

REVIEW

Clinical practice guidelines for the prevention of childhood obesity: A systematic review of quality and content

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Summary

Obesity in childhood is a significant global issue, and prevention is key to reducing prevalence. Healthcare providers can play an important role in the prevention of obesity. The aim of this systematic review was to identify and evaluate clinical practice guidelines (CPGs) for preventing childhood obesity with a focus on the role of medical doctors. Peer-reviewed literature and gray literature sources were searched for CPGs published from 2010 to 2021. Eleven CPGs were identified. Quality was evaluated using the Appraisal of Guidelines for Research and Evaluation Collaboration (AGREE II) instrument; seven CPGs were higher quality and four lower quality. Recommendations within the CPGs covered three main areas: growth monitoring, maintaining a healthy weight, and managing overweight. The importance of involving the whole family and healthy lifestyle behaviors was emphasized. The majority of the CPGs rated poorly in guideline applicability highlighting the need for practical implementation tools. Although our review identified a number of CPGs relevant to the prevention of obesity for doctors working with children and their families, more research is needed to produce high-quality meaningful and applicable CPGs to maximize uptake, implementation, and ultimately, benefit to children and their families.

KEYWORDS

clinical practice guidelines, obesity, pediatric, prevention

1 | INTRODUCTION

Overweight and obesity in childhood are associated with increased risk of excess weight in adulthood,¹ and more specifically, childhood obesity is associated with increased co-morbid health risks such as type 2 diabetes mellitus² as well as significant direct and indirect economic costs.³ The prevention of childhood obesity is a

critical part of the strategy to address its increasing global prevalence.⁴

Preventive health care is the interaction between the clinician and patient to promote health and prevent illness.⁵ And as part of a systems approach, healthcare providers can play an important role in the prevention of obesity⁶; however, there are many cited barriers to obesity prevention in health services across adult and pediatric populations,^{7–9} including lack of knowledge, time, and appropriate resources and discomfort of healthcare providers associated with talking about weight, and evidence

Abbreviations: AGREE II, Appraisal of Guidelines for Research and Evaluation Collaboration; CPG, Clinical Practice Guideline; ICC, intraclass correlation coefficient.

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supporting the role of clinicians in obesity prevention is reportedly scarce.^{10,11}

In this context, clinical practice guidelines (CPGs) can be an important resource for clinicians and health services. CPGs are formal statements containing “recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options” (p. 15).¹² Potential benefits of CPGs include improvement in care quality, provision of guidance to clinicians unsure of appropriate care and increased consistency of care within the healthcare system.¹³ However, diversity may be seen among CPGs and a systematic review of CPGs can be an effective way to explore their characteristics, quality and content relating to a specific topic.¹⁴ The reasons for doing a systematic review of CPGs include assessing knowledge and gaps relating to available clinical guidance,¹⁴ informing future guidelines, planning health services and policy formulation (Figure 1).

A number of reviews of CPGs relating to childhood overweight and/or obesity have been published.^{15–21} Only one of these reviews, published within a doctoral thesis on nursing practice, was focused solely on prevention²¹; three CPGs were identified and assessed for quality, but the review only included CPGs published between 2012 and 2017. Delgado-Noguera et al.'s review¹⁸ included CPGs published between January 1998 and August 2007 for the prevention and treatment of childhood overweight and obesity; 22 relevant documents were identified and assessed for quality. Despite the authors recommending six CPGs for use (and a further eight with provisos), the content of the recommendations in the CPGs was not described.¹⁸ Polfuss et al.¹⁶ conducted a more recent review of CPGs addressing the prevention and management of overweight and obesity; however, it focused on primary care and only included CPGs originating from the United States. Other previous CPG reviews had specific foci such as management in primary care,¹⁷ the role of parents

in the treatment of adolescent overweight and obesity,¹⁵ and nutritional management.¹⁹

However, to the best of the authors' knowledge, no peer-reviewed CPG reviews have focused solely on childhood obesity prevention for doctors. As such, the aim of this systematic review was to identify and appraise the quality of national and international CPGs relating to the prevention of childhood obesity, specifically relevant to a doctor's clinical practice across all levels of healthcare settings (e.g., community-based general practice, speciality clinicians and hospital-based services). This review also aimed to provide an overview of the key recommendations within included CPGs however it is not intended to replace individual CPGs and provide specific clinical guidance.

2 | METHOD

This systematic review was registered on the PROSPERO database (registration number of CRD42021226153) and is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement.²² A preliminary version of the review was presented in poster form at the European Congress on Obesity in May 2021.²³

2.1 | Key definitions

In clinical practice, weight status is described as a continuum of underweight, healthy weight, overweight and obesity,²⁴ with increasing health risks associated with high body fat levels.²⁴ For the purpose of this review, “prevention” was defined as actions to maintain a healthy weight or manage overweight, that is, to prevent the development of obesity. For the purposes of this review, the management of children who have already developed obesity was not considered to be consistent with obesity prevention and therefore not in scope.

2.2 | Search strategy

Given previous coverage of older CPGs in reviews¹⁸ and the geographical limitations of the more recent review,¹⁶ we sought CPGs published globally from 2010 onwards. Both gray and peer-reviewed literature were sought that related to the prevention of childhood obesity.

2.2.1 | Peer-reviewed literature

A search strategy was developed in consultation with specialist academic librarians using a combination of key words and Medical Subject Headings (MeSH) terms or subject headings (as relevant). In addition, search filters were added to focus on publications that were more likely to be CPGs using the Canadian Agency for Drugs and

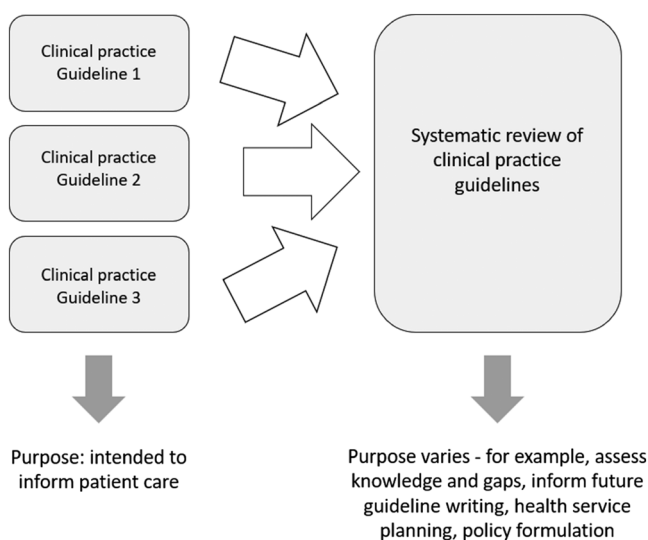


FIGURE 1 Schematic diagram illustrating the relationship between clinical practice guidelines (CPGs) and a CPG systematic review and their differing purposes

Technologies in Health (CADTH) database search filters²⁵ as a guide. Limits used were English language and dates of 2010 to current (or equivalent) (see supporting information for further details of the search strings). Databases searched were Medline, Embase and All EBM reviews via the OVID platform. All EBM reviews include eight databases: Cochrane Database of Systematic Reviews, ACP Journal Club, Database of Abstracts of Reviews of Effects, Cochrane Clinical Answers, Cochrane Central Register of Controlled Trials, Cochrane Methodology Register, Health Technology Assessment and the NHS Economic Evaluation Database. The date range was January 2010 to 15 February 2021 (“current”).

2.2.2 | Gray literature

A gray literature search was included to identify CPGs that had not been published in conventional academic repositories (see supporting information for complete list of the 29 sources). Searches were carried out in January and February 2021 on the following:

- web-based guideline repositories (e.g., TRIP database, Guidelines International Network and Guideline Central)
- websites of organizations who produce CPGs (e.g., National Institute for Health and Clinical Excellence and World Health Organization);
- websites from relevant obesity organizations (e.g., The Obesity Society, European Association for the Study of Obesity);
- websites of relevant Australian organizations (e.g., Australian and New Zealand Obesity Society, National Health and Medical Research Council, Royal Australian College of General Practitioners and National Aboriginal Community Controlled Health Organisation);
- General web search engines Google, Duck Duck Go and Google Scholar, using the term “obesity overweight child guideline” with a review of the results (up to the first 100 hits) on each of these search engines.

Screening of gray literature was carried out directly on the websites unless covered by database searches (e.g. Joanna Briggs Institute). If available on a given website, a search engine was used to search for relevant CPGs using key words such as “obesity”, “overweight” and “child”; the keyword of “prevention” was purposely not used with the intent of keeping the initial search broad. If an appropriate website search engine was not available, a more iterative approach was taken and the website was searched using the menu system initially, reviewing pages that appeared to have relevant information and then following additional links that may be available. The gray literature search details were documented on tailored Microsoft Excel spreadsheets and included website title and URL, search strategy including search terms (if applicable) and how many documents were screened.

Previously published reviews of CPGs identified by the formal search strategy^{15–20,26–38} and references of CPGs included in the systematic review were also searched to identify additional CPGs.

2.3 | Inclusion and exclusion criteria

In this review, the definition of children included those from birth to 17 years old.

Key criteria determining CPG eligibility included in this review were as follows:

- That overweight and/or obesity was a main focus, and the guideline contained content on prevention of obesity.
- That at least 20% of recommendations in the CPG related to children and/or the CPG had distinct section(s) relating to children.
- That key recommendations in the CPG were linked to underlying evidence.
- Based on a systematic search for evidence.
- For use by doctors in any setting (e.g., primary care or hospitals).

CPGs were excluded from this review if they were not published in English; had been formally retired or superseded; were accessible only to members of a particular group requiring payment, that is, a “paywall”—as these may not be available to all practising doctors; or whose geographical scope was narrower than national-level (e.g., state or institution specific guidelines).

2.4 | Study selection

Results from database and gray literature searching were imported into Covidence³⁹ for screening. All abstracts from the peer review search and full-text papers from both the gray literature and the peer review were reviewed by one reviewer (MG or KH) with 10% independently coscreened by a second reviewer (MG, KH or JB). Additionally, three complete websites (Guidelines International Network, British Medical Journal Best Practice and World Obesity Federation) from the gray literature search were coscreened (KH). Conflicts were discussed by the two reviewers, and if resolution could not be reached, they were discussed with a third independent reviewer (PB) for adjudication.

2.5 | Data extraction

This review focused on the “key recommendations” of each guideline. “Key recommendations” was defined as outlined by the Appraisal of Guidelines for Research and Evaluation Collaboration (AGREE II) instrument⁴⁰—specifically, recommendations contained within a box, presented in bold type and/or found in the executive summary or a dedicated “recommendation” section. Individual recommendations were then assessed for relevancy to this review, that is, whether they pertained to the prevention of childhood obesity in clinical practice, so that only appropriate recommendations were extracted and analyzed. For example, recommendations that related to community advocacy or policy level interventions were not included as the focus

of this review was the delivery of patient care with a focus on preventative measures.

Data extraction was conducted by one team member, with co-extraction independently conducted on a selection of 10% of data points. Extracted data for each CPG included the sponsoring organization, country or region of origin, publication year, population, target audience, number of recommendations and the recommendations assessed relevant to this review. Conflicts pertaining to data extraction were discussed by the two reviewers, and if resolution could not be reached, a third independent reviewer was available for adjudication.

2.6 | Analysis

A narrative analysis and summary of the content of the relevant recommendations was undertaken to generate themes and subthemes reflecting key recommendations, using NVivo⁴¹ for coding recommendations to themes. Coding was undertaken by one researcher with 10% of recommendations recoded by a second researcher. Discrepancies were discussed by the two coders until an agreement was reached.

2.7 | Quality assessment

Each guideline that met the inclusion and exclusion criteria was appraised for methodological quality using the AGREE II instrument⁴⁰ by two independent reviewers. AGREE II is a validated 23-item instrument which assesses a range of methodological areas using a 7-point scale across six domains: 1, Scope and Purpose; 2, Stakeholder Involvement; 3, Rigour of Development; 4, Clarity of Presentation; 5, Applicability and 6, Editorial Independence. Following completion of scoring, appraisers independently reviewed any items for a given guideline that scored “1” by one appraiser but not the other or with a difference in score of 5 or more to ensure critical information that may inform the AGREE II assessment had not been accidentally missed by one of the reviewers.

The AGREE II guideline does not specify quality thresholds; for the purposes of this review, CPGs with scores greater than 50% in the majority of domains (i.e., 4 or more) were categorized as a higher-quality guideline. Fifty percent was chosen based on previously published approaches⁴² and given this is usually the threshold for “pass or fail” assessment. An intraclass correlation coefficient (ICC) for consistency of the two raters' assessments of the 23 items included in the AGREE II appraisal was calculated for each of the CPGs, using a two-way mixed model (IBM SPSS Statistics Version 27).

2.8 | Strength of recommendations

To analyze the strength of recommendations in the higher-quality CPGs, Semlitsch et al.'s⁴³ approach of using a single nomenclature to

describe the relative strength of recommendation was adapted. The categories used were stronger recommendation, weaker recommendation, expert consensus or similar (e.g., best practice), insufficient evidence and not rated.

3 | RESULTS

3.1 | Results of literature search

As shown in Figure 2, database searches yielded 7981 titles and abstracts; following deduplication and screening, 167 full-text papers were reviewed. The gray literature search yielded 112 full-text papers which were assessed for eligibility. Following screening of the 279 full-text documents, 11 CPGs were eligible for inclusion in the review^{44–54} which included two identified from the database search and nine from the gray literature search.

Of the full-text documents that were co-screened, only two conflicts on inclusion and exclusion criteria could not be resolved between the reviewers and required additional input from a third independent reviewer; one CPG was included and the other excluded.

References pertaining to the individual CPG's acronyms are presented in Table 1A and B and for ease of reading will not be repeated in the body of the results.

3.2 | Characteristics of the CPGs (see Table 1A and B)

Most CPGs were national in scope ($n = 8$) comprising three from North America,^{46,50,52} three from Europe^{44,45,54} and one each from Asia⁴⁸ and the Middle East.⁵¹ Three CPGs were published by international organizations or collaborations.^{47,49,53} One CPG focused explicitly on low- and medium-resource settings⁵³ and one on more affluent populations.⁴⁷ Similarly, the intended audiences of the CPGs varied, with some designed only for healthcare providers,^{50,51} others for broader dissemination including to policy makers and service providers^{44,46,53} and others intended for children and their families⁴⁶ and the community more broadly.^{44,46} None of the guidelines were targeted exclusively to doctors. Several did not explicitly state the target audience within the body of the guidelines.

Most of the included CPGs were published in the latter 5 years of the search period (2016 onwards), with the most recent being the CPG from Qatar published in 2020.⁵¹ At least two CPGs^{44,45} were in the process of being updated at the time of this review with an expected publication date of 22 June 2023.⁵⁷

While some CPGs covered a broad age range of children, two specifically focused on a younger cohort of children^{47,53}—the WHO CPG on children less than 5 years old and the EarlyNutrition CPG on children less than 4 years old. Three CPGs excluded children younger than 2 years old^{45,46} or those who had not yet been weaned⁴⁴ from their scope. Three CPGs^{44,45,52} additionally included guidance relating to people older than 17 years.

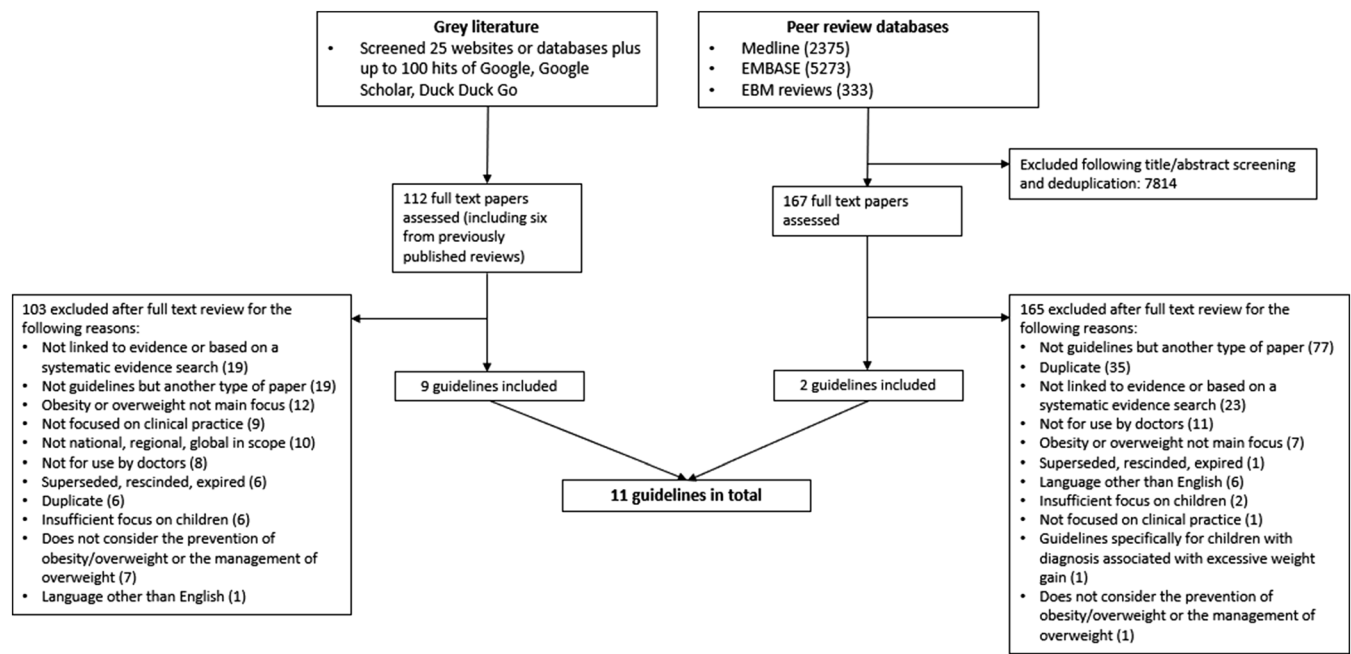


FIGURE 2 Flow diagram of included studies

Two CPGs focused on specific interventions—behavioral⁴⁶ or dietary interventions⁴⁷—and two CPGs focused on obesity prevention without obesity management recommendations.^{44,47} The total number of recommendations in each guideline varied, ranging from five in the APA CPG to 113 in the NICE CG189 CPG.

3.3 | Quality of the CPGs

Seven of the 11 CPGs met our criteria for higher quality^{44–46,49–51,53} (Table 1A). Complete domain and overall quality AGREE II scores for all CPGs are included in the supporting information.

In terms of domains, Domain 4 (Clarity of Presentation) was the domain in which all CPGs consistently scored above 50%, while Domain 5 (Applicability) had the least number of CPGs with scores above 50%.

With regard to specific individual AGREE II items, most guidelines performed well on “key recommendations are easily identifiable” (Domain 4: Clarity of Presentation) with scores of 6 or 7 out of a maximum of 7. Conversely, performance was poor (scores of 1 or 2) on “the potential resource implications of applying the recommendations have been considered” and “the guideline presents monitoring and/or auditing criteria”, both belonging to the “applicability” domain (Domain 5).

3.3.1 | ICC

An analysis of the ICC for the AGREE II scores for the overall agreement across all 23 items for each guideline is included in the supporting information. Overall, agreement between the raters was

acceptable, with the majority of values between 0.75 and 0.90 or greater than 0.90 indicating good and excellent reliability, respectively.⁵⁸ Agreement on AGREE II scoring for the two National Institute for Health and Care Excellence (NICE) CPGs was low with an ICC of less than 0.50 which is considered to be poor correlation.⁵⁸

3.4 | Recommendation analysis

In total, there were 315 key recommendations contained within all 11 CPGs, and of these, 146 were related to the prevention of obesity and considered relevant to this review. Following 10% coextraction, there was good agreement on what was a key recommendation.

Following analysis and coding, four themes emerged: growth monitoring, maintaining a healthy weight, managing overweight and undernutrition. With regard to the theme of undernutrition, the recommendations were specifically pertaining to children with stunting and wasting, and in terms of the weight continuum, children with stunting and/or wasting are often (although not always) underweight,⁵⁹ so it was allocated a separate theme. Considering that undernutrition is associated with additional complex health implications⁶⁰ and that this theme included only three recommendations from a single guideline,⁵³ this theme will not be discussed further in this review.

3.4.1 | Assessment of recommendations from higher-quality CPGs ($n = 110$)

One hundred and ten recommendations relevant to this systematic review were extracted from the seven higher-quality CPGs (further

TABLE 1A and B Guideline characteristics divided by higher (A) and lower (B) quality according to AGREE II assessment

	Organization	Year published	Country or region	Population (age range of children)	Number of relevant ^a /total recommendations
A: Higher-quality CPGs: \geq 4 domains scored > 50%	Ministry of Public Health, Qatar (QMOH) ⁵¹	2020	Qatar	Children (0–18 years)	13/29
	American Psychological Association (APA) ⁴⁶	2018	United States	Children (2–18 years)	5/5
	Endocrine Society (ES) ⁴⁹	2017	International	Children (not stated)	18/30
	World Health Organization (WHO) ⁵³	2017	International	Children (0–4 years)	6/7
	Canadian Task Force on Preventive Health Care (CTFPHC) ⁵⁰	2015	Canada	Children (0–17 years)	6/6
	National Institute for Health and Care Excellence (NICE NG7) ⁴⁴	2015	United Kingdom	Adults and children after weaning (not specified)	9/10
	National Institute for Health and Care Excellence (NICE CG189) ⁴⁵	2014	United Kingdom	Adults and children (2–18 years)	53/113
	The EarlyNutrition Project (EarlyNutrition) ⁴⁷	2019	International	Mothers, infants and young children (not specified)	7/21
	Korean Society of Pediatric Gastroenterology Hepatology and Nutrition (KSPGHN) ^{48b}	2019	South Korea	Children (0 to 18 years)	11/25
	Italian Society for Pediatric Endocrinology and Diabetology and the Italian Society of Pediatrics (ISPED) ⁵⁴	2018	Italy	Children (0 to 18 years)	13/52
B: Lower-quality CPGs: < 4 domains scored > 50%	National Health, Lung and Blood Institute (Washington) ^{52c}	2012	United States	Children and Adolescents (0–21 years)	6/17

Abbreviation: CPG, clinical practice guideline.

^aRecommendations relevant to prevention of childhood obesity.

^bPublished concurrently in two journals.^{48,55}

^cThis paper summarized the obesity chapter from the National Heart, Lung, and Blood Institute Guidelines.⁵⁶

details of individual recommendations are available from the authors on request). A varying level of detail was included in the individual recommendations across the different guidelines. The following is an overview of common recommendations relating to themes of growth monitoring; maintaining a healthy weight and managing overweight; focusing on the CPGs assessed as higher quality, that is, American Psychological Association (APA), World Health Organization (WHO), National Institute for Health and Care Excellence CPG 189 (NICE CPG189), National Institute for Health and Care Excellence NG7 (NICE NG7), Canadian Task Force on Preventive Health Care (CTFPHC), Endocrine Society (ES) and Ministry of Public Health, Qatar (QMOH); and excluding those assessed as lower-quality guidelines.

3.4.2 | Growth monitoring

Growth monitoring was addressed in five^{45,49–51,53} CPGs, and 14 recommendations were coded to this theme. Recommendations for opportunistic growth monitoring during clinic visits were included in five CPGs.^{45,49–51,53} Body mass index (BMI) measured against normative percentiles for age and sex was the recommended measurement for children, especially for those aged 2 years or older in the CTFPHC, ES and NICE189 CPGs. Measurement of weight for length was recommended for children younger than 2 years old in the ES guideline and weight for length/height for children less than 5 years old in WHO guideline.

Recommended standardized growth charts differed between CPGs and were often geographically specific. Differences in percentile cutoffs for defining obesity and overweight were also noted—for example, the ES CPG defines children 2 years of age or older with a BMI between the 85th and 95th percentile on the United States Centre for Disease Control growth chart as having overweight, whereas NICE CG189 refers to the UK 1990 BMI charts, which defined overweight as between 91st and 98th percentile⁶¹ (and is consistent with updated charts⁶²).

3.4.3 | Maintaining a healthy weight

Thirty recommendations from three CPGs^{44,49,53} involved maintaining a healthy weight. Maintaining a healthy weight was the sole focus of only one CPG.⁴⁴

Promoting healthy lifestyle behaviors was the mainstay of this theme; CPGs recommended regular physical activity,^{44,49} good sleep habits,^{44,49} healthy eating^{44,49,53} and consideration of television and other screen time^{44,49}; the NICE CG7 and ES CPGs included advice addressing multiple factors. As part of healthy feeding, both the ES and WHO CPGs included recommendations relating to breastfeeding—for infants in the ES CPG and for children aged up to

at least 24 months in the WHO guideline. The ES and NICE CG7 CPGs recommended that clinicians involve family in promoting healthy behaviors for example, the NICE CG7 CPG recommended parents support an active lifestyle for their children and encourage eating meals as a family.

3.4.4 | Managing overweight

Six CPGs included recommendations addressing management of overweight,^{45,46,49–51,53} and 122 recommendations were coded to this theme. None of the CPGs solely focused on the management of overweight but instead included this as part of a broader discussion with obesity management. Furthermore, within some CPGs,^{45,49,51} delineation between the management of overweight (within scope of this review) and management of obesity (outside scope of this review) was occasionally unclear; for example, despite a heading such as “management of obesity”, subsequent recommendations directly referred to the management of overweight as well as obesity.

Two CPGs made recommendations regarding the goals of weight management^{45,51} and both recommended that the aim of weight management programs should be tailored to the child, considering factors such as age,^{45,51} and that health benefits can be derived by maintaining modest weight loss⁵¹ or an improvement in diet or physical activity levels even without weight loss.⁴⁵

Higher-quality CPGs consistently recommended lifestyle changes as the initial focus of overweight management. Four CPGs^{45,49,51,53} recommended physical activity counseling, and three CPGs^{45,51,53} addressed dietary factors such as reducing energy intake^{45,51} and improving nutrition.^{45,51,53} Other recommendations included behavioral interventions^{45,46,50}; in particular, both APA and CTFPHC recommended formal, family-inclusive behavior change programs of significant duration (weeks to months⁵⁰ or a minimum of 26 hours⁴⁶). The involvement of multidisciplinary team members was also recommended by several CPGs.^{45,50,51} Three CPGs also recommended the referral to specialist care in certain circumstances, such as significant comorbidities or complex needs^{45,51} or as part of the delivery of behavioral interventions by a specialized interdisciplinary team.⁵⁰ Assessment for comorbidities was recommended by the ES and NICE CG189 CPGs.

The role of the child's family in managing overweight was included in five of the CPGs' recommendations^{45,46,49–51}—for example, educate the family about healthy food and physical activity,^{45,49} involve the family as well as the child in formal behavior change interventions^{46,50} and encourage whole family to make lifestyle changes.⁴⁵

Four CPGs included recommendations relating to pharmacological approaches in children with overweight^{45,49–51} and generally recommended against drug treatment for most overweight children. Most CPGs did not discuss the role of surgery in overweight management; the CTFPHC guideline recommended against routine referral of patients for bariatric surgery by primary care practitioners.

3.5 | Strength of recommendations of higher-quality CPGs

Although nomenclature for describing strength of recommendations differed between CPGs, all but one higher quality CPG⁵¹ had a two-tier rating system base for recommendation strength, that is, each recommendation was determined by the guideline authors to be a higher or lower strength recommendation. The QMOH CPG had a three-tiered strength rating and for the purposes of this analysis, a QMOH rating of RGA and RGC was both designated as “higher quality”. Three CPGs^{49,51,53} additionally included an expert consensus/best practice statement (or similar) category.

Of the recommendations in the higher-quality CPGs, 53 (47%) were considered by the guideline authors to be stronger recommendations, 20 (18%) were weaker recommendations and five (4%) were based on expert consensus or similar (see Table 2). Thirty-one (27%) of the recommendations were not associated with a strength assessment. In the NICE CG189 guideline, strength was indicated by the wording of the recommendation; however, a number of the individual recommendations did not reliably incorporate current NICE writing standards⁶³ and therefore could not be analyzed. Additionally, some recommendations from QMOH CPG did not have a strength assessment. The APA CPG recommendations included four statements indicating insufficient evidence to make a formal recommendation.

3.6 | Lower-quality CPG recommendations (n = 37)

The four lower-quality CPGs included 115 key recommendations in total and 37 relating to the prevention of obesity in children (Table 1B). Six of these recommendations were coded to growth monitoring, 29 recommendations coded to maintaining a healthy weight and 20 coded to managing of overweight.

Overall, recommendations within the lower-quality guidelines were generally consistent with those in the higher-quality guidelines. However, in comparison with the higher-quality group, there were a number of subthemes that lower-quality CPG recommendations did not address; for example, with respect to the management of overweight, there were no recommendations relating to formal behavioral interventions or the role of pharmacologic treatment. Recommendations relating to appropriate growth patterns in healthy weight children were included in two lower-quality guidelines^{47,54} but not seen in any higher-quality guidelines.

4 | DISCUSSION

This review identified 11 CPGs containing recommendations relating to childhood obesity prevention, of which seven were assessed to be higher quality. Recommendations covered three main themes of growth monitoring, maintaining a healthy weight and managing overweight. As far as we are aware, this is the first peer-reviewed systematic review of CPGs that focused on childhood obesity prevention for doctors.

Of the 11 CPGs included, it is noteworthy that only two CPGs solely focused on obesity prevention without including the management of obesity.^{44,47} In the context of healthcare systems which traditionally focus on disease treatment and a preventive lens is often lacking,⁶⁴ the relative lack of standalone prevention CPGs implicitly reinforces some views that prevention is not the “core business” (p 71)⁷ of healthcare providers.^{7,8,64}

This review also found that consideration of practical implications for implementing recommendations is a gap in many of the included guidelines. Most CPGs included in this review scored less than 50% in the AGREE II assessment of Domain 5: applicability, which relates to the “likely barriers and facilitators to implementation, strategies to improve uptake, and resource implications of applying the guideline” (p. 7).⁴⁰ Applicability has similarly been found to be a frequently low scoring item in other guidelines outside of obesity prevention.⁴² This is concerning given evidence indicating that the existence of a guideline does not automatically translate into clinical practice changes⁶⁵ and more specifically, findings of low uptake of other guidelines in the setting of childhood obesity prevention.⁶⁶ This issue has also been highlighted by a recently published systematic review by Ray et al.,⁹ which identified a range of challenges and facilitators at the level of the provider, parent and organization to implementing childhood obesity prevention practices. Although the Ray et al. review focused only on primary care and young children, many of the identified challenges are likely to be relevant to other healthcare sectors and a broader age range. For example, a frequently identified recommendation in this review was the need for growth monitoring. At face value, implementation should be relatively simple; however, there are underlying complexities to be considered. For example, the doctor needs access to accurate weight and height (and length for infants) measurement tools, tools to facilitate BMI calculation and the use of standardized growth charts appropriate for that jurisdiction, sufficient time during the consultation, knowledge regarding appropriate actions to follow up results, record keeping systems that provide reminders for repeat growth measurements and adequate reimbursement for the services provided. Such an example illustrates the potential complexity of

TABLE 2 Strength assessment of key recommendations from higher-quality CPGs

	Total	Stronger recommendations	Weaker recommendations	Expert consensus or similar	Insufficient evidence	Not rated
Overall	113 ^a	53	20	5	4	31

Abbreviation: CPG, clinical practice guideline.

^aThe QMOH CPG included a single key recommendation with two strength assessments and the ES CPG included two key recommendations with two strength assessments each.

guideline implementation relating to the prevention of obesity. Adequate dissemination, continuous education, direct interaction with educators such as local opinion leaders, decision support systems such as automated reminders and the use of standard orders and documentation are some considerations for improving guideline implementation.⁶⁵ The specific choice of implementation strategies should be informed by exploration of behavioral drivers of practice such as habit.⁶⁷ This enables targeted interventions and reduces resource waste.

This review focused on the doctor's role specifically, as it is informing a subsequent barriers and facilitators analysis which is best done at the level of individual health professions as behavioral drivers and perspectives vary between groups even for the same behavior.⁶⁸ However, it is acknowledged that other healthcare professionals can play an important role in childhood obesity prevention, and several CPGs in this review specifically highlighted the importance of multidisciplinary teams.^{45,50,51} For example, nurses are already involved in the prevention of chronic disease⁶⁹ and are well placed to play an important part in childhood obesity prevention.⁷⁰ Thus, implementation strategies should also consider the role of broader health workforce and how they could contribute to effective execution.

As outlined earlier, weight is categorized along a continuum of underweight, healthy weight, overweight and obesity in a clinical setting. However, it is recognized that in the reality of clinical practice, the prevention and management of obesity is a continuous spectrum with many common management principles. Ideally, intervention to prevent obesity would occur as early in the continuum as possible, hence the focus of this review on maintenance of healthy weight and management of overweight to prevent obesity from developing. However, it was observed that the term "obesity" was sometimes, but not always, used as an umbrella term for "overweight and obesity" in some CPGs. For example, although several CPGs referred only to the management of obesity in their title, they explicitly also included the management of overweight within the guideline itself. This presented a challenge for our review as this required us to distinguish recommendations relating to the management of overweight from those relating to the management of obesity only. For cases in which the recommendation wording was not explicit, determination for inclusion and exclusion was made based on the context of the supporting text. A clearer and more consistent use of nomenclature should be considered in future CPGs as this blurring of terminology for two related but distinctly defined clinical entities may cause confusion, especially for doctors who are less familiar with this clinical area or those seeking specific knowledge about either obesity or overweight but not both.

This review also found that there were a small number of individual recommendations within the higher-quality guidelines that were based on expert consensus (or similar) or specifically highlighted as having insufficient evidence. For example, although both the CTFPHC and APA CPGs included the value of formal behavioral interventions for children with overweight, the APA CPG found that there was insufficient evidence regarding the comparative effectiveness of the different components within a behavioral intervention.⁴⁶ Such recommendations indicate evidence gaps and potential areas for further research in the future.

Strengths of this study included a comprehensive search strategy incorporating both gray and peer-reviewed literature, allowing a significant degree of confidence that relevant CPGs were included. The quality appraisal also facilitated focus on higher-quality CPGs and enabled potential areas of improvement to be identified for future CPG development. For most CPGs, inter-rater agreement of AGREE II scores between reviewers was either good or excellent. Standardization of the strength assessment of higher-quality CPG recommendations was another strength of this review. In terms of benefit to individual clinicians, this review may help them distinguish between higher- and lower-quality guidelines.

A limitation of this review is that the analysis focused on "key recommendations", which have been specifically highlighted by the authors of the CPGs and are expected to be most easily recognized by busy clinicians looking for obesity prevention guidance. While some recommendations in the individual CPGs may not be considered "key" and therefore not included in this review, all reviewed guidelines are readily available for further reference. Furthermore, as stated previously, this systematic review is not intended to replace the individual guidelines or provide comprehensive clinical guidance but rather gives an overview of the main themes within the guidelines.

Other limitations included the exclusion of non-English CPGs and the poor inter-rater agreement for quality appraisal for both NICE sponsored guidelines.^{44,45} With specific reference to the inter-rater agreement scores for the NICE CPGs, the same degree of difference was not seen with the other CPGs, suggesting that there may be a particularity such as formatting within the NICE guidelines that impacted the AGREE II assessment. The inter-rater agreement scores may have been improved with additional appraisers; however, the use of two assessors is consistent with the minimum number suggested by the AGREE II instrument's user manual.⁴⁰ Finally, although the majority of screening and extraction was done by one reviewer, 10% was checked by a second reviewer.

5 | CONCLUSION

This systematic review is the first peer-reviewed systematic review that focused on CPGs relating to childhood obesity prevention for doctors. The review identified 11 relevant CPGs; of these, the quality assessment identified seven CPGs of higher quality and four of lower quality. CPGs included recommendations for doctors working with children and their families for the prevention of obesity, such as growth monitoring and emphasizing the importance of healthy lifestyle behaviors. A key future challenge is improving implementation to optimize uptake of CPG recommendations into routine clinical practice.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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