardiac Dysrhythmia	6	31.6%

CCHH (Tier 3) - Cost

CCHH Tier 3 – Run 3

Cohort	N
TRMT	19
CONTROL	152

TRMT Cohort compared to CONTROL Cohort		
LCL (95% C.I.)	Diff in Means	UCL (95% C.I.)
-\$ 606	-\$153	+\$ 299



Other Notes:

3 TRMT Member-months “outliers” removed

Response profiles not different

TRMT + \$6.70 CONTROL + \$2.28 [Linear trends “cross” in Feb 2020]

CCHH (Tier 3) - Cost

Sensitivity Analyses

Program / Sensitivity Analysis	Difference in Average Change in PMPM cost (Treatment – Control)	95% C.I.
<i>CCHH Tier 3</i>		
Primary Dataset #1 – Adults Only (>= 18 yrs. old)	^ ^ ^	^ ^ ^
Primary Dataset #1 – Children Only (< 18 yrs. old)	+ + +	+ + +

Notes:

+ + + - Sensitivity analysis not conducted as no children met the “child” inclusion criteria for the analysis.

^ ^ ^ - Sensitivity analysis not conducted as all (100%) members of Treatment cohort were adults.

CCHH Tier 3 - Utilization



Control Cohort			Treatment Cohort		
Total Count - Inpatient Hospitalizations	Frequency	Percent	Total Count - Inpatient Hospitalizations	Frequency	Percent
0	103	67.76	0	12	63.16
1	27	17.76	1	5	26.32
2	13	8.55	4	2	10.53
3	5	3.29			
4	2	1.32			
5	2	1.32			

CCHH Tier 3 - Utilization



Cohort	Inpatient Event Sum	Inpatient LOS Sum	Total Days Eligibility	Rate - Inpatient Events per 1,000 Days	Rate - Inpatient LOS per 1,000 Days
Control	86	1,228	95,545	0.9001	12.85
Treatment	13	57	12,160	1.06908	4.69
<i>Maternal/OB-related Events and LOS</i>					
Control	2	6	95,545	0.0209	0.0628
Treatment	0	0	12,160	0.0000	0.0000
<i>Neonatal-related Events and LOS</i>					
Control	0	0	95,545	0	0
Treatment	0	0	12,160	0	0
<i>Mental Health-related Events and LOS</i>					
Control	9	70	95,545	0.0942	0.7326
Treatment	5	30	12,160	0.4112	2.4671
<i>External Cause of Injury-related Events and LOS</i>					
Control	0	0	95,545	0	0
Treatment	0	0	12,160	0	0

CCHH Tier 3 - Utilization

Percent Difference in Expected Count of Inpatient Stay Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 3</i>		
20.56%	(50.39%)	192.94%

CCHH Tier 3 - Utilization



Control Cohort			Treatment Cohort		
Total Count - ED Visits	Frequency	Percent	Total Count - ED Visits	Frequency	Percent
0	32	21.05	0	6	31.58
1	43	28.29	1	6	31.58
2	24	15.79	2	1	5.26
3	20	13.16	3	3	15.79
4	7	4.61	11	1	5.26
5	10	6.58	13	1	5.26
6	4	2.63	17	1	5.26
7	1	0.66			
8	2	1.32			
9	2	1.32			
10	4	2.63			
11	1	0.66			
19	1	0.66			
28	1	0.66			

CCHH Tier 3 - Utilization



Cohort	ED Visit Event Sum	Total Days Eligibility	Rate - ED Visit Events per 1,000 Days
Control	392	95,545	4.10
Treatment	58	12,160	4.77
<i>Maternal/OB-related Events</i>			
Control	15	95,545	0.1570
Treatment	0	12,160	0.0000
<i>Neonatal-related Events</i>			
Control	0	95,545	0
Treatment	0	12,160	0
<i>Mental Health-related Events</i>			
Control	25	95,545	0.2617
Treatment	3	12,160	0.2467
<i>External Cause of Injury-related Events</i>			
Control	0	95,545	0
Treatment	0	12,160	0

CCHH Tier 3 - Utilization

Percent Difference in Expected Count of ED Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 3</i>		
27.56%	(23.76%)	113.40%

CCHH Tier 3 - Utilization

Control Cohort			Treatment Cohort		
Total Count – Observation Room Visits	Frequency	Percent	Total Count – Observation Room Visits	Frequency	Percent
0	140	92.11	0	19	100
1	10	6.58			
2	2	1.32			

CCHH Tier 3 - Utilization



Cohort	Observation Room Event Sum	Total Days Eligibility	Rate - Observation Room Events per 1,000 Days
Control	14	95,545	0.14653
Treatment	0	12,160	0
<i>Maternal/OB-related Events</i>			
Control	0	95,545	0
Treatment	0	12,160	0
<i>Neonatal-related Events</i>			
Control	0	95,545	0
Treatment	0	12,160	0
<i>Mental Health-related Events</i>			
Control	3	95,545	0
Treatment	0	12,160	0
<i>External Cause of Injury-related Events</i>			
Control	0	95,545	0
Treatment	0	12,160	0

CCHH Tier 3 - Utilization



Percent Difference in Expected Count of Observation Room Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 3</i>		
(60.12%)	(100.00%)	87.47%

CCHH Tier 3 – Observations

Observations:

- No difference in expenditures
- No difference in the incidence of utilization services

CCHH (Tier 4)



CCHH (Tier 4)

N = 15

Rank	Chronic Condition	N	Prevalence (%)
1	Hyperlipidemia	13	86.7%
2.5	Hypertension - Essential	12	80.0%
2.5	Back Problems	12	80.0%
4.5	Mood (Depression) Disorder	11	73.3%
4.5	Obesity	11	73.3%
7	Substance-related Disorder	10	66.7%
7	Cardiac Dysrhythmia	10	66.7%
7	Severe/Acute Conditions	10	66.7%
9	COPD	9	60.0%
10	Diabetes Without Complications	8	53.3%

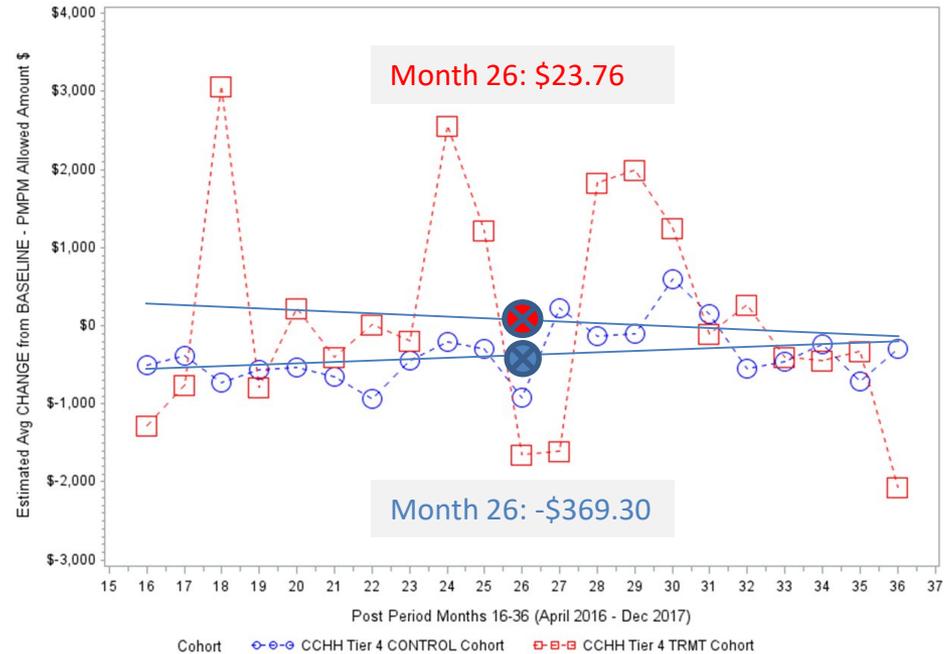
Note: Severe/Acute Conditions include any one or more of the following events/conditions: septicemia, shock, peritonitis/intestinal abscess, pulmonary embolism (PE)/deep vein thrombosis (DVT), gastrointestinal hemorrhage, epilepsy/convulsions, coma/stupor/brain damage, respiratory failure and cardiac arrest/ventricular fibrillation.

CCHH (Tier 4) - Cost

CCHH Tier 4 – Run 24

Cohort	N
TRMT	14
CONTROL	64

TRMT Cohort compared to CONTROL Cohort		
LCL (95% C.I.)	Diff in Means	UCL (95% C.I.)
- \$649	\$393	+ \$1,436



Other Notes:

1 TRMT Member-month “outlier” removed

Response profiles not different

TRMT - \$26.60 CONTROL + \$20.29 [Linear trends “cross” in Jan 2018]

CCHH (Tier 4) - Cost

Sensitivity Analyses

Program / Sensitivity Analysis	Difference in Average Change in PMPM cost (Treatment – Control)	95% C.I.
<i>CCHH Tier 4</i>		
Primary Dataset #1 – Adults Only (>= 18 yrs. old)	^ ^ ^	^ ^ ^
Primary Dataset #1 – Children Only (< 18 yrs. old)	+ + +	+ + +

Notes:

+ + + - Sensitivity analysis not conducted as no children met the “child” inclusion criteria for the analysis.

^ ^ ^ - Sensitivity analysis not conducted as all (100%) members of Treatment cohort were adults.

CCHH Tier 4 - Utilization



Control Cohort			Treatment Cohort		
Total Count - Inpatient Hospitalizations	Frequency	Percent	Total Count - Inpatient Hospitalizations	Frequency	Percent
0	37	57.81	0	6	42.86
1	12	18.75	1	5	35.71
2	6	9.38	2	1	7.14
3	4	6.25	4	1	7.14
4	1	1.56	5	1	7.14
5	1	1.56			
6	2	3.13			
8	1	1.56			

CCHH Tier 4 - Utilization



Cohort	Inpatient Event Sum	Inpatient LOS Sum	Total Days Eligibility	Rate - Inpatient Events per 1,000 Days	Rate - Inpatient LOS per 1,000 Days
Control	65	1,972	40,304	1.61	48.93
Treatment	16	156	8,960	1.79	17.41
<i>Maternal/OB-related Events and LOS</i>					
Control	0	0	40,304	0.0	0
Treatment	0	0	8,960	0.0	0
<i>Neonatal-related Events and LOS</i>					
Control	0	0	40,304	0	0
Treatment	0	0	8,960	0	0
<i>Mental Health-related Events and LOS</i>					
Control	5	707	40,304	0.1241	17.54
Treatment	3	14	8,960	0.3348	1.56
<i>External Cause of Injury-related Events and LOS</i>					
Control	0	0	40,304	0	0
Treatment	0	0	8,960	0	0

CCHH Tier 4 - Utilization



Percent Difference in Expected Count of Inpatient Stay Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 4</i>		
11.62%	(54.46%)	173.55%

CCHH Tier 4 - Utilization



Control Cohort			Treatment Cohort		
Total Count - ED Visits	Frequency	Percent	Total Count - ED Visits	Frequency	Percent
0	12	18.75	0	5	35.71
1	10	15.63	1	3	21.43
2	11	17.19	2	2	14.29
3	5	7.81	5	2	14.29
4	7	10.94	19	1	7.14
6	3	4.69	31	1	7.14
7	2	3.13			
8	5	7.81			
9	1	1.56			
10	1	1.56			
11	1	1.56			
12	1	1.56			
14	1	1.56			
15	1	1.56			
16	1	1.56			
21	1	1.56			
23	1	1.56			

CCHH Tier 4 - Utilization



Cohort	ED Visit Event Sum	Total Days Eligibility	Rate - ED Visit Events per 1,000 Days
Control	278	40,304	6.90
Treatment	67	8,960	7.48
<i>Maternal/OB-related Events</i>			
Control	0	40,304	0
Treatment	0	8,960	0
<i>Neonatal-related Events</i>			
Control	0	40,304	0
Treatment	0	8,960	0
<i>Mental Health-related Events</i>			
Control	9	40,304	0.22
Treatment	5	8,960	0.56
<i>External Cause of Injury-related Events</i>			
Control	1	40,304	0
Treatment	0	8,960	0

CCHH Tier 4 - Utilization

Percent Difference in Expected Count of ED Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 4</i>		
(1.00%)	(51.31%)	102.67%

CCHH Tier 4 - Utilization



Control Cohort			Treatment Cohort		
Total Count – Observation Room Visits	Frequency	Percent	Total Count – Observation Room Visits	Frequency	Percent
0	61	95.31	0	14	100
1	3	4.69			

CCHH Tier 4 - Utilization



Cohort	Observation Room Event Sum	Total Days Eligibility	Rate - Observation Room Events per 1,000 Days
Control	3	40,304	0.074
Treatment	0	8,960	0.000
<i>Maternal/OB-related Events</i>			
Control	0	40,304	0
Treatment	0	8,960	0
<i>Neonatal-related Events</i>			
Control	0	40,304	0
Treatment	0	8,960	0
<i>Mental Health-related Events</i>			
Control	0	40,304	0
Treatment	0	8,960	0
<i>External Cause of Injury-related Events</i>			
Control	0	40,304	0
Treatment	0	8,960	0

CCHH Tier 4 - Utilization

Percent Difference in Expected Count of Observation Room Visit Events – Treatment vs. Control	95% Confidence Interval (C.I.) – Lower and Upper Limits	
<i>CCHH Tier 4</i>		
16.92%	(100.00%)	671.18%

CCHH Tier 4 – Observations

Observations:

- No difference in expenditures
- No difference in the incidence of utilization services



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References



- Shadish WR, Cook TD, Campbell DT. (2002). *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. Boston, MA: Houghton Mifflin Company.
- Kane RL (Ed). (2006). *Understanding Health Care Outcomes Research (2nd ed.)*. Sudbury, Massachusetts: Jones and Bartlett Publishers.
- Iezzoni L (Ed.). *Risk Adjustment for Measuring Health Outcomes (3rd ed.)*. (2003). Chicago, Illinois: Health Administration Press.
- Isaac S, Michael WB. (1997). *Handbook in Research and Evaluation (3rd ed.)*. San Diego, California: EdITS/Educational and Industrial Testing Services.
- Mattke S, Bergamo G, Balakrishnan A, Martino S, Vakkur N. (August, 2006). *Measuring and Reporting the Performance of Disease Management Programs*. (Rand Health Working Paper – WR-400).
- D’Agostino Jr. RB. (1998). Tutorial in Biostatistics – Propensity Score Methods for Bias Reduction in the Comparison of a Treatment to a Non-Randomized Control Group. *Statistics in Medicine*, 17: 2265-2281.
- Rosenbaum PR, Rubin DB. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects, *Biometrika*; 70: 45-55.
- Rosenbaum PR, Rubin DB. (Feb 1985). Constructing a Control Group Using Multivariate Matched Sampling Methods That Incorporate the Propensity Score. *The American Statistician*, 39(1): 33-38.
- Sturmer T, Joshi M, Glynn RJ, Avorn J, Rothman KJ, Schneeweiss S. (2006). A Review of the Application of Propensity Score Methods Yielded Increasing Use, Advantages in Specific Settings, but not Substantially Different Estimates Compared with Conventional Multivariable Methods. *Journal of Clinical Epidemiology*, 59: 437-447.

References



- Faries DE, Leon AC, Haro JM, Obenchain RL. (2010). Analysis of Observational Health Care Data Using SAS. Cary, NC: SAS Institute Inc.
- Stock S, Drabik A, Buscher G, Graf C, Ullrich W, Gerber A, Lauterbach KW, Lungen M. (Dec., 2010). German Diabetes Management Programs Improve Quality of Care and Curb Costs. *Health Affairs*, 29(12): 2197-2205.
- Haukos JS, Lewis RJ. (Oct 20, 2015). The Propensity Score. *JAMA*, 314(15):1637-1638.
- Austin PC. (2008). The Performance of Different Propensity-score Methods for Estimating Relative Risk. *Journal of Clinical Epidemiology*, 61: 537-545.
- Austin PC. (2011). An Introduction to Propensity Score Methods for Reducing the Effects of Confounding in Observational Studies. *Multivariate Behavioral Research*, 46:339-424.
- Austin PC. (2010). Optimal Caliper Widths for Propensity-score Matching When Estimating Differences in Means and Differences in Proportions in Observational Studies. *Pharmaceutical Statistics*, 10:150-161.
- Austin PC, Laupacis A. (2011). A Tutorial on Methods to Estimating Clinically and Policy-meaningful Measures of Treatment Effects in Prospective Observational Studies: A Review. *The International Journal of Biostatistics*, 7(1): 1-31.
- Austin PC, Grootendorst P, Anderson GM. (2007). A Comparison of the Ability of Different Propensity Score Models to Balance Measured Variables Between Treated and Untreated Subjects: A Monte Carlo Study. *Statistics in Medicine*, 26:734-753.
- Austin PC. (2011). A Tutorial and Case Study in Propensity Score Analysis: An Application to Estimating the Effect of In-hospital Smoking Cessation Counseling on Mortality. *Multivariate Behavioral Research*, 46:119-151.

- Austin PC. (2007). Propensity-score Matching in the Cardiovascular Surgery Literature from 2004 to 2006: A Systematic Review and Suggestions for Improvement. *Journal of Thoracic and Cardiovascular Surgery*, 134(5): 1128-1135.
- Austin PC. (2010). Comparing Paired vs Non-paired Statistical Methods of Analyses When Making Inferences About Absolute Risk Reductions in Propensity-score Matched Samples. *Statistics in Medicine*, 30: 1292-1301.
- Austin PC. (2014). A Comparison of 12 Algorithms for Matching on the Propensity Score. *Statistics in Medicine*, 33:1057-1069.
- Hinnant L, Razi S, Lewis R, Sun A, Alva M, Hoerger T, Jacobs S, Halpern M. (Mar 2016). Evaluation of the Health Care Innovation Awards: Community Resource Planning, Prevention, and Monitoring – Annual Report 2015. RTI International.
- Caloyeras JP, Liu H, Exum E, Broderick M, Matke S. (Jan., 2014). Managing Manifest Diseases, But Not Health Risks, Saved PepsiCo Over Seven Years. *Health Affairs*, 33(1): 124-131.
- Lanehart RE, Rodriguez de Gil P, Kim ES, Bellara AP, Kromrey JD, Lee RS. (2012). Propensity Score Analysis and Assessment of Propensity Score Approaches Using SAS Procedures. *Proceedings of the SAS Global Forum 2012 Conference, Orlando, Florida.*
- Schmitz A, Navratil-Strawn J, Hartley S, Ozminkowski R. (2015). Reducing the Bias: Practical Application of Propensity Score Matching in Healthcare Program Evaluation. *SAS Global Forum 2015, Dallas, Texas.*

- Fronstin P, Roebuck CM. (Sept 2014). Quality of Health Care After Adopting a Full-replacement High-deductible Health Plan With a Health Savings Account: A Five-year Study. Employee Benefit Research Institute Issue Brief, No. 404.
- Crowson CS, Schenck LA, Green AB, Atkinson EJ, Therneau TM. (Aug 2013). The Basics of Propensity Scoring and Marginal Structural Models. Mayo Clinic – Technical Report #84.
- Bergstralh EJ, Kosanke JL. (Apr 1995). Computerized Matching of Cases to Controls. Mayo Foundation – Technical Report #56.
- Delate T, Olson KL, Rasmussen J, Hutka K, Sandhoff B, Hornak R, Merenich J. (2010). Reduced Health Care Expenditures After Enrollment in a Collaborative Cardiac Care Service. *Pharmacotherapy*, 30(11): 1127-1135.
- Holden DJ, Smith LR, Hoerger T, Renaud J, Council M. (Oct 2014). Evaluation of the Health Care Innovation Awards: Community Resource Planning, Prevention, and Monitoring – Annual Report. RTI International.
- Moss RR, Humphries KH, Gao M, Thompson CR, Abel JG, Fradet G, Munt BI. (Sep 2003). Outcome of Mitral Valve Repair or Replacement: A Comparison by Propensity Score Analysis. *Circulation*, 108:II-90-II-97.
- Shah BR, Laupacis A, Hux JE, Austin PC. (2005). Propensity Score Methods Give Similar Results to Traditional Regression Modeling in Observational Studies: A Systematic Review. *Journal of Clinical Epidemiology*, 58: 550-559.
- Parsons LS. (2001). Reducing Bias in a Propensity Score Matched-pair Sample Using Greedy Matching Techniques. Proceedings of the 26th Annual SAS Users Group International Conference, Long Beach, California.

- Gao Y. (2013). Propensity Score-based Analysis of Short-term Complications in Patients with Lumbar Discectomy in the ASC-NSQIP Database. SAS Global Forum 2013 – Paper 220-2013.
- Girman CJ, Gokhale M, Kou TD, Brodovicz KG, Wyss R, Sturmer T. (Mar 2014). Assessing the Impact of Propensity Score Estimation and Implementation on Covariate Balance and Confounding Control Within and Across Important Subgroups in Comparative Effectiveness Research. *Medical Care*, 52(3):280-287.
- Gondara L, McGahan C. (2014). Case Control Matching: Comparing Simple Distance and Propensity Score-based Methods. SAS Methods – Paper 1861-2014.
- Heller T, Owen R, Mitchell D, Keys C, Viola J, Eisenberg Y, Bowers A, Gibbons H, Yamaki K, Wing C. (May 2014). An Independent Evaluation of the Integrated Care Program – Findings from Baseline Through Year Two [FY 13]. Institute on Disability and Human Development – University of Chicago.
- Roberts L. (Nov 18, 2009). Exploring the Real Cost of Patient Safety. Research presented at 2009 Iowa Healthcare Collaborative Annual Conference, Des Moines, Iowa.
- Kauter J, Pope GC, Ingber M, Freeman S, Patterson L, Cohen M, Keenan P. (2014). The HHS-HCC Risk Adjustment Model for Individual and Small Group Markets Under the Affordable Care Act, 4(3):E1-E46.

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Chronic Conditions

28 Major Chronic Condition Categories	50 Detailed Chronic Conditions
Hypertension	Essential Hypertension
	Secondary Hypertension
Hyperlipidemia	Hyperlipidemia
Diabetes	Diabetes Without Complications
	Diabetes With Complications
Heart Arrhythmias	Conduction Disorders
	Cardiac Dysrhythmias
Arthritis	Rheumatoid
	Osteoarthritis
Osteoporosis	Osteoporosis
Cancer	Head/Neck
	Upper Gastrointestinal
	Lower Gastrointestinal
	Liver/Pancreas
	Lung
	Skin/Bone
	Breast
	Female
	Male
	Urinary
	Brain/Nervous
	Thyroid
	Lymphoma
	Leukemia
	Other/Secondary
	Malignant Neoplasm
Coronary Artery Disease (CAD)	Heart Attack (AMI)
	Atherosclerosis/Other Heart Disease
Chronic Obstructive Pulmonary Disease (COPD)	Chronic Obstructive Pulmonary Disease (COPD)
Chronic Kidney Disease (CKD)	Chronic Kidney Disease (CKD)
	Nephritis/Nephrosis/Sclerosis
Congestive Heart Failure (CHF)	Congestive Heart Failure (CHF)
Asthma	Asthma
Stroke	Acute Cerebrovascular
	Occlusion/Stenosis of Precerebral Arteries
	Other/III-defined Cerebrovascular Disease
	Transient Cerebral Ischemia
Dementia	
Depression	
Schizophrenia	
Substance Abuse Disorder	Alcohol-related Substance Abuse
	Substance-related Substance Abuse
Parkinson's Disease	Parkinson's Disease
Multiple Sclerosis	Multiple Sclerosis
Hepatitis	Hepatitis
Sickle Cell Anemia	Sickle Cell Anemia
Cystic Fibrosis	Cystic Fibrosis
HIV	HIV
Back Problems	Back Problems
Autism	Autism
Obesity	Obesity
Hypothyroidism	Hypothyroidism
Liver Disease/Cirrhosis/Other Liver Conditions (non-viral)	Liver Disease/Cirrhosis/Other Liver Conditions (non-viral)

Health Status – Emergent Events

External Cause of Injury	CCSDX codes 2601-2616, 2618-2621
Maternity/OB	CCSDX codes 176-196
Renal Dialysis	Util Flag Rev codes 0800-0804, 0809; POS = 65 (ESRD/Dialysis Trmt Facility)
Organ Acquisition	Util Flag Rev codes 0810-0814, 0819
Hospice Utilization	POS = 34 (Hospice Facility)
ICU/NICU/CCU Utilization	Util Flag Rev codes 0200-0204, 0206-0209, 0172-0174, 0210-0214, 0219

Severity Indicator - Components

CCS Cat	Severity Indicator - Short Description
CCS_2	Septicemia (except in labor)
CCS_83	Epilepsy, convulsions
CCS_85	Coma, stupor, and brain damage
CCS_107	Cardiac Arrest and Ventricular Fibrillation
CCS_118	Phlebitis, Thrombophlebitis and Thromboembolism
CCS_131	Respiratory Failure, Insufficiency, arrest (adult)
CCS_148	Peritonitis and Intestinal Abscess
CCS_153	Gastrointestinal hemorrhage
CCS_221	Respiratory Distress Syndrome (neonatal)
CCS_249	Shock

Telligen-modeled – Using HHS-HCC Risk-Adjustment Model Severity Indicators

Used within ACA Marketplace risk-adjustment/cost-sharing algorithms in commercial insurance market

Kauter, Pope, Ingber et. al. MMRR, 2014