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A Conceptual Model for Developing a Measurement Tool for Hospital Food Service Operation in Malaysia

Noor Suzana Osman^{1,2}, Norazmir Md. Nor^{1,3}

¹ Centre of Nutrition and Dietetics, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, 42300, Puncak Alam, Selangor Malaysia

² Department of Nutrition Sciences, Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Kuantan Campus, 25200, Kuantan, Pahang

³ Food Service Quality Research Group, Faculty of Hotel and Tourism Management, Universiti Teknologi MARA, 42300, Puncak Alam, Selangor Malaysia

noorsuzana@iiu.edu.my, azmir2790@puncakalam.uitm.edu.my
 Tel: +60174238586

Abstract

This study aims to provide and identify the best tools for measuring the quality of food service in Malaysian hospitals. The discussion focuses on the models used to evaluate the performance of food service operation in hospitals, as well as review critiques, issues, and the latest findings. Many tools have been introduced in the previous studies. However, the decision about the best fit tool to measure the quality of hospital food service is still unclear. Future study should be conducted, and an empirical test that examines various dimensions, such as food and meal service quality, staff/service issues and physical environment must be considered in the evaluation.

Keywords: hospital food service; patients' satisfaction; measurement tool; performance

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1.0 Introduction

Issues about hospital food service operation have been discussed over the years mainly in relation to patients' satisfaction, and it has become an important indicator to assess the effectiveness of hospital service operation (Al-torky et al., 2016). Patients' satisfaction refers to the extent to which the patients' feel that their needs and expectations are being met by the service provider (Ware et al., 1984). The main goal of a hospital food service can be considered as achieved when meals are carefully planned and customized to meet patients' specific needs (Dall'Oglio et al., 2015).

The quality of the food served to the patient plays a major role to measure patients' satisfaction with their overall hospital experience (Hartwell & Edwards, 2001). Many studies have been conducted to research patients' satisfaction with health care facilities and services. However, the number of studies that specifically address the satisfaction with food service in health care facilities is comparatively low (Doninia et al., 2008; Ferguson et al., 2001). Previous studies reported that the food service quality was evaluated by in-patients based on several factors such as nutritional value, taste, texture, variety, sanitation, portion size, temperature, meal time and servers' characteristics (Fallon et al., 2008; Theurer, 2011; Wright et al., 2006). It was suggested that the patients' attitudes and their level of satisfaction with hospital food service depend mainly on these factors (Fernando & Wijesinghe, 2016).

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Hospital food service is known as an essential element of the treatment process which affects the recovery length and quality of life of the patients (Sahin et al., 2006). Malnutrition is a key concern since it increases a disease's severity as well as lengthens recovery duration and hospital stay (Hartwell & Edwards, 2003; Sahin et al., 2006; Wilson et al., 2000). A previous study reported that in-patients were found to suffer from malnourishment, due to the lack of basic knowledge about dietary requirements and practical aspects of hospital's food provision (Kondrup et al., 2002). A study reported that food preferences, condition of the disease, and dependency on hospital food are the contributing factors for malnutrition risks among geriatric patients (Shahar et al., 2002).

Monitoring patients' satisfaction with the food service is an important component of risk management because a decline in their satisfaction with food and service could contribute to the risk of malnutrition (Wright et al., 2006). Measuring patient's satisfaction is the main concern for a food service provider in order to improve patient acceptance and food intake, and this may indirectly reduce the risk of malnutrition (Hannan-Jones & Capra, 2017). Currently, only a few validated tools to measure patients' level of satisfaction with hospital food have been published (Dall'Oglio et al., 2015). A validated and widely used questionnaire provides several aspects including food and meal service quality, physical environment, staff/service issues, and overall satisfaction with the service that can be used as a form of measurement. However, such studies usually examine the level of choice and variety apart from the temperature of the meals and beverages as elements that can influence the quality of food and meal services (Hannan-Jones & Capra, 2017).

Findings based on patients' surveys do not provide rich enough information on what causes quality problems or what food service professionals must do in terms of quality improvement, especially in Malaysia. A research area that focuses more on food service operation and management or other attributes which may influence the patients' satisfaction with hospital food service is still lacking. Therefore, it is suggested in a study should be conducted to provide a standard measurement tool to measure food service quality that will help to improve the service operation so patient's satisfaction and needs can be met.

2.0 Literature Review

2.1 Food Quality

It is important for hospital food service provider to ensure the quality of the food served is good and it can satisfy the patients during their hospital stay to promote optimum recovery. The increase in the quality of foods and hospital food service will indirectly increase the contentment that patients will have with the food served and the food services given (Abdelhafez et al., 2012). According to Chang et al., (2014), food quality measurement is defined as the overall quality, taste, freshness and eye appeal of the food. In the most recent study by Hannan-Jones and Capra (2017), it was established that the quality, appearance, and taste of the meals served, rather than the serving that provided more satisfaction to the patients. Besides that, they suggest that attending to other aspects of the quality of the meals may be far more important than the plate itself. Previous studies reported that food characteristics such as taste, appearance, variability, and warmth are the aspects which may influence the patient's satisfaction with hospital food service (Mangunsong & Junadi, 2017). Good appearance of the food served will also stimulate the appetite of patients to consume the food. The visual appeal of a meal can either stimulate the appetite or cause depression (Singh-Ackbarali & Maharaj, 2014).

2.2 Meal Service Quality

A previous study found that the presentation of meals was the only variable that predicted the overall satisfaction with more than half of the subjects rated the meals as good/excellent (O'Hara et al., 1997). A study by Jeong and Seo (2014) reported that both food quality and service quality significantly influence patients' satisfaction with hospital food. This finding was supported by Messina et al., (2013) who claimed that meal service quality including food quality and staff/service issues are among the factors that were significantly associated with the overall sense of satisfaction. They suggested that a wider menu, ingredients information, and serving time, food distribution, and food presentation, could also be important variables to measure. In another study, texture and temperature were the most significant attributes that were found to determine patients' satisfaction (Hartwell et al., 2007). It was also reported that satisfaction with food service was strongly associated with variety, flavor, meat and vegetables texture, temperature, meal taste (Wright et al., 2006). Therefore, the findings indicated the need to regularly monitor patient's satisfaction by offering a wide variety of meals, flavour, temperature, texture, and tastes, as these aspects were the main variables that influenced patients' satisfaction with food served in the ward.

2.3 Staff Attitude/Service

Staff attitude in food service operation refers to personal hygiene, neat and cleanliness, friendliness and being polite as the indicator to measure the quality of food service. Even though the staff's attitude/service is less important, but it does have a slightly significant effect on patients' satisfaction (Messina et al., 2013). The patients may not be satisfied with the staff's level of hygiene especially in the absence of gloves while serving the meal. The hygiene aspect of food preparation is the main concern of patients (Mentziou et al., 2014). In contrast, other studies have suggested that various aspects of service such as friendliness, politeness, and helpful nursing staff were considered essential in meal delivery (Gregoire, 1994; Tomes & Peng Ng, 1995). It was proven that the interaction between the staff and patients during a meal service could also influence patients' satisfaction. A similar finding by Jessri et al., (2011) reported the food quality, quantity, meal service, and staff attitude were the factors which influenced patients' satisfaction. In addition, Abdelhafez et al., (2012) also reported similar findings where it was proven that staff/service issues, the taste of food and food temperature had been significantly associated with the overall satisfaction of hospital food service.

2.4 Meal Distribution System

The types of food distribution were among the issues which were considered relatively important in monitoring and measuring the food service performance. A previous study found that the patients were more satisfied with the trolley system more than a plated meal system as the temperature is maintained well with trolley system (Hartwell & Edwards, 2001). A similar finding was also reported in another study on the bulk versus trolley system by Hartwell et al., (2007), and it was indicated that the plate system has the benefit of having an appropriate portion size, but poor temperature and texture; while the trolley system has the benefits of the correct temperature, texture, and good flavor. Jamaluddin et al. (2010) claimed that bulk-trolley food service system is associated with patients' satisfaction and energy-and-protein intakes; it was also found that patient's energy and protein requirements were not attained from the hospital food served. However, the bulk-trolley system reported in this study did increase the satisfaction and food intakes of the patients. In the other study, it was established that room service is a new approach by the hospital to improve patients' satisfaction. Room service has been reported to improve patients' nutrient intake and assists in their recovery (Sofaer & Firminger, 2005).

3.0 Conceptual Models

3.1 Existing of Theoretical/Conceptual Models

Previous researchers mostly utilized the basic theoretical model for food service as shown in Fig. 1 (Jacobs & Kok, 2016). The aspects of food service concept that are usually proposed include food quality, service, choice variety, presentation, and autonomy. The summary of various aspects of the food service concept is shown in Table 1. Physical environment and patient characteristics are also included as the influential factors that may affect patients' satisfaction outcome in a study. In the model, patients' satisfaction should increase in tandem with the higher service quality they perceived (Oliver, 2010).

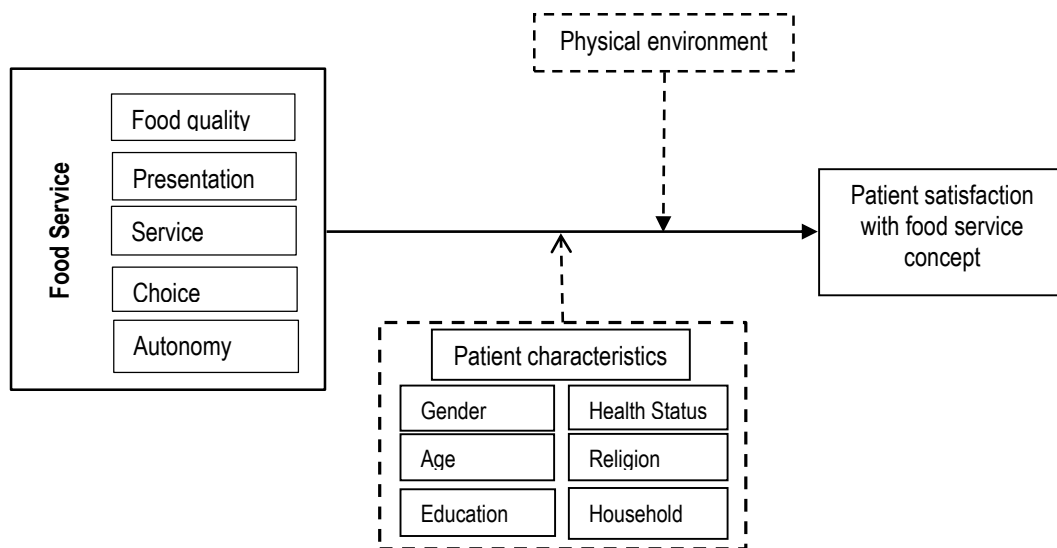


Fig. 1: Foodservice concept (Jacobs & Kok, 2016)

Aspects	Sub-aspects
Food quality	Flavour Texture Temperature
Presentation	Portion size and volume Crockery and cutlery Colour
Choice	Dietary variety Across-meal variety Within-meal variety
Service	Attitude Appearance
Autonomy	Flexibility Understandable and accessible system

Table 1: The summary of the aspects of food service concept.

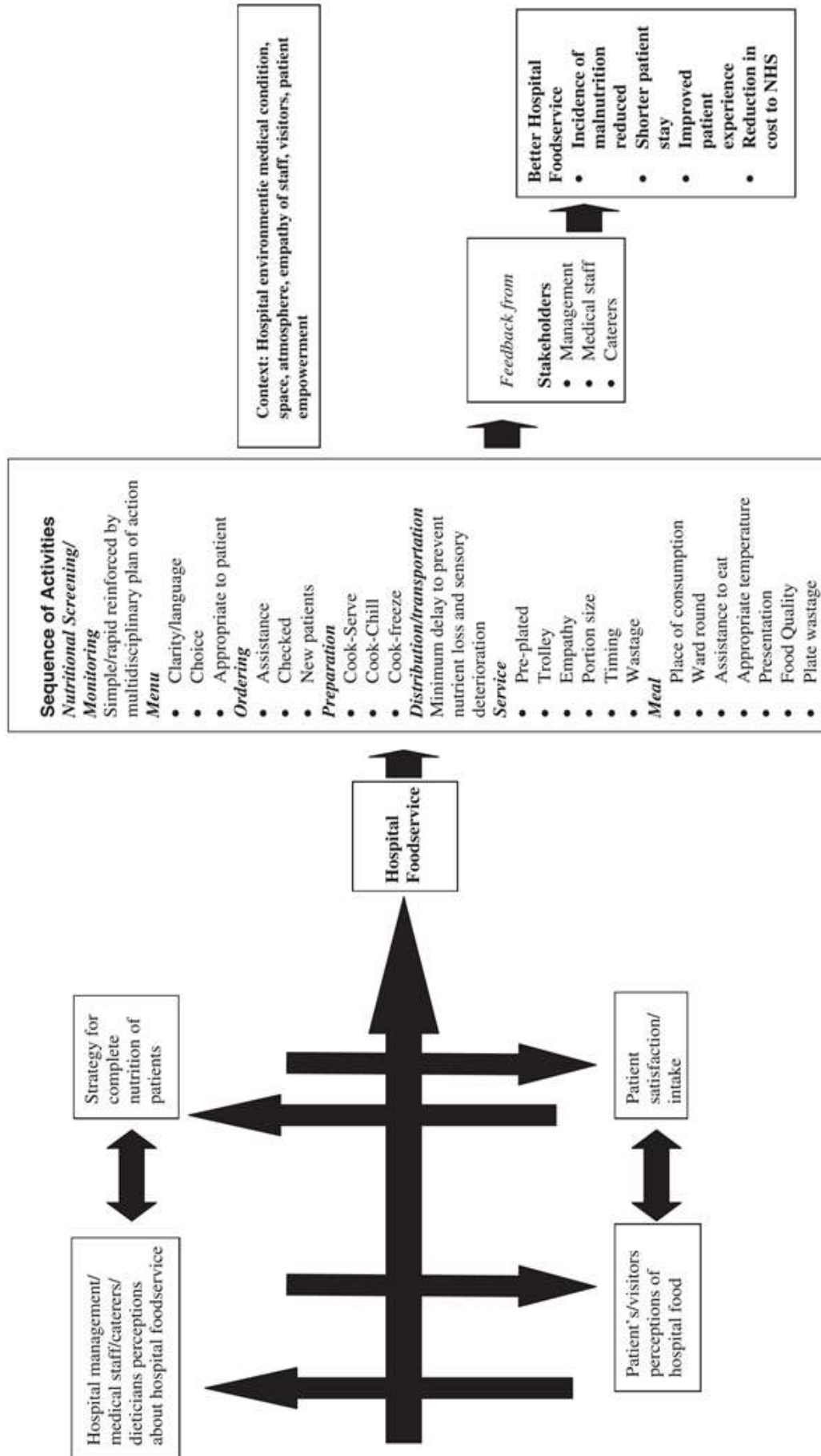


Fig. 2: Conceptual model hospital foodservice. NHS, National Health Service. Source: (Hartwell et al., 2006)

A model by Hartwell et al., (2006), proposed that it is important to incorporate several disciplines to evaluate the actual patient experience of food service quality. A theoretical model in Fig.2 was developed to explore the factors of satisfaction and knowledge, including the service element which involves mixed methodologies that take into account the complex nature of hospital foodservice. The model also investigates the interactions and connections involved in the process.

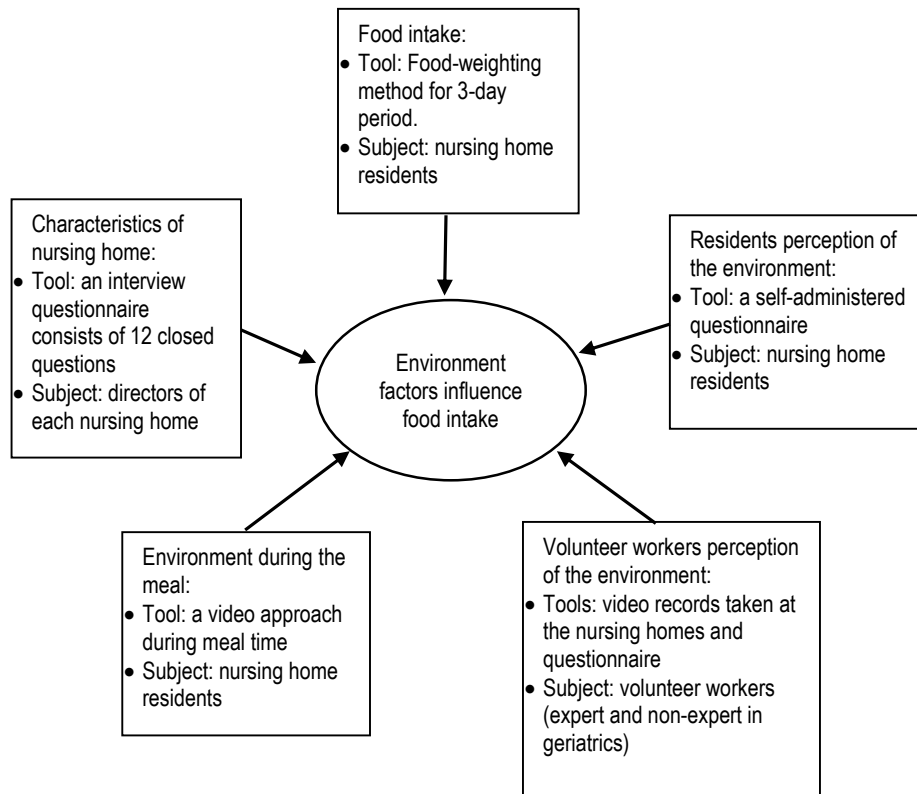
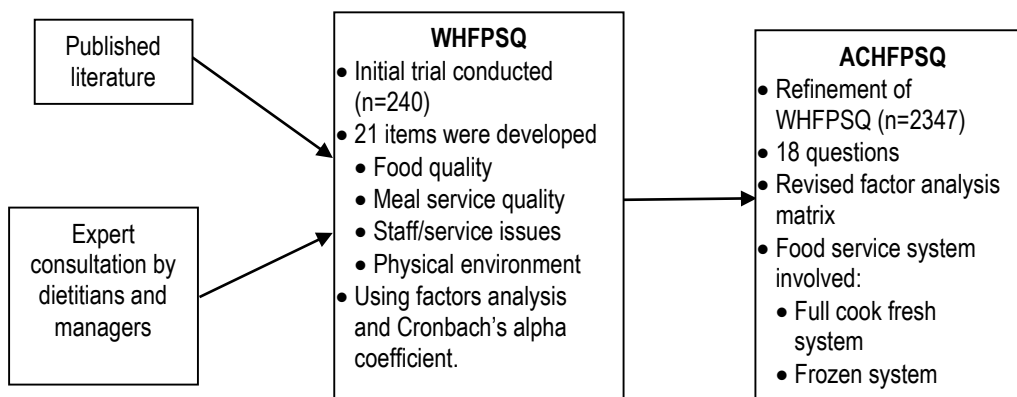


Fig. 3: The influence of the environmental factors on food intake among residents in a nursing home. Source: (Buckinx et al., 2017)

The result of the study in Fig. 3 showed that environmental factors have less influence on the food intake of the residents, apart from their perception of the quantity of the food served (Buckinx et al., 2017). The study suggested that future research should focus on a more complex design with multilevel investigations to examine the association between the age and other characteristics of the population subgroups. Therefore, a standard measurement to assess food environments and policies can be developed and evaluated to improve the current dietary assessment methodologies (Larson & Story, 2009).

3.2 Existing Model of Questionnaires Development in Hospital Food Service



WHFPSQ: Wesley Hospital Foodservice Patient Satisfaction Questionnaire
ACHFPSQ: The Acute Care Hospital Foodservice Patient Satisfaction Questionnaire

Fig. 4: Conceptual model for developing the questionnaire for ACHFPSQ. Source: (Capra et al., 2005)

Various studies related to hospital food service and its impact on patients' satisfaction have been developed. The Acute Care Hospital Foodservice Patient Satisfaction Questionnaire by Capra et al. (2005) has been widely used in many studies to evaluate patients' satisfaction in food service operation. The ACHFPSQ was adapted from the original WHFPSQ (Fig. 4). The model categorizes food service into four main aspects and facilities with detailed information about each component. The study suggested that it helps if the patients' groups or location can be identified in studies where satisfaction is of concern.

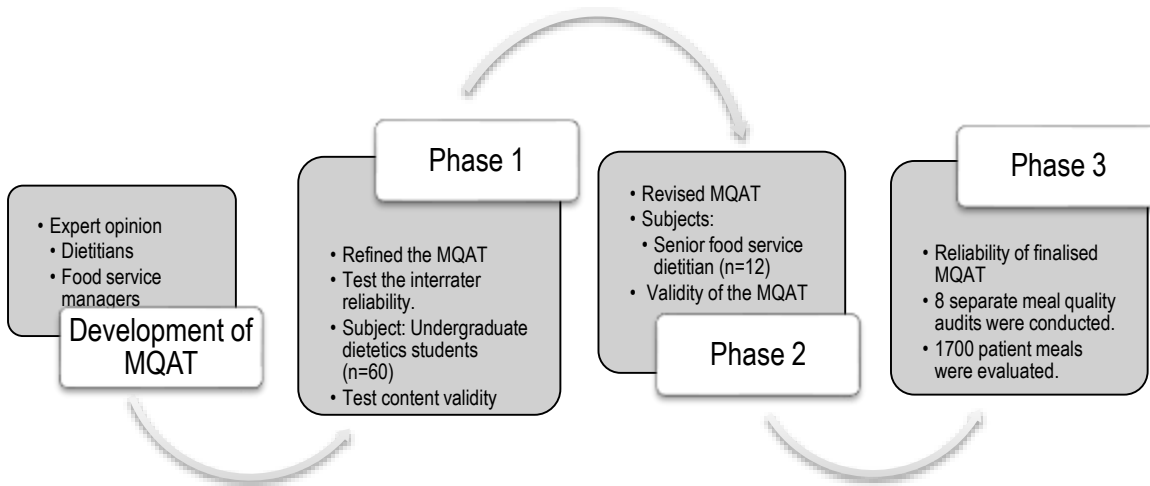
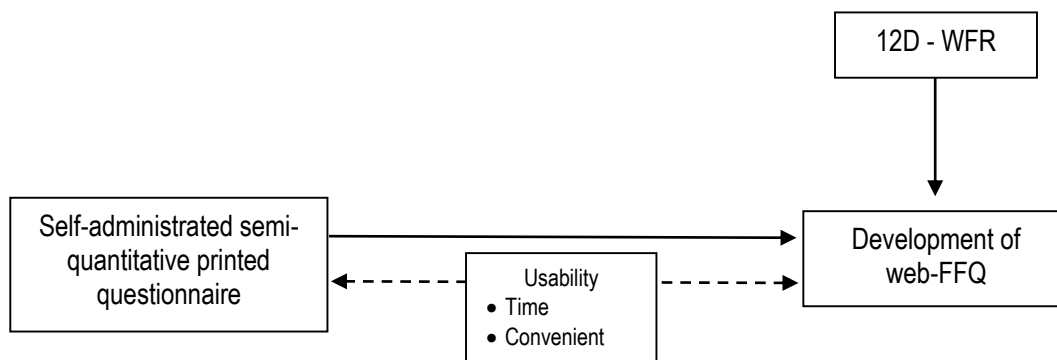


Fig. 5: Conceptual model for developing the questionnaire for Meal Quality Audit Tool. Source: (Banks et al., 2017)

The most recent questionnaire to audit the quality of hospital meals was developed by Banks et al., (2017) to assist dietitians and food service managers in distinguishing areas for improvement (Fig. 5). It will be used to determine the quality of delivered meals during a normal meal service at the point of service to the patients. However, the study was conducted among dietetics and food service dietitians which only focus on temperature, accuracy, appearance and sensory. In contrast to the ACHFPSQ questionnaire developed by Capra et al., (2005), this Meal Quality Audit Tool (MQAT) is reliable in terms of temperature and accuracy domains. However, the appearance and sensory dimension reliability needs to be improved.



12d – WFR: 12-days weighed food record
FFQ: Food Frequency Questionnaire

Fig. 6: Conceptual model for an online version of the self-administered FFQ. Source: (Kato et al., 2017)

The most recent study was conducted by Kato et al. (2017), they introduced a more advanced approach of data collection using a web questionnaire (Fig. 6). Online dietary assessment tools have more advantages compared to the printed questionnaire as they generate automatic and direct data storage and have the potential to become valuable research methods in future research. An online survey system (web-FFQ) used in the JPHC-NEXT protocol was developed for the purpose of using it in a large-scale cohort study. The validity of ranking individuals according to their dietary intake and its usability was compared between web-FFQ and the printed FFQ for

combined usage. It is suggested that the web-based dietary assessment or survey tool offers more advantages as it will improve data quality, time and cost efficiency (Labonté et al., 2012).

4.0 Implication and Direction for Future Research

The purpose of this study is to determine the possible factors that may affect patient's satisfaction with hospital food service and the most suitable tools to evaluate the quality of hospital food service. It is important to determine the factors and closing the gaps regarding patients' satisfaction with a food service operation. The researchers have proposed a conceptual model framework which includes the quality of food, meal service quality, staff attitude/service, physical/environment factors, types of the food service system and patients' satisfaction outcome. The researchers aim to consider each of the possible factors that may influence patients' satisfaction in the proposed integrated model (Fig. 7). This is because doing so will make it more specific and it could accommodate different types of factors that reflect the patients' satisfaction with the quality of hospital food service.

The study should focus on factors such as food and meal service quality, staff or service quality and physical environment that give the outcome of the current food service quality in the hospitals selected in the study. Four aspects in ACHFPSQ such as food quality, staff/service issues, physical environment, and meal service quality, will be included as the main aspects that will be evaluated. However, the ACHFPSQ reported have some limitations as the tool could only explain 61.2% of the variance in the overall satisfaction (Capra et al., 2005). In addition, the study performed by Jamaluddin et al. (2010) using modified ACHFPSQ claimed that the questionnaire did not measure factors that influence hospital food consumption, nor did it differentiate between the acceptability of different kinds of food. Other than that, Vijayakumaran et al., (2016) in their study found that emotions (both positive and negative) have been identified as one of the factors that indirectly influence patients' meal experience and food intakes in hospital. Therefore, it is suggested that a few additional aspects such as medical condition (e.g., pain), emotions, types of delivery system and food preference should be investigated further in order to identify the possible factors that influence patient's satisfaction with hospital food service.

Environmental factors should also be further investigated in order to explore the problems that arise in food service operation (Buckinx et al., 2017). This study includes both quantitative and qualitative methods using a self-administered questionnaire different indicators (e.g. noise, space, conform, light, odors, perceived satisfaction of meals, taste, and presentation of meals, service, and setting) answered by the residents and two separate panels (including one who work or expert in geriatrics and one panel who is non-expert in geriatrics) after having watched a video of mealtime in each nursing homes. However, there are certain limitations that have been highlighted regarding Buckinx et al.'s study, where the residents were probably not representative of the general nursing home population because of the selection criteria of the population. It was also claimed that the video approach did not represent the reality and no specific validated questionnaire was posed to assess the environment of a dining room. It was suggested that interviews with food service staffs should have been conducted to support the validity of the findings from the main methodology and provide more information related to the actual factors that affect the performance of hospital food service.

Other than the environmental factors, feedback from staff is also important given the requirement of cooperation and integration of several disciplines to provide the actual patient experience of food service quality (Hartwell et al., 2006). Because the research was conducted based on a single case study, with a small-scale qualitative study of patients' and staff's views on food service, the issues raised are regarded as relevant to other cases that represent similar theoretical conditions. Therefore, a generalization about the findings can be made. Organizational research is recommended for the evaluation of the hospital food service to assess and improve the communication between staff from different disciplines to improve the quality of hospital food service.

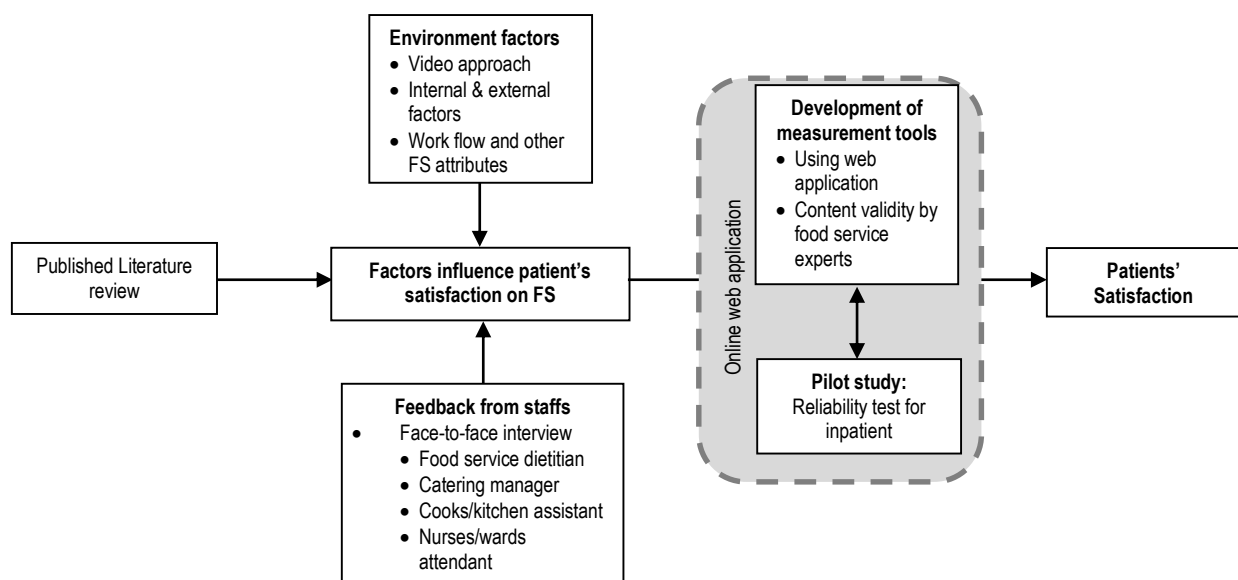


Fig. 7: Proposed model of the development of measurement tools for hospital food service operation

The online dietary assessment tool was introduced by Kato et al., (2017) who introduced a new approach in the survey method as it offers advantages over printed questionnaire such as automatic and direct data storage of answers and this tool has the potential to become a valuable research method. However, in the proposed model of the measurement tools development, it might not be similar in terms of response time and mean interval between different type of food delivery system, wards disciplines and the location of internet access, since the printed and online questionnaires were not compared.

A pilot study should be conducted to take into account of expert opinions and feedback from dietitians and food service managers to improve the usability and usefulness in practice (Banks et al., 2017). It helps determine whether the proposed measurement is well-constructed and suitable for psychometric testing (Davis, 1992). Reliability testing will be conducted in a structured way to ensure the consistency of the measurement tool. Theoretically, the reliability of the tools (e.g., questionnaire) should be ensured to aim for a large sample to include equal distribution of respondents from the hospitals and wards discipline.

Therefore, the online web application (Fig. 7) is proposed for future research to improve the data quality, time and cost efficiency of to examine hospital food service operation. It is hoped that this research will contribute to a new approach and practice in monitoring and improving the quality of service in health care especially in food service operation. The online web application will provide an effective measurement of patients' satisfaction and will provide quick data process to improve the quality of food service. This research will act as a reference for developing a specific measurement and evaluation of food service performance in future research, especially in Malaysia.

5.0 Conclusion

This conceptual model is necessary to identify the correct methodology in developing a suitable and reliable tool to evaluate the quality and performance of food service operation in a hospital setting. Furthermore, it is proposed that the data evaluation should use a new approach of electronic data which is simple and fast. This will indirectly improve data quality, and it will increase time and cost efficiency. Therefore, more research should be carried out especially in Malaysia as this study could only provide baseline data and methodology for future research.

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References

- Abdelhafez, A. M., Al Qurashi, L., Al Ziyadi, R., Kuwair, A., Shobki, M., & Mograbi, H. (2012). Analysis of Factors Affecting the Satisfaction Levels of Patients Toward Food Services at General Hospitals in Makkah, Saudi Arabia. *American Journal of Medicine and Medical Sciences*, 2(6), 123–130. <https://doi.org/10.5923/j.ajmms.20120206.03>
- Al-torky, M. A., Mohamed, E. A., & Yousef, F. M. A. (2016). Inpatients' satisfaction with food services in Sohag University Hospital. *The Egyptian Journal of Community Medicine*, 34(2), 33–45.
- Banks, M., Hannan-Jones, M., Ross, L., Buckley, A., Ellick, J., & Young, A. (2017). Measuring the quality of Hospital Food Services: Development and reliability of a Meal Quality Audit Tool. *Nutrition and Dietetics*, 74(2), 147–157. <https://doi.org/10.1111/1747-0080.12341>
- Buckinx, F., Reginster, J. Y., Morelle, A., Paquot, N., Labeye, N., Locquet, M., Adam, S., & Bruyère, O. (2017). Influence of Environmental Factors on Food Intake Among Nursing Home Residents: A Survey Combined with a Video Approach. *Clinical Interventions in Aging*, 12, 1055–1064. <https://doi.org/10.2147/CIA.S135937>
- Capra, S., Wright, O., Sardie, M., Bauer, J., & Askew, D. (2005). The Acute Hospital Foodservice Patient Satisfaction Questionnaire: the Development of a Valid and Reliable Tool To Measure Patient Satisfaction With Acute Care Hospital Foodservices. *Foodservice Research International*, 16(1–2), 1–14. <https://doi.org/10.1111/j.1745-4506.2005.00006.x>
- Chang, M. L., Suki, N. M., & Tam, Y. L. A. (2014). Student Satisfaction with the Service Quality of Cafeteria: A Structural Approach. *International Journal of Business, Economics, and Law*, 4(1), 105–111.
- Dall'Oglio, I., Nicolò, R., Di Ciommo, V., Bianchi, N., Ciliento, G., Gawronski, O., Pomponi, M., Tiozzo, E., & Raponi, M. (2015). A Systematic Review of Hospital Foodservice Patient Satisfaction Studies. *Journal of the Academy of Nutrition and Dietetics*, 115(4), 567–584. <https://doi.org/10.1016/j.jand.2014.11.013>
- Davis, L. L. (1992). Instrument Review: Getting the Most From a Panel of Experts. *Instrument Review: Getting the Most From a Panel of Experts*, 194–197.
- Doninia, L.M., Castellatetab, E., De Guglielmib, C.S., De Feliceb, M.R., Savinab, C., Colettia, C., Paolinia, M., & Canella, C. (2008). Improvement on the Quality of the Catering Service of a Rehabilitation Hospital. *Clinical Nutrition*, 27, 105–114. <https://doi.org/10.1016/j.clnu.2007.10.004>
- Fallon, A., Gurr, S., Hannan-jones, M., & Bauer, J. D. (2008). Use of the Acute Care Hospital Foodservice Patient Satisfaction Questionnaire to monitor trends in patient satisfaction with foodservice at an acute care private hospital. *Journal Compilation © Dietitians Association of Australia*, (65), 41–46. <https://doi.org/10.1111/j.1747-0080.2007.00219.x>
- Ferguson, M., Capra, S., Bauer, J., & Banks, M. (2001). Development of a patient satisfaction survey with inpatient clinical nutrition services. *Australian Journal of Nutrition*

and *Dietetics*, 58(3), 157–163.

Fernando, G. H. S., & Wijesinghe, C. J. (2016). Patient perceptions on hospital food service at Teaching Hospital, Karapitiya. *Galle Medical Journal*, 20(2), 13. <https://doi.org/10.4038/gmj.v20i2.7933>

Gregoire, M. B. (1994). Quality of Patient Meal Service in Hospitals: Delivery of Meals by Dietary Employees vs Delivery by Nursing Employees. *Journal of the American Dietetic Association*, 94(10), 1129–1134. [https://doi.org/10.1016/0002-8223\(94\)91132-0](https://doi.org/10.1016/0002-8223(94)91132-0)

Hannan-Jones, M., & Capra, S. (2017). Developing a Valid Meal Assessment Tool for Hospital Patients. *Appetite*, 108, 68–73. <https://doi.org/10.1016/j.appet.2016.09.025>
Hartwell, H. J., Edwards, J. S. A., & Symonds, C. (2006). Foodservice in Hospital: Development of a Theoretical Model for Patient Experience and Satisfaction Using One Hospital in the UK National Health Service as a Case Study. *Journal of Foodservice*, 17, 226–238. <https://doi.org/10.5406/pluralist.11.2.0064>

Hartwell, H. J., & Edwards, J. S. A. (2001). A Preliminary Assessment of Two Hospital Food Service Systems Using Parameters of Food Safety and Consumer Opinion. *The Journal of the Royal Society for the Promotion of Health*, 4(121), 236–242. <https://doi.org/10.1177/146642400112100407>

Hartwell, H. J., & Edwards, J. S. A. (2003). A comparative analysis of "plated" and "bulk trolley" hospital food service systems. *Food Service Technology*, 3, 133–142.
Hartwell, H. J., Edwards, J. S. A., & Beavis, J. (2007). Plate Versus Bulk Trolley Food Service in a Hospital: Comparison of Patients' Satisfaction. *Nutrition*, 23(3), 211–218. <https://doi.org/10.1016/j.nut.2006.12.005>

Jacobs, L., & Kok, H. B. (2016). *Food Service Concepts: A Comparison of the Effects on Patient Satisfaction of Three Different Food Service Concepts*. Wageningen University.

Jamaluddin, R., Manan, N. A. A., Basri, A. M., & Karim, M. S. A. (2010). Patients' Satisfaction with the Bulk Trolley System in a Government Hospital in Malaysia. *Leadership in Health Services*, 27(4), 229–315. <https://doi.org/10.1108/LHS-02-2014-0010>

Jeong, J., & Seo, S. (2014). Importance of Satisfaction with Food for Older Adults??? Quality of Life. *British Food Journal*, 116(8), 1276–1290. <https://doi.org/10.1108/BFJ-01-2013-0019>

Jessri, M., Mirmiran, P., Jessri, M., Johns, N., Rashidkhani, B., Amiri, P., Barfmal, M., & Azizi, F. (2011). A Qualitative Difference. Patients' Views of Hospital Food Service in Iran. *Appetite*, 57(2), 530–533. <https://doi.org/10.1016/j.appet.2011.06.012>

Kato, E., Takachi, R., Ishihara, J., Ishii, Y., Sasazuki, S., Sawada, N., Iwasaki, M., Shinozawa, Y., Umezawa, J., Yokoyama, Y., Kitamura, K., Nakamura, K., & Tsugane, S. (2017). Online Version of The Self-administered Food Frequency Questionnaire For the Japan Public Health Center-based Prospective Study for the Next Generation (JPHC-NEXT) Protocol: Relative Validity, Usability, and Comparison with a Printed Questionnaire. *Journal of Epidemiology*, 27(9), 435–446. <https://doi.org/10.1016/j.je.2016.08.021>

Kondrup, J., Johansen, N., Plum, L. M., Bak, L., Larsen, H. I., Martinsen, A., Andersen, J.R., Baernthsen, H., Bunch, E., & Lauesen, N. (2002). Incidence of nutritional risk and causes of inadequate nutritional care in hospitals. *Clinical Nutrition*, 21(6), 461–468. <https://doi.org/10.1054/clnu.2002.0585>

Labonté, M. È., Cyr, A., Baril-Gravel, L., Royer, M. M., & Lamarche, B. (2012). Validity and Reproducibility of a Web-based, Self-administered Food Frequency Questionnaire. *European Journal of Clinical Nutrition*, 66(2), 166–173. <https://doi.org/10.1038/ejcn.2011.163>

Larson, N., & Story, M. (2009). A Review of Environmental Influences on Food Choices. *Annals of Behavioral Medicine*, 38(SUPPL.), 56–73. <https://doi.org/10.1007/s12160-009-9120-9>

Mangunsong, E. R., & Junadi, P. (2017). Patient Satisfaction Contributing Factors on Hospital Food Service: a Systematic Review. In *Proceedings of 88th The IRES International Conference, Phuket, Thailand* (pp. 52–61). Retrieved from http://www.worldresearchlibrary.org/up_proc/pdf/1175-15154111852-61.pdf

Mentziou, I., Delezos, C., Nestoridou, A., & Boskou, G. (2014). Evaluation of food services by the patients in hospitals of Athens in Greece. *Health Science Journal*, 8(3), 383–392.

Messina, G., Fenucci, R., Vencia, F., Niccolini, F., Quercioli, C., & Nante, N. (2013). Patients' Evaluation of Hospital Foodservice Quality in Italy: What Do Patients Really Value? *Public Health Nutrition*, 16(4), 730–737. <https://doi.org/10.1017/S1368980012003333>

O'Hara, P. A., Harper, D. W., Kangas, M., Dubeau, J., Borsutzky, C., & Lemire, N. (1997). Taste, Temperature, and Presentation Predict Satisfaction with Foodservices in a Canadian Continuing-care Hospital. *Journal of the American Dietetic Association*. [https://doi.org/10.1016/S0002-8223\(97\)00100-4](https://doi.org/10.1016/S0002-8223(97)00100-4)

Oliver, R. L. (2010). *Satisfaction: A Behavioral Perspective on the Consumer* (2nd ed.). M.E. Sharpe.

Sahin, B., Demir, C., Celik, Y., & Teke, A. K. (2006). Factors affecting satisfaction level with the food services in a military hospital. *Journal of Medical Systems*, 30(5), 381–387. <https://doi.org/10.1007/s10916-006-9022-3>

Shahar, S., Chee, K. Y., & Chik, W. C. P. W. (2002). Food intakes and preferences of hospitalised geriatric patients. *BMC Geriatrics*, 2, 1–6. <https://doi.org/10.1186/1471-2318-2-3>

Singh-Ackbarali, D., & Maharaj, R. (2014). Sensory Evaluation as a Tool in Determining Acceptability of Innovative Products Developed by Undergraduate Students in Food Science and Technology at The University of Trinidad and Tobago. *Journal of Curriculum and Teaching*, 3(1), 10–27. <https://doi.org/10.5430/jct.v3n1p10>

Sofaer, S., & Firminger, K. (2005). Patient Perceptions of the Quality of Health Services. *Annual Review of Public Health*, 26(1), 513–559. <https://doi.org/10.1146/annurev.publhealth.25.050503.153958>

Theurer, V. A. (2011). *Improving Patient Satisfaction in a Hospital Foodservice System Using Low-Cost Interventions: Determining Whether a Room Service System is the Next Step*.

Tomes, A. E., & Peng Ng, S. C. (1995). Service Quality in Hospital Care: The Development of An In-patient Questionnaire. *International Journal of Health Care Quality*

Assurance, 8(3), 25–33. <https://doi.org/10.1108/09526869510089255>

Vijayakumaran, R. K., Eves, A., & Lumbers, M. (2016). Patients Emotions during Meal Experience: Understanding through Critical Incident Technique. *International Journal of Hospital Research*, 5(4), 113–121. <https://doi.org/10.15171/ijhr.2016.21>

Ware, J., Synder, M., and Wright, R. (1984). Defining and Measuring Patient with Medical Care Satisfaction. *Evaluation and Program Planning*, 6, 247–263.

Wilson, A., Evans, S., & Frost, G. (2000). A comparison of the amount of food served and consumed according to meal service system. *Journal of Human Nutrition and Dietetics*, 13(4), 271–275. <https://doi.org/10.1046/j.1365-277X.2000.00235.x>

Wright, O. R. L., Connelly, L. B., & Capra, S. (2006). Consumer Evaluation of Hospital Foodservice Quality: An Empirical Investigation. *International Journal of Health Care Quality Assurance*, 19(2), 181–194. <https://doi.org/10.1108/09526860610651708>