The Analysis of the Importance-Performance of the Flight Attendants’ Inflight Meal Hygiene Management

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Abstract

Objectives: The present study is aimed to provide fundamental data on hygiene management in inflight meal and sanitation training of flight attendants. Methods/Statistical analysis: An investigation was performed with 260 flight attendants on the importance and performance of hygiene management and the items that are required for series of procedures such as reheating, distribution and collection of leftover food to passengers during in-flight food service. Findings: The average scores of flight attendants on the importance and performance hygiene management in inflight meal were 4.42 and 3.79 out of 5 points, respectively. And there are significant differences in the overall importance and performance scores (P<0.01, P<0.001). The average score on importance and performance was the lowest for the kitchen hygiene area, and the difference between them was the greatest for the personal hygiene area among the 6 areas. An importance-performance analysis revealed that 14 out of a total of 24 items (58.3%) corresponded to Quadrant I that indicated above-average scores on importance and performance, while the item “having the experience of hygiene education” corresponded to Quadrant II that represented an above average importance and below average performance. Quadrant III represented below average scores on both importance and performance, which included 9 items (37.5%), whereas Quadrant IV that indicated below average importance and above average performance included no item. Application/Improvements: There is a need for the special and regular inflight meal related hygiene education and training that separated from service training in order to raise the importance and performance of individual hygiene by flight attendants.

Keywords: Hygiene Education, Hygiene Management, In-Flight Meal, Personal Hygiene

1. Introduction

The world’s first in-flight catering was provided to the passengers with sandwiches, fruits, and chocolates packed in paper box in the regular London-Paris flight in the year 1918¹. In Korea, the in-flight catering started when Hanil Development Inc., a catering speciality company, signed the contract to provide the in-flight meal for Korean Air in 1970². With the launching of Asiana Airlines in 1994, the competition system of the airlines in Korea has started, which led to a lot of investment and development of the in-flight meal³. The in-flight catering has made a continuous development, with Korean Air acquiring the HACCP(Hazard Analysis and Critical Control Point) certification from the Ministry of Food and Drug Safety in November 2000 for the first time in the area of catering service meal in Korea⁴.

The process of producing in-flight meal is done in the central kitchen on the ground. The cool foods are kept in the refrigerator until they are carried to the airplane, and the hot foods use cook-chil method, being cooled down to below 5ºF within 2 hours using blast chiller and then put into the refrigerator⁵. For the meal of the economy class, the main dish, salad, dessert, forks, and knives are
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put together in a tray and then put in the tray cart with the built-in dry ice to be carried to the airplane. The tray carts are again carried to the galleys, the inflight kitchen, which are located in the front, middle, and the back of the airplane, right before the passengers are on board. All the meals carried to the airplane are kept in the air chiller until they are reheated and distributed to the passengers.

The inflight meals of the international flight, which have been loaded onto the airplane after being mostly cooked, are reheated and distributed in the special environment in the airplane that is above 30,000 feet high. Therefore, when there is a hygiene problem with the meal distributed to the passengers, the ways to solve it is extremely limited. Currently, the factories of the major inflight meal manufacturers take care of this problem by introducing HACCP, the scientific hygiene management system. However, the information on the inflight meal hygiene management of the flight attendants in the airplanes, who are in charge of distributing the meals, is not well known. Therefore, this research suggests the hygiene management items needed in a series of processes in which the meals are brought to the passengers, such as reheating, distributing, and off-loading and investigates the importance and performance of them, in an aim to provide the basic data for the inflight meal hygiene management and hygiene education targeting at the flight attendants.

2. Methods

2.1 Research subjects and duration

This research was conducted from June 22 to June 29 in 2015, targeting at the flight attendants who were waiting to prepare for the flight briefing on the first floor of ‘A’ airline. After the researchers with PhD explained the research objective and survey methods, they handed the questionnaires to the cabin leaders for each flight, who are in charge of the flight, and collected the completed questionnaires after briefing. To best achieve the objective of the research, the questionnaires were distributed only to the international flights with longer than 6 hours of flight, in which hot meals are provided and reheated. Among the 300 questionnaires distributed, 300 questionnaires (100%) were collected and 260 (86.6%) were used after excluding the ones with insufficient answers and missing values.

2.2 Survey contents and method

The research was conducted through a survey of the flight attendants. The questionnaires referred to the researches on the hygiene management of the catering meal targeting the catering food handlers and service workers, and was revised to adjust to the situations of the meal management in the airplanes after collecting opinions from 2 people who were in charge of educating the flight attendants, 2 professors from the department of food and nutrition, and 2 people with doctors’ degree from aviation related departments.

The questionnaire consisted of two parts, the general items and the hygiene management of inflight meal service. The general items included 8 questions such as sex, age, marital status, education, position at work, monthly income, years of work and the contractual working conditions using nominal scale. The hygiene management of inflight meal service included 5 questions for “food handling hygiene,” 5 for “food storage hygiene,” 5 for “equipment and utensils hygiene,” 3 for “personal hygiene,” 3 for “kitchen hygiene,” and 1 for “hygiene education.” Among the 22 items, the importance and performance were measured using the Likert 5-point scale (1 point: not at all ~ 5 point: very much so).

2.3 Data analysis

For the statistical analysis of the research results, SPSS ver. 18.0 for windows (Statistical Package for Social Science, SPSS Inc, Chicago, IL, USA) was used. The descriptive analysis was conducted to investigate the demographic characteristics of the subjects. After getting the average of the importance and performance of the inflight meal hygiene management items through descriptive analysis, the differences between the importance and performance were analyzed through paired t-test. Also, the average of the importance and performance was set as the parting line of x axis and y axis to conduct the importance-performance analysis after dividing the area into 4 sections.

3. Results

3.1 General characteristics

The demographic characteristics of the subjects are as shown in Table 1. Among all the flight attendants, females accounted for the most with 247 (95%), and people in
their 20s took up the most with 122(46.9%) in terms of age. For marital status, the unmarried outnumbered the married with 157(60.4%) over 103(39.6%). For education, most of them were 4 year university graduates with 230(88.5%). For position at work, 160 were flight attendants(61.5%), 48 were assistant pursers(18.5%), 44 were pursers(16.9%), and 8 were senior pursers(3.1%). As for years of work, flight attendants with less than 5 years of work accounted for more than majority with 135(51.9%), and for contractual condition, most of them were regular workers with 237(91.2%).

### Table 1. Demographic characteristics of the subjects

|                          | Frequency | Percentage (%) |
|--------------------------|-----------|----------------|
| **Gender**               |           |                |
| Female                   | 247       | 95.0           |
| Male                     | 13        | 5.0            |
| **Marriage**             |           |                |
| Married                  | 103       | 39.6           |
| Single                   | 157       | 60.4           |
| **Age**                  |           |                |
| 20 ~ 29                  | 122       | 46.9           |
| 30 ~ 39                  | 83        | 31.9           |
| 40 ~ 49                  | 55        | 21.2           |
| **Education level**      |           |                |
| College Graduate         | 14        | 5.4            |
| University Graduate      | 230       | 88.5           |
| Graduate school and higher | 16      | 6.2            |
| **Position**             |           |                |
| Crew                     | 160       | 61.5           |
| Assistant purser         | 48        | 18.5           |
| Purser                   | 44        | 16.9           |
| Senior purser            | 8         | 3.1            |
| **Period of work (years)** |       |                |
| 1 ≤ ~ <3                | 81        | 31.2           |
| 3 ≤ ~ <5                | 54        | 20.8           |
| 5 ≤ ~ <7                | 17        | 6.5            |
| 7 ≤ ~ <10               | 31        | 11.9           |
| 10 ≤                    | 77        | 29.6           |
| **Monthly income (10,000won)** |     |                |
| < 250                   | 77        | 29.6           |
| 250 ≤ ~ <350            | 111       | 42.7           |
| 350 ≤ ~ <450            | 43        | 16.5           |
| 450 ≤ ~ <550            | 25        | 9.6            |
| 550 ≤                   | 4         | 1.5            |

### 3.2 Comparison of the difference and the average of the importance-performance of the inflight meal hygiene management items of the flight attendants

The Table 2 shows the averages of the importance-performance of the inflight meal hygiene management items of the flight attendants and the difference between them. The total average of the importance was 4.42 point out of 5, and that of the performance was 3.79, showing significant difference between averages of the importance and performance in all the inflight meal hygiene management items ($P<0.001$).

Among the averages of the importance in 6 areas, the average of the food handling hygiene was the highest with 4.52 point, followed by food storage hygiene 4.50 point, hygiene education 4.43 point, equipment and utensils hygiene 4.41 point, personal hygiene 4.39 point, and kitchen hygiene 4.19 point. Among the averages of the performance in each area, the average of the food storage hygiene was the highest with 4.01 point, followed by food handling hygiene 3.88 point, equipment and utensils hygiene 3.86 point, personal hygiene 3.59 point, kitchen hygiene 3.46 point, and hygiene education 3.40 point. Among the 6 areas, the kitchen hygiene showed the lowest average point for the importance, and the hygiene education showed the lowest point for the performance. If we examine the specific items for different areas, in the area of food handling hygiene, the importance and performance of “the milk bottles for the infants are provided after sterilization” marked the lowest point with 4.37 and 3.50 respectively, and the difference between the two average points was also the biggest.

In the area of food storage hygiene, the importance and performance of “keeping the temperature of the refrigerator below 5” marked the lowest point with 4.36 and 3.71 respectively, and the difference between the two points was also the biggest in the items in this area. In the area of equipment and utensils hygiene, the performance point of “checking the hygiene of the oven before using it”
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Table 2. Mean comparison between importance and performance about sanitation management of inflight catering

| Sanitation management items | Importance | Performance | Gap | t-value |
|-----------------------------|------------|-------------|-----|---------|
| **Food handling**           |            |             |     |         |
| 1. hygienic care of the beverages served (ex.: checking the caps of the beverages) | 4.62±0.63 | 3.95±0.72 | 0.67 | 12.79*** |
| 2. putting on hygiene gloves when dealing with food (ex.: preparing lemon for red tea) | 4.50±0.71 | 3.81±1.00 | 0.69 | 11.56*** |
| 3. keeping the center temperature of the food above 75 when reheating | 4.62±0.71 | 4.19±0.76 | 0.43 | 8.38*** |
| 4. the milk bottles for the infants are provided after sterilization | 4.37±0.74 | 3.60±0.86 | 0.77 | 12.72*** |
| 5. thoroughly checking expiration date of the processed food | 4.50±0.72 | 3.87±0.81 | 0.63 | 11.77*** |
| **Subtotal mean**            | 4.52±0.70 | 3.88±0.83 | 0.64 | 11.24*** |
| Cronbach’s α                | 0.834      | 0.668       |     |         |
| **Food storage hygiene**    |            |             |     |         |
| 6. keeping the temperature of the refrigerator below 5 | 4.36±0.95 | 3.71±0.85 | 0.65 | 10.17*** |
| 7. keeping the temperature of the hot ready to eat food above 60, and that of the cold food below 5 | 4.47±0.77 | 3.93±0.78 | 0.54 | 11.61*** |
| 8. distinguishing the foods that have been served (leftover food) and will be served | 4.50±0.77 | 4.05±0.85 | 0.45 | 9.32*** |
| 9. keeping the chilled foods in the refrigerator | 4.64±0.65 | 4.39±0.70 | 0.25 | 6.75*** |
| 10. checking the load of the dry ice for the refrigerator and beverages | 4.52±0.60 | 3.95±0.71 | 0.57 | 12.08*** |
| **Subtotal mean**            | 4.50±0.75 | 4.01±0.78 | 0.49 | 9.19*** |
| Cronbach’s α                | 0.828      | 0.714       | 0.49 | 9.19*** |
| **Equipment and utensils hygiene** |       |             |     |         |
| 11. the towels provided for the passengers are kept and heated hygienically | 4.63±0.59 | 4.11±0.77 | 0.52 | 11.69*** |
| 12. checking the hygiene of the oven before using it | 4.25±0.78 | 3.75±0.88 | 0.50 | 9.73*** |
| 13. checking the hygiene of the coffee brewer and coffee pot before serving coffee | 4.44±0.76 | 3.82±0.90 | 0.62 | 11.24*** |
| 14. checking the hygiene of room temperature closet for ingredients | 4.42±0.74 | 3.89±0.87 | 0.53 | 11.06*** |
| 15. using ports, cups, and trays for beverage service after checking their hygiene | 4.33±0.90 | 3.73±0.80 | 0.60 | 9.84*** |
| **Subtotal mean**            | 4.41±0.75 | 3.86±0.84 | 0.55 | 10.50*** |
| Cronbach’s α                | 0.828      | 0.783       |     |         |
| **Personal hygiene**         |            |             |     |         |
| 16. excluding the flight attendants with high fever, diarrhea, and stomach ache from the flight | 4.34±0.87 | 3.20±1.05 | 1.14 | 13.62*** |
| 17. checking the hygiene of the outfits and aprons before food service | 4.28±0.63 | 3.55±1.01 | 0.73 | 12.31*** |
| 18. washing hands before preparing meal and after using the bathroom | 4.54±0.76 | 4.01±0.86 | 0.53 | 10.88*** |
| **Subtotal mean**            | 4.39±0.75 | 3.59±0.97 | 0.80 | 11.46*** |
| Cronbach’s α                | 0.782      | 0.797       |     |         |
marked the lowest with 4.25 point, and the performance point of “using ports, cups, and trays for coffee and beverage service after checking their hygiene” marked the lowest with 3.73 point. In the area of personal hygiene, the importance point of “checking the hygiene of the outfits and aprons before food serving” marked the lowest with 4.28 point, and the performance point of “excluding the flight attendants with high fever, diarrhea, and stomach ache from the flight” marked the lowest with 3.20 point. In the area of kitchen hygiene, the importance and performance points of “managing the kitchen out of the reach of the passengers” marked the lowest with 3.08 point respectively.

3.3 Analysis

The analysis of the importance-performance of the flight attendants’ inflight meal hygiene management items is as shown in Figure.1. The average of the performance points was the x axis, and the average of the importance points was the y axis. The 3.79 average point of performance and the 4.42 average point of importance became the parting line of the x axis and y axis.

The importance and performance were analyzed after dividing this into quadrant planes of , , , , . The quadrant plane I was about all the items that showed points above the average in the importance and performance, including a total of 13 items accounting for 59.1% such as “hygienic care of the beverages served (Example: checking the caps of the beverages), “putting on gloves when dealing with food(Example: preparing lemon for red tea),” “keeping the center temperature of the food above 75°F when reheating,” “thoroughly checking expiration date of the processed food,” “keeping the temperature of the hot ready to eat food above 60°F, and that of the cold food below 50°F,” “distinguishing the foods that have been served(leftover food) and will be served.” The quadrant planes II, III, and IV were defined as shown in the table. The quadrant plane IV was the area that showed the lowest results in both importance and performance.
vided for the passengers are kept and heated hygienically, “checking the hygiene of the coffee brewer and coffee pot before serving coffee,” “washing hands before preparing meal and after using the bathroom,” and “checking the hygiene of the beverage and food carts in the galley.” In the quadrant plane II, the importance was above average and the performance was below average, including the item “having the experience of hygiene education”. In the quadrant plane III, the importance and the performance were all below average, including 8 items accounting for 36.3% of the total items, such as “the milk bottles for the infants are provided after sterilization”, “keeping the temperature of the refrigerator below 5”, “checking the hygiene of the oven before using it”, “using ports, cups, and trays for beverage service after checking their hygiene”, “excluding the flight attendants with high fever, diarrhea, and stomach ache from the flight”, “checking the hygiene of the outfits and aprons before serving food”, “managing the galleys out of the reach of the passengers”, and “the brightness of the galley is proper (illumination of more than 220 lux).” There were no items in the quadrant plane IV, in which the importance was below average and the performance was above the average.

Figure 1. Analysis of importance and performance about sanitation management of in-flight catering

4. Discussion

This research investigated the importance and the performance of the inflight meal hygiene management items of the flight attendants in an aim to provide the basic data for the hygiene management of the inflight meal and hygiene education targeting the flight attendants. Among the 6 areas for the inflight hygiene management, the area of personal hygiene showed low average points for the importance and performance following the kitchen hygiene. In the research about the hygiene management perception of the hotel restaurant service workers, the personal hygiene marked the highest point followed by environment hygiene, Equipment and utensils hygiene, indicating the difference from the results of this research that personal hygiene area showed importance and performance points below average.

The result of examining the personal hygiene items shows that the importance point of “checking the hygiene of the outfits and aprons before food service” was the lowest and the performance point of “excluding the flight attendants with high fever, diarrhea, and stomach ache from the flight” was the lowest. If this is compared with the importance-performance of the personal hygiene of other catering service workers such as the school catering service workers and the hospital catering service workers, it shows that they have the experience of frequent hygiene education, the points of the flight attendants in this research show lower points than them.

In the analysis of “the importance-performance” of the flight attendants’ inflight meal hygiene management, there was “having the experience of hygiene education” in the section where importance was above average and performance was below average. To secure the hygiene and safety throughout the whole process from the planning of the meal production to the final moment of eating it, thorough hygiene education for the employees needs to be implemented. The frequent education for hygiene has a positive effect on the performance of the food handler’s hygiene management, and the degree of applying the hygiene education has a significantly positive effect on hygiene knowledge, which has a positive effect on the performance of the hygiene management. Especially considering that personal hygiene items of the flight attendants were lower than those of the schools and hospitals, experience of frequent hygiene education, regular sanitation education for the flight attendants is needed.

5. Conclusion

This research was conducted from June 22 to June 29 in 2015 targeting 260 flight attendants to investigate the importance and performance of a series of processes in which the meals are brought to the passengers, such as reheating, distributing, and off-loading. The research aims to provide the basic data for the inflight meal hygiene management and hygiene education targeting at the flight attendants. The research results show that among the inflight meal hygiene management items, the importance and performance of the personal hygiene and
kitchen hygiene were below average, lower than the other items. Especially for the galleys in the airplanes, air curtains or doors that can separate the bathrooms and space for passengers from the kitchen areas are needed to block the harmful environment and people from outside, and the hygiene education about this needs to be done. Also, to enhance the importance-performance of the personal hygiene of the flight attendants, measures for improvement are required, such as planning and conducting hygiene education related to inflight meals separated from the service education.

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