Development of an evidence-based practice guideline for UK public health nurses (health visitors) to use with parents of infants at risk of obesity

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INTRODUCTION

Worldwide more than 40 million children under the age of five were overweight or obese in 2011[1]. The risk factors for childhood overweight and obesity can be identified antenatally and during infancy. These include maternal pre-pregnancy BMI, paternal BMI, smoking during pregnancy, high birth weight and rapid weight gain[2]. A meta-analysis found breastfeeding decreased the odds of childhood overweight by 15%. There is conflicting evidence regarding the protective effects of later introduction of solid foods and longer durations of breastfeeding on childhood overweight[2].

A systematic review conducted in 2010, identified only five obesity prevention interventions for children <2 years old, all of which reported some positive impact on feeding practices but not weight outcomes[3]. This finding may be at least partially attributable to the restricted focus on the review which only included behavioural studies and excluded some interventions that potentially modify rapid weight gain such as breastfeeding.

In order to inform the development of a guideline for the management of infants at risk of obesity the present systematic review was conducted to identify all randomised controlled trials of behavioural and non-behavioural interventions delivered during infancy or the antenatal period. Studies were selected that aimed to reduce the risk of developing childhood overweight and obesity that included infant weight outcomes (e.g. weight-for-length, weight-for-age, BMI) or outcomes related to obesity risk (breastfeeding, physical activity, timing of weaning).

METHODS

Four stages (based on UK National Institute for Health and Clinical Excellence (NICE)[4] guidelines):

1. Assemble a Guideline Development Group (GDG).
A GDG was assembled to include the research team (SR, BE, CG, ANS, JS, SW) clinical practitioners (DN, VW, PA) and a parent (FE).

2. Develop a review protocol and undertake a systematic review.
The GDG undertook a scoping review to include the Cochrane database and developed a review protocol for primary randomised controlled trials (RCTs).
Inclusion criteria:
Participants: Parents of infants < 2 years old.
Intervention: Behavioural/non-behavioural.
Comparison: Control group.
Primary outcomes: Child BMI (weight and height), child body fat percentage.
Secondary outcomes: Breastfeeding uptake and duration, timing of introduction of solid food, food composition, energy intake and expenditure, sleep/soothe strategies, responsive feeding and infant physical activity.
Search strategy
Five electronic databases (Medline, CINAHL, PsychINFO, Cochrane, and EMBASE) were searched for articles published from 1990 onwards.
Data Extraction:
Study design, study population, location, sample size and reported results.
Quality Assessment and process evaluation:
Randomisation, blinding and attrition[5].
Evidence based-behavioural Medicine (EBBM), (training, supervision, adherence, preference, and delivery)[6]

3. Data interpretation and writing of the guideline.

4. Piloting of the guideline.

DESCRIPTION OF INCLUDED STUDIES

Electronic searches identified 1784 titles, a further 27 were identified through hand searches of the literature. 604 articles were identified as duplicates and removed. 1206 titles and abstracts were screened by two reviewers (BE, SR), 1064 did not meet the eligibility criteria. The remaining 142 were subjected to full text review. 46 eligible articles were identified, describing 35 trials.

The wide range of interventions, process and outcome measures used in the identified studies made it impossible to calculate an effect size. Therefore the studies were grouped thematically.

1. Breastfeeding and lactation support
2. Formula and bottle-feeding interventions
3. Dietary supplement interventions
4. Feeding behaviour interventions
5. Parenting and family health interventions
6. Maternal health interventions.

TABLE 1 MAIN RESULTS SHOWING IMPACT OF INTERVENTIONS ON FEEDING AND WEIGHT OUTCOMES

Studies	Feeding Outcomes			Weight Outcomes		
	++	+/-	--	++	+/-	--
Breastfeeding promotion and lactation support	8	2	1	1	1	4
Agrasada 2005	v					v
Agrasada 2009	v					
Albernaz 2003		v				v
Bonuck 2005	v					
Bhandari 2003	v					v
Chapman 2013		v				
Jakobsen 2008			v	v		
Kramer 2001	v					
Kramer 2002	v				v	
Kramer 2007	v					v
Morrow 1999	v					
Formula and bottle-feeding interventions			1	6		3
Escribano 2012				v		
Fewtrell 2013						v
Kavanagh 2008			v			v
Koletzko 2009				v		
Menella 2011				v		
Rzehak 2009				v		
Singhal 2010				v		
Socha 2011				v		
Dietary supplement interventions			1			3
Andersen 2011			v			v
Anderson 2011						v
Yurdakok 2004						v
Feeding behaviour interventions	8	7	2	3	2	10
Aboud 2009		v				v
Black 2001	v					
Campbell 2013	v					v
Daniels 2012			v	v		
Daniels 2013	v					v
French 2012	v					v
Jonsdottir 2013	v					v
Lapinleimu 1994		v				v
Lapinleimu 1995		v				v
Paul 2011	v			v		
Scheiwe 2010		v				v
Shi 2010		v			v	
Vazir 2012	v					v
Verbestel 2013			v		v	
Watt 2009		v				v
Wen 2011	v					
Wen 2012		v		v		
Parenting and family health interventions		2	1			2
Cupples 2011			v			v
Johnson 1993		v				
Jungmann 2010						v
Kemp 2011		v				
Maternal health interventions			2		1	2
Dewey 1994			v			v
Hauner 2012			v		v	
Laitinen 2009						v

++ **Strong effect**: Intervention associated significant improvements in all feeding outcomes assessed or reduction in all weight outcomes measured
+/- **Mixed effect**: Intervention associated with significant improvements in some feeding outcomes assessed or reduction in some weight outcomes measured
-- **No effect:** There is no effect of the intervention in improving feeding outcomes or reducing weight outcomes

TABLE 2 QUALITY ASSESSMENT OF INCLUDED STUDIES

Studies	EBBM score (max 5)	Jadad score (max 6)
Breastfeeding promotion and lactation support		
Agrasada 2005	3	3
Agrasada 2009	3	3
Albernaz 2003	3	2
Bonuck 2005	3	2
Bhandari 2003	3	3
Chapman 2013	1	2
Jakobsen 2008	2	3
Kramer 2001	1	3
Kramer 2002	1	3
Kramer 2007	1	3
Morrow 1999	2	2
Formula and bottle-feeding interventions		
Escribano 2012	N/A	5
Fewtrell 2013	N/A	2
Kavanagh 2008	1	1
Koletzko 2009	N/A	5
Menella 2011	N/A	4
Rzehak 2009	N/A	5
Singhal 2010	N/A	2
Socha 2011	N/A	5
Dietary supplement interventions		
Andersen 2011	N/A	5
Anderson 2011	N/A	5
Yurdakok 2004	N/A	0
Feeding behaviour interventions		
Aboud 2009	3	2
Black 2001	3	3
Campbell 2013	3	3
Daniels 2012	3	1
Daniels 2013	3	1
French 2012	1	0
Jonsdottir 2013	1	2
Lapinleimu 1994	2	2
Lapinleimu 1995	2	2
Paul 2011	1	0
Scheiwe 2010	3	3
Shi 2010	3	0
Vazir 2012	3	3
Verbestel 2013	2	1
Watt 2009	3	3
Wen 2011	1	3
Wen 2012	1	3
Parenting and family health interventions		
Cupples 2011	4	3
Johnson 1993	2	2
Jungmann 2010	2	3
Kemp 2011	1	2
Maternal health interventions		
Dewey 1994	2	1
Hauner 2012	0	3
Laitinen 2009	0	1

Key:
Jadad score, Randomisation = 2 points if study described as randomised and the method to generate the sequence of randomisation was described, Blinding = 2 points for double blind, Attrition= 1 points for description of number and reasons for withdrawal. Total possible = 5.
EBBM, 1 point each for description of training of staff delivering intervention, supervision of staff, preference of participants and providers, adherence to intervention, integrity. Total possible = 5.

SUMMARY OF FINDINGS

Eleven studies described interventions that promote breastfeeding and lactation support to women. Ten of these reported highly significant improvements in feeding outcomes such as the uptake and duration of breastfeeding (Table 1).

Interventions targeting feeding behaviours included components that focused on dietary content or feeding practices such as parental responsiveness or both. Eight studies (describing eight unique trials) described interventions that targeted diet and feeding behaviours and reported highly significant improvements in feeding outcomes (Table 1). However, only three trials reported significant differences in weight outcomes with small effect sizes. This may be partially attributable to participant selection. The majority of studies recruited generic samples, such as first time parents, some of whose baseline risk of obesity was low, rather than targeting those at greatest risk. Most behavioural studies failed to incorporate a theory of change in the design and/or implementation of their interventions (Table 2).

Four studies were identified that delivered generic parenting and health interventions with feeding components, via home visiting. These interventions had some significant impact on feeding behaviours but overall the impact of this type of intervention found fewer improvements than those focusing on feeding behaviours exclusively (Table 1).

Six non-behavioural studies (describing four trials) were identified which tested different types of formula milk (high vs. average protein content) delivered to pre-term and term infants. Two trials reported infants given higher protein feed grew more rapidly and one trial reported they grew more slowly. These double-blind studies achieved the highest scores for quality (Table 2) . Only one small trial testing a behavioural intervention to support parents around formula milk feeding was identified.

This review identified limited interventions delivered pre-conceptually or antenatally with outcomes measured during infancy (n=3).

GUIDELINE DEVELOPMENT AND PILOTING

Three levels of evidence were considered by the GDG.

1. Cochrane-registered systematic reviews
2. Primary RCTs (identified in this systematic review)
3. Current guidelines, policy documents and clinical opinion.

A consensus method was used to establish agreement about the significance or otherwise of an intervention and recommendations made for practice. Each recommendation was assigned the words “must”, “should”, “could” to reflect the GDG’s views about its relative importance based on the key at the bottom of Table 1.

- Strong effect and/or clinical consensus = must
- Mixed effect and/or clinical consensus = should
- No effect but clinical consensus = could

The GDG considered identification of overweight/obesity risk in light of the IROC developed by the research team for another project[7]. Identification of overweight/obesity risk was provided with a “must” recommendation on the basis that this is necessary in order for targeted intervention to take place.

The GDG agreed that the guideline should be presented as a patient pathway which is summarised on a flow chart for ease of use.

The guideline was circulated for external peer review and revised in light of the comments received. The revised guideline was reviewed by 12 members of a health visiting team in the UK. Comments about feasibility, acceptability and usability were fed back via a focus group facilitated by two members of the GDG (BE, JS).

The guideline is available on the UK Institute of Health Visiting website.

CONCLUSIONS

The systematic review identified a number of important interventions which have the potential to prevent childhood obesity. Some interventions (e.g. breastfeeding promotion and support) and some components of interventions (e.g. parental education about responsive feeding, soothing and sleep expectations) were incorporated into the guideline. The majority of the feeding behavioural interventions did not target infants with known risk factors, or focus on important periods such as antenatally. Further research is needed to develop and test interventions specifically for parents of infants identified as at risk of childhood overweight or obesity.

The findings from the studies describing the non-behavioural formula milk interventions were not included the guideline. Apart from the equivocal evidence, the GDG considered that there is an ethical question with respect to double blind studies where normal healthy infants are provided with formula milks which are designed to over-nourish. Furthermore, in the absence of components targeting feeding behaviour such interventions may be limited in the long term.

Only one small study testing behavioural interventions that provide guidance for parents who formula milk feed was identified. The practitioners on the GDG believed such interventions may be difficult to implement because of the UNICEF Baby Friendly guidelines. A dialogue is needed to ensure pro-breastfeeding policies are not a barrier to infant obesity prevention.

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Full references from systematic review available on request.

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