Assessment of good practices in hospital food service by comparing evaluation tools

Juliana Macedo Gonçalves¹, Kelly Lameiro Rodrigues², Ângela Teresinha Santiago Almeida³, Giselda Maria Pereira³ and Márcia Rúbia Duarte Buchweitz²

¹Programa de Posgrado en Nutrición y Alimentos, Universidad Federal de Pelotas, Pelotas, RS. ²Departamento de Nutrición, Universidad Federal de Pelotas, Facultad de Nutrición, Pelotas, RS. ³Departamento de Matemática y Estatística, Instituto de Física y Matemática, Universidad Federal de Pelotas, Pelotas, RS. Brasil.

Abstract

Introduction: since food service in hospitals complements medical treatment, it should be produced in proper hygienic and sanitary conditions. It is a well-known fact that food-transmitted illnesses affect with greater severity hospitalized and immunosuppressed patients.

Aims: good practices in hospital food service are evaluated by comparing assessment instruments.

Methods: good practices were evaluated by a verification list following Resolution of Collegiate Directory n. 216 of the Brazilian Agency for Sanitary Vigilance. Interpretation of listed items followed parameters of RCD 216 and the Brazilian Association of Collective Meals Enterprises (BACME). Fisher’s exact test was applied to detect whether there were statistically significant differences. Analysis of data grouping was undertaken with Unweighted Pair-group using Arithmetic Averages, coupled to a correlation study between dissimilarity matrices to verify disagreement between the two methods.

Results and discussion: Good Practice was classified with mean total rates above 75% by the two methods. There were statistically significant differences between services and food evaluated by BACME instrument. Hospital Food Services have proved to show conditions of acceptable good practices.

Conclusion: the comparison of interpretation tools based on RCD n. 216 and BACME provided similar results for the two classifications.

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Correspondence: Márcia Rúbia Duarte Buchweitz. Departamento de Nutrición, Universidad Federal de Pelotas, Facultad de Nutrición. Calle Gomes Carneiro, n° 1, Campus Universitario Porto, CEP 96010-610, Pelotas, RS, Brasil. E-mail: marciabuchweitz@yahoo.com.br

Introduction

A hospital's Food Service (FS) comprises the sector that caters for meals to hospital staff, patients and their kin by attending to a diet therapy regime and enhancing nutrition education. Since food in hospitals is a complement to medical treatment, it should be produced in adequate hygienic and sanitary conditions, due to the fact that food-transmitted diseases affect hospitalized and immunosuppressed patients with greater severity. Consequently, the implementation of strict practices in sanitary safety during the production of hospital meals is mandatory and thus more organic harm may be avoided to the subjects' already compromised health conditions.

Good Practice (GP) may be defined as a set of procedures that should be adopted by FS to warrant hygiene and sanitary quality according to the law. It is rather a wide term and comprises items such as environmental conditions, installations, reception and storing of food, maintenance, hygiene and disinfection of equipments, utensils and work places, pest control, drinkability of water and cleanliness of the people who handle food.

The verification list for the diagnostic assessment of food processing conditions provides a fast and easy visualization of the negative and positive points and thus a detailed analysis of each site. The Resolution of Collegiate Directory (RCD) n. 216 published by the Brazilian Agency of Sanitary Vigilance (BASV) lays down procedures for food service and evaluates their quality. However, the interpretation and quantification of risks are classified as conformant or not to current legislation.

Another assessment tool for Good Practice used by the Brazilian Association of Collective Meals Enterprises (BACME) is foregrounded on the same legislation (RCD n. 216) coupled to the dimension of inadequacies with regard to severity. This interpretation may be a great help in listing priorities for the introduction of recommended corrective measures.

Current analysis evaluated the implementation of Good Practice in food services in hospitals by comparing the assessment tools.

Methods

Sample

Current investigation was undertaken in four hospital Food Services in Pelotas RS Brazil, tagged as A, B, C and D.

Research project was analyzed and approved by the Committee for Ethics in Research of the Faculty of Dentistry of the Universidade Federal de Pelotas (Protocol 205/2011).

Assessment of Good Practice

GP in hospital FS was assessed by a verification list according to RCD n. 216 comprising the following items: premise, installations, equipment, furniture and utensils; hygiene of rooms; integrated control of vectors and pests; water supply; disposal of residues; handlers; raw material, ingredients and packaging; preparation of food; storing and transport of the product; shelf exposure; documents, registration and technical responsibility.

Interpretation of the verification list

The results from the verification list of RCD n. 216 were analyzed by two different classifications: a simplified classification based on RCD n. 216 and a classification with different scores according to the degree of severity of faults, based on BACME.

Items listed by RCD n. 216 were classified ‘conformant’, ‘non-conformant’ and ‘not applicable’. The number of conformant items was added and given in numbers and percentages, whereas non-applicable items were excluded from final tally.

The BACME system required the classification of items according to risk level within the microbiological safety of the food and received different scores according to the level of severity in non-conformity. Score 2 meant low non-conformity level; score 5 was equivalent to average non-conformity level; score 10 equaled severe non-conformity level. Scores were then added and given in numbers and percentages, excluding the non-applicable items. The higher the score total, the better was the FS classification.

Statistical analysis

A descriptive analysis of data was performed with averages and percentages of the variables. After the analysis of variation test, Fisher’s exact test was applied to verify whether there were statistically significant differences between the different food services with regard to conformant percentages for each item, with STATA and SPSS 20.0 at 5% significance level.

Group analysis by Unweighted Pair-group using Arithmetic averages (UPGMA) verified similarity between food services with regard to variables in each method. Dissimilarity measures were obtained by the complement of simple coincidence coefficient and mean Euclidian distance for the variables of the respective interpretation methods RCD n. 216 and BACME. Further, the co-relationship between dissimilarity matrices was undertaken to verify any agreement between the methods. GENES evaluated multivariate analyses.

Results and discussion

Tables I and II show Good Practice evaluated by RCD n. 216 and BACME, with mean total rates
### Table I

*Fitness of Good Practice, according to RCD n. 216*, in hospital food services in the municipality of Pelotas RS Brazil, 2015

<table>
<thead>
<tr>
<th>Assessed Items</th>
<th>Assessed Subitems n</th>
<th>FS&lt;sup&gt;2&lt;/sup&gt; &lt;br&gt; A &lt;br&gt; Fitness n (%)</th>
<th>FS &lt;br&gt; B &lt;br&gt; Fitness n (%)</th>
<th>FS &lt;br&gt; C &lt;br&gt; Fitness n (%)</th>
<th>FS &lt;br&gt; D &lt;br&gt; Fitness n (%)</th>
<th>p-rate&lt;sup&gt;3&lt;/sup&gt; (5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise</td>
<td>19</td>
<td>12 (63.2)</td>
<td>10 (52.6)</td>
<td>14 (73.7)</td>
<td>12 (63.2)</td>
<td>0.65</td>
</tr>
<tr>
<td>Hygiene</td>
<td>6</td>
<td>5 (83.3)</td>
<td>6 (100)</td>
<td>4 (66.7)</td>
<td>4 (66.7)</td>
<td>0.70</td>
</tr>
<tr>
<td>Pest control</td>
<td>4</td>
<td>4 (100)</td>
<td>4 (100)</td>
<td>4 (100)</td>
<td>4 (100)</td>
<td>–</td>
</tr>
<tr>
<td>Water supply</td>
<td>2</td>
<td>2 (100)</td>
<td>2 (100)</td>
<td>2 (100)</td>
<td>2 (100)</td>
<td>–</td>
</tr>
<tr>
<td>Residue management</td>
<td>3</td>
<td>1 (33.3)</td>
<td>1 (33.3)</td>
<td>3 (100)</td>
<td>2 (66.7)</td>
<td>0.59</td>
</tr>
<tr>
<td>Handlers</td>
<td>15</td>
<td>13 (86.7)</td>
<td>13 (86.7)</td>
<td>12 (80.0)</td>
<td>11 (73.3)</td>
<td>0.89</td>
</tr>
<tr>
<td>Raw material</td>
<td>7</td>
<td>7 (100)</td>
<td>7 (100)</td>
<td>7 (100)</td>
<td>6 (85.7)</td>
<td>1</td>
</tr>
<tr>
<td>Food Preparation</td>
<td>16</td>
<td>14 (87.5)</td>
<td>12 (75.0)</td>
<td>13 (81.3)</td>
<td>14 (87.5)</td>
<td>0.93</td>
</tr>
<tr>
<td>Storage</td>
<td>3</td>
<td>1 (33.3)</td>
<td>3 (100)</td>
<td>2 (66.7)</td>
<td>3 (100)</td>
<td>0.51</td>
</tr>
<tr>
<td>Shelf exposure</td>
<td>9</td>
<td>8 (88.9)</td>
<td>8 (88.9)</td>
<td>8 (88.9)</td>
<td>8 (88.9)</td>
<td>1</td>
</tr>
<tr>
<td>Documentation</td>
<td>3</td>
<td>3 (100)</td>
<td>3 (100)</td>
<td>3 (100)</td>
<td>3 (100)</td>
<td>–</td>
</tr>
<tr>
<td>Technical responsibility</td>
<td>2</td>
<td>2 (100)</td>
<td>2 (100)</td>
<td>2 (100)</td>
<td>2 (100)</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>72 (80.9)</td>
<td>71 (79.8)</td>
<td>74 (83.2)</td>
<td>71 (79.8)</td>
<td>0.93</td>
</tr>
</tbody>
</table>

<sup>1</sup>RCD = Resolution of Collegiate Directory n. 216 - National Health Surveillance Agency.

<sup>2</sup>Food Service.

<sup>3</sup>p-rate (Fisher’s exact test).

### Table II

*Fitness to Good Practice according to BACME<sup>1</sup> in hospital food services in the municipality of Pelotas RS Brazil, 2015*

<table>
<thead>
<tr>
<th>Items</th>
<th>Total of scores</th>
<th>FS&lt;sup&gt;2&lt;/sup&gt; &lt;br&gt; A &lt;br&gt; P&lt;sup&gt;1&lt;/sup&gt; (%)</th>
<th>FS &lt;br&gt; B &lt;br&gt; P (%)</th>
<th>FS &lt;br&gt; C &lt;br&gt; P (%)</th>
<th>FS &lt;br&gt; D &lt;br&gt; P (%)</th>
<th>p-rate&lt;sup&gt;4&lt;/sup&gt; (5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise</td>
<td>139</td>
<td>87 (62.6)</td>
<td>62 (44.6)</td>
<td>97 (69.8)</td>
<td>79 (56.8)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hygiene</td>
<td>50</td>
<td>45 (90)</td>
<td>50 (100)</td>
<td>35 (70)</td>
<td>35 (70)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Pest control</td>
<td>40</td>
<td>40 (100)</td>
<td>40 (100)</td>
<td>40 (100)</td>
<td>40 (100)</td>
<td>-</td>
</tr>
<tr>
<td>Water supply</td>
<td>20</td>
<td>20 (100)</td>
<td>20 (100)</td>
<td>20 (100)</td>
<td>20 (100)</td>
<td>-</td>
</tr>
<tr>
<td>Residue management</td>
<td>25</td>
<td>10 (40)</td>
<td>10 (40)</td>
<td>25 (100)</td>
<td>15 (60)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Handlers</td>
<td>112</td>
<td>97 (86.6)</td>
<td>92 (82.1)</td>
<td>87 (77.7)</td>
<td>82 (73.2)</td>
<td>0.240</td>
</tr>
<tr>
<td>Raw material</td>
<td>60</td>
<td>60 (100)</td>
<td>60 (100)</td>
<td>60 (100)</td>
<td>50 (83.3)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Food Preparation</td>
<td>140</td>
<td>120 (85.7)</td>
<td>105 (75)</td>
<td>115 (82.1)</td>
<td>130 (92.9)</td>
<td>0.066</td>
</tr>
<tr>
<td>Storage</td>
<td>20</td>
<td>5 (25)</td>
<td>20 (100)</td>
<td>15 (75)</td>
<td>20 (100)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Shelf exposure</td>
<td>75</td>
<td>65 (86.7)</td>
<td>65 (86.7)</td>
<td>65 (86.7)</td>
<td>65 (86.7)</td>
<td>1</td>
</tr>
<tr>
<td>Documentation</td>
<td>30</td>
<td>30 (100)</td>
<td>30 (100)</td>
<td>30 (100)</td>
<td>30 (100)</td>
<td>-</td>
</tr>
<tr>
<td>Technical responsibility</td>
<td>20</td>
<td>20 (100)</td>
<td>20 (100)</td>
<td>20 (100)</td>
<td>20 (100)</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>731</td>
<td>599 (81.9)</td>
<td>574 (78.5)</td>
<td>609 (83.3)</td>
<td>586 (80.2)</td>
<td>0.186</td>
</tr>
</tbody>
</table>

<sup>1</sup>BACME = Brazilian Association of Collective Meals Enterprises.

<sup>2</sup>Food Service.

<sup>3</sup>P: scores.

<sup>4</sup>Fisher’s exact test.
above 75% for all food services under analysis. Full (100%) fitness of the items “Pest Control”, “Water Supply”, “Documentation” and “Technical Responsibility” occurred for the two evaluated tools. The activities “Pest Control” and “Water Supply” are accounted for by the committees for the control of hospital infections which are extremely keen in the hospitals analyzed and have a strong influence on sanitary quality. The above explains the high percentage of fitness.

The item “Raw material” was similar in FS, except FS “D” with an 85.7% fitness difference according to RCD n. 216, and 83.3% according to BACME. Owing to the latter classification, it had a significant difference when compared to the other FS analyzed. Souza & Campos underscored that periodic visits to suppliers may provide greater safety in the acquisition of products.

Only items “Management of residues” in FS “A” and “B” and “Food Storage” in FS “A” provided fitness percentages according to RCD n. 216 and final score according to ABERC lower than 50% of the expected score in the two tools. However, a statistically significant difference only occurred in assessment by BACME.

It must be underpinned that pedal touch-less waste bins were handled with open lids. The waste bins were not identified and frequently no separation between dry and organic wastes was extant. Vieiros et al. assessed GP in cafeterias and noted inadequate control of residues since waste bins were handled manually and no adequate garbage storage existed. Four out of ten internal waste bins without lids were reported in the six restaurants analyzed. Genta et al. reported similar results to current research and suggested that the situation is common in FSs due to heavy service and short periods for handling tasks, with the consequent carelessness in closing the waste bins and in storing food residues.

The item “Food storage” had the lowest fitness percentages due to problems related to refrigeration. In fact, few refrigeration equipments were extant and no cold chambers. Space for non-perishable objects was inadequate and insufficient. Food for immediate consumption should be maintained in proper hygienic and sanitary conditions due to possible microbial development2. Space for non-perishable objects was inadequate and insufficient. Food for immediate consumption should be maintained in proper hygienic and sanitary conditions due to possible microbial development2.

Lack of fitness seems to be a recurring problem in FSs. Bas et al. underscored that food-transmitted diseases. Periodic training of workers with an emphasis on the correct hygiene of hands, prohibition in using jewelry and other accessories during working hours and instructions to avoid crossed contamination is an alternative to lessen food contaminations risks15. Roto et al. concluded that information on hygiene by restaurant workers intervenes positively on food hygiene and cleanliness in the kitchen16.

Positive results in current analysis may have occurred due to the fact that survey period with regard to the verification list was relatively short. No absolute certainty could be obtained that the guidelines and procedures in the handbooks on food handling were being totally complied with. Further, since assessment visits had to be previously scheduled there was always the possibility that places were prepared for the evaluation of the items, included food handling. Bas et al. underscored that the guarantee for safe food depends on the adequate establishment of GPs and the elaboration of the GP handbook.

The statistical analysis of data reveals that there was no significant difference between FS by RCD n. 216 classification. However, there was significant difference for FS in the items “Physical Structure”, “Hygiene”, “Residue management”, “ Handlers”, “Raw material”, “Food Preparation” and “Storage”, according to BACME classification. The difference may have existed due to the fact that BACME classification uses different scores to classify the items under analysis. They are more sensitive and complement corrective measures for the most relevant issues.

Grouping analysis showed that FSs “A”, “B” and “D” analyzed by RCD n. 216 and BACME methods formed a single group due to their similarity. FS “C” formed a separate group, with great dissimilarities for the variables studied (Fig. 1). General results (Tables I and II) revealed that FS “C” had the best results with regard to hospitals “A”, “B” and “D”. The above may be due to the fact that the hospital of FS “C” is a small unit served by a totally private attendance. Grouping analyses were used to verify the similarity between services in hospital pharmacies to identify which hospitals were most similar.

The correlation between dissimilarity matrices by the RCD n. 216 and BACME methods was 0.9607 and revealed concordant methods (Fig. 2). This boils down to the fact that results were similar by the two classifications. In other words, when a more detailed tool,
such as BACME classification with greater weight for the more critical issues, was employed, the irregularities were similar to the classification foregrounded on the RCD n. 216 interpretation tool which fails to distinguish between issues but merely counts the unconformities.

**Conclusions**

As a rule, hospital food services provided acceptable GP conditions, even though items “Residue management”, “Storage” and “Physical structure” must be the object of immediate corrective actions.
The interpretation tools RCD n. 216 and BACME did not show any statistical differences. In fact, both were efficient to give a good diagnosis of hygiene and sanitary conditions of the food services under analysis.

References
7. Stata Corp. 2009. Stata Statistical Software: Release 11. College Station, TX: Stata Corp LP.