



The Operation of Food Production in Egyptian University Hospitals

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Abstract *Hospital food production is a complicated process which requires co-operation between all hospital staff. However, there is increased competition in the healthcare industry and the patients increasingly have better knowledge about food and nutrition and to help them to understand the quality of food service. Hospital food generally has a poor reputation despite recognition of the importance of good nutrition in patient recovery from illness. Improving food service quality in hospitals remains an underexplored issue and a difficult challenge because it includes both tangible and intangible issues. The delivery of a catering service in hospitals has become another challenge for over-stretched hospital budgets as hospital managers struggle to deliver high-quality food service to patients.*

Keywords: Menu, Food Purchasing, Food Production, University Hospitals, Egypt

INTRODUCTION

Today, as a result of the recent economic crisis, organizations (including health-care organizations) are forced to look for innovative ways to maintain themselves and maintain their competitiveness (Sargeant, 2010). Egyptian hospitals are approaching a time of change that is forcing them to assess their roles and practices relating to food production and service (Mostafa, 2005). The health sector, both public and private, is forced to think of creative ways to provide patients with satisfactory services (Sargeant, 2010). Health care institutions seeking excellence in their performance to achieve its objectives efficiently and effectively whether they are working in the field of healthcare, or production and delivery of services or profit or non-profit (Aiello, 2010). In Egypt, healthcare services are delivered through different methods, including: private hospitals, public or governmental hospitals, medical care premises and university hospitals (Mostafa, 2005). Healthcare service and food and beverage services are provided free in public hospitals in Egypt. Unfortunately, patients often have negative perceptions of food and beverage services in hospitals - even before tasting the food (Hartwell et al., 2006). Therefore, the aim of this paper is to identify the operation of food production system in Egyptian University hospitals.

LITERATURE REVIEW

Menu

The menu impacts on all aspects of food and beverages in hospitals, such as: production requirement, staffing and skills need, service requirement and equipment need (Mavrommatis et al., 2011). These considerations should be taken in account in menu planning to determine: menu variety, portion size, and nutritional standard (Hartwell and Edwards, 2003). The menu is the main way of addressing communication problems between kitchen staff and patients (Hospital Caterers Association, 2000) so it needs to be easy to read and understand (Hartwell, 2004). Menu design should enhance food quality and include a wide range of choice (Assaf, 2009). Menus are fundamental to overall satisfaction with food and service quality (Porter and Cant, 2009). The best way to help patients select the appropriate foods is by assisting their choice (Davis et al., 2008). In spite of this is, it is considered a major problem, because menus often do not include enough information about food ingredients, which influences patient expectations (Donini et al., 2008; Hwang et al., 1999).

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Food Purchasing

The purchasing process influences food production and service costs and the quality of food served to the patients - Payne-Palacio and Theis (2009) explained that purchasing is the process of securing the right ingredients at the right time in a form that meets defined standards of quality, quantity and price. Purchasing is vital to maintaining an adequate flow of ingredients to meet production and service requirements and is critical to the financial success of the food production and service operations (Spears and Gregoire, 2004; Feinstein and Stefanelli, 2012). The purchasing function includes numerous processes or activities that must be carried out, including:

- *Raw material specification:* indicates the quality, the size and the factors needed to obtain the right food items (Sullivan and Atlas, 1998). To purchase food accurately, it is necessary to use specifications for the key features of each food item (Dittmer and Griffin, 1997; Cichy and Wise, 1999).
- *Selecting supplier:* a good relationship with suppliers is a key issue in delivering high standards of food quality (Puckett, 2004). Also, the communication between buyers and suppliers is necessary to meet the needs of hospital operations (Stefanelli, 1997).
- *Purchasing:* plays an essential role in meeting patient's needs and ensuring the success of the healthcare food production and service operations (Sonnino and McWilliam, 2011). The purchasing has a significant impact on food quality, patient satisfaction and profitability (Spears and Gregoire, 2004).
- *Receiving:* is considered the missing link in the purchasing of materials because the food quality problems can be caused by breakdowns in receiving procedures (Spears and Gregoire, 2004). The receiving process is a control point in food production and service operations and involves more than just acceptance and signing for delivered products (Walker, 2009).
- *Storing and issuing:* once received, food items should be transferred into appropriate storage, which includes refrigerators for chilled foods, freezers for frozen foods and dry storage areas for dry goods, then issuing food by using FIFO (first in, first out, i.e. using the oldest stock first) (Spears and Gregoire, 2004; Ahmed et al., 2015).

Food Production

Hospital food production systems are organised to produce different quantities of food at high standards by recruiting skilled employees and using equipment and materials effectively and efficiently (Assaf et al., 2008) to achieve best practice (Hwang and Sneed, 2009). Food production is a complicated operation with multiple inputs (Rodgers, 2005). Four types of food production system are described in the literature:

- *Conventional (cook-serve),* ingredients of foods are assembled and produced in on-site premises, and held either heated or chilled, before being served to patients (Spears and Gregoire, 2004).
- *Cook-chill,* based on preparing and cooking food normally then being chilled and stored and then reheated for serving to patients (Ahmed et al., 2015).
- *Cook-freeze,* cooks food in a complete fashion and this is then frozen quickly, stored in a freezer and reheated to order (Davis et al., 2008).
- *Sous-vide,* a modified version of cook-chill. It involves the process of vacuum sealing the food in plastic pouches then steaming followed by rapidly cooking and chilling (Assaf, 2009).

Cook-chill system is mostly used in larger establishments of food production (Ahmed et al., 2015). It is more productive than the cook-serve system, it is for more adaptable which saves money and increases productivity (Griffin, 2006; Englund et al., 2007). Hospitals have used cook-chill systems successfully to provide suitable menus which meet patients' nutritional requirements (Porter and Cant, 2009). The advantages of using sous-vide in hospitals are: cutting food costs by reducing material; enhancing flavour and eliminating wastage; labour-cost benefits by using fewer-skilled staff; increasing productivity and reducing operational costs and energy costs (Ghazala, 1998; Assaf, 2009).

Standard recipes play key roles in controlling cooking processes and providing information about the product, such as: ingredients; quantities/quality required; portion sizes (Shiring, 2001). Cooking methods, recipes and portion sizes all affect food quality and costs (Sullivan, and Atlas, 1998; Hwang, et al., 1999; Assaf, et al., 2008).

This study proposed the conceptual framework of food production in university hospitals in Egypt based on the gathered information from the literature review (see Figure 1).

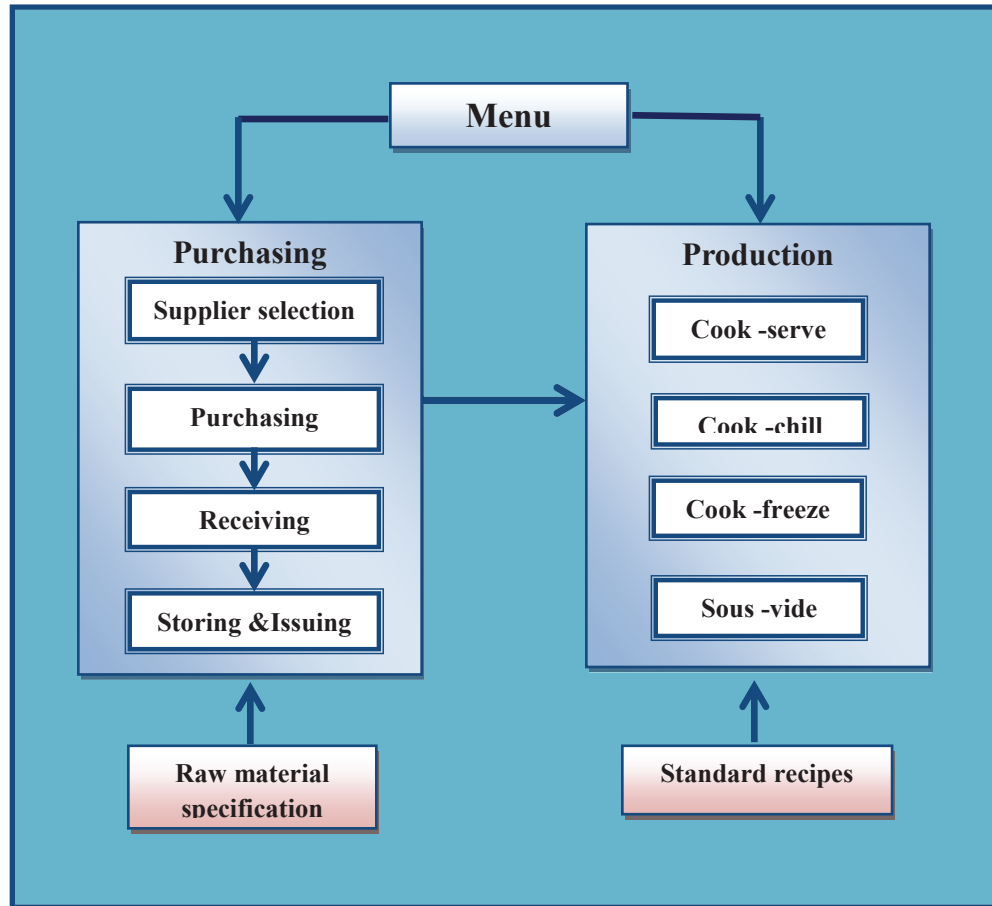


Fig. 1: Conceptual Framework of Food Production Systems in University Hospitals in Egypt

METHODS

This study is based on a qualitative approach; therefore two distinct phases of data collection methods were used: first, a Delphi technique; second, direct observation. Figure 2 shows the process of collection, analysing and interpret the data.

The First Phase was carried out to get an accepted consensus from a panel of experts in the field, selected according to their experience, knowledge, closeness and commitment to the research as recommended by Sobaih et al. (2012). Justification for using the Delphi technique in this study were; *first*, the Delphi technique is considered appropriate for getting expert opinions about a phenomenon without necessarily bringing them together (Okoli and Pawlowski, 2004); *second*, it depends on iteration which gives the researcher the opportunity to add or remove information to establish a consensus (Hsu and Sandford, 2007; Sobaih et al., 2012); *third*, it is an efficient method for judging research data (Sobaih et al., 2012), by exploring the diverse

experiences and the backgrounds of the experts that have worked on similar problems.

According to the mode of interaction, all experts were invited to participate by telephone and face-to-face interview, the panel of expert involved 15 participants. The response rate was 67% because ten experts responded and committed themselves to the research. Consensus was achieved in the first round of the Delphi technique. The interviews were conducted to identify the food production operations used in their hospitals, the interview undertaken with catering managers, chefs, and kitchen staff.

The Second Phase was carried out through direct observation. Direct observation was undertaken in: the receiving and the storage areas to identify the procedures of receiving, storing and issuing material; the kitchen areas to identify the processes of food preparation and cooking process.

The qualitative data was analysed thematically using (NVivo 9 software) for coding and identifying common themes. All the interviews were conducted in Arabic and the researcher transcribed them and translated them into English.

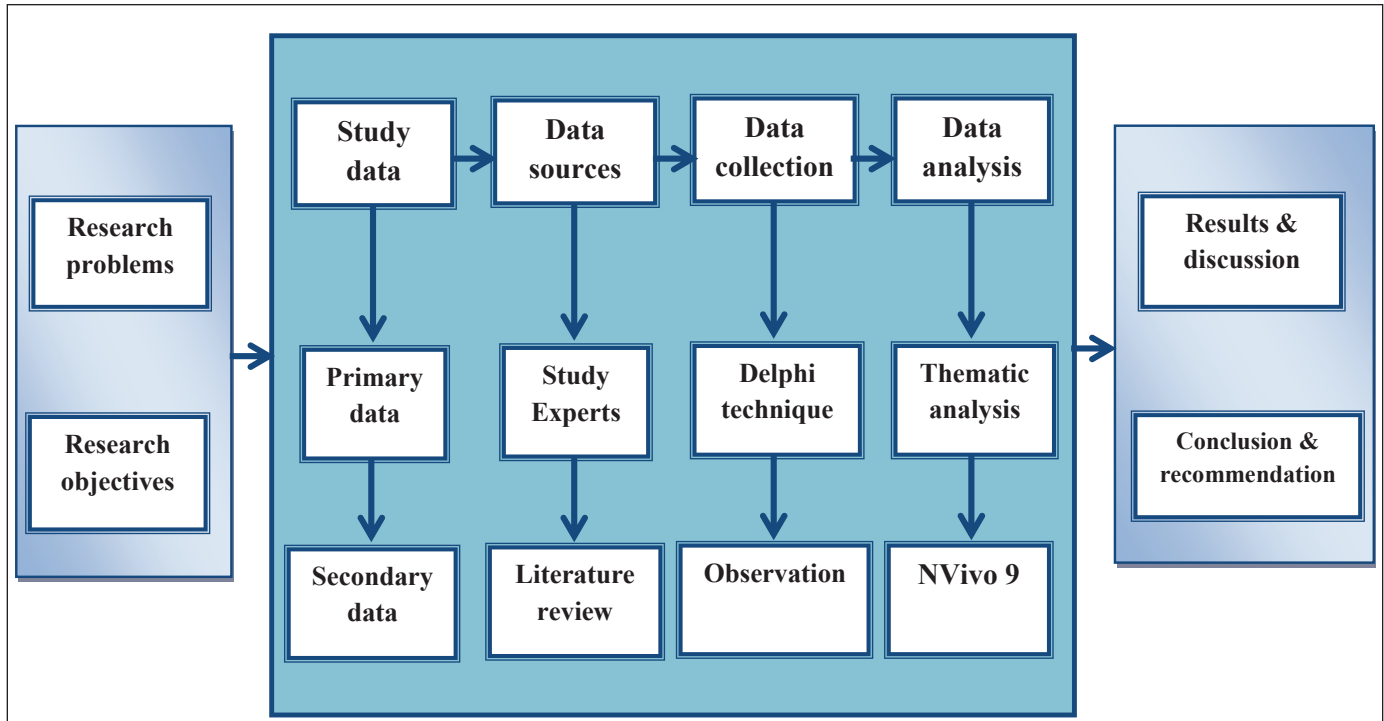


Fig. 2: The Study Design (Source: Yin, 2009)

Justification of the Selection of the FUH

FUH is one of the newest teaching hospitals in Egypt. It was constructed in March 2007 and opened with full capacity in September 2010. It is noted for its achievements in healthcare, research and teaching, as well as for compassionate care. It offers food production and service behind the treatment service. FUH was chosen for this research because the researcher had prior experience regarding hospital food production system in this hospital, and this experience was reflected in discussions during interviews with two academic professors - one of them also a public-sector hospital manager. The professors highlighted that FUH has problems in relation to their food production operations, such as: the way food is produced; the volume of wastage - a lot of wastage comes from: patients not eating their meals; overproduction.

RESULTS

Phase One: Delphi Technique

All experts who agreed to conduct an interview were contacted by telephone to ascertain that they were willing to be interviewed for providing information concerning food production and service systems within the hospital. Five catering staff members regretted to participate due their heavy commitment and lack of time. Thus interviews were conducted with ten experts (catering staff) to identify the operation of food production system in FUH, see Table 1.

Table 1: Results Obtained from Semi-structured Interview on Food Production System

Influencing factors	Reported data	Participant comments from semi-structured interview discussions
Menu	Most experts explained that the menu offered a variety of items. Experts assured that the menu design highly considers the patients nutritional needs. The majority of experts indicated that the menu regularly changes and they are involved in these changes.	Yes, our menu has a variety of food items. All these items are in accordance with specifications. (FUH- Expert 1) Definitely, FUH provide two types of menu; one for patients and another for staff and visitors. (FUH- Expert 5) Actually, we provide the patients with the food according to their nutritional needs based on their physicians' recommendation. (FUH- Expert 1) We have a cyclical menu changing daily. In general, we don't change it regularly because it's a sit menu and we don't have enough empowerment from the management to do what we want. Also, it isn't easy to change or add new items. (FUH- Expert 4)
Food Purchasing	Experts explained that hospital has a specification list for menu items. Experts explained that they have a committee responsible for writing the food specifications. Experts reported that they deal with reputable suppliers who provide the best price and quality. Experts mentioned that they dealt with local suppliers. Experts mentioned that they selecting supplier by tendering method. Experts claimed that they haven't used software or computer system for purchasing food material.	Actually, we had specifications list for all items and materials which we want to purchase. It is the contract between the hospital and the suppliers. It also provides the suppliers with all information and specification of all materials. (FUH-Expert 1) Occasionally, there is a list of specification for all materials. We are going to buy it. We send this list to the suppliers, and wait for their response. The committee team is responsible for investigating the suppliers to identify the quality of material, prices, facilities and reputation. In order to purchasing, decision is based on price and quality. (FUH- Expert 2) In terms, who are responsible for writing these specifications? FUH has a committee; involving professional and academics in nutrition and professionals in food production and service operations. They set up specifications based on different references. (FUH- Expert 1) FUH has purchasing team responsible for writing food specification, this team including; nutritional staff, food service supervisor, professors from the Faculty of Agriculture and the Faculty of Tourism and Hotels. (FUH- Expert 2) Some of our suppliers are locals, but not all of them and identifying the supplier is advertised tendering based so, we have suppliers from outside the governorate. Principles of the selection decision process focus on price and quality. (FUH- Expert 1) We select food suppliers by a tendering method. It is not necessary to have all suppliers from the local area. (FUH- Expert 6) We depend and highly consider local suppliers as much as possible, as this support and help the economy of the local community. For example, we use local fish and meat suppliers. (FUH- Expert 1) No, we don't have any computer programme for purchasing process. Also, the hospital has limited facilities. (FUH- Expert 5) Formal purchasing is a simple process. So, we haven't used software or any computer programme for purchasing food material. Also, the catering company conducts all the purchasing. (FUH- Expert 7)

Influencing factors	Reported data	Participant comments from semi-structured interview discussions
Food receiving	A number of experts indicated that kitchen staff follow specific procedures for receiving food.	Receiving time starts from 9am through 2pm, and all purchased food materials are allocated in the receiving area. The receiving committee in charge which involves (4/5) specialized members in nutrition, purchasing, and storage. They investigate the appearance and physical properties of all food materials separately and check quality, temperature, and expired date. (FUH- Expert 1) It is clearly defined; it is part of auditing; all goods when received should be checked; and it is a basic knowledge of chef to know these issues. FUH has three stores, dry, cold and freeze storages. (FUH- Expert 2) All materials are separately received according to purchasing specifications and expiry date. Any damaged food materials or occurring waste result in returning them to the supplier. All accepted food materials are moved directly to the storage areas. (FUH- Expert 3) We have six days deliveries of food in our hospital. We get deliveries every three days of vegetables, meat and fish once a month, but dry goods once every two weeks. (FUH- Expert 4)
Storing and issuing food	Experts claim that kitchen staff used FIFO principle to issue food.	All received food materials are stored appropriately according to their type (e.g. dry, cold, or freeze), then issued as the kitchen needs. But, meat is sent directly to the kitchen, and the rest is sent to the store. The catering company provides the hospitals with 15-days food items stock. This means that the Company supply materials on fortnight basis. FIFO is used to issue food materials. Also, it helps for inventory control. (FUH- Expert 1) In terms of controlling the kitchen inventory; there are daily, weekly and monthly checks and investigation for all items in the store. (FUH- Expert 6)
Food production	Some experts explained that the hospital has standard recipes for some of food items. Experts reported that they use traditional system/cook-serve and they have a plan for all production processes. Experts claimed that they prepare food according to cooking plan.	FUH have standard recipes for food production, but not for all menu items. (FUH- Expert 2) Standard recipe book, we follow it for food items produced by using cook-serve. (FUH- Expert 3) We follow standard recipes in cooking process. They are called a specification book. It considered the guide for the cooking staff in all production processes. (FUH- Expert 4) Chefs prepare and produce food according to the plan set up by the hospital authority. This plan helps kitchen staff to identify types of food items used for the menu every day. There is flexibility to add or remove some food items. (FUH- Expert 6) There is a daily production plan involves menu items, number of meal, time of service the kitchen staff is in charge for preparing and cooking. The kitchen served 150 meals for patients and 140 for staff, roughly 300-350 meals daily. (FUH- Expert 7) Kitchen staff have specific schedules for food production and service operations. (FUH- Expert 3) Cooking staff have to consider the necessary steps to maintain the quality of food before serving. If the food is directly portioned into lunchbox after cooking, the food will be subject of microbial growth and becomes risky to the health. (FUH- Expert 3)

PHASE TWO: DIRECT OBSERVATION

The main purpose of the observation is to identify the actual practices of food production systems in the hospital. It involved the process of receiving, storing, preparation/cooking food. The researcher was given permission from the food and beverage manager to conduct the observation.

Receiving Area

The receiving area was located at the back of the kitchen. It was a small area and was not suitable for receiving different food orders at the same time. It has been noted that there was a designated storeman and one or two staff from the receiving committee to receive food stuffs in the day of delivery which was three days a week for dairy products and once every two weeks for the other food materials. It was noticed that the receiving area was not well equipped. Also, the kitchen staff did not check food in receiving process. In addition, the observation did not find a specifications list for purchasing food in place (see Table 2).

Table 2: Observation Checklist Through Food Receiving Practices

	Yes	No
Is there a designated person responsible for receiving all materials?	√	
Is the receiving area well equipped with scales?		√
Is the receiving area well organized and clean?		√
Is a detailed specification list of each item received available?		√
Are all received items checked immediately against its specification list?		√

Storing and Issuing Area

In terms of storage and issuing practices, it was observed that the storage area was small and not equipped with appropriate tools and equipment to accommodate the different received food items. The hospital had: dry, chill and freezing storage for storing all received food items. The dry store contained organized shelves for different food and beverage items, but it was not clean enough (see Figure 3). There was no designated person responsible for storing food, but the kitchen and disorganised (see Figure 4). In the refrigerator room, it was observed that there were unwrapped foodstuffs with no labels. The chill storage was clean, but not well organised and there were some materials found on the floor (see Figure 5). Its ventilation was not adequate and its ceiling was damaged (see Table 3).

Table 3: Observation Checklist through Food Storage Practices

	Yes	No
Is there a designated person responsible for storing all materials?		√
Is the storing area organised and clean?		√
Is the storing area equipped with trays and racks?		√
Is dry food store clean?		√
Is dry store well ventilated?		√



Fig 3: Dry Storage at FUH

(Source: Photo taken during the observation process)



Fig. 4: Package and Boxes Storage at FUH

(Source: Photo taken during the observation process)



Fig. 5: An Example of Food Items During the Storage at FUH

(Source: Photo taken during the observation process)

Preparation and Cooking Area

Concerning the preparation and cooking process as shown in Table 4, it was noticed that the preparation areas were not appropriately clean or organised (see Figure 6). So, there were some items kept in the kitchen outside the fridge which affected food quality. It was noticed that food temperature was not checked during preparation.

Table 4: Observation Checklist Through Food Preparation and Cooking Practices

	Yes	No
Are the food preparation and cooking areas clean and organised?		√
Are temperatures checked during the cooking process?		√
Are standard recipes written and followed for cooking process?		√
Is the food preserved or held before serving to the patient?		√
Is the production plan announced in the kitchen?		√
Is the kitchen have suitable equipment?		√
Do the cooking staff wear clean and tidy clothes?		√



Fig. 6: Food Preparation and Cooking Areas at FUH

(Source: Photo taken during the observation process)

Kitchen staff did not refer to the standard recipes and all of them used their experience. Observations indicated that some kitchen staff left food items (on the tables) before serving it to the patients, which negatively affected the quality of food

(see Figure 7). It was also noticed that the kitchen was not well-equipped (see Figure 8) and no production plan was announced in the kitchen areas for all staff.

Figure 7: An example of food after cooking and before service at FUH



Fig. 7: An Example of Food After Cooking and Before Service at FUH

(Source: Photo taken during the observation process)

In terms of safety and sanitation, the observation indicated that food safety rules were not in place and cooking and service staff had not been given any instructions in this

regard. Some kitchen and service employees were clean and tidily dressed, but some did not wear gloves during the preparation and cooking of food.



Fig. 8: Kitchen Equipment at FUH

(Source: Photo taken during the observation process)

DISCUSSION

Menu

Food plays a vital role in the medical treatment of patients, meeting nutritional needs and promoting patient satisfaction (Hartwell & Edwards, 2001). However, Allison (2003) pointed out that malnutrition is a big problem in hospitals and affects patient's satisfaction, length of stay and hospital costs. Many issues affect on the feeding of patients; including: food taste, temperature, meal presentation, medical treatment, staff attitudes and relationships with the patients (Hartwell & Edwards, 2001; Mavrommatis *et al.*, 2011).

However, the participants stated that they deliver a cyclical menu for two weeks with different food items everyday, it delivers the patient menu, visitor menu and staff menu. With regard to that, menu variety Edwards and Hartwell (2006) explained that cook-serve systems assist the hospitals to present, flexibility, fresh items and variety of menu choices. The results indicated that the menu has a variety of foods with nutritional, healthy and special foods according to patient requirements; also the participants reported that regularly changes and they are involved in these changes.

Food Purchasing

Food suppliers were selected on an annual contract basis, according to their quality, price, facilities and location. Accordingly, FUH had a contract with *El-Giza Catering Company*, which is responsible for the purchasing, preparation, cooking and serving food to the patients.

Raw Material Specification: Once the menu has been designed, the food specifications are developed to identify the key characteristics of the products and suppliers (Chon & Sparrowe, 2000). The results emphasised the importance of specification lists, because they make explicit the essential information related to the product (i.e. type, quantity, quality and price). Also, Brown (2005) explained that specifications should be kept short and simple. The specifications indicate the quality, the size and the factors needed to obtain the right food items (Sullivan & Atlas, 1998). To purchase food accurately, it is necessary to use specifications for the key features of each food item (Dittmer & Griffin, 1997; Cichy & Wise, 1999). The FUH has specification list followed when they prepared purchasing order, additionally there was a committee responsible for writing the specification list.

Selecting Supplier: There are numerous factors that should be taken in supplier selection, such as quality, price, discounts and facilities (Puckett, 2004), and these factors matched the results which were collected from fieldwork. FUH staff preferred dealing with reputable suppliers who provided the best quality and price. In this regard, Spears and Gregoire (2004) emphasized the importance of using local food produced in hospital operations as it leads to cheaper products and contributes to the sustainability of the local economy by allowing farmers to keep producing and offering job opportunities to local people. The majority of suppliers were selected from outside Fayoum city.

Purchasing: FUH used formal purchasing methods which depended on tendering methods for supplier selections. Also, it is a large hospital and has a huge menu. Similarly, Feinstein and Stefanelli (2012) reported that formal purchasing is best for larger food service operations which have large orders.

The participants mentioned that they used local ingredients and the reasons to use local food and a local supplier was to reduce costs and support the community. This matched Walker *et al.*'s (2009) findings where local sources help to reduce costs and to build relationships with the society, which, in turn, leads to purchasing cheaper products and contributing to a sustainable economy by offering job opportunities for local people. The results indicated that FUH did not use computer software for managing purchasing.

Receiving: FUH had specific procedures where the receiving area is clean and suitably-equipped with the necessary tools. The receiving process includes and specification list, weighting, temperature, labels and expiry date. This echoes Puckett (2004), the receiving areas should be equipped with various tools, e.g. adequate floor scale and a small table scale. In contrast the observation indicated that the receiving area is a small area and is not suitable for receiving big orders. It was not well-equipped, but includes two big fridges, one scale and some baskets. It was noted that, it was not clean or organised which effect on the receiving process will be taken a long time; also the staff not checked the food.

Storing and Issuing: Food materials are issued from store to the appropriate section within the catering department - i.e. kitchen and food and beverage outlets (Puckett, 2004). The hospital implemented FIFO to issue food from the store to the kitchen. The observation data showed that the hospital has dry, chill and freezing for storing all received food. The observation showed that the storage areas were not well-equipped, not clean or organised and not ventilated appropriately. In terms of designating a special person for storing food, the results showed that they did not have a nominated person for this job and all the kitchen staff are responsible for conducting it.

Food Production

Traditional system/cook-serve used in the current hospital. In terms of food preparation, this study results revealed that the kitchen staff checked the production plan to identify menu items and, prepared food ingredients before the cooking day to reduce the time. Also, the result indicated that the kitchen staff followed standard recipes for all menu items. However, the observation found that kitchen staff preparing food according to their experience not standard recipes. These sentences seem to contradict themselves.

Observation results indicated that the preparation areas were not clean and organised. In addition, it was noticed that cooking staff was not check temperatures during the cooking process and the cooking plan wasn't announced for all staff. On the other hand, it was noticed that the kitchen staff, after preparation or cooking food, did not put the food material and cooking utensils in dedicated places. There were some food items which were kept in the kitchen without putting them in the

fridge after preparation. Furthermore, it was noticed that the kitchen staff did not wear gloves when preparing the food.

The work environment, whether physical (e.g. equipment; light; temperature) or managerial (e.g. communication with staff; access to documents), has a fundamental impact on the employees performance (Virts, 1996). Rodgers (2005) pointed out that developed equipment is a key and necessary for food production operations and support producing consistent food quality. The findings coming out from the observation revealed that the kitchen is not designed and doesn't fit for the purpose where it lacks the appropriate ventilation and lighting systems. Kitchen need to buy good instead of old equipment. Kitchen floor and the ceiling have lots of holes making a good environment for rats, insects and bacteria to breed.

CONCLUSIONS AND RECOMMENDATIONS

There were many obstacles and challenges that faced the FUH food production system, such as: financial problems; menu; number of staff; kitchen; skills and experience; kitchen equipment these don't all get a mention in the results section – they need to. The findings indicate that kitchen design is a major problem at FUH and affects the quality of food produced. The results explored that FUH needed to improve the food production systems through; selecting good suppliers; preparing training programmes for kitchen and food service staff; improving communication between staff, re-designing the kitchen; providing a budget to buy good equipment and high quality of raw materials. The FUH menu needed to present different choice and explain its ingredients, it also kitchen staff need to follow the standard recipes and production plan during the cooking process.

The study recommends that the hospital management should provide the necessary equipment and tools for the food production area to improve food quality. The kitchen should be designed according to the flow of food production and service systems. Food production operators should ensure that the receiving areas are equipped with various tools, i.e. adequate floor and table scales. Kitchen staff should ensure that food is issued according to a properly authorized requisition from the correct storeroom for the correct staff in the correct quantities at specified times during the day. Kitchen staff should have a production plan and food temperatures should be monitored and checked regularly during this phase.

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