efficacy and safety of advanced technologies, including cost-effectiveness [28, 29]. Current glycemic target recommendations are also based on the following observations:

Diabetic Retinopathy

Independent risk factors for developing diabetic retinopathy include not only glycemic management, but also age of onset and duration of diabetes [30, 31], which emphasizes the need to pursue optimal glycemic targets in young people with diabetes from diagnosis. Precursors to retinopathy are now measurable with optical coherence tomography angiography, and microvascular changes are seen in youth with suboptimal glycemic levels [32]. Critically, the lowest rates of diabetic retinopathy at the time of transition to adult services are seen where HbA1c is ≤6.5% (48 mmol/mol) [33].

Diabetic Kidney Disease

Multiple studies confirm that lower HbA1c protects against the development of diabetic kidney disease [1–6]. In contrast to the development of diabetic retinopathy, Swedish registry data did not find a similar clear relationship for the development of increased albuminuria at the 6.5% (48 mmo/mol) HbA1c threshold [33]. There is evidence that some individuals from differing racial groups have different predispositions to developing complications early independently of glycemia and socioeconomic status [34, 35]. Indeed, observations from the general population showed that Native Americans at risk of developing type 2 diabetes and HbA1c in a prediabetes range (5.7–6.4% [39–47 mmol/mol]) had higher incidence of albuminuria and retinopathy than children with optimal HA1c levels [36]. However, there is limited evidence supporting reductions in diabetic kidney disease onset and progression at HbA1c levels below 7% in type 1 diabetes.

Diabetic Neuropathy

While systematic reviews confirm the relationship between HbA1c and the development of diabetes neuropathy [36], there is, again, a paucity of data to derive a specific threshold that confers significant additional risk. An HbA1c >7% (53 mmol/mol) was associated with a higher risk of developing diabetic neuropathy in adolescents with type 1 diabetes for >5 years, but the risk associated with a lower threshold of 6.5% (48 mmol/mol) was not assessed [37]. Further data, or modeling, are needed to confirm the additional benefit of using a target of 6.5% (48 mmol/mol) for protecting against the development of diabetic neuropathy and other vascular complications.

Cognition

Optimal glycemia is associated with improved cognitive function, including memory, learning and attention [13, 38–41]. Yet, in settings where hypoglycemia-protective technologies such as CGM and AID are not available or adopted, there may be unacceptable risks of severe hypoglycemia and associated negative impact on cognitive function. Overall, with respect to cognition, a lower target of 6.5% should be carefully guided on an individual basis, particularly in situations with limited access to glucose monitoring and technologies that suspend insulin when glucose is low or projected to be low.

Burden

Recognizing and addressing the psychosocial and behavioral needs of youth with diabetes and their families is a key element of their care. The relationship between the demands of care and HbA1c is complex; for example, while some reports describe the challenges of diabetes technology, improved quality of life and glycemia have been consistently demonstrated [27]. Burden of care can be considered in the following domains; psychological, behavioral, social, quality of life, and economic. Avoidance of complications with lower HbA1c will lower the health cost of diabetes and can be safely achieved with advanced diabetes technologies, with proven health economic benefits. Adoption of these technologies is associated with potential barriers, which includes perceived and actual workload, physical discomforts, frustrations with technical glitches and alarms, as well as concerns about device size/visibility and stigma [42–44]. Potential benefits of diabetes technologies must also be recognized, with improvements in individual and parental health of life [45], as well as autonomy, greater flexibility in social activities and eating, improved sleep, and higher treatment satisfaction being reported [27].

Body Mass Index

Due to overweight and obesity being established as independent risk factors for developing cardiovascular disorders, any relationship between glycemic targets and body mass index (BMI) is an important consideration. This is especially relevant given that while international registries are demonstrating an overall improvement in HbA1c, there is also an increasing prevalence of higher BMI-standard deviation scores (SDS) [46, 47]. Earlier landmark studies have shown increased excess weight gain and obesity with intensive treatment [26]. However, there are apparent external influences on BMI independent of HbA1c, as is apparent with the U-shaped curve with the highest HbA1c observed in groups with unhealthy weight [48]. Some studies