The Revision of CDPS and the Development of a Combined Diagnostic and Pharmacy Based Risk Adjustment Model

The goals of this project were to update CDPS using recently available national Medicaid data, and to develop a combined diagnostic and pharmacy based risk adjustment model based on CDPS and MedicaidRx. The CDPS update to version 5.0, and the combined model, CDPS-Rx, were developed using data from up to 41 state Medicaid programs for years 2001-2002.[1] The data were supplied by CMS from the Medicaid Analytic eXtract (MAX) data system. The MAX data are a set of person-level data files containing information on Medicaid eligibility, service utilization, and payments. An extensive description of the MAX data and links to documentation are available at the CMS web site.[2]

The first step in this project was to estimate CDPS weights using the version 2.0 algorithm and the new diagnostic and expenditure data from this nationally representative Medicaid data set. Separate analytic files were created for Disabled, TANF Adult, and TANF Child Medicaid beneficiaries who had 6 or more months of fee-for-service (FFS) eligibility in 2001, at least one month of FFS eligibility in 2002, and who were not dually eligible for Medicare. These data were run through the version 2.0 CDPS grouper to create the set of CDPS category indicators. Expenditure data were used to calculate expenditures per eligible month for Medicaid services that are typically included in a managed care health benefits package.[3] Regression analyses were used to calculate CDPS weights, separately for Disabled, TANF Adults, and TANF Children. These regressions were weighted by the number of months of eligibility in 2002. These preliminary analyses focused on prospective regressions. Notably, R-squares increased when we moved to the new data, from 19.1 to 20.4 among the disabled, from 8.8 to 12.1 among TANF adults, and from 3.5 to 10.1 among TANF children for prospective models and a full benefit package. This increase in predictability was due in part to an increase in the numbers of beneficiaries receiving diagnoses that place them into CDPS categories.

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[1] We excluded states with a high penetration of managed care. Data from AZ, DE, HI, MI, MD, NM, PA, OR, TN were excluded from all models. Data CT, DC, MN, NJ, RI, and WI were excluded from the TANF Adults model; and CT, DC, MI, MN, NJ, NM, RI, WA, and WI from the TANF Children model because large fractions of beneficiaries in these aid categories were in managed care.

[2] www.cms.hhs.gov/MedicaidDataSourcesGenInfo/07_MAXGeneralInformation.asp

[3] The services included were: inpatient hospital, physician, outpatient hospital, clinic, psychiatric, other practitioners, pharmacy, home health, lab & xray, transportation, rehabilitation physical/other therapy, hospice, private duty nursing, and durable medical equipment.

We next considered potential revisions to two major CDPS categories: Diabetes and Psychiatric. The Diabetes category had been revised for the Medicare version of CDPS.[4] The Psychiatric category was revised during development work we had done for a risk adjustor for specialty mental health for Oregon. In the Medicare version, we no longer consider diabetes complications for additional reimbursement above and beyond having diabetes itself, although diabetes reimbursement remained differentiated by type 1 vs. type 2. Although diabetes related complications are a primary cost driver among persons with diabetes, the criteria for receiving an ICD9 code are sufficiently vague that they could be considered discretionary. One endocrinologist with whom we consulted told us that any patient with diabetes, if examined carefully enough, could be coded as having some complications. CMS has reported that the fraction of diabetics coded with complications has increased substantially in the Medicare Advantage program.[5] We decided to apply the same logic we used for Diabetes in the Medicare to the revised CDPS model, thus reducing the potential for gaming the system through upcoding of diagnoses, at a slight cost to R-squared.

We had previously developed a risk adjustment system for specialty mental health services for the state of Oregon. This system included a finer differentiation of payment categories than CDPS 2.0. For example, there were 6 levels in Psychiatric category for the Oregon model compared to 3 for CDPS 2.0. We applied our Oregon specification to the 2001-02 MAX data. Although the 2001-02 data did not support the full detail of the Oregon model, as a result of modeling all acute Medicaid covered services rather than only specialty mental health services, the analysis did suggest that some finer differentiation was appropriate. As a result, our new CDPS model includes one additional Psychiatric category.

We next considered revisions to the assignment of stage 1 groups into CDPS buckets. The stage 1 groups are the building block of CDPS, and consist of groups of ICD9 codes, typically at the 3 digit level. Occasionally, codes are grouped at the 4 or 5 digit level. For example, 296.4-7 is a stage 1 group for bipolar disorder that has been separated from the remainder of the 3 digit code, 296X, for affective psychosis. We reconsidered assignment of each of the 877 stage 1 groups, as well as modification of the composition of some groups. Our analysis was based on empirical results (a regression of acute expenditures among the disabled on the stage 1 groups) and clinical input (consultation with physicians). The goal in this work, as in the original CDPS, was to combine Stage 1 groups within a major CDPS category – e.g., in Cardiovascular Medium – if the association with expenditures was similar for the groups. We were also careful in this work to assure that more general diagnoses (e.g., XXX.9 and some XXX.8 codes) could not be paid at a higher rate than more specific diagnoses, and that if two diagnoses were clinically quite similar that they were placed in the same CDPS group, regardless of the empirical results. The result of the analysis was the reassignment of approximately 4,000 diagnosis codes through the reassignment of stage 1 groups and the modification of some groups. Most of the stage 1 groups that were moved from one CDPS category to another

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[4] http://cdps.ucsd.edu/CDPS_Medicare.pdf

[5] http://www.cms.hhs.gov/MedicareAdvtgSpecRateStats/Downloads/Advance2009.pdf

had relatively small numbers of beneficiaries in them. We also revised the set of interaction variables for disabled children.

We then re-estimated a set of CDPS weights on the revised model. One version of these weights include a full benefits package for acute care; additional versions model carve-outs for mental health, pharmacy, and combined mental health and pharmacy. Separate weights were developed for prospective and concurrent models, and for the disabled, TANF adults, and TANF children. The R-squares for the revised CDPS model are 21.0 among the disabled, 12.2 among TANF adults, and 11.4 among TANF children for prospective models and a full benefit package. The new CDPS algorithm and the revised set of weights comprise CDPS version 5.0.

Development of the combined diagnostic and pharmacy-based model was begun with the updating of MedicaidRx weights using the 2001-02 MAX data. This revised model is MedicaidRx 5.0. The R-squares for the MedicaidRx model are 15.5 among the disabled, 9.7 among TANF adults, and 8.5 among TANF children for prospective models and a full benefit package. We then considered each of the Medicaid RX categories for inclusion in the CDPS model. Our analysis was based both on empirical data (i.e. a regression including both CDPS groups and MRX categories) and clinical input (i.e. consultation with physicians). We decided to limit the MRX categories to 15 categories that added predictive power to the diagnostic model (i.e. both relatively common and significant predictors of cost) and that were relatively less susceptible to variations in practice patterns. We excluded a large number of drugs that would have improved the statistical performance of the model, but for which there is substantial disagreement about the appropriate indications for use, and for which we were concerned about providing financial incentives for overuse. For example, we did not include Ritalin (commonly used for ADHD), because of concerns that inclusion of Ritalin would inappropriately provide incentives for its use. The new model, CDPS+Rx 5.0, includes the full set of CDPS categories as well as 15 MRX categories that are embedded within the CDPS hierarchy. Four sets of weights were developed for each model, aid category, and prospective vs. concurrent approach corresponding to 1) a full acute care benefit package, 2) a mental health carveout, 3) a pharmacy carveout, and 4) a combined mental health and pharmacy carveout. The R-squares for the CDPS+Rx model are 22.0 among the disabled, 13.0 among TANF adults, and 12.1 among TANF children for prospective models and a full benefit package.