Easy to open? Exploring the ‘openability’ of hospital food and beverage packaging by older adults

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Abstract

Food is increasingly a packaged commodity, both in the community and in institutionalised settings such as hospitals, where many older people are malnourished. Previous research with patients aged over 65 years in NSW public hospitals identified difficulties opening milk, water, juices, cereal and tetra packs. The aim of this paper was to assess the ability of well older people living in the community to open food and beverage items routinely used in NSW hospitals in order to gain further insights into the older person/pack interaction and the role of hand and finger strength in pack opening. A sample of 40 older people in good health aged over 65 years from 3 community settings participated in the study. The attempts at pack opening were observed, the time taken to open the pack was measured and the correlation between grip and pinch strengths with opening times was determined. Tetra packs, water bottles, cereal, fruit cups, desserts, biscuits and cheese portions appeared to be the most difficult food products to open. Ten percent of the sample could not open the water bottles and 39% could not open cheese portions. The results were consistent with the previous research involving hospitalised older adults, adding emphasis to the conclusion that food and beverage packaging can be a potential barrier to adequate nutrition when particular types of packaged products are used in hospitals or the community. The ageing population is rapidly becoming a larger and more important group to consider in the provision of goods and services. Designers, manufacturers and providers of food and beverage products need to consider the needs and abilities of these older consumers to ensure good ‘openability’ and promote adequate nutritional intakes.

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1. Introduction

The prevalence of malnutrition in the hospitalised older population is estimated between 6 and 53% in Australia depending upon diagnosis, assessment tool and timing (Walton, 2012) and between 20 and 65% in European and US hospitals (Gout, Barker, & Crowe, 2009; Kyle, Genton, & Pichard, 2005; Naber et al., 1997; Roubenoff, Preto, & Balke, 1987; Schenker, 2003; Visvanathan et al., 2003). In NSW public hospitals, the Special Commission of Inquiry into Acute Care Services (Garling, 2008) reported that at any point in time there were around 7480 people 65 years and older in hospital, representing 44% of all inpatients. With the projected growth in numbers of people aged 65 (older adults) and the corresponding growth in people aged above 85 (older old adults) and their complex and chronic health conditions, most hospital patients in the future will be ‘elderly’. The report also discussed the provision of food and food services in NSW hospitals and the move towards centralisation of production with the ‘cook-chill’ system. Here food is mostly prepared in advance, kept chilled in a refrigeration system at the hospital and then heated in customised trolleys in the kitchen or on the ward. This form of food provision signals the regular use of packaged foods as these are considered cost effective and provide standardised portion sizes.

While the reasons for malnutrition are complex and multifactorial (Barker, Gout, & Crowe, 2011; Pereira, Bulik, Weaver, Holland, & Platts-Mills, 2015; Pirlich et al., 2005), hospital food service systems have a key role to play in enabling patients to consume food, beverages and supplements to assure adequate nutrition for recovery (Allison, 2003; Hartwell, Edwards, & Symonds, 2006; Jonkers, Prins, Van Kempen, Tepaske, & Sauerwein, 2001; Stratton, King, Stroud, Jackson, & Elia, 2006). The system can play a role in the ‘food as medicine’ paradigm of the holistic care model. However, a number of previous studies and reports have identified that food and beverage packaging is a contributing factor to
malnutrition for the older and disabled in hospital settings (Lazarus & Hamlyn, 2005; Schenker, 2003; Tsang, 2008; Vivanti et al., 2008; Walton, Williams, & Tappel, 2006). A 2007 NSW Health Service malnutrition prevalence audit identified that a number of patients did not eat their food because they could not open the packaging (Matthews, Bartlett, & Hall, 2007). NSW Health has acknowledged that food and beverage packaging can pose an accessibility problem for the patient and they have implemented a tender checklist for products purchased by the hospital system in an attempt to order the best performing packs (NSW HealthShare, 2013). Many products, however, such as water, biscuits and supplements (served in tetra packs) are considered by patients to be difficult to open (Bell et al., 2013).

Malnutrition is not restricted to the hospitalised older population. Research has identified that many older people enter hospital in a malnourished state, indicating that their nutritional status was compromised prior to admission. For example, one study in Sweden found 14.5% of older people living in their own homes were at risk of malnutrition (Johansson, Machrach-Lindström, Carstensen, & Ek, 2009). In a similar Australian setting of independently community living older people receiving home nursing services 34.5% were found to be at risk (Rist, Miles, & Karimi, 2012), while in a Belgium-based study, 57% of older home-living participants were at risk of malnutrition (Arvanitakis, Vandewoude, Perkias, & Van Gossum, 2013). More general reports indicate malnutrition amongst the community living older population is likely to be 8–10% (British Association of Parenteral and Enteral Nutrition (BAPEN), 2006; McCormack, 1997; Rist et al., 2012). The implications for this malnourished group on entering hospital includes longer recovery time, greater susceptibility to infection and medical complications as well as sigificantly longer length of hospital stay leading to greater cost of care (Hickson, 2006; Isabel, Correia, & Waitzberg, 2003; Middleton, Nazarenko, Nivison-Smith, & Smerdely, 2001). In the community, it can lead to decreased mobility, depression as well as an increased likelihood of other illness and falls (Hickson, 2006; Johansson et al., 2009; Visvanathan et al., 2003; Visanathan et al., 2004).

With the ageing Australian population, many older people in the community live alone. In 2011, 50% of people 65–84 years and 34% of those aged 85 years and over lived alone (Australian Institute of Health and Welfare, 2012, p. 11). These percentages are projected to remain constant over the next 20 years while the number of those aged 65 and over living alone in Australia will almost double to 1.45 million people. The packaging industry recognise this shift to single ‘grey’ households (Packaging Council of Australia, 2013) with the development and increasing availability of ‘easy-opening’ packaging, single portion products and individual microwaveable meals. ‘Easy-opening’, however, is often a marketing term rather than a reality for many consumers. Traditional design criteria consider the user capabilities of the majority (95%) of the total population, rather than universal design (Berns, 1981; Yoxall et al., 2006). Universal design is considered inclusive in that this design approach allows the product to be used by the most possible users in a variety of environments (Wegge & Zimmerman, 2007).

Researchers have investigated accessibility issues with food packaging, mostly concentrating on opening jars with vacuum lug closures (VLC) and determining how much force the user required to open the lid (Yoxall et al., 2006, 2008), as well as biomechanical analysis with motion capture (Fair, Bix, & Bush, 2008). The size, shape and texture of the package has been found to determine the grip to be adopted – lateral pinch grip for small lids such as water bottles, tip or chuck (3 point) pinch for thin film and flexible packaging such as individual serves of yoghurt, cheese and biscuits. (Rowson & Yoxall, 2011).

While much of this research has focussed on biomechanical aspects of opening packaging, a few researchers have also reviewed user satisfaction. Pousette, Löfgren, Nilsson, and Gustafsson (2014) surveyed users from different age groups and found the key factor informing satisfaction with packaging was the ease of opening. A Japanese consumer survey found that users preferred packs that required low levels of strength to open, could be opened without a tool and the method needed to open the pack was easily understood (Kozak, Terauchi, Kubo, & Aoki, 2003). Mixed methods packaging studies include a previous study of hospitalised older adults (Bell et al., 2013) and a recent study by Hensler, Herren, and Marks (2015) investigating the issues of peelable supermarket meat and patients with hand disorders to determine a more efficient seal design.

The previous research conducted in NSW hospitals highlighted problems for older patients opening packaged products used in food service delivery through a combination of observation, self-report and grip and pinch strength measurement (Bell et al., 2013). The study reviewed a limited range of hospital food and beverage items with 24 subjects in the hospital environment, finding relationships between grip and pinch strength and efficient opening of tetra packs, cereal packs and biscuit portions. While water bottles in the hospital study were described as impossible to open by 40% of survey respondents, no significant correlation with grip strength was found, despite the reasons for difficulty being attributed to strength (Bell et al., 2013). Further research into the relationship between hand and finger strength of older people and efficient opening of food and beverage packs used in NSW hospital food service would be useful to examine this issue more fully and explore pack openability with older users generally.

The purpose of this study, therefore, is to comprehensively assess the full range of hospital food and beverage packs with well older people (aged 65 years and above). Well older people (aged 65 years and above) were selected as subjects as the results of the previous study with hospitalised older adults may have been affected by subject’s health status and competing demands of the hospital environment. The aim of this community study was to determine if well older people living independently at home have difficulty opening packaged foods commonly used in NSW hospitals and to gain further insights into the older person/pack interaction and the role of hand strength in pack opening. This research will inform better product selection and design that would enhance nutritional intakes.

2. Methods

This study used an ergonomics research methodology, integrating qualitative and quantitative methods in order to triangulate data to more fully understand pack ‘openability’ (Hignett & Wilson, 2004; Wilson, 2000). Integrated qualitative and quantitative approaches to research have been found to be ‘...the most comprehensive and productive approach to health and human service research.’ (DeFoy & Gitlin, 1998; p. xii).

2.1. Participants

This study included a non-probability convenience sample of 40 well older men and women living in three community locations in regional NSW, Australia. Criteria for joining the study were that participants were over 65 years of age, had no cognitive impairment or upper limb weakness, were living independently in the community and preparing their own meals. This judgemental sampling included snowballing recruitment methods through involvement of community groups and consequently, the subjects were a self-selected group and may not be representative of the wider population. An over-representation of women (68% of the
total sample) was expected as they currently make up 55% of people aged 65 years and older (Australian Institute of Health and Welfare 2007, updated 2012, p. 3).

The study was conducted by researchers from the University of Wollongong and a hospital based occupational therapist/hand therapist at three community locations, a community club; a church meeting location and an urban residence. Ethics approval was obtained by both the University of Wollongong and the former Eastern Sydney and Illawarra Area Health Service (SESIAHS). Written informed consent was obtained from all participants.

2.2. Sample meal tray

A range of hospital food and beverage items were supplied from a local hospital on the three testing days. The range of food and beverage items and number tested varied according to the availability of the items from the hospital. Items included breakfast, snack and lunch packs as outlined in Table 1. Note that milk (150 ml), fruit cup, biscuit portions and sandwich triangle packs were the only items tested by all subjects. The sequence of pack opening was not prescribed, allowing subjects to determine the order of pack opening.

Participants consented to their hands being video recorded while opening food and beverage items from a sample meal tray. Items on the tray consisted of products served at breakfast and lunch, as well as snack items (see Table 1).

Mini Digital Video Recorder/s were positioned on a tripod in front of each subject to record their hand actions. The video recording allowed accurate time recording of food and beverage package opening, number of attempts to be determined and a review of the strategies used to open the packaging.

2.3. Hand grip and pinch strength testing

Grip and pinch strength testing was conducted on each subject using a standardised protocol (American Society of Hand Therapists, 1992) with the Jamar Grip Strength Dynamometer (Lafayette Instruments, Indiana, USA) and the B&L Pinch Gauge (B&L Engineering, California, USA). Both instruments were calibrated prior to the study. For standardisation, the dynamometer’s adjustable handle was set on the second handle position for all subjects, with one trial and hand dominance recorded; the B&L pinch gauge measured tip, lateral and 3 point pinch strength for a single effort. These two hand assessment tools are commonly used and considered to produce the most reliable and valid measurements of grip and pinch strength (Crosby & Wehbe, 1994; Gilbertson & Barber-Lomax, 1994; Mathiowetz, 1985; Ugurlu & Özdogan, 2012).

2.4. Questionnaire

Participants were requested to complete a questionnaire that utilised components from an earlier study (Bell et al., 2013). Questions related to hand function (strength, tremor, pain, range of motion, arthritic conditions, hand dominance) and vision; as well as issues relating to opening the food items. Ratings of opening ability were organised by answering ‘yes’ or ‘no’ followed by a scale of ‘no difficulty/easy’, ‘some difficulty’, ‘moderately difficult’, ‘very difficult’, and ‘impossible’.

2.5. Data analysis

Data for all phases were analysed using a standard statistical package, SPSS V19 (SPSS Inc., 2010). Questionnaires and sample meal tray recordings were analysed using descriptive statistics. Correlations were performed using Spearman’s rho to examine relationships between grip and pinch strengths and time taken to open the items. A correlation of 0 indicating no relationship, while a large correlation is ±1 indicating complete correlation. According to Cohen (1988, cited in Pallant, 2005) a small correlation is between ±0.1 and ±0.29, a medium correlation between ±0.30 and ±0.49 and a large correlation is ±0.50 and ±1.0. Negative correlations indicated shorter opening times and therefore better pack efficiency.

3. Results

3.1. Subjects

Subjects were recruited from Blackheath, Blue Mountains region (n = 11); Warilla, South Illawarra region (n = 16); and Thirroul, North Illawarra region (n = 11). This resulted in a total sample of 40 participants with a mean age of 77 (SD 6.3) years, and an age range

### Table 1

<table>
<thead>
<tr>
<th>Breakfast items</th>
<th># packs tested</th>
<th>Snack items</th>
<th># packs tested</th>
<th>Lunch items</th>
<th># packs tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juice portion</td>
<td>37</td>
<td>Water bottle</td>
<td>36</td>
<td>Soup portion</td>
<td>38</td>
</tr>
<tr>
<td>Milk (150 ml)</td>
<td>40</td>
<td>Fruit Cup</td>
<td>40</td>
<td>Dessert Bowl</td>
<td>20</td>
</tr>
<tr>
<td>Yoghurt</td>
<td>39</td>
<td>Biscuit pack single serve</td>
<td>40</td>
<td>Mousse</td>
<td>19</td>
</tr>
<tr>
<td>Cereal sachet</td>
<td>21</td>
<td>Cheese portions</td>
<td>27</td>
<td>Jelly cup</td>
<td>37</td>
</tr>
<tr>
<td>Boiled cereal single serve</td>
<td>7</td>
<td>Tetra pack</td>
<td>19</td>
<td>Pureed fruit jelly</td>
<td>9</td>
</tr>
<tr>
<td>Vegemite portion</td>
<td>38</td>
<td></td>
<td></td>
<td>Sandwich triangle pack</td>
<td>40</td>
</tr>
<tr>
<td>Jam portion</td>
<td>38</td>
<td></td>
<td></td>
<td>Sugar sachet</td>
<td>31</td>
</tr>
<tr>
<td>Butter portion</td>
<td>29</td>
<td></td>
<td></td>
<td>Coffee sachet</td>
<td>35</td>
</tr>
<tr>
<td>Margarine portion</td>
<td>30</td>
<td></td>
<td></td>
<td>Salt &amp; Pepper sachets</td>
<td>28</td>
</tr>
</tbody>
</table>

* a Tested by all subjects.
  b 27 subjects attempted this pack, however data is only available on 7 as only these subjects opened the complete pack (box + inner bag).
between 65 and 88 years. The mean age of females (n = 27) was 76.4 years (SD 6.4) and males (n = 13) was 77.2 years (SD 6.2). Participants in the Blue Mountains region were a friendship group of retirees; the participants in the South and North Illawarra regions from established community groups of retirees.

3.2. Food and beverage items

The mean time taken to open the food and beverage packs was determined and is shown in Fig. 2. The juice portion had the fastest mean opening time (3.5 s); the water bottle 8.5 s, biscuit sachet 10.3 s, fruit cup 17.3 s and tetra pack 32.3 s. The cheese portion took the longest mean time to open with a mean time of 50.9 sec.

Fig. 3 shows the number of attempts to open each food and beverage item. The juice portion had the least attempts (mean 1.1); the biscuit sachet a mean of 2.5 attempts; the water bottle a mean of 2.8 attempts, and the fruit cup with the most attempts to open with a mean of 5.8. The cheese portion had the longest mean time (50.9 s) and mean of 5.6 attempts to open.

3.3. Hand grip and pinch strength testing

Grip and pinch strength test results showed a normal distribution across the sample (n = 40) for Dominant Grip and Dominant 3 point pinch grip. Dominant lateral pinch grip and non-dominant lateral pinch grips with all other grip and pinch tests were not normally distributed. (Table 2). Please note that data for dominant 3 point and lateral pinch grips represent 39 of the 40 subjects as one subject did not complete this aspect of the protocol.

Correlations were performed to investigate the relationship between different types of grips and time taken to open the packs and are outlined in Table 3. Results for the water bottle indicated a large correlation between dominant grip and shorter opening times as well as a medium correlation for non-dominant grip. Medium correlations were also found for both dominant and non-dominant grips and shorter opening times for biscuit portions, indicating that stronger grips are important for successful and efficient opening of these products.

Medium correlations were found for non-dominant tip pinch and the biscuit portion and fruit cup, indicating that stronger non-dominant tip pinch grips were associated with faster and efficient pack opening for these particular products.

3.4. Questionnaire

The accompanying questionnaire highlighted particular openness issues with the packaging, ranging from the participants inability to actually open the item/s and reasons why the opening was difficult. A number of packs were unable to be opened by all participants and these are detailed in Table 4. Of the 23 cheese portions attempted, 9 were unable to be opened (39% of sample); while 10% of the sample could not open the water bottle.

The subjects were also asked to rate the opening of packs on a 5-point likert scale, ranging from ‘easy’ to ‘impossible’ (Fig. 4). The water bottle was rated as ‘easy’ by 24 participants (63% of sample), with the tetra pack rated as ‘easy’ by 11 participants (58% of sample). However, the cheese portion ratings were spread across the categories, with only 4 participants (17% of sample) rating it as ‘easy’ to open. 9 participants (39%) rating it as ‘moderate’ and ‘very difficult’ to open, and 9 participants (39%) unable to open the pack and rating it as ‘impossible’.

Subjects were also asked for reasons why the packs were difficult to open using 4 categories including vision, strength and pack characteristic of ‘fiddly packaging’ (Fig. 5). ‘Fiddly packaging’ was the main reason given for pack opening difficulties, with the exception of the water bottle, which was attributed to strength issues.

When asked if they would like to comment on the packs to help identify where the difficulty lay with pack ‘openability’, most participants commented on mousse, cheese and biscuit portions. Participants stated that the tab on the mousse container was too small to grip and difficult to break the seal; 7 people reported that the product spilt while they were opening it. Fourteen participants reported that the cheese portion was difficult to open because of the lack of instructions, while 10 subjects reported the same issue with the biscuit portion.

4. Discussion

Older people have disproportionate levels of malnutrition in both hospital and the community, with hospitalised older adults five times more likely to be at risk of malnutrition than younger patients (Lazarus & Hamlyn, 2005; Vivanti et al., 2008). Packaged foods and beverages are a core component of food service in NSW hospitals and are commonly used in the community. While the reasons for malnutrition among older people in hospital, care settings and the community is multifactorial, packaging has been found to be a contributing factor (Lazarus & Hamlyn, 2005; Matthews et al., 2007; Schenker, 2003; Tsang, 2008; Vivanti et al., 2008; Walton et al., 2006; Walton, 2012).

This study of well older adults interacting with packed breakfast, snack and lunch items used in NSW hospitals, undertook
a mixed methods inquiry to examine the relationship of hand and finger strength with pack opening and review user ratings of ease of opening. Hand strength is consistently associated with pack opening design and assessment in the literature (Lewis, Menardi, Yoxall, & Langley, 2007; Rowson & Yoxall, 2011; Voorbij & Steenbekkers, 2002; Yiangkamolsing, Bohez, & Bueren, 2010; Yoxall et al., 2006). However, the findings in both this study and the previous hospital study (Bell et al., 2013) show limited correlations between hand and finger strength and shorter opening times for the hospital food and beverage packs. Only 3 packs were found to have significant correlations in this study, the water bottle, the biscuit pack and the fruit cup. Ten percent of participants could not open the water bottle; 8% could not open the biscuit pack and 24% could not open the fruit cup. Four other packs could not be opened by some of the participants in this study, these being the tetra pack (11%), boxed cereal (18%), mousse (23%) and cheese portion (39%). Hand and finger strength were not associated with efficient pack opening for any of these items with the well older people. This is a different finding to the previous study with hospitalised older adults (Bell et al., 2013) for both the tetra pack and the boxed cereal. In that study, strong correlations were found between hand and finger strength of the hospitalised older adults and efficient opening of the tetra pack. Similarly, finger 3 point pinch and lateral pinch grips were associated with faster

### Table 2
Mean grip and pinch strength values of total sample (kg/f).

<table>
<thead>
<tr>
<th></th>
<th>Dominant grip (kg/f)</th>
<th>Non dominant grip (kg/f)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dominant pinch grips (kg/f)</strong></td>
<td>Tip</td>
<td>3 point</td>
</tr>
<tr>
<td>Mean</td>
<td>24.99</td>
<td>24.00</td>
</tr>
<tr>
<td>SD</td>
<td>8.35</td>
<td>7.64</td>
</tr>
</tbody>
</table>

* n = 39.

### Table 3
Correlations between grip strength, pinch strength and package type.

<table>
<thead>
<tr>
<th>Pack</th>
<th>Grip strength</th>
<th>Tip pinch</th>
<th>3 Point pinch</th>
<th>Lateral pinch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dominant</td>
<td>Non Dominant</td>
<td>Dominant</td>
<td>Non Dominant</td>
</tr>
<tr>
<td>Water bottle correlation coefficient</td>
<td>-.521*</td>
<td>-.389*</td>
<td>-.271</td>
<td>-.353*</td>
</tr>
<tr>
<td>p value</td>
<td>.001</td>
<td>.019</td>
<td>.026</td>
<td>.036</td>
</tr>
<tr>
<td>Biscuit portion correlation coefficient</td>
<td>-.442*</td>
<td>-.347*</td>
<td>-.286</td>
<td>-.316*</td>
</tr>
<tr>
<td>p value</td>
<td>.004</td>
<td>.028</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Fruit cup correlation coefficient</td>
<td>.047</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p value</td>
<td>.004</td>
<td>.028</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Spearman Rho Correlation is significant at the .05 level (2-tailed).

### Table 4
Percentage of participants unable to open packs.

<table>
<thead>
<tr>
<th>Pack</th>
<th>Number attempted</th>
<th>Number unable to be opened</th>
<th>Percent of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biscuit portion</td>
<td>25</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>Water bottle</td>
<td>38</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>Tetra pack</td>
<td>19</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>Boxed cereal</td>
<td>17</td>
<td>3</td>
<td>18%</td>
</tr>
<tr>
<td>Mousse</td>
<td>13</td>
<td>3</td>
<td>23%</td>
</tr>
<tr>
<td>Fruit cup</td>
<td>29</td>
<td>7</td>
<td>24%</td>
</tr>
<tr>
<td>Cheese</td>
<td>23</td>
<td>9</td>
<td>39%</td>
</tr>
</tbody>
</table>

### Fig. 4.
Ease of opening ratings for packs.

### Fig. 5.
Reasons for difficulties in accessing packs.
cereal pack opening for the hospital study (Bell et al., 2013). These differences could be due to a number of factors related to the hospital environment and/or the individual. Older people in hospital often eat in a semi-recumbent bed posture which could enhance or impair hand function; additionally their physical, social and mental well-being while in hospital may impact on how much hand strength they can exert.

The limited correlations between hand and finger strength of well older adults and shorter opening times for the food and beverage packs in this study, indicates other aspects of hand function such as dexterity are likely to be involved with pack openability. This could be investigated in laboratory studies to determine if there is a relationship with an older person’s dexterity and shorter pack opening times. Such information would be useful for pack designers, particularly for packs with multiple opening steps involving fine dexterity, such as the tetra pack which requires a small straw to be removed from the side of the pack, unwrapped and then inserted into the pack to access contents.

User satisfaction with packaging has been found to be closely linked with how easy the pack is to open (Pousette et al., 2014). The well older people in this study reported the cheese portion to be the most difficult pack to open, and attributed the reason for this accessibility issue to ‘fiddly packaging.’ Although the water bottle was rated as ‘easy’ to open by most participants, the reason for any difficulty opening the pack attributed to strength, consistent with the correlations for hand grips. The previous hospital study (Bell et al., 2013) reported that cereal boxes, condiments, tetra packs and milk/juice containers were the most difficult packs to open. Cheese portions were not assessed in the hospital study. It is likely that this difference between the two study groups of older people is due to aspects of the hospital environment such as the bed posture as noted above and this could be further explored through laboratory studies.

NSW hospitals have recognised there is a potential issue for patients. A number of strategies have been implemented to address the issues of food and beverage accessibility by colour coding trays to indicate which patients need assistance; and by instituting a checklist for the purchase of packaged food and beverages in consultation with Arthritis Australia (Favorito, 2014). As a result, cereal boxes are no longer used in NSW public hospitals. Colour coding of hospital trays and instituting tender checklists to utilise better performing packs is one approach to the issue of pack openability. A more lasting solution would be to either improve the design of products to enable access by every user or alter aspects of the food service delivery system to ensure all older adults can access their meal tray, be able to open the products and consume the contents.

Participants in this study noted a number of design characteristics which could be improved, including tab sizes being too small to grip and lack of opening instructions. Designing packs to optimise openability for the ageing population needs a universal design approach (Follette Story, Mueller, & Mace, 1998), to ensure the maximum number of people in a wide range of environments can access food and beverage packs. The packaging industry recognises the need to address the needs of the ‘greying’ market (Packaging Council of Australia, 2013). Mixed methodology research such as this study can ‘bridge the gap’ between users and designers to provide insights into the older person/pack interaction and inform better design; and in depth usability testing would provide opportunity to comprehensively explore users’ views and experiences with pack opening.

What is clear from this research is that water bottles require strength to open – and strength decreases with age. Ten percent of the study group could not access the water at all, and 40% of participants reported difficult opening the bottle; while 17% of the hospitalised older people reported they could not open the water bottle (Bell et al., 2013). Water is served in NSW hospitals to vulnerable and ‘unwell’ older adults in sealed plastic bottles and this practice has potential implications for the patient and the hospital system. Further research into the use of water bottles in hospitals is indicated to gather data on the effectiveness of bottled water meeting the hydration needs of hospitalised older adults, and assess any possible effects on length of stay.

The most difficult item for participants to open in this study was the cheese portion, with almost 40% of well older adults unable to open the pack. Cheese portions are an important high protein snack both in the hospital and the community. Older adults often eat smaller meals and use snacks to provide ‘easy to eat’ nutrition. A study of 2000 Americans over 65 years was conducted to identify the extent and benefit of snacking (Zizza, Tayie, & Lino, 2007). Most participants (84%) were ‘snackers’ and the study concluded that snacking enabled adequate energy intake in this older population.

Tetra packs were unable to be opened by 11% of the well older people in this study, and 12% of the hospitalised older adults (Bell et al., 2013). Tetra packs are used in institutional healthcare settings and the community for nutrition supplements. Further investigation of the older person’s interaction with tetra packs could be undertaken using task analysis and usability studies to identify specific aspects of pack design to be improved.

There are a number of limitations to the research study outlined in this paper. Firstly, the participants were a non-probability convenience sample from community or friendship groups and self-selected to participate. As such, the researchers had little control over the subject participation on the testing days. Secondly, participants completed the product testing in a shared environment in two settings (club and church venues) while in the third location (urban residence), participants completed the testing alone. This type of sampling approach is not random. Instead the participants are targeted, allowing judgemental bias as inclusion and exclusion criteria are determined by the researcher through a purposive sampling approach (Hesse-Biber, 2010, p. 54). Additionally, the influence of the central testing locations may have affected results in that participants were in an artificial setting and not the normal environment for eating (Boutrolle, Delarue, Arranz, Rogeaux, & Köster, 2007; Kozlowska et al., 2003). True random sampling would prevent this bias but was considered impractical due to time and resource constraints.

The shared testing environment in two of the sample groups could have affected the time to open the pack – either delaying the time due to conversation, or shortening the time taken due to competition. While the testing environment may have influenced results, it does replicate the experience in hospital, where eating can be in a shared ward environment or alone in a single room. Thirdly, the participants opened the packaging on one occasion only and may have become fatigued during the testing, impacting on opening time. As the participants could determine their own order of pack opening, they could have elected to leave the more ‘difficult’ packs until the end and this may have affected their motivation to open the pack. Finally, while the participants considered themselves to be ‘well’, no formal testing of their physical, cognitive or mental health was undertaken and this could also have influenced the findings. However, as the driver for this research study was to assess an older person interacting with hospital food and beverage packaging as part of everyday life, a screening process was considered unnecessary. Additionally, these subjects could be considered to be highly motivated users as they were socially active and encouraged by their social group to participate, and may not be reflective of older adults in the wider community.
5. Conclusion

This study has identified that well older adults experience difficulties opening single serve food and beverage items used by NSW hospitals, confirming and extending previous research with hospitalised older adults. A number of the well older adults in this study were unable to open a range of everyday packs, including the cheese portion, fruit cup, biscuit packs, tetra pack and water bottles. Hand strength was associated with successful opening of water bottles and biscuit packs only, indicating that dexterity is likely to be the most important aspect of hand function in determining openability.

Food and beverage packaging is now part of everyday life. It provides convenience for consumers and longevity for foodstuffs. As the population ages, many older adults are living alone and are purchasing single serve items to save on waste and for ease of use (Williams, Vergheese, Lockrey, & Crossin, 2014). Food and beverage products that are highly nutritious and attractive with good openability have an important role to play in enhancing independence and well-being of older people. It is high time to further examine problematic pack types, particularly those providing significant protein and energy (e.g., supplements in tetra packs and cheese portions) to people who are malnourished, or at risk of malnutrition.

Further research is required to examine the role of dexterity and posture on pack openability and to explore the impact of packaging in the provision of foods and beverages for older people in hospital, care facilities and the community.

References


