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ACCORDANT CARE MANAGEMENT PROGRAM FOR MEMBERS WITH SPECIFIC RARE CHRONIC CONDITIONS IS ASSOCIATED WITH CONTROLLED HEALTH CARE COSTS AND INPATIENT ADMIT RATES – AN ACCORDANT WHITE PAPER

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Disclosure

All authors of this white paper are employees of Accordant Health Services, a CVS Caremark Company, which is the provider of care management services described in this paper.

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EXECUTIVE SUMMARY

Background: Accordant Health Services (Accordant) is a CVS Caremark company that provides health care management (CM) services to members suffering from one of 17 rare and chronic conditions and currently serves members enrolled in approximately 30 different health plans and/or employer clients in the United States. The traditional total population pre-post design for CM program evaluation with no controls has endured many criticisms, and conducting a controlled experimental study is not usually possible due to lack of unmanaged controls. The objective of this paper is to show the impact of Accordant's CM program on health care costs and inpatient utilization using a quasi-experimental control with data from a large payer population that also has members not managed by Accordant, but with the same rare and chronic conditions.

Methodology: The data used for this matched-control study came from a large, nation-wide private payor employer group and having a current contract with Accordant for CM services. Only data for members with any one of five large N chronic conditions, namely epilepsy, lupus, multiple sclerosis, Parkinson's disease and rheumatoid arthritis, were considered. The two study groups compared were (1) the Accordant care managed group and (2) the control group (or group comprising members not care managed by Accordant). These two study groups were prepared by match-pairing members using propensity scores derived from logistic regression by using selected demographic and health care utilization characteristics. The match-pairing technique was done using stratification by disease condition. The health care costs per member per year (PMPY) and hospital admit rates were measured over two consecutive measurement periods of two years each (total duration four years). The change in outcome metrics from measurement period-1 (MP1) to measurement period-2 (MP2) was calculated. The CM program impact during MP2 was quantified by using the difference in difference (DID) technique.

Findings: Each of the two study groups consisted of 8,198 members. By design, both study groups were statistically similar with respect to the matching variables and disease mix composition. The cost PMPY increased from $14,352 in the MP1 to $16,572 in the MP2 for the control group, while the costs PMPY remained nearly unchanged from MP1 to MP2 ($16,212 vs. $16,248) for the Accordant care managed group. The hospital inpatient admission rate (per 1,000 member months per year) increased significantly ($p<0.01$) from 142 in MP1 to 160 in MP2 for the control group, while hospital inpatient admission rate decreased slightly ($p=0.26$) from 154 to 149 for the Accordant care-managed group. The DID method of estimation for CM program impact showed a stabilization of costs and admit rates in MP2 compared to MP1 for the intervention group, while the control group realized an increase in cost and utilization.

Conclusion: The match-paired quasi-experimental control study design showed that Accordant CM program intervention results in stabilization of overall cost and hospital admission rates compared with the control, which displayed both cost and utilization increases.

BACKGROUND

Accordant description: Accordant Health Services (Accordant) was started in 1995 as a disease management (DM) company. Currently, Accordant is a CVS Caremark company, which provides health care management (CM) services to members of approximately 30 health plans and/or employer groups in the United States and serves members suffering from any of the 17 rare and chronic conditions. These conditions are (1) amyotrophic lateral sclerosis, (2) chronic inflammatory demyelinating polyradiculoneuropathy, (3) Crohn's disease, (4) cystic fibrosis, (5) dermatomyositis, (6) epilepsy, (7) Gaucher disease, (8) hemophilia, (9) lupus, (10) multiple sclerosis, (11) myasthenia gravis, (12) Parkinson's disease, (13) polymyositis, (14) rheumatoid arthritis, (15) scleroderma, (16) sickle cell anemia, and (17) ulcerative colitis.

Accordant CM program description: Accordant CM program is an individualized nurse-assisted health care planning and management program aimed at increasing a member's knowledge about his or her condition and improving self-management skills. Each member enrolled in Accordant CM program is assigned to their primary care nurse, who will remain as the primary point of contact for that member for the duration of participation. The primary care nurse regularly assesses the member's knowledge gaps in self-management skills and works with the member in filling those gaps so that the member gets appropriate and timely care from providers, thus avoiding the need for costly emergent or inpatient care visits. The primary care nurse develops a member-centric CM plan and coordinates educational outreach, which is enabled by telephonic exchanges, through mailings, or online. The primary care nurse consults with additional care team members including social workers, case managers, and an expert medical advisory board to review care plans, provide advice and urgently solve care coordination problems. The Accordant CM program intervention also focuses on appropriate use of medication and encourages medication adherence. Members can contact Accordant nurses through a 24-hour telephone access line or a web-based member portal. In addition, Accordant nurses collect member assessments on at least a quarterly basis, which are used for tracking member improvements and ultimately used for improving a member's overall condition.

Why was this study needed? The goal of Accordant CM program is primarily to teach a member to better manage their condition, which leads to avoiding unnecessary hospital admissions and results in significant cost savings for the health plan and/or the employer group clients. A scientifically valid methodology utilizing an appropriate control group is required for showing the CM program effectiveness on costs and utilizations. The traditional population-based pre-post design with no unmanaged control group for comparison has many criticisms (Conklin and Nolte 2010). The matched-pair designs or other controlled study designs alone will not work in absence of appropriate unmanaged controls. Linden and Adams (2012) recommended using regression discontinuity design either alone or in combination with propensity score weighting adjustment for evaluating health management program effectiveness. An evaluative study was needed where data were available to Accordant from a large pay0r population in which both managed and unmanaged control population were present. Hence, we saw an opportunity to use an evaluation methodology where (1) Accordant care managed and control groups of members could be prepared for comparison by use of matched-pair technique, (2) the outcomes, namely health care costs and hospital inpatient admit rates, could be measured during the MP1 and MP2, and (3) a DID technique could be used for quantifying the CM program impact during MP2 compared to that in MP1.

METHODOLOGY

Data source description: Medical and pharmacy claims data obtained from a large, nationwide private payor employer group were analyzed for this study. The provider data already residing in the Accordant data warehouse were used, and members were not contacted for conducting this study. Although Accordant has a contract with this health insurance provider for CM services for multiple rare chronic diseases, data for only members with five large n conditions, namely epilepsy, lupus, multiple sclerosis, Parkinson's disease and rheumatoid arthritis were used for this study due to population size.

Description of the two measurement periods: The total length of the data period considered was four years (from November 2005 to October 2009). The first two years of the data period were considered as the MP1 and the second two years of the data period were considered as the MP2. More specifically, the period from November 2005 to October 2007 was considered as MP1 and the period from November 2007 to October 2009 was considered as MP2. The Accordant CM program intervention was applied to the managed or intervention group of members during these measurement periods.

Characteristics of eligible member population: A list of the eligible member population was prepared, which consisted of 20,203 members. Each member was considered an eligible member to be included in the study if he/she had any of the five Accordant managed large N disease conditions considered for this study and the member remained active or eligible with the health insurance provider for 42 of the 48 months of the data period. The disease mix in this eligible member population before match-pairing was epilepsy (34%), lupus (11%), multiple sclerosis (13%), Parkinson's disease (4%), and rheumatoid arthritis (37%). There were 75% commercial health plan members and 25% Medicare members within the eligible member population.

The eligible member population was sorted into two distinct cohorts or groups. The first group was the intervention group comprising members who were enrolled in the Accordant CM program. The second group was the control group comprising members who were not enrolled in the Accordant CM program. The control group also included unreachable members and those who refused to participate in Accordant CM program. The requirement for sorting the member in one or the other group was that an intervention group member had received clinical intervention(s) from a licensed Accordant nurse. The members assigned to the control group had no Accordant CM program exposure at any point during the two measurement periods, but just like the members in the intervention group, they were identified with one of the five large N disease conditions considered for this study and their health care occurred at the same time, in the same general geographic region, and potentially with the same physicians.

Preparation of the two study groups by match-pairing. The two study groups for this matched-control study were prepared with the members from the two respective eligible member groups described above by match-pairing using propensity scores generated from logistic regression procedure of SAS Statistics (Version 9.1). The dependent variable used in the logistic regression model was "Enrolled in Accordant CM program" coded as yes=1 or no=0. The predictor variables used in the logistic regression model were (1) age, (2) gender, (3) health plan product, (4) presence of severe comorbidities (the members having a diagnosis of one or more of conditions, namely diabetes, coronary artery disease, congestive heart failure, asthma, chronic obstructive pulmonary disease, osteoporosis, renal failure, and cancer, were considered to have severe comorbidity), (5) whether members were taking prescriptions for specialty drug (e.g., infliximab, glatiramer acetate) during MP1, (6) whether members had one or more inpatient admits during the MP1, and (7) whether members had one or more emergency room (ER) visits during the MP1. The logistic regression analysis produced a single probability value or propensity score for each member for the set of seven predictor variables entered into the model statement.

The match-pairing using propensity score was done using the Greedy Matching Algorithm (Parsons 2001). This algorithm is recognized by SAS Institute Inc. and

is generally used to match cases to controls in observational studies (Parsons 2001) such as this one. After 1:1 matching, 16,396 of the 20,203 eligible members were paired in the two study groups combined, with each study group consisting of n=8,198 members.

The two study groups were similar with respect to matching characteristics: The two study groups prepared, by propensity score-matching, were tested statistically to ensure that they were similar to each other with respect to the matching characteristics or the variables used for generating propensity scores. Data shown in Table 1 indicate that the match-pairing process worked as expected and made two study groups that were similar with respect to the matching variables.

Table 1. Demographic characteristics of the two study groups with respect to the matching variables used for creating propensity scores.

Variable	Unmanaged n=8,198	Managed n=8,198
Average age (years)	51.4	51.4
Gender, female (%)	69	69
Health plan product, commercial (%)	76	76
Members with severe comorbidities* (%)	54	54
Members using specialty medications** (%)	29	29
Members with one or more inpatient admits (%)	18	18
Members with one or more ER visits (%)	37	36

*The members having a diagnosis for one or more conditions, namely diabetes, coronary artery disease, congestive heart failure, asthma, chronic obstructive pulmonary disease, osteoporosis, renal failure, and cancer, were considered to have severe comorbidity.
**e.g., infliximab, glatiramer acetate.
ER=emergency room.

As noted earlier, match-pairing was stratified by the disease, hence the disease mix of the two study populations was also similar. The disease mix for each study population was epilepsy 35%, lupus 12%, multiple sclerosis 13%, Parkinson's disease 3% and rheumatoid arthritis 37%. By study design, the proportions of commercial and Medicare-insured members in each of the study groups was similar. Each of the study groups had 76% commercial and 24% Medicare-insured members.

The outcome metrics: Two outcome metrics examined were (1) the health care costs per member per year (PMPY, $) and (2) the hospital inpatient admit rates (per thousand member months per year). The health care cost PMPY ($) for each study group and measurement period was calculated by dividing the sum of health plan paid amounts for all members by the sum of total member months for the members in that study group and the measurement period. The inpatient hospital admit rate was calculated by dividing the sum of inpatient hospital admits for all members in the specific study group and the measurement period by the sum of total member months for the members in that study group, and the measurement period, and then by multiplying the resulting amount by 12,000 to annualize the rate per thousand.

Use of DID for estimating CM program impact: The DID technique was used for estimating the Accordant CM program impact on MP2. The average values of outcome metrics were calculated separately for (1) the control group during MP1, (2) the control group during MP2, (3) the Accordant care managed group during the MP1, and (4) the Accordant care managed group during the MP2. On one hand, changes in the measurement period means (MP2 mean minus the MP1 mean) were determined for two study groups. On the other hand, the difference in group means (mean for Accordant managed group minus the mean for control group) were determined for both MP1 and MP2. These cell means and differences in means as described above are all shown in figures in the results section of this white paper to illustrate how DID was used while showing CM program impact in MP2.

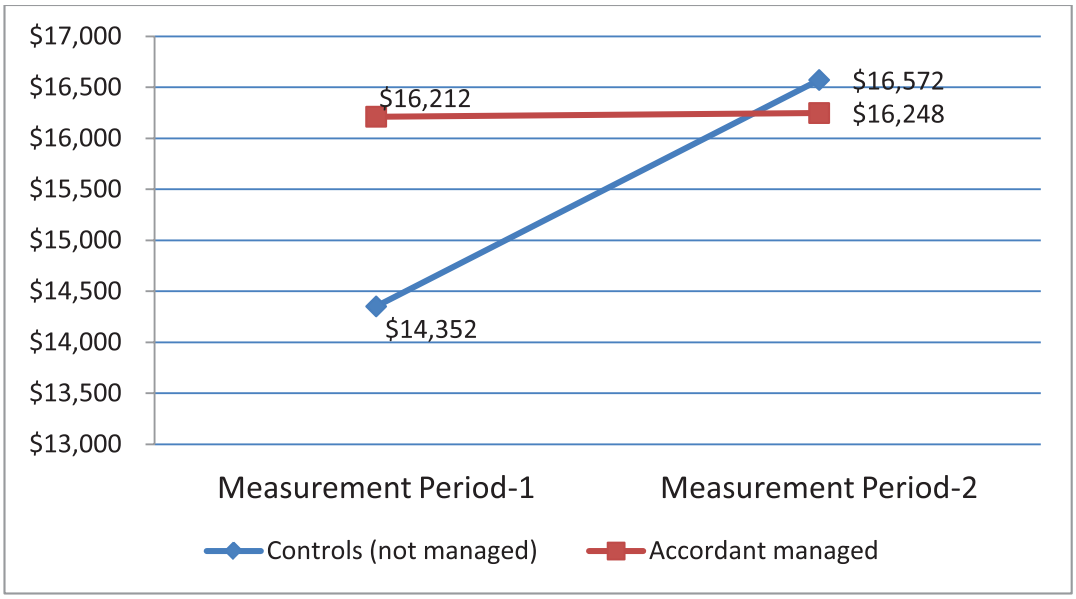
Statistical procedures: The proportions of members in each study group with specific matching characteristics were tested statistically using Chi-square tests. T-test was conducted using SAS (Version 9.1) to determine if the mean age of members in the two study groups was statistically different. The Logistic regression procedure of SAS Statistics (Version 9.1) was used for generating propensity scores, as mentioned earlier.

FINDINGS

Cost PMPY

- The health care cost PMPY increased from $14,352 during MP1 to $16,572 during the MP2 ($p<0.05$) for the control group (Fig. 1).
- The health care cost PMPY was $16,212 during MP1 and $16,248 during MP2 or remained similar ($p=0.91$) for the Accordant care managed group (Fig. 1).

Fig 1. Health care cost per member per year for the control (not managed) and the Accordant care managed group during the two measurement periods (n per group was 8,198).



- The change in mean PMPY from MP1 to MP2 for control group was $2,220 (Table 2).
- The change in mean PMPY from MP1 to MP2 for Accordant care managed group was $36 (Table 2).
- The difference in mean PMPY between Accordant care managed and control group was $1,860 during MP1 (Table 2).
- The difference in mean PMPY between Accordant care managed and control group was -$324 during MP2 (Table 2).
- Using DID technique of estimation, gross PMPY savings from Accordant CM program was $2,184 (Table 2).

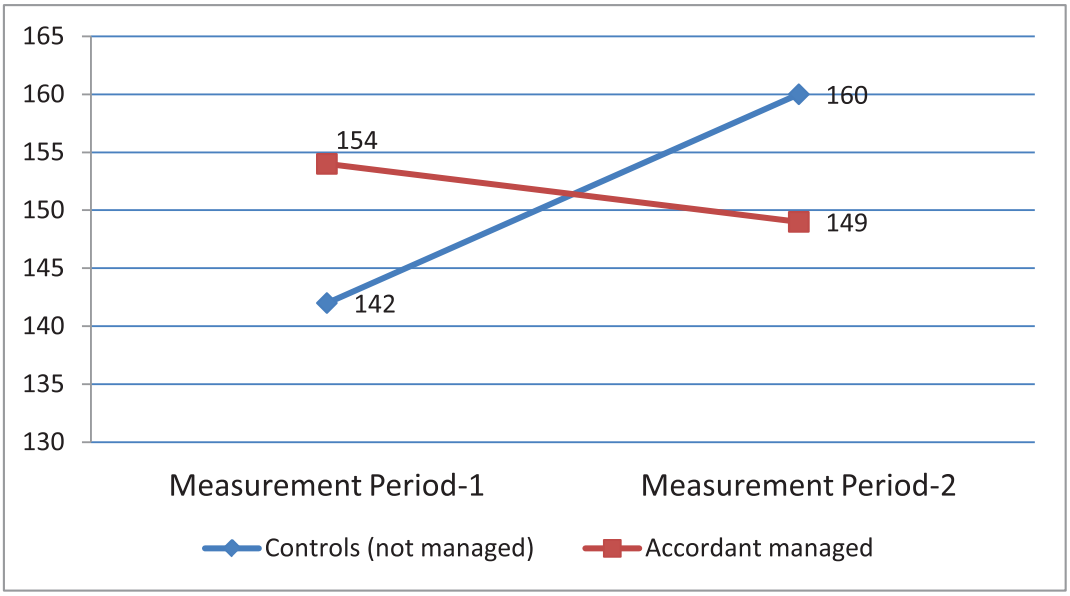
Table 2. Illustration of how DID was used for estimating CM program impact on costs per member per year ($)

	Study Group		
Variable	Unmanaged (a)	Managed (b)	Difference, b-a
1. Measurement Period-1	$ 14,352	$ 16,212	$ 1,860
2. Measurement Period-2	$ 16,572	$ 16,248	$ (324)
3. Change in means (Period-2 mean minus Period-1 mean)	$ 2,220	$ 36	$ 2,184

Inpatient admit rate

- The all-cause inpatient admission rate (per thousand member months per year) increased significantly ($p<0.01$) from 142 during MP1 to 160 during the MP2 for the control group (Fig. 2).
- The all-cause inpatient admission rate (per thousand member months per year) decreased slightly from 154 during the MP1 to 149 during MP2 for the Accordant care managed group (Fig. 2). This decrease from MP1 to MP2 was not statistically significant ($p=0.26$).

Fig 2. Inpatient admit rate (per thousand member months per year) for the control (not managed) and the Accordant care managed group during the two measurement periods (n per group was 8,198).



- The change in mean inpatient admit rates from MP1 to MP2 for control group was 18 (Table 3).
- The change in mean inpatient admit rates from MP1 to MP2 for Accordant care managed group was -5 (Table 3).
- The difference in mean inpatient admit rates between Accordant care managed and control group was 12 during MP1 (Table 3).
- The difference in mean inpatient admit rates between Accordant care managed and control group was -11 during MP2 (Table 3).
- Using DID technique of estimation, reduction on inpatient admit rate from Accordant CM program was 23 (Table 3).

Table 3. Illustration of how DID was used for estimating CM program impact on inpatient admit rate per 1,000 member months per year

	Study Group		
Variable	Unmanaged (a)	Managed (b)	Difference, b-a
1. Measurement Period-1	142	154	12
2. Measurement Period-2	160	149	-11
3. Change in means (Period-2 mean minus Period-1 mean)	18	-5	23

DISCUSSION

The key finding of this study, by using the methodology described, is the Accordant CM program does contribute to a positive impact on health care costs PMPY and inpatient admission rates for members with one of the five large n rare chronic conditions considered together. These are critically important findings for this member population with high health care costs. This is also important for other health plans concerned with rising health care costs that are looking for ways to control these costs for members diagnosed with a rare chronic disease condition that was considered for this study.

The direct health care costs PMPY are high for all five diseases considered for this study, although these costs also vary from disease to disease. Wilner et al. (2012) showed that mean cost PMPY in 2009 for members with epilepsy was $11,232. Slawsky et al. (2011) showed that mean costs PMPY for lupus members ranged from $13,735-$20,926. Prescott et al. (2007) reported that total average cost PMPY for multiple sclerosis members in 2004 was $12,879. Adelman et al. (2013) reported that range of total costs, which included both direct and indirect cost, was $8,528-$54,244 for multiple sclerosis members, for which 77% of total costs was the direct health care cost. O'Brien et al. (2009) reported that mean direct medical cost PMPY in 2007 dollars for Parkinson's disease members was $12,491. Joyce et al. (2009) reported that mean health care cost PMPY for rheumatoid arthritis members without comorbidities was $11,404 and that the cost

increased based on type of comorbidity (e.g. rheumatoid arthritis members with cardiovascular disease had the highest cost PMPY). The range in cell means for costs PMPY in this study was $14,352- $16,572 (Table 2). The gross savings PMPY of $2,184 shown from this study is 13% to 15% of the total costs for the disease mix of members used and can be considered significant for the health plans. The concurrent reductions in health care costs PMPY and the inpatient admit rate implies that at least part of this PMPY savings was due to reduced admit rates resulting from CM program intervention.

Through this study, we have shown how the methodology for CM program evaluation can be used where a concurrent comparison group is prepared using propensity score matching and the outcomes for each study group are measured over two measurement periods. In addition, the DID technique was used for estimating CM program impact in MP2 using outcomes observed in MP1 as the baseline. Finding a large number of control members for Accordant managed members was not difficult because the size of the diseased population in this health insurer was large and there were also a large number of members who were not care managed by Accordant. Linden et al. (2005) utilized a case-control pre-post study design with controls matched using propensity scores for disease management (DM) evaluation for congestive heart failure and suggested that propensity score matching could be an alternative procedure for use in non-experimental designs aimed at evaluating DM program effectiveness. The propensity score reduces a set of covariates for each member into a single probability value, and in our study it represented the probability of a member enrolling into the Accordant CM program. Propensity score matching alleviates the bias due to differences between the treated (Accordant care managed in this study) and comparison group (not managed controls in this study; Dehejia and Wahba 2002). Using a matched sampling technique allows choosing members from the untreated or control population so that they are similar to the program participants with respect to variables used for calculating propensity scores. The methodology we have used can be used for evaluating CM program impact for similar large payor populations whose members have a long period of CM program exposure or have pre-exposure period data also available.

The methodology used for this study does have some limitations. The MP1 is not exactly the pre-intervention period. Hence, the design used is not a true pre-post design, but one with measurement periods spanning a four-year period and the CM program impact is measured using outcomes in this MP1 as the baseline. The impact on cost savings and utilizations shown from this study are for MP2 compared to MP1 and for CM program intervention group compared to control group considered simultaneously. This methodology is not appropriate for health plans or large employer groups who have contracted with a CM vendor but have a small diseased population, because finding appropriate control group members will be difficult. The matched-pair methodology makes the two comparison groups statistically similar only with respect to the variables used for pairing and does not reduce the bias due to other group characteristics not considered for generating propensity scores.

We acknowledge that our use of members refusing the program participation and those who could not be reached for CM could also be criticized. It is likely that members who are participating in the CM program may be more motivated, but it is hard to control for the motivation level even when using matched-pair designs. However, motivation alone does not guarantee successful outcomes. In addition, Accordant attempts to enroll every member into the program without consideration to motivation, and there were nearly equal numbers of participating and nonparticipating members in the eligible population reservoir (51%, 49%). Our goal was to use these nonparticipating members belonging to the same five conditions within the same payor for preparing the control unmanaged group. Our use of unreachable members and those refusing to participate in the CM program was the closest control or comparison group we could use for preparing matched controls for this study.

CONCLUSION

The match-paired quasi-experimental control study design showed that Accordant CM program intervention results in stabilization of overall cost and hospital admission rates compared with the control, which displayed both cost and utilization increases.

REFERENCES

1. Adelman G, Rane SG, Villa KF. The cost burden of multiple sclerosis in the United States: a systematic review of the literature. J Med Econ 2013. 16(5):639-647.
2. Conklin A, Nolte E. Disease management evaluation: a comprehensive review of current state of the art. RAND Europe Technical Report. December 2010. www.rand.org/content/dam/pubs/technical.../RAND_TR894.pdf
3. Dehejia RH, Wahba S. Propensity score-matching methods for nonexperimental causal studies. Rev Econ Stat, 2002; 84(1):151-161.
4. Joyce AT, Smith P, Khandker R, Melin JM, Singh A. Hidden cost of rheumatoid arthritis (RA): estimating cost of comorbid cardiovascular disease and depression among patients with RA. J Rheumatol 2009. 36(4):743-752.
5. Linden A, Adams JL. Combining the regression discontinuity design and propensity score-based weighting to improve causal inference in program evaluation. J Eval Clin Pract, 2012; 18(2):317–325. doi: 10.1111/j.1365-2753.2011.01768.x
6. Linden A, Adams J, Roberts N. Using propensity scores to construct comparable control groups for disease management program evaluation. Dis Manag Health Out, 2005; 13(2):107-115.
7. O'Brien JA, Ward A, Michels SL, Tzivelekis S, Brandt NJ. Economic burden associated with Parkinson disease. Drug Benefit Trends 2009. 21(6):179-190.
8. Parsons LS. Reducing bias in a propensity score matched-pair sample using Greedy matching techniques. Proceedings of the 26th Annual SAS ® User Group International Conference, Seattle, WA: SAS Institute Inc., 2001: 214-226.
9. Prescott JD, Factor S, Pill M, Levi GW. Descriptive analysis of the direct medical costs of multiple sclerosis in 2004 using administrative claims in a large nationwide database. J Manag Care Pharm, 2007; 13(1):44-52.
10. Slawsky KA, Fernandes A, Fusfeld L, Manzi S, Goss TF. A structured literature review of the direct costs of adult systemic lupus erythematosus in the United States. Arthritis Care Res, 2011; 63(9):1224-1232.
11. Wilner AN, Sharma BK, Soucy A, Krueger A. Health plan paid cost of epilepsy in 2009 in the U.S. Epilepsy Behav 2012; 25:412-416.

About Accordant Health Services

Accordant Health Services, Inc., a CVS Caremark company based in Greensboro, N.C., is a care management organization dedicated to empowering individuals with rare conditions such as multiple sclerosis, lupus, Parkinson's, rheumatoid arthritis, hemophilia, cystic fibrosis and sickle cell anemia, to promote their total health and manage their multiple and complex diseases and needs. As a result, Accordant clients benefit from more informed and supported individuals, which leads to optimized medical and pharmacy spend. Accordant accomplishes these objectives through an Accordant Care Team that leverages deep domain expertise and proprietary tools and resources. Accordant's Medical Advisory Board comprises national medical experts who participate in the development and continuous quality improvement of the company's programs. For more information about Accordant, visit www.accordant.com or call 1-800-948-2497.

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