CGMS in children with diabetes – current technologies and future prospects

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The development of subcutaneous continuous glucose monitoring (CGM) devices represents one of the most promising technological advancements in diabetes care in the last two decades. Use of these devices in clinical practice is increasing, with CGM a standard component of both sensor augmented pump (SAP) therapy and in automated insulin delivery (e.g. predictive low-glucose suspend) systems. Furthermore, improvements in reliability and accuracy in recent years have seen the regulatory approval and commercialisation of some CGM devices that can now be used without the need for either calibration or confirmatory adjunctive capillary blood glucose (BG) testing using a standard portable BG meter.

The utility of CGM, and of the more recently introduced intermittently scanned CGM devices (i.e. so-called 'flash' glucose monitoring), has been established in randomised clinical trails carried out in children and young people with Type 1 diabetes, where improvements in BG control have been observed. However, these improvements are highly dependent on the sustained patient / family engagement and adherence with the technology, and highlights a potential weakness with these devices are they applied in the 'real world setting' of clinical practice. CGM data overload / interpretation, device alarm and alert fatigue and device wearability / comfort are just some of the issues that currently challenge patient acceptance / adherence behaviours towards these devices. Looking forward strategies that minimise the need for human interaction with these technologies including the creation of hybrid artificial intelligence systems designed interpret data and to make therapeutic decisions are under development. These include the introduction of adaptive learning algorithms incorporated into either stand alone cloud based 'real-time' decision-support tools or into hybrid closed loop insulin delivery ('artificial pancreas') systems.