# T1D Exchange: Towards risk-based management of type 1 diabetes (T1D): Developing a population health dashboard based on performing diabetes self-management habits

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## Introduction: the “six habits”

Performance of six diabetes self-management habits, the “six habits” are associated with (i) lower HbA1c and (ii) higher time in range (TIR).[1]

Habits are easy understandable and actionable for patients, and documentation is low-burden for providers.

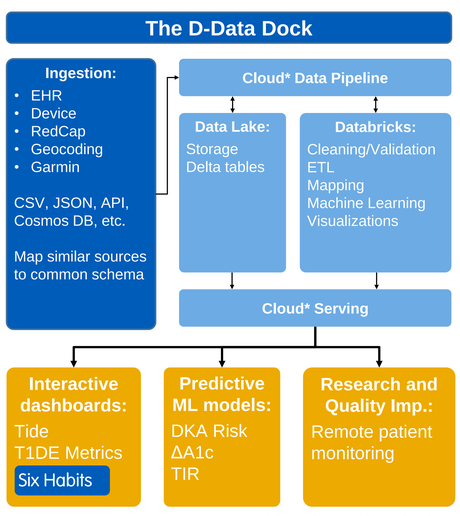
**The six habits:**
Habit 1: Checks BG ≥ 4× / day or uses a CGM.
Habit 2: Administers ≥ 3 rapid-acting boluses / day.
Habit 3: Uses an insulin pump.
Habit 4: Delivers boluses before meals.
Habit 5: Reviewed glucose data for patterns since last clinic visit.
Habit 6: Changed insulin dose at least once since last clinic visit.

**Population health dashboards:** Recent algorithm-enabled, population-level health dashboards for T1D patients helped improve time in range (TIR) and reduced provider time spent per patient, leading to increased clinic capacity.[2]


Interactive population dashboard for CGM users, prioritizing review for patients by low TIR, time above range, and time below range. From J. O. Ferstad et al., *Pediatr Diabetes*. **2021**; 22( 7): 982- 991.

**Objective:** To implement the “six habits” as interactive population health management tools for providers and propound additional habits (healthy eating) which map to the Association for Diabetes Care and Education Specialists’ (ADCES) seven pillars of diabetes self-management.

## Methods: the D-Data Dock

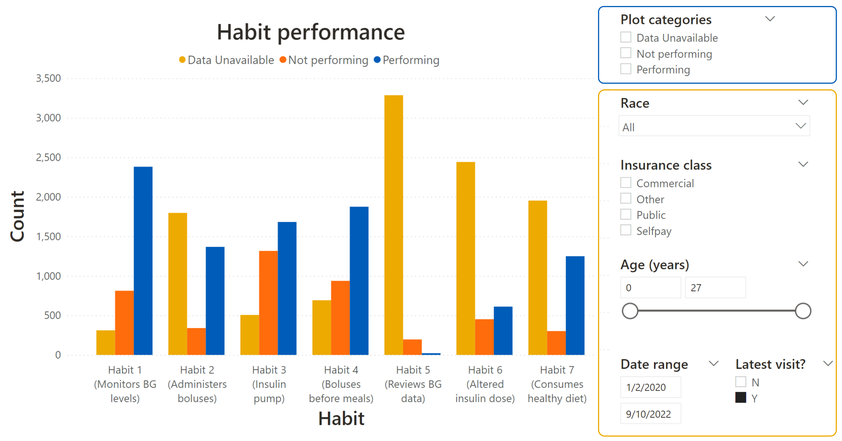



* Microsoft Azure Cloud Services

**A single platform**: Combines electronic health record and device data from multiple vendors to a single platform and common schema.

**Fresh data**: Ingestion and ETL pipeline refreshes weekly.

## Results: Monitoring Habit Performance



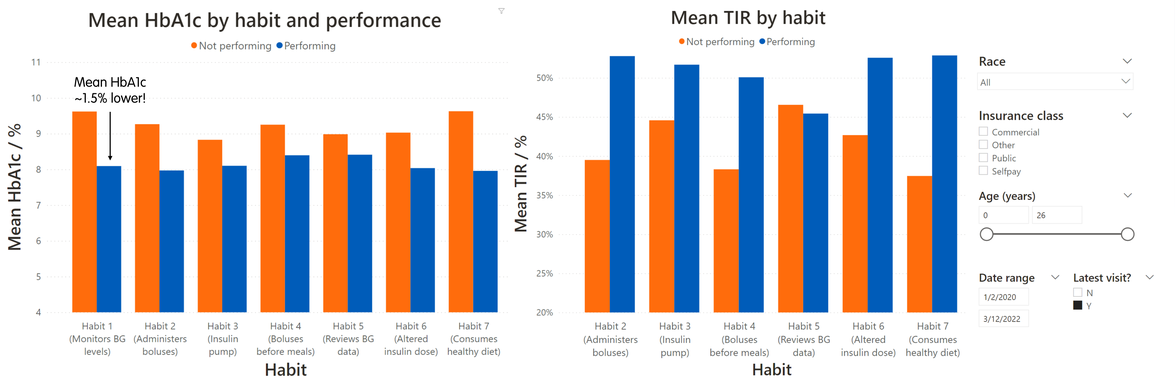

**Monitor habit performance:** Which habits are performed the most? The least? Where can processes be improved to collect more data.

**User-definable populations:** Define populations by common demographics like age, race and insurance status

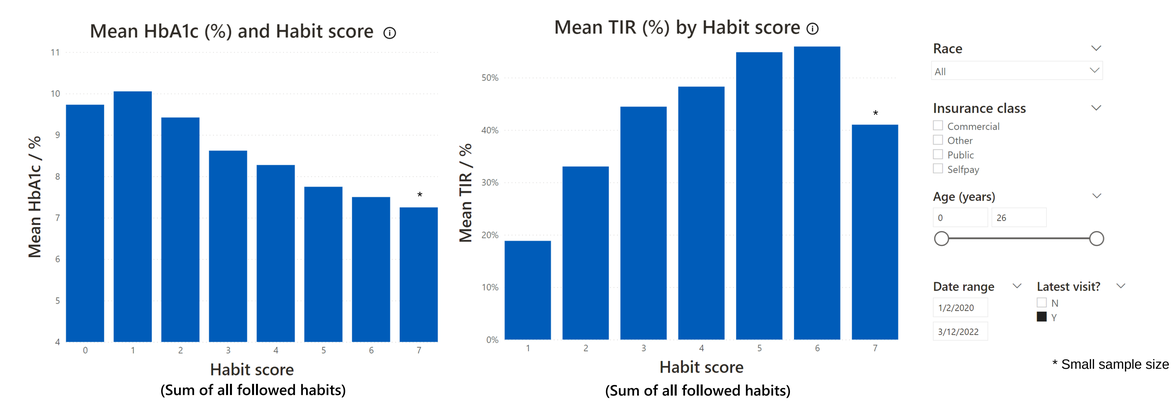
View performance in different eras (pre-Covid vs peri-Covid).

Filter by other common covariates and demographics: T1D duration, telehealth vs non-telehealth, gender, etc.

## Impact of habit performance on glycemic outcomes



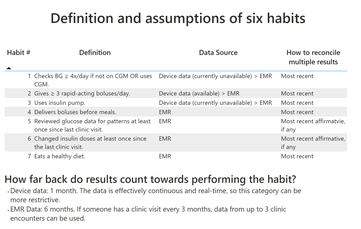

## Habit score associates with glycemic outcomes




* Small sample size

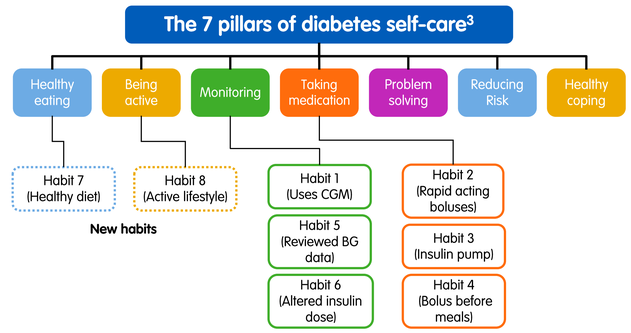
## Clear definitions

**Well-defined data**: data sources, definitions, and assumptions clearly listed.



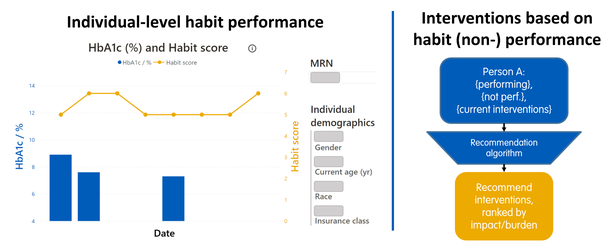

**Detailed information**: most dashboards have info modals for more details.


## Proposing additional habits




## Conclusions and future work

The six habits dashboard gives a population-level view for habit performance for a diabetes center. Habit score is strongly associated with glycemic outcomes and shows which habits lead to the biggest glycemic outcome improvements on average.




## References + acknowledgements

1. J. M. Lee *et al.*, *JAMA Netw Open*. **2022**; 5(1):e220001
2. J. O. Ferstad et al., *Pediatr Diabetes*. **2021**; 22(7): 982-991.
3. D Tomky *et al.*, *Diabetes Educ*. **2008**; 34:445–449

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