

# Anticipatory guidance and children's oral health: A scoping review

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**Background:** Anticipatory guidance (AG) involves providing parents with information about developmental milestones and promoting optimal development. Oral AG was first introduced as a comprehensive approach to provide age-appropriate oral health information and preventive interventions. The literature regarding this important topic has not yet been reviewed and summarised. **Aim:** To describe the literature on AG provided to parents about their children's oral health and identify gaps in the current research. **Method:** The scoping review mapped the existing peer-reviewed and guideline documents about AG and children's oral health using the framework established by Arksey and O'Malley (2005) and modified by Levac et al. (2010). Firstly, we defined our research questions and searched the literature using Medline, Web of Science and Scopus. Secondly, we selected all types of literature and then applied the inclusion and exclusion criteria, and finally, we analysed and summarised the information using thematic analysis. **Results:** Forty-three peer-reviewed articles and six guidelines were included. There was variation in how AG was described and defined. While some studies have evaluated the effectiveness of AG, most have investigated its short-term effectiveness only, with few interventional studies assessing this approach in the long-term. **Conclusion:** While the concept of AG shows promise, there is no consensus within the current literature on a defined definition and there is a lack of long-term evaluation.

**Keywords:** parent, children's oral health, anticipatory guidance

## Introduction

Anticipatory guidance (AG) has been defined as “the process of providing practical, developmentally appropriate health information about children to their parents in anticipation of significant physical, emotional and psychological milestones” (Nowak and Casamassimo, 1995). To ensure AG is appropriately applied, it must be provided routinely, be relevant to the child and family within their community setting, and discuss specific age-related issues so that recommendations are readily adopted (Hagan *et al.*, 2017). It was first introduced to oral health in 1995 so that health professionals could support parents with oral health at several time points during childhood (Pinkham *et al.*, 1999) through providing information and delivery of preventive procedures (Nowak and Casamassimo, 1995).

To deliver useful AG, health professionals require guidelines for oral health support (Shetty *et al.*, 2005). Nowak and Casamassimo (1995) and Pinkham *et al.* (1999) established primary guidelines to implement AG about child oral health. The guidelines included five developmental age categories: 6–12 months, 12–24 months, 2–6 years, 6–12 years and 12–18 years. They covered six essential issues; oral development, adequacy of fluoride, oral hygiene, diet and nutrition, behavioural and traumatic injury prevention (Pinkham *et al.*, 1999; Shetty *et al.*, 2005). Each milestone has different content based on what is essential at that age. For example, the first tooth erupts for children in the first category, so the parent will

be given information on how they can take care of teeth, deal with teething and introduce babies to solid foods.

Subsequently, AG has been adopted into guidelines in countries such as the United States and Australia to improve children's oral health. However, despite the use of the term AG in these guidelines, it is unclear whether AG has been adopted globally, how this intervention has been operationalised and what studies have been published evaluating this approach. This study aimed to conduct a scoping review of AG provided to parents about their children's oral health and identify gaps in the existing research.

## Methods

Arksey and O'Malley (2005) developed a methodological framework for scoping reviews involving five stages: defining the research question, identifying relevant studies, study selection, charting data and collating and reporting results. They emphasised the descriptive numerical summary for the included literature. On the other hand, Levac *et al.* (2010) point out the importance of both a numerical summary and a thematic analysis.

Electronic databases including Medline via Ovid, Web of Science and Scopus were used to search for peer-reviewed literature. Additionally, relevant guidelines were searched for using Google. A manual search of the reference lists of included papers was conducted. The search terms included ‘anticipatory guidance’ AND ‘oral health’ OR ‘dental health’. All studies were exported to EndNote X9, all duplicates removed and then screened

against the inclusion criteria. The inclusion criteria were literature focusing on AG and children’s oral health, written in English where the full text was available. Literature published between 1995-2020 was included. Figure 1 details this process in a PRISMA flow diagram. Data were extracted and recorded in a bespoke spreadsheet by one researcher (DA). More details regarding the variables captured can be provided upon request. The results were reported using thematic and numerical analyses to describe the nature and scope of the studies. Themes were identified by one author (DA) and agreed by the others.

## Results

This section summarises the results for the peer-reviewed literature (n=43), followed by the results from the guidelines (n=6) (Figure 1).

The number of published child oral health studies involving AG increased from 1995 to 2020. Three were carried in the first five years, compared to 17 in the last five years. The studies originated from eleven countries, including the USA (n=22), Australia (n=5), India (n=5) and Canada (n=3). Various study designs were used (Figure 2).

Interventions were involved in seventeen reports, including randomised controlled trials (RCTs) and other longitudinal studies. Different forms of AG were studied, with a lack of a universal definition; seven studies included an intervention composed of information-giving combined with chairside procedures, and nine included information-only interventions. Formats of interventions to parents included verbal advice from healthcare professionals, discussing a PowerPoint presentation, videos or provision of leaflets. These were provided in different settings, including dental clinics, physicians’ offices, maternity wards and home.

The duration of the interventions ranged from 15 to 30 minutes (Bulut and Bulut, 2020; Wagner *et al.*, 2014), 8 and 30 weeks (Cooper *et al.*, 2017; Wilson *et al.*, 2013), and took place during different points during pregnancy and up to 12 to 18 months after birth (Jamieson *et al.*, 2018; Plutzer and Spencer, 2008). Some studies reported follow up periods which ranged from four weeks (Cardenas and Ross, 2010), six months (Smithers *et al.*, 2017), 18 months (Plutzer and Spencer, 2008), three years (Ismail *et al.*, 2018; Jamieson *et al.*, 2018), and up to five years (Jamieson *et al.*, 2019; Wagner *et al.*, 2014).

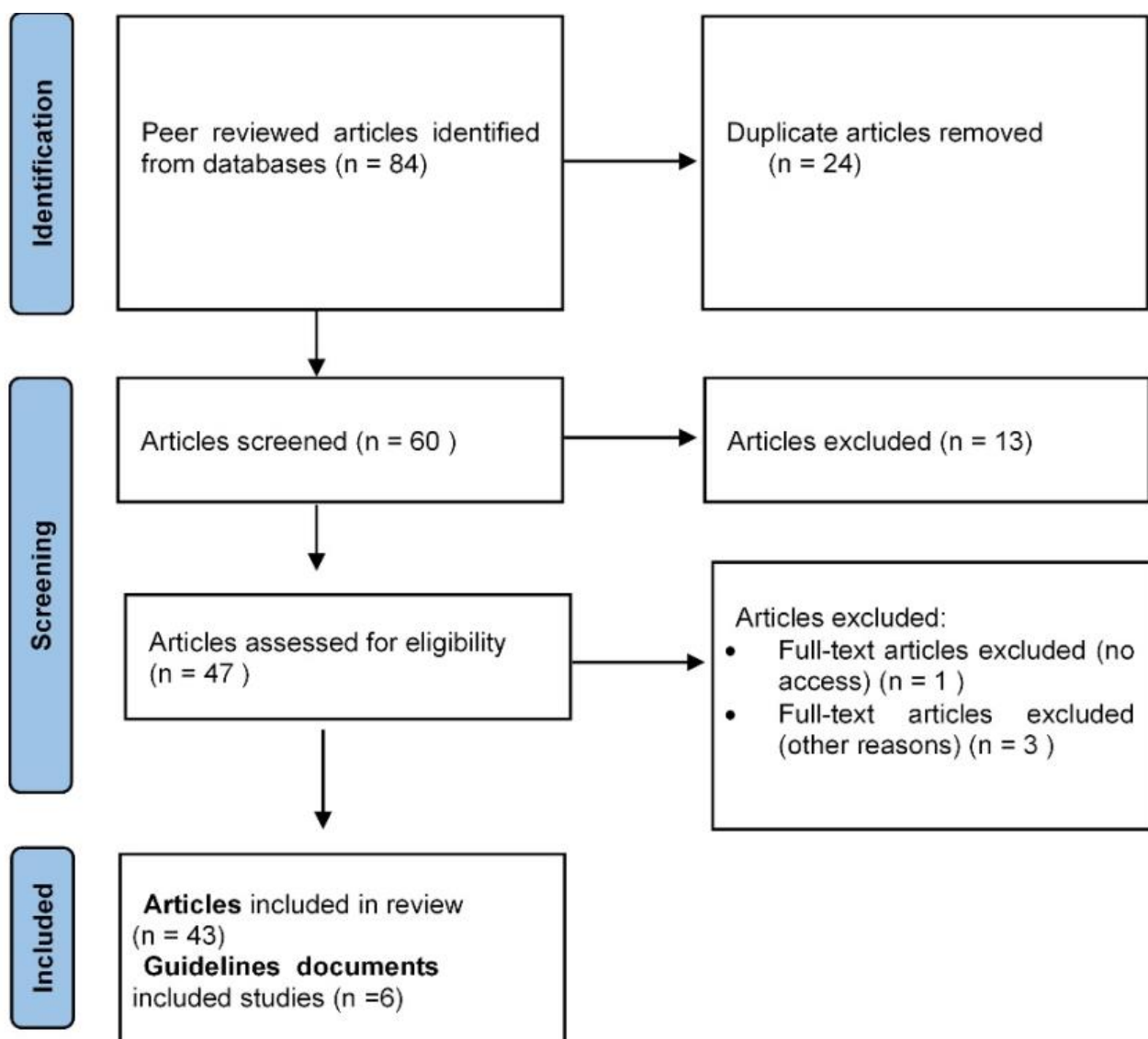
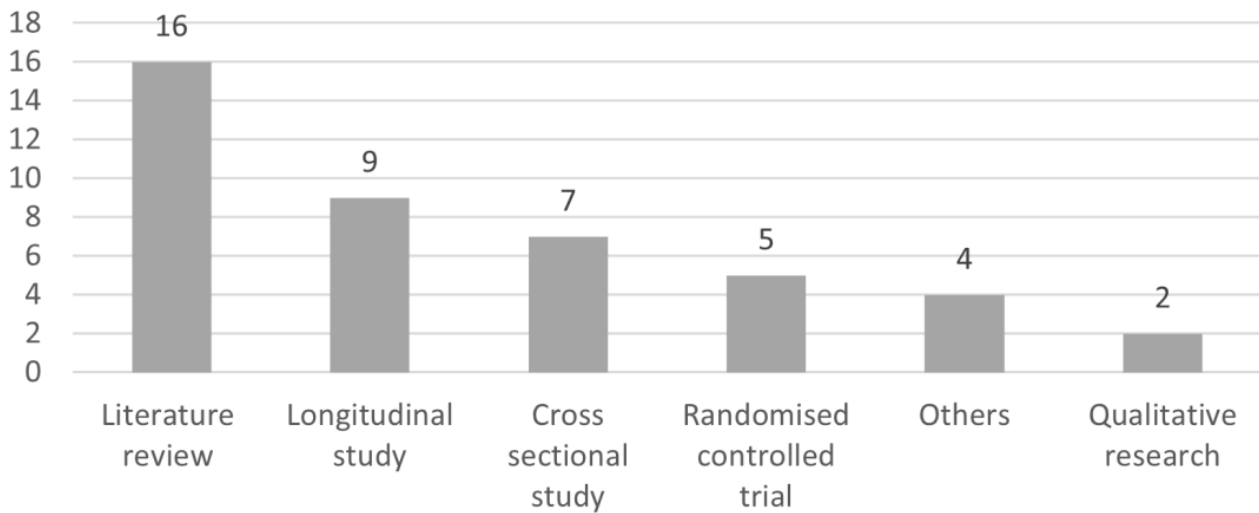


Figure 1. The PRISMA flow diagram of the scoping review.



**Figure 2.** Study design for included studies.

The numbers of participants varied widely. Eight studies involved less than 100 participants, eleven studies involved less than 1000 and two involved more than 1000. Different healthcare professionals were targeted in seven studies. Three involved paediatricians delivering the AG (Al Jameel *et al.*, 2019; Ditto *et al.*, 2010; Lewis *et al.*, 2004), others involved healthcare educators, (Alsada *et al.*, 2005) paediatric nurses, (Khanbodaghi *et al.*, 2019) paediatric health care providers, (Cooper *et al.*, 2017) and one involved a combination of medical and dental students and oral health promotion professionals (Lossius *et al.*, 2016). Just five studies reported a power calculation.

The thematic analysis of peer-reviewed papers found three themes; the importance of AG, the importance of inter-professional integration and parental awareness about their children oral health (Table 1).

The importance of AG theme emphasised its perceived importance in improving child oral health by preventing dental disease. Three specific aspects of AG were identified as making a significant contribution. Five studies discussed its value for oral health (Chowdary and Padmavathi, 2011; Nowak and Casamassimo, 1995; Sharma *et al.*, 2014; Shetty *et al.*, 2005; Wandera, 1998). The literature described AG's main objective as the prevention of dental problems in children through parent counselling

and chairside procedures. Most papers focused on AG's role in preventing dental caries. Intervention studies typically assessed the effect of AG on the prevention of dental caries. Four randomised controlled trials found that the proportion of children with dental caries was lower in the intervention group compared with children from the control group (Ismail *et al.*, 2018; Jamieson *et al.*, 2018; Plutzer and Spencer, 2008; Wagner *et al.*, 2014). The studies focused on mothers and their children, with a total of 450 to 670 participants. Two were conducted in dental clinics (Ismail *et al.*, 2018; Jamieson *et al.*, 2018), one in an obstetrics hospital (Plutzer and Spencer, 2008) and one in a birth ward (Wagner *et al.*, 2014). One study delivered the intervention once for just 30 minutes (Wagner *et al.*, 2014). Three others delivered the intervention at multiple intervals at 12 months, 18 months, and three years (Ismail *et al.*, 2018; Jamieson *et al.*, 2018; Plutzer and Spencer, 2008). Children were followed up for periods ranging from 18 months up to two, three and five years.

In addition to dental caries, the role of AG in improving gingival health (Farias *et al.*, 2005) and traumatic dental injuries (Bahadure *et al.*, 2019) was investigated. An RCT of preschool children assessing AG's effectiveness in improving gingival health and determining their

**Table 1.** Themes identified from the peer-reviewed literature.

Main themes	Topics covered	Number of studies
1. The importance of AG	1.1 Preventing dental problems	26
	1.1.1 Dental caries	
	1.1.2 Gingival problems	
	1.1.3 Traumatic dental injuries	
	1.2 Specifics aspects of anticipatory guidance	
	1.2.1 Breastfeeding	
	1.2.2 Diet counselling	
1.2.3 Value of early intervention		
2. Importance of inter-professional integration	2.1 The role of healthcare professionals	9
	2.2 Healthcare professional knowledge	
3. Parental awareness about their child's oral health	3.1 Dental caries	8
	3.2 Oral healthcare	
	3.3 How risk factors impact oral health	

role in their oral hygiene practices found that children aged 6 to 18 months who received the intervention tended to have lower levels of plaque (Farias *et al.*, 2005). The preventive programme confirmed that visible dental plaque had been reduced and that the oral health hygiene routine had been improved among parents and young children.

The specific aspects of AG mentioned in the literature included 1) breastfeeding, 2) diet counselling, and 3) the value of early intervention. Breastfeeding was a recurring area of interest, with contradictory findings. Four studies discussed the need to provide AG on breastfeeding to mothers to improve child oral health and minimise dental disease, covering both the positive aspects of breastfeeding and potentially negative impact of prolonged breastfeeding (Agarwal *et al.*, 2012; Cidro *et al.*, 2015; Wert *et al.*, 2015; Wong *et al.*, 2017). One study highlighted the confusion caused by inconsistencies between mothers' cultural influences and health professionals' advice about breastfeeding (Cidro *et al.*, 2015).

Secondly, diet counselling was another critical aspect of AG. A recent study suggested that AG about diet should be informed by behaviour change theory (Smithers *et al.*, 2017). Thirdly, seven studies examined the value of the early intervention AG to improve childhood dental health (Donaldson and Fenton, 2006; Finlayson *et al.*, 2017; Fleming, 2015; Jamieson *et al.*, 2019; Lee *et al.*, 2006; Nowak and Warren, 2000; Ramos-Gomez *et al.*, 2002). Overall, these studies emphasised the importance of early intervention to improve long-term oral health outcomes (Lee *et al.*, 2006) by encouraging parents to engage with dental services throughout childhood (Donaldson and Fenton, 2006; Finlayson *et al.*, 2017; Ramos-Gomez *et al.*, 2002).

Jamieson *et al.* (2019) in Australia conducted the only RCT assessing long term effectiveness. They investigated the reduction of dental caries in children aged three years and compared immediate intervention (II) with a delayed intervention (DI). The AG involved dental treatment to mothers, fluoride varnish application to children, and motivational interviewing. The same intervention was delivered to both groups but at different time intervals. After five years, children in the II group had lower dmft scores than children in the DI group. They concluded that the best time to intervene was in infancy, sooner rather than later in a child's life.

The second key theme was the importance of integrating improving oral health with other health practitioners from an early age. The literature here focused on non-dental health professionals' role, including paediatricians, those who provide post-natal care, the early years workforce, dieticians, and nurses (Fernandez, 2016; Fisher-Owens, 2019; Lewis *et al.*, 2004). To enable this inter-professional integration, Taylor *et al.* (2014) recommended collaborative working environments. However, a lack of knowledge and confidence regarding oral health information amongst these professional has been reported with recommendations for embedding oral health into training curricula, post-qualification training courses and workshops (Al Jameel *et al.*, 2019; Cooper *et al.*, 2017; Ditto *et al.*, 2010; Khanbodaghi *et al.*, 2019; Lossius *et al.*, 2016).

Parental knowledge and awareness of their children's oral health was the third theme. Eight studies covered specific aspects such as dental caries, oral healthcare and

risk factors for poor oral health (Alsada *et al.*, 2005; Blackburn *et al.*, 2020; Bulut and Bulut, 2020; Cardenas and Ross, 2010; Mahat and Bowen, 2017; Ramazani *et al.*, 2014; Shanthini *et al.*, 2017; Wilson *et al.*, 2013). Most of the literature targeted mothers, including pregnant women. Two cross-sectional (Blackburn *et al.*, 2020; Mahat and Bowen, 2017) and six longitudinal studies measured the effectiveness of AG at improving parent knowledge (Alsada *et al.*, 2005; Bulut and Bulut, 2020; Cardenas and Ross, 2010; Ramazani *et al.*, 2014; Shanthini *et al.*, 2017; Wilson *et al.*, 2013). Most found the intervention improved knowledge; however, this was measured in the short-term only (within eight weeks). Two studies showed that face to face presentations were more effective than providing leaflets (Ramazani *et al.*, 2014; Shanthini *et al.*, 2017).

Six guideline documents were included; four from the US, one from Canada and one from Australia. Guidelines were established by the ministry of health, paediatric dentistry associations, health department and dental public health organisations. The documents targeted dental and other health care professionals; more details are provided regarding data materials can be provided upon request.

The guidelines focused on both mothers' oral health during pregnancy and their children. Four concentrated on child oral health with variations in the age group and two on both mother and child oral health. There were different definitions of AG in the guidelines. Some considered AG to involve chairside preventive. Others considered it to be the provision of specific age-appropriate information or included both advice and chairside prevention.

## Discussion

This scoping review aimed to describe the literature on child oral health AG and identify gaps in the current research. Both the peer-reviewed literature and guidelines were explored and found that AG was defined differently. Generally, the literature suggests AG is effective in preventing dental caries, however, more research is needed to assess its long term effectiveness.

Studies evaluating AG have found it to be effective at raising awareness, improving oral health knowledge and improving some oral health-related behaviours. However, Smithers *et al.* (2017) found that their intervention was insufficient to reduce sugar consumption. While parental awareness improved, knowledge alone is not sufficient to improve children's oral health unless the underlying determinants of oral health are tackled. The AG interventions in the literature could therefore be considered as downstream interventions. Interestingly, several Australian studies emphasised the role of culture in determining the effectiveness of their AG (Plutzer and Spencer, 2008; Smithers *et al.*, 2017).

Partnership working with other health professionals to improve children's oral health is a more upstream approach and was another key theme. This integration helps to provide information in a timely and anticipatory way and widens the reach to those parents who do not attend dental settings. Indeed, Gussy and colleagues (2006) confirmed that, on average, in children's first year of life, they accessed primary healthcare services 35 times, with few or no dental visits. However, it was also noted



that there was low awareness among non-dental health professionals regarding oral health. While partnership working may be cost-effective and beneficial for parents and children (Strandberg-Larsen and Krasnik, 2009), there is a need for an appropriate organisational system and ongoing training for the potential to be realised.

The lack of an agreed definition of AG and variation in how it is operationalised suggests the need to reach a consensus on the key features of AG before further evaluations. In addition, some have argued that to improve the effectiveness of these interventions, future developments should be informed by behaviour change theory (Smithers *et al.*, 2017)

Three significant limitations were noticed among the included studies: small samples, brief follow ups and disregarding confounding variables. Studies often lacked sample size calculations, so further research needs to be appropriately powered. Secondly, the follow-up periods for the evaluation studies ranged from 4 weeks to five years. Given the progression rate of the caries process, most caries prevention trials involve a follow-up period of several years (Araujo *et al.*, 2020). Thirdly, many of the studies omitted confounding factors such as socioeconomic status.

From the guidelines, it appears AG has been recommended and potentially implemented to some extent in the United States, Canada, and Australia, with variation in how the term is used. However, the principles of AG may be adopted in guidance documents from other countries without the specific use of the term. For example, Public Health England's (2017) *Delivering better oral health: an evidence-based toolkit for prevention* (DBOH) may be considered as AG, although this term is not used. DBOH presents the key preventive messages by age groups, but also includes preventive procedures alongside the key advice, which resembles the main ideas behind AG.

There are some limitations to this study. Due to time constraints the review of the grey-literature was limited to guidelines only and the consultation stage recommended by Levac *et al.* (2010) was not included. Moreover, the quality of the empirical studies was not assessed.

## Conclusion

In conclusion, AG shows promise but there is a lack of consensus of how the definition of AG should be operationalised and a lack of long-term clinical and cost-effectiveness evaluations.

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