

Variations in the Rates of Type 1 and Type 2 Diabetes in a Managed Care Population Stratified by Age, Geographic Region, and Insurance Type

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Research Collaboration

Background

- The prevalence of both type 1 diabetes (T1DM) and type 2 diabetes (T2DM) continues to rise in the United States. As a result, future challenges with long term management and the economic burden of complications and comorbidities are anticipated.
- Current literature has reported that T1DM accounts for approximately 5-10% of all diagnosed cases of diabetes in adults, with the large majority of the remaining 90-95% being T2DM. However, there is currently little data on variation in rates of T1DM among subpopulations of patients with diabetes.
- We reviewed available literature and developed an algorithm that was applied to a population of patients that had Medicare Advantage with Prescription Drug (MAPD) insurance. The rate of T1DM among all patients identified using this algorithm was approximately <2%.
- In order to validate this algorithm, the same criteria were applied to a population of commercially insured patients for comparison.

Objective

It is anticipated that older populations have lower rates of T1DM due to the low rate of new T1DM diagnoses and the high rate of onset of T2DM. However, no literature is currently available describing how the rate of T1DM changes with varying patient demographics. This study compares the rates of T1DM and T2DM within a large population of MAPD members and commercially-insured adults with diabetes, stratified by insurance type, age, and geographic region in order to explore potential sources of heterogeneity.

Methods

MAPD and commercial members of Humana, a large managed care organization, were considered for inclusion in the study. Patients ages 19-89 with T1DM or T2DM were identified using the criteria described below.

Inclusion Criteria:

All Subjects:

- Age ≥19 and <90 as of July 1, 2010
- Continuous enrollment for the period July 1, 2010 to June 30, 2012 unless terminated by death.

Type 1 Diabetes: Patients meeting any of the following criteria during the baseline period will be classified as having T1DM:

- ≥1 medical claim with a diagnosis of T1DM (ICD-9-CM codes 250.x1 or 250.x3), no medical claims with a diagnosis of T2DM (ICD-9-CM code 250.x0 or 250.x2), ≥1 pharmacy claim for insulin, and no gaps of 6 or more months in pharmacy claims for insulin .
- Claims for both T1DM and T2DM (ratio of T1DM:T2DM claims ≥0.5) but no pharmacy claims for oral antidiabetic medications and no gaps of 6 or more months in pharmacy claims for insulin.
- ≥1 pharmacy claim for urine acetone test strips (see Appendix C for related codes)

Type 2 Diabetes: Patients meeting any of the following criteria during the baseline period will be classified as having T2DM:

- ≥1 medical claim with a diagnosis of T2DM (ICD-9-CM code 250.x0 or 250.x2), no medical claims with a diagnosis of T1DM (ICD-9-CM codes 250.x1 or 250.x3), and ≥1 pharmacy claim for a non-insulin antidiabetic medication
- Medical claims with a diagnosis of both T1DM and T2DM (ratio of T2DM:T1DM claims ≥0.5) and any one of the following:
 - At least one pharmacy claim for a non-insulin antidiabetic medication
 - At least 6 months at any time during the study period with no pharmacy claims for insulin

Methods Cont.

Exclusion Criteria:

- Any patient with claim(s) for T1DM and/or T2DM not meeting any of the inclusion criteria was excluded as “undefined” diabetes.
- ≥1 medical claim with a diagnosis of secondary diabetes (ICD-9-CM code 249.xx) at any time during the baseline period
- ≥1 medical claim with a diagnosis of gestational diabetes (ICD-9-CM code 648.xx) or pregnancy (630.xx-679.xx or v22.x-v24.x) at any time during study period

The identified study populations with T1DM and T2DM were stratified by age category, geographic region (North East, South, Mid-West, or West), and insurance type (MAPD or commercial insurance). The proportion of patients diagnosed with T1DM to T2DM is reported for each strata.

Results

Table 1. Rate of Type 1 and Type 2 Diabetes Stratified by Insurance Type

The total sample of patients with at least one claim for diabetes (ICD-9-CM code 250.xx) included 511,874 MAPD patients and 74,706 commercially-insured patients. Of those patients, 228,609 MAPD members (median age=70 years) and 36,073 commercial members (median age=55 years) were classified as either having T1DM or T2DM. 1.7% of the classified MAPD patients and 6.9% of the classified commercial patients were identified as having T1D, respectively (Table 1). While the ratio of T1DM to T2DM observed in the MAPD population is lower than previously reported (5-10% of all patients with diabetes),^{1,2} the ratio with the commercially-insured population falls within this range.

| | Type 1 Diabetes | | Type 2 Diabetes | |
|----------------|-----------------|------|-----------------|-------|
| Insurance Type | n | % | n | % |
| Commercial | 2,502 | 6.9% | 33,571 | 93.1% |
| <65 | 2,429 | 7.5% | 29,988 | 92.5% |
| ≥65 | 73 | 2.0% | 3,583 | 98.0% |
| MAPD | 3,806 | 1.7% | 224,803 | 98.3% |
| <65 | 1,491 | 3.6% | 39,845 | 96.4% |
| ≥65 | 2,315 | 1.2% | 184,958 | 98.8% |

Figure 2. Ratio of Type 1 Diabetes to Type 2 Diabetes Stratified by Geographic Region and Insurance Type

As described above, the overall rate of T1DM is substantially higher in the commercial population than is observed in the MAPD population. The ratio of T1DM to T2DM among MAPD patients does not vary widely across geographic regions. However, within the commercially-insured population, the ratio of T1DM to T2DM is much higher in the northeast and west regions of the United States compared with the south and midwest (Figure 2).

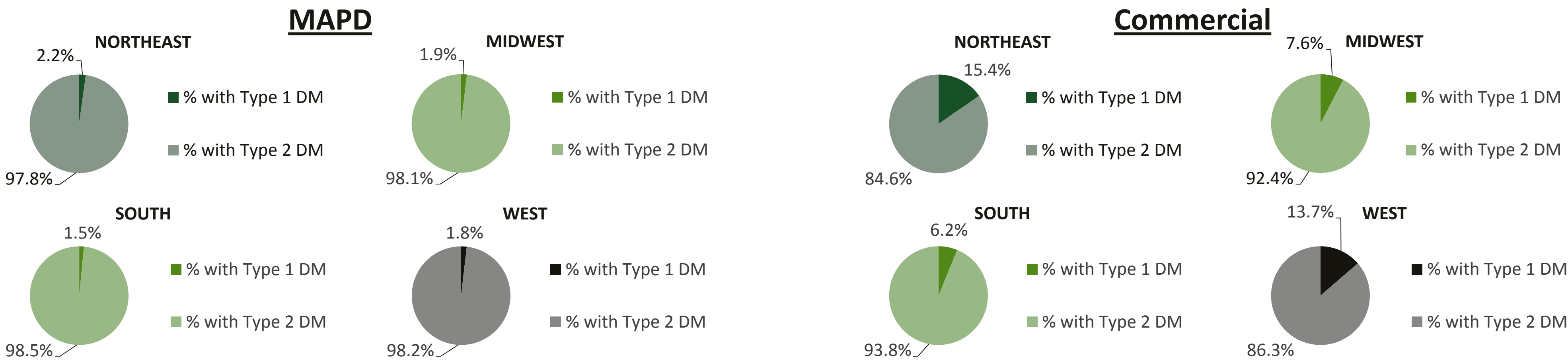
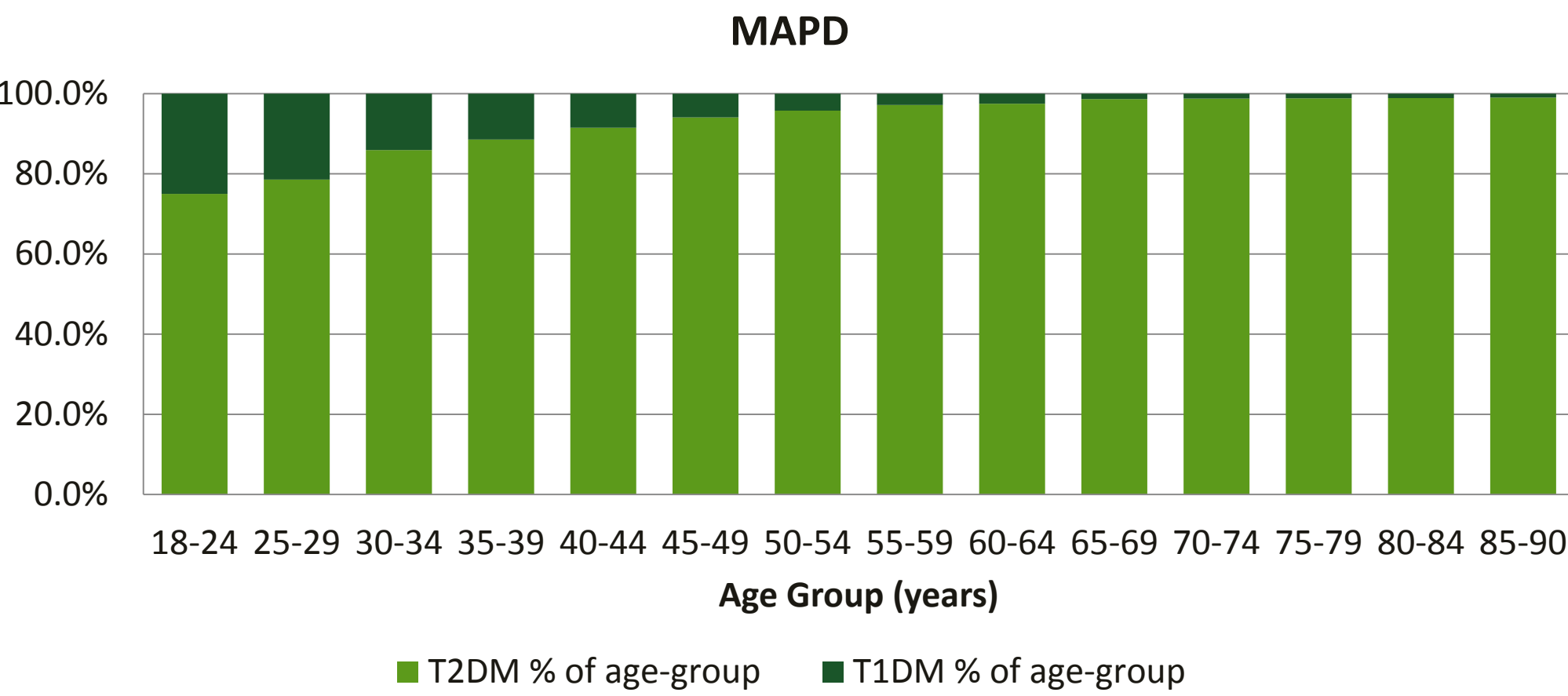


Figure 1. Ratio of Type 1 to Type 2 Diabetes Stratified by Age and Insurance Type

Only 25% of MAPD patients with diabetes age 18-24 had T1DM, compared to 76.7% of the same age group in the commercially-insured population. The ratio of T1DM to T2DM decreases sharply as age increases. The ratio of T1DM to T2DM among the age-groups 45 years and older are very similar in the MAPD and commercially-insured populations. (Figure 1)



Conclusions

- The proportion of T1DM among adults with diabetes changes significantly with age and geographic region, and among MAPD patients appears to be significantly less than frequently referenced (5-10%).
- However, among commercially insured adults the rate of T1DM was within the reported range, suggesting that the algorithm employed here is not under-estimating the rate of T1DM among MAPD patients.
- The rate of T1DM varies widely among the commercially-insured across geographic regions of the U.S. These findings are consistent with previously-reported trends.³
- Further validation of this algorithm is planned. It is important for health plans to understand sources of heterogeneity in diabetes populations in order to allocate resources for educational and interventional programs aimed at addressing future clinical and economic challenges.

Limitations

- Similar to other retrospective database studies, this study is subject to limitations including coding errors of omission and commission, incomplete claims, unreliable clinical coding, and unobservable factors that may also influence the outcomes.
- Many of the patients identified as having at least one diabetes diagnosis could not be classified using the algorithm described. It is unclear whether the ratio of T1DM to T2DM would be different among the unclassified patients.

References

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