



Perception of Choking Injury Risk Among Healthcare Students

Carolina Fano¹ · Giulia Lorenzoni¹ · Danila Azzolina¹ · Anna Giuliani² · Megan French² · Sara Campagna³ · Paola Berchialla³ · Dario Gregori¹

Published online: 16 April 2019

© Springer Science+Business Media, LLC, part of Springer Nature 2019

Abstract

Choking injuries in children represent a severe public health burden. Although most choking injuries are due to food, parents have often been found to be unaware of the choking hazards presented by food. In this context, healthcare professionals may play an important role in choking prevention by educating families. We investigate the perception of choking injury risk among healthcare profession students by comparing their awareness and knowledge of choking hazards with those of people without a specific health education. A survey was conducted among a sample of final year healthcare profession students from two universities in northern Italy and a sample of adults from the general population without any health education. Respondents were asked to look at ten pictures and identify the items that pose the greatest choking hazard to children of different age groups. Seventy-one students and 742 adults without any health education responded to the survey. A higher percentage of the adults without a health education identified a food item as posing the greatest choking hazard in comparison to the percentage of healthcare profession students. The results of this study suggest that there is a need to include specific educational modules on choking prevention in healthcare-related degree programs.

Keywords Foreign body injuries · Food · Risk perception · Choking hazard · Healthcare profession students

Introduction

Foreign body (FB) aspiration is a common problem for the pediatric population. In most cases, FBs are expelled spontaneously [1], but a significant proportion of FBs become stuck in the aerodigestive tract, which can lead to severe complications [2]. It has been estimated that in developed countries, 300–600 children under 15 years of age die every year due to choking injuries [3]. According to the statistics of the National Safety Council of the United States, in 2013,

a total of 4800 deaths in the US alone were caused by FB aspiration or ingestion [4].

Several studies have found that food items represent the most common type of aspirated FB by children [5]. Specific characteristics of food items (e.g., shape, size and texture) can expose children to a high risk of choking, with the most hazardous being small and hard foods such as nuts and seeds [6, 7]. However, large pieces of food can still represent a choking hazard for children because they are, for example, difficult to chew (e.g., large pieces of fruit). The most hazardous shapes are cylindrical and round (e.g., hot dogs, sausages, cherry tomatoes, and olives) because food items of this shape can more easily slip into the airway before a child can chew them, thus causing a complete or partial obstruction.

Food items that pose the greatest choking hazard (with a few exceptions) can be altered (size, shape or texture) through food preparation guidelines to become less hazardous [8, 9] (e.g., by cutting fruits and vegetables into small pieces, by cutting spherical-shaped food into quarters, and by cutting cylindrical foods lengthwise). However, several studies [10–12] have shown that families are often unaware of the choking hazards presented by many food items and

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s10900-019-00662-5>) contains supplementary material, which is available to authorized users.

✉ Dario Gregori
dario.gregori@unipd.it

¹ Unit of Biostatistics, Epidemiology and Public Health, Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padova, Via Loredan, 18, 35131 Padova, Italy

² Prochild Onlus, Trieste, Italy

³ Department of Clinical and Biological Sciences, University of Torino, Torino, Italy

may consequently give hazardous, inadequately prepared food items to young children.

Existing studies have therefore demonstrated that families seem to lack current and/or sufficient information about choking injury prevention and thus suggest an urgent need for educational campaigns aimed at preventing choking injuries. In this context, healthcare professionals (especially pediatric professionals) play a key role in choking injury prevention through family education, since they are often the principal source of information on choking hazards for parents [12]. Despite this evidence, most published studies addressing the role of healthcare professionals in the acute care of patients with FB and choking injuries miss the relevance of primary prevention activities [13]. Healthcare professionals play a key role in both primary and secondary prevention activities. Thus, it could be beneficial to have their perceptions and knowledge of choking hazards considered in the planning of effective public health choking prevention strategies.

Several studies have investigated the relationship between risk perception and the adoption of ‘risky’ behaviors. The analysis of risk perception has become a crucial factor in predicting higher risk behaviors, including unintentional injuries [14]. Within such a framework, it can be reasonably assumed that the perception of choking hazards may have a significant impact on the attitudes and actions of healthcare professionals. This category of professionals, because of their close contact with parents and families, can play a crucial role in choking prevention; in contrast, a lack of awareness or incorrect knowledge of choking hazards could result in incorrect information being passed on to families.

The purpose of this study is therefore to investigate the perception of choking hazard risk among students studying for degrees in the healthcare profession at two universities in northern Italy and to compare their awareness and knowledge about choking hazards with those of adults without a specific health education.

Materials and Methods

Questionnaire Development

A questionnaire developed in the context of the Susy Safe project [10] was used to gather information on choking hazard perception for the study survey. The questionnaire (Fig. 1) gathered sociodemographic information [age; gender and city of residence; number of children; number of brothers/sisters; type of health degree (for students)] and included ten images: jewelry; popcorn; batteries; hotdogs; toys; stationery; candies; coins; nuts; and seeds (Fig. 1). Participants were asked to look at the images and answer three questions by identifying a maximum of two items (per

age group) that they considered to pose the greatest choking hazard (out of the ten items) to children aged: (A) less than 1 year old; (B) 1–2 years old; and (C) 3–6 years old (Fig. 1). A further question asked participants if any of their children, brothers or sisters had suffered from a choking injury and if so, what type of FB was involved.

Students in Healthcare Education

Anonymous, self-administered questionnaires were emailed to 154 healthcare profession students and completed between February and May 2017. The students were in their final year of a bachelor’s degree in Dietetics, Midwifery (University of Padova, Italy), or Nursing (University of Torino, Italy). Research Electronic Data Capture (RedCap) [15] was used for questionnaire management. Weekly reminders encouraging participation were sent out over a 15-week period to students who did not access the survey in the first instance. Seventy-one students completed the questionnaire (46% response rate).

Adults Without a Health Education

A self-administered printed questionnaire was completed by 742 adults (aged > 18 years old, with Italian comprehension) without a health education. Enrollment and completion of questionnaires took place during several Italian public events in 2015 (in Padova and Rimini) and 2016 (in Trieste, ‘Trieste Next’, and Rome, ‘Women’s health day’). During these events, after the completion of the questionnaire, information was presented to sensitize adults to the issue of food choking injuries in children by promoting primary prevention (food items that pose a higher choking hazard and reducing choking risk through food preparation) and secondary prevention (how to perform pediatric unblocking maneuvers).

Statistical Analysis

Descriptive statistics were reported as the median (I and III quartiles) for continuous variables and percentages (absolute numbers) for categorical variables. The Wilcoxon–Kruskal–Wallis test was performed for continuous variables, and Pearson’s Chi square test was performed for categorical variables. The multiple marginal independence test was performed on multiple-response variables [16].

Items shown in the images (Fig. 1) and identified by respondents as posing the greatest choking risk (for the different age groups) were classified as being either food or nonfood. Multivariable logistic regression models (odds ratio, OR, and confidence intervals, C.I.) were estimated to assess the effects of factors of interest on the probability of

Look at these pictures and answer the 3 questions:

1 Jewellery 2 Pop Corn 3 Batteries 4 Wurstel 5 Toys

6 Stationery 7 Candies 8 Coins 9 Nuts 10 Seeds

A. Among the represented objects, which ones in your opinion pose the greatest risk of choking in an infant less than 1 year old? (check the number corresponding to the object, max 2)

1 2 3 4 5
 6 7 8 9 10

B. Among the represented objects, which ones in your opinion, pose the greatest risk of choking in a child of 1 or 2 years? (check the number corresponding to the object, max 2)

1 2 3 4 5
 6 7 8 9 10

C. Among the represented objects, which ones in your opinion, pose the greatest risk of choking in a child of 3, 4, 5 or 6 years? (check the number corresponding to the object, max 2)

1 2 3 4 5
 6 7 8 9 10

Did any of your children already risked choking due to a foreign body?

Yes No

Object cause of the accident?

Was there risk of death?

Yes No

Fig. 1 Questionnaire given to adults without a health education (English version)

identifying a food item as one that poses a higher choking hazard to children in comparison to nonfood items.

Computations were performed with R software 3.3.3 [17] with the Rms [18] and MRCV [19] packages.

Results

The median age of the 71 students who completed the questionnaire was 22 years, and most of them were female (87%). The largest participation came from students in a nursing

degree program (56%, Table 1). No students had children, and most of them (84%) had at least one sibling.

The median age of the 742 adults without a specific health education was 41.5 years old, with 79% being female with at least one child. Table 2 shows that their socioeconomic level was medium–high, that 51% of respondents had attended college and that 35% were employed in office jobs.

Of the participants, 15 out of 71 students and 206 out of 742 adults without a health education reported that a family member (children for adults without a health education, siblings for students) had experienced a choking episode

Table 1 Characteristics of students

	(n = 71)
Gender	
Male	13% (9)
Female	87% (62)
Age	21.0/22.0/23.0
Children: 0	100% (71)
Siblings: 0	15% (11)
1–2	77% (55)
3–4	7% (5)
Degree course	
Dietetics	18% (13)
Nursing	56% (40)
Midwifery	25% (18)

Data are percentages (absolute numbers) for categorical variables and first quartile/median/third quartile for continuous variables

Table 2 Characteristics of adults without a health education

	(n = 742)
Gender	
Male	21% (155)
Female	79% (575)
Age	36.0/41.5/49.0
Children	
0	14% (103)
1–2	74% (529)
3–4	12% (83)
Education	
Postsecondary education	51% (371)
Primary education	8% (56)
Secondary education	41% (296)
Job	
Housewife	10% (62)
Manager	27% (172)
Student	5% (33)
Self-employed	5% (29)
Teacher/office worker	35% (221)
Manual laborer	10% (63)
Retired	4% (24)
Unemployed	5% (31)

Data are percentages (absolute numbers) for categorical variables and first quartile/median/third quartile for continuous variables

as a child. Food (especially candies and cured meat) was the item most frequently involved in the choking injuries reported (Table 3).

Table 4 shows the distribution of responses from the student and adult groups to the three questions (Fig. 1a–c). For

Table 3 Items involved in previous choking episodes experienced and reported by survey participants (grouped as either food or nonfood)

	Students (n = 14)	Adults without health education (n = 184)
Food items		
Grain/granola	–	1% (2)
Meat and fish	–	6% (10)
Pasta, bakery products	7% (1)	15% (29)
Cured meats	21% (3)	8% (15)
Vegetables and legumes	–	3% (7)
Savory snacks	–	2% (4)
Candy	7% (1)	19% (35)
Mozzarella cheese	7% (1)	3% (5)
Fruits	–	12% (21)
Hot dog	–	1% (1)
Nuts and seeds	7% (1)	2% (4)
Food, not specified	21% (3)	10% (19)
Nonfood items		
Glass	–	2% (3)
Coins and buttons	7% (1)	3% (5)
Batteries and magnets	–	1% (1)
Caps	7% (1)	1% (2)
Paper	–	2% (3)
Screw/nail	–	1% (2)
Toys	–	2% (4)
Packaging	–	1% (2)
Liquids	7% (1)	1% (1)
Hairpins	–	1% (2)
Pearls, balls, and marbles	7% (1)	2% (4)
Latex balloon	–	1% (1)

Data are percentages (absolute numbers)

children aged less than 1 year (question A), of the total student responses, toys (39%), coins (35%), and candies (28%) were selected most often as posing the greatest choking hazard. Adults without a health education most often identified coins (38% of total adult responses), candies (38%), and toys (34%) as posing the greatest choking hazard. However, there was no significant difference in the distribution of responses between students and adults without a health education for question A (p-value 0.135, Table 4).

In question B, students mostly identified toys (51%), candies (44%), and coins (24%) as posing the greatest choking hazard for children aged between 1 and 2 years old. Adults without a health education mostly identified candies (44%), toys (34%), and coins (32%) as posing the greatest choking risk. The difference in the distribution of responses between students and adults without a health education was significant for question B (p-value 0.042, Table 4).

In response to question C (children aged 3–6 years old), students most often identified stationery (48%), candies

Table 4 Questionnaire responses from students and adults without a health education regarding the items that pose the greatest choking hazard according to child's age

Items posing the greatest hazard to children	Students (n = 71)	Subjects without health education (n = 742)	p-value
Question A. < 1 year			0.135
Jewelry	21% (15)	18% (135)	
Popcorn	7% (5)	11% (82)	
Batteries	14% (10)	25% (188)	
Hotdog	3% (2)	7% (51)	
Toys	39% (28)	34% (251)	
Stationery	8% (6)	7% (55)	
Candies	28% (20)	38% (282)	
Coins	35% (25)	38% (284)	
Nuts	7% (5)	13% (99)	
Seeds	18% (13)	14% (103)	
Question B. Age 1–2 years			0.042
Jewelry	14% (10)	9% (68)	
Popcorn	10% (7)	12% (87)	
Batteries	20% (14)	26% (195)	
Hotdog	3% (2)	12% (88)	
Toys	51% (36)	34% (254)	
Stationery	13% (9)	10% (76)	
Candies	44% (31)	44% (329)	
Coins	24% (17)	32% (238)	
Nuts	13% (9)	16% (118)	
Seeds	4% (3)	6% (41)	
Question C. Age 3–6 years			<0.001
Jewelry	4% (3)	8% (60)	
Popcorn	14% (10)	20% (150)	
Batteries	6% (4)	17% (129)	
Hotdog	14% (10)	29% (212)	
Toys	31% (22)	16% (121)	
Stationery	48% (34)	14% (106)	
Candies	37% (26)	35% (257)	
Coins	23% (16)	21% (156)	
Nuts	6% (4)	20% (146)	
Seeds	3% (2)	4% (31)	

Data are percentages (absolute numbers)

(37%), and toys (31%) as posing the greatest choking hazard, whereas adults without a health education mostly identified candies (35%), hotdogs (29%), and coins (21%). The difference in the distribution of responses between students and adults without a health education was significant (p -value < 0.001, Table 4).

Analysis of the responses from students according to degree type (nursing, dietetics, or midwifery) revealed similar results to those reported for students overall. Students more often identified toys and coins as posing the greatest choking hazard to children aged 0–2 years and stationery for children aged 3–6 years, regardless of their degree type (refer to the Supplementary Material). These results are supported by the analysis of the predictors for

correctly identifying food as posing the greatest choking hazard (for the three age groups, Table 5). None of the factors considered (age, gender, a report that a family member—child or sibling—had choked, participation in a health profession degree program) significantly affected the likelihood of correctly identifying food as the greatest choking hazard in children aged less than 1 year or 1–2 years (questions A and B). Conversely, for question C, subjects who reported that one of their family members (child or sibling) had choked as a child were significantly more likely to identify food as posing the greatest choking hazard (OR 2.01, 95% C.I. 1.32–3.07, Table 5). However, the likelihood of identifying food as posing the greatest choking hazard was lower for health profession students

Table 5 Odds ratios for identifying food as posing the greatest choking hazard for three age groups (<1 year old; 1–2 years old; 3–6 years old)

	Question A. Hazardous items for children <1 year		Question B. Hazardous items for children ages 1–2 years		Question C. Hazardous items for children ages 3–6 years	
	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.
Age	1.01	0.83–1.24	0.98	0.8–1.21	0.84	0.67–1.06
Choking injuries in family members (yes vs no)	1.06	0.76–1.47	0.88	0.63–1.25	2.01	1.32–3.07
Group (students vs adults without health education)	0.7	0.4–1.25	0.82	0.45–1.5	0.38	0.2–0.71
Gender (male vs female)	1.26	0.86–1.86	0.91	0.61–1.36	0.9	0.59–1.39

Age and gender were included in the model irrespective of their statistical significance

OR odds ratio, C.I. confidence interval

than for adults without a health education (OR 0.38, 95% C.I. 0.20–0.71).

Discussion

The purpose of this study was to investigate the perception of choking injury risk among health care profession students. The data obtained suggest that knowledge about items that pose the greatest choking hazard in young children is still lacking. To the best of our knowledge, this is the first study aimed at evaluating perception of choking injury risk among health care profession students. Another study conducted in England investigated health professionals' knowledge about childhood injuries, including choking injuries, and gathered data about the age at which children might be safely involved in a range of common, potentially dangerous activities. Regarding a question about the age at which peanuts might be safely given to a child, one-third of responses did not identify the correct age and in fact, underestimated the recommended safe age [20].

Despite the fact that choking injuries represent a severe public health burden [21], the attention given to this issue is still lacking both in international scientific literature (e.g., a lack of systematic surveillance of injury occurrence) and in public health awareness schemes. The Susy Safe project [10] has collected data to frame the situation more clearly. The data obtained to date show that 40% of choking injuries occurred while children were eating without adult supervision and that the remaining 60% happened when children were eating hazardous food when an adult was present [22]. Such data are consistent with findings from the international literature. For example, a study conducted in 2011 found that parents who are aware of hazardous food items are less likely to give such foods to their young children. Unfortunately, in many cases, parents are not aware of the choking hazard posed by certain foods [12]. Similar data were found from a survey conducted in Japan in 2010, whereby most mothers had insufficient knowledge about choking injury

prevention with regard to hazardous foods and symptoms of FB aspiration [11].

Worryingly, the findings from these studies and the present survey suggest that caregivers of young children are often unaware of food choking hazards. The top three most hazardous ranked items for children <1 year were toys, coins, and candies (students, Table 4) and coins, candies, and toys (adults). This finding can be compared to those for the 1–2-year-old age group [toys, candies, coins (students) versus candies, toys, coins (adults)] and the 3–6-year-old age group [stationary, candies, toys (students) versus candies, hotdog, coins (adults)].

Candies appeared in the top three ranked items for all age groups for both student and adult responses. This result is disparate from FB literature, which generally identifies nuts and seeds as the most hazardous food item [6]. One possible explanation for our finding may relate to cultural factors and the popularity of candies versus nuts, which may be less popular in Italy than in other countries. For example, in Turkey, nuts form a larger part of the general diet in relation to higher country production, and nut aspiration is reported to be a public health problem [7]. However, it seems likely that the selection of candies in the questionnaires was in part influenced by the fact that a significant number of respondents (of the adult group) reported a family member having had a previous choking episode due to candies (Table 3).

The prevalence of toys in the results may reflect the belief that toys were once the leading cause of choking injuries among nonfood items [23]. However, since 2009 in Europe, toys are no longer one of the most hazardous items [24] owing to directive 2009/48/EC of the European Parliament, which established strict and mandatory safety requirements for toys.

The results of this study suggest that both the student and adult groups are not completely aware of food choking hazards for children. It can be observed from Table 4 that in almost every case, students selected the food items less often than the adult group for all age groups (e.g., question A, nuts 7% students versus 13% adults; question B, nuts 13%

students versus 16% adults; question C, nuts 6% students versus 20% adults).

Given that these final year students may go on to be health professionals and possibly be responsible for educating parents and patients about choking hazards, we suggest that there is a need to introduce specific educational modules on choking injuries in health education degrees. This suggestion is because healthcare professionals can play an important role in educating and training parents about childhood injury prevention [25, 26] and can also provide guidelines on appropriate food selection and safe methods of feeding [8, 12]. Other avenues for educating adults can come from other interventions within wider public health strategies, as have been shown to be useful in improving child safety [27] and in reducing the incidence of choking injuries [28].

Currently, in Italy, there are no mandatory educational modules for health profession students relating to child choking injuries, nor are there mandatory degree programs, except for physicians, for health professionals working in the field of child health. The bachelor's degree in pediatric nursing has been recently discontinued in many Italian universities due to the high unemployment rate due to examination-related problems.

Study Limitations

One of the study limitations is the low response rate of students (46%). Although unsatisfactory, it is quite common in surveying healthcare profession students [29–31]. Another limitation is the difference in the way the questionnaire was submitted: web-based for students and paper-and-pencil for adults without a health education. For example, the latter gave the possibility of selecting more than two hazardous items from the ten options, whereas the web-based questionnaire did not. However, it is unlikely that this difference resulted in biased results, since such routes of administration have been shown to not produce significantly different results [32]. Additionally, participants were enrolled in two different periods: adults without a health education in either 2015 or 2016 and students in 2017. Furthermore, adults without a health education were enrolled during social events promoting choking injury prevention, and consequently, it could be hypothesized that they were more sensitive to the topic.

Conclusions

The results of the present study suggest that there is a need to include specific educational modules on the prevention of choking hazards during healthcare-related degree programs. We further recommend that, in the absence of (and while waiting for) such modules, healthcare students, in addition

to professionals already working in pediatric healthcare, be provided with adequate training on choking prevention.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Snidero, S., Soriani, N., Baldi, I., Zobec, F., Berchiolla, P., & Gregori, D. (2012). Scale-up approach in CATI surveys for estimating the number of foreign body injuries in the aero-digestive tract in children. *International Journal of Environmental Research and Public Health*, 9(11), 4056–4067. <https://doi.org/10.3390/ijerh9114056>.
2. Rodríguez, H., Passali, G. C., Gregori, D., Chinski, A., Tiscornia, C., Botto, H., et al. (2012). Management of foreign bodies in the airway and oesophagus. *International Journal of Pediatric Otorhinolaryngology*, 76, S84–S91.
3. Bader, I., & Amjad, C. (2003). Tracheobronchial foreign bodies: A review and analysis during past one year at Children's Hospital, PIMS, Islamabad. *Pakistan Journal of Medical Sciences*, 19, 57–60.
4. National Safety Council. (2015). *Injury Facts 2015*. Retrieved from <http://www.nsc.org/learn/safety-knowledge/Pages/injury-facts.aspx>. Accessed 11 Jan 2018
5. Foltran, F., Ballali, S., Passali, F. M., Kern, E., Morra, B., & Passali, G. C. (2012). Foreign bodies in the airways: A meta-analysis of published papers. *International Journal of Pediatric Otorhinolaryngology*, 76(Suppl 1), S12–S19. <https://doi.org/10.1016/j.ijporl.2012.02.004>.
6. Sih, T., Bunnag, C., Ballali, S., Lauriello, M., & Bellussi, L. (2012). Nuts and seed: A natural yet dangerous foreign body. *International Journal of Pediatric Otorhinolaryngology*, 76(Supplement 1), S49–S52. <https://doi.org/10.1016/j.ijporl.2012.02.012>.
7. Tander, B., Kirdar, B., Aritürk, E., Rizalar, R., & Bernay, F. (2004). Why nut? *Pediatric Surgery International*, 20(7), 502–504. <https://doi.org/10.1007/s00383-004-1224-5>.
8. American Academy of Pediatrics. (2010). Policy statement—Prevention of choking among children. *Pediatrics*, 125, 601–607.
9. Cyr, C. (2012). Preventing choking and suffocation in children. *Paediatrics & Child Health*, 17(2), 91–94.
10. Gregori, D. (2006). The Susy Safe Project. *International Journal of Pediatric Otorhinolaryngology*, 70(9), 1663–1664. <https://doi.org/10.1016/j.ijporl.2006.05.013>.
11. Higuchi, O., Adachi, Y., Adachi, Y. S., Taneichi, H., Ichimaru, T., & Kawasaki, K. (2013). Mothers' knowledge about foreign body aspiration in young children. *International Journal of Pediatric Otorhinolaryngology*, 77(1), 41–44.
12. Nichols, B. G., Visotcky, A., Aberger, M., Braun, N. M., Shah, R., Tarima, S., 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. <https://doi.org/10.1016/j.ijporl.2011.10.018>.
13. Kendrick, D., Marsh, P., & Williams, E. I. (1995). How do practice nurses see their role in childhood injury prevention? *Injury Prevention*, 1(3), 159–163.
14. Dal Santo, J. A., Goodman, R. M., Glik, D., & Jackson, K. (2004). Childhood unintentional injuries: Factors predicting injury risk

- among preschoolers. *Journal of Pediatric Psychology*, 29(4), 273–283.
15. Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research Electronic Data Capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42(2), 377–381. <https://doi.org/10.1016/j.jbi.2008.08.010>.
 16. Bilder, C. R., Loughin, T. M., & Nettleton, D. (2000). Multiple marginal independence testing for pick any/c variables. *Communications in Statistics-Simulation and Computation*, 29(4), 1285–1316.
 17. R Development Core Team. (2015). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from <http://www.R-project.org>.
 18. Harrell, F. E. J. (2014). *rms: Regression Modeling Strategies. R package version 4.1-3*. Retrieved from <http://CRAN.R-project.org/package=rms>.
 19. Koziol, N. A., & Bilder, C. R. (2014). MRCV: A package for analyzing categorical variables with multiple response options. *A Peer-Reviewed, Open-Access Publication of the R Foundation for Statistical Computing*, 6, 144.
 20. Tomlinson, R., & Sainsbury, C. (2004). Childhood injury prevention advice: A survey of health professionals responses to common scenarios. *Child Care, Health and Development*, 30(4), 301–305. <https://doi.org/10.1111/j.1365-2214.2004.00436.x>.
 21. Gregori, D., Salerni, L., Scarinzi, C., Morra, B., Berchiolla, P., & Snidero, S. (2008). Foreign bodies in the upper airways causing complications and requiring hospitalization in children aged 0–14 years: Results from the ESFBI study. *European Archives of Oto-Rhino-Laryngology*, 265(8), 971–978. <https://doi.org/10.1007/s00405-007-0566-8>.
 22. The Susy Safe Working Group. (2012). The Susy Safe project overview after the first four years of activity. *International Journal of Pediatric Otorhinolaryngology*, 76, S3–S11. <https://doi.org/10.1016/j.ijporl.2012.02.003>.
 23. Ryan, C., Yacoub, W., Paton, T., & Avard, D. (1990). Childhood deaths from toy balloons. *American Journal of Diseases of Children*, 144(11), 1221–1224. <https://doi.org/10.1001/archpedi.1990.02150350053023>.
 24. Slapak, I., Passali, F. M., & Gulati, A. (2012). Non food foreign body injuries. *International Journal of Pediatric Otorhinolaryngology*, 76(Suppl 1), S26–S32. <https://doi.org/10.1016/j.ijporl.2012.02.006>.
 25. Bass, J. L., Christoffel, K. K., Widome, M., Boyle, W., Scheidt, P., Stanwick, R., et al. (1993). Childhood injury prevention counseling in primary care settings: A critical review of the literature. *Pediatrics*, 92(4), 544–550.
 26. Kendrick, D. (1994). Role of the primary health care team in preventing accidents to children. *British Journal of General Practice*, 44(385), 372–375.
 27. Pressley, J. C., & Barlow, B. (2004). Preventing injury and injury-related disability in children and adolescents. In *Seminars in pediatric surgery* (Vol. 13, pp. 133–140). Elsevier.
 28. Sadan, N., Raz, A., & Wolach, B. (1995). Impact of community educational programmes on foreign body aspiration in Israel. *European Journal of Pediatrics*, 154(10), 859–862. <https://doi.org/10.1007/BF01959798>.
 29. Kennedy, N., Healy, J., & O’Sullivan, K. (2014). The beliefs of third-level healthcare students towards low-back pain. *Pain Research and Treatment*. <https://doi.org/10.1155/2014/675915>.
 30. Talbot, A.-L., Dorrian, J., & Chapman, J. (2015). Using the theory of planned behaviour to examine enrolled nursing students’ intention to care for patients with alcohol dependence: A survey study. *Nurse Education Today*, 35(11), 1054–1061.
 31. Kingston, L. M., O’Connell, N. H., & Dunne, C. P. (2017). Survey of attitudes and practices of Irish nursing students towards hand hygiene, including handrubbing with alcohol-based hand rub. *Nurse Education Today*, 52, 57–62.
 32. Van De Looij-Jansen, P. M., & De Wilde, E. J. (2008). Comparison of web-based versus paper-and-pencil self-administered questionnaire: Effects on health indicators in Dutch adolescents. *Health Services Research*, 43(5 Pt 1), 1708–1721. <https://doi.org/10.1111/j.1475-6773.2008.00860.x>.

Publisher’s Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.