ID	Field	Content
0.	PROSPERO registration number	[Complete this section with the PROSPERO registration number once allocated]
1.	Review title	Glucose monitoring in children and young people with type 1 diabetes
2.	Review question	***Guideline:*** Type 1 diabetes in children and young people: diagnosis and management (NG18) ***Question***: In children and young people with type 1 diabetes, what is the most effective method of glucose monitoring to improve glycaemic control: - continuous glucose monitoring - flash glucose monitoring - intermittent capillary blood glucose monitoring
3.	Objective	To determine the clinical and cost effectiveness of different glucose monitoring methods in improving glycaemic control in children and young people with type 1 diabetes
4.	Searches	The following databases will be searched: Clinical searches:

		• Cochrane Central Register of Controlled Trials (CENTRAL) • Cochrane Database of Systematic Reviews (CDSR) • Embase • DARE • MEDLINE • MEDLINE In Process • MEDLINE ePubs • PsycINFO Economic searches: • Econlit • Embase • HTA • MEDLINE • MEDLINE In Process • MEDLINE ePubs • NHS EED • PsycINFO Searches will be restricted by: • English language

		• Study designs of RCTs, SRs and observational studies will be applied • Animal studies will be excluded from the search results • Conference abstracts will be excluded from the search results There was no date limit set for these searches. Other searches: • N/A The full search strategies for MEDLINE database will be published in the final review.
5.	Condition or domain being studied	Type 1 diabetes in children and young people.
6.	Population	Children and young people with type 1 diabetes Children and young people are defined as 18 years and below
7.	Intervention	• Continuous glucose monitoring • Flash glucose monitoring • Intermittent capillary blood glucose monitoring Definitions:

		Continuous glucose monitoring: Consists of a subcutaneous sensor which continuously measures the glucose levels in the interstitial fluid. Data on glucose level and direction/rate of change is automatically sent to a display device (a handheld monitor, smart phones or pump) and the user can obtain real-time data as well as trends. The user can then analyse data and respond to changes in real-time or can make changes to insulin delivery, dose or timing based on retrospective data or trends. CGM models allow users to set alerts for high and low glucose levels, and rapid rate of change of glucose levels. Continuous glucose monitoring can also be referred to as real time CGM (rtCGM). **Flash glucose monitoring:** Consists of a subcutaneous sensor which continuously measures the glucose levels in the interstitial fluid. The user can obtain real-time data as well as trends by scanning the sensor with a reader device (including smart phones). The information provided gives a glucose level and information regarding the rate of change of glucose levels. Flash glucose monitoring can also be referred to as intermittently scanned CGM (isCGM). **Intermittent capillary blood glucose monitoring:** Conventional self-monitoring of blood glucose (SMBG) through 'finger prick' testing. Alternate sites may also be used for testing such as the palm, the upper forearm, the abdomen, the calf or the thigh.
8.	Comparator	Compared to each other

		• **Note:** comparison group should be on the same insulin regimen as intervention group (e.g., rapid acting, short acting, intermediate, long acting or mixed insulin) as the treatment group.
9.	Types of study to be included	• RCTs • Systematic review of RCTs • If insufficient[1] RCT evidence is identified for individual comparisons, comparative prospective observational studies ○ If no prospective cohort studies are identified, comparative retrospective observational studies will be included. **Note:** Only cohort and other observational studies that attempt to assess and adjust for baseline differences (e.g., through propensity matching) or adjust for confounding (e.g., maternal age, smoking and BMI) in multivariable analysis will be included. [1]: This will be assessed for the review. There is no strict definition, but in discussion with the guideline committee we will consider whether we have a large enough quantity of data to form the basis for a recommendation.

10.	Other exclusion criteria	• Exclude studies <1-week duration
		
		• Studies with mixed adult and children populations will be excluded if:
		
		  ○ data has not been reported for the subgroup of children AND
		
		  ○ ≤50% of people are aged <18 years

		• Studies with indirect, or mixed diabetes (type 1 diabetes and type 2 diabetes) populations will be excluded if:
		  ○ data has not been reported for the subgroup of type 1 diabetes patients OR,
		  ○ the population contains ≤70% of type 1 diabetes patients
		• Non-English language studies
		• Conference abstracts
		• Studies which examine retrospective (blinded) glucose monitoring
		• Studies with closed-loop systems.

11.	Context	This review is part of an update of the NICE guideline on Type 1 diabetes in children: diagnosis and management (NG18). https://www.nice.org.uk/guidance/ng17 This update covers continuous glucose monitoring in children and young people with type 1 diabetes. This guideline will also cover all settings where NHS healthcare is provided or commissioned.
12.	Primary outcomes (critical outcomes)	All outcomes will be sorted into up to 3 months, up to 6 months, up to 12 months, >12 months • HbA1c (dichotomous or continuous outcome, depending how it is reported

		• Time spent in target glucose range
		  ○ Time spent above target glucose range
		  ○ Time spent below target glucose range
		• Hypoglycaemia (dichotomous or continuous outcome, depending how it is reported) including:
		  ○ severe hypoglycaemia
		  ○ nocturnal hypoglycaemia
		• Glycaemic variability
		• Mortality
		• Children and young people's and families' satisfaction with intervention (including impact of pain and burden of intervention) – measured by validated tools
		• Diabetic ketoacidosis (DKA)
		• % of data captured

13.	Secondary outcomes (important outcomes)	• Other adverse events (dichotomous) limited to:
		  ○ Diabetes related hospitalisation
		  ○ malfunction of CGM monitor
		  ○ serious adverse events

		• Mental health outcomes:
		  ○ Diabetes distress (including fear of hypoglycaemia and diabetes burnout)
		  ○ Diabetes related depression
		  ○ Body image issues related to device
		• Awareness of hypoglycaemia
		• Adherence (dichotomous)
		• Attendance to care services
		• Educational attainment
		• Quality of life (continuous) – measured by validated tools (e.g., Short Form 12 (SF-12), Glucose Monitoring System Satisfaction Survey (GMSS), BG Monitoring System Rating Questionnaire (BGMSRQ), Hypoglycaemia Fear Survey- II (HFS-II))

14.	Data extraction (selection and coding)	All references identified by the searches and from other sources will be uploaded into EPPI reviewer and de-duplicated. 10% of the abstracts will be reviewed by two reviewers, with any disagreements resolved by discussion or, if necessary, a third independent reviewer. This review will make use of the priority screening functionality within the EPPI-reviewer software.

		The full text of potentially eligible studies will be retrieved and will be assessed in line with the criteria outlined above. A standardised form will be used to extract data from studies (see Developing NICE guidelines: the manual section 6.4). Study investigators may be contacted for missing data where time and resources allow.
15.	Risk of bias (quality) assessment	Risk of bias will be assessed using the appropriate checklist as described in Developing NICE guidelines: the manual. Randomised control trials (individuals or cluster) will be assessed using the Cochrane risk of bias tool 2.0. Assessment of observational studies will be dependent on study design. Cohort studies will be assessed using the Cochrane ROBINS-I tool while case-control studies will be assessed using CASP case control checklist.
16.	Strategy for data synthesis	For details please see section 6 of Developing NICE guidelines: the manual Meta-analysis will be conducted where appropriate. Evidence will be grouped into the following categories: • ≤6 months (or the one nearest to 6 months if multiple time-points are given) • >6 months (or the longest one if multiple time-points are given)
17.	Analysis of sub-groups	The following groups will be considered for subgroup analysis if heterogeneity is present: • Children under 5 years old • School age children (6 - 12 years)

		• Adolescents (>12 years) Results will be stratified by the following subgroups where possible: • Type of insulin regimen (e.g., rapid acting, short acting, intermediate, long acting or mixed insulin) • Mode of insulin delivery (e.g., multiple daily injections, continuous subcutaneous insulin infusion or insulin pump) • Length of CGM monitoring • Different testing sites in SMBG The following groups will be considered for subgroup analysis if heterogeneity is present: • People with learning difficulties or autism • People with renal impairment • People who have hypoglycaemic unawareness • People who are unable to self-test • People with distress/depression/co-morbid mental ill-health • frequency of CGM (real time) • frequency of CGM (intermittently scanned) • frequency of intermittent capillary blood glucose monitoring • Generic vs individualised range (for time in range) • Target HbA1c % • Target Time in range • Ethnicity (Whether people are from an ethnic minority)
18.	Type and method of review	☒ Intervention ☐ Diagnostic ☐ Prognostic

		☐ Qualitative ☐ Epidemiologic ☐ Service Delivery ☐ Other (please specify)		
19.	Language	English		
20.	Country	England		
21.	Anticipated or actual start date	01/05/2021		
22.	Anticipated completion date	18/08/2021		
23.	Stage of review at time of this submission	**Review stage**	**Started**	**Completed**
		Preliminary searches	☐	
		Piloting of the study selection process		
		Formal screening of search results against eligibility criteria		

		Data extraction		
		Risk of bias (quality) assessment		
		Data analysis		
24.	Named contact	**5a. Named contact** Guideline Updates Team **5b Named contact e-mail** Diabetesupdate@nice.org.uk **5c Organisational affiliation of the review** National Institute for Health and Care Excellence (NICE)		
25.	Review team members	From the Guideline Updates Team: • Caroline Mulvihill • Joseph Crutwell • Kusal Lokuge • Joshua Pink • David Nicholls		
26.	Funding sources/sponsor	This systematic review is being completed by the Centre for Guidelines which receives funding from NICE.		

27.	Conflicts of interest	All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a member's declaration of interests will be recorded in the minutes of the meeting. Declarations of interests will be published with the final guideline.
28.	Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website: https://www.nice.org.uk/guidance/indevelopment/gid-ng18
29.	Other registration details	None
30.	Reference/URL for published protocol	None
31.	Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as: • notifying registered stakeholders of publication • publicising the guideline through NICE's newsletter and alerts • issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels, and publicising the guideline within NICE.

32.	Keywords	Continuous glucose monitoring, flash glucose monitoring, intermittent capillary blood glucose monitoring, type 1 diabetes, glycaemic control, children, young people
33.	Details of existing review of same topic by same authors	None
34.	Current review status	☒ Ongoing ☐ Completed but not published ☐ Completed and published ☐ Completed, published and being updated ☐ Discontinued
35..	Additional information	[Provide any other information the review team feel is relevant to the registration of the review.]
36.	Details of final publication	www.nice.org.uk