

Hazard Analysis and Critical Control Points at Hospitals: How applied in Kendari City, Indonesia

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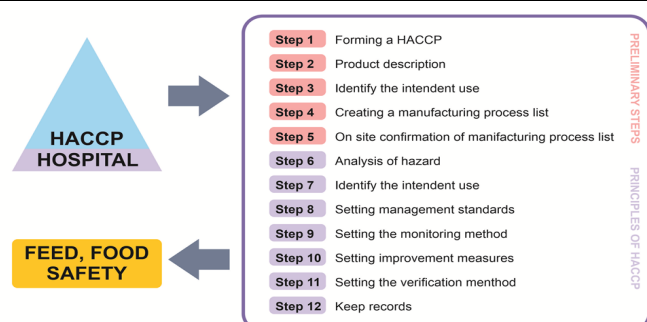
ABSTRACT

Unsafe food for consumption can cause disease for humans, such as food poisoning and nosocomial infections. This study aimed to describe the implementation of Hazard Analysis and Critical Control Points (HACCP) in Hospitals in Kendari City, Indonesia. This study used analytical descriptive approach, with a survey design. It was conducted at General Hospital Bahteramas and in Kendari City General Hospital. The respondents were part of the nutrition staffs, hosts, and waiters with total of 25 people from Bahteramas General Hospital and 19 people from Kendari City General Hospital. The results revealed that the implementation of HACCP in hospitals had never been implemented effectively, at the Bahteramas General Hospital, the implementation of HACCP starting from stage 1 to stage 12 had not been entirely implemented. In addition, whilst the application of HACCP in stages 2 to 5 had been carried out at the Kendari City Hospital, the 1 and steps 6 through 12 were not applied yet. Thus, based on the concepts of food hygiene and sanitation, the hospitals must strengthen their food management efforts, in order to implement the HACCP system and for health workers, food handlers, and food servicers.

ABSTRAK

Makanan yang tidak aman untuk dikonsumsi dapat menyebabkan penyakit, nosokomial dan keracunan makanan. Penelitian ini bertujuan untuk mengetahui implementasi penerapan Hazard Analysis and Critical Control Points (HACCP) pada Rumah Sakit di Kendari. Penelitian ini menggunakan pendekatan analisis deskriptif, dengan desain survey. Penelitian ini dilakukan di Rumah Sakit Umum Bahteramas dan Rumah Sakit Umum Kota Kendari. Responden penelitian ini adalah tenaga gizi, penjamu dan pramusaji. Jumlah responden diperoleh sebanyak 25 orang dari Rumah Sakit Umum Bahteramas dan 19 orang dari Rumah Sakit Umum Kota Kendari. Penerapan HACCP di Rumah Sakit sampai saat ini belum efektif diterapkan. Di Rumah Sakit Umum Bahteramas penerapan HACCP dari tahap 1 sampai 12 belum diterapkan, sedangkan di Rumah Sakit Umum Daerah Kota Kendari penerapan HACCP telah dilaksanakan tahap 2 sampai tahap 5, sedangkan pada tahap 1 dan 6 seampai tahap 12 tidak diterapkan. Disarankan agar rumah sakit agar membentuk tim HACCP dan menerapkannya untuk meningkatkan upaya pengelolaan makanan berdasarkan prinsip-prinsip higiene dan sanitasi makanan.

GRAPHICAL ABSTRACT



Keyword

haccp implementation
haccp in hospital
hazard analysis and critical control point
hazard analysis in hospital
hospital management

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INTRODUCTION

Since food is a basic human need, it must be attractive, delicious, nutritious, and safe for consumption to maintain health (Barba et al., 2015; Berry et al., 2015). Unsafe food for consumption can cause human disease (foodborne disease) (Hoelzer et al., 2018). The provision of outstanding food in clinics must be at its most excellent and in line with the level of service, health regulations, and patient disease indications (do Rosario & Walton, 2020). In addition to lengthening the healing process, providing food that does not adhere to health standards (is unclean and unhygienic) can also result in nosocomial infections. Food poisoning is another effect (Khan et al., 2017; Fusco et al., 2018).

One of the global public health issues is food poisoning. Food plays a role in the transmission of more than 200 diseases. Foodborne illnesses are contagious diseases brought on by bacteria that enter the body through food (World Health Organization, 2016). According to data from the drug and food control center, in 2019, there were approximately 20 million occurrences of food poisoning in Indonesia. Of those cases, 6,205 were reported through the Extraordinary Events of Food Poisoning application in 2019 by 257 hospitals out of 2,813 hospitals in Indonesia. Southeast Sulawesi, with 42 occurrences, is the region in Indonesia with the 13th-highest number of poisoning incidents based on geography. (Ellinda-Patra et al., 2020).

Using information from Southeast Sulawesi Provincial Health Office, in 2018, there were 30 cases of poisoning, which increased by 54 cases in 2019, with one person dying. In 2020, there were 291 incidents, a substantial increase, and one food poisoning death (Southeast Sulawesi Provincial Health Office, 2020). Food given to patients to aid in their rehabilitation is managed in the hospital's dining hall storage area. As a result, the hospital nutri-

tion installation is crucial in food processors until the food is provided to patients in guaranteed hygienic and sanitary circumstances. Patients must therefore get high-quality and safe food.

Hospital food management must be aware of food hygiene and sanitation activities from ingredient selection to storage, preparation, processing, cooking, distribution, and serving of the meal to patients (Lahou et al., 2015). Implementing a workable HACCP is one method used to maintain food hygiene and sanitation so that these risks can be identified early and addressed to prevent foodborne illnesses (Allata et al., 2017; Todd, 2020).

Microorganisms are often associated with poisons and chemical contaminants, which are the main causes of disease. Several foodborne pathogens that cause disease were found, such as *Staphylococcus aureus*, *Salmonella spp.*, *Listeria spp.*, *Escherichia coli*, and *Bacillus spp.* These microorganisms can result in foodborne illnesses in hospitals and society, as whole foodborne infections can lead to severe illnesses. Risk factors include the nature of microorganisms, food quality, patient's physiological state, degree of contamination, inadequate cooking temperatures, sanitation, cross-contamination, contaminated equipment, and poor personal hygiene. These elements can cause foodborne illnesses with serious health and financial repercussions. Hospital food service programs require severe systems to be implemented (Bano et al, 2020).

HACCP is an effective food safety assurance system. For implementing the HACCP System, training and constant supervision of employees is essential for producing safe food (Trafialek & Kolanowski, 2014). Implementing HACCP in the hospital food service system must be addressed in most countries. However, these guidelines have been adopted by various hospitals to guarantee that the food served to

patients is safe. (Adibi et al., 2022; Vukman et al., 2021).

Regarding microorganisms in food taken from the food handling process in hospitals, sources of food ingredients and humans who process and make the food served in hospitals are likely connected in the chain of disease transmission. Therefore, it is necessary to carry out additional hazard analysis of food products, raw materials, and additives to determine the risk of biological, chemical, and physical hazards. To ensure that the food consumed by patients is in good condition, the hospital needs to carry out food hygiene and sanitation. One of the efforts that can be made for food hygiene and protection is implementing the Hazardous Critical Control Points Analysis (HACCP) in Hospitals. HACCP guarantees that potential foodstuff hazards are systematically configured in each processing plant (Zeb et al., 2020).

The HACCP approach in food management analyses ingredients by paying attention to the flow of the stages of the food production process. This approach is described by dividing the food flow into several different categories based on the sequence of stages of the production process. After that, at each stage of the production process, the possibilities that arise are analyzed and apply the appropriate control methods (Barrere et al., 2020; Chen et al., 2020). Foods that have implemented the HACCP principle aim to improve the quality of food in hospitals. However, based on the results of observations in December 2021 at the general hospital Bahteramas and hospitals, The city of Kendari has not yet implemented the HACCP system.

Several studies have shown that hospital patients tend to experience a decrease in nutritional status during hospitalization. Patients' satisfaction with food services in the hospital will affect food intake, and this food intake will affect nutritional status (Abd Aziz et al., 2017;

Allard et al., 2016; Lima et al., 2021). Hence, implementing the HACCP Program and increasing the knowledge of all food handling staff must be carried out in all hospitals. Several studies have revealed the importance of implementing HACCP in some areas, including a study conducted on seafood processors (Al-Busaidi et al., 2017), in the food industries (Hung et al., 2015), in the Laundry facility (Glowicz et al., 2022), in the Hotel (Lateefat et al., 2018), and in the restaurant (Ko, 2013). However, the application of HACCP in hospitals to the author's knowledge is rarely studied. This study aimed to find out the Hazard Analysis and Critical Control Points (HACCP) application in Hospitals in Kendari City, Indonesia.

METHODS

This research was conducted using a qualitative study with a descriptive-analytical approach. The interviews were performed to obtain detailed information about the Hazard Analysis Critical Control Point system design observations. The data included product descriptions, determination of critical control points, process flow settings, critical limit specifications, determination and implementation of monitoring systems, and corrective actions. Then the instruments used were GMP assessment worksheets, product description worksheets, production process flowchart worksheets, hazard analysis and evaluation worksheets, Critical Control Point determination worksheets, and paper worksheets for controlling and monitoring the Hazard Analysis Critical Control Point system.

This research was conducted from January 28th until March 4th, 2022, at the Bahteramas General Hospital and Kendari City General Hospital, Southeast Sulawesi, Indonesia. The sample for this study were nutritionists, hosts and servers at Bahteramas General Hospital and Kendari City General Hospital.

Table 1
The Characteristics of Respondents

Characteristics	Research sites				Total	
	General Hospital Bahteramas		Regional Public Hospital		n =44	%
	n = 25	%	n = 19	%		
Age Group (Year)						
20-29	3	12.0	12	63.2	15	34.1
30-39	10	40.0	2	10.5	12	27.3
40-49	10	40.0	4	21.1	14	31.8
50-59	2	8.0	1	5.2	3	6.8
Gender						
Man	3	12.0	0	0	3	6.8
Woman	22	88.0	19	100	41	93.2
Education Level						
Primary School	0	0	1	5.3	1	2.3
Senior High School	15	60.0	12	63.2	27	61.3
College (DIII/S1)	10	40.0	6	31.5	16	36.4
Period of Service						
≥ 5 Year	3	12.0	10	52.6	13	29.5
< 5 Year	22	88.0	9	47.4	31	70.5

Considering that the hospital is a hospital serving a large number of patients, efforts to implement HACCP need to be promoted more effectively. In taking samples at Bahteramas General Hospital, 25 people were taken by simple random sampling, and 19 were taken as samples at Bahteramas Hospital. from Kendari City General Hospital area obtained from the total sample. This research was conducted with ethical approval. Data collection was in the form of respondents' age, gender, education level, years of service, and Hazard Analysis Critical Control Point application. All respondents in this study signed informed consent as proof of their willingness to participate voluntarily as research subjects.

The goal of the risk analysis was to reduce the chemical, biological, and physical risks that could arise during the manufacture, handling, and processing of raw materials as well as during the manufacturing, transport, and consumption of the finished product in both hospitals.. Primary data in this study were collected using questionnaires and direct interview techniques. Data were processed using a computer and analysed descriptively. In addition, all doc-

uments originating from general descriptions at Bahteramas General Hospital and Kendari City General Hospital related to food safety systems in food management are also used as secondary data in this study. The aim was to strengthen the findings and complete the information collected through observation and interviews with the leadership, staff, and food handlers of the Hospital Nutrition Installation.

After the intervention, the data were analyzed and processed by classifying the data/information that had been systematically compiled beforehand to compare the information obtained between the informants and the literature using a qualitative approach, then as information that described the results that had been obtained. The Research and Development Agency of Southeast Sulawesi Province, Indonesia, approved this study. All participants had received appropriate informed consent.

RESULTS

Table 1 shows that there were 25 samples in the general hospital Bahteramas, primarily aged 30-39 years and 40-49 years, respectively (40%), while in the Regional public hospital

Table 2
The Implementation of HACCP

Stages HACCP	Activity	General Hospital Bahteramas		Regional Public Hos- pital Kendari City	
		Pre Test	Post Test	Pre Test	Post Test
Stages 1	Assemble the CCP team	No	No	No	No
Stages 2	Product Description	No	No	Yes	Yes
Stages 3	Identify the intended use	No	No	Yes	Yes
Stages 4	Drawing up flow charts	No	No	Yes	Yes
Stages 5	Confirming the flow chart in the field	No	No	Yes	Yes
Stages 6	Confirming the flow chart in the field Compile a list of all potential hazards associated with each stage Conduct a hazard analysis and find ways to control the identified hazards	No	No	No	No
Stages 7	Determine critical control points	No	No	No	No
Stages 8	Define critical limits for each CCP	No	No	No	No
Stages 9	Define a monitoring system for each CCP	No	No	No	No
Stages 10	Determination of corrective measures (corrective action)	No	No	No	No
Stages 11	Develop verification procedures	No	No	No	No
Stages 10	Compile documentation and record keeping	No	No	No	No

Kendari City, primarily aged 20-29 years (63.2%). In the general hospital Bahteramas, most respondents are female, with a total of 25 respondents (88%), and in the Regional public hospital Kendari City, all of them are women, namely 19 people (100%). In general hospital Bahteramas, most respondents were high school graduates, comprising 15 respondents (60%). The least were college graduates (DIII/S1), as many as 10 people (40.0%), as well as in Regional public hospital Kendari City, the most respondents were high school graduates, as many as 12 people (63.2%) and at least 1 elementary school graduate (5.3%). The majority of respondents are in general hospital Bahteramas, their working period was <5 years (88.0%), while in Regional public hospital Kendari City, tenure of 5 years (52.6%).

Table 2 shows that the implementation of HACCP in general hospital Bahteramas, starting from stage 1 to stage 12, was not fully implemented. In contrast, at the Kendari City Hospital, the implementation of HACCP in stages 2 to 5 was carried out, while stages 1 and stages 6 to 12 were not implemented. Stages 2 to 5 were applied at the general hospital

city of Kendari, namely describing the product, identifying the intended use, compiling a flow chart and confirming the flow chart in the field.

DISCUSSION

This study reveals that the Hazard Analysis Critical Control Point has yet to be applied to hospitals in Kendari. Hazard Analysis Critical Control Point Implementation in General Hospital Bahteramas, starting from stage 1 to stage 12, were not fully implemented. Previous studies revealed that this could be due to the lack of knowledge of nutritionists, presenters, and food handlers about the importance of Hazard Analysis Critical Control Point (Al-Busaidi et al., 2017). Training has never been carried out in hospitals and also the implementation of the Hazard Analysis Critical Control Point requires certain procedures, such as the need for a Hazard Analysis Critical Control Point training certificate before the Hazard Analysis Critical Control Point team is formed, which is approved and given a decree officially from the hospital director. However, with the socialization, the nutrition installation has formed a draft of the Hazard Analysis Critical Control

Point (Peerally et al., 2019). The implementation starts from stage 1 to stage 12, but the draft made needs to be approved by the Director to be implemented. Undoubtedly, this requires advocacy to the leadership about the importance of implementing Hazard Analysis Critical Control Points in hospital food management.

While at the hospital In Kendari City, the implementation of Hazard Analysis Critical Control Point in stages 2 to 5 has been carried out, while in stages 1 and stages 6 to 12, it was not implemented. Only stages 2 to 5 are applied at the Kendari City public hospital, namely describing the product, identifying the intended use, compiling a flow chart and confirming the flow chart in the field. It can be seen from the Hazard Analysis Critical Control Point document that has been documented at the nutrition installation. The Hazard Analysis Critical Control Point document is divided based on staple foods, animal side dishes, vegetable side dishes and vegetables Hospital side. The city of Kendari already has a Hazard Analysis Critical Control Point team that describes products and even compiles a flow chart in the field. However, the specific implementation of Hazard Analysis Critical Control Points based on the type and menu of food ingredients has not been implemented effectively.

Based on our actual findings and survey experience, as well as relevant research literature, we emphasize several essential elements to implement and successfully operate a HACCP system in a hospital, such as Managerial commitment; availability and enforcement of risk information regulations; involvement of hospital nutritionists, food technologists, and health professionals; patient menu planning; training of hospital kitchen personnel and food management; integration of HACCP procedures with other hospital functions; hygiene supervision by central and regional public health authorities; delivery/introduction of food from outside to

the hospital; minimally processed food handling; routine inspection of kitchen equipment; food storage conditions; food waste disposal etc. Last but not least, an essential element is the absence of HACCP-certified suppliers for all food products, especially in small towns.

One of the factors causing the Hazard Analysis Critical Control Point not to be implemented due to lack of support from superiors regarding the importance of implementing a Hazard Analysis Critical Control Point (Domínguez et al., 2021). Lack of advocacy and understanding of presenters and handlers in implementing Hazard Analysis Critical Control Points in hospitals and having never conducted training on Hazard Analysis Critical Control Points in hospitals (Illés et al., 2021). This research is in line with the research of which found that the Hazard Analysis Critical Control Point principle has not been implemented optimally because it is not supported by policies that should be owned by RS X Batu City. It can be concluded that Hospital X has not implemented the Hazard Analysis Critical Control Point principle optimally because the hospital does not yet have a standard for implementing the Hazard Analysis Critical Control Point Principle (Bader & Jagtap, 2020). Hazard Analysis Critical Control Point (HACCP) is a proven food safety management system based on precautionary measures aimed at identifying possible hazards at every stage of the food supply chain (Gehring & Kirkpatrick, 2020). Food management in hospital institutions is more complex and requires special handling (Carino et al., 2020).

It was found that hospital food safety is critical because patients are susceptible to infections transmitted through unsafe food (Bhunia, 2018). The focus of this study is to critically analyze the knowledge of food safety and hygiene in the Kingdom of Saudi Arabia (KSA) concerning compliance with Hazard Analysis

and Critical Control Points (HACCP) and the International Organization for Standardization (ISO22000) (Alrasheed et al., 2021). The survey was designed to evaluate their level of education, training, ethnicity, understanding, and knowledge of food safety management systems, such as HACCP. The level of education among the ethnically diverse group of catering workers is adequate. However, hygiene training in some of the hospitals investigated could be improved, and training should be started immediately after work (Anthias, 2022). The catering supervisory group was well-educated, but the survey identified weaknesses in their knowledge and understanding of HACCP (Trafialek & Kolanowski, 2017). The MOH monitoring group were all Saudi nationals and also showed some weaknesses in their knowledge and understanding of HACCP. Food policies in KSA should be more accessible to their target audience, and policy formats would benefit from increased consultation at all levels of the food supply chain (Alrasheed et al., 2021).

CONCLUSIONS

This research uncovered food safety problems in large hospitals in Southeast Sulawesi that had never been found before. No Hazard Analysis Critical Control Point team has yet been formed in these two hospitals. The application of Hazard Analysis Critical Control Points in the two hospitals has never been implemented effectively. The limitations of this research are not to show specific control points for biological, chemical and physical hazards, starting from the production of raw materials to the consumption of finished products, so that their application can be measured and analyzed significantly. However, there is evidence that both hospitals have implemented some HACCP measures, although the implementation is still far from the system that should be implement-

ed. Only after the research was conducted did there not have been morbidity reports due to food processing errors in the two hospitals. However, it is suggested that the two hospitals immediately form a Hazard Analysis Critical Control Point Team to ensure food safety for patients at Bahteramas Hospital and Kendari City Hospital. This research requires further study by intervening in the HACCP implementation program in the two hospitals.

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AUTHORS' CONTRIBUTIONS

Erwin A. Jayadipraja wrote original draft, performed the statistical analysis, acquired the data, interpreted the data, and approved the final version to be published. Reslin Tobigo and Muhammad Asrullah designed the study, reviewed and critically revised the article, and approved the final version to be published. Anry H. Depu designed instrument and drafted the article.

AUTHORS' DETAILS

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COMPETING INTERESTS

The authors confirm that all of the text, figures, and tables in the submitted manuscript work are original work created by the authors and that there are no competing professional, financial, or personal interests from other parties.

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