Dietitians View of Foodservice Sanitary Practices and Demands in Long-Term Care Hospitals

Jeonghyeon Woo,1 Hee-Sook Lim,2 Hee-Joon Baek,3 Dal Lae Ju,4 Youri Jin,5 Jieun Lee,6 Hwayoung Yoon,7 Wan-So Hong,8 Yoo Kyoung Park1

1Department of Medical Nutrition, Graduate School of East-West Medical Science, Kyung Hee University, Yongin 17104, Korea
2Department of Food & Nutrition, Yeonsung University, Anyang 14011, Korea
3Department of Food and Nutrition, Hanyang Women's University, Seoul 04763, Korea
4Department of Nutrition, SMG-SNU Boramae Medical Center, Seoul 07061, Korea
5Department of Food and Nutrition Services, Hanyang University Hospital, Seoul 04763, Korea
6Department of Nutrition, Hyoja Geriatric Hospital, Yongin 17089, Korea
7Department of Clinical Nutrition, Bobath Memorial Hospital, Bundang 13552, Korea
8Department of Foodservice Management and Nutrition, Sangmyung University, Seoul 03016, Korea

ABSTRACT

This study aimed to investigate the current state of foodservice management and demands for improvement in long-term care hospitals. The survey was performed in experienced dietitians working at 25 hospitals. General characteristics, status of sanitary management (document management, self-assessment of importance and performance), necessity and ranking of sanitary management items were investigated. Approximately 2.5 dietitians worked in each hospital, but only 7 (28.0%) hospitals employed clinical dietitians. From the questionnaire, the scores of the importance in sanitary management and performance were 4.5 ± 0.7 and 4.3 ± 0.9, respectively, and were significantly different (p = 0.000). Participants also reported “special therapeutic diets management” and “compliance with standards of refrigerating time, food, method management” had the lowest importance and performance, respectively. The result of Importance-Performance Analysis revealed a significant positive correlation between importance and performance (R² = 0.427). However, items such as “performing hand hygiene” and “compliance with standards of refrigerating time, food, method management” had low importance recognition with low performance. All participants reported “preparing sanitary management standards was necessary” is necessary and “development of sanitary management manual” is the most important. These findings suggest that sanitary management is important in food service management of long-term care hospitals, and improving awareness is required. Developing a hospital foodservice hygiene manual would ensure better safety and quality for patient care and public health.

Keywords: Long-term care hospital; Food service; Sanitary management
INTRODUCTION

Currently, Korea is experiencing acceleration in aging population due to economic development, reduction of birth rate and medical technology development [1], along with increasing life expectancy. According to data from Statistics Korea, life expectancy in 2019 was 86.3 years, which is continuously increasing compared to 84.0 years in 2011 and 85.2 years in 2015. However, disability adjusted life expectancy, excluding the duration of illness, is decreasing to 64.4 years in 2018, following 65.2 years in 2014 and 64.9 years in 2016 [2]. The number of elderly people admitted to long-term care hospital is increasing as families have difficulties in providing the care with a continuing decline in Activities of Daily Living (ADL) of the elderlies [3]. In particular, elderly people who use long-term care hospitals often have chronic diseases that require continuous medical care. Unlike acute care hospitals, many elderly people are hospitalized for management of disease rather than for active treatment of disease [4-6]. Most of the patients and are at high risk of infection in environments prone to exposed pathogens due to physical aging, such as chronic diseases and reduced recovery ability [7,8]. Infection, accounting for one-third of the elderly's reason of death [9], has a significant impact on the health of the elderly. Since they receive all daily meals from the hospital, safe hygiene and foodservice management of patients are essential to prevent the occurrence of infection problems.

Ministry of Health and Welfare has been enforced medical facilities to obtain accreditation from the Healthcare Accreditation Program since 2013, which manages the quality of medical practice and patient safety. Among the standards for long-term care hospital, there is ‘management of infection in kitchen’ item related to foodservice sanitation including foods, cooking utensils, equipment, environment management and employee sanitation management, which are similar to standards for acute care hospital [10,11]. Even acute care hospitals have difficulties in meeting the standards and guidelines for preparation Healthcare Accreditation Program [12] despite having experienced professionals [13]. Let alone, long-term care hospitals are expected to have more difficulties as they are often smaller in size or lack manpower and resources than acute care hospital [5]. According to previous studies [5,14], depending on the hospital size of long-term care hospitals, they normally have low priority in foodservice management compared to general and tertiary hospital as a result of small kitchen, dish-washing using hand, no partition wall from contamination zone in the hospital. More than 70% of dietitians in long-term care hospitals were in charge of both foodservice and clinical nutrition, and more than 60% of respondents said they needed to separate their duties, indicating the lack of manpower. In addition, Lee [15] reported that since dietitian at long-term care hospitals are aware of the importance of foodservice management standards, producing manuals with clear regulation or detailed explanations will help manage foodservice onsite.

In the case of other facilities that implement foodservice, such as school [16], kindergarten [17], and retails [18] are provided with governmental foodservice management manuals. Especially, Child-care centers or kindergartens are actively supported by the Center for Child-Care Foodservice Management for sanitary management and education support. Meanwhile, there is no manual or support for foodservice management of medical institutions for patients who are vulnerable to health. Research on effects after developing manual for children’s meals showed significant increases in sanitary management performance after applying the manual that indicated improving overall sanitary management quality [19]. Another research also [15] reported that dietitians at long-term care hospital had to find and apply sanitary management
standards for accreditation by themselves without any guidance. Therefore, if guidelines were developed that could be used in practice will greatly improve their practice. Research on sanitary foodservice management of medical institutions included dietitians’ awareness about foodservice management related healthcare accreditation [15], Hazard Analysis and Critical Control Point (HACCP) standard evaluation at general hospital [20] but, recent research on sanitary foodservice management at long-term care hospital is lacking.

For vulnerable elderly or who have certain health conditions, carefully planned, monitored, and closely inspected foodservice is essential. Therefore, from this study, we aimed to understand the status and demands of foodservice management in long-term care hospital which are different from the acute care hospital in scale, human resource, patient characteristics.

**MATERIALS AND METHODS**

**Subject and duration of research**
This survey was conducted from July to September 2019, to investigate the status and awareness of improving foodservice management in long-term care hospital. Dietitians were recruited from the long-term care hospital dietitians’ study group. After explaining the contents and purpose of the study, the questionnaire and research consent form were distributed to dietitians who agreed to participate in the study using e-mails and faxes. The completed questionnaires and consent forms were retrieved via e-mail and fax, and insufficient responses were supplemented by direct contact (phone call and message). A total of 25 surveys were retrieved and all surveys were used for analysis. This study was conducted with the approval of the Institutional Review Board of Kyung Hee University (approval number: KHGIRB-19-231)

**Contents of investigation**
General information included the area, hospital adequacy grade after accreditation, number of licensed bed, average operation rate, accreditation of medical institutions, average number of dietitians, presence of clinical dietitians, number of cooks (‘less than 5,’ ‘6–10,’ ‘11-45,’ ‘16–20’ and ‘more than 20’), working experience period of dietitian responded.

The sanitary management assessment questions consisted of a total of 41 questions in seven areas. It consists of personal sanitation (4 items), food material sanitation (9 items), operation sanitation (15 items), utensil & equipment sanitation (2 items), environment sanitation (5 items), menu planning (2 items), infection management (4 items) and investigated status of performance, document management, importance and performance score about each items. The importance and performance scores were also collected from the respondents. These questions are composed through expert consultation based on Healthcare Accreditation Program, HACCP management criteria, and related prior study [10,11,20].

The performance status of sanitary management items, documentation, and the presence of regulations and guidelines was asked. Importance and performance score were investigated using the Likert 5-point scale (1 = very low, 2 = low, 3 = normal, 4 = high, 5 = very high) and each response number was used as score for analysis.

The reason for the performance score below 3 points was further questioned to choose among “Insufficient conditions and lack of space in the facility environment,” “Lack of
hospital support such as manpower and supplies,” “Lack of dietitian’s hygiene management skills, information and knowledge.”

In the demand for the preparation of sanitary management standards for foodservice management, the ranking of necessity and weighted ranking of items were considered. The necessity section was divided into ‘strongly required,’ ‘required,’ ‘not required,’ ‘strongly not required’ and ‘no answer.’ Weighted ranking of items were “Development of sanitary management manual considering medical environment and patient meals,” “Development of supervision checklist for healthcare institution,” “Establish a standard based on healthcare accreditation,” “Sharing information on the current status of food poisoning in healthcare institution,” “Sharing information on the types of disinfectants and how to use them,” “Provision of various materials for sanitary management of foodservice for healthcare institutions,” “Extra sanitary education for employees of healthcare institutions” and “Sharing information on microbiological testing method.” Those were selected from 1st–8th by priority of importance.

Statistical analysis
The general information and status of performance, documentation, necessity of preparing sanitary management standards, the status of sanitary management inspection were calculated through technical statistics analysis. As for the weighted ranking of preparing sanitary management standard, priority was calculated by adding weights in order from rank 1 to rank 8. The importance and performance scores were shown by the mean and standard deviation, and the Mann Whitney test was carried out to see the difference between the importance and performance scores. Importance-performance analysis (IPA) [21] was conducted using the mean value of importance and performance, which was expressed as a scatterplot, and Pearson’s correlation analysis was performed to determine the correlation between importance and performance. All analyses were performed using IBM SPSS statistics version 25.0 (IBM Corporation, Amonk, NY, USA) and were analyzed at a significant level of \( p < 0.05 \).

RESULTS

General characteristics of the long-term care hospitals
General characteristics of the long-term care hospitals are shown in Table 1. The survey areas showed a similar rate of 48% and 40% respectively in the capital area and metropolitan area, and they accounted for more than 80% of the total. Among the long-term care hospitals, 76% of the hospitals were grade I from the hospital adequacy grade accreditation. The average number of dietitians was 2.5, and only 28% of the hospitals employed clinical dietitians. The hospitals with 6–10 cooks accounted for 44% and fewer than 5 or 11–15 accounted for 20% each.

Status of performance and document management for sanitary management
The status of performance and document management for sanitary management is shown in Table 2. Overall, there was a lack of records keeping among performance, records keeping, regulation storage. The three items of “Compliance with standards of refrigerating time, foods, method,” “Compliance with standards of providing special therapeutic diet (low microbial, sterile, after organ transplant, etc.),” “Operate programs for infection prevention and management” were generally lacking in performance, records keeping and regulation storage.
Importance and performance for the sanitary management items

The result of the importance and performance of the sanitary management items at long-term care hospitals is shown in Table 3. The overall average score for importance and performance was 4.5 and 4.3, respectively, showing significant differences between the two scores. Five out of 41 items showed significant differences between importance and performance scores. As a result of the importance evaluation, hand hygiene performance items scored 4.5 points, the lowest among items in the area. In the food material sanitation area, refrigerated or frozen food management and drinking water management scored highest in the area with 4.8 points, respectively, and checking the business report of food supply was the lowest score with 4.3 points. In the operation sanitation area, the score of manage sample meals item was the highest at 4.8 points, the highest among the importance scores of the entire item, indicating that the sample meals management was well done. The lowest score was compliance with the standards of refrigerating item (4.0 points). The score of the two items was similar in the areas of operation sanitation, and the score of cleaning by machine and area was 3.8 points, the lowest in the areas of environment sanitation. Compliance with standards of providing special therapeutic diet in the menu planning area was 3.8 points, indicating the lowest importance recognition score among all items as well as within the area. In the infection management area, having infection control manual items scored the highest with 4.6 points, and the operating infection program items scored the lowest with 4.3 points.

The performance score of hand hygiene (4.0 points) in the personal sanitation was lower than the other items in the area, significantly different from the importance score. Compliance with countermeasure item’s score was also significantly lower than the importance score of 4.4 points. In the food material sanitation area, the lowest point was

Table 3. General characteristics of the long-term care hospitals (n = 25)

| Characteristics                                | Values |
|------------------------------------------------|--------|
| Area                                           |        |
| Capital area                                   | 12 (48.0) |
| Metropolitan area                              | 10 (40.0) |
| Others                                         | 3 (12.0)  |
| Hospital adequacy grade accreditation          |        |
| Grade I                                        | 19 (76.0) |
| Grade II                                       | 2 (8.0) |
| Under grade III                                | 2 (8.0) |
| No implement                                   | 1 (4.0) |
| Excluded                                       | 1 (4.0)  |
| Number of licensed bed                         | 218.5 ± 93.5 |
| Average bed operation rate (%)                 | 90.0 ± 7.6 |
| Accreditation of medical institutions          |        |
| Accreditation                                  | 23 (92.0) |
| Non-accreditation                              | 2 (8.0) |
| Average number of dietitians                   | 2.5 ± 1.1 |
| Presence of clinical dietitians                |        |
| Yes                                            | 7 (28.0) |
| No                                             | 18 (72.0) |
| Number of cooks                                |        |
| ≤ 5                                           | 5 (20.0) |
| 6–10                                          | 11 (44.0) |
| 11–15                                         | 5 (20.0) |
| 16–20                                         | 2 (8.0) |
| ≥ 20                                          | 2 (8.0) |
| Working experience period of dietitian responded (yr) | 11.6 ± 8.9 |

Values are presented as number (%) or mean ± standard deviation.
Table 2. Status of performance and document management for sanitary management (n = 25)

| Category               | Items                                                                 | Performance (%) | Records keeping (%) | Regulation (%) |
|------------------------|----------------------------------------------------------------------|-----------------|---------------------|----------------|
| Personal sanitation    | P1 - Perform regular check-up once a year                            | 25(100.0)       | 25(100.0)           | 25(100.0)      |
|                        | P2 - Perform hand hygiene                                            | 24(96.0)        | 23(92.0)            | 25(100.0)      |
|                        | P3 - Compliance with clothing by use                                 | 23(92.0)        | 24(96.0)            | 25(100.0)      |
|                        | P4 - Compliance with countermeasure when employee have symptoms       | 25(100.0)       | 24(96.0)            | 25(100.0)      |
| Food material sanitation| F1 - Checking the business report of food supply                      | 24(96.0)        | 22(88.0)            | 23(92.0)       |
|                        | F2 - Manage the cleanliness and temperature of supplier vehicle       | 25(100.0)       | 23(92.0)            | 25(100.0)      |
|                        | F3 - Compliance with receiving management of food material            | 25(100.0)       | 19(76.0)            | 23(92.0)       |
|                        | F4 - Compliance with standards of storage (date, contents, etc.).     | 25(100.0)       | 20(80.0)            | 24(96.0)       |
|                        | F5 - Compliance with standards of refrigerated or frozen proper storage, FIFO (first-in/first-out) | 25(100.0)       | 21(84.0)            | 25(100.0)      |
|                        | F6 - Compliance with standards of quality control by food ingredients (prevention of microbial growth and contamination, check acid value, etc.) | 20(80.0)        | 15(60.0)            | 20(80.0)       |
|                        | F7 - Compliance with environmental management (temperature, humidity, etc.) in food materials storage room | 23(92.0)        | 24(96.0)            | 23(92.0)       |
|                        | F8 - Compliance with standards of enteral tube feeding management     | 23(92.0)        | 22(88.0)            | 24(96.0)       |
|                        | F9 - Compliance with standards of drinking water management           | 25(100.0)       | 25(100.0)           | 25(100.0)      |
| Operation sanitation    | O1 - Compliance with standards of preparation, clothes, storage according to food materials | 25(100.0)       | 23(92.0)            | 25(100.0)      |
|                        | O2 - Compliance with standards of defrosting                         | 21(84.0)        | 16(64.0)            | 21(84.0)       |
|                        | O3 - Compliance with cleaning procedure and method by raw materials    | 22(88.0)        | 17(68.0)            | 23(92.0)       |
|                        | O4 - Compliance with method of disinfect by food materials            | 22(88.0)        | 18(72.0)            | 23(92.0)       |
|                        | O5 - Use knives and cutting boards separately                         | 24(96.0)        | 22(88.0)            | 24(96.0)       |
|                        | O6 - Compliance with operation standards when mixing or heating food materials | 22(88.0)        | 13(52.0)            | 20(80.0)       |
|                        | O7 - Compliance with standards of refrigerating time, food, method     | 18(72.0)        | 9(36.0)             | 16(64.0)       |
|                        | O8 - Compliance with standards of meal testing                        | 23(92.0)        | 22(88.0)            | 24(96.0)       |
|                        | O9 - Manage sample meal (container, foods, amount, place, mark)       | 25(100.0)       | 25(100.0)           | 25(100.0)      |
|                        | O10 - Compliance with standards of food storage after cook            | 23(92.0)        | 19(76.0)            | 23(92.0)       |
|                        | O11 - Compliance with standards of serving clothes and method         | 23(92.0)        | 18(72.0)            | 23(92.0)       |
|                        | O12 - Compliance with standards of cart management                    | 25(100.0)       | 17(68.0)            | 24(96.0)       |
|                        | O13 - Compliance with standards of plate waste after serving          | 25(100.0)       | 16(64.0)            | 24(96.0)       |
|                        | O14 - Compliance with standards of food waste and tableware management of patients at risk of contagion | 25(100.0)       | 21(84.0)            | 25(100.0)      |
|                        | O15 - Compliance with standards of foreign material by operation process | 23(92.0)        | 14(56.0)            | 22(88.0)       |
| Utensil & equipment sanitation | U1 - Compliance with standards of using cleaning liquid according to kind | 21(84.0)        | 19(76.0)            | 23(92.0)       |
|                        | U2 - Compliance with standards of disinfect method according to kind (knife, cutting board, vegetable cutting machine, plate, gas utensils, dish towel, etc.) | 24(96.0)        | 18(72.0)            | 23(92.0)       |
| Environment sanitation | E1 - Compliance with standards of area classification and management  | 23(92.0)        | 19(76.0)            | 25(100.0)      |
|                        | E2 - Make and carry out a cleaning plan                               | 25(100.0)       | 24(96.0)            | 25(100.0)      |
|                        | E3 - Manage food waste                                               | 25(100.0)       | 24(96.0)            | 25(100.0)      |
|                        | E4 - Clean by machines and areas (trench, hood, window frame, trash can) | 25(100.0)       | 18(72.0)            | 24(96.0)       |
|                        | E5 - Compliance with standards of ventilation, preventing insect and rodents | 23(92.0)        | 20(80.0)            | 22(88.0)       |
| Menu planning          | M1 - Restrict food materials with high risk of food poisoning         | 25(100.0)       | 19(76.0)            | 22(88.0)       |
|                        | M2 - Compliance with standards of providing special therapeutic diet (low microbial, sterile, after organ transplant, etc.) | 12(48.0)        | 12(48.0)            | 14(56.0)       |
| Infection management   | I1 - Have infection control manual about foodservice                  | 25(100.0)       | 22(88.0)            | 24(96.0)       |
|                        | I2 - Set up an operating system for infection prevention and management at the medical institution level | 22(88.0)        | 21(84.0)            | 23(92.0)       |
|                        | I3 - Operate programs for infection prevention and management         | 19(76.0)        | 19(76.0)            | 19(76.0)       |
|                        | I4 - Educate about infection management for infection prevention     | 22(88.0)        | 22(88.0)            | 23(92.0)       |

3.8 points in the food ingredients’ quality control, which differed significantly from the importance score. In addition, environmental management in food storage room also had a relatively low score of 4.0 points, with significant differences from the importance score. Both items showed that their performance scores were lower than importance score, recognizing their importance, but showing that they were not performing well in the actual field. In the operation sanitation area, the performance score of refrigerating food management item was 3.6 points, the lowest in the same area, and the lowest among the total items. The performance score of disinfection control items was also relatively low within the areal, with 4.0 points. Both items had lower performance scores than their importance scores.
Table 3. Importance and self-assessment for the sanitary management items

| Category                  | Items                                                                 | Importance* | Performance† | p value |
|---------------------------|-----------------------------------------------------------------------|-------------|--------------|---------|
| Personal sanitation       | P1 - Perform regular check-up once a year                             | 4.7 ± 0.6   | 4.8 ± 0.4    | 0.889   |
|                           | P2 - Perform hand hygiene                                             | 4.5 ± 0.8   | 4.0 ± 0.9    | 0.029†  |
|                           | P3 - Compliance with clothing by use                                  | 4.6 ± 0.5   | 4.4 ± 0.9    | 0.490   |
|                           | P4 - Compliance with countermeasure when employee have symptoms        | 4.8 ± 0.4   | 4.4 ± 0.6    | 0.077†  |
| Food material sanitation  | F1 - Checking the business report of food supply                       | 4.3 ± 1.1   | 4.8 ± 0.7    | 0.057   |
|                           | F2 - Manage the cleanliness and temperature of supplier vehicle       | 4.5 ± 0.7   | 4.6 ± 0.5    | 0.821   |
|                           | F3 - Compliance with receiving management of food material             | 4.4 ± 0.7   | 4.4 ± 0.6    | 0.619   |
|                           | F4 - Compliance with standards of storage (date, contents, etc.).      | 4.6 ± 0.7   | 4.6 ± 0.6    | 0.944   |
|                           | F5 - Compliance with standards of refrigerated or frozen proper storage, storage period, FIFO (first-in/first-out) | 4.8 ± 0.4   | 4.7 ± 0.6    | 0.693   |
|                           | F6 - Compliance with standards of quality control by food ingredients (prevention of microbial growth and contamination, check acid value, etc.) | 4.4 ± 1.0   | 3.8 ± 1.2    | 0.042†  |
|                           | F7 - Compliance with environmental management (temperature, humidity, etc.) in food materials storage room | 4.6 ± 0.7   | 4.0 ± 0.9    | 0.005§  |
|                           | F8 - Compliance with standards of enteral tube feeding management      | 4.7 ± 0.5   | 4.6 ± 0.7    | 0.631   |
|                           | F9 - Compliance with standards of drinking water management            | 4.8 ± 0.4   | 4.7 ± 0.5    | 0.533   |
| Operation sanitation      | O1 - Compliance with standards of preparation, clothes, storage according to food materials | 4.6 ± 0.6   | 4.4 ± 0.8    | 0.361   |
|                           | O2 - Compliance with standards of defrosting                          | 4.4 ± 0.8   | 4.0 ± 0.9    | 0.146   |
|                           | O3 - Compliance with cleaning procedure and method by raw materials    | 4.5 ± 0.8   | 4.1 ± 0.9    | 0.076   |
|                           | O4 - Compliance with method of disinfect by food materials             | 4.4 ± 0.8   | 4.0 ± 1.1    | 0.221   |
|                           | O5 - Use knives and cutting boards separately                          | 4.7 ± 0.5   | 4.4 ± 1.0    | 0.164   |
|                           | O6 - Compliance with operation standards when mixing or heating food materials | 4.2 ± 0.7   | 4.1 ± 0.9    | 0.810   |
|                           | O7 - Compliance with standards of refrigerating time, food, method     | 4.0 ± 1.0   | 3.6 ± 1.2    | 0.237   |
|                           | O8 - Compliance with standards of meal testing                         | 4.6 ± 0.8   | 4.4 ± 0.9    | 0.479   |
|                           | O9 - Manage sample meal (container, foods, amount, place, mark)       | 4.8 ± 0.4   | 4.8 ± 0.4    | 1.000   |
|                           | O10 - Compliance with standards of food storage after cook             | 4.5 ± 0.7   | 4.3 ± 0.8    | 0.261   |
|                           | O11 - Compliance with standards of serving clothes and method          | 4.4 ± 0.7   | 4.2 ± 1.0    | 0.362   |
|                           | O12 - Compliance with standards of cart management                     | 4.3 ± 0.7   | 4.1 ± 0.9    | 0.367   |
|                           | O13 - Compliance with standards of plate waste after serving           | 4.4 ± 0.6   | 4.4 ± 0.5    | 0.758   |
|                           | O14 - Compliance with standards of food waste and tableware management of patients at risk of contagion | 4.8 ± 0.4   | 4.7 ± 0.5    | 0.512   |
|                           | O15 - Compliance with standards of foreign material by operation process | 4.3 ± 1.0   | 4.0 ± 0.9    | 0.260   |
| Utensil & equipment sanitation | U1 - Compliance with standards of using cleaning liquid according to kind | 4.5 ± 0.7   | 4.2 ± 1.3    | 0.323   |
|                           | U2 - Compliance with standards of disinfect method according to kind (knife, cutting board, vegetable cutting machine, plate, gas utensils, dish towel, etc.) | 4.5 ± 0.7   | 4.4 ± 0.7    | 0.878   |
| Environment sanitation    | E1 - Compliance with standards of area classification and manage       | 4.5 ± 0.6   | 3.9 ± 0.9    | 0.077†  |
|                           | E2 - Make and carry out a cleaning plan                                | 4.7 ± 0.6   | 4.5 ± 0.6    | 0.181   |
|                           | E3 - Manage food waste                                                | 4.6 ± 0.7   | 4.7 ± 0.5    | 0.631   |
|                           | E4 - Clean by machines and areas (trench, hood, window frame, trash can) | 4.3 ± 0.7   | 4.3 ± 0.7    | 0.897   |
|                           | E5 - Compliance with standards of ventilation, preventing insect and rodents | 4.4 ± 0.8   | 4.2 ± 0.9    | 0.415   |
| Menu planning             | M1 - Restrict food materials with high risk of food poisoning          | 4.5 ± 0.9   | 4.6 ± 0.6    | 0.770   |
|                           | M2 - Compliance with standards of providing special therapeutic diet (low microbial, sterile, after transplant, etc.) | 3.8 ± 1.5   | 3.8 ± 1.3    | 0.701   |
| Infection management      | I1 - Have infection control manual about foodservice                   | 4.6 ± 0.5   | 4.4 ± 0.7    | 0.160   |
|                           | I2 - Set up an operating system for infection prevention and management at the medical institution level | 4.5 ± 0.6   | 4.3 ± 0.8    | 0.382   |
|                           | I3 - Operate programs for infection prevention and management          | 4.3 ± 0.7   | 4.0 ± 0.9    | 0.324   |
|                           | I4 - Educate about infection management for infection prevention       | 4.3 ± 0.9   | 4.4 ± 0.6    | 0.965   |
| Median (range)§           |                                                                      | 4.5 (3.5–4.8) | 4.4 (3.6–4.8) |        |
| Total                     |                                                                      | 4.5 ± 0.7   | 4.3 ± 0.9    | 0.000§  |

*Numbers are mean ± standard deviation from a 5 point Likert scale, †p < 0.05, ‡p < 0.01, §p < 0.001.

†Range: Min–Max.
area, the score of the infection program operation (4.0 points) was the lowest in the area, and it was the same as importance score. The comparison between the importance and performance score of the entire items showed a significant difference and the performance score was consistently lower.

**IPA for Sanitary management items**

Importance-Performance Analysis results for sanitary management items in long-term care hospital foodservice are presented in Figure 1. The criterion for the y-axis was 4.5, the average of the overall importance score, and the criterion for the x-axis was set to 4.3, the average of the overall performance score. A significant correlation between importance and performance scores was shown ($r^2 = 0.427, p < 0.001$). In the “Concentrate here” area, which has a lower performance compared to its importance, items 2 of food storage management and food management after cooking were included. In the “Keep up the good work” area, which requires maintenance due to its high importance and performance, 17 items were included, including sample meal management, meal management for infectious

**Figure 1.** Importance-performance analysis of foodservice sanitary management items in long-term care hospitals. (A) Concentrate here: F7, compliance with environmental management (temperature, humidity, etc.) in food materials storage room; O10, compliance with standards of food storage after cook. (B) Keep up the good work: P1, perform regular check-up once a year; P3, compliance with clothing by use; P4, compliance with countermeasure when employee have symptoms; F2, manage the cleanliness and temperature of supplier vehicle; F4, compliance with standards of storage (date, contents, etc.); F5, compliance with standards of refrigerated or frozen proper storage, storage period, FIFO (first-in/first-out); F8, compliance with standards of enteral tube feeding management; F9, compliance with standards of drinking water management; O1, compliance with standards of preparation, clothes, storage according to food materials; O5, use knives and cutting boards separately; O8, compliance with standards of meal testing; O9, manage sample meal (container, foods, amount, place, mark); O14, compliance with standards of food waste and tableware-management of patients at risk of contagion; E2, make and carry out a cleaning plan; E3, manage food waste; M1, restrict food materials with high risk of food poisoning; I1, have infection control manual about foodservice. (C) Low priority: P2, perform hang hygiene; F6, compliance with standards of quality control by food ingredients (prevention of microbial growth and contamination, check acid value, etc.); O2, compliance with standards of defrosting; O3, compliance with cleaning procedure and method by raw materials; O4, compliance with method of disinfect by food materials; O6, compliance with operation standards when mixing or heating food materials; O7, compliance with standards of refrigerating time, food, method; O11, compliance with standards of preparing clothes and method; O12, compliance with standards of cart management; O15, compliance with standards of foreign material by operation process; O7, compliance with standards of using cleaning liquid according to kind; E1, compliance with standards of area classification and manage; E4, clean by machines and areas (trench, hood window frame, trash can); E5, compliance with standards of ventilation, preventing insect and rodents; M2, compliance with standards of providing special therapeutic diet (low microbial, sterile, after transplant, etc.); I3, operate programs for infection prevention and management. (D) Possible overkill: F1, check the declaration of the food materials supply; F9, compliance with receiving management of food material; O13, compliance with standards of food waste after serving; U2, compliance with standards of disinfect method according to kind (knife, cutting board, vegetable cutting machine, plate, gas utensils, dish, towel, etc.); I2, set up an operating system for infection prevention and management at the medical institution level; I4, educate about infection management for infection prevention. E, environment sanitation; F, food material sanitation; I, infection management; M, menu planning; O, operation sanitation; P, personal sanitation; U, utensil & equipment sanitation.
patients and perform regular check-up. The “Low priority” areas with both low importance and performance included 16 items, including compliance with standards of providing special therapeutic diet and refrigerating food management. The “Possible overkill” area, which is low in importance but high in performance, included 6 items, including check the declarations of supply and management food waste after serving.

**Necessity for preparing sanitary management guidelines and priority consideration**

Tables 4 and 5 showed the results on the necessity and priority consideration for preparing sanitary management guideline. All responses to the necessity were “Strongly Required (64.0%)” and “Required (36.0%).” The most priority item to consider was the “Development of sanitary management manual considering medical environment and patient meals” followed by the “Development of supervision checklist for healthcare institution,” “Establish a standard based on healthcare accreditation.” The lowest priority was “Sharing information on microbiological testing method.”

**DISCUSSION**

This study was conducted to investigate the current status of foodservice management at long-term care hospital, identify the actual demands for support to improve the overall foodservice management and develop sanitary manuals for medical institutions. With the investigation of importance and performance about foodservice management items, we identified items that have low performance such as refrigerating food management, compliance of providing special therapeutic diet, compliance with foods mixing or heating standards, and high demands about foodservice guideline available in medical institutions. Most patients in long-term care hospitals are elderly with chronic diseases and are provided with all meals a day at the hospital, so food safety management is essential. The meals provided to them go through many processes, from preprocessing of food materials to distribution to the patient’s room, and it is important to manage these processes with high standards of safety [22].

| Table 4. Necessity for preparing sanitary management |
|-----------------------------------------------|
| Variables | Values |
| Strongly required | 16 (64.0) |
| Required | 9 (36.0) |
| Not required | 0 (0.0) |
| Strongly not required | 0 (0.0) |
| No answer | 0 (0.0) |
| Total | 25 (100.0) |

Values are presented as number (%).

| Table 5. Weighted ranking of sanitary management items |
|-----------------------------------------------|
| Items | Priority* |
| Development of sanitary management manual considering medical environment and patient meals. | 1 |
| Development of supervision checklist for healthcare institution | 2 |
| Establish a standard based on healthcare accreditation | 3 |
| Sharing information on the current status of food poisoning in healthcare institution | 4 |
| Sharing information on the types of disinfectants and how to use them | 5 |
| Provision of various materials for sanitary management of foodservice for healthcare institutions | 6 |
| Extra sanitary education for employees of healthcare institutions | 7 |
| Sharing information on microbiological testing method | 8 |

*Priority was calculated by assigning weights from 8 point to 1 point in order from 1st to 8th ranks.
The average number of dietitians surveyed in this study was 2.5 per each hospital, a similar result to a research with 2 dietitians on average which has not changed from the study performed 10 years ago [15,23]. This is considered as a situation in which the number of long-term care hospitals continue to increase, but the number of dietitians in charge of foodservice management has not increased. If this situation continues, the quality of foodservice management will only go down due to the increased workload of dietitians. Extra provision of manpower is crucial, and it should also be accompanied by an improved work environment to increase the work efficiency of dietitians.

In the area of personal sanitation, there was a significant difference between the importance and performance score in the item of hand hygiene, and the lowest performance score in the area. This was similar to the results of a study [24] on worker who works at the long-term care facility, which showed lower hand hygiene performance than other items. The main reasons for the lack of hand hygiene were the lack of awareness of hygiene management and therefore lack of practice of food service workers. Allegranzi and Pittet [25] reported hand sanitation performed by healthcare workers could reduce infection and cross-transmission in hospitals, and Bae [26] found that foods prepared by food service worker who has insanitary hands have high detection rate of food poisoning bacteria. We therefore can conclude that hand hygiene is important for safe foodservice management and to increase the hand hygiene performance of employee, it is thought that continuous and repetitive education about hand hygiene is necessary.

In the area of food material sanitation, relatively low performance scores of the food ingredients’ quality control and environmental management of food material storage were shown, and the importance and performance score of receiving the management of food materials were low. The main reason for the low performance of storage environment management was the insufficient conditions and lack of space in the facility environment. Food materials can be easily contaminated by food processing, handling tools, equipment, employee themselves, etc. while working in the kitchen [27] and food material contamination can be a major cause of food poisoning [28]. Therefore, it is essential to manage food materials in a safe way and provide education on how to manage the food materials. In addition, the safe storage of food materials requires proper facilities and equipment in addition to the accurate knowledge of manager, so it is considered that the hospitals’ material support should be provide to supplement this part.

In the area of operation sanitation, the lowest importance and performance scores were shown in compliance with the freezing process. The main reason for the low performance of this item was insufficient conditions and lack of space in the facility environment. Bae et al. [29] said that if enough refrigeration and frost facilities were not secured, risks would occur due to insufficient temperature control and excessive storage capacity would reduce management efficiency. Refrigeration and cooling management is included in HACCP prerequisite and are essential for safe food hygiene management, so proper temperature maintenance and space for freezing-frosting facilities are considered necessary.

In the same area, the performance score was low in item of compliance with disinfect method by food materials, which was same at the elderly welfare facility foodservice [30] and it seemed to be low in overall foodservice facility for elderly. Insufficient disinfecting of food materials is likely to cause problems, especially in raw vegetable foods. Microbial accidents can also be prevented when vegetables are consumed after heating, but if non-heated
seasoned vegetable and salad foods are contaminated, the risk of food poisoning is high as contaminated food can be provided to patients as it is [28]. In this case, the disinfection process of food materials should be more thorough. It would be also desirable to provide education on methods and clear standards because this part requires not only dietitian’s management but also prior knowledge of employees who actually perform disinfection.

In the area of environment sanitation, there was a significant difference between importance and performance in compliance with the standards of area classification and manage, performance score was lower than importance, and the insufficient conditions and lack of space in the facility environment was the main reason. A research [29] showed relatively low importance and performance in items such as separation of food and employee movements and set a proper movement of food materials, but dietitians’ awareness of the importance of the distinction between area classification has been growing more than before [15]. Lastly, this work showed the highest importance score for the same item, it is considered difficult to increase performance in a short time because this is a part that requires hospital economic and mechanical support. If the kitchen is small, it is difficult to distinguish between moving routes and workplaces, but if the area is not clearly divided, it increases the risk of cross-contamination [31]. For this reason, the facilities and mechanical improvement is need and as much as possible, contaminated and non-contaminated areas should be distinguished in current facilities to prevent contamination of food materials. Particularly, low importance and performance score were also shown in compliance with providing special therapeutic diet and it is thought that the frequency of performance will be low due to the fewer patients who are more sensitive to infection than acute care hospital. The hospital that provide special therapeutic diet and answer the lack of hospital support such as manpower and supplies lead to lower performance. Low microbial diet and sterile diet etc. are usually provided to patients with impaired immune system [32] and with inadequate management, bacteria from the meal can be directly transferred to the patient’s body. Although long-term care hospital do not have as much demand for infection controlled meals as acute care hospitals, it is still not less important because most of the patient in long-term care hospitals are elderly with low immune function.

Interestingly, drinking water management and keeping sample meal showed high importance and performance scores, which are considered easier to manage than others because of their strict standards by law. Providing more strict standards and methods for items with low importance and performance scores may also improve the quality of care at long-term care hospital foodservice.

Analysis of the overall importance and performance scores of sanitation management items at long-term care hospital showed a correlation between importance and performance, and 33 out of 41 items were distributed in the “Keep up the good work” and “Low priority” areas. We confirmed that the overall sanitary management performance was accompanied as dietitians recognized its importance. Although sanitary management was not insufficient due to the scores of importance and performance showed more than 4 points in most items, the items surveyed in this study are all necessary for safe foodservice management, we can expect to improve the quality of foodservice management by increasing the importance and performance of them. In particular, items such as hand hygiene, compliance with food material disinfection and etc. in “Concentrate here area” and “Low priority area “with low performance can be improved through management guideline or manual. In items that require support for hospital, such as compliance with area classification standards, we could
suggest including those standards in the manual to provide a basis for the need to renovate the cooking facilities in hospitals.

The need for manuals and guidelines for sanitary management at hospital foodservice have been continuously raised for a long time [15,33]. From our study also, all respondents reported sanitary management guidelines were necessary, and the priority consideration was also high for development of sanitary management manual and supervision checklist, indicating that the demand for systematic standards was quite high. Among the facilities that provide meals for the elderly, foodservice management at long-term care hospital is stricter because of the accreditation program than the management of the elderly welfare facility. However, systematic improvements are still in need. The results show that dietitians at long-term care hospitals were fully aware of the importance of foodservice sanitary management, but showed a significant difference from self-evaluation scores, indicating that there is not enough performance in the field.

We believe that items that have low importance and performance from IPA, need to be constantly reminded of the risks of patient care and management needs, which should be done not only to the dietitians or cook, but also for all employees.

Despite the practical implications, this study has few limitations. Since the number of respondents in this study was relatively small compared to prior studies [5,15,23,34,35], it is difficult to generalize to all long-term care hospital. Nevertheless, the significance of this study is that we identified the level of performance during foodservice management by dietitians, and we ensured that most of the dietitian wanted a structured manual for the improvement of their practice.

In this study, the importance and performance of sanitation foodservice management was assessed for dietitians in long-term care hospitals. First, we asked questions about the current state of foodservice hygiene practice and further asked their demands for improvement. The results of this study are summarized as follows.

1. The average number of licensed beds was 218.5 ± 93.5 beds, and 23 hospitals (92.0%) were accredited by Korea Institute for Healthcare Accreditation. The average number of dietitians was 2.5 ± 1.1, but, certified clinical dietitians were hired in only 28% of the hospitals (7 hospitals).
2. The overall average for the importance score of the sanitary management items was 4.5 ± 0.7, but the performance score was significantly lower (4.3 ± 0.9, p = 0.000).
3. IPA result based on importance and performance scores showed 17 items in the “Keep up the good work” area on both high importance and performance, and 16 items in the “Low priority area” on low importance and performance. Two items were shown in the “Concentrate here” area and 6 items in the “Possible overkill area,” respectively.
4. All respondents said need to prepare sanitary management guidelines for hospital foodservice was necessary. The priority was to “develop manuals,” and the next was to “develop supervision checklist.”

The study found that dietitians at long-term care hospitals felt the need to prepare relevant guidelines and standards for sanitary management of foodservice, and identified areas that needed improvement by understanding the importance and performance level of each sanitary management item. Although dietitians were highly aware of the importance of...
management, in many cases, the items with low performance were caused by inadequate facilities and equipment. Lastly, in some cases, it was difficult to achieve standardized management due to insufficient management standards. In conclusion, a structured manual for improving of their practice was considered necessary for safe foodservice and to secure the safety for the patients.

REFERENCES

1. Kim MJ, Hwang JY. A study on the long-term care insurance system prepare for the super-aged society. J Korea Acad Ind Coop Soc 2019;20:395-405.
2. Statistic of Korea. Life expectancy and health life expectancy [Internet]. Available from http://www.index.go.kr/potal/main/EachDtlPageDetail.do?idx_cd=2758 [cited 2021 April 26]. 2020.
3. Lee YJ, Lee SG, You CH, Kim B, Kim TH. Factors associated with the long-stay admissions in geriatric hospitals-focused on dementia’s inpatients. Korean J Hosp Manag 2020;25:29-37.
4. Jung HY, Jung YK. Recognition and performance level of hospital infection control in nurses of long-term care hospital. Korean J Health Serv Manag 2013;7:131-41.
5. Lee C, Lee SK. Clinical nutrition management status in convalescent hospitals before and after healthcare accreditation process. J Korean Diet Assoc 2014;20:199-211.
6. Cho C. Geriatric long-term care practice in Korea. Korean J Clin Geri 2018;19:63-71.
7. Avci M, Ozgenc O, Coskuner SA, Olut AI. Hospital acquired infections (HAI) in the elderly: comparison with the younger patients. Arch Gerontol Geriatr 2012;54:247-50.
8. Bang JY, Lee H, Son Y. Status of infectious disease inpatients at long-term care hospitals in Korea. J Korea Acad Ind Coop Soc 2020;21:134-43.
9. Kline KA, Bowdish DM. Infection in an aging population. Curr Opin Microbiol 2016;29:63-7.
10. Korea Institute for Healthcare Accreditation. Standards of long term care hospitals accreditation system. Seoul: Korea Institute for Healthcare Accreditation; 2016.
11. Korea Institute for Healthcare Accreditation. Standards of large hospitals accreditation system. Seoul: Korea Institute for Healthcare Accreditation; 2016.
12. Kim M, Jung Y, Kim K, Lee S. An analysis of accreditation preparation process and costs in hospitals. Korean J Hosp Manag 2015;20:45-55.
13. Kim KS. Urgent problems and solution strategies in 2nd cycle of long-term care hospital accreditation. Korean J Hosp Manag 2016;21:65-70.
14. Kim HJ, Kim EM, Lee GJ, Lee JI, Lim JH, Lee JM, Jeon HJ, Lee HY. Analysis of hospital foodservice management and health insurance coverage of inpatient meals in Seoul. J Korean Diet Assoc 2010;16:378-96.
15. Lee JE. Dietitians’ perception of importance about standards of foodservice management associated with long-term care hospital accreditation. J Korean Soc Food Sci Nutr 2015;44:1558-66.
16. Ministry of Education. Guidelines of school foodservice sanitation management. Sejong: Ministry of Education; 2019.
17. Ministry of Education. Operation manual for kindergarten meals & snack. Sejong: Ministry of Education; 2017.
18. Ministry of Food and Drug Safety. Sanitation manual of franchise. Cheongju: Ministry of Food and Drug Safety; 2017.
19. Cho SH, Bae MA, Lee HS, Park SH. Development of customized hygiene management manual for Bucheon children meal supply organization and evaluation of effects. J East Asian Soc Diet Life 2014;24:275-82.
20. Song YJ, Bae HI. Evaluation on HACCP prerequisite-program performance within general hospital foodservice operations. J Nutr Health 2016;49:43-50.
21. Martilla JA, James JC. Importance-performance analysis. J Mark 1977;41:77-9.

22. Cairo RC, Silva LR, Andrade CF, Barberino MG, Bandeira AC, Santos KP, Diniz-Santos DR. Bacterial contamination in milk kitchens in pediatric hospitals in Salvador, Brazil. Braz J Infect Dis 2008;12:217-21.

23. Park M, Lyu E. Importance and performance of dietitian’s task at long term care hospital foodservice in Busan · Kyungnam area. Korean J Community Nutr 2011;16:602-12.

24. Park EJ, Lim YJ, Cho BH, Sin IJ, Kim SO. A survey on performance of infection control by workers in nursing homes for the elderly. J Korean Gerontol Nurs 2011;13:79-90.

25. Allegranzi B, Pittet D. Role of hand hygiene in healthcare-associated infection prevention. J Hosp Infect 2009;73:305-15.

26. Bae HJ. Analysis of contamination of bacteria from raw materials, utensils and workers’ hands to prepared foods in foodservice operations. J Korean Soc Food Sci Nutr 2006;35:655-60.

27. Legnani P, Leoni E, Berveglieri M, Mirolo G, Alvaro N. Hygienic control of mass catering establishments, microbiological monitoring of food and equipment. Food Control 2004;15:205-11.

28. Cho SK, Park JH. Microbial contamination analysis for drinking water, foodstuff, and cooked food for foodservice operation. Korean J Food Sci Technol 2012;44:478-83.

29. Bae HJ, Jeon EK, Lee HY. Analyzing the importance and performance of sanitation management within foodservice facilities and utilities. Korean J Food Cookery Sci 2008;24:325-32.

30. Choi JH, Kim DH, Choi EH, Chung MJ, Lee HS, Lee MJ, Chang HJ, Lee KE, Kwak TK. Assessment of foodservice management practices according to types of elderly foodservice facilities. J Korean Soc Food Sci Nutr 2019;48:469-81.

31. Song YJ, Bae HJ. Importance-performance analysis about sanitation management items at general hospital foodservice operations. Korean J Food Cookery Sci 2013;29:63-71.

32. Lund BM. Microbiological food safety and a low-microbial diet to protect vulnerable people. Foodborne Pathog Dis 2014;11:413-24.

33. Lee JE. Importance-performance analysis on foodservice management items of the dieticians at long-term care hospitals. Indian J Sci Technol 2016;9;17.

34. Kim NY, Seong GM, Lee JS. Job performance, perception of job importance, and job satisfaction in dietitians working in geriatric hospitals in Busan. J Korean Diet Assoc 2012;18:396-71.

35. Lee SJ, Park E. Importance-performance analysis of clinical nutrition management in convalescent hospitals in the Gyeongnam area. J Korean Diet Assoc 2016;22:53-69.