

# Food Related Choking in Children/Early Learning Centres

(2011). "Preventing choking in children." Nursing **41**(10): 56.

Aguiar, R. S., et al. (2018). "Physical hazards in dairy products: Incidence in a consumer complaint website in Brazil." Food Control **86**: 66-70.

The incidence of physical hazards in dairy products (2012–2016) was investigated through a complaint website (Reclame Aqui) used by Brazilian consumers to report complaints. Among the complaints, 2% referred to the presence of physical hazards in the products. With regard to milk and dairy products, 515 complaints were reported, with the greatest percentage for yogurt/milk drink (37%) followed by UHT milk (14.6%) and milk powder (10.7%). The least cited products were Prato Cheese, Brie-type cheese, and Cottage cheese (0.3–0.4%). The most reported hazards were the presence of foreign objects (42.4%), followed by insects (23.3%), hair (15.2%), plastics (11.1%), metal (6.2%) and fabric (1.8%). The results showed failures in both Brazilian dairy foods processing and the public-sector inspection, and demonstrated that the Internet has proven to be an effective tool for spreading consumer dissatisfaction. © 2017 Elsevier Ltd

Anonymous (2011). "Preventing choking in children." Nursing **41**(10): 56.

Anonymous (2017). "Grapes are common cause of food-related choking." Emergency nurse : the journal of the RCN Accident and Emergency Nursing Association **24**(9): 12.

After hot dogs and sweets, grapes are the third most common cause of food-related choking, a report concludes.

Anonymous (2017). "Grapes pose danger of choking for under fives." Nursing children and young people **29**(1): 13.

Grapes eaten whole are the third-biggest cause of food-related choking in under fives, according to research. More than half of fatal choking cases in this age group are caused by food, most commonly hot dogs, sweets and grapes.

Arantes, A. L. A. E., et al. (2018). "THE BABY-LED WEANING METHOD (BLW) IN THE CONTEXT OF COMPLEMENTARY FEEDING: A REVIEW." METODO BABY-LED WEANING (BLW) NO CONTEXTO DA ALIMENTACAO COMPLEMENTAR: UMA REVISAO. **36**(3): 353-363.

OBJECTIVE: To review the scientific findings on the baby-led weaning method (BLW) in the context of complementary feeding., DATA SOURCES: Two independent examiners searched the Medical Literature Analysis and Retrieval System Online (MEDLINE)/PubMed database in August 2016. No time-period was defined for the publication dates. The following descriptors were used: "baby-led weaning" OR "baby-led" OR "BLW". Inclusion criteria were: original studies that were available in English, and which addressed the BLW method. Exclusion criteria were: references in other languages, opinion articles and literature reviews, editorials and publications that did not elaborate on the intended subject. Of the 97 references identified, 13 were included in the descriptive synthesis., DATA SYNTHESIS: The BLW group of babies, when compared to the traditional eating group, were less prone to being overweight, less demanding of food, and ate the same foods as the family. The number of choking episodes did not differ between groups. Mothers who opted for the implementation of BLW had higher levels of schooling, held managerial

positions at work, and were more likely to have breastfed until the sixth month of the child's life. Concerns were raised about messes made during meals, wasting food, and choking, but most of the mothers recommended adopting the method. Health professionals were hesitant to indicate this method., CONCLUSIONS: BLW was recommended by mothers who followed the method with their own children. However, concerns have been reported, which, coupled with professionals' fears about the inability of infants to self-feed, reflect a lack of knowledge about the method.

Awadalla, N., et al. (2018). "Chew on This: Not All First Finger Foods Are Created Equal." Clinical Pediatrics **57**(8): 889-894.

The American Academy of Pediatrics (AAP) recommends when to start first finger foods (FFFs) and what types of foods to start with, but it is unclear whether products marketed as FFF comply with these recommendations. We evaluated FFF products for compliance with AAP recommendations and product safety using 41 adult product testers, who were asked to dissolve each product in their mouth. Product characteristics, comments pertaining to product safety, and time to dissolve each product were recorded. Only 2 products met all AAP criteria, and safety concerns were raised for an additional 2 products. One product showed a large change in dissolvability after being left out of original packaging. Consumers should not assume that products marketed for infant/toddler consumption comply with AAP recommendations. Also, products left out of original packaging may change consistency, presenting a choking hazard. Additional research is warranted to guide the development of regulations surrounding labeling and marketing of these foods. © 2018, The Author(s) 2018.

Bamber, A. R., et al. (2014). "Fatal aspiration of foreign bodies in infants and children." Fetal and pediatric pathology **33**(1): 42-48.

PURPOSE: To investigate the frequency, circumstances, demographics and autopsy findings of infants and children dying as a result of foreign body aspiration., METHODS: Retrospective review of autopsy cases in children aged between seven days and 18 years, at one specialist centre over a 16-year period, in which death was the result of aspiration of a foreign body., RESULTS: Ten cases were identified out of a total autopsy population of 2165. Only one individual had an underlying diagnosis potentially contributing to aspiration. All but one case involved aspiration of food, with grapes being a feature of four cases. In cases with a prolonged survival interval, autopsy demonstrated bronchopneumonia and hypoxic-ischaemic encephalopathy. In the remaining cases autopsy findings were non-specific., CONCLUSIONS: Fatal aspiration of a foreign body is rare in this population. The cases involve normal children who aspirate food, particularly grapes. There are typically minimal, non-specific findings at autopsy.

Bentivegna, K. C., et al. (2018). "Basic choking education to improve parental knowledge." International journal of pediatric otorhinolaryngology **113**: 234-239.

OBJECTIVE: To evaluate the effect of an educational intervention on parental knowledge of choking hazards and prevention., METHODS: A quasi experimental study was performed utilizing an internet based educational video intervention for parents with a child 6 months to 4 years old presenting to a Pediatric Otolaryngology clinic at a Level 1 pediatric hospital. Following the clinic visit, participants were sent a choking video (intervention) or general safety video (control) with a pretest and posttest knowledge survey (via email). An additional posttest knowledge survey was sent 30 days later as a surrogate measure for knowledge retained over time. Frequencies, chi square test, Independent t-test and McNemar's test were used for statistical analyses., RESULTS: 202 participants viewed the video and completed both the pretest and immediate posttest knowledge survey. Average change in total

knowledge scores from the pretest to immediate posttest was statistically significant between the intervention ( $\mu=1.88$ ,  $\sigma=1.20$ ) and control group ( $\mu=0.14$ ,  $\sigma=1.05$ );  $t(200)=-10.99$ ,  $P<.001$ . This finding was consistent when assessing change from the pretest to 30 day posttest between the intervention ( $\mu=1.41$ ,  $\sigma=1.32$ ) and control group ( $\mu=0.17$ ,  $\sigma=1.41$ );  $t(118)=-4.95$ ,  $P<.001$ . A majority of the knowledge questions (5 of 7) showed a significant change in score from the pretest to immediate posttest ( $P=.001-.027$ ). Additional analyses revealed accuracy on 4 of 7 knowledge questions significantly changed from the pretest to 30 day later posttest ( $P<.001-.002$ )., CONCLUSION: The brief educational video overall improved parental knowledge of choking hazards and prevention immediately after the video and 30 days later. Importantly, improved parental knowledge may decrease rates of choking among children. Copyright © 2018 Elsevier B.V. All rights reserved.

Boufersaoui, A., et al. (2013). "Foreign body aspiration in children: experience from 2624 patients." International journal of pediatric otorhinolaryngology **77**(10): 1683-1688.

OBJECTIVES: The objective of this study is to analyze the epidemiological, clinical, radiological and endoscopic characteristics of pediatric foreign body aspiration in Algeria., METHODS: In this retrospective study, the results of 2624 children younger than 18 years admitted in our department for respiratory foreign body removal between 1989 and 2012, were presented. Most of them had an ambulatory rigid bronchoscopy., RESULTS: The children (62.34% males and 37.65% females) were aged 4 months to 18 years with 66% between 1 and 3 years. Choking was related in 65% of cases. The delay between aspiration and removal was 2-8 days in 65.8% and within 24 h in 9.2%. In the most cases, the children arrived with cough, laryngeal or bronchial signs and unilateral reduction of vesicular murmur. The examination was normal in 13%. The most common radiologic finding was pulmonary air trapping (40.7%). The aspirated bodies were organic in 66.7%, dominated by peanuts, while sunflower seeds, beans and ears of wheat were the most dangerous. In the other cases, they were metallic or plastic as pen caps and recently scarf pins. The endoscopic removal by rigid bronchoscopy was successful and complete in 97%. Cases with extraction failure (3%) limited to certain FBs, all of them inorganic were assigned to surgery. The complications related to the endoscopic procedure were 0.29% with a mortality of 0.26%., CONCLUSION: Foreign body aspiration is a real public health problem in Algeria. The best way to manage it is an early diagnosis and a rigid bronchoscopy removal under general anesthesia used by fully trained staff. The prevention of this domestic accident should consider the population lifestyle and cultural habits to be more effective. Copyright © 2013 Elsevier Ireland Ltd. All rights reserved.

Brkic, F., et al. (2018). "Death as a Consequence of Foreign Body Aspiration in Children." Medical archives (Sarajevo, Bosnia and Herzegovina) **72**(3): 220-223.

Aim: To analyze the rate of mortality in children with foreign body aspiration (FBA)., Methods: We outlined a retrospective review of hospital data of patients between 1971 and 2013. FBA occurring in children 0 year to 14 years was considered for inclusion (patient ages ranged from 0.6 to 15 years, with a median age of 2.2 years). The gender structure within the investigated cases was 75.8% males and 24.2% females. During the study period, 772 patients undergoing rigid bronchoscopy with the diagnosis of FBA were included. Deaths on arrival were excluded., Results: Total rate of mortality (for whole investigated period) was 0.785. For last fifteen years of the investigated period the rate of mortality was zero., Conclusion: For prevention of foreign body aspiration in children and its mortality should be taken two strategies: non-medical (alterations in product design and public education campaigns) and medical (education of medical staff and improvement of equipment).

Brown, A. (2018). "No difference in self-reported frequency of choking between infants introduced to solid foods using a baby-led weaning or traditional spoon-feeding approach." Journal of Human Nutrition and Dietetics **31**(4): 496-504.

Background: Baby-led weaning (BLW) where infants self-feed family foods during the period that they are introduced to solid foods is growing in popularity. The method may promote healthier eating patterns, although concerns have been raised regarding its safety. The present study therefore explored choking frequency amongst babies who were being introduced to solid foods using a baby-led or traditional spoon-fed approach. Methods: In total, 1151 mothers with an infant aged 4–12 months reported how they introduced solid foods to their infant (following a strict BLW, loose BLW or traditional weaning style) and frequency of spoon-feeding and puree use (percentage of mealtimes). Mothers recalled if their infant had ever choked and, if so, how many times and on what type of food (smooth puree, lumpy puree, finger food and specific food examples). Results: In total, 13.6% of infants (n = 155) had ever choked. No significant association was found between weaning style and ever choking, or the frequency of spoon or puree use and ever choking. For infants who had ever choked, infants following a traditional weaning approach experience significantly more choking episodes for finger foods ( $F_{2,147} = 4.417$ ,  $P = 0.014$ ) and lumpy purees ( $F_{2,131} = 6.46$ ,  $P = 0.002$ ) than infants following a strict or loose baby-led approach. Conclusions: Baby-led weaning was not associated with increased risk of choking and the highest frequency of choking on finger foods occurred in those who were given finger foods the least often. However, the limitations of noncausal results, a self-selecting sample and reliability of recall must be emphasised. © 2017 The British Dietetic Association Ltd.

Cameron, S. L., et al. (2012). "Healthcare professionals' and mothers' knowledge of, attitudes to and experiences with, Baby-Led Weaning: A content analysis study." BMJ open **2**(6).

Objective: Baby-Led Weaning (BLW) is an alternative approach for introducing complementary foods to infants that emphasises infant self-feeding rather than adult spoon-feeding. Here we examined healthcare professionals' and mothers' knowledge of, attitudes to and experiences with, BLW. Design, setting and participants: Healthcare professionals (n=31) and mothers who had used BLW (n=20) completed a semistructured interview using one of two tailored interview schedules examining their knowledge of, attitudes to and experiences with, BLW. Interview notes and transcripts were analysed using content analysis to identify subcategories and extract illustrative quotes. Results: Healthcare professionals had limited direct experience with BLW and the main concerns raised were the potential for increased risk of choking, iron deficiency and inadequate energy intake. Although they suggested a number of potential benefits of BLW (greater opportunity for shared family meal times, fewer mealtime battles, healthier eating behaviours, greater convenience and possible developmental advantages) most felt reluctant to recommend BLW because of their concern about the potential increased risk of choking. In contrast, mothers who had used this style of feeding reported no major concerns with BLW. They considered BLW to be a healthier, more convenient and less stressful way to introduce complementary foods to their infant and recommended this feeding approach to other mothers. Although mothers did not report being concerned about choking, 30% reported at least one choking episode—most commonly with raw apple. Conclusions: Given the lack of research on BLW, further work is needed to determine whether the concerns expressed by healthcare professionals and potential benefits outlined by mothers are valid. The current study suggests that there is a mismatch between healthcare professionals' and mothers' knowledge of, attitudes to and experiences, with BLW.

Cameron, S. L., et al. (2012). "How feasible is Baby-Led Weaning as an approach to infant feeding? A review of the evidence." *Nutrients* **4**(11): 1575-1609.

Abstract: Baby-Led Weaning (BLW) is an alternative method for introducing complementary foods to infants in which the infant feeds themselves hand-held foods instead of being spoon-fed by an adult. The BLW infant also shares family food and mealtimes and is offered milk (ideally breast milk) on demand until they self-wean. Anecdotal evidence suggests that many parents are choosing this method instead of conventional spoon-feeding of purées. Observational studies suggest that BLW may encourage improved eating patterns and lead to a healthier body weight, although it is not yet clear whether these associations are causal. This review evaluates the literature with respect to the prerequisites for BLW, which we have defined as beginning complementary foods at six months (for safety reasons), and exclusive breastfeeding to six months (to align with WHO infant feeding guidelines); the gross and oral motor skills required for successful and safe self-feeding of whole foods from six months; and the practicalities of family meals and continued breastfeeding on demand. Baby-Led Weaning will not suit all infants and families, but it is probably achievable for most. However, ultimately, the feasibility of BLW as an approach to infant feeding can only be determined in a randomized controlled trial. Given the popularity of BLW amongst parents, such a study is urgently needed. © 2012 by the authors; licensee MDPI, Basel, Switzerland.

Cameron, S. L., et al. (2015). "Development and pilot testing of Baby-Led Introduction to SolidS--a version of Baby-Led Weaning modified to address concerns about iron deficiency, growth faltering and choking." *BMC pediatrics* **15**: 99.

BACKGROUND: In Baby-Led Weaning (BLW), infants are offered 'finger' foods from the start of the complementary feeding period instead of being spoon-fed. Healthcare professionals have expressed concerns about adequacy of iron and energy intake, and about choking, for infants following Baby-Led Weaning., METHODS: We developed a modified version of BLW, Baby-Led Introduction to SolidS (BLISS), to address these concerns. In a 12-week pilot study, families who had chosen to use a BLW approach were assigned to BLISS (n = 14) or BLW (n = 9). BLISS participants received 2 intervention visits, resources and on-call support. BLW participants received no intervention. Participants were interviewed weekly for 12 weeks and completed a three-day weighed record or three 24-h iron questionnaires., RESULTS: Compared to the BLW group, the BLISS group were more likely to introduce iron containing foods during the first week of complementary feeding, and to offer more serves per day of iron containing foods at 6 months (2.4 vs 0.8 serves/day; P = 0.001); and less likely to offer high-choking-risk foods (3.24 vs 0.17 serves/day; P = 0.027)., CONCLUSIONS: This pilot study suggests BLISS may result in higher iron intakes and lower choking risk than unmodified BLW. However, the results need to be confirmed in a large randomised controlled trial.

Cameron, S. L., et al. (2013). "Parent-led or baby-led? Associations between complementary feeding practices and health-related behaviours in a survey of New Zealand families." *BMJ open* **3**(12).

Objective: To determine feeding practices and selected health-related behaviours in New Zealand families following a 'baby-led' or more traditional 'parent-led' method for introducing complementary foods. Design, setting and participants: 199 mothers completed an online survey about introducing complementary foods to their infant. Participants were classified into one of four groups: 'adherent baby-led weaning (BLW)', the infant mostly or entirely fed themselves at 6-7 months; 'self-identified BLW', mothers reported following BLW at 6-7 months but were using spoon-feeding at least half the time; 'parentled feeding', the mother reported not having tried BLW; and 'unclassified method', the mother reported they were not following BLW at 6-7 months but reported the infant mostly or entirely fed themselves at 6-7 months.

Results: 8% were following 'adherent BLW', 21% 'self-identified BLW' and 0% were following the 'unclassified method'. Compared with 'self-identified BLW' and 'parent-led feeding', a higher proportion of the 'adherent BLW' met the WHO recommendations to exclusively breastfeed for 6 months and to introduce complementary foods at 6 months. The 'adherent BLW' group was more likely to have family foods ( $p=0.018$ ), and less likely ( $p=0.002$ ) to have commercially prepared baby food. Both BLW groups were more likely to share meals with the family compared with 'parent-led feeding'. In contrast to 'self-identified BLW' and 'parent-led feeding', the 'adherent BLW' group did not offer iron-fortified cereal as a first food. Conclusions: This study suggests that although many parents consider they follow BLW, a very few are following it strictly. The extent to which BLW was followed was associated with potential benefits (eg, sharing family meals) and risks (eg, low iron first foods) highlighting the importance for health professionals and researchers of accurately determining the extent of adherence to BLW.

Cameron, S. L., et al. (2015). "Development and pilot testing of Baby-Led Introduction to SolidS - a version of Baby-Led Weaning modified to address concerns about iron deficiency, growth faltering and choking." *BMC pediatrics* **15**(1).

Background: In Baby-Led Weaning (BLW), infants are offered 'finger' foods from the start of the complementary feeding period instead of being spoon-fed. Healthcare professionals have expressed concerns about adequacy of iron and energy intake, and about choking, for infants following Baby-Led Weaning. Methods: We developed a modified version of BLW, Baby-Led Introduction to SolidS (BLISS), to address these concerns. In a 12-week pilot study, families who had chosen to use a BLW approach were assigned to BLISS ( $n = 14$ ) or BLW ( $n = 9$ ). BLISS participants received 2 intervention visits, resources and on-call support. BLW participants received no intervention. Participants were interviewed weekly for 12 weeks and completed a three-day weighed record or three 24-h iron questionnaires. Results: Compared to the BLW group, the BLISS group were more likely to introduce iron containing foods during the first week of complementary feeding, and to offer more serves per day of iron containing foods at 6 months (2.4 vs 0.8 serves/day;  $P = 0.001$ ); and less likely to offer high-choking-risk foods (3.24 vs 0.17 serves/day;  $P = 0.027$ ). Conclusions: This pilot study suggests BLISS may result in higher iron intakes and lower choking risk than unmodified BLW. However, the results need to be confirmed in a large randomised controlled trial. © 2015 Cameron et al.

Casalini, A. G., et al. (2013). "Foreign body aspiration in adults and in children: advantages and consequences of a dedicated protocol in our 30-year experience." *Journal of bronchology & interventional pulmonology* **20**(4): 313-321.

BACKGROUND: Foreign body (FB) inhalation is a potentially life-threatening emergency also in clinically stable patients as the situation could worsen at any moment. There is varying opinion regarding the urgency for removal of inhaled FBs, and there are no guidelines in the literature. The aim of our study was to present our experience with FB aspiration in children and adults from 1993, when we introduced our Thoracic Endoscopy Service with the availability "on call" of a bronchologist 24 hours a day, 7 days a week, defining a dedicated protocol together with our anaesthesiologists for prompt intervention in this situation., METHODS: We consulted our database and examined the records of all patients undergoing bronchoscopy for suspected FB aspiration from 1993 onwards; our previous experience of 11 children and 14 adults with FBs from 1981 to 1992 was also included to compare the results obtained., RESULTS: In this period, we removed 159 FBs (in 70 children and 89 adults) and performed 23 negative bronchoscopies in children and 6 in adults for suspected aspiration. All FBs were removed successfully. We were able to intervene immediately also in critical situations: in 60/70 children within 24 hours of admission to hospital, in 44 of these 60 on the actual day of

admission, thus avoiding a potentially dangerous delay between aspiration and removal. We had no complications, and no patients needed surgery.,  
**CONCLUSIONS:** We conclude that an efficient organization involving a dedicated protocol of intervention, trained staff available 24 hours a day, 7 days a week, appropriate setting, and the right instrumentation enabled us to tackle this important emergency.

Chapin, M. M., et al. (2013). "Nonfatal choking on food among children 14 years or younger in the united states, 2001-2009." Pediatrics **132**(2): 275-281.

**OBJECTIVE:** The objective of this study was to investigate the epidemiology of nonfatal choking on food among US children. **METHODS:** Using a nationally representative sample, nonfatal pediatric choking-related emergency department (ED) visits involving food for 2001 through 2009 were analyzed by using data from the National Electronic Injury Surveillance System-All Injury Program. Narratives abstracted from the medical record were reviewed to identify choking cases and the types of food involved. **RESULTS:** An estimated 111 914 (95% confidence interval: 83 975-139 854) children ages 0 to 14 years were treated in US hospital EDs from 2001 through 2009 for nonfatal food-related choking, yielding an average of 12 435 children annually and a rate of 20.4 (95% confidence interval: 15.4-25.3) visits per 100 000 population. The mean age of children treated for nonfatal food-related choking was 4.5 years. Children aged  $\geq 1$  year accounted for 37.8% of cases, and male children accounted for more than one-half (55.4%) of cases. Of all food types, hard candy was most frequently (15.5% [16 168 cases]) associated with choking, followed by other candy (12.8% [13 324]), meat (12.2% [12 671]), and bone (12.0% [12 496]). Most patients (87.3% [97 509]) were treated and released, but 10.0% (11 218) were hospitalized, and 2.6% (2911) left against medical advice.

**CONCLUSIONS:** This is the first nationally representative study to focus solely on nonfatal pediatric food-related choking treated in US EDs over a multiyear period. Improved surveillance, food labeling and redesign, and public education are strategies that can help reduce pediatric choking on food. Pediatrics 2013;132:275-281 © 2013 by the American Academy of Pediatrics.

Cheek, J. A. and D. Egerton-Warburton (2014). "Dangers of eating vegetables: contralateral perfusion deficit with an inhaled foreign body." Emergency medicine Australasia : EMA **26**(4): 411-412.

Cheng, J., et al. (2017). "The public health resource utilization impact of airway foreign bodies in children." International journal of pediatric otorhinolaryngology **96**: 68-71.

**Objective** Quantify the resource utilization associated with airway foreign bodies in children in the United States using a national database and report observed trends over time. **Study type:** Cross-sectional analysis of national inpatient database with weighted estimates. **Data source** The KID database (2000–2009). **Methods** ICD-9-DM codes for foreign body aspiration were used to identify patients to be included for investigation. Admission rates and charges were aggregated and compared among geographic region, location, and teaching hospital status. These factors were then also trended over time. **Results** From 2000 to 2009, airway foreign body diagnoses in children accounted for an estimated 4000 to 5000 admissions, resulting in a mean admission rate of 6.6 per 10,000 pediatric patients annually. Charges related to airway foreign bodies in children rose from a total of \$93 million to \$486 million in the observed period. There is an increasing trend over time of total charges per patient. Charges appear to be higher in urban locations and teaching hospitals. **Conclusions** The public health and economic burden of pediatric airway foreign bodies appears to be rising. Further investigation may be helpful to examine factors that may be contributing to increasing charges and creating strategies to improve cost

effectiveness, as well as why there seems to be increased resource utilization in urban locations and teaching hospitals. © 2017 Elsevier B.V.

Cheng, J., et al. (2019). "National estimations of airway foreign bodies in children in the United States, 2000 to 2009." Clinical Otolaryngology **44**(3): 235-239.

Objective: Identify risk factors associated with airway foreign bodies in children in the United States and report observed trends over time. Data source: KID database (2000-2009). Methods: ICD-9-CM codes for airway foreign bodies were used to identify patients. Risk factors were used for univariate analysis and a multivariate model to identify any increased risk of mortality. These factors were then also trended over time. Results: Children with airway foreign bodies demonstrate similar risk factors as previously reported, such as male gender, age less than five years and lack of private insurance. The weighted mortality rate for paediatric inpatients with airway foreign bodies was about 2.75%. Fortunately, the rate remained relatively unchanged from 2000 to 2009. Geographically, urban hospital settings appeared to be more affected. Increased risks of mortality were noted for older age, urban hospital setting and teaching hospital status. Conclusions: Our findings confirm previous findings and identified that the diagnosis of airway foreign bodies in children were associated with male gender, age <5 years, lack of private insurance and geographic location in an urban setting. Further investigation may be warranted to provide clarity on other factors found to have increased association with mortality for quality improvement. © 2018 John Wiley & Sons Ltd

Chinski, A., et al. (2010). "Foreign bodies causing asphyxiation in children: the experience of the Buenos Aires paediatric ORL clinic." The Journal of international medical research **38**(2): 655-660.

Inhalation or aspiration of a foreign body (FB) occurs relatively frequently in young children. The size, shape, type and site of arrest of the FB lead to variability in the clinical picture. The present study included data from 65 cases of FB inhalation presenting over 1 year at the Children's Hospital Gutierrez, Buenos Aires, Argentina, compared with information from four well-known published case series chosen as representative of other cultural and geographical backgrounds: the USA, Europe, North Africa (Egypt) and Asia (India). The mean age of children studied was 4.03 years. Injuries happened mainly at home (53 cases [81.54%]) and under adult supervision (59 cases [90.77%]). The most frequently inhaled FB was nuts, however, in contrast to previous reports, the majority of incidents involved inhalation of an inorganic, rather than an organic (food) FB. Complications included pneumonia (three cases), atelectasis (two cases) and pneumonitis (one case). No deaths were recorded. These data suggest that children play with objects inappropriate for their age, such as pins and nails, that adults may not be aware of the choking risks, and that more effort is required in educating caregivers about these risks.

Choroomi, S. and J. Curotta (2011). "Foreign body aspiration and language spoken at home: 10-year review." The Journal of laryngology and otology **125**(7): 719-723.

OBJECTIVE: To review foreign body aspiration cases encountered over a 10-year period in a tertiary paediatric hospital, and to assess correlation between foreign body type and language spoken at home., STUDY DESIGN AND METHOD: Retrospective chart review of all children undergoing direct laryngobronchoscopy for foreign body aspiration over a 10-year period. Age, sex, foreign body type, complications, hospital stay and home language were analysed., RESULTS: At direct laryngobronchoscopy, 132 children had foreign body aspiration (male:female ratio 1.31:1; mean age 32 months (2.67 years)). Mean hospital stay was 2.0 days. Foreign bodies most commonly comprised food matter (53/132; 40.1 per cent), followed by non-food matter (44/132; 33.33 per cent), a negative endoscopy (11/132; 8.33 per cent) and unknown composition (24/132; 18.2 per cent). Most parents spoke English



(92/132, 69.7 per cent; vs non-English-speaking 40/132, 30.3 per cent), but non-English-speaking patients had disproportionately more food foreign bodies, and significantly more nut aspirations ( $p = 0.0065$ ). Results constitute level 2b evidence., CONCLUSION: Patients from non-English speaking backgrounds had a significantly higher incidence of food (particularly nut) aspiration. Awareness-raising and public education is needed in relevant communities to prevent certain foods, particularly nuts, being given to children too young to chew and swallow them adequately.

Chung, P. H. Y., et al. (2012). "Peanut aspiration: an avoidable life-threatening condition." Hong Kong medical journal = Xianggang yi xue za zhi **18**(4): 340-342.

Foreign body aspiration is a potentially fatal condition. Yet, an accurate diagnosis may not be easy. Management is also challenging and requires a high level of expertise with proper instruments. In this article, we report our experience in the management of peanut aspiration in two young children by means of a ventilating bronchoscope.

Cichero, J. A. Y. (2016). "Introducing solid foods using baby-led weaning vs. spoon-feeding: A focus on oral development, nutrient intake and quality of research to bring balance to the debate." Nutrition Bulletin **41**(1): 72-77.

The World Health Organization recommends that infants be introduced to first solid foods from 6 months of age to complement milk feeds. The introduction of complementary foods is required to help infants meet their changing nutritional requirements. In recent years, baby-led weaning and spoon-feeding have been discussed as mutually exclusive approaches to introducing first solids. Baby-led weaning advocates that babies direct and control the process of weaning, deciding what they will eat, how much and how quickly. There is an emphasis on parents providing chunks of soft food that babies can pick up and chew. A traditional spoon-feeding approach involves introducing smooth runny purees as the texture for first foods and progressing to chewable solids as oral motor skills develop. Spoon-feeding provides an opportunity for infants to develop oral skills necessary for safe management of solids and may facilitate intake of iron-rich foods at weaning, whilst baby-led weaning promotes greater participation in family meals and exposure to family foods. The need to supervise infants whilst eating to avoid risk of choking on food is required for both approaches. The review highlights the need for quality, well-designed research on different approaches to the introduction of first solid foods and suggests that a combined approach to baby-led weaning should be considered. © 2016 British Nutrition Foundation.

Committee on Injury, V. and P. Poison (2010). "Prevention of choking among children." Pediatrics **125**(3): 601-607.

Choking is a leading cause of morbidity and mortality among children, especially those aged 3 years or younger. Food, coins, and toys are the primary causes of choking-related injury and death. Certain characteristics, including shape, size, and consistency, of certain toys and foods increase their potential to cause choking among children. Childhood choking hazards should be addressed through comprehensive and coordinated prevention activities. The US Consumer Product Safety Commission (CPSC) should increase efforts to ensure that toys that are sold in retail store bins, vending machines, or on the Internet have appropriate choking-hazard warnings; work with manufacturers to improve the effectiveness of recalls of products that pose a choking risk to children; and increase efforts to prevent the resale of these recalled products via online auction sites. Current gaps in choking-prevention standards for children's toys should be reevaluated and addressed, as appropriate, via revisions to the standards established under the Child Safety Protection Act, the Consumer Product Safety Improvement Act, or regulation by the CPSC. Prevention of food-related choking among children in the United States has

been inadequately addressed at the federal level. The US Food and Drug Administration should establish a systematic, institutionalized process for examining and addressing the hazards of food-related choking. This process should include the establishment of the necessary surveillance, hazard evaluation, enforcement, and public education activities to prevent food-related choking among children. While maintaining its highly cooperative arrangements with the CPSC and the US Department of Agriculture, the Food and Drug Administration should have the authority to address choking-related risks of all food products, including meat products that fall under the jurisdiction of the US Department of Agriculture. The existing National Electronic Injury Surveillance System-All Injury Program of the CPSC should be modified to conduct more-detailed surveillance of choking on food among children. Food manufacturers should design new foods and redesign existing foods to avoid shapes, sizes, textures, and other characteristics that increase choking risk to children, to the extent possible. Pediatricians, dentists, and other infant and child health care providers should provide choking-prevention counseling to parents as an integral part of anticipatory guidance activities.

Cyr, C., et al. (2012). "Preventing choking and suffocation in children." Paediatrics and Child Health **17**(2): 91-92.

Choking, suffocation, and strangulation cause serious unintentional injuries in children and are leading causes of unintentional death in infants and toddlers. Nearly all choking, suffocation and strangulation deaths and injuries are preventable. The present statement reviews definitions, epidemiology and effective prevention strategies for these injuries. Recommendations that combine approaches for improving safety, including research, surveillance, legislation and standards, product design and education, are made. Paediatric health care providers should be encouraging parents and other caregivers to learn CPR and choking first aid, as well as offering anticipatory, age-appropriate guidance to prevent these injuries, at regular health visits.

da Costa, S. P., et al. (2017). "Exposure to texture of foods for 8-month-old infants: Does the size of the pieces matter?" Journal of texture studies **48**(6): 534-540.

This study examined the effect of meals varying in amount, size, and hardness of food pieces on the development of the chewing capabilities of 8-month-old infants. The study also examined changes in shivering, gagging, coughing, choking, and their ability to eat from a spoon. In an in-home setting two groups were given commercially available infant meals and fruits, purees with either less, smaller and softer or more, larger and harder pieces. Both groups were given these foods for 4 weeks and were monitored several times during this period. After the 4-week exposure period infants in both groups were given the same five test foods. Structured questionnaires with questions on eating behavior and the child's development were conducted 6 times in the 4 to 12-month period and video analyses of feedings were conducted 4 times between 8 and 9 months. After the 4-week exposure period, the group that had been exposed to the foods with more, larger and harder pieces showed a significantly higher rating for chewing a piece of carrot and potato for the first time, but not for a piece of banana nor for mashed foods. Shivering, gagging, coughing, choking, and ability to eat from a spoon were not different between the two groups. These results contribute to the insight that exposure to texture is important for young children to learn how to handle texture. PRACTICAL APPLICATIONS: (a) The study shows the feasibility of testing the effects of texture interventions on chewing capability and oral responses such as gagging, coughing, and choking in infants. (b) The study contributes to the insight that exposure to food texture to learn how to handle texture is important for infants and showed that exposing children to a higher amount of larger pieces improves their chewing capability for a piece of carrot and potato, at least immediately after the intervention. Copyright © 2017 Wiley Periodicals, Inc.

Daniels, L., et al. (2015). "Baby-Led Introduction to SolidS (BLISS) study: a randomised controlled trial of a baby-led approach to complementary feeding." BMC pediatrics **15**: 179.

**BACKGROUND:** In 2002, the World Health Organization recommended that the age for starting complementary feeding should be changed from 4 to 6 months of age to 6 months. Although this change in age has generated substantial debate, surprisingly little attention has been paid to whether advice on how to introduce complementary foods should also be changed. It has been proposed that by 6 months of age most infants will have developed sufficient motor skills to be able to feed themselves rather than needing to be spoon-fed by an adult. This has the potential to predispose infants to better growth by fostering better energy self-regulation, however no randomised controlled trials have been conducted to determine the benefits and risks of such a "baby-led" approach to complementary feeding. This is of particular interest given the widespread use of "Baby-Led Weaning" by parents internationally.,

**METHODS/DESIGN:** The Baby-Led Introduction to SolidS (BLISS) study aims to assess the efficacy and acceptability of a modified version of Baby-Led Weaning that has been altered to address potential concerns with iron status, choking and growth faltering. The BLISS study will recruit 200 families from Dunedin, New Zealand, who book into the region's only maternity hospital. Parents will be randomised into an intervention (BLISS) or control group for a 12-month intervention with further follow-up at 24 months of age. Both groups will receive the standard Well Child care provided to all parents in New Zealand. The intervention group will receive additional parent contacts (n = 8) for support and education on BLISS from before birth to 12 months of age. Outcomes of interest include body mass index at 12 months of age (primary outcome), energy self-regulation, iron and zinc intake and status, diet quality, choking, growth faltering and acceptability to parents., **DISCUSSION:** This study is expected to provide insight into the feasibility of a baby-led approach to complementary feeding and the extent to which this method of feeding affects infant body weight, diet quality and iron and zinc status. Results of this study will provide important information for health care professionals, parents and health policy makers., **TRIAL REGISTRATION:** Australian New Zealand Clinical Trials Registry ACTRN12612001133820 .

D'Auria, E., et al. (2018). "Baby-led weaning: what a systematic review of the literature adds on." Italian journal of pediatrics **44**(1): 49.

The term weaning describes the time period in which a progressive reduction of breastfeeding or the feeding of infant-formula takes place while the infant is gradually introduced to solid foods. It is a crucial time in an infant's life as not only does it involve with a great deal of rapid change for the child, but it is also associated with the development of food preferences, eating behaviours and body weight in childhood and also in adolescence and adulthood. Therefore, how a child is weaned may have an influence later, on the individual's entire life. Babies are traditionally first introduced to solid foods using spoon-feeding, in most countries. Beside to traditional approach, an alternative method, promoting infant self-feeding from six months of age, called baby-led weaning or "auto-weaning", has grown in popularity. This approach causes concern to healthy professionals and parents themselves as data from observational studies pointed out to a potential risk of iron and energy inadequacy as well as choking risk. Aim of this systematic review was to critically examine the current evidence about baby-led weaning approach and to explore the need for future research. A systematic search was conducted in Cochrane library databases and DARE (Database of Abstract of Reviews of Effects), EMBASE and MEDLINE in the period 2000-2018 (up to March 1st) to address some key questions on baby-led weaning. Prisma guidelines for systematic reviews has been followed. After the inclusion/exclusion process, we included for analysis of evidence 12 articles, 10 observational cross-sectional studies and 2 randomized controlled

trials. Pooling of results from very different outcomes in the studies included was not possible. Both randomized trials have potential bias; therefore, the quality of the evidence is low. There are still major unresolved issues about baby-led weaning that require answers from research and that should be considered when advices are requested from health professionals by parents willing to approach this method.

Dogan, E., et al. (2018). "Baby-led complementary feeding: Randomized controlled study." Pediatrics international : official journal of the Japan Pediatric Society **60**(12): 1073-1080.

**BACKGROUND:** Baby-led weaning (BLW) is an approach to introducing solid foods to infants that gives control of the feeding process to the infant. Anecdotal evidence suggests that BLW is becoming popular with parents, but scientific research is limited to a few publications. This study assessed growth, hematological parameters and iron intake in 6-12-month-old infants fed by traditional or baby-led complementary feeding., **METHODS:** We recruited 280 healthy 5-6-month-old infants allocated to a control (traditional spoon feeding; TSF) group or an intervention (BLW) group in a randomized controlled trial. Infant growth, hematologic parameters and iron intake were evaluated at age 12 months., **RESULTS:** Infants in the TSF were significantly heavier than those in the BLW group. Mean weight in the BLW group was 10.4 +/- 0.9 kg compared with 11.1 +/- 0.5 kg in the TSF group. There was no statistically significant difference in the iron intake from complementary foods between the BLW (7.97 +/- 1.37 mg/day) and TSF (7.90 +/- 1.68 mg/day) participants who completed the diet records. Hematologic parameters were similar at 12 months. The incidence of choking reported in the weekly interviews was not different between the groups., **CONCLUSIONS:** To the best of our knowledge, this is the first randomized - controlled study to have examined the impact of weaning method on iron intake, hematological parameters and growth in breast-fed infants. BLW can be an alternative complementary feeding type without increasing the risk of iron deficiency, choking or growth impairment. Copyright © 2018 Japan Pediatric Society.

Fangupo, L. J., et al. (2016). "A baby-led approach to eating solids and risk of choking." Pediatrics **138**(4).

**Objective:** To determine the impact of a baby-led approach to complementary feeding on infant choking and gagging. **METHODS:** Randomized controlled trial in 206 healthy infants allocated to control (usual care) or Baby-Led Introduction to SolidS (BLISS; 8 contacts from antenatal to 9 months providing resources and support). BLISS is a form of baby-led weaning (ie, infants feed themselves all their food from the beginning of complementary feeding) modified to address concerns about choking risk. Frequencies of choking and gagging were collected by questionnaire (at 6, 7, 8, 9, 12 months) and daily calendar (at 6 and 8 months); 3-day weighed diet records measured exposure to foods posing a choking risk (at 7 and 12 months). **RESULTS:** A total of 35% of infants choked at least once between 6 and 8 months of age, and there were no significant group differences in the number of choking events at any time (all Ps >.20). BLISS infants gagged more frequently at 6 months (relative risk [RR] 1.56; 95% confidence interval [CI], 1.13-2.17), but less frequently at 8 months (RR 0.60; 95% CI, 0.42-0.87), than control infants. At 7 and 12 months, 52% and 94% of infants were offered food posing a choking risk during the 3-day record, with no significant differences between groups (7 months: RR 1.12; 95% CI, 0.79-1.59; 12 months: RR 0.94; 95% CI, 0.83-1.07). **CONCLUSIONS:** Infants following a baby-led approach to feeding that includes advice on minimizing choking risk do not appear more likely to choke than infants following more traditional feeding practices. However, the large number of children in both groups offered foods that pose a choking risk is concerning. © 2016 by the American Academy of Pediatrics.

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Feltbower, S., et al. (2015). "Fatal and near-fatal grape aspiration in children." Pediatric emergency care **31**(6): 422-424.

Choking remains an important cause of morbidity and mortality in young children. Whole seedless grapes are a popular fruit snack to give to young children. We present 3 cases of grape aspiration, discussing the emergency care from basic life support to specialist treatment. The lessons learned will be applicable to a wide range of health professionals from frontline emergency medical service personnel to physicians and nurses working in a hospital.

Gardner, H. G., et al. (2010). "Policy statement - Prevention of choking among children." Pediatrics **125**(3): 601-607.

Choking is a leading cause of morbidity and mortality among children, especially those aged 3 years or younger. Food, coins, and toys are the primary causes of choking-related injury and death. Certain characteristics, including shape, size, and consistency, of certain toys and foods increase their potential to cause choking among children. Childhood choking hazards should be addressed through comprehensive and coordinated prevention activities. The US Consumer Product Safety Commission (CPSC) should increase efforts to ensure that toys that are sold in retail store bins, vending machines, or on the Internet have appropriate choking-hazard warnings; work with manufacturers to improve the effectiveness of recalls of products that pose a choking risk to children; and increase efforts to prevent the resale of these recalled products via online auction sites. Current gaps in choking-prevention standards for children's toys should be reevaluated and addressed, as appropriate, via revisions to the standards established under the Child Safety Protection Act, the Consumer Product Safety Improvement Act, or regulation by the CPSC. Prevention of food-related choking among children in the United States has been inadequately addressed at the federal level. The US Food and Drug Administration should establish a systematic, institutionalized process for examining and addressing the hazards of food-related choking. This process should include the establishment of the necessary surveillance, hazard evaluation, enforcement, and

public education activities to prevent food-related choking among children. While maintaining its highly cooperative arrangements with the CPSC and the US Department of Agriculture, the Food and Drug Administration should have the authority to address choking-related risks of all food products, including meat products that fall under the jurisdiction of the US Department of Agriculture. The existing National Electronic Injury Surveillance System - All Injury Program of the CPSC should be modified to conduct more-detailed surveillance of choking on food among children. Food manufacturers should design new foods and redesign existing foods to avoid shapes, sizes, textures, and other characteristics that increase choking risk to children, to the extent possible. Pediatricians, dentists, and other infant and child health care providers should provide choking-prevention counseling to parents as an integral part of anticipatory guidance activities. Copyright © 2010 by the American Academy of Pediatrics.

Iversen, R. H. and T. E. Klug (2012). "Need for more clear parental recommendations regarding foreign body aspiration in children." Danish medical journal **59**(9): A4498.

INTRODUCTION: Foreign body (FB) aspiration is a common cause of respiratory emergency in early childhood and is associated with a high rate of airway distress. FB aspiration peaks at the age of 1-2 years. Factors placing children at higher risk include incomplete dentition, immature swallowing coordination and the tendency to be easily distracted while eating. Symptoms may vary from an un-affected child to impending airway failure. Mucosal cough receptors often accommodate and the child may be asymptomatic when evaluated., MATERIAL AND METHODS: Files of children (0-15 years) admitted with suspected FB aspiration were reviewed. Patients were included if the FB was confirmed by bronchoscopy., RESULTS: Among 136 children undergoing bronchoscopy, a FB was confirmed in 59 patients. The median age was one year. All children had a history of aspiration and in 48% a persistent cough was present at the initial examination. Eleven children (19%) had a normal physical examination at admission. Nuts were identified in 34% and carrots in 20%. Of the FBs removed, 86% were organic and 14% were inorganic. Organic FBs were more common in patients younger than three years ( $p < 0.001$ )., CONCLUSION: Parental suspicion of FB aspiration indicates acute bronchoscopy in children, even in case of no abnormal findings. The completion of the bronchoscopy within 24 hours facilitates the examination and reduces the risk of complications. We recommend increased awareness of the hazards associated with small crunchy organic food items, especially nuts and carrots, given to children under three years of age., FUNDING: not relevant., TRIAL REGISTRATION: not relevant.

Levin, R. A. and G. A. Smith (2010). "Choking prevention among young children." Pediatric annals **39**(11): 721-724.

Lumsden, A. J. and J. G. Cooper (2017). "The choking hazard of grapes: a plea for awareness." Archives of disease in childhood **102**(5): 473-474.

Deaths from choking are a major cause of childhood mortality, especially in the very young. Whole grapes are ideally suited to cause paediatric airway obstruction and, though regularly implicated, knowledge that this popular fruit, and other similarly shaped foods, is a choking hazard is not widespread. We present the cases of three children who presented to our institution after grape aspiration. Increased dissemination of the learning points among health professionals working with children may aid in the prevention of further episodes. Copyright Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to <http://www.bmj.com/company/products-services/rights-and-licensing/>.

Marduel Boulanger, A. and M. Vernet (2018). "Introduction of new food textures during complementary feeding: Observations in France." Archives de pediatrie : organe officiel de la Societe francaise de pediatrie **25**(1): 6-12.

**INTRODUCTION:** Complementary feeding plays a crucial role in the development of infants and toddlers and studies suggest benefits specific to the introduction of food textures., **OBJECTIVES:** Evaluate the recommendations given to parents, their practices, and their attitudes towards the introduction of food textures during complementary feeding in France., **METHODS:** This was a cross-sectional pilot study conducted in 2013. One hundred and eighty-one parents with at least one child aged 6-36 months living in France completed an ad hoc questionnaire., **RESULTS:** Eighty-eight percent of the parents surveyed received oral information on complementary feeding, but only 46% received such information on the introduction of food textures. Pediatricians were the most frequently listed source of oral information on complementary feeding. More than half the parents also looked for additional information in books and on the internet. While oral recommendations matched parents' practices, they seemed to occur at a later age compared to infants' physiological ability to handle new textures. The quality of information on food texture advice available in paper and electronic formats evaluated using a 4-point scale was found to be limited. Introducing new food texture was spontaneously reported as the most common difficulty in complementary feeding (16%). Fear of choking when first introducing food pieces was reported by 54% of the parents., **CONCLUSIONS:** The parents' lack of information on the introduction of food textures, as well as their fear that their child may choke, should encourage providing new recommendations in France. Copyright © 2017 Elsevier Masson SAS. All rights reserved.

Mohammad, M., et al. (2017). "Foreign body aspiration in children: A study of children who lived or died following aspiration." International journal of pediatric otorhinolaryngology **98**: 29-31.

Foreign body aspiration (FBA) is a preventable cause of mortality and morbidity in children. We conducted a chart review of children who presented to a university hospital due to FBA in the period 1999-2014. Children were either managed with bronchoscopy for removal of the foreign body or died due to FBA. A total of 103 children were seen due to FBA including 27 deaths. The majority of children were boys and were less than 3 years old. Most aspirated foreign bodies were food-related, mainly peanuts. The majority of children presented with acute choking incidents, a smaller number presented with recurrent chest infections, and few children's choking incidents were unwitnessed. X-ray had a high rate of false negatives and bronchoscopy was the gold standard technique for assessment and management. Aspiration of foreign bodies is a preventable, life-threatening condition that calls for increased parent education and awareness. Copyright © 2017 Elsevier B.V. All rights reserved.

Morison, B. J., et al. (2016). "How different are baby-led weaning and conventional complementary feeding? A cross-sectional study of infants aged 6-8 months." BMJ open **6**(5).

**Objectives:** To compare the food, nutrient and 'family meal' intakes of infants following baby-led weaning (BLW) with those of infants following a more traditional spoon-feeding (TSF) approach to complementary feeding. **Study design and participants:** Cross-sectional study of dietary intake and feeding behaviours in 51 age-matched and sex-matched infants (n=25 BLW, 26 TSF) 6-8 months of age. **Methods:** Parents completed a questionnaire, and weighed diet records (WDRs) on 1-3 non-consecutive days, to investigate food and nutrient intakes, the extent to which infants were self-fed or parent-fed, and infant involvement in 'family meals'. **Results:** BLW infants were more likely than TSF infants to have fed themselves all or most of their food when starting complementary feeding (67% vs 8%, p<0.001).

Although there was no statistically significant difference in the large number of infants consuming foods thought to pose a choking risk during the WDR (78% vs 58%,  $p=0.172$ ), the CI was wide, so we cannot rule out increased odds with BLW (OR, 95% CI: 2.57, 0.63 to 10.44). No difference was observed in energy intake, but BLW infants appeared to consume more total (48% vs 42% energy,  $p<0.001$ ) and saturated (22% vs 18% energy,  $p<0.001$ ) fat, and less iron (1.6 vs 3.6 mg,  $p<0.001$ ), zinc (3.0 vs 3.7 mg,  $p=0.001$ ) and vitamin B12 (0.2 vs 0.5  $\mu\text{g}$ ,  $p<0.001$ ) than TSF infants. BLW infants were more likely to eat with their family at lunch and at the evening meal (both  $p\leq 0.020$ ). Conclusions: Infants following BLW had similar energy intakes to those following TSF and were eating family meals more regularly, but appeared to have higher intakes of fat and saturated fat, and lower intakes of iron, zinc and vitamin B12. A high proportion of both groups were offered foods thought to pose a choking risk. © 2016, BMJ Publishing Group. All rights reserved.

Morison, B. J., et al. (2016). "How different are baby-led weaning and conventional complementary feeding? A cross-sectional study of infants aged 6-8 months." BMJ open 6(5): e010665.

**OBJECTIVES:** To compare the food, nutrient and 'family meal' intakes of infants following baby-led weaning (BLW) with those of infants following a more traditional spoon-feeding (TSF) approach to complementary feeding. **STUDY DESIGN AND PARTICIPANTS:** Cross-sectional study of dietary intake and feeding behaviours in 51 age-matched and sex-matched infants (n=25 BLW, 26 TSF) 6-8 months of age. **METHODS:** Parents completed a questionnaire, and weighed diet records (WDRs) on 1-3 non-consecutive days, to investigate food and nutrient intakes, the extent to which infants were self-fed or parent-fed, and infant involvement in 'family meals'. **RESULTS:** BLW infants were more likely than TSF infants to have fed themselves all or most of their food when starting complementary feeding (67% vs 8%,  $p<0.001$ ). Although there was no statistically significant difference in the large number of infants consuming foods thought to pose a choking risk during the WDR (78% vs 58%,  $p=0.172$ ), the CI was wide, so we cannot rule out increased odds with BLW (OR, 95% CI: 2.57, 0.63 to 10.44). No difference was observed in energy intake, but BLW infants appeared to consume more total (48% vs 42% energy,  $p<0.001$ ) and saturated (22% vs 18% energy,  $p<0.001$ ) fat, and less iron (1.6 vs 3.6 mg,  $p<0.001$ ), zinc (3.0 vs 3.7 mg,  $p=0.001$ ) and vitamin B12 (0.2 vs 0.5  $\mu\text{g}$ ,  $p<0.001$ ) than TSF infants. BLW infants were more likely to eat with their family at lunch and at the evening meal (both  $p\leq 0.020$ ). **CONCLUSIONS:** Infants following BLW had similar energy intakes to those following TSF and were eating family meals more regularly, but appeared to have higher intakes of fat and saturated fat, and lower intakes of iron, zinc and vitamin B12. A high proportion of both groups were offered foods thought to pose a choking risk. Copyright Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to <http://www.bmj.com/company/products-services/rights-and-licensing/>

Nichols, B. G., et al. (2012). "Pediatric exposure to choking hazards is associated with parental knowledge of choking hazards." International journal of pediatric otorhinolaryngology 76(2): 169-173.

**OBJECTIVE:** To evaluate parental knowledge regarding household food and non-food choking hazards. **DESIGN:** Cross Sectional Survey. **SETTING:** Tertiary Care Children's Hospital. **PARTICIPANTS:** Parents presenting to a Pediatric Otolaryngology Clinic with a child <4 years old. **METHODS:** Parental survey asking which choking hazard foods (CHF) they allow their child to eat, previous instruction of CHF, knowledge of non-food choking hazards, and their knowledge sources. **STATISTICS:** adjusted odds ratios (AOR) and logistic regressions. **RESULTS:** 492 respondents. Adjusted for significant covariates associations between correct knowledge of CHF and correct parents actions of disallowing CHF: fruit chunks (prior



instruction=42%; correct action=25%; AOR=3.51; P<0.0001), hot dogs (59%; 28%; 1.75; 0.0178), raw vegetables (41%; 47%; 1.28; 0.198) popcorn (67%; 49% 2.64; <0.0001), whole grapes (68%; 51%; 2.2; <0.0001), nuts (73%; 66%; 2.47; <0.0001), chunks of peanut butter (45%; 79%; 2.55; 0.0003), sticky candy (79%; 80%; 2.16; <0.0033), gum (72%; 84%; 1.75; 0.028), seeds (65%; 87%; 1.4; 0.247), 76% always supervise meals, 57% always cut food, 62% know CPR. KNOWLEDGE OF NON-FOOD HAZARDS: Coins (97%), marbles (94%), small batteries (93%), small toy parts (93%), dice (92%), pen caps (92%), safety pins (85%), balloons (84%), syringes (40%). Sources of choking hazard knowledge: physicians (67%), family/friends (52%), books/magazines (40%), and the Internet (25%)., CONCLUSIONS: Parental knowledge of CHF is incomplete. The consumption of CHF in children under 4 is significantly associated with decreased parental knowledge. Therefore, more parental education is needed. Copyright © 2011 Elsevier Ireland Ltd. All rights reserved.

Seiverling, L., et al. (2016). "The effects of a brief behavioral intervention on food refusal in a child with a fear of choking." Clinical Case Studies **15**(2): 117-125.

This study examined the effects of an exposure-based behavioral treatment on food refusal in a 4-year-old girl who developed a fear of choking after an acute choking episode. Prior to treatment, the child had stopped eating almost all solid foods for 3 months and was primarily consuming a chocolate-flavored pediatric formula. Treatment occurred across the span of 2 weeks and took place at a pediatric feeding program. At the end of treatment, the child accepted over 30 new foods and was no longer dependent on a pediatric formula to meet her nutritional needs. © The Author(s) 2015.

Shah, R. K., et al. (2010). "Management of foreign bodies obstructing the airway in children." Archives of otolaryngology--head & neck surgery **136**(4): 373-379.

OBJECTIVE: To review national trends in the management of pediatric airway foreign bodies (A-FBs) and esophageal foreign bodies (E-FBs) that obstruct the airway., DESIGN: Retrospective review using a national pediatric data set (Kids' Inpatient Database)., SETTING: Pediatric patients admitted across the United States during 2003., PATIENTS: The Kids' Inpatient Database 2003 samples 2 984 129 pediatric discharges from 3438 hospitals in 36 states., MAIN OUTCOME MEASURES: The Kids' Inpatient Database 2003 was analyzed for A-FBs and E-FBs (International Classification of Diseases, Ninth Revision, Clinical Modification codes E911 and E912) in patients 20 years or younger, and weighted data are presented to facilitate national estimates., RESULTS: A total of 2771 patients (59% male) were admitted for an A-FB or an E-FB that was obstructing the airway. The mean (SE) age of the patients was 3.5 (0.17) years; 55% were younger than 2 years. The foreign bodies were classified as food (42%; mean age, 2.5 years) or other (58%; mean age, 4.3 years). The average length of stay was 6.4 days (median [SE], 1.5 [0.6] days), and the average number of procedures was 2.4 (median [SE], 1.3 [0.1] procedures). Seventy-one percent of the patients were treated at teaching hospitals. The mean (SD) total charges were \$34 652 (\$3543), with regional variation (P < .001). Children's hospitals (28%) had higher mean total charges than nonchildren's hospitals (P = .03); 3.4% of admissions died in the hospital (mean [SE] age, 4.6 [0.9] years), with an average length of stay of 11.7 (SE, 2.7) days and an average of 6.2 (SE, 0.7) procedures. Bronchoscopy (52%), esophagoscopy (28%), and tracheotomy (1.7%) were the primary procedures performed. The rates of positive FB findings for bronchoscopy and esophagoscopy were 37% and 46%, respectively., CONCLUSIONS: Pediatric A-FBs and E-FBs that obstruct the airway occur infrequently. Most of the patients are referred to teaching institutions. Among patients who were admitted with a diagnosis of airway obstruction from an A-FB or an E-FB, the rates of positive findings at surgery were 37% and 46%, respectively. A

surprisingly high mortality rate was noted. Alternative education measures should be considered to train physicians in the management of this infrequent, potentially lethal condition.

Sidell, D. R., et al. (2013). "Food choking hazards in children." International journal of pediatric otorhinolaryngology **77**(12): 1940-1946.

**OBJECTIVES:** To review the literature on pediatric food choking risks, with the long-term goal of supporting legislation regulating the production, labeling, and distribution of high-risk foods., **METHODS:** A PubMed search (Keywords: choking, obstruction, asphyxiation, foreign body, food) was conducted in July-September 2010 with publication dates ranging from 1966 to 2010., **STUDY SELECTION:** Articles related to pediatric foreign body aspiration (FBA) were selected by three independent reviewers. 1145 articles were initially identified. Abstracts were then screened utilizing a tool designed to isolate relevant pediatric choking events; this tool helped to only select abstracts which presented data on patients younger than 18 years of age who had choked on food items. Through this, a total of 72 pertinent articles were isolated (55 observational studies, 17 case reports/series)., **DATA EXTRACTION:** For each study, patient age, sex, foreign body location, presenting signs and symptoms, utility of radiographic studies, and type of foreign body detected in the majority of study participants were determined. A "majority" of patients for each study was predetermined arbitrarily to be 2/3 of the studied population., **RESULTS:** The majority of patients in each observational study was determined to be: male (87% of all studies) and age <5 years (95% of all studies). Aspirated foreign bodies were mostly detected in the right main bronchus foreign body (72% of all studies), and there were abnormal radiographic signs (81% of all studies) at the time of evaluation. Food-object foreign bodies were the most frequent factors associated with choking (94% of all studies)., **CONCLUSION:** Childhood aspiration of food-objects is a significant public health issue. Although there is substantial legislation regulating non-food items that pose a choking hazard, equivalent guidelines do not exist for high-risk foods. Our study identifies and confirms several risk factors for pediatric FBA events. In doing so, it echoes the concerns and suggestions of various groups in supporting the development of legislation which may reduce the incidence of food-object aspiration. Copyright © 2013. Published by Elsevier Ireland Ltd.

Sink, J. R., et al. (2016). "Predictors of foreign body aspiration in children." Otolaryngology - Head and Neck Surgery (United States) **155**(3): 501-507.

**Objectives** To examine the sensitivity and specificity of history, physical examination, and radiologic studies as predictors of foreign body aspiration in children. **Study Design** Case series with chart review. **Setting** Tertiary care children's hospital. **Subjects and Methods** Medical records were reviewed for 102 children who presented to our institution from 2006 to 2013 with suspected foreign body aspiration and who underwent endoscopy. Data included symptoms, physical examination, radiologic, and endoscopy findings. Descriptive statistics, sensitivity and specificity, and univariate and multivariable analyses were performed. **Results** A total of 102 patients were included (62% male). The mean age was 3.3 years (SD, 3.7). A foreign body was identified on endoscopy in 69 cases (68%). The most common presenting symptoms were cough (88%), choking/gagging (67%), and wheezing (57%). Decreased breath sounds and wheezing on examination were independently associated with increased odds of foreign body. The most common abnormal radiographic finding was air trapping (33%). The most frequent items retrieved were fragments of seeds and nuts (49%). There were no serious complications related to endoscopy. The sensitivity and specificity of any finding on history, physical examination, and imaging were 100% and 3%, 90% and 33%, 61% and 77%, respectively. Having a positive history, examination, and chest radiograph combined was 46% sensitive and 79% specific. **Conclusions** Patients with airway foreign bodies

have varied presentations. The presence of any radiologic finding suggests that endoscopy should be performed, as a foreign body is probable. The absence of any history or physical examination finding was associated with a low likelihood of a foreign body. © Official journal of the American Academy of Otolaryngology-Head and Neck Surgery Foundation.

Sink, J. R., et al. (2016). "Diagnosis of Pediatric Foreign Body Ingestion: Clinical Presentation, Physical Examination, and Radiologic Findings." The Annals of otology, rhinology, and laryngology **125**(4): 342-350.

OBJECTIVES: (1) To describe clinical and radiologic findings in patients with esophageal foreign bodies. (2) To examine the sensitivity and specificity of history, physical examination, and radiologic studies in children with suspected foreign body ingestion., METHODS: A retrospective cohort study was performed evaluating all children who underwent esophagoscopy for suspected foreign body ingestion at our institution from 2006 to 2013., RESULTS: Five hundred forty-three patients were included (54% male). Average age was 4.7 years (SD = 4.1 years). Foreign bodies were identified on esophagoscopy in 497 cases (92%). Ingestion was witnessed in 23% of cases. Most common presenting symptoms were choking/gagging (49%), vomiting (47%), and dysphagia/odynophagia (42%). Most patients with foreign bodies had a normal exam (76%). Most foreign bodies were radiopaque (83%). In 59% of patients with normal chest radiographs, a foreign body was present. Sensitivity and specificity of 1 or more findings on history, physical examination, and imaging were 99% and 0%, 21% and 76%, and 83% and 100%, respectively., CONCLUSIONS: Most patients with esophageal foreign bodies are symptomatic. Although many patients will have a normal physical examination, an abnormal exam should increase suspicion for a foreign body. Most esophageal foreign bodies are radiopaque, but a normal chest radiograph cannot rule out a foreign body. Copyright © The Author(s) 2015.

Sjogren, P. P., et al. (2018). "Predictors of complicated airway foreign body extraction." The Laryngoscope **128**(2): 490-495.

OBJECTIVES: To evaluate outcomes of foreign body aspiration (FBA) and to investigate surgeon and hospital volume as risk factors for a complicated course., STUDY DESIGN: Retrospective case series., METHODS: Children with FBA in a multihospital network were identified from January 2005 to September 2015. Demographic information, surgeon, and hospital location were reviewed. Mean operative time and hospital length of stay were recorded. Cases requiring intensive care unit admission, hospital stay greater than 24 hours, need for more than one bronchoscopy, operative time greater than 1 hour, or death were considered "complicated.", RESULTS: A total of 450 cases of airway foreign body extraction were performed. Patient ages ranged from 0.6 to 18.8 years, with a median age of 1.9 years. Bronchoscopy with foreign body extraction was performed by 55 different surgeons at 11 different facilities. There were one to 24 surgeons for each facility, with an average number of 5.4 surgeons per facility. A total of 88 (19.6%) cases were considered complicated, including five (1.1%) deaths. Increased rates of complications were seen with unwitnessed aspiration (P = 0.008) and hyperlucency (P < 0.001) or infiltrates (P = 0.001) on chest radiographs. No significant association was found between surgeon type or facility as related to a complicated case., CONCLUSIONS: Unwitnessed aspiration events and abnormalities on chest radiograph may be associated with a more complicated course in children with FBA. This multihospital study identified a low number of procedures by many surgeons; however, surgeon and hospital volume did not significantly correlate with higher complication rates., LEVEL OF EVIDENCE: 4. Laryngoscope, 128:490-495, 2018. Copyright © 2017 The American Laryngological, Rhinological and Otological Society, Inc.

Susy Safe Working, G. (2012). "The Susy Safe project overview after the first four years of activity." International journal of pediatric otorhinolaryngology **76 Suppl 1**: S3-11.

OBJECTIVES: to collect relevant, up-to-date, representative, accurate, systematic information, related to foreign bodies (FB) injuries., METHODS: The "Susy Safe" registry, a DG SANCO co-funded project gathering data on choking in all EU Countries and beyond, was established in order to create surveillance systems for suffocation injuries able to provide a risk-analysis profile for each of the products causing the injury. Main findings after 4 years of activities are resumed here., RESULTS: 16,878 FB injuries occurred in children aged 0-14 years have been recorded in the SUSY SAFE databases; 8046 cases have been reported from countries outside EU. Almost one quart of the cases involving very young children (less than one year of age) presented a FB located in bronchial tract, thus representing a major threat to their health. Esophageal foreign bodies are still characterizing injuries occurred to children younger than one year, in older children the most common locations are the ears and the nose. FB type was specified in 10,564 cases. Food objects represented the 26% of the cases, whereas non-food objects were the remaining 74%. Among food objects, the most common were bones, nuts and seed, whereas for the non-food objects pearls, balls and marbles were observed most commonly (29%). Coins were involved in 15% of the non-food injuries and toys represented the 4% of the cases., CONCLUSIONS: this data collection system should be taken into consideration for the calculation of the risk of injuries in order to provide the EU Commission with all the relevant estimates on FB injuries. Copyright © 2012 Elsevier Ireland Ltd. All rights reserved.

Testa, R., et al. (2010). "Choking injuries and food products containing inedibles: a survey on mothers' perception in the United Kingdom." Acta otorhinolaryngologica Italica : organo ufficiale della Societa italiana di otorinolaringologia e chirurgia cervico-facciale **30(2)**: 100-102.

Although recent investigations showed no specific hazard resulting from Food Products Containing Inedibles as compared to the wider category of toys, in view of recent findings and subsequent study of the European Registry of Foreign Bodies Injuries, a potential threat has been identified in a lack of parental supervision in the event of injury. Indeed, according to the report of the European Registry of Foreign Bodies Injuries, almost 80% of the injuries occur under parental supervision, which is obviously inadequate. The aim of this short contribution is to present the results of a Computer Assisted Personal Interviewing survey in the UK focused on the knowledge that mothers, fathers and other adults have on the issue of choking. A total of 1946 interviews have been conducted in the UK, in January 2001, all of which directed to subjects over 15 years of age. Data are presented as percentages and absolute numbers. The statistical significance of group differences has been evaluated with the chi-square test with continuity correction. All analyses have been performed using the R system. Those replying to the interview comprised 804 males and 1102 females. Of these, 10% had a child between 0 and 36 months, 9% between 3 and 4 years, 16% between 5-10 years and 13% between 11-15 years. Of those responding, 7% had bought Kinder Surprise within the last two weeks before the interview, 14% within the last three months, and the remaining 53% before, while 26% had never bought Kinder Surprise. These findings would appear to offer a confirmation that mothers tend to balance potential risks with the benefits of exposing the child to a stimulating activity. This mechanism of a controlled exposure to risk, has already been identified as one of the important mechanisms in the psychological development of the child.

Wise, J. (2016). "Young children risk choking on whole grapes, doctors warn." BMJ (Clinical research ed.) **355**: i6831.

Wu, X., et al. (2018). "Fatal choking in infants and children treated in a pediatric intensive care unit: A 7- year experience." International journal of pediatric otorhinolaryngology **110**: 67-69.

**INTRODUCTION:** Foreign bodies aspiration can lead to significant morbidity, few have examined in detail the deaths resulting from foreign bodies aspiration., **METHODS:** We conducted a review of children who presented to the pediatric intensive care unit of a university hospital due to fatal foreign bodies aspiration during the period of 2010-2017., **RESULT:** Of the 28 patients, 17 (61%) patients were male and 11 (39%) were female. The range of age was 1-63 months, with mean of 15.2 months. The common foreign bodies included milk, nuts and fruits. Majority of them had round shapes. All the patients died due to asphyxia or serious complications after foreign bodies aspiration., **CONCLUSIONS:** Prevention and early recognition remains a critical factor to reduce the mortality of foreign bodies aspiration. Copyright © 2018 Elsevier B.V. All rights reserved.

## Search Strategy

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) <1946 to August 13, 2019>

Search Strategy:

- 
- 1 safe feeding.ab,ti. (44)
  - 2 Feeding Behavior/ (78482)
  - 3 Asphyxia/ (6090)
  - 4 Airway Obstruction/ (18473)
  - 5 1 or 2 (78522)
  - 6 3 or 4 (24303)
  - 7 5 and 6 (35)
  - 8 Infant, Newborn/ or Infant Behavior/ or Infant/ (1101562)
  - 9 Child, Preschool/ (886276)
  - 10 ((early or childhood) adj2 (education or learning\*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (6453)
  - 11 (preschool or pre-school).ab,ti. (26901)
  - 12 kindergarten\*.ab,ti. (6168)
  - 13 (daycare and (child\* or baby or babies or toddler\* or infant\*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (968)

- 14 (toddler\* or babies or baby or infant\*).ab,ti. (439045)
- 15 8 or 9 or 10 or 11 or 12 or 13 or 14 (1657088)
- 16 7 and 15 (19)
- 17 limit 16 to yr="2010 -Current" (10)
- 18 Eating/ (51100)
- 19 6 and 18 (51)
- 20 15 and 19 (16)
- 21 limit 20 to yr="2010 -Current" (7)
- 22 choking.mp. (1885)
- 23 1 or 2 or 18 (124025)
- 24 15 and 22 and 23 (31)
- 25 limit 24 to yr="2010 -Current" (20)
- 26 Foreign Bodies/ and Airway Obstruction/ (837)
- 27 foreign body airway obstruction.mp. (48)
- 28 26 or 27 (863)
- 29 15 and 28 (408)
- 30 limit 29 to yr="2010 -Current" (104)
- 31 17 or 21 or 25 or 30 (127)
- 32 limit 31 to english language (113)
- 33 Airway Obstruction/pc [Prevention & Control] (880)
- 34 Foreign Bodies/pc [Prevention & Control] (390)
- 35 33 or 34 (1261)
- 36 exp Food/ (1234938)
- 37 exp Health Education/ (234672)
- 38 36 or 37 (1461409)
- 39 35 and 38 (61)
- 40 health promotion.mp. or feeding behavior/ or diet/ or (prevent\* adj3 chok\*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (297833)
- 41 35 and 40 (33)
- 42 39 or 41 (80)
- 43 limit 42 to (english language and yr="2010 -Current") (23)
- 44 32 or 43 (131)

#1 MeSH descriptor: [Feeding Behavior] explode all trees  
#2 ("safe feeding"):ti,ab,kw  
#3 MeSH descriptor: [Asphyxia] explode all trees  
#4 MeSH descriptor: [Airway Obstruction] explode all trees  
#5 #3 OR #4  
#6 #1 AND #5  
#7 MeSH descriptor: [Foreign Bodies] explode all trees  
#8 #4 AND #7  
#9 ("foreign body airway obstruction"):ti,ab,kw  
#10 #2 OR #9 OR #6 OR #8  
with Cochrane Library publication date from Jan 2010 to Aug 2019

Scopus was used to perform a citation analysis on some of the older articles to see what had cited them more recently.

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