



Accolade: The Claims Cost Impact of Implementing Personalized Advocacy

Results for Six Customers Implemented in 2018 and 2019

January 2021

Preparation of This Report

This report has been prepared to present Aon's analysis of the medical and pharmacy utilization and financial results of a group of six employers utilizing Accolade's services in 2018 and 2019.

The purpose of this analysis is to compare the claims cost profile experienced by employer plans utilizing Accolade's Personalized Advocacy services to a broad population of self-insured employers representing the general employer market as captured in the IBM MarketScan® Research Databases¹. The analysis was commissioned by Accolade.

In conducting the analysis, Aon has relied on detailed claims and membership data provided by Accolade. While Aon cannot verify the accuracy of this information, the supplied information was reviewed for consistency and reasonability. As a result of this review, Aon has no reason to doubt the substantial accuracy and completeness of the information and believe that it has produced appropriate results.

This analysis has been conducted in accordance with generally accepted actuarial principles and practices, including the applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board. The methods used in this report are described in the Data Sources and Methodology sections of this report.

Todor Penev
Fellow of the Society of Actuaries
Member of the American Academy of Actuaries

Robert Tate
Fellow of the Society of Actuaries
Member of the American Academy of Actuaries

Garima Gupta
Fellow of the Institute and Faculty of Actuaries

Shelley Zhao
Fellow of the Society of Actuaries
Member of the American Academy of Actuaries

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Executive Summary

Aon conducted an actuarial analysis of six Accolade customers implemented in 2018 and 2019. The analysis utilizes Aon's rigorous member-level Cost Efficiency Measurement (CEM) methodology comparing Accolade customers' experience to that of a multi-employer group with over 15M members in the market for the same time periods. The report evaluates the absolute cost changes, as well as the relative improvement compared to market trends starting with a baseline year prior to Accolade being implemented and assessing the initial years following implementation across the six customers.

Compared to the matched multi-employer controls in 2018 and 2019, all six of Accolade's customers experienced reductions in cost levels and lower year-over-year trends. Specifically:

- Group of customers implemented in 2018 experienced [See Exhibit 1A]:
 - o 2018 and 2019 trends of -0.1% and 4.2% compared to 4.9% and 7.4% control trends
 - o Cost levels of 105% of market pre-Accolade improving to 100% of market in Year 1 of Accolade and 97% of Market in Year 2 of implementation
 - o Lower allowed claims cost of \$311 Per Employee Per Year (PEPY) or \$162 Per Member Per Year (PMPY) vs. controls in 2019, compared to pre-Accolade claim levels exceeding controls by \$469 PEPY (\$241 PMPY)

- Group of customers implemented in 2019 experienced [See Exhibit 1B]:
 - o 2019 trend of 0% vs control trend of 8.3%
 - o Cost levels of 105% of market pre-Accolade improving to 97% of market in Year 1 of Accolade
 - o Lower allowed claims cost of \$432 PEPY (\$184 PMPY) vs. controls in 2019, compared to pre-Accolade claim levels exceeding controls by \$590 PEPY (\$249 PMPY)

- Cost efficiency improved across key service categories in 2019 relative to pre-Accolade, led by Outpatient, Brand and Specialty Drug, Inpatient, and Physician reductions.

- Cost profiles improved across key member subgroups within the six customers and 2018 and 2019 implementation cohorts relative to both market and pre-Accolade baselines:
 - o Lower spend by age band, led by reductions for adult members aged 30-59
 - o Lower spend for members managing one or more chronic conditions
 - o Reductions in average spend for the most costly quartile of members

- For the most prevalent chronic conditions among the customers, 2019 implementations saw notable reductions in costs per patient relative to market, with 2019 costs ranging from 88% to 95% of market cost levels.

Across the six Accolade customers analyzed, the results demonstrate lower member costs compared to similar employers in the market as well as significant reductions compared to the pre-Accolade experience of all six customers. A detailed description of the findings, data and methodology used in this report is enclosed.

Exhibit 1A, 1B: Per Member Per Year (PMPY) Allowed Cost and Trends

Customers Implementing in 2018

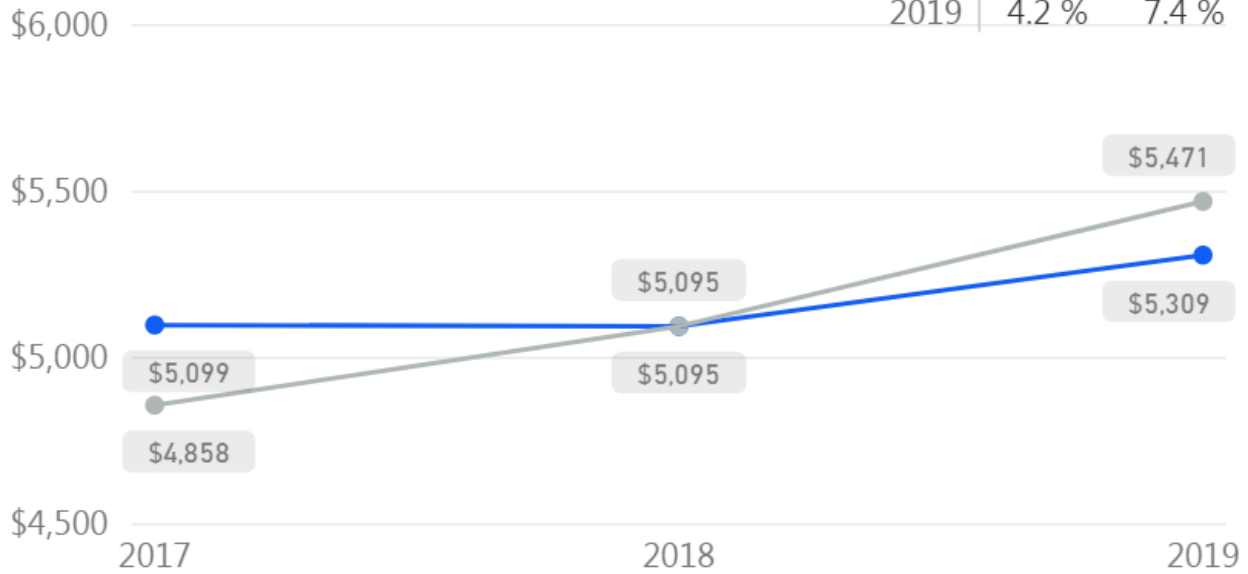
Year-over-Year Trend

Group ● Client ● Control

Year	Client	Control
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2018	-0.1 %	4.9 %
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2019	4.2 %	7.4 %
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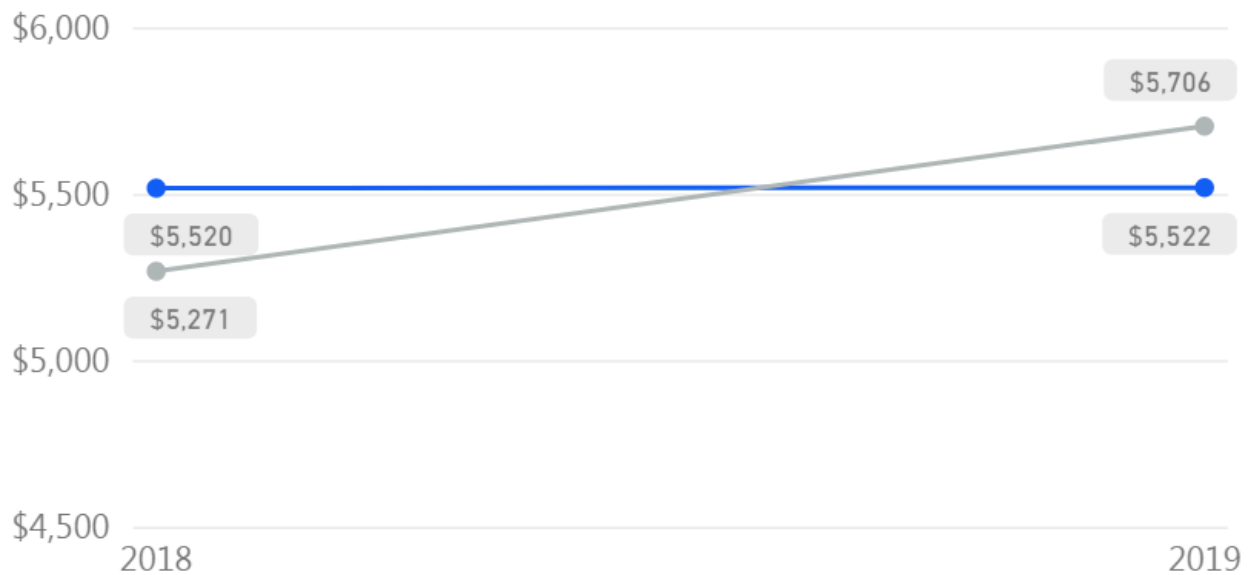
Customers Implementing in 2019

Year-over-Year Trend

Group ● Client ● Control

Year	Client	Control
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2019	0.0 %	8.3 %
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Description of Accolade Customers Measured

The six customers provided by Accolade for this study are self-insured employers covering from 2,000 to 70,000 members. All six customers included met the following report criteria: fewer than 50,000 employees, service launch in January with a full year of data, and implementation of the complete Accolade Total Health and Benefits solution.

Four of the six customers launched in Jan 2019 and two launched Jan 2018. The individual customers are labeled C, D, E, F, G, H in this report (two customers, A and B, were measured in a previous 2018 study²). All customers reported Accolade family engagement rates between 55% and 62%.

Customers C, D, E and F implemented Accolade in 2019 and this analysis includes one year of pre-Accolade and one year of post-Accolade data. Customers G and H implemented Accolade in 2018 and this analysis includes one year of pre-Accolade data and two years of post-implementation data. The analysis measures the cost results of all customers individually. Detailed results by subgroups or categories were presented in two cohorts: 2018 Implementations and 2019 Implementations due to smaller employer population limiting the credibility of individual employer breakouts.

Implementation Changes

All customers had generally stable populations and benefit programs during the measurement period of this study. Several notable changes occurred together with the Accolade program implementations and comparisons of the pre-implementation (Year 0) and post-implementation (Years 1 and 2) periods may be influenced by external factors. Specifically:

- 72% of members in the study sample (Customers E, G, and H) retained the same medical network providers but switched to their carriers' Third Party Administrator (TPA) option
- 28% of members in the study sample (Customers C, D and F) changed medical network providers with the Accolade implementations; Customers C and D (7% of the study sample) also changed pharmacy benefit managers

This analysis does not make additional adjustments for the customers changing networks. Medical or pharmacy vendor changes are common in the multi-employer datasets used to compare Accolade in this report and it is reasonable to expect a similar portion of employers in the control group also experienced network or vendor changes which is captured in the in the cost profiles of the multi-employer control groups across years.

² <https://accolade.com/resources/aon-study-shows-power-of-accolade-personalized-advocacy/>

Plan Design Richness

All customers offered PPO and HDHPs plans to their members typical for large self-insured employers. To reduce the significance of differences in plan design and cost-sharing between Accolade customers and the control groups, costs were evaluated on an “Allowed” basis prior to the application of plan design cost-sharing.

The tables below compare the Actuarial Value (AV) or the ratio of paid and allowed claims between the Accolade customers and the matched market control groups. The customers implementing in 2019 offered plans richer than market, while the 2018 implementations were below market in richness.

Table 1: Paid-to-Allowed Ratios by Customer and Year

2019 Implementations	Year 0 (2018)			Year 1 (2019)		
	Client Mbrs	Client AV	Control AV	Client Mbrs	Client AV	Control AV
Customer C	2,177	85%	86%	2,130	86%	85%
Customer D	7,449	83%	82%	6,665	84%	83%
Customer E	67,357	85%	85%	70,122	85%	85%
Customer F	27,790	91%	87%	28,456	92%	87%

2018 Implementations	Year 0 (2017)			Year 1 (2018)			Year 2 (2019)		
	Client Mbrs	Client AV	Control AV	Client Mbrs	Client AV	Control AV	Client Mbrs	Client AV	Control AV
Customer G	19,243	77%	84%	19,719	77%	84%	21,452	79%	85%
Customer H	9,437	76%	83%	9,252	77%	84%	10,102	76%	84%

Demographics

Demographics were stable across the measurement period for all six customers. Average membership ages ranged from 26.6 to 35.3. The external multi-employer datasets had an average membership age of 34.4 prior to matching. Post-matching the control groups had identical demographic profiles to the Accolade customers.

Table 2: Average Member Age by Customer and Year

2019 Implementations	Year 0 (2018)	Year 1 (2019)
Customer C	35.35	35.07
Customer D	26.87	26.62
Customer E	30.00	29.96
Customer F	33.21	33.20

2018 Implementations	Year 0 (2017)	Year 1 (2018)
Customer G	33.33	33.42
Customer H	31.88	32.33

All customers have members distributed across multiple states, with the exception of Customer C, whose population is mostly concentrated in one state.

Overall Results: Allowed Medical and Pharmacy Costs

PEPY = Per Employee Per Year

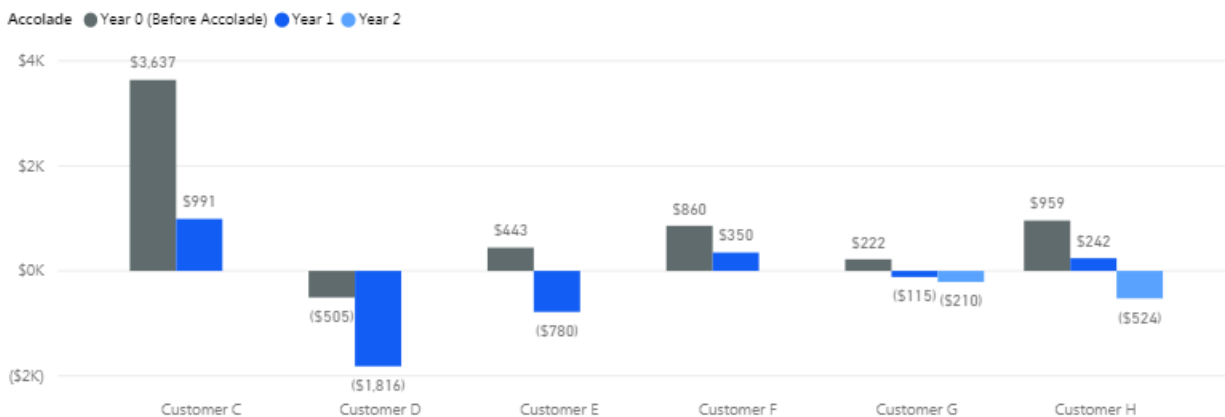
PMPY = Per Member Per Year

Cost Ratio = Per Member Accolade Customers' Allowed Cost / Per Member Control Group Allowed Cost

Allowed Costs Per Employee and Per Member

Exhibit 2 shows the differences between the PEPY allowed costs for the six customers relative to the costs of their matched controls. A difference of \$0 indicates costs same as market controls; differences greater than zero indicate costs higher than market; and differences less than zero indicate below-market costs for the same member and patient profiles. For each customer, the results from the year prior to implementing Accolade (Year 0) are also included.

Exhibit 2: PEPY Allowed Difference between Accolade and Control by Year



All customers show a relative improvement in PEPY costs from the pre-Accolade year to the post-Accolade years.

- The two customers with two years of post-implementation data show continued improvement in the second year since Accolade was launched
- Among Accolade customers implementing in 2019 (customers C-F), the weighted average PEPY allowed cost was \$590 higher compared to market in Year 0, and \$432 lower in Year 1; while Accolade customers implementing in 2018 had a \$469 higher weighted average PEPY allowed cost compared to market, improving to the as market in their first year, and \$311 lower in the second year

The charts below show the costs on a per member (PMPY) basis for the Accolade customers relative to their respective matched control populations:

Exhibit 3: PMPY Allowed Difference between Accolade and Control by Year



The full cost levels and ratios to market are shown in the tables below.

The pre-Accolade Year 0 costs show that the 2019 Implementation cohort was on average at 105% of market costs per member before Accolade. In Year 1 of Accolade, the same cohort exhibited a 97% cost ratio to market, or an 8 percentage point improvement in cost efficiency relative to market.

Table 3: PMPY and Cost Ratio by Customer and Year (2019 Implementations)

Customer	2018 - Year 0 (Before Accolade)				2019 - Year 1 (Accolade)				Cost Ratio vs Yr0
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	
Customer C	2,177	\$7,107	\$5,784	1.23	2,130	\$5,870	\$5,496	1.07	-0.16
Customer D	7,449	\$4,107	\$4,282	0.96	6,665	\$4,325	\$4,941	0.88	-0.08
Customer E	67,357	\$5,076	\$4,903	1.04	70,122	\$4,992	\$5,301	0.94	-0.09
Customer F	27,790	\$6,839	\$6,385	1.07	28,456	\$7,088	\$6,901	1.03	-0.04
Total	104,773	\$5,520	\$5,271	1.05	107,373	\$5,522	\$5,706	0.97	-0.08

The two customers implementing in 2018 on average started at 105% of market in costs per member. In Year 1 of Accolade (2018), those two customers improved to 100% of market, or a 5 percentage point improvement. In Year 2 of Accolade (2019), those customers further improved to 97% of market, or an 8 point improvement in cost per member relative to market across the two years.

Table 4: PMPY and Cost Ratio by Customer and Year (2018 Implementations)

Customer	2017 - Year 0 (Before Accolade)				2018 - Year 1 (Accolade)					2019 - Year 2 (Accolade)				
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0
Customer G	19,243	\$5,310	\$5,197	1.02	19,719	\$5,196	\$5,256	0.99	-0.03	21,452	\$5,598	\$5,705	0.98	-0.04
Customer H	9,437	\$4,666	\$4,165	1.12	9,252	\$4,880	\$4,753	1.03	-0.09	10,102	\$4,694	\$4,971	0.94	-0.18
Total	28,680	\$5,099	\$4,858	1.05	28,971	\$5,095	\$5,095	1.00	-0.05	31,554	\$5,309	\$5,471	0.97	-0.08

Detailed Results: 2019 Implementations

Comparisons by Service Category

Table 5: PMPY and Cost Ratio by Service Category

Service Category	2018 - Year 0 (Before Accolade)				2019 - Year 1 (Accolade)				
	Client PMPY	Control PMPY	Client - Control	Cost Ratio	Client PMPY	Control PMPY	Client - Control	Cost Ratio	Cost Ratio vs Yr0
Physician	\$2,101	\$2,068	\$33	1.02	\$2,150	\$2,208	(\$58)	0.97	-0.05
Outpatient	\$1,499	\$1,312	\$187	1.14	\$1,443	\$1,432	\$11	1.01	-0.13
Inpatient	\$852	\$814	\$38	1.05	\$860	\$911	(\$51)	0.94	-0.11
Specialty Rx	\$609	\$587	\$23	1.04	\$616	\$626	(\$10)	0.98	-0.06
Brand Rx	\$299	\$318	(\$19)	0.94	\$267	\$343	(\$76)	0.78	-0.16
Generic Rx	\$159	\$172	(\$13)	0.93	\$186	\$186	\$0	1.00	0.07
Total	\$5,520	\$5,271	\$249	1.05	\$5,522	\$5,706	(\$184)	0.97	-0.08

Accolade members' cost profile in Year 1 compare favorably (0.97 cost ratio) to the control group after comparing unfavorably (1.05 cost ratio) in Year 0. Accolade members' cost profiles improved significantly across all major categories except Generic Drugs. The most significant cost reductions relative to market were observed in the Inpatient, Outpatient and Brand Drugs categories.

Comparison by Age Group

Table 6: PMPY and Cost Ratio by Age Group

Age Group	2018 - Year 0 (Before Accolade)				2019 - Year 1 (Accolade)				
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0
0-14	24,358	\$3,034	\$2,920	1.04	24,737	\$3,192	\$3,166	1.01	-0.03
15-22	11,852	\$3,869	\$3,787	1.02	12,097	\$3,969	\$3,945	1.01	-0.01
23-29	11,903	\$4,210	\$4,003	1.05	12,133	\$4,536	\$4,431	1.02	-0.03
30-44	30,182	\$5,732	\$5,741	1.00	31,751	\$5,602	\$6,101	0.92	-0.08
45-59	22,398	\$8,197	\$7,521	1.09	22,548	\$7,996	\$8,357	0.96	-0.13
60-64	4,080	\$12,478	\$11,226	1.11	4,107	\$12,627	\$12,074	1.05	-0.06
Total	104,773	\$5,520	\$5,271	1.05	107,373	\$5,522	\$5,706	0.97	-0.08

Comparing the cost results by age group, the most significant reductions were seen in the age 45-59 cohort with improvements of 13 percentage points from Year 0 to Year 1, and the age 30-44 cohort with improvements of 8 points. All age groups' cost efficiency improved compared to the pre-Accolade baselines with greater improvements for age 30-64 adults and lower improvements for children and younger adults age 0-29.

Comparison by Comorbidity Group

Table 7: PMPY and Cost Ratio by Comorbidity Group

Comorbidity Group	2018 - Year 0 (Before Accolade)				2019 - Year 1 (Accolade)				Cost Ratio vs Yr0
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	
0	66,104	\$1,953	\$1,780	1.10	65,782	\$1,883	\$1,828	1.03	-0.07
1	25,626	\$7,465	\$7,332	1.02	26,470	\$7,295	\$7,535	0.97	-0.05
2	9,020	\$14,761	\$14,455	1.02	10,201	\$13,837	\$14,663	0.94	-0.08
3	2,905	\$25,627	\$24,275	1.06	3,501	\$23,215	\$24,644	0.94	-0.12
4+	1,118	\$43,361	\$39,209	1.11	1,419	\$36,418	\$38,722	0.94	-0.17
Total	104,773	\$5,520	\$5,271	1.05	107,373	\$5,522	\$5,706	0.97	-0.08

Comparing member results across the presence of comorbidities, Accolade customers implementing in 2019 saw significant improvement in cost profile relative to market among members managing one or more chronic conditions. Compared to the pre-Accolade baseline, cost efficiency improvement was observed after implementation, especially among those managing 3 or more chronic conditions, where Accolade customers' costs were 12 to 17 percentage points better in Year 1 than Year 0.

Comparisons by High Cost Claimant Level

Table 8: PMPY and Cost Ratio by Member Cost Percentile

Member Cost Percentile	2018 - Year 0 (Before Accolade)				2019 - Year 1 (Accolade)				Cost Ratio vs Yr0
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	
Top 25%	26,193	\$18,833	\$18,086	1.04	26,844	\$18,700	\$19,593	0.95	-0.09
Top 20%	20,956	\$22,374	\$21,526	1.04	21,475	\$22,180	\$23,306	0.95	-0.09
Top 10%	10,478	\$36,649	\$35,469	1.03	10,739	\$36,073	\$38,327	0.94	-0.09
Top 5%	5,240	\$56,542	\$54,963	1.03	5,371	\$55,297	\$59,242	0.93	-0.10
Top 2%	2,097	\$94,737	\$91,760	1.03	2,150	\$92,340	\$98,959	0.93	-0.10
Top 1%	1,049	\$134,131	\$129,517	1.04	1,076	\$131,541	\$140,366	0.94	-0.10

Comparing the highest-cost members within the population, Accolade customers saw consistent improvements in the cost profile relative to controls. While the entire 2019 implementation population saw a post-implementation cost ratio of 97% [see Table 3], the cost ratio for the top 25% of members by claims spend (allowed cost) was 95% of market with similar results observed across the top percentiles. Pre-Accolade cost profiles were above market across all levels shown here, improving by 9 to 10 points in Year 1.

Comparison by Chronic Condition (Top 15 by Prevalence)

Table 9: PMPY and Cost Ratio by Chronic Conditions

Conditions	2018 - Year 0 (Before Accolade)				2019 - Year 1 (Accolade)				
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0
Mental Anxiety	9,653	\$9,619	\$9,471	1.02	11,077	\$9,399	\$10,019	0.94	-0.08
Disc Disorders	8,204	\$12,484	\$12,030	1.04	8,768	\$11,848	\$12,960	0.91	-0.12
Hypertension/Cardiovascular	7,888	\$16,988	\$16,052	1.06	8,480	\$16,154	\$17,005	0.95	-0.11
Neurological Disorders*	4,005	\$23,779	\$22,027	1.08	4,767	\$23,732	\$23,444	1.01	-0.07
Mental Mood*	3,946	\$13,018	\$12,819	1.02	4,469	\$13,138	\$13,737	0.96	-0.06
Metabolic Disorders	3,518	\$14,086	\$13,764	1.02	4,181	\$12,840	\$14,518	0.88	-0.14
Asthma*	3,412	\$10,632	\$9,384	1.13	3,744	\$10,057	\$10,160	0.99	-0.14
Migraine/Headache*	3,135	\$11,948	\$11,455	1.04	3,409	\$11,446	\$11,964	0.96	-0.09
Diabetes*	2,756	\$15,115	\$14,687	1.03	2,882	\$14,917	\$15,856	0.94	-0.09
Pregnancy Related	2,735	\$18,939	\$19,201	0.99	2,764	\$19,096	\$19,925	0.96	-0.03
Hypothyroid	2,473	\$12,833	\$11,815	1.09	2,633	\$12,038	\$13,267	0.91	-0.18
Lipid Disorders*	2,414	\$9,910	\$10,047	0.99	2,725	\$9,665	\$10,501	0.92	-0.07
Upper GI/Esophageal*	1,904	\$15,318	\$14,919	1.03	2,275	\$14,489	\$15,100	0.96	-0.07
Osteoarthritis*	1,446	\$19,538	\$19,412	1.01	1,591	\$18,381	\$19,602	0.94	-0.07
Cancer*	1,286	\$42,344	\$36,329	1.17	1,417	\$35,814	\$36,440	0.98	-0.18

*Differences in PMPY between control and Accolade customers in Year 1 not statistically significant

The most common chronic conditions within this cohort were Anxiety, Disc/Lower Back Disorders and Hypertension/Cardiovascular conditions. Pre-Accolade (Year 0) costs profiles were generally similar to market or above market. Following Accolade implementations in Year 1, all conditions improved relative to pre-Accolade baselines and relative to market with most conditions ending up between 88% to 95% of market costs. However, due to the smaller sample sizes and high cost volatility of some conditions the differences vs market costs were not statistically credible across all conditions [See Table 9].

Detailed Results: 2018 Implementations

Comparison by Service Category

Table 10: PMPY and Cost Ratio by Service Category

Service Category	2017 - Year 0 (Before Accolade)				2018 - Year 1 (Accolade)					2019 - Year 2 (Accolade)				
	Client PMPY	Control PMPY	Client - Control	Cost Ratio	Client PMPY	Control PMPY	Client - Control	Cost Ratio	Cost Ratio vs Yr0	Client PMPY	Control PMPY	Client - Control	Cost Ratio	Cost Ratio vs Yr0
Physician	\$1,642	\$1,665	(\$23)	0.99	\$1,639	\$1,703	(\$64)	0.96	-0.03	\$1,661	\$1,797	(\$136)	0.92	-0.07
Outpatient	\$1,509	\$1,325	\$184	1.14	\$1,544	\$1,429	\$115	1.08	-0.06	\$1,616	\$1,560	\$56	1.04	-0.10
Inpatient	\$839	\$781	\$58	1.07	\$809	\$791	\$18	1.02	-0.05	\$908	\$869	\$39	1.05	-0.02
Specialty Rx	\$519	\$498	\$21	1.04	\$513	\$571	(\$58)	0.90	-0.14	\$522	\$608	(\$86)	0.86	-0.18
Brand Rx	\$358	\$361	(\$3)	0.99	\$388	\$404	(\$16)	0.96	-0.03	\$383	\$431	(\$48)	0.89	-0.10
Generic Rx	\$232	\$228	\$4	1.02	\$202	\$197	\$5	1.02	0.00	\$219	\$206	\$13	1.06	0.04
Total	\$5,099	\$4,858	\$241	1.05	\$5,095	\$5,095	\$0	1.00	-0.05	\$5,309	\$5,471	(\$162)	0.97	-0.08

The two customers implementing in 2018 started with a pre-Accolade cost profile of 105% of market in Year 0, driven by high Outpatient, Inpatient, Specialty and Generic Drugs costs in excess of market controls. In Accolade’s first year, cost ratios relative to market improved across all categories except Generic Drugs, with total cost at the same level as market. By Year 2, Physician, Specialty and Brand Drugs were below market, with Outpatient continuing to improve, for an overall efficiency of 97% or an 8 percentage point relative improvement over Year 0.

Comparison by Age Group

Table 11: PMPY and Cost Ratio by Age Group

Age Group	2017 - Year 0 (Before Accolade)				2018 - Year 1 (Accolade)					2019 - Year 2 (Accolade)				
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0
0-14	5,277	\$2,203	\$2,269	0.97	5,247	\$2,118	\$2,157	0.98	0.01	5,598	\$2,476	\$2,624	0.94	-0.03
15-22	3,601	\$3,321	\$3,022	1.10	3,684	\$2,956	\$3,030	0.98	-0.12	4,004	\$3,169	\$3,520	0.90	-0.20
23-29	3,540	\$3,373	\$3,290	1.03	3,503	\$3,721	\$3,382	1.10	0.07	3,727	\$3,503	\$3,710	0.94	-0.09
30-44	7,577	\$5,062	\$4,690	1.08	7,677	\$5,227	\$5,108	1.02	-0.06	8,486	\$5,165	\$5,125	1.01	-0.07
45-59	7,131	\$7,680	\$7,565	1.02	7,189	\$7,622	\$7,808	0.98	-0.04	7,861	\$8,016	\$8,267	0.97	-0.05
60-64	1,554	\$11,121	\$9,659	1.15	1,671	\$10,347	\$10,527	0.98	-0.17	1,878	\$11,017	\$11,190	0.98	-0.17
Total	28,680	\$5,099	\$4,858	1.05	28,971	\$5,095	\$5,095	1.00	-0.05	31,554	\$5,309	\$5,471	0.97	-0.08

All age groups showed cost efficiency improvement in Year 2, compared to pre-Accolade baselines. The largest cohorts, ages 30-44 and 45-59, started at 108% and 102% of market pre-Accolade, respectively, and improved to 101% and 97% of market in Year 2, with smaller

improvements in Year 1. Due to the smaller membership size within each age band in this cohort, comparisons by age band for these customers were not sufficiently credible.

Comparison by Comorbidity Group

Table 12: PMPY and Cost Ratio by Comorbidity Group

Comor-bidity Grp	2017 - Year 0 (Before Accolade)				2018 - Year 1 (Accolade)					2019 - Year 2 (Accolade)				
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0
0	18,062	\$1,466	\$1,557	0.94	17,780	\$1,444	\$1,581	0.91	-0.03	19,243	\$1,452	\$1,680	0.86	-0.08
1	6,787	\$6,497	\$6,247	1.04	7,034	\$6,502	\$6,331	1.03	-0.01	7,493	\$6,233	\$6,545	0.95	-0.09
2	2,502	\$14,465	\$12,706	1.14	2,713	\$13,316	\$12,854	1.04	-0.10	3,051	\$14,141	\$13,681	1.03	-0.11
3	904	\$23,998	\$22,894	1.05	980	\$23,736	\$22,540	1.05	0.00	1,196	\$24,105	\$22,781	1.06	0.01
4+	425	\$40,650	\$37,157	1.09	464	\$35,188	\$37,771	0.93	-0.16	571	\$35,861	\$37,855	0.95	-0.14
Total	28,680	\$5,099	\$4,858	1.05	28,971	\$5,095	\$5,095	1.00	-0.05	31,554	\$5,309	\$5,471	0.97	-0.08

Prior to Accolade, the two customers in this cohort had above-market cost levels for members with 1 or more chronic conditions. In Years 1 and 2, and relative to market, Accolade improved the cost efficiency for all comorbidity groups except for those managing 3 conditions. Due to the smaller sample sizes and high cost volatility in this cohort, only the results for members with 0 or 1 chronic conditions represented statistically credible reductions vs. market controls.

Comparisons by High Cost Claimant Level

Table 13: PMPY and Cost Ratio by Member Cost Percentile

Member Cost Percentile	2017 - Year 0 (Before Accolade)				2018 - Year 1 (Accolade)					2019 - Year 2 (Accolade)				
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0
Top 25%	7,170	\$18,049	\$16,843	1.07	7,243	\$18,051	\$17,668	1.02	-0.05	7,889	\$18,919	\$19,048	0.99	-0.08
Top 20%	5,737	\$21,618	\$20,084	1.08	5,795	\$21,650	\$21,055	1.03	-0.05	6,312	\$22,717	\$22,734	1.00	-0.08
Top 10%	2,869	\$36,460	\$33,347	1.09	2,898	\$36,467	\$34,811	1.05	-0.05	3,157	\$38,483	\$37,804	1.02	-0.08
Top 5%	1,435	\$57,643	\$52,314	1.10	1,449	\$57,828	\$54,254	1.07	-0.04	1,579	\$60,851	\$59,521	1.02	-0.08
Top 2%	574	\$96,717	\$88,393	1.09	581	\$97,885	\$90,616	1.08	-0.01	633	\$102,779	\$100,497	1.02	-0.07
Top 1%	288	\$135,186	\$125,497	1.08	291	\$139,794	\$127,018	1.10	0.02	317	\$144,306	\$142,765	1.01	-0.07

For the highest-cost members within the population, Accolade customers implementing in 2018 had above-market costs in Year 0 ranging from 107% to 110% of controls. The cost ratios for these members generally improved in Year 1 and again in Year 2 resulting in cost levels similar to the control groups and overall efficiency improvements of 7-8 percentage points compared to pre-Accolade cost ratios.

Comparison by Chronic Condition (Top 15 by Prevalence)

Table 14: PMPY and Cost Ratio by Chronic Conditions

Conditions	2017 - Year 0 (Before Accolade)				2018 - Year 1 (Accolade)					2019 - Year 2 (Accolade)				
	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0	Client Mbrs	Client PMPY	Control PMPY	Cost Ratio	Cost Ratio vs Yr0
Hypertension/ Cardiovascular*	3,025	\$14,984	\$14,821	1.01	3,249	\$15,119	\$14,776	1.02	0.01	3,667	\$15,373	\$15,652	0.98	-0.03
Disc Disorders*	2,154	\$13,093	\$11,697	1.12	2,107	\$13,438	\$12,922	1.04	-0.08	2,254	\$13,655	\$13,062	1.05	-0.07
Mental Anxiety*	2,124	\$9,246	\$8,944	1.03	2,445	\$8,102	\$8,699	0.93	-0.10	2,742	\$9,040	\$9,005	1.00	-0.03
Diabetes*	1,282	\$16,045	\$15,659	1.03	1,297	\$15,349	\$15,489	0.99	-0.03	1,533	\$15,656	\$15,442	1.01	-0.01
Mental Mood*	1,134	\$13,038	\$12,196	1.07	1,357	\$11,539	\$11,915	0.97	-0.10	1,470	\$11,675	\$12,240	0.95	-0.12
Neurological Disorders*	1,123	\$24,787	\$22,431	1.11	1,162	\$21,847	\$22,362	0.98	-0.13	1,358	\$26,779	\$25,911	1.03	-0.07
Asthma*	1,056	\$12,222	\$10,040	1.22	974	\$11,728	\$11,061	1.06	-0.16	1,129	\$12,334	\$12,007	1.03	-0.19
Metabolic Disorders	935	\$13,629	\$12,968	1.05	1,169	\$11,312	\$11,716	0.97	-0.09	1,519	\$11,775	\$13,932	0.85	-0.21
Migraine/ Headache*	826	\$12,495	\$11,802	1.06	880	\$12,578	\$11,966	1.05	-0.01	987	\$12,270	\$12,267	1.00	-0.06
Lipid Disorders*	776	\$11,249	\$9,300	1.21	807	\$8,992	\$9,888	0.91	-0.30	870	\$9,998	\$9,910	1.01	-0.20
Hypothyroid*	609	\$13,483	\$11,387	1.18	581	\$10,861	\$10,950	0.99	-0.19	669	\$12,637	\$12,490	1.01	-0.17
Pregnancy Related	548	\$16,720	\$16,062	1.04	544	\$17,084	\$15,272	1.12	0.08	550	\$19,047	\$17,125	1.11	0.07
Upper GI/ Esophageal*	471	\$15,996	\$14,195	1.13	480	\$13,601	\$13,355	1.02	-0.11	574	\$16,271	\$14,782	1.10	-0.03
Osteoarthritis*	429	\$20,374	\$17,294	1.18	454	\$19,253	\$19,330	1.00	-0.18	478	\$19,539	\$20,038	0.98	-0.20
Cancer*	362	\$39,769	\$31,856	1.25	397	\$36,705	\$38,067	0.96	-0.28	418	\$42,363	\$42,663	0.99	-0.26

*Differences in PMPY between control and Accolade customers in Year 2 not statistically significant

The top chronic conditions within the 2018 cohort were consistent with the 2019 cohort: Anxiety, Disc/Lower Back Disorders and Hypertension/Cardiovascular conditions. However, due to the smaller sample sizes in this cohort, many comparisons are not sufficiently credible. With the exception of Pregnancy-related conditions, Years 1 and 2 of Accolade showed cost reductions for all conditions. Whereas all conditions started Year 0 at or above market in costs, most were at or below market by Year 2 of Accolade consistent with the larger cohort results.

Data Sources

Accolade Customer Data

Aon received detailed medical and pharmacy claims experience and corresponding eligibility data for six Accolade customers, including claims for the 12 months prior to the Accolade start date:

- Four customers implemented Accolade in January 2019: provided with 2018 – 2019 incurred claims data with six (6) months runout.
- Two customers implemented Accolade in January 2018: provided with 2017 – 2019 incurred claims data with six (6) months runout.

Multi-Employer Benchmark Control Group

The multi-employer benchmark population was derived from the IBM MarketScan® Research Databases using claims incurred in 2017 and 2018 with six (6) months runout. These datasets represent the claims experience of hundreds of employers and payers nationally in the commercial market, allowing for robust control group development. Employers in the IBM MarketScan® databases represent large self-insured entities with sophisticated multi-vendor benefit programs. We believe the cost and utilization profiles represented by these databases are an appropriate market benchmark for Accolade’s customers and target employers.

Due to the timing of this study, 2019 market datasets were not yet available and unit cost trend by service category (inpatient facility, outpatient facility, physician, outpatient drugs administered in the medical setting, and prescription drugs) were applied to the 2018 MarketScan® claims data. No utilization trend was applied. The unit cost trend was derived by directly comparing allowed claims incurred in 2018 to claims incurred in 2017:

Category	2018 to 2019 Unit Cost Trend
Inpatient Facility	3.75%
Outpatient Facility	5.50%
Physician	2.25%
Outpatient Drugs	12.50%
Prescription Drugs	4.50%

Measurement Eligibility Restrictions

Eligibility restrictions were equally applied at the member level for both the Accolade customer datasets as well as the external market datasets used for comparison. To achieve robust matching and measurement, eligibility was restricted to:

- Members under age 65
- Members with least eight (8) months of enrollment within a plan year

Catastrophic Member Exclusion

Catastrophic claimants exceeding \$500,000 in allowed cost (medical and pharmacy combined) in a single year were excluded from that year for both the Accolade data as well as the external market datasets. Aon performed sensitivity testing evaluating the \$750,000 and \$250,000 exclusion levels as alternatives. We found levels higher than \$500,000 produced

similar aggregate results but with considerably higher measurement noise for subgroups due to the small sample sizes. Catastrophic levels lower than \$500,000 eliminated more than 10% of the total claims experience from the study limiting the evaluated cost profile.

Methodology

The comparisons in this report follow a difference in differences measurement of actual claims costs recorded for Accolade's customers compared to actual claims from a market-derived control group of precisely matched member risks across the measurement period.

Member Matching and Control Group Derivation

Each member of the six Accolade customers was matched to the 3 most similar members in the multi-employer database within each year. The matching was based on the exact demographic, geographic and chronic medical condition profile for each individual compared to eligible control members across each individual dimension. No propensity scores or risk scores were used to combine or simplify dimensions or risk profiles.

- Members were matched by Age and Gender to the nearest available external controls. Members ages 0 and 1 were always exactly matched on age, and a caliper of (+/-) 5 years was applied to members aged 2-64.
- Members were only matched to other members with the exact same conditions and combinations of conditions present. Members with no chronic conditions were always matched to controls with no chronic conditions present.
- The chronic condition indicators for each member were based on primary medical diagnostic codes according to the Chronic Condition Indicator and Clinical Classifications Software (CCS) developed by the AHRQ Healthcare Cost and Utilization Project (HCUP). Diagnostic Laboratory and Imaging claims were excluded from the development of the indicators. The set of chronic conditions used for member matching were selected based on the highest combined explanatory power with respect to member allowed medical and pharmacy costs using regularized linear models.

Chronic condition indicators used for patient matching:

- Asthma / COPD
- Blood Disorders
- Cancer (Primary) excluding skin cancer
- Diabetes
- Diabetes with Complications
- Diverticulitis
- Endocrine disorders
- Esophageal / Upper GI Diseases
- Regional enteritis and ulcerative colitis
- Hepatitis
- HIV infection
- Hypertension
- Cardiovascular Disease
- Immune System Diseases
- Lower Back / Disc Diseases (including spondylosis)
- Metabolic and Nutritional Disorders
- Migraine
- Multiple Sclerosis
- Neurological Disorders, including epilepsy and Parkinson's diseases
- Osteoarthritis
- Pregnancy and Labor Categories
- Renal Failure
- Rheumatoid Arthritis and related diseases
- Anxiety and Attention Disorders
- Mood Disorders (including depression)

- Members were matched to the closest geographical controls using the following proximity hierarchy:
 - 1st Preference: Within same Metropolitan Statistical Area (MSA) level: 97.1% of the members were matched locally
 - 2nd Preference: Within same State: an additional 1.7% members were matched outside their MSA but within the same state
 - 3rd Preference: National level: Remaining 1.2% members where local MSA or State controls were not found were matched at the national level

Overall, over 99.6% of all members were fully matched with high-quality external controls. The remaining members were dropped from the study due to insufficient controls available. The dropped members were typically patients with rare combinations of demographics and/or chronic conditions where appropriate quality controls could be found in the market datasets. For members where multiple identical matches were identified, the controls were selected at random from the identical match candidates.

Pre-and post-matching testing was performed on all matching variables confirming that post-matching standardized mean differences were minimized and confirming appropriate balance of the covariates between the Accolade members and the derived control groups.

Cost and Utilization Metrics

All measurements of cost and utilization metrics were derived from the raw claims records of the matched members and calculated using identical methods for Accolade customers and the

matched multi-employer datasets. Pharmacy rebate data was not available and was not incorporated for Accolade or the external market data.

Claim service types and category classifications were based on the Health Care Cost Institute Analytics methodology (2018) and Aon standard code sets.

Differences in cost between the Accolade customers and control groups were tested for statistical significance at the 95% confidence level using two-sample unequal variances t-tests. Unless otherwise noted in this report, cohort-level results were statistically significant.

Methodology Discussion

The most challenging aspect of studying the effects of interventions or programs on benefit costs is obtaining appropriate contemporaneous controls for comparison. Few employers are able to conduct randomized trials within their benefit programs, so industry studies typically rely heavily on observational evaluations or convenience samples across years that are easily influenced by selection bias, reversion-to-the-mean, or choice of major assumptions such as trend, plan design, or relative demographic, geographic or risk factors. Many industry studies rely on trending forward static historical data which introduces external assumptions and fails to account for the evolving diagnostic or treatment patterns in the market across years.

The methodology used in this analysis is designed to minimize external assumptions and potential for bias addressing common measurement challenges:

- By deploying a refined algorithmic matching technique using one of the largest claims datasets in the country, appropriate controls for each member can be developed, matched on over 25 dimensions of geography, demographics and chronic condition presence. This direct member-to-member matching approach eliminates the need for geographic adjustments, demographic or risk adjustments commonly used to modify comparisons.
- The exact matching used in this study improves balance and minimizes bias across key variables and member characteristics like demographics, geography, chronic conditions and combinations of conditions. Commonly used approaches like propensity score matching or risk-scoring increase the risk of bias and model dependence by reducing dimensionality or making assumptions about cost relativities.
- All cost and utilization metrics were developed for this study from raw claims data, ensuring consistent classification and measurement methods across all comparisons. Aggregate differences between the treatment and control groups were further tested for statistical significance.
- By using multiple years of external member data, comparisons capture ongoing industry cost and utilization trends such as the reduction of inpatient utilization, increase in outpatient and specialty drug utilization that are common across the industry regardless of

payers/vendors. The geographical matching further allows the study to capture local cost or utilization differences appropriate for the measured population.

- The inclusion of 12-months of “pre-Accolade” period allows the study to compare the cost and utilization profile of these customers to an external benchmark population pre-treatment and post-treatment. While the “pre-Accolade” comparisons introduce the possibility for additional vendor changes influencing the results, this additional period provides important context for the starting point of these employers relative to market.
- This study focuses on allowed claims costs (pre plan-design cost-sharing) in order to normalize for the variations in plan designs and cost-sharing provisions. This choice eliminates the need for external adjustments for plan design – however it may result in the customers differing in overall benefit richness compared to market.

Limitations and Further Study

The methodologies of this analysis minimize the impact of many common challenges when measuring the financial impact of a benefit program. The matching algorithms and comprehensive multi-employer dataset of this study present a rigorous normalization for risk exposure within a given plan year that avoids the use of external assumptions such as trend, geographical and demographic factors, while capturing broad market-level trend such as utilization and treatment pattern changes.

Factors that could positively or negatively impact the cost comparisons that could not be controlled for in this study include:

- Differences in benefit programs, vendors and protocols other than Accolade that have influenced patient care cost and utilization patterns
- Differences in provider contracted rates or pharmacy acquisition costs and network arrangements not typical in the market
- Unobserved confounders influencing utilization patterns such as socioeconomic or other incentive differences across employers
- Induced or suppressed utilization as a result of Accolade customer's plan design or plan design incentives relative to market
- Differences in Out-of-Network utilization patterns and management
- Differences in claims administration, coding or quality of data provided to us

This study attempts to provide objective cost and utilization comparisons of Accolade members compared to controls pre-and post-implementation. Due to the small size of the individual customers and cohorts, some comparisons were limited in credibility as noted in the report.