

# Child mortality due to soft porridge aspiration in healthy infants

M J Selatole, MB ChB, FCFORPath, MBA

Polokwane Provincial Hospital and Department of Forensic Medicine, University of Limpopo, South Africa

Corresponding author: M J Selatole (mjselatole@yahoo.com)

Prevention of under-five mortality is a priority of the World Health Organization, whose Sustainable Development Goals include ending preventable deaths in children under five. Two case reports of infant deaths due to soft porridge aspiration (in non-predisposed infants) are presented here. In healthy infants, feeding problems result from an interplay of cultural influences, parental concern and child factors, which may lead to food aspiration. It is hypothesised that the deaths presented were likely due to forceful feeding practices and it is suggested that further research be undertaken to quantify and correlate food aspiration deaths with forceful feeding practices.

*S Afr J Child Health* 2019;12(2):98-99. DOI:10.7196/SAJCH.2019.v13i2.1565

The World Health Organization (WHO) reports that sub-Saharan Africa has the highest under-five mortality rate (U5MR) in the world, and that one of its Sustainable Development Goals targets the end of preventable deaths in children under 5 years of age.<sup>[1]</sup> Preventable deaths are defined as deaths that occur from causes whereupon public health interventions could have avoided all or most deaths from that cause, given that determinants of health at the time of death are considered and understood.<sup>[2]</sup> Child deaths due to food aspiration pose an important public health challenge, as well as opportunities to help curb U5MR, when the issue lies with the caregiver's style of feeding. Problems during feeding, that may culminate in aspiration of food, occur from interplay between the child's feeding behaviour (actual or perceived) and the caregiver's feeding style, namely, responsive, neglectful, indulgent or controlling.<sup>[3]</sup> The caregiver's feeding style is in turn influenced by their personal characteristics, the child's characteristics, and cultural influences.<sup>[3]</sup> This short paper presents two case reports of autopsied preventable child deaths due to soft porridge aspiration to raise an awareness of possible problems with caregiver style of feeding, notably forceful feeding practices.

## Case 1

A 7-month-old black African male infant was presented for autopsy with the history that he had died during a feed with soft porridge. On further probing, the child had a normal gestational, birth and neonatal history and had been well with no current medical history. He was being fed by his grandmother at the time of his demise. The history of the feeding style was not forthcoming. On examination, he was a well-fed child with anthropometric parameters within the normal range and the external examination was unremarkable. The trachea, bronchi and distal airways were clogged with creamish soft porridge; the lungs were congested and showed subpleural petechial haemorrhages. The stomach contained ~125 mL of the same food material while the oesophagus was empty. There were petechiae on the thymus and epicardial surface of the heart. The liver, spleen, kidneys and brain were congested. The rest of the organs were unremarkable. Histological examination showed the presence of plant foreign body material in the alveoli. The cause of death was concluded as choking due to food aspiration.

## Case 2

A reportedly healthy 9-month-old black African male child suddenly started making choking movements and then died during a feed.

No abnormal gestational, birth or neonatal history was elicited. The child was being fed by his 20-year-old mother in the presence of his grandmother at the time of his demise. The feeding style could not be elicited. On autopsy examination, he had normal anthropological parameters and an external examination was unremarkable. Tracheal and bronchial mucosa was hyperaemic and the airways contained traces of white soft porridge. The oesophagus was empty and the stomach contained the same soft porridge. The lungs were congested, oedematous and food particles could be seen issuing from the cut surface. There were petechial haemorrhages on the thymus and epicardial surface of the lung. The liver, spleen, kidneys and brain were congested. The rest of the tissues were unremarkable. Histological examination further revealed alveolar oedema, haemorrhage, and the presence of foreign plant food material, as well as septal congestion. There were no bacterial colonies observed. The cause of death was stated as aspiration pneumonitis.

## Discussion

Although the preventable deaths referred to in the WHO report<sup>[1]</sup> are largely due to natural factors, unnatural deaths can also be preventable. In children under 5 years of age, unnatural deaths comprise accidental and homicidal deaths. Death as a result of food aspiration would constitute an accidental cause. Food aspiration occurs when food material is introduced into the respiratory tract from the oropharynx, which may lead to four major syndromes: bronchial obstruction; chemical pneumonitis; aspiration pneumonia; and interstitial lung disease, which is less common.<sup>[4]</sup> Bronchial obstruction will occur as a result of a large volume of aspirate, or severe bronchospasm. This mechanism was evident in the first case, where a large volume of soft porridge was found in the airways. Aspiration (chemical) pneumonitis will result if the pH in the food is lowered, when the food itself has a low pH, or has been regurgitated from the stomach, as in the second case. Aspiration pneumonia occurs as a result of the introduction of large quantities of low virulence organisms from the oral cavity or small quantities of highly virulent organisms.<sup>[4]</sup> It is possible that a number of the pneumonia cases reported by the WHO in the sub-Saharan region are aspiration pneumonias.

Soft porridge was the offending food material in these two cases and other similar cases in the author's area of forensic pathology practice. This is because maize meal, from which soft porridge is made, is a staple food in South Africa, the setting of these two cases. This is usually the food choice when introducing solids to infants in

## CASE REPORT

this economically constrained country, particularly in rural areas. In more affluent areas, infants may be weaned with mashed vegetables or fruits (homemade or store-bought), as well as commercial cereals,<sup>[5]</sup> which can also be aspirated.

Food aspiration in healthy infants can result from problems during feeding which in turn occur from interplay between the child's feeding behaviour (or perceived problems) and the caregiver's feeding style.<sup>[3]</sup> In reviewing the Diagnostic and Statistical Manual of Mental Disorders and Medical International Statistical Classification of Diseases and Related Health Problems coding systems, where child feeding disorders are stipulated, Bryant-Waugh *et al.*<sup>[6]</sup> recognise three principal feeding behaviours that are of concern to parents: limited appetite, selective intake, and fear of feeding.

Possible factors with regard to limited appetite include the following: food refusal; selective, picky or fussy eating; failing to advance to more complex foods; and eating processed foods; eating slowly; being less interested in food; having a small appetite.<sup>[5]</sup> In healthy children, reasons for refusal would not include structural, gastrointestinal, cardiorespiratory, neurological, and metabolic problems.<sup>[3]</sup> The children in the present report did not exhibit any structural pathology or medical history suggestive of any predisposing condition. Children with autistic spectrum disorders who do not suffer from any structural/medical illness have been found to be severely picky or selective eaters and severe resisters to new foods. Healthy children may also experience a fear of feeding, particularly if meals are or have been accompanied by unpleasant acts such as choking.<sup>[3]</sup> This is where a vicious cycle of forceful feeding may ensue: the child fears choking, the caregiver becomes concerned about the child not eating and may feed the child forcefully. This puts the child greatly at risk for aspirating or choking from the food material. It is therefore more than likely that food aspiration in healthy infants occurs as a result of forceful feeding.

Four feeding styles of caregivers, which are determined by influences of cultural practices, parental concern and the characteristics of the child, have been described.<sup>[3]</sup> It becomes imperative to understand these factors at play when attempting to address feeding styles that have negative outcomes. Responsive feeding style, deemed a more appropriate style, divides the feeding responsibility between the caregiver and the child: the parent decides what, when and where to feed the child and the quantity is decided by the child. Indulgent feeders give the child any type and quantity, and whenever the child demands to eat. Neglectful feeders do not take the responsibility to feed the child and may neglect to give the child food or set limits to when, what and how much a child eats. Caregivers with a controlling feeding style do not consider the child's hunger signals and may use forceful techniques or negative reinforcements to get the child to eat. The latter is when physical tussles (particularly in healthy children)

and crying with food in the mouth may occur, which predisposes the child to aspiration of the food material. The forceful feeding style may be culturally motivated or form part of a spectrum of child abuse.<sup>[3]</sup> As cited in Iwelunmor,<sup>[7]</sup> culture refers to shared values and norms that mould a group's way of thinking, beliefs and behaviours. For instance, due to what certain groups think is good health in a child, they may want to enforce this through feeding practices.

### Conclusion

Two cases of preventable death due to food aspiration in healthy infants are presented. It is hypothesised that the deaths in these two cases most likely resulted from forceful feeding, a rife and culturally motivated practice in certain ethnic groups, which has been witnessed firsthand by the author in the setting of the case reports, i.e. the Limpopo Province of SA. The author calls for a quantitative analysis of soft porridge aspiration deaths, particularly in healthy infants, qualitative enquiry into feeding practices, as well as correlational studies on food aspiration and forceful feeding to better inform public health interventions. Child healthcare practitioners are also reminded that food aspiration deaths are unnatural causes and need to be referred for forensic autopsies.

**Acknowledgements.** None.

**Author contributions.** Sole author.

**Funding.** None.

**Conflicts of interest.** None.

1. World Health Organization. Global Health Observatory Data. Geneva: WHO, 2016. <http://www.who.int/gho/en/> (accessed 13 October 2017).
2. Penagini F, Marnell C, Fabiano V, et al. Dietary intakes and nutritional issues in neurologically impaired children. *Nutrients* 2015;7(11):9400-9415. <https://doi.org/10.3390/nu7115469>
3. Kerzner B, Milano K, MacLean Jr WC, Berall G, Stuart S, Chatoor I. A practical approach to classifying and managing feeding difficulties. *Pediatrics* 2015;135(2):344-353. <https://doi.org/10.1542/peds.2014-1630>
4. Chaiwongkarjohn S, Heidari A, Greber CJ, Goetz MB. Aspiration pneumonia. In: Schlossberg D, ed. *Clinical Infectious Disease*. Cambridge: Cambridge University Press, 2015:226-232.
5. Motee A, Ramasawmy D, Pugo-Gunsam P, Jeewon R. An assessment of the breastfeeding practices and infant feeding pattern among mothers in Mauritius. *J Nutr Metab* 2013;2013(24385):8. <https://doi.org/10.1155/2013/24852>
6. Bryant-Waugh R, Markham L, Kreipe RE, Walsh BT. Feeding and Eating Disorders in Childhood. *Int J Eat Disord* 2010;43(2):98-111.
7. Iwelunmor J, Newsome V, Airhihenbuwa CO. Framing the impact of culture on health: Systematic review on the PEN-3 cultural model and its application in public health research and interventions. *Ethn Health* 2014;19(1):20-46. <https://doi.org/10.1080/13557858.2013.857768>

Accepted 04 September 2018.