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Healthcare resource utilization in patients with type 1 diabetes with or without prior type 2 diabetes misdiagnosis in a US managed care population

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INTRODUCTION

- There has been increased awareness that type 1 diabetes (T1D) should not be regarded primarily as a childhood-onset disease.[1,2]
- However, adult individuals with T1D are often initially misdiagnosed with type 2 diabetes (T2D misDx), which may lead to a delay in appropriate disease management.[1]
- These delays in appropriate diagnosis (Dx) may lead to increased healthcare resource utilization (HCRU).

OBJECTIVE

The aim of this study was to examine baseline HCRU in individuals with T1D with and without prior T2D misDx.

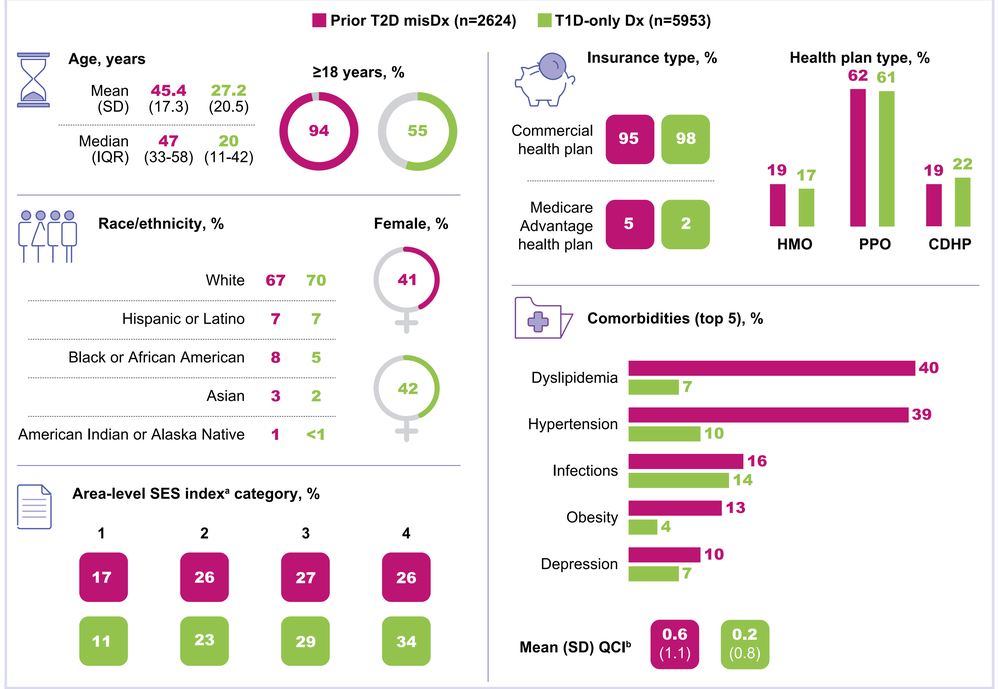
METHODS

- This retrospective, observational study used administrative claims data (Oct 1, 2015, to Dec 31, 2023) for newly diagnosed T1D beneficiaries from the Healthcare Integrated Research Database (HIRD®).
- Individuals were required to have ≥12 months of continuous medical and pharmacy benefit before index (baseline) and after index (follow-up).
- Individuals with ≥2 outpatient T1D claims 30 to 183 days apart or ≥1 inpatient T1D claim were identified.
- The date of the first T1D Dx during the observation period (Oct 1, 2016, to Dec 31, 2022) was the index date.
- Individuals were excluded if they had ≥2 T2D diagnoses during the 12-month follow-up period or if they reported secondary diabetes or pregnancy during baseline.

Figure 2. Proportion of HCRU at baseline among individuals with an index T1D Dx: overall; <18 years; ≥18 years

Dx, diagnosis; ED, emergency department; HCRU, healthcare resource utilization; misDx, misdiagnosis; T1D, type 1 diabetes; T2D, type 2 diabetes.

Figure 1. Baseline characteristics



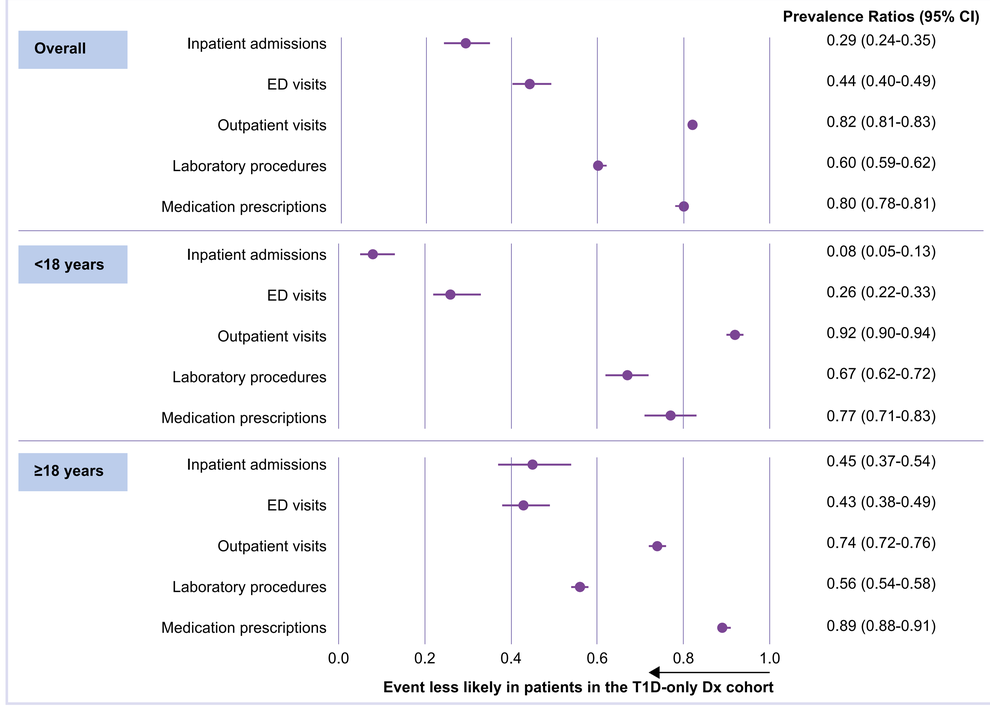
Note: Unknown/missing values for ethnicity/race, SES index, and health plan type are not reported.

CDHP, consumer-directed health plan; Dx, diagnosis; HMO, health maintenance organization; misDx, misdiagnosis; PPO, preferred provider organization; QCI, Quan-Charlson Comorbidity Index; SES, socioeconomic status; T1D, type 1 diabetes; T2D, type 2 diabetes.

[a]The SES index is a composite measure based on 7 social determinants of health variables. A score of 4 indicates the patient is in the top 25% of SES, and a score of 1 indicates the patient is in the bottom 25% of SES using all census block groups and 2017 as the reference basis for calculation.

[b]QCI is a modified and enhanced Deyo-Charlson Comorbidity Index; it indicates disease burden and was measured during the 365 days before (exclusive of) the index date. The final score consists of a sum of weighted values (up to 24), with higher scores indicating a greater comorbidity burden.

Figure 3. Likelihood of HCRU during the 12-month baseline period in the T1D-only Dx cohort relative to the prior–T2D misDx cohort: overall; <18 years; ≥18 years



Note: Prevalence ratios were calculated, because all variables were categorical with event rates of over 10%.

Dx, diagnosis; ED, emergency department; HCRU, healthcare resource utilization; misDx, misdiagnosis; T1D, type 1 diabetes.

METHODS CONTINUED

- Overall and by age category (<18 and ≥18 years), all-cause HCRU in individuals with T1D with prior T2D misDx (the prior T2D–misDx cohort) and T1D without prior T2D misDx (the T1D-only Dx cohort) was assessed for the 12-month baseline period prior to index date.
- Prevalence ratios (95% CI) for the T1D-only Dx cohort relative to the prior T2D–misDx cohort were calculated.

RESULTS

- Of 8577 individuals with an index T1D Dx (**Figure 1**), 31% had a prior T2D misDx (41% female; mean age, 45.4 years), and 69% had no prior T2D misDx (42% female; mean age, 27.2 years).
- In individuals in the prior T2D–misDx cohort vs those in the T1D-only Dx cohort, a higher frequency of the following was observed during the 12-month baseline period:
  - inpatient admissions (11% vs 3% [<18 years, 16% vs 1%; ≥18 years, 11% vs 5%]; all *P*<0.001; **Figures 2 and 3**),
  - emergency department visits (24% vs 11% [<18 years, 44% vs 12%; ≥18 years, 23% vs 10%]; all *P*<0.001),
  - outpatient visits (99% vs 81%, *P*<0.001 [<18 years, 98% vs 90%, *P*=0.002; ≥18 years, 99% vs 73%, *P*<0.001]),
  - laboratory procedures (88% vs 53% [<18 years, 85% vs 57%; ≥18 years, 88% vs 49%]; all *P*<0.001),
  - and medication prescriptions (94% vs 75% [<18 years, 82% vs 63%; ≥18 years, 95% vs 84%]; all *P*<0.001).

LIMITATIONS

- Claims data are collected for payment and not for research, potentially leading to inaccuracies like unobserved medication use and incorrect diagnoses.
- Important patient characteristics may be undercoded or missing, affecting data accuracy and generalizability.
- The HIRD® database could be underestimating the number of some tests (eg, autoantibody tests), because most laboratory data come from the outpatient setting, especially in pediatric individuals, where initial diagnoses and tests often occur in the inpatient setting.

CONCLUSIONS

- T1D with prior T2D misDx was consistently associated with higher baseline HCRU; patients with T2D misDx may inappropriately receive oral antidiabetics such as metformin, which can lead to hyperglycemia and diabetic ketoacidosis.[3]
- Earlier and accurate Dx of T1D can prevent complications and reduce unnecessary HCRU by enabling timely, effective treatment.
- Diagnostic accuracy may be improved with increased access to appropriate diagnostic tools (eg, autoantibody tests), clear referral pathways to specialists, and greater clinical awareness of age-related diagnostic biases and accurate diagnostic criteria.[4-6]

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DISCLOSURES

Diana Brixner has consulted for Sanofi, Tandem, and Insulet and is an investigator on a research grant from Dexcom. Tariku J Beyene, Malvika Venkataraman, Hung-Yuan P Chen, Chia-Chen Teng, and Hiangkiat Tan are employees of Carelon Research, which is a consultancy whose activities on research projects are funded by various life sciences companies and health plans. Laura Wilson and Andrew Cagle are employees and stockholders of Sanofi. Daniel C Malone has served as a consultant to Sanofi for this study and has also received consulting fees from Sarepta, Tandem, AstraZeneca, Humacyte, and Otsuka.

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