Indicators of choking risk in adults with learning disabilities: A questionnaire survey and interview study

ALICE THACKER1, ADAM ABDELNOOR2, CLAIRE ANDERSON1, SARAH WHITE1 & SHEILA HOLLINS1

1Division of Mental Health, St George’s, University of London, Cranmer Terrace, London, UK, and 2Inaura the Inclusion Charity, Central Hill, London, UK

Accepted May 2007

Abstract

Purpose. Feeding and swallowing impairments are key predictors of increased morbidity and mortality in adults with learning disabilities. This postal survey and interview study sought to identify risk factors in adults with learning disabilities who have histories of choking.

Method. A total of 2000 questionnaires were sent to carers of all adults with learning disabilities registered as service users by three local health authorities. (A ‘service user’ may be using any specialist learning disability health or social care facility with day, residential or therapeutic services). Of the 674 service users for whom surveys were returned, 47 were living in hospital, 396 were living in residential or group homes and 208 were living with relatives, or in their own homes. Eighteen subjects who had reported serious or repeated episodes of choking were interviewed in depth in their residences or workplaces. Responses were subjected to frequency analyses. Personal characteristics were analysed. Choking patterns were differentiated by food texture.

Results. A total of 34% of questionnaires on 674 service users were returned; 42% of respondents reported one or more choking episodes. There was a significantly greater occurrence of choking among people with more severe learning disability, with Down syndrome, people who had an incomplete dentition or were taking a greater number of psychotropic drugs. Antisocial eating habits learnt in institutional settings presented an additional choking hazard for some individuals.

Conclusion. Choking is a serious hazard for many adults with learning disabilities. This study establishes many of the characteristics associated with swallowing problems in this population. Clinicians and carers should benefit from awareness of these predictors, leading to better management of eating behaviours and habits. A choking and swallowing risk assessment should be included in routine health assessments of adults with learning disability, paying especial attention to the condition of a person’s teeth; possible side effects from prescribed medication, and abnormal eating behaviour.

Keywords: Choking, swallowing, learning disabilities, Down syndrome

Introduction

Evidence of choking prevalence and related risk factors has previously been collected for children, for adults with neurological disorders, and, to a lesser extent, people with learning disabilities. This study was first suggested because of concern that adults with severe learning disabilities might be at risk of choking on non-food items, such as toys included in food packets.

Asphyxiation due to inhalation of a foreign body is a common cause of accidental death in children [1–3]. There is a steady decline in the number of childhood deaths resulting from choking on food items, although the incidence of choking on non-food items is comparatively stable [4]. In a recent project seeking to determine regulatory standards for products containing small parts, data gathered from across the USA indicated that toy products were the single most common cause of choking in children [5] and this has led to regulations about the minimum size of non-food items included in food packets. However, it is only recently that the food industry has considered whether the minimum size is also adequate to protect adults with learning disabilities [6].

Commonly aspirated foods by children included nuts, hot dogs, raw carrot sticks, raw apples, boiled sweets, grapes, seeds, and egg shells, and non-food objects included balloons, ring pulls, pills, safety...
pins, marbles, dummies (pacifiers), silver foil, and baby powder [3,7,8].

Interestingly, 15% of all cases of inhalation of foreign bodies in children are asymptomatic, and it is common for a delay of up to a month before discovery, usually due to persistent wheezing, coughing, and possible chest infection and associated complications [2]. Some have recommended that bronchoscopy should be performed in all patients with a history of choking crisis, even if they have normal radiological findings, and no symptoms exist [9,11] to avoid aspiration pneumonia. Pulmonary aspiration was one of the most common underlying conditions in children who experienced recurrent pneumonia [10].

In adults pharyngeal and oesophageal dysmotility and gastroesophageal reflux have been found to be associated with an increased risk of aspiration, and an increased risk is also associated with the use of psychotropic drugs, particularly when pre-existing dysphagia is present. The texture of food, including pastes and liquids, presents different risks to different people, and individual risk assessments are therefore required [12]. In general, liquids are the most difficult to manage if there is a swallowing abnormality [13]. Silent or asymptomatic aspiration more frequently follows drinking, and choking more frequently follows ingestion of solids. Asymptomatic aspiration is probably underestimated and may present a more serious problem than transient choking incidents because people with severe learning disabilities may be unaware that aspiration has occurred, or unable to communicate this to their carers. There is an increasing awareness of the additional nutritional support needed by people with learning disabilities who have swallowing difficulties in community settings [14].

People with Down syndrome typically have poor tongue control and an underdeveloped jaw leading to impaired chewing, and inefficient use of a tongue thrust during swallowing [15,16]. If tongue coordination is poor, the food may pass into the pharynx in an uncontrolled manner which, if combined with delayed triggering of the swallow reflex, will increase the risk of aspiration. This is also common in people with cerebral palsy when damage to the brain stem and cerebral nuclei reduces neuromuscular coordination [17]. Many studies have found swallowing abnormalities in patients with severe neuromotor impairment [13,19]. For example, people with CHARGE syndrome have intellectual disability, sensory impairments and many dysmorphic features and also have neurogenic swallowing problems [18].

People with learning disabilities are more likely to put non-food items in their mouths and may have physical abnormalities and disabilities, which influence the likelihood and manner of choking. Of a total of 204 sudden deaths in one Bristol long-stay hospital between 1930 and 1980, 25 were attributed to choking. Higher risk groups comprised those with a history of habitual feeding difficulties or respiratory problems, cerebral palsy or severe spasticity, bulimics, and those who took large doses or combinations of tranquillizers [20].

Whilst choking fatalities amongst children decrease with age, for people with cerebral palsy, such fatalities increase with age. People with learning disabilities have an increased risk of premature death in general [21]. In a Danish study [22], researchers retrospectively reviewed the cause of death of 9891 people with a severe learning disability, and found that the incidence of fatal choking incidents was almost 100 times greater than in the general population. They concluded that this incidence would be reduced by better staff training, awareness, and care. Eyman et al. found that a key predictor of earlier death for people with severe learning disability was the presence of feeding difficulties [23]. Hollins et al. studying causes of death in a community sample identified respiratory diseases as much more common in people with learning disabilities compared with the general population [21]. Could this finding in part be due to an increased incidence of silent aspiration?

In the light of the findings that choking has already been identified as a significant cause of death in people with learning disabilities, the present study was designed to identify the risk factors for choking in a community-based sample. The importance of the study may be in raising awareness of higher choking risk in subsets of the population under study, thus paving the way for preventative interventions and earlier diagnosis of aspiration.

Method

In the UK, adults with a significant learning disability such that they require special services are listed on voluntary registers kept by local authorities. The carers of 2000 adults with learning disabilities registered with two local authorities in South-west London were invited to take part in this study by postal questionnaire, and a sample of respondents who had reported serious choking events were interviewed at length. The questionnaire contained a short introduction to the study and guidance on completion. Carers (members of staff looking after people with learning disabilities or parents) completing the questionnaire were asked to confirm that they had known the client for at least 1 year and, if the client was able to understand the questions, each question was to be discussed with them. The questionnaire contained 27 questions.
The questionnaire gathered profiling details (age and gender), information on factors which were thought to be associated with choking (type of care, accommodation, nature of learning and other disabilities, schooling, eyesight, reading ability, dention, weight, hearing, medication, eating style, presence of pica: 16 questions), nine questions on choking history, and two questions on consumption of snack foods which were mainly relevant to the funders of the study.

Because Down syndrome and cerebral palsy were expected to increase the risk of choking, data for individuals having these conditions was examined separately. It was found that there were too few subjects with cerebral palsy to justify analysis and reporting here.

Data on demographics and choking patterns were compared between people with Down syndrome and the rest of the sample using Pearson’s $\chi^2$ statistics. Simple logistic regression methods were then used to investigate the odds of choking using the following selected predictors: Age group, gender, reading ability, teeth condition, medication use, type of medication, whether the participants needed help drinking liquids and Down syndrome diagnosis. Odds ratios and 95% confidence levels were reported.

Multiple logistic regression methods were then used to test and estimate the combined influence of potential predictors (those significant at $\alpha = 0.10$ significance level) on choking occurrence. Because the variable ‘Down syndrome’ was hypothesized to be a confounder, two models, one with it and one without, were tested.

Semi-structured qualitative interviews were carried out with a sample of 18 respondents who had reported a serious or unusual choking history in one or more service users in their care, primarily to explore whether there were any additional risk factors which had not been addressed in the postal questionnaire. Before each interview commenced, a short statement was made confirming the confidentiality pledge given in the questionnaire. Information collected comprised demographic details, the home background, mealtimes, habits, staff levels and skills (where applicable). The worst choking event experienced by the client or witnessed by the carer, and its relationship to other behaviours, was recorded, such as a serious choking incident resulting in a change in eating patterns. Environmental features were canvassed, and details of where and when the episode occurred.

Results

A total of 2000 questionnaires were sent to carers of adults with learning disabilities of which 674 (33.7%) were returned. (A copy of the questionnaire is available on application to the corresponding author). We consider this an excellent response rate to a community survey. However, it is possible that there was a response bias toward subjects who had experienced a choking incident. However, this study did not set out to estimate prevalence and thus the response rate is considered adequate to address the aims outlined above. A total of 40.5% (273) of the sample reported one or more choking events, and 27 respondents who reported serious or unusual choking history were followed up for an in-depth interview to ascertain more information about their eating behaviour and risk of aspiration or choking.

The sample was 51.3% female, over 55% of the study participants were aged between 31 and 50 years of age, and most had attended special MLD or SLD schools (93.2%). The majority of the participants resided either in residential homes (50.2%) or with their parents or other family members (39.5%). Almost 84% of the respondents received 24-hour care. There were several significant differences between those people with Down syndrome and the rest of the sample: More adults with Down syndrome tended to live in residential home, they were less able to read ($p = 0.008$), were more likely to be toothless than those without Down syndrome ($p = 0.001$) and more likely to have had a choking incident ($p = 0.025$) (see Table I).

Some 226 respondents (33.5%) reported choking on either solid food, 105 (15.6%) on liquids, 52 (7.7%) on semi-solid food, and 32 (4.7%) on non-food items or on more than one of these. Four other specific choking questions (regarding choking on tongue/saliva, chewing gum, and non-food items within and outside food packages) produced very low positive responses, thus results are only reported for the question ‘has this client ever choked?’. There was no evidence against the null hypothesis for any factors not reported below. No particular consistency or type of material was significantly more likely to cause choking in people with or without Down syndrome than any other, though events involving solids and liquids approached significance for people with Down syndrome. When subjects without teeth were eliminated from the analysis, the increased tendency of people with Down syndrome to have choked was maintained ($p = 0.014$) (Table I).

As shown in Table II, there was no evidence of an association between age or gender of subjects and risk of choking. The odds of choking were higher for adults with Down syndrome ($OR = 1.52$) than adults with other disabilities. The odds of choking were also higher for those unable to read ($OR = 1.65$), for those who were toothless (compared to participants with their own teeth, $OR = 1.87$) and for those...
Table I. Sample description at baseline by Down syndrome compared to other causes of learning disability.

<table>
<thead>
<tr>
<th></th>
<th>Down (n=144)</th>
<th>No Down (n=530)</th>
<th>Total (n=674)</th>
<th>$\chi^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 – 30</td>
<td>30 (21.1%)</td>
<td>95 (18.6%)</td>
<td>125 (19.1%)</td>
<td>0.492</td>
<td></td>
</tr>
<tr>
<td>31 – 50</td>
<td>77 (54.2%)</td>
<td>284 (55.5%)</td>
<td>361 (55.2%)</td>
<td>p = 0.782</td>
<td></td>
</tr>
<tr>
<td>50+</td>
<td>35 (24.6%)</td>
<td>138 (26.0%)</td>
<td>168 (25.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>60 (43.2%)</td>
<td>252 (50.3%)</td>
<td>312 (48.8%)</td>
<td>2.22</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>79 (56.8%)</td>
<td>249 (49.7%)</td>
<td>328 (51.3%)</td>
<td>p = 0.137</td>
<td></td>
</tr>
<tr>
<td><strong>Type of care received</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-hour care</td>
<td>123 (88.5%)</td>
<td>405 (82.7%)</td>
<td>528 (83.9%)</td>
<td>5.94</td>
<td></td>
</tr>
<tr>
<td>Daily visiting care</td>
<td>3 (2.2%)</td>
<td>0 (0.0%)</td>
<td>3 (0.5%)</td>
<td>p = 0.115</td>
<td></td>
</tr>
<tr>
<td>Carer few days week</td>
<td>3 (2.2%)</td>
<td>20 (4.1%)</td>
<td>23 (3.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>10 (7.2%)</td>
<td>61 (12.4%)</td>
<td>71 (11.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of accommodation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lives alone</td>
<td>1 (0.7%)</td>
<td>19 (3.7%)</td>
<td>20 (3.1%)</td>
<td>10.49</td>
<td></td>
</tr>
<tr>
<td>Lives with parents/other</td>
<td>56 (38.9%)</td>
<td>201 (39.6%)</td>
<td>257 (39.5%)</td>
<td>p = 0.015</td>
<td></td>
</tr>
<tr>
<td>Lives in hospital</td>
<td>4 (2.8%)</td>
<td>43 (8.5%)</td>
<td>47 (7.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lives in residential home</td>
<td>83 (57.6%)</td>
<td>244 (48.1%)</td>
<td>327 (50.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of schooling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special school (MLD/SLD/other)</td>
<td>81 (94.2%)</td>
<td>301 (92.9%)</td>
<td>382 (93.2%)</td>
<td>0.176</td>
<td></td>
</tr>
<tr>
<td>Mainstream school</td>
<td>5 (5.8%)</td>
<td>23 (7.1%)</td>
<td>28 (6.8%)</td>
<td>p = 0.675</td>
<td></td>
</tr>
<tr>
<td><strong>Reading ability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Able</td>
<td>53 (36.8%)</td>
<td>251 (49.2%)</td>
<td>304 (46.5%)</td>
<td>6.95</td>
<td></td>
</tr>
<tr>
<td>Not able</td>
<td>91 (63.2%)</td>
<td>259 (50.8%)</td>
<td>350 (53.5%)</td>
<td>p = 0.008</td>
<td></td>
</tr>
<tr>
<td><strong>Condition of teeth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own teeth</td>
<td>100 (69.4%)</td>
<td>424 (83.3%)</td>
<td>524 (80.2%)</td>
<td>23.80</td>
<td></td>
</tr>
<tr>
<td>Dentures + teeth</td>
<td>2 (1.4%)</td>
<td>17 (3.3%)</td>
<td>19 (2.9%)</td>
<td>p &lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Dentures</td>
<td>18 (12.5%)</td>
<td>39 (7.7%)</td>
<td>57 (8.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toothless</td>
<td>24 (16.7%)</td>
<td>29 (5.7%)</td>
<td>53 (8.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drug use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No drugs</td>
<td>82 (56.9%)</td>
<td>187 (35.3%)</td>
<td>269 (39.9%)</td>
<td>23.03</td>
<td></td>
</tr>
<tr>
<td>One drug</td>
<td>51 (35.4%)</td>
<td>261 (49.2%)</td>
<td>312 (46.3%)</td>
<td>p &lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Two or more</td>
<td>11 (7.6%)</td>
<td>82 (15.5%)</td>
<td>93 (13.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Help with liquids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No help</td>
<td>141 (97.9%)</td>
<td>507 (95.7%)</td>
<td>648 (96.1%)</td>
<td>1.55</td>
<td></td>
</tr>
<tr>
<td>Help required</td>
<td>3 (2.1%)</td>
<td>23 (4.3%)</td>
<td>26 (3.9%)</td>
<td>p = 0.212</td>
<td></td>
</tr>
<tr>
<td><strong>Choking event</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>70 (48.6%)</td>
<td>203 (38.3%)</td>
<td>273 (40.5%)</td>
<td>4.99</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>74 (51.4%)</td>
<td>327 (61.7%)</td>
<td>401 (59.5%)</td>
<td>p = 0.025</td>
<td></td>
</tr>
<tr>
<td><strong>Choked on solid food</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>58 (40.3%)</td>
<td>168 (31.7%)</td>
<td>226 (33.5%)</td>
<td>3.74</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>86 (59.7%)</td>
<td>362 (68.3%)</td>
<td>448 (66.5%)</td>
<td>p = 0.053</td>
<td></td>
</tr>
<tr>
<td><strong>Choked on semi-solids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9 (6.3%)</td>
<td>43 (8.1%)</td>
<td>52 (7.7%)</td>
<td>0.552</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>135 (93.8%)</td>
<td>487 (91.9%)</td>
<td>622 (92.3%)</td>
<td>p = 0.457</td>
<td></td>
</tr>
<tr>
<td><strong>Choked on liquids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15 (10.4%)</td>
<td>90 (17.0%)</td>
<td>105 (15.6%)</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>129 (89.6%)</td>
<td>440 (83.0%)</td>
<td>569 (84.4%)</td>
<td>p = 0.054</td>
<td></td>
</tr>
<tr>
<td><strong>Choked on tongue/saliva</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4 (2.8%)</td>
<td>12 (2.3%)</td>
<td>16 (2.4%)</td>
<td>0.129</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>140 (97.2%)</td>
<td>518 (97.7%)</td>
<td>658 (97.6%)</td>
<td>p = 0.720</td>
<td></td>
</tr>
<tr>
<td><strong>Choked on non-food item</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7 (4.9%)</td>
<td>25 (4.7%)</td>
<td>32 (4.7%)</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>137 (95.1%)</td>
<td>505 (95.3%)</td>
<td>642 (95.3%)</td>
<td>p = 0.943</td>
<td></td>
</tr>
<tr>
<td><strong>Choking event when have own teeth or dentures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>59 (49.2%)</td>
<td>185 (36.9%)</td>
<td>244 (39.3%)</td>
<td>6.08</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>61 (50.8%)</td>
<td>316 (63.1%)</td>
<td>377 (60.7%)</td>
<td>p = 0.014</td>
<td></td>
</tr>
</tbody>
</table>
who needed help drinking liquids (OR = 5.2). In addition, the odds of choking for participants on two or more drugs were twice those of participants not taking any (OR = 2.02), and in terms of specific drugs, the use of tranquillizers nearly doubled the odds of choking (OR = 1.99).

The results of the multiple logistic regression analyses are detailed in Table III: When Down syndrome diagnosis was not included as a covariate, forward logistic regression generated a model where reading ability, teeth condition, drug use, use of tranquillizers and help with liquids could correctly predict whether or not choking occurred for 62.1% of users. When controlling for the other predictors, the model indicated that the odds of choking were multiplied by 4 if one needed help with liquids, 91% greater when one wore dentures, 75% greater if one was on tranquillizers and 50% greater if one was unable to read. Once the variable ‘Down syndrome’ was added to the model, it was found that when controlling for the other variables in the model, the odds of choking was increased by 57% for adults with Down syndrome over other adults with learning disabilities. Furthermore, while the effect of wearing dentures was no longer significant in the model, other effects were maintained: The odds of choking were increased with needing help with drinking (OR = 4.46), being on tranquillizer medication (OR = 89%) and being unable to read (OR = 1.49). Although it was univariately associated with choking, the number of drugs used was not retained in the predictive models.

**Interview data**

Eighteen survey respondents were interviewed. These carers reported, in varying levels of detail, on 48 service users who had choked, or who, in their opinion were at significant risk of choking because of their ‘eccentric’ eating habits (e.g., pica), including, in one case, a picture frame. Clients who had documented damage or deformity in the oral and thoracic areas or lack of a gagging reflex were reported by their carers to have an increased risk of choking. The psychological effects of previous institutionalization on eating habits were perceived

---

**Table II. Choking odds for adults with learning disabilities.**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Choking event (n = 273)</th>
<th>No choking event (n = 401)</th>
<th>OR</th>
<th>95% C.I. (OR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 16 – 30</td>
<td>52 (41.6%)</td>
<td>73 (58.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 – 50</td>
<td>146 (40.4%)</td>
<td>215 (59.6%)</td>
<td>0.953</td>
<td>(0.63, 1.44)</td>
</tr>
<tr>
<td>50+</td>
<td>73 (43.5%)</td>
<td>95 (56.5%)</td>
<td>1.08</td>
<td>(0.68, 1.72)</td>
</tr>
<tr>
<td>Gender Male</td>
<td>133 (42.6%)</td>
<td>179 (57.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>133 (40.5%)</td>
<td>195 (59.5%)</td>
<td>0.920</td>
<td>(0.67, 1.26)</td>
</tr>
<tr>
<td>Reading ability Able</td>
<td>106 (34.9%)</td>
<td>198 (65.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not able</td>
<td>164 (46.9%)</td>
<td>186 (53.1%)</td>
<td>1.65</td>
<td>(1.20, 2.26)</td>
</tr>
<tr>
<td>Condition of teeth Teeth</td>
<td>206 (39.3%)</td>
<td>318 (60.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dentures + teeth</td>
<td>9 (47.4%)</td>
<td>10 (52.6%)</td>
<td>1.39</td>
<td>(.555, 3.48)</td>
</tr>
<tr>
<td>Dentures</td>
<td>29 (50.9%)</td>
<td>28 (49.1%)</td>
<td>1.60</td>
<td>(.924, 2.77)</td>
</tr>
<tr>
<td>Toothless</td>
<td>29 (54.7%)</td>
<td>24 (45.3%)</td>
<td>1.87</td>
<td>(1.06, 3.29)</td>
</tr>
<tr>
<td>Drug use No drugs</td>
<td>93 (34.6%)</td>
<td>176 (65.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One drug</td>
<td>132 (42.3%)</td>
<td>180 (57.7%)</td>
<td>1.39</td>
<td>(.991, 1.94)</td>
</tr>
<tr>
<td>Two or more</td>
<td>48 (51.6%)</td>
<td>45 (48.4%)</td>
<td>2.02</td>
<td>(1.25, 3.26)</td>
</tr>
<tr>
<td>Type of drug</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tranquillizers</td>
<td>57 (20.9%)</td>
<td>47 (11.7%)</td>
<td>1.99</td>
<td>(1.30, 3.03)</td>
</tr>
<tr>
<td>Epilepsy medication</td>
<td>74 (27.1%)</td>
<td>91 (22.7%)</td>
<td>1.27</td>
<td>(.888, 1.81)</td>
</tr>
<tr>
<td>Antidepressant</td>
<td>32 (11.7%)</td>
<td>45 (11.2%)</td>
<td>1.05</td>
<td>(.649, 1.70)</td>
</tr>
<tr>
<td>Asthma medication</td>
<td>11 (4.0%)</td>
<td>23 (5.7%)</td>
<td>0.690</td>
<td>(.331, 1.44)</td>
</tr>
<tr>
<td>Sleeping tablets</td>
<td>10 (3.7%)</td>
<td>10 (2.5%)</td>
<td>1.49</td>
<td>(.610, 3.62)</td>
</tr>
<tr>
<td>Over-the-counter drugs</td>
<td>48 (17.6%)</td>
<td>65 (16.2%)</td>
<td>1.10</td>
<td>(.732, 1.66)</td>
</tr>
<tr>
<td>Help with liquids No help</td>
<td>253 (39.0%)</td>
<td>395 (61.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help required</td>
<td>20 (76.9%)</td>
<td>6 (23.1%)</td>
<td>5.20</td>
<td>(2.06, 13.14)</td>
</tr>
<tr>
<td>Down syndrome No</td>
<td>203 (38.3%)</td>
<td>327 (61.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>70 (48.6%)</td>
<td>74 (51.4%)</td>
<td>1.52</td>
<td>(1.05, 2.21)</td>
</tr>
</tbody>
</table>
to be important. For example, some carers noted that concern about the availability of food for some people who had previously lived in a mental handicap hospital sometimes resulted in stealing and bolting food, or stealing and consuming it while unsupervised. The reality of these anxieties is supported by the finding that the nutritional status of people living in long stay hospitals was poor [24] and the budget for patients in mental handicap hospitals was lower than other NHS hospitals. These behaviours, in the opinion of some carers who were interviewed, increased the likelihood of choking. Many interviewees suggested that dry and crumbly foods were more likely to trigger a choking incident, and some reported that they would not supply friable foods such as cake to certain individuals in their care. In other respects, the interview data added support to the quantitative data collected by post.

The strengths and the limitations of this study

The rate of response (34%) was not as high as hoped, and we have assumed that the informants of service-users who had choked were more likely to respond.

In comparison with the summary data for all those known to the registers, we found no evidence of a difference in age distribution in severity of disability between our sample and the wider population, but proportionally more responses were received from residential care staff than family carers (sample carers 56%, register carers 46.5%).

Nevertheless, the data as received do add to the corpus of knowledge on risk factors. The format of data-collection made it impossible to comment on the incidence of silent aspiration in our study population.

Discussion

Choking accounts for a high number of fatalities amongst adults with learning disabilities and while aspiration of food and liquids is often asymptomatic, it may result in serious medical complications later. The aim of this study was to investigate the potential risk factors associated with choking history among adults with learning disabilities. This topic is particularly relevant because the factors identified as related to choking can be used as indicators to provide a quick and effective means for staff to determine increased choking odds for individuals in their care, particularly in cases where the adult with learning disabilities concerned is not well known to them.

This study found that a number of variables were univariately associated with having a choking incident and a multivariate predictive model was generated in which Down syndrome diagnosis, needing help with liquids, inability to read and being on tranquillizers were associated with an increase in the odds of choking.

The investigation of the association between choking and learning disability yielded the following result: Subjects with Down syndrome were more likely to have experienced a choking incident than those with other disabilities. More importantly, two factors were often associated with more severe disability ‘Needing help with liquids’ and ‘inability to read’ were highly associated with choking occurrence. Moreover, the association of choking with an inability to read, and thus, perhaps, an inability to read warnings or advice about safe eating habits, could suggest that choking becomes more prevalent with increasing severity of learning disability [20]. ‘Needing help with liquid’ was found to be the strongest predictor, even when controlling for other predictors, increasing the odds of choking by four-fold.

This study also confirmed previous findings of an association between the use of psychotropic drugs and an increased rate of aspiration suggesting that tranquillizers may have an effect on swallowing function [12]. Hence, carers should be familiar with information about prescribed medication and possible side effects.
Conclusion

Both choking and aspiration are serious hazards, especially for those who have more severe learning disabilities, or additional physical disabilities. Care staff or relatives who are aware of risks generally supervise people with learning disabilities when they are eating, particularly those who are believed to have a higher risk of choking or aspiration [27]. This study of 40 individuals with learning disabilities and dysphagia found good adherence to dysphagia guidelines provided by speech and language therapists. It appears that the greater the degree of understanding of the specific needs, likes, dislikes and capabilities of the individual, the lower the choking risk.

Provision of a choking assessment should be a service standard, but this is not always achieved. There are substantial variations in the quality of care provided to people with learning disabilities, and the level of staff training. Higher risk eating behaviours, such as bolting food, or eating ‘on the move’, may be the result of poor management of social settings.

Little information and few training materials are available for direct care staff. Education of carers about healthy and safe eating could help to reduce choking risk in this population [28] and a picture book for people with learning disabilities and their carers was developed during this project to increase knowledge amongst both carers and those they care for.

The Screening Tool of Feeding Problems (STEP) is a diagnostic, treatment, and outcome tool designed to target risk of aspiration, nutrition-related behaviour problems, and other aspects of eating [29,30]. The factors identified in this study could also be used as indicators of level of choking risk.

The implications for future research or clinical practice

The incidence of silent aspiration, both of liquids taken by mouth and of reflux, requires further study, particularly given the high reported prevalence of gastro-oesophageal disease in people with severe or profound learning disabilities [25,26] and the previously reported association with aspiration. The data taken together highlight the need for dietary assessment and awareness of the serious medical risks associated with choking and aspiration of foods, liquids, and non-food items.

Acknowledgements

The authors would like to acknowledge the invaluable contribution to the study made by Julie Fenton, Senior Dietician, Twickenham Community Team for people with learning disabilities, before her untimely death in December 1998.

The authors would like to acknowledge and thank Paul Wicks for his contribution and help with this article.

References

6. Anderson C, Abdelnoor A. Choking risks for adults with learning disabilities. Unpublished research carried out by the Department of Psychiatry of Disability at St George’s, University of London on behalf of Fritolay; 1999. Available from Department of Mental Health, St George’s, University of London.


