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Short Communication

Hygiene auditing in mass catering: a 4-year study in a university canteen



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ABSTRACT

Objectives: The outcomes of hygiene audits carried out two times per year were used to determine the correct execution of the procedures foreseen by the Hazard Analysis and Critical Control Points (HACCP) plan over 4 years (2013–2016) in a university canteen producing about 1200 meals a day.

Study design: Critical analysis of hygiene audits.

Methods: Hygiene audits were carried out on the basis of a checklist divided into seven main items and subitems that covered all the production areas of the canteen. For each audit subitem, total percentage of inadequacy was calculated as the total number of negative answers (N) divided by the total number of answers ($n = 8$) collected in the period 2013–2016.

Results: The results showed a discontinuous trend among years. In more detail, the highest percentage of inadequacy was seen for food maintaining temperatures, thus highlighting management issues mainly related to time taken for food preparation. A relatively high level of inadequacy was also recorded for staff clothing and hygiene.

Conclusions: The critical analysis of data emerged from the audits was useful to obtain an overview of improvements and emerging criticalities.

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The catering system is characterized by very complex actions that lead to the production of finished food intended for a large number of consumers.¹ During the production process, biological, physical, and chemical contamination can occur, leading to the worsening of the quality and safety of food.² On the basis of Regulation (EU) No 853/2004 of the European Parliament and the Council of 29 April 2004 on the hygiene of foodstuffs, food business operators are responsible for the

implementation of the measures and conditions necessary to control hazards by using the preventive approach based on the principles of the Hazard Analysis and Critical Control Points (HACCP) system. The impact of HACCP initiatives on the enhancement of food safety can be measured directly (e.g. through data collected from programmes for surveillance of food-borne diseases or monitoring contamination of food) or indirectly (e.g. through data collected in industries on the

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results of auditing or inspection of design and implementation of HACCP). Hence, as part of the HACCP system, hygiene audits can be a pivotal part of the HACCP verification process.^{3,4}

As reported by Regulation (EU) No. 882/2004, the term 'audit' refers to a systematic and independent examination to determine whether activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.⁵

In this 4-year study, hygiene audits were used to verify the implementation of the HACCP plan of a university canteen in central Italy that produces up to 1200 meals a day.

For each year within the time span under study (2013–2016), two audits were carried out by the same trained advisor. The audits were performed on the basis of a checklist (Table 1) prepared in accordance with the main activities foreseen by the HACCP plan. The audit checklist main items ($n = 7$) were chosen in agreement with the HACCP coordinator and the HACCP team on the basis of the HACCP plan as follows: 1) raw material receiving area; 2) food storage; 3) general hygiene; 4) food preparation areas; 5) food distribution area; 6) staff hygiene; and 7) records. For each main item, different subitems were also identified (Table 1).

For all the questions reported in the checklist, an answer in terms of 'yes' or 'no' was assigned. At the end of each audit, a report, summarizing all the inadequacies (questions with negative answers), was filled out. For each year, a total score was determined by assigning one point to each answer which matched with the requirements. The maximum achievable score corresponded to 72 points per year (two audits, resulting from 36 questions per audit).

For each audit subitem, total percentage of inadequacy was calculated from the total number of negative answers (N) divided by the total number of answers ($n = 8$) collected in the period 2013–2016.

During the study, the canteen staff, composed of 24, 24, 26, and 25 employees in 2013, 2014, 2015, and 2016, respectively, were regularly trained two times per year.

The results of the audits are reported in Table 1. Among years, a discontinuous trend was observed in annual scores, ranging between a maximum of 69/72 (in 2015) and a minimum of 63/72 (in 2016). In addition, 21 of the 36 answered questions were always compliant with the prerequisites set in the HACCP system. In detail, regarding the raw material receiving area (item 1), one sole inadequacy was recorded in 2016 for the unwanted occurrence of empty packing boxes in the receiving area (item 1a). By contrast, numerous inadequacies were found in the general hygiene (item 3). In more detail, in two of the eight audits (25.0%), cooked and raw products were found to be not correctly separated, thus suggesting a potential risk of cross-contamination between raw materials and ready-to-eat foods. This latter phenomenon is already recognized as the main cause for the spread of food-borne pathogens such as *Listeria monocytogenes* and *Salmonella* in the catering industry.^{6,7} In one out of the eight audits (12.5%), negative answers were registered for the occurrence of spoiled products (subitem 3b) or pests (subitem 3e) and general conditions of cleanliness (subitem 3g).

Concerning food preparation areas (item 4), a low level of inadequacy (1 audit of 8, 12.5%) was seen for cleanliness of

tools (subitem 4e) and tableware (subitem 4g) as well as risks of cross-contamination (subitem 4b).

During the study, the highest percentage of inadequacy (50%) was seen for subitem 5b, referring to proper storage of cooked and cold-served food preparations at <10 °C. Moreover, in two of the eight audits (25.0%), the subitem related to warm-served foods (5a) obtained a negative answer because maintaining temperatures <60 °C were measured. Proper refrigeration and temperature maintenance of perishable foods are acknowledged as the main operations to assure the safety of meals, especially in mass catering.^{6,7}

It is worth noting that before the year 2013, the university canteen under study had undergone a restructuring, which mainly involved the food display units for the maintenance of cold- and warm-served foods. Therefore, the high level of inadequacy recorded for these subitems in the time span considered might be attributed to management issues, e.g. timing in food preparation, rather than to obsolescence or malfunctioning of food display units.

Regarding staff clothing and hygiene, a relatively high level of inadequacy was recorded for subitems 6a and 6e, with 25.0% and 37.5% of negative answers, respectively. In more detail, members of the canteen staff were found to wear earrings and necklaces during food preparation; this behavior represents a concern as jewelry could inadvertently fall in the preparations, thus constituting a risk for the consumer. Moreover, the required cap was not always properly worn.

In two of the eight audits, a negative answer was recorded also for the subitem 7a, dealing with the non-conformance/corrective action log. This later reports the actions that the canteen staff undertake to solve any non-conformance occurred during manufacturing operations. Therefore, it constitutes an important document to be used for the HACCP plan revision process. It is worth noting that for this subitem, negative answers were only collected in 2013, thus suggesting a higher attention of the canteen staff toward this specific aspect, starting from 2014.

Recent literature reviews have highlighted the contribution of mass catering in the spread of food-borne diseases.^{6,7} In more detail, the inadequate application of good hygiene practices during the preparation and storage of food have been reported as a main risk factor, with members of the staff being directly involved in most documented outbreaks. It is evident that the proper training of staff is pivotal for risk prevention.⁸ Training is expressly required by Regulation (EU) No. 852/2004 (Chapter XII); however, as reported by Seaman,⁹ it can sometimes be perceived by food handlers as a waste of time. In a published survey of head chefs and catering managers responsible for food hygiene in catering establishments throughout Ireland, the crucial impact of training activities clearly emerged. Regarding this specific aspect, in the time span 2013–2016, the university canteen staff were regularly trained; however, one retirement and three new recruitments occurred between 2015 and 2016. It is noteworthy that the unconsolidated knowledge of the newly hired staff on food safety and hygiene might explain the higher level of inadequacy recorded in the year 2016.

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