Longitudinal Changes in Continuous Glucose Monitoring Use Among Individuals With Type 1 Diabetes: International Comparison in the German and Austrian DPV and U.S. T1D Exchange Registries

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Continuous glucose monitoring (CGM) has been demonstrated in randomized trials to improve glucose control in patients with type 1 diabetes (1), but until recently only a minority of participants in the German/Austrian Diabetes Patienten Verlaufsdokumentation (DPV) registry and the U.S.-based T1D Exchange (T1DX) registry were using CGM (2,3).

Over the past decade, both the accuracy and usability of CGM devices have improved considerably with expanded cost coverage of CGM by government statutory and private insurance. Some CGM devices are regulatory body approved for determining insulin dose in most circumstances, thereby reducing the number of fingersticks needed to monitor blood glucose. To assess change in CGM use over time across the age spectrum, we analyzed data from the T1DX and DPV registries for the years 2011, 2013, 2015, and 2017.

CGM use (including both real-time and intermittent scanning CGM) at each data collection time point were obtained from clinic medical records. The number of participants with available data on CGM usage varied slightly depending on the calendar year for both registries. In DPV, the cohort size ranged from 17,632 to 21,707 for youth (aged 2 to <18 years) and from 7,651 to 8,390 for adults aged (≥18 years). In T1DX, cohort size ranged from 8,334 to 9,184 for youth and from 7,717 to 9,759 for adults.

For T1DX, CGM use increased from 2011 to 2017 in all age-groups, with the most pronounced change occurring in the youngest patients. For DPV, CGM use increased in all youth age-groups, but there was no change among DPV adults except in the youngest group aged 18 to 26 years (Fig. 1). For youth in the DPV registry, CGM use remained steady from 2011 to 2015 with a dramatic increase from 4% to 44% occurring between years 2015 and 2017, whereas for T1DX youth, CGM use increased from 4% in 2013 to 14% in 2015 and to 31% in 2017. Among adults in the DPV registry, a dramatic increase in CGM occurred from 4% in 2015 to 30% in 2017 for individuals aged 18 to <26 years, with all other adult age-groups maintaining stable CGM usage rates at around 8% to 12%. For T1DX adults, CGM use increased steadily from 2013 to 2017 across age-groups, with a slightly higher rate of increase in younger adults. Despite the higher rate of increase (4% in 2011 to 24% in 2017), young adults had the lowest percentage of CGM use in T1DX by 2017.

CGM use among youth in both registries increased from 2011 to 2017 regardless of sex, insulin delivery method, or minority status. Among DPV youth using injections for insulin delivery, CGM use increased from 3% to 35% compared with 5% to 50% among pump users. Among T1DX youth, CGM use increased from 1% to 13% among injection users and from 5% to 40% among pump users. For T1DX adults, an increase in CGM use from 2011 to 2017 was observed in both injection users (5% to 16%) and pump users (15% to 41%), with a higher rate in pump versus injection. For DPV, the pattern of CGM use over time stratified by insulin delivery method mimicked the

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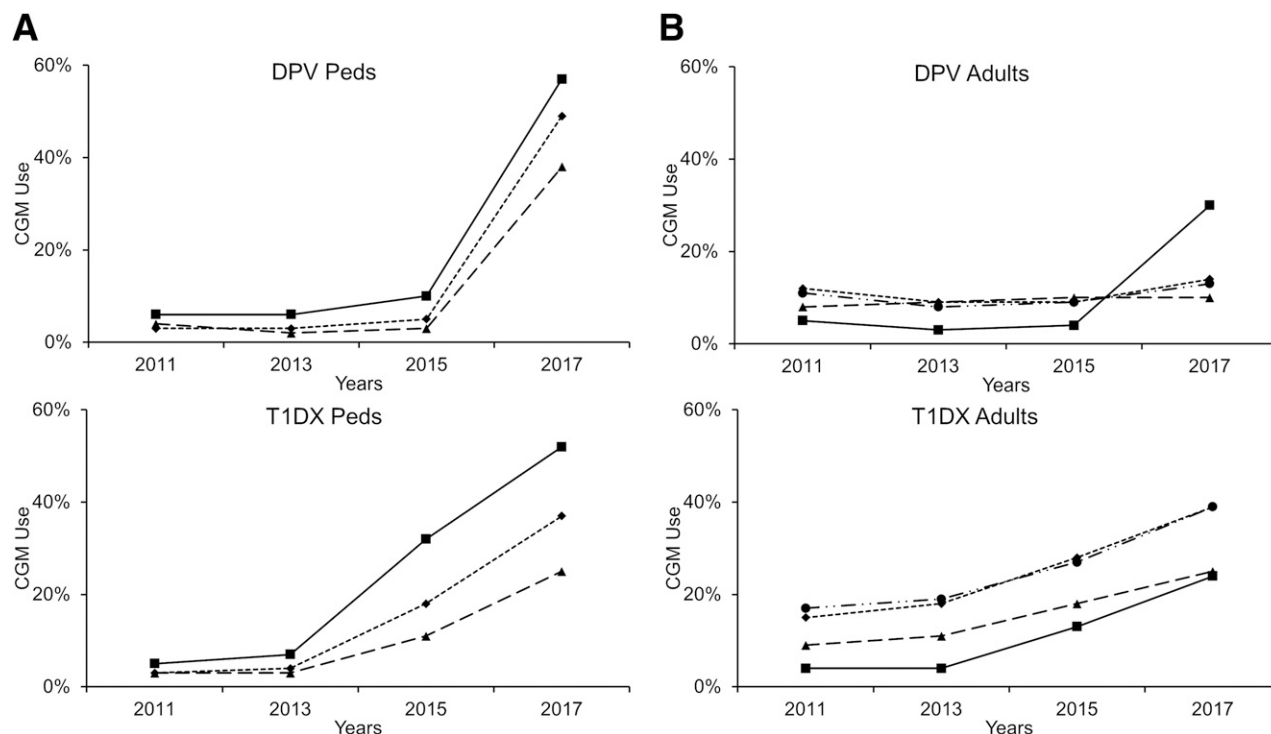
Figure 1—*A*: DPV and T1D Exchange pediatric (Peds) CGM use. The solid black line with solid black squares represents the cohort aged <6 years. The dotted black line with solid black diamonds represents the cohort aged 6 to <13 years. The dashed black line with solid black triangles represents the cohort aged 13 to <18 years. *B*: DPV and T1D Exchange adult CGM use. The solid black line with solid black squares represents the cohort aged 18 to <26 years. The dotted line with solid black diamonds represents the cohort aged 26 to <50 years. The dashed black line with solid black circles represents the cohort aged 50 to <65 years. The dashed black line with solid black triangles represents the cohort aged ≥65 years.

overall cohort with minimal differences between injection users (8% to 18%) and pump users (10% to 26%).

It is important to use caution when interpreting the CGM use frequencies reported here. The T1DX registry is not population based and represents patients from specialized endocrinology clinics in the U.S.; therefore, the frequency of CGM use in the general population of patients with type 1 diabetes is likely lower than that observed for this cohort. The DPV registry is population based for the pediatric cohort and is therefore representative of CGM use for youth in Germany and Austria; however, the adult cohort covers only about 30% of the entire type 1 diabetes population.

The observed increase in CGM use over time is likely reflective of changes in insurance coverage and improvements in device technology, patient acceptability, and availability within nations. Of note, for the year 2017, CGM use in the T1DX was

primarily real-time CGM (>98%), whereas CGM in the DPV was primarily intermittent scanning CGM (>80%).

These data document a significant increase in CGM use in people with type 1 diabetes in both the T1DX and DPV registries that has clinical implications for standardizing review of CGM data and delivering care in clinical practice and the future use of automated insulin delivery systems.

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