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Are food and drink retailers within NHS venues adhering to NICE Quality Standard 94 guidance on childhood obesity?

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Are food and drink retailers within NHS venues adhering to NICE Quality Standard 94 guidance on childhood obesity?

List of authors:
A James¹, L Birch², P Fletcher³, S Pearson⁴, C Boyce⁵, AR Ness², J Hamilton-Shield², FE Lithander²

Corresponding author: Fiona Lithander, fiona.lithander@bristol.ac.uk

Keywords: childhood, obesity, NICE Quality Standard 94, retailers, food, drink

Abstract

Objective

To assess whether the food and drink retail outlets in two major National Health Service (NHS) district general hospitals in England adhere to Quality Statements 1-3 of the UK National Institute for Health and Care Excellence (NICE) Quality Standard 94.

Design

Cross-sectional, descriptive study to assess the food and drink options available in vending machines, restaurants, cafes and shops in two hospitals.

Main outcome measures

Adherence to Quality Statement 1 whereby the food and drink items available in the vending machines were classified as either healthy or less healthy using the Nutrient Profiling Model (NPM). Compliance with Quality Statements 2 and 3 was assessed through the measurement of how clearly the shops, cafes and restaurants displayed nutrition information on menus, and the availability and prominent display of healthy food and drink options in retail outlets, respectively.

Results

Adherence to Quality Statement 1 was poor. Of the 18 vending machines assessed, only 7 (39%) served both a healthy food and a healthy drink option. Neither hospital was compliant with Quality Statement 2 wherein nutritional information was not available on menus of food providers in either hospital. There was inconsistent compliance with Quality Standard 3 whereby healthy food and drink options were prominently displayed in the two main hospital restaurants, but all shops and cafes prioritised the display of unhealthy items.

Conclusions

Neither hospital was consistently compliant with Quality Statements 1-3 of the NICE Quality Standard 94. Improving the availability of healthy foods and drinks whilst reducing the display and accessibility to less healthy options in NHS venues may improve family awareness of healthy alternatives. Making it easier for parents to direct their children to healthier choices is an ostensibly central component of our health care system.

Strengths and limitations of this study

- This is the first study to evaluate the consumer nutrition environment of two NHS hospitals in England, and to assess their compliance to recommendations of the NICE Quality Standards 94.
- Only two hospitals in the same geographical area in England were assessed.
- The inclusion of a second assessor to provide an additional independent evaluation would have been beneficial to reduce possible bias.

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Introduction

Childhood obesity is a global health concern¹. 9.3% of 4-5 year olds and 19.8% of 10-11 year olds in the UK are currently classified as obese^{2,3} which is known to increase morbidity and mortality in later life through its association with cancer, cardiovascular disease and mental health disorders.^{3,4} The doubling of obesity rates between the first and final years of primary school highlights early childhood as a high-risk period for obesogenic factors to take effect^{2,3}. Whilst overweight and obese children are more likely to become obese adults,⁴ healthy weight adults who were obese during childhood have similar risk for metabolic diseases as those who maintained a healthy weight throughout life⁵, suggesting that childhood is an opportune time for obesity prevention.

In addition to treating ill health, the National Health Service (NHS) Constitution pledges to maintain wellbeing through ‘supporting individuals to promote and manage their own health’⁶. The NICE Quality Standard 94 entitled ‘Obesity in children and young people: prevention and lifestyle weight management programmes’⁴ (Table 1) identifies NHS venues as important settings in which to implement childhood obesity prevention strategies. Children may attend an NHS venue such as a hospital as a patient or a visitor and can be directly or indirectly influenced by the consumer nutrition environment within a hospital.

There is increasing evidence that the consumer nutrition environment is an important determinant of dietary behaviour and obesity⁷⁻⁹. The consumer nutrition environment describes what an individual encounters when he or she enters a venue where food is purchased or consumed¹⁰. Studies have shown that healthier eating patterns have been developed by students when their school nutrition environments were improved through an increase in the nutrient quality of the food provided^{11,12}. Moreover, evidence suggests that hospital retailers such as shops, cafes and restaurants can serve as examples of healthy nutrition environments¹³. Studies conducted in Canada and the USA have assessed consumer nutrition environments in hospitals and have shown that food and drink retailers in both adult^{14,15} and children’s^{13,16} hospitals offer unhealthy food and drink options. Little is known however about the consumer nutrition environment of NHS venues in England and in addition, few tools exist to allow it to be assessed.

The aim of the current study was to measure compliance to National Institute for Health and Care Excellence (NICE) Quality Standard 94 by assessing the consumer nutrition environment of two NHS District General Hospitals in England. An assessment tool was developed to guide quality assessment of food and drink provision in these two NHS venues.

87 **Methods**

88 *Setting/Hospitals*

89 This study was conducted in two major District General Hospitals in the South West of England in July 2016.
90 These two NHS hospitals were chosen as the lead author was studying in these hospitals during this period.
91 Both hospitals offer paediatric, day-time access for assessment and out-patients but only one, the larger
92 hospital, provides inpatient care. One Hospital has approximately 680 beds in total, 8 vending machines and
93 a total of 6 food retail outlets which comprise 1 restaurant, 3 cafes and 2 shops. The other has approximately
94 380 beds, 10 vending machines and 7 food retail outlets comprising 1 restaurant, 2 cafes and 3 shops. The
95 two restaurants served hot and cold meals throughout the day. The only meals served by the cafes were
96 sandwiches and salads in addition to confectionary, savoury snack items, and hot drinks. Food and drink
97 retailers in each hospital were evaluated against Quality Statements 1-3 of NICE Quality Standard 94 (Table
98 1). Data were collected by the lead author during a 2 week period in July 2016 where each vending machine
99 and retail outlet was visited by her on one occasion only.

100

101 *Assessment Tool*

102 The Consumer Nutrition Environment Tool (C-NET) was developed by the lead author. To measure adherence
103 to Quality Statement 1, the user recorded each food and beverage item for sale in each of the vending
104 machines. The nutrient composition for each item was then retrieved from the item packaging or from
105 product nutrition information available online. The UK Department of Health Nutrient Profiling Model (NPM)
106 was used to classify these foods and drinks into two categories; less healthy and healthy, and details of this
107 model and the scoring system have been published elsewhere¹⁷. To do this, the nutrient content of each food
108 and beverage was assessed against a set of published criteria to determine whether it contains certain
109 nutrients above or below particular thresholds. The NPM identifies foods and drinks that are high in fat, salt
110 or sugar and enables them to be differentiated into two categories, healthy or less healthy, based on their
111 nutrient composition. The NPM uses a scoring system where points are allocated on the basis of the nutrient
112 content of 100g of a food or beverage. Points are awarded for energy, saturated fat, total sugar and sodium
113 ('A' nutrients) and fruit, vegetable and nut content, fibre and protein ('C' nutrients). The score for 'C'
114 nutrients is subtracted from the 'A' nutrients score to give a final NPM score. Foods that score four points or
115 more, and drinks which score one or more points are classified as 'less healthy' using the NPM. An example is
116 that of raw nuts which had a nutrient composition (per 100g) as follows: 2656kJ, 9.1g saturated fat, 3.7g total
117 sugar, 0.02g salt; this item scored 16 'A' points. Upon calculation of 'C' points for the raw nuts (per 100g),
118 they contained >80% fruit, vegetables or nuts, 6g fibre, and 15.8 g protein, giving it a total of 5 'C' points. The
119 final score for this item was 1, hence this item was classified as healthy according to the NPM. The price of
120 each food and beverage, and the number of vending machines within each NHS venue where each food and

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121 beverage was available was also recorded. Data collected were used to measure compliance with Quality
122 Statement 1.

123 The NPM was not used to measure compliance with Quality Statements 2 or 3; this was done using a
124 more subjective assessment of the consumer nutrition environment by the lead author. To measure
125 adherence to Quality Statements 2 and 3, she evaluated the quality of the consumer nutrition environment
126 within each hospital restaurant, café or shop through answering a series of yes/no questions which centred
127 around 3 main themes: the provision of nutrient information for meals on menus, advertising and
128 promotions and the prominent placing of healthy and unhealthy items in the retail outlets (Table 3). For
129 Quality Statement 2, the lead author examined the retail outlets for the display of nutritional information on
130 menus. For Quality Statement 3, her knowledge of the Eatwell Guide¹⁸ was used whereby foods within the
131 food groups such as fruit, vegetables, dairy, wholegrain and high fibre foods, eggs, lean meat and pulses,
132 were classified as healthy, and foods and drinks which are high in fat, salt and sugars such as biscuits, sweets,
133 chocolate, and sugar sweetened beverages were classified as unhealthy.

134
135 *Procedure*

136 Compliance with Quality Statement 1 was observed if a NHS venue had a vending machine where at least
137 one healthy food and at least one healthy beverage option were available for sale in the same machine.
138 Compliance with Quality Statement 2 was observed if retail outlets provided information on energy, total fat,
139 saturated fat, salt and sugar content of meals and snacks. Quality Statement 2 states that listing ingredients
140 and cooking methods constitutes an acceptable level of nutritional information if the information on energy,
141 fat, saturated fat, salt and sugar content is not available. Drinks were not assessed as part of Quality
142 Statement 2 since the rationale provided by NICE refers to food only. When nutrient information was not
143 clearly displayed, the lead author liaised with members of catering staff to identify whether this information
144 would be available on request. With respect to Quality Statement 3, the lead author examined whether
145 healthy and less healthy foods and drinks were advertised outside the venues, whether advertising stalls
146 containing food and drink items were placed nearest the door of the shop, café or restaurant, whether items
147 were at a child’s eye level which was classified as 1 metre height, and whether items were displayed at the
148 payment area. Compliance with Quality Statement 3 was observed if healthy food and drink choices were
149 displayed prominently in the retail outlets and poor compliance was deemed if unhealthy options were
150 prominently displayed. The definition of compliance with the three Quality Statements was selected by the
151 authors given the lack of guidance regarding what constituted compliance provided by NICE Quality Standard
152 94.

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154 *Data analyses*

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3 155 Data on the NPM scored are presented as mean (sd) and range. Qualitative data were initially coded and
4 156 collated into themes by the lead author. Interpretation of these data and the identification of themes was
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6 157 reviewed and discussed by multiple authors (AJ, LB, FEL) throughout the process to validate the findings.
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159 **Results**

160 Two restaurants, 5 cafes, 5 shops and 18 vending machines were included in the analyses across both
161 hospital sites. Data were originally collected from 29 vending machines but 11 were excluded from analyses.
162 Ten vending machines, which sold hot drinks only, were excluded because nutrition information was not
163 clearly displayed nor was it available online or from the supplier when requested by the lead author. One
164 vending machine, which sold only frozen items such as burgers, was also excluded because this machine was
165 removed from the hospital before the end of the data collection period.

166
167 *Quality Statement 1: “Children and young people, and their parents or carers, using vending machines in local*
168 *authority and NHS venues can buy healthy food and drink options”*

169 Of the 18 vending machines, 7 (39%) offered both a healthy food and a healthy drink (Table 2). 55 different
170 items were on sale across all 18 vending machines, 40 of which were foods and 15 were drinks. Where the
171 same drink was served in a 330ml can or in a larger 500ml bottle, this was classified as two separate drinks.
172 When the 40 foods alone were assessed using the NPM, the mean NP score was 18.3, (9.3). Only 4 of the 40
173 (10%) foods were classified as healthy with a NP score of less than 4; these items were baked crisps, a packet
174 of dried fruit and nuts, a packet of raw nuts and a muesli bar (NP score -1.3 (sd 4.5)). When the other 36
175 (90%) food items were analysed according to the NPM, the NP score was 20.5 (sd 6.8), significantly greater
176 than the cut-off for the less healthy classification of 4 points or more. The 4 healthy foods items were priced
177 equivalently to similar less healthy items available in the vending machines.

178 When the drinks were assessed, where healthy is defined as scoring 1 point or more, 8 of the 15
179 (53%) available were classified as healthy (NP score -0.5 (sd 1.4)) using the NPM cut-off of 1 point or more,
180 and the remainder classified as less healthy (NP score 1.7 sd (0.5)). The drinks that were classified as healthy
181 were an orange flavoured sugar sweetened beverage, concentrated orange juice, bottled water, and sugar-
182 free cola drinks. The healthy options were marginally less expensive (£1.25 sd 0.27p) than the less healthy
183 options (£1.36 sd 0.24p).

184
185 *Quality Statement 2: “Children and young people, and their parents or carers, see details of nutritional*
186 *information on menus at local authority and NHS venues”*

187 Neither hospital was compliant with Quality Statement 2. When the two restaurants were analysed against
188 Quality Statement 2, it was found that neither displayed nutrition information on their menus for hot or cold
189 meals. When the lead author asked the retail staff, she was informed that this information was available only
190 for cold fillings offered with jacket potatoes and for a proportion of the filled sandwiches on sale. Quality
191 Statement 2 states that if the nutrient content of a recipe is unavailable to consumers, the ingredients and
192 cooking methods should be available. Whilst this information was not displayed on menus, catering staff

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3 193 advised that this information would be available on request, though it was not specifically requested by the
4 194 lead author as part of this study. Though not displayed on menus, a range of sandwiches and salads that
5 195 were made onsite were available in the restaurants. Nutritional information detailing total energy, fat,
6 196 saturated fat, sugar and salt content was displayed on the labels of these items.
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11 198 None of the cafes provided nutrient information on their menus, meaning that all five cafes were not
12 199 compliant with Quality Statement 2. However, three of the cafes offered pre-packaged sandwiches and
13 200 comprehensive nutrition information was available on the packaging of these. The remaining two cafes sold
14 201 sandwiches, baguettes and salads made by a local catering company. Catering staff in these cafes advised
15 202 that specific nutrition information was not available for these items but that details of ingredients were
16 203 available on request, though the lead author did not specifically request this information. Quality Statement
17 204 2 was not relevant to the shops as they did not have menus.
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24 206 *Quality Statement 3: "Children and young people, and their parents or carers, see healthy food and drink*
25 207 *choices displayed prominently in local authority and NHS venues".*
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27 208 There was inconsistent compliance to Quality Statement 3 in both hospitals. When the two restaurants were
28 209 analysed, adherence to Quality Statement 3 varied. One of the restaurants housed a stall inside the entrance,
29 210 which sold fresh fruit, vegetables, and local produce and was labelled as a 'Farm Shop'. The same restaurant
30 211 also sold steamed potatoes and these, in addition to fresh vegetables, were clearly advertised as a cheaper
31 212 option than a portion of chips. In the second restaurant there were several signs which advertised 'Healthier
32 213 Options'. This included a 'lighter breakfast' which comprised grapefruit segments, natural yoghurt, a bowl of
33 214 breakfast cereal with milk, a pastry and a cheese portion. Healthier snack options such as fresh fruit were
34 215 prominently displayed on service counters and by the payment area. All five cafes demonstrated good
35 216 adherence to Quality Statement 3. The balance of healthy and less healthy items on display in the most
36 217 prominent areas such as the queuing or payment area was equal and there was less evidence of advertising
37 218 and price promotions on less healthy items than in the shops. Fresh fruit was available beside the payment
38 219 areas in 4 of the 5 cafes. However baked goods such as muffins, scones, cookies and cakes were displayed in
39 220 glass cabinets or on the counter surface next to the queuing and payment area in all 5 cafes.
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51 222 Healthy options made up approximately 25% of the food and beverage items available in the shops and these
52 223 items were displayed in less prominent locations such as at the back of the shop or on low-lying shelves.
53 224 Posters were used in all of the hospital shops and cafes to advertise price promotions on less healthy options
54 225 including signs placed outside shops and cafes to advertise items such as hot dogs and ice cream. Cakes
55 226 made onsite were displayed next to the payment area in 2 of the shops, and less healthy options including
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227 muffins and chocolate bars were displayed at the payment areas in all shops and cafes. Price promotions
228 were advertised for several of these less healthy products displayed at the payment area.
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230 The layout of the unhealthy items in many of the shops appeared to target children. The 'pic n mix' sweet
231 stalls in both of the largest shops had prominent positions near the entrance and products such as colourful
232 sugar-sweetened iced drinks, lollipops and chocolate eggs containing small toys were displayed at the
233 payment area or at a child's eye level. There was a display in one shop with a sign which read 'Big Kids Sweet
234 Zone' offering 35 different sweets all priced at less than £1. Both of the largest shops used posters to
235 advertise a price deal on fresh fruit, however fruit stalls were not in a prominent location and were poorly
236 stocked.

Discussion

This study is the first to describe the consumer nutrition environment of two NHS hospitals in England and to assess their compliance with NICE Quality Standard 94. We found that food and drink retailers in these two hospitals demonstrated poor compliance with this Quality Standard. Only 39% of vending machines across both hospitals served both one healthy food and one healthy drink option indicating poor compliance with Quality Statement 1. Moreover, 90% (36/40) of the food items in the vending machines were classified as less healthy suggesting that the consumer may have difficulty identifying and locating the 10% of items classified as healthy. 53% (8/15) of the drink items available were classified as unhealthy. It was found that the two hospitals were not compliant with Quality Statement 2, which refers to the availability of nutritional information at the point of choosing food or drink. Compliance was variable in relation to Quality Statement 3, where restaurants engaged in various activities in the display of healthy options yet all cafes and shops favoured the prominent display and advertising of unhealthy foods and drinks.

Hospitals have a role to play in advocating for healthy lifestyle and good nutrition^{19, 20}. The consumer nutrition environment in 14 children's hospitals in California was assessed and it has been suggested that nutrition intervention is needed to improve the availability of healthy food and beverage options¹³. The authors of that research suggest that inexpensive interventions could be used such as providing nutrient information and introducing signage that promotes healthy choices¹³. McDonald and co-workers¹⁶ reported that university-affiliated children's hospitals in Canada and the US provide a suboptimal health environment, and hypothesise that a reliance on revenue from outlets which provide less nutritious foods may be a factor. Such results are not restricted to children's hospitals however. Winston and co-workers^{14, 15} described the nutrition environment of 39 hospitals in the USA, and found that the consumer nutrition environment was poor and suggested that dietary interventions are justified in health settings.

The current study found that only 39% of vending machines provided both a healthy food and a healthy drink, and yet this result must be interpreted with caution. The most widely available healthy food item was baked crisps which were found in 33% vending machines, and when presented in the same vending machine as a healthy drink such as bottled water or a sugar-free drink, the machine, and by extension the hospital, was classified as compliant with Quality Statement 1. It is known that nutrient profile schemes have become drivers for product reformulation¹⁷ and the baked crisps, and indeed the orange flavoured sugar sweetened beverage which was classified as healthy, may have been reformulated to meet the NPM criteria. It is noteworthy that both of these items are classified as unhealthy according to the Eatwell Guide¹⁸ where they are both in the category of foods which are high in fat, salt and sugar yet are classified as healthy when the NPM was used.

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272 It is well accepted that nutrition information at the point of purchase can influence food choice²¹. Consumers
273 under-estimate by 2 to 4 times the saturated fat, energy and sodium content of restaurant foods²¹, yet
274 providing accurate point-of-sale nutrition information is known to improve consumer choice²¹. None of the
275 restaurants, cafes or shops examined in the current study were compliant with Quality Statement 2, which
276 states that nutrition information should be available for consumers at the point of choosing food and drink
277 options. It is a hospital's duty to empower consumers with the information required to make an informed
278 choice²². When asked, staff suggested that nutrition information would be provided to consumers on request
279 yet the format of this information, exactly when it would be provided, and how user-friendly it would be, is
280 unknown.
281
282 The availability and accessibility of unhealthy foods have been identified as risk factors for overeating²³ and it
283 is understood that the prominence of food and drinks displays can influence consumer choice^{24, 25}. In the
284 current study, the restaurants demonstrated variable compliance to Quality Statement 3 which states that
285 healthy food and drink options are displayed prominently. Evidence of good practice included one restaurant
286 which advertised fresh fruit and vegetables at competitive prices, whilst the other advertised what was
287 referred to as a 'lighter breakfast'. This option, however, also included a pastry and cheese portion, both of
288 which are known to be high in fat, saturated fat and salt. The 5 shops and 5 cafes all prioritised the
289 prominent display of unhealthy options, and whilst fruit was available beside the payment area in 4 of the 5
290 cafes albeit poorly stocked, so too were unhealthy baked goods which were displayed by the payment area
291 in all 5 cafes. Research has shown that unhealthy food and drink items are difficult for consumers to avoid in
292 supermarkets, as not only do they take up more shelf space than healthy items such as fruit and vegetables,
293 but are more often displayed at payment areas, as seen in the current study²⁶⁻²⁸. Moreover, the placement of
294 healthy food items at a payment area can lead to a substantial positive impact on sales of these products²⁹.
295 In addition, both of the largest shops in the current study displayed an array of sweets, chocolate and sugar-
296 sweetened drinks at child's eye level, and evidence suggests that placing products on shelves at eye-level
297 positively influences sales²⁵.
298
299 The Consumer Nutrition Environment Tool (C-NET) used in the current study was developed by the lead
300 author of this study. Whilst this tool has not been validated, it allowed both the objective collection of data
301 using the NPM, and the subjective assessment of marketing practices that contribute to food purchases using
302 a series of questions (Table 3). Other studies which have assessed food retailers in hospitals have used a
303 variety of methods; some relied on telephone interviews with cafeteria directors which may have biased the
304 data collected¹⁶ whilst others used a validated tool such as the University of Pennsylvania Nutrition

Environment Measures Scale (NEMS). However, no equivalent British tool was found and thus the lead author developed the C-NET. When compliance with Quality Statement 1 was assessed in the current study, C-NET used the NPM which was developed by the Food Standards Agency in 2004-2005, and was subject to rigorous scientific scrutiny, extensive consultation, and review. It is supported by the independent Scientific Advisory Committee on Nutrition and a wide range of nutrition experts³⁰. The NPM was introduced as mandatory in 2007 by the UK Office of Communications and DH to regulate food and drinks in the context of television advertising to children. This model was selected for use in the current study as it is widely regarded as scientifically robust and effective in identifying less healthy items, and in practical terms, it is well established in the UK. There are other government endorsed NPMs available, such as the EU Pledge model and the WHO Europe model, but these use multiple categories and subcategories of foods which have raised concerns of ambiguity and additional complexity that may reduce the clarity and transparency of the models³¹. They also do not have the same track record of effective use in the UK regulatory environment. The Committee of Advertising Practice (CAP), the lead UK organisation that write and maintain the UK Advertising Codes to ensure advertising in the UK is legal, decent, honest and truthful, have adopted the DH NPM in their recently published regulatory statement on food and soft drink advertising to children, which was developed following public consultation and will come into effect in the UK on 1 July 2017³².

Consumer organisations have set up campaigns in the UK and Australia asking supermarkets to remove unhealthy food and drink items from payment and queuing areas³³⁻³⁵ but it is not known if such campaigns exist for retail outlets in hospitals. NICE Quality Standards are a set of prioritised statements, which draw on existing guidance to set out the priority areas for quality improvement in health and social care. They are designed to drive measurable quality improvements yet, using them in the current study has proven challenging. Quality Statement 1 refers to the availability of 'healthy food and drink options' in vending machines, yet nowhere in NICE Quality Standard 94 or in the associated documents is there a clear definition of what 'healthy' means, and it was on this basis that the DH NPM was chosen as a method of classification. Moreover, the definition of compliance to Quality Statement 1, where a vending machine contained both a healthy food and a healthy drink was chosen by the study authors given the lack of guidance on what constitutes as compliance from NICE Quality Standard 94. The authors considered compliance to Quality Statements 2 and 3 if most retail outlets in the hospitals adhered to the respective statement. 'Evidence' of 'arrangements to display healthy food and drink options in prominent places' constitutes adherence to Quality Statement 3 according to NICE Quality Standard 94. However, challenges arose in assessing what constituted a 'healthy option' and a 'prominent place', and was subjective. The measurement of adherence to all three Quality Statements is open to interpretation, and assessment of adherence was a challenging task given their non-quantifiable and non-specific nature.

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340 The main limitation of the current study is that only two hospitals were included, both of which are in the
341 same geographical area in England. Moreover, a second assessor would have provided an additional
342 independent evaluation of the offerings. Further research is needed on a more representative sample of
343 hospitals to fully understand compliance to NICE Quality Standard 94. However, such a study would be
344 subject to similar limitations in terms of the vague nature of this Quality Standard and a more objective
345 means of assessing adherence to the Statements within the Quality Standard would be necessary.
346
347 In conclusion, the current study showed that two NHS hospitals demonstrated poor compliance with Quality
348 Statements 1-3 in NICE Quality Standard 94. The lack of availability of healthy foods and drinks, the absence
349 of nutritional information on the menus, the lack of advertising and display of healthy items and the
350 consistent advertising and prominent display of unhealthy items highlights that improvements are required
351 in NHS venues such as hospitals. These findings have been shared with the NHS Trust of one of these
352 hospitals and re-evaluation will take place in the future. However, as the prevalence of childhood obesity
353 continues to rise globally, it is important that every opportunity is taken to improve the nutrition
354 environment for children’s food choices. Hospitals have a duty to provide consumers with the information
355 required to make informed nutrition choices and should take the lead in supplying food and drinks that
356 reflect evidence based nutrition²².
357

Author affiliations:

¹5th year medical student, Faculty of Health Sciences, University of Bristol

²National Institute for Health Research Biomedical Research Centre, Bristol (Nutrition Theme), University Hospitals Bristol NHS Foundation Trust and the University of Bristol, UK

³Department of General and Old Age Medicine, Cheltenham General Hospital, Gloucestershire, UK,

⁴Department of Clinical Strategy, Gloucestershire Hospitals NHS Foundation Trust Main Board, Gloucestershire, UK

⁵Department of Clinical Strategy, Gloucestershire Hospitals NHS Foundation Trust, Gloucestershire, UK

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Contributors

AJ and JHS designed and collected the data. PF, SP and CB supervised and oversaw AJ during the data collection period. LB calculated and analysed the nutrient model scores. FEL, LB and ARN supervised the data analyses and prepared the manuscript. All authors revised the manuscript and approved the final version.

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Data sharing

No additional data are available.

Competing interests

No competing interests.

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Table 1: NICE Quality Standard 94 “Obesity in children and young people: prevention and lifestyle weight management programmes”

	Quality Statement	How it was assessed and how compliance was defined
Quality Statement 1	Children and young people, and their parents or carers, using vending machines in local authority and NHS venues can buy healthy food and drink options	Foods and drinks were classified as healthy or less healthy using the NPM. A hospital was deemed compliant if it housed one vending machine which contained both one healthy food and one healthy drink
Quality Statement 2	Children and young people, and their parents or carers, see details of nutritional information on menus at local authority and NHS venues.	A hospital was deemed compliant if the majority of its retail outlets displayed nutritional information on their menus
Quality Statement 3	Children and young people, and their parents or carers, see healthy food and drink choices displayed prominently in local authority and NHS venues	Foods and drinks were defined as healthy if they were within the four food groups in the Eatwell Guide. A hospital was deemed compliant if the majority of its retail outlets prominently displayed healthy food and drinks options

NPM, nutrient profile model[17]

Table 2: Mean (sd) nutrient profile model scores for all 40 foods and 15 drinks found in the vending machines; data includes healthy and less healthy foods and drinks. A food is classified as less healthy where it scores ≥ 4 points. A drink is classified as less healthy where it scores ≥ 1 point

	Mean	sd	Range
Crisps, n=10	10.3	4.3	1, 17
Chocolate, n=19	25.6	1.3	23, 27
Sweets, n=2	15.5	0.7	15, 16
Sweet & savoury biscuits, n=4	19.8	6.7	10, 25
Dried fruit and /or nuts, n=5	6.4	12.8	-8, 25
Drinks, n=15	0.5	1.6	-4, 2

Table 3: Consumer Nutrition Environment Tool (C-NET); the questions were asked to ascertain if retail outlets adhered to Quality Statements 2 and 3. Questions around nutritional information for hot and cold meals relate to Quality Statement 2. Questions around advertising and promotions, and the layout & prominent placing of healthy and unhealthy items relate to Quality Statement 3.

Nutritional information for hot and cold meals
Are comprehensive details on nutritional content available for sandwiches, salads and other cold and packaged meal options?
If this information is not provided, are the ingredients listed?
Are comprehensive details on nutritional content available for hot meal options?
If this information is not provided, are details provided about the ingredients and cooking methods?
Are posters or labels used to direct consumers to healthier meal options?
Advertising & Promotions
Are signs or other promotional materials used to advertise healthy options?
Are signs or other promotional materials used to promote unhealthy options?
Are there advertisements for unhealthy items that are clearly aimed at children? For example the use of bright colours, television/cartoon characters and/or specific wording of advertisement?
Are price incentives (e.g. reduced price offers) for healthy items clearly displayed (e.g. using signs)?
Are price incentives (e.g. reduced price offers) for unhealthy items clearly displayed (e.g. displayed at payment area)?
Layout & prominent placing of healthy & unhealthy items
Are healthy food and drink items promoted via prominent placing e.g. near the entrance to a shop or as part of a large/attractive display?
Are unhealthy food & drink options promoted via prominent placing?
Are unhealthy options displayed at the payment area or point of purchase?
Are unhealthy options displayed at an easy height for children to 'grab' (1 metre height)

Table 4. Observed activities which shops, cafes and restaurants engaged in against which compliance to Quality Statement 3 was measured. The number in parentheses is number of shops or cafes or restaurants that engaged in this activity

Quality Statement 3: Prominent placing of healthy options		
	Compliant	Non-compliant
Shops, n=5	Advertising & Promotions <ul style="list-style-type: none"> • 'Meal-deal' promotion includes sugar-free drink options (5) • Poster advertising price promotions on fresh fruit and dried fruit (2) 	Advertising & Promotions <ul style="list-style-type: none"> • Fruit available was not reflective of the fruit advertised on the poster (2) • 'Big Kids Sweet Zone' offering 35 different products at 'pocket money' prices (1) • Posters advertising price promotions on unhealthy options including share-size confectionary, sugar-sweetened beverages, crisps, 'coffee & muffin deal' hotdogs and ice-cream (5) • 'Low saturated fat' sandwich range available but not advertised (2) • 'Meal-deal' poster advertising sandwich, crisps or piece of fruit plus a drink although the fruit option was unavailable in some shops (3) Layout & prominent placing of healthy & unhealthy items <ul style="list-style-type: none"> • Fresh fruit stall located at the back of the shop (1) • Bruised fruit (1) • First visible items on entry were pic'n'mix stalls, confectionary and crisps (5) • Floor-to-ceiling confectionary stall adjacent to the entrance (1) • Multiple rows of confectionary at 1m height (5) • Ice-cream freezer at the entrance and visible from main hospital concourse (2) • Homemade cakes prominently displayed at payment areas (2) • Price promotions on unhealthy snack items prominently displayed at payment areas (2)

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Cafes, n=5	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Poster advertising healthier wraps (roast chicken rainbow/sweet potato/falafel) (1)• Skimmed/semi-skimmed/soya milk advertised as options for drinks & porridge (1)• Poster and table-top advertisements for fruit smoothies containing 100% fruit in 500ml portions stating ‘1 of your 5 a-day’ (1) <p>Layout & prominent placing of healthy & unhealthy items</p> <ul style="list-style-type: none">• ‘Healthier range’ wraps/sandwiches/salads available and clearly labelled (1)• Healthy breakfast options clearly displayed. Options included porridge pots, fruit salad and yoghurt (2)• Fresh fruit salad tubs prominently displayed in glass display cabinet (1)• Salads served without dressing. Self-service dressings available (1)• Prices available for soup with or without a bread roll (1)• 2 healthier snack options prominently displayed which were cereal bars and healthier biscuits (2)• Fresh fruit prominently displayed although no price information was available (1)• Baked crisps available (2)	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Price promotions on baked goods such as brownies displayed prominently next to the payment area (1)• Poster advertisement in main hospital foyer outside café for ‘double chocolate cookie mocha creamy cooler’ (1)• Poster advertisement for ‘Product of the month’ which were cookies (1) <p>Layout & prominent placing of healthy & unhealthy items</p> <ul style="list-style-type: none">• Cakes and other baked goods prominently displayed at service and payment areas (5)• No healthy snacks or fruit available (1)• Crisps and salted nuts prominently displayed next to café entrance and in front of healthier snack items (2)• Large chocolate bar selection available (5)
Restaurants, n=2	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Multiple healthy options advertised in prominent positions including cold breakfast bar, fresh fruit and steamed potatoes (2)• Healthier ‘side options’ advertised using poster entitled “It’s better for you” on the service counter (1)• Poster advertising ‘now serving [Brand Name] (no added sugar) in our restaurant’ (1)• Poster advertising 100% fruit smoothies (2)• Poster advertising ‘lighter breakfast’ options including cereal, yoghurt, fruit, mixed nuts (1)	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Price promotion on home-made cookies with self-service tongs at payment areas (1) <p>Layout & prominent placing of healthy & unhealthy items</p> <ul style="list-style-type: none">• Self-service salad bar no longer in use (1)• ‘Snack’ table in central location near payment areas predominantly serving baked goods (1)• Snack bar and ice-cream freezer located next to payment area and

Layout & prominent placing of healthy & unhealthy items

- First visible stall on entry is a farm stall displaying fresh fruit and vegetables (1)
- Choice of 4 packaged salads available in addition to sandwiches (1)
- Fruit and healthier snack options displayed near payment area (2)
- Healthier and cheaper 'side options' available which include potatoes and vegetable options with clear, comparable prices (2)

cutlery collection area (1)

- Menu displayed by restaurant entrance on stall sponsored by Coca-Cola and states 'Coca Cola – complete your meal' (1)

BMJ Open

Are food and drink retailers within NHS venues adhering to NICE Quality Standard 94 guidance on childhood obesity? A cross-sectional study of two large secondary care NHS hospitals in England



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Are food and drink retailers within NHS venues adhering to NICE Quality Standard 94 guidance on childhood obesity? A cross-sectional study of two large secondary care NHS hospitals in England

List of authors:
A James¹, L Birch², P Fletcher³, S Pearson⁴, C Boyce⁵, AR Ness², J Hamilton-Shield², FE Lithander²

Corresponding author: Fiona Lithander, fiona.lithander@bristol.ac.uk

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Abstract

Objective

To assess whether the food and drink retail outlets in two major National Health Service (NHS) district general hospitals in England adhere to Quality Statements 1-3 of the UK National Institute for Health and Care Excellence (NICE) Quality Standard 94.

Design

Cross-sectional, descriptive study to assess the food and drink options available in vending machines, restaurants, cafes and shops in two secondary care hospitals.

Main outcome measures

Adherence to Quality Statement 1 whereby the food and drink items available in the vending machines were classified as either healthy or less healthy using the Nutrient Profiling Model (NPM). Compliance with Quality Statements 2 and 3 was assessed through the measurement of how clearly the shops, cafes and restaurants displayed nutrition information on menus, and the availability and prominent display of healthy food and drink options in retail outlets, respectively.

Results

Adherence to Quality Statement 1 was poor. Of the 18 vending machines assessed, only 7 (39%) served both a healthy food and a healthy drink option. Neither hospital was compliant with Quality Statement 2 wherein nutritional information was not available on menus of food providers in either hospital. There was inconsistent compliance with Quality Standard 3 whereby healthy food and drink options were prominently displayed in the two main hospital restaurants, but all shops and cafes prioritised the display of unhealthy items.

Conclusions

Neither hospital was consistently compliant with Quality Statements 1-3 of the NICE Quality Standard 94. Improving the availability of healthy foods and drinks whilst reducing the display and accessibility to less healthy options in NHS venues may improve family awareness of healthy alternatives. Making it easier for parents to direct their children to healthier choices is an ostensibly central component of our health care system.

Strengths and limitations of this study

- This is the first study to evaluate the consumer nutrition environment of two NHS hospitals in England, and to assess their compliance to recommendations of the NICE Quality Standards 94.
- Only two hospitals in the same geographical area in England were assessed.
- The inclusion of a second assessor to provide an additional independent evaluation would have been beneficial to reduce possible bias.

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Introduction

Childhood obesity is a global health concern.¹ Almost 10% of 4-5 year olds and 20% of 10-11 year olds in the UK are currently classified as obese^{2,3} which is known to increase morbidity and mortality in later life through its association with cancer, cardiovascular disease and mental health disorders.^{3,4} The doubling of obesity rates between the first and final years of primary school highlights early childhood as a high-risk period for obesogenic factors to take effect.^{2,3} Whilst overweight and obese children are more likely to become obese adults,⁴ healthy weight adults who were obese during childhood have similar risk for metabolic diseases as those who maintained a healthy weight throughout life,⁵ suggesting that childhood is an opportune time for obesity prevention.

There is increasing evidence that the consumer nutrition environment is an important determinant of dietary behaviour and obesity.⁶⁻⁸ The consumer nutrition environment is one of four types of food environments and describes what an individual encounters when he or she enters a venue where food is purchased or consumed.⁹ The consumer nutrition environment accounts for factors that influence food choice within shops such as availability, price, promotions, placement, variety, quality and nutrition information of food and drink^{7,10} and it is understood that consumers' dietary choices are affected by these factors.^{7,11}

The UK National Health Service (NHS) recognises that venues such as hospitals are consumer nutrition environments given that hospitals are venues where food is purchased and consumed. Indeed the NICE Quality Standard 94 (Table 1), which is entitled 'Obesity in children and young people: prevention and lifestyle weight management programmes',⁴ identifies NHS venues as important settings in which to implement childhood obesity prevention strategies. The NICE Quality Standard 94 specifically refers to the availability of healthy foods and drinks in vending machines, nutrition labelling of menus and the prominently placement of healthy food and drink options in NHS venues.⁴ Children may attend an NHS venue, including a hospital, as a patient or a visitor, and can be directly or indirectly influenced by the consumer nutrition environment within a hospital.

Studies conducted in Canada and the USA have assessed consumer nutrition environments in hospitals and have shown that food and drink retailers in both adult^{12,13} and children's^{14,15} hospitals offer unhealthy food and drink options. One of these studies¹⁵ used a tool to assess the consumer nutrition environment by evaluating individual factors such as amount of nutritious food sold at cafeterias, the presence of fast food outlets, the amount of nutritious food alternatives, and the availability of exercise programmes. The other three studies¹²⁻¹⁴ used tools which allowed the creation of a composite score of the environment such as the Hospital Nutrition Environment Scan,^{12,13} or the Nutritional Environmental Measured Survey-cafeteria (NEMS-C).¹⁴ There are many other consumer nutrition environment tools in the

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3 90 literature that have been used in different venues which assess availability, price, variety and quality of fruit
4 91 and vegetables, advertising, product placement, price promotions and labelling.^{7, 16, 17} Regardless of whether
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6 92 these tools assess individual factors or allow the creation of a composite score, it is noteworthy that few
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8 93 have been deemed reliable or valid.⁷ Moreover, most tools have been developed and used in the United
9
10 94 States and Canada and have not been used outside North America.⁷

11 Not only is little known about the consumer nutrition environment in NHS Hospitals in the UK but
12 no tool exists which could comprehensively assess it. The current study addresses a gap in the literature by
13 developing a consumer nutrition environment tool to measure the healthfulness of food outlets of NHS
14 hospitals, and assesses this against NICE Quality Standard 94 which refers to the availability of healthy foods
15 and drinks in vending machines, nutrition labelling of menus, and the prominent placement of healthy food
16 and drink options.
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Table 1: NICE Quality Standard 94 “Obesity in children and young people: prevention and lifestyle weight management programmes”

	Quality Statement	How it was assessed and how compliance was defined
Quality Statement 1	Children and young people, and their parents or carers, using vending machines in local authority and NHS venues can buy healthy food and drink options	Foods and drinks were classified as healthy or less healthy using the NPM. A hospital was deemed compliant if it housed one vending machine which contained both one healthy food and one healthy drink
Quality Statement 2	Children and young people, and their parents or carers, see details of nutritional information on menus at local authority and NHS venues.	A hospital was deemed compliant if the majority of its retails outlets displayed nutritional information on their menus
Quality Statement 3	Children and young people, and their parents or carers, see healthy food and drink choices displayed prominently in local authority and NHS venues	Foods and drinks were defined as healthy if they were within the four food groups in the Eatwell Guide. A hospital was deemed compliant if the majority of its retail outlets prominently displayed healthy food and drinks options

NPM, nutrient profile model

110 **Methods**

111 *Setting/Hospitals*

112 This study was conducted in two major District General Hospitals in the South West of England in July 2016.
113 These two NHS hospitals were chosen as the lead author was studying in these hospitals during this period.
114 Both hospitals offer adult inpatient care; paediatric, day-time access for assessment and out-patients are
115 available in both, but only the larger hospital, provides paediatric inpatient care. One Hospital has
116 approximately 680 beds in total, 8 vending machines and a total of 6 food retail outlets which comprise 1
117 restaurant, 3 cafes and 2 shops. The other has approximately 380 beds, 10 vending machines and 7 food
118 retail outlets comprising 1 restaurant, 2 cafes and 3 shops. The two restaurants served hot and cold meals
119 throughout the day. All shops sold sweet and savoury snack items, cold drinks and pre-packaged sandwiches
120 and salads. The only meals served by the cafes were sandwiches and salads in addition to confectionary,
121 savoury snack items, and hot drinks. All outlets were accessible to both staff and patients. The only two
122 outlets which appeared to differentially target staff rather than patients were the two cafes, one on each
123 hospital site, within the respective Education Centres where staff training and meetings take place, and
124 where several members of staff hold offices. Food and drink retailers in each hospital were evaluated against
125 Quality Statements 1-3 of NICE Quality Standard 94 (Table 1). Data were collected by the lead author during
126 a 2 week period in July 2016 where each vending machine and retail outlet was visited by her on one
127 occasion only.

129 *Assessment Tool*

130 The Consumer Nutrition Environment Tool (C-NET) was developed by the lead author and used two different
131 methods to measure adherence to Quality Standards 1-3 within NICE Quality Statement 94.

133 *Quality Statement 1: "Children and young people, and their parents or carers, using vending machines in local
134 authority and NHS venues can buy healthy food and drink options".*

135 To measure adherence to Quality Statement 1, the user recorded each food and beverage item for sale in
136 each of the vending machines. The nutrient composition for each item was then retrieved from the item
137 packaging or from product nutrition information available online. The UK Department of Health Nutrient
138 Profiling Model (NPM) was used to classify these foods and drinks into two categories; less healthy and
139 healthy, and details of this model and the scoring system have been published elsewhere.¹⁸ To do this, the
140 nutrient content of each food and beverage was assessed against a set of published criteria to determine
141 whether it contains certain nutrients above or below particular thresholds. The NPM identifies foods and
142 drinks that are high in fat, salt or sugar and enables them to be differentiated into two categories, healthy or
143 less healthy, based on their nutrient composition. The NPM uses a scoring system where points are allocated

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144 on the basis of the nutrient content of 100g of a food or beverage. Points are awarded for energy, saturated
145 fat, total sugar and sodium ('A' nutrients) and fruit, vegetable and nut content, fibre and protein ('C'
146 nutrients). The score for 'C' nutrients is subtracted from the 'A' nutrients score to give a final NPM score.
147 Foods that score four points or more, and drinks which score one or more points are classified as 'less
148 healthy' using the NPM. An example is that of raw nuts which had a nutrient composition (per 100g) as
149 follows: 2656kJ, 9.1g saturated fat, 3.7g total sugar, 0.02g salt; this item scored 16 'A' points. Upon
150 calculation of 'C' points for the raw nuts (per 100g), they contained >80% fruit, vegetables or nuts, 6g fibre,
151 and 15.8 g protein, giving it a total of 5 'C' points. The final score for this item was 1, hence this item was
152 classified as healthy according to the NPM. The number of vending machines within each NHS venue where
153 each food and beverage was available was recorded and data collected were used to measure compliance
154 with Quality Statement 1. The NPM was developed by the Food Standards Agency in 2004-2005, and was
155 subject to rigorous scientific scrutiny, extensive consultation, and review. It is supported by the independent
156 Scientific Advisory Committee on Nutrition and a wide range of nutrition experts.¹⁹ The NPM was introduced
157 as mandatory in 2007 by the UK Office of Communications and DH to regulate food and drinks in the context
158 of television advertising to children.

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160 *Quality Statements 2 and 3, respectively: "Children and young people, and their parents or carers, see details*
161 *of nutritional information on menus at local authority and NHS venues" and "Children and young people, and*
162 *their parents or carers, see healthy food and drink choices displayed prominently in local authority and NHS*
163 *venues".*

164 The NPM was not used to measure compliance with Quality Statements 2 or 3; this was done using a more
165 subjective assessment of the consumer nutrition environment by the lead author. To measure adherence to
166 Quality Statements 2 and 3, she evaluated the quality of the consumer nutrition environment within each
167 hospital restaurant, café or shop through answering a series of yes/no questions which centred around 3
168 main themes: the provision of nutrient information for meals on menus (Quality Statement 2), advertising
169 and promotions (Quality Statement 3) and the prominent placing of healthy and unhealthy items in the retail
170 outlets (Quality Statement 3) as outlined in Table 2. The themes were derived directly from the two Quality
171 Statements. For assessment against Quality Statement 2, for example, the lead author examined the retail
172 outlets for the display of calories, fat, saturated fat and sugar on menus, as specified in the Quality
173 Statement itself. Quality Statement 2 was not relevant to the shops as they did not have menus.

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Table 2: Consumer Nutrition Environment Tool (C-NET); the questions were asked to ascertain if retail outlets adhered to Quality Statements 2 and 3. Questions around nutritional information for hot and cold meals relate to Quality Statement 2. Questions around advertising and promotions, and the layout & prominent placing of healthy and unhealthy items relate to Quality Statement 3.

Nutritional information for hot and cold meals. These questions relate to Quality Statement 2 "Children and young people, and their parents or carers, see details of nutritional information on menus at local authority and NHS venues"

Are comprehensive details on nutritional content available for sandwiches, salads and other cold and packaged meal options?

If this information is not provided, are the ingredients listed?

Are comprehensive details on nutritional content available for hot meal options?

If this information is not provided, are details provided about the ingredients and cooking methods?

Are posters or labels used to direct consumers to healthier meal options?

Advertising & Promotions. These questions relate to Quality Statement 3 "Children and young people, and their parents or carers, see healthy food and drink choices displayed prominently in local authority and NHS venues".

Are signs or other promotional materials used to advertise healthy options?

Are signs or other promotional materials used to promote unhealthy options?

Are there advertisements for unhealthy items that are clearly aimed at children? For example the use of bright colours, television/cartoon characters and/or specific wording of advertisement?

Are price incentives (e.g. reduced price offers) for healthy items clearly displayed (e.g. using signs)?

Are price incentives (e.g. reduced price offers) for unhealthy items clearly displayed (e.g. displayed at payment area)?

Layout & prominent placing of healthy & unhealthy items. These questions relate to Quality Statement 3 "Children and young people, and their parents or carers, see healthy food and drink choices displayed prominently in local authority and NHS venues".

Are healthy food and drink items promoted via prominent placing e.g. near the entrance to a shop or as part of a large/attractive display?

Are unhealthy food & drink options promoted via prominent placing?

Are unhealthy options displayed at the payment area or point of purchase?

Are unhealthy options displayed at an easy height for children to 'grab' (1 metre height)

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184 For Quality Statement 3, the lead author’s knowledge of the Eatwell Guide²⁰ was used whereby foods
185 within the food groups such as fruit, vegetables, dairy, wholegrain and high fibre foods, eggs, lean meat and
186 pulses, were classified as healthy, and foods and drinks which are high in fat, salt and sugars such as biscuits,
187 sweets, chocolate, and sugar sweetened beverages were classified as unhealthy. Quality Statement 3
188 includes phrases such as 'can easily find' healthy food, and that these items were 'prominently displayed' and
189 descriptions of these terms are outlined in Table 2.

190 *Procedure*

191 Compliance with Quality Statement 1 was observed if a NHS venue had a vending machine where at least
192 one healthy food and at least one healthy beverage option were available for sale in the same machine.
193 Compliance with Quality Statement 2 was observed if retail outlets provided information on energy, total fat,
194 saturated fat, salt and sugar content of meals and snacks. Quality Statement 2 states that listing ingredients
195 and cooking methods constitutes an acceptable level of nutritional information if the information on energy,
196 fat, saturated fat, salt and sugar content is not available. Drinks were not assessed as part of Quality
197 Statement 2 since the rationale provided by NICE refers to food only. When nutrient information was not
198 clearly displayed, the lead author liaised with members of catering staff to identify whether this information
199 would be available on request. With respect to Quality Statement 3, the lead author examined whether
200 healthy and less healthy foods and drinks were advertised outside the venues, whether advertising stalls
201 containing food and drink items were placed nearest the door of the shop, café or restaurant, whether items
202 were at a child’s eye level which was classified as 1 metre height, and whether items were displayed at the
203 payment area. Compliance with Quality Statement 3 was observed if healthy food and drink choices were
204 displayed prominently in the retail outlets and poor compliance was deemed if unhealthy options were
205 prominently displayed. Items were deemed to be prominently displayed if they were placed at the entrance
206 to the retail outlet and hence visible to those walking past, beside queuing and payment areas, or if they
207 were accompanied by signs advertising the product or detailing price promotions. Though price was not
208 specifically mentioned in Quality Statements 1, 2 or 3, the price of vending machine items and the existence
209 of price promotions were both assessed as part of this study. Quality Statement 1 asks that venues ensure
210 that children and their carers ‘can buy’ healthy items and Quality Statement 3 requires that healthy food and
211 drink items are ‘promoted’. Both Statements thus require reasonable accessibility to healthy options.
212 Accessibility applies not only to the physical display and number of items, but also to the financial
213 accessibility. The definition of compliance with the three Quality Statements was selected by the authors
214 given the lack of guidance regarding what constituted compliance provided by NICE Quality Standard 94.

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216 *Data analyses*

217 Data on the NPM scored are presented as mean (sd) and range. Qualitative data were initially coded and
218 collated into themes by the lead author. Interpretation of these data and the identification of themes was
219 reviewed and discussed by multiple authors (AJ, LB, FEL) throughout the process.

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For peer review only

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221 **Results**

222 Two restaurants, 5 cafes, 5 shops and 18 vending machines were included in the analyses across both
223 hospital sites. Data were originally collected from 29 vending machines but 11 were excluded from analyses.
224 Ten vending machines, which sold hot drinks only, were excluded because nutrition information was not
225 clearly displayed nor was it available online or from the supplier when requested by the lead author. One
226 vending machine, which sold only frozen items such as burgers, was also excluded because this machine was
227 removed from the hospital before the end of the data collection period.

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229 *Quality Statement 1: “Children and young people, and their parents or carers, using vending machines in local*
230 *authority and NHS venues can buy healthy food and drink options”*

231 Of the 18 vending machines, 7 (39%) offered both a healthy food and a healthy drink (Table 3). 55 different
232 items were on sale across all 18 vending machines, 40 of which were foods and 15 were drinks. Where the
233 same drink was served in a 330ml can or in a larger 500ml bottle, this was classified as two separate drinks.
234 When the 40 foods alone were assessed using the NPM, the mean (sd) NP score was 18.3, (9.3). Only 4 of the
235 40 (10%) foods were classified as healthy with a NP score of less than 4; these items were baked crisps, a
236 packet of dried fruit and nuts, a packet of raw nuts and a muesli bar (mean (sd) NP score -1.3 (4.5)). When
237 the other 36 (90%) food items were analysed according to the NPM, the mean (sd) NP score was 20.5 (6.8),
238 significantly greater than the cut-off for the less healthy classification of 4 points or more. The 4 healthy
239 foods items were priced equivalently to similar less healthy items available in the vending machines.

240 When the drinks were assessed, 8 of the 15 (53%) available were classified as healthy (NP score -0.5
241 (sd 1.4)) using the NPM cut-off of 1 point or more, and the remainder classified as less healthy (NP score 1.7
242 sd (0.5)). The drinks that were classified as healthy were an orange flavoured sugar sweetened beverage,
243 concentrated orange juice, bottled water, and sugar-free cola drinks.

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Table 3: Mean (sd) nutrient profile model scores for all 40 foods and 15 drinks found in the vending machines; data includes healthy and less healthy foods and drinks. A food is classified as less healthy where it scores ≥ 4 points. A drink is classified as less healthy where it scores ≥ 1 point

	Mean	sd	Range
Crisps, n=10	10.3	4.3	1, 17
Chocolate, n=19	25.6	1.3	23, 27
Sweets, n=2	15.5	0.7	15, 16
Sweet & savoury biscuits, n=4	19.8	6.7	10, 25
Dried fruit and / or nuts, n=5	6.4	12.8	-8, 25
Drinks, n=15	0.5	1.6	-4, 2

Quality Statement 2: "Children and young people, and their parents or carers, see details of nutritional information on menus at local authority and NHS venues"

Neither hospital was compliant with Quality Statement 2. When the two restaurants were analysed against Quality Statement 2, it was found that neither displayed nutrition information on their menus for hot or cold meals. When the lead author asked the retail staff, she was informed that this information was available only for cold fillings offered with jacket potatoes and for a proportion of the filled sandwiches on sale. Quality Statement 2 states that if the nutrient content of a recipe is unavailable to consumers, the ingredients and cooking methods should be available. Whilst this information was not displayed on menus, catering staff advised that this information would be available on request, though it was not specifically requested by the lead author as part of this study. Though not displayed on menus, a range of sandwiches and salads that were made onsite were available in the restaurants. Nutritional information detailing total energy, fat, saturated fat, sugar and salt content was displayed on the labels of these items.

None of the cafes provided nutrient information on their menus, meaning that all five cafes were not compliant with Quality Statement 2. However, three of the cafes offered pre-packaged sandwiches and comprehensive nutrition information was available on the packaging of these. The remaining two cafes sold sandwiches, baguettes and salads made by a local catering company. Catering staff in these cafes advised that specific nutrition information was not available for these items but that details of ingredients were available on request, though the lead author did not specifically request this information.

279 *Quality Statement 3: “Children and young people, and their parents or carers, see healthy food and drink*
280 *choices displayed prominently in local authority and NHS venues”.*
281 There was inconsistent compliance to Quality Statement 3 in both hospitals (Table 4). When the two
282 restaurants were analysed, adherence to Quality Statement 3 varied. One of the restaurants housed a stall
283 inside the entrance, which sold fresh fruit, vegetables, and local produce and was labelled as a ‘Farm Shop’.
284 The same restaurant also sold steamed potatoes and these, in addition to fresh vegetables, were clearly
285 advertised as a cheaper option than a portion of chips. In the second restaurant, there were several signs
286 which advertised ‘Healthier Options’. This included a ‘lighter breakfast’ which comprised grapefruit
287 segments, natural yoghurt, a bowl of breakfast cereal with milk, a pastry and a cheese portion, both of which
288 are less healthy options. Healthier snack options such as fresh fruit were prominently displayed on service
289 counters and by the payment area. All five cafes demonstrated good adherence to Quality Statement 3. The
290 balance of healthy and less healthy items on display in the most prominent areas such as the queuing or
291 payment area was equal and there was less evidence of advertising and price promotions on less healthy
292 items than in the shops. Fresh fruit was available beside the payment areas in 4 of the 5 cafes. However
293 baked goods such as muffins, scones, cookies and cakes were displayed in glass cabinets or on the counter
294 surface next to the queuing and payment area in all 5 cafes.

Table 4. Observed activities which shops, cafes and restaurants engaged in against which compliance to Quality Statement 3 was measured. The number in parentheses is number of shops or cafes or restaurants that engaged in this activity.

<i>Quality Statement 3: "Children and young people, and their parents or carers, see healthy food and drink choices displayed prominently in local authority and NHS venues".</i>		
	Compliant	Non-compliant
Shops, n=5	<i>Advertising & Promotions</i> <ul style="list-style-type: none"> • 'Meal-deal' promotion includes sugar-free drink options (5) • Poster advertising price promotions on fresh fruit and dried fruit (2) 	<i>Advertising & Promotions</i> <ul style="list-style-type: none"> • Fruit available was not reflective of the fruit advertised on the poster (2) • 'Big Kids Sweet Zone' offering 35 different products at 'pocket money' prices (1) • Posters advertising price promotions on unhealthy options including share-size confectionary, sugar-sweetened beverages, crisps, 'coffee & muffin deal' hotdogs and ice-cream (5) • 'Low saturated fat' sandwich range available but not advertised (2) • 'Meal-deal' poster advertising sandwich, crisps or piece of fruit plus a drink although the fruit option was unavailable in some shops (3) <i>Layout & prominent placing of healthy & unhealthy items</i> <ul style="list-style-type: none"> • Fresh fruit stall located at the back of the shop (1) • Bruised fruit (1) • First visible items on entry were pic'n'mix stalls, confectionary and crisps (5) • Floor-to-ceiling confectionary stall adjacent to the entrance (1) • Multiple rows of confectionary at 1m height (5) • Ice-cream freezer at the entrance and visible from main hospital concourse (2) • Homemade cakes prominently displayed at payment areas (2) • Price promotions on unhealthy snack items prominently displayed at payment areas (2)

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Cafes, n=5	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Poster advertising healthier wraps (roast chicken rainbow/sweet potato/falafel) (1)• Skimmed/semi-skimmed/soya milk advertised as options for drinks & porridge (1)• Poster and table-top advertisements for fruit smoothies containing 100% fruit in 500ml portions stating ‘1 of your 5 a-day’ (1) <p>Layout & prominent placing of healthy & unhealthy items</p> <ul style="list-style-type: none">• ‘Healthier range’ wraps/sandwiches/salads available and clearly labelled (1)• Healthy breakfast options clearly displayed. Options included porridge pots, fruit salad and yoghurt (2)• Fresh fruit salad tubs prominently displayed in glass display cabinet (1)• Salads served without dressing. Self-service dressings available (1)• Prices available for soup with or without a bread roll (1)• 2 healthier snack options prominently displayed which were cereal bars and healthier biscuits (2)• Fresh fruit prominently displayed although no price information was available (1)• Baked crisps available (2)	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Price promotions on baked goods such as brownies displayed prominently next to the payment area (1)• Poster advertisement in main hospital foyer outside café for ‘double chocolate cookie mocha creamy cooler’ (1)• Poster advertisement for ‘Product of the month’ which were cookies (1) <p>Layout & prominent placing of healthy & unhealthy items</p> <ul style="list-style-type: none">• Cakes and other baked goods prominently displayed at service and payment areas (5)• No healthy snacks or fruit available (1)• Crisps and salted nuts prominently displayed next to café entrance and in front of healthier snack items (2)• Large chocolate bar selection available (5)
Restaurants, n=2	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Multiple healthy options advertised in prominent positions including cold breakfast bar, fresh fruit and steamed potatoes (2)• Healthier ‘side options’ advertised using poster entitled “It’s better for you” on the service counter (1)• Poster advertising ‘now serving (Brand Name) (no added sugar) in our restaurant’ (1)• Poster advertising 100% fruit smoothies (2)• Poster advertising ‘lighter breakfast’ options including cereal, yoghurt, fruit, mixed nuts (1) <p>Layout & prominent placing of healthy & unhealthy items</p>	<p>Advertising & Promotions</p> <ul style="list-style-type: none">• Price promotion on home-made cookies with self-service tongs at payment areas (1) <p>Layout & prominent placing of healthy & unhealthy items</p> <ul style="list-style-type: none">• Self-service salad bar no longer in use (1)• ‘Snack’ table in central location near payment areas predominantly serving baked goods (1)• Snack bar and ice-cream freezer located next to payment area and cutlery collection area (1)• Menu displayed by restaurant entrance on stall sponsored by Coca-Cola and states ‘Coca Cola – complete your meal’ (1)

	<ul style="list-style-type: none">• First visible stall on entry is a farm stall displaying fresh fruit and vegetables (1)• Choice of 4 packaged salads available in addition to sandwiches (1)• Fruit and healthier snack options displayed near payment area (2)• Healthier and cheaper ‘side options’ available which include potatoes and vegetable options with clear, comparable prices (2)	
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300 Healthy options made up approximately 25% of the food and beverage items available in the shops and these
301 items were displayed in less prominent locations such as at the back of the shop or on low-lying shelves.
302 Posters were used in all of the hospital shops and cafes to advertise price promotions on less healthy options
303 including signs placed outside shops and cafes to advertise items such as hot dogs and ice cream. Cakes
304 made onsite were displayed next to the payment area in 2 of the shops, and less healthy options including
305 muffins and chocolate bars were displayed at the payment areas in all shops and cafes. Price promotions
306 were advertised for several of these less healthy products displayed at the payment area.
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308 The layout of the unhealthy items in many of the shops appeared to target children. The 'pic n mix' sweet
309 stalls in both of the largest shops had prominent positions near the entrance and products such as colourful
310 sugar-sweetened iced drinks, lollipops and chocolate eggs containing small toys were displayed at the
311 payment area or at a child's eye level. There was a display in one shop with a sign which read 'Big Kids Sweet
312 Zone' offering 35 different sweets all priced at less than £1. Both of the largest shops used posters to
313 advertise a price deal on fresh fruit, however fruit stalls were not in a prominent location and were poorly
314 stocked.

Discussion

This study is the first to describe the consumer nutrition environment of two NHS hospitals in England and to assess their compliance with NICE Quality Standard 94. We found that food and drink retailers in these two hospitals demonstrated poor compliance with this Quality Standard. Only 39% of vending machines across both hospitals served both one healthy food and one healthy drink option indicating poor compliance with Quality Statement 1. Moreover, 90% (36/40) of the food items in the vending machines were classified as less healthy suggesting that the consumer may have difficulty identifying and locating the 10% of items classified as healthy. 53% (8/15) of the drink items available were classified as unhealthy. It was found that the two hospitals were not compliant with Quality Statement 2, which refers to the availability of nutritional information at the point of choosing food or drink. Compliance was variable in relation to Quality Statement 3, where restaurants engaged in various activities in the display of healthy options yet all cafes and shops favoured the prominent display and advertising of unhealthy foods and drinks.

Hospitals have a role to play in advocating for healthy lifestyle and good nutrition.^{21, 22} Choice architecture describes the concept that behaviour could be changed in anticipated ways by changing the environments where people make choices.^{23, 24} The alteration of micro-environments, which are settings where people may congregate for a specific purpose,²⁵ including hospitals, may be one approach to encourage healthier dietary behaviour, and studies have shown that minor changes in accessibility to food can decrease food intake.²⁶ The consumer nutrition environment in 14 children's hospitals in California was assessed and it has been suggested that nutrition intervention is needed to improve the availability of healthy food and beverage options.¹⁴ The authors of that research suggest that inexpensive interventions could be used such as providing nutrient information and introducing signage that promotes healthy choices.¹⁴ McDonald and co-workers¹⁵ reported that university-affiliated children's hospitals in Canada and the US provide a suboptimal health environment, and hypothesise that a reliance on revenue from outlets which provide less nutritious foods may be a factor. Such results are not restricted to children's hospitals however. Winston and co-workers^{12, 13} described the nutrition environment of 39 hospitals in the USA, and found that the consumer nutrition environment was poor and suggested that dietary interventions are justified in health settings.

The current study found that only 39% of vending machines provided both a healthy food and a healthy drink, and yet this result must be interpreted with caution. The most widely available healthy food item was baked crisps which were found in 33% vending machines, and when presented in the same vending machine as a healthy drink such as bottled water or a sugar-free drink, the machine, and by extension the hospital, was classified as compliant with Quality Statement 1. It is known that nutrient profile schemes have become drivers for product reformulation¹⁸ and the baked crisps, and indeed the orange flavoured sugar sweetened

349 beverage which was classified as healthy, may have been reformulated to meet the NPM criteria. It is
350 noteworthy that both of these items are classified as unhealthy according to the Eatwell Guide²⁰ where they
351 are both in the category of foods which are high in fat, salt and sugar yet are classified as healthy when the
352 NPM was used.

353

354 It is well accepted that nutrition information at the point of purchase can influence food choice.²⁷ Consumers
355 under-estimate by 2 to 4 times the saturated fat, energy and sodium content of restaurant foods,²⁷ yet
356 providing accurate point-of-sale nutrition information is known to improve consumer choice.²⁷ None of the
357 restaurants, cafes or shops examined in the current study were compliant with Quality Statement 2, which
358 states that nutrition information should be available for consumers at the point of choosing food and drink
359 options. It is a hospital's duty to empower consumers with the information required to make an informed
360 choice.²⁸ When asked, staff suggested that nutrition information would be provided to consumers on request
361 yet the format of this information, exactly when it would be provided, and how user-friendly it would be, is
362 unknown.

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364 The availability and accessibility of unhealthy foods have been identified as risk factors for overeating²⁹ and it
365 is understood that the prominence of food and drinks displays can influence consumer choice.^{30, 31} In the
366 current study, the restaurants demonstrated variable compliance to Quality Statement 3 which states that
367 healthy food and drink options are displayed prominently. Evidence of good practice included one restaurant
368 which advertised fresh fruit and vegetables at competitive prices, whilst the other advertised what was
369 referred to as a 'lighter breakfast'. This option, however, also included a pastry and cheese portion, both of
370 which are known to be high in fat, saturated fat and salt. The 5 shops and 5 cafes all prioritised the
371 prominent display of unhealthy options, and whilst fruit was available beside the payment area in 4 of the 5
372 cafes albeit poorly stocked, so too were unhealthy baked goods which were displayed by the payment area
373 in all 5 cafes. Research has shown that unhealthy food and drink items are difficult for consumers to avoid in
374 supermarkets, as not only do they take up more shelf space than healthy items such as fruit and vegetables,
375 but are more often displayed at payment areas, as seen in the current study.³²⁻³⁴ Moreover, the placement of
376 healthy food items at a payment area can lead to a substantial positive impact on sales of these products.³⁵
377 In addition, both of the largest shops in the current study displayed an array of sweets, chocolate and sugar-
378 sweetened drinks at child's eye level, and evidence suggests that placing products on shelves at eye-level
379 positively influences sales.³⁰

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381 The Consumer Nutrition Environment Tool (C-NET) used in the current study was developed by the lead
382 author of this study. Whilst this tool has not been validated, it allowed both the objective collection of data

using the NPM, and the subjective assessment of marketing practices that contribute to food purchases using a series of questions (Table 2). Other studies which have assessed food retailers in hospitals have used a variety of methods; some relied on telephone interviews with cafeteria directors which may have biased the data collected¹⁵ whilst others used a validated tool such as the University of Pennsylvania Nutrition Environment Measures Scale (NEMS). However, no equivalent British tool was found and thus the lead author developed the C-NET. This model was selected for use in the current study as it is widely regarded as scientifically robust and effective in identifying less healthy items, and in practical terms, it is well established in the UK. There are other government endorsed NPMs available, such as the EU Pledge model and the WHO Europe model, but these use multiple categories and subcategories of foods which have raised concerns of ambiguity and additional complexity that may reduce the clarity and transparency of the models.³⁶ They also do not have the same track record of effective use in the UK regulatory environment. The Committee of Advertising Practice (CAP), the lead UK organisation that write and maintain the UK Advertising Codes to ensure advertising in the UK is legal, decent, honest and truthful, have adopted the DH NPM in their recently published regulatory statement on food and soft drink advertising to children, which was developed following public consultation and will come into effect in the UK on 1 July 2017.³⁷

Consumer organisations have set up campaigns in the UK and Australia asking supermarkets to remove unhealthy food and drink items from payment and queuing areas³⁸⁻⁴⁰ but it is not known if such campaigns exist for retail outlets in hospitals. NICE Quality Standards are a set of prioritised statements, which draw on existing guidance to set out the priority areas for quality improvement in health and social care. They are designed to drive measurable quality improvements yet, using them in the current study has proven challenging. Quality Statement 1 refers to the availability of 'healthy food and drink options' in vending machines, yet nowhere in NICE Quality Standard 94 or in the associated documents is there a clear definition of what 'healthy' means, and it was on this basis that the DH NPM was chosen as a method of classification. Moreover, the definition of compliance to Quality Statement 1, where a vending machine contained both a healthy food and a healthy drink was chosen by the study authors given the lack of guidance on what constitutes as compliance from NICE Quality Standard 94. The authors considered compliance to Quality Statements 2 and 3 if most retail outlets in the hospitals adhered to the respective statement. 'Evidence' of 'arrangements to display healthy food and drink options in prominent places' constitutes adherence to Quality Statement 3 according to NICE Quality Standard 94. However, challenges arose in assessing what constituted a 'healthy option' and a 'prominent place', and was subjective. The measurement of adherence to all three Quality Statements is open to interpretation, and assessment of adherence was a challenging task given their non-quantifiable and non-specific nature. NICE Quality Standard 94 would benefit from being

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416 measurable and, in the first instance, hospital venues could strive towards a balance of 50% healthy and 50%
417 less healthy food and drinks.

418 The main limitation of the current study is that only two hospitals were included, both of which are in the
419 same geographical area in England. Moreover, a second assessor would have provided an additional
420 independent evaluation of the offerings. A further limitation is that the methodological approach for Quality
421 Statements 2 and 3 is qualitative and subjective in nature, and future studies could use published tools which
422 provide quantitative measurement variables and describe a systematic approach to data collection.^{7, 41}

423 Further research is needed on a more representative sample of hospitals to fully understand compliance to
424 NICE Quality Standard 94. However, such a study would be subject to similar limitations in terms of the vague
425 nature of this Quality Standard and a more objective means of assessing adherence to the Statements within
426 the Quality Standard would be necessary.

427

428 In conclusion, the current study showed that two NHS hospitals demonstrated poor compliance with Quality
429 Statements 1-3 in NICE Quality Standard 94. The lack of availability of healthy foods and drinks, the absence
430 of nutritional information on the menus, the lack of advertising and display of healthy items and the
431 consistent advertising and prominent display of unhealthy items highlights that improvements are required
432 in NHS venues such as hospitals. These findings have been shared with the NHS Trust of one of these
433 hospitals and re-evaluation will take place in the future. However, as the prevalence of childhood obesity
434 continues to rise globally, it is important that every opportunity is taken to improve the nutrition
435 environment for children's food choices. Hospitals have a duty to provide consumers with the information
436 required to make informed nutrition choices and should take the lead in supplying food and drinks that
437 reflect evidence based nutrition.²⁸

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439 Author affiliations:

440 ¹5th year medical student, Faculty of Health Sciences, University of Bristol

441 ²National Institute for Health Research Biomedical Research Centre, Bristol (Nutrition Theme), University
442 Hospitals Bristol NHS Foundation Trust and the University of Bristol, UK

443 ³Department of General and Old Age Medicine, Cheltenham General Hospital, Gloucestershire, UK,

444 ⁴Department of Clinical Strategy, Gloucestershire Hospitals NHS Foundation Trust, Gloucestershire, UK

445 ⁵Department of Clinical Strategy, Gloucestershire Hospitals NHS Foundation Trust, Gloucestershire, UK

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451 Contributors

452 AJ and JHS designed and collected the data. PF, SP and CB supervised and oversaw AJ during the data
453 collection period. LB calculated and analysed the nutrient model scores. FEL, LB and ARN supervised the data
454 analyses and prepared the manuscript. All authors revised the manuscript and approved the final version.

455

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460 Data sharing

461 No additional data are available.

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463 Competing interests

464 No competing interests.

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