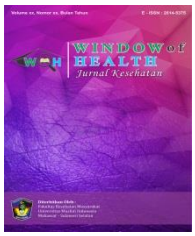
Window of Health Jurnal Kesehatan
journal homepage : www.jurnal.fkmumi.ac.id



ARTICLE RESEARCH

URL artikel: http://jurnal.fkm.umi.ac.id/index.php/woh/article/view/woh7301

Analysis of Factors Causing Work Accidents Using the Root Cause Analysis (RCA) Method at the Sumber Asih 1 Bitung Clinic

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ABSTRACT

Work accidents are unexpected events that can result in property loss and loss of life. Occupational safety and health in health installations are defined as activities to guarantee and protect the safety and health of human resources in health installations, patients, and patient companions so that protection standards are created for workers in health installations to prevent and reduce the risk of these dangers. The research was conducted at the Sumber Asih 1 Bitung Clinic in August – December 2023. Based on data on accidents at the Sumber Asih 1 Bitung clinic last year, there were ten work accidents. This research analyzes factors related to work accidents at the Sumber Asih 1 Bitung clinic in 2023. The method used in this research is the root cause analysis (RCA) method with five why analysis. The data source for this research consisted of 4 workers at the Sumber Asih 1 Bitung clinic. The data collection technique uses the observation method and in-depth interviews, followed by the triangulation method to validate the research results. The research found that the causes of work accidents were environmental factors: Lack of lighting in several clinic areas, slippery floors, and limited movement space. Meanwhile, human factors include unsafe actions, Lack of work safety training, Lack of concentration at work, and Lack of awareness of workers using personal protective equipment. It is necessary to carry out K3 (Occupational Safety and Health) training so that workers know the importance of working safely.

Keywords: Root Cause Analysis (RCA); Work Accident; Personal Protective Equipment (PPE); Work Safety.

PUBLISHED BY :
Faculty of Public Health
Universitas Muslim Indonesia
Address :
Jl. Urip Sumoharjo Km. 5 (Campus II UMI)
Makassar, Sulawesi Selatan.
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Article history :
Received 17 April 2024
Received in revised from 4 July 2024
Accepted 21 July 2024
Available online 24 July 2024

INTRODUCTION

Occupational safety and health in health installations are defined as activities to guarantee and protect the safety and health of human resources in health installations, patients, and patient companions so that protection standards are created for workers in health installations to prevent and reduce the risk of these dangers. Occupational safety and health in health installations is a new program for health installations in Indonesia. Only a few health installations have a K3-Hospital committee; they still need a targeted program. Therefore, health installations are required to implement occupational safety and health (K3) efforts in an integrated and comprehensive manner so that the risk of occupational diseases (PAK) and work accidents (KAK) in health installations can be avoided. [(1)]

The potential danger to health installation workers is more significant when compared to workers in general. Health installation workers are more vulnerable to danger, the possibility of sprains, injuries, infections, and diseases from parasites, dermatitis, hepatitis, and others. Looking at the current development of health installations, medical support facilities are increasingly developing, so the potential dangers and problems are becoming more complex. [(2)] Health workers need to be protected to ensure safety and health when carrying out work activities. Potential dangers arise in health installations. Apart from infectious diseases, there are also other potential dangers that are influenced by the situation and conditions of health installations, namely accidents (explosion, fire, accidents related to electrical installations, and other sources of injury), radiation, and materials. -hazardous chemicals, anesthetic gases, psychosocial disturbances, and ergonomics. [(3)]

Efforts made by health installations to reduce patient safety incidents include Forming health installation patient safety committees with programs that meet patient safety standards. Implementing a seven-step program toward health installation safety. Implementing patient safety targets. [(4)] Implementing good patient safety targets will create complete service. Many factors influence patient safety targets, including staff characteristics in age, length of service, level of knowledge, motivation, supervision, facilities, organizational structure, organizational culture, and actions that should be taken. [(5)] However, some factors influence achieving this, including nurses' knowledge level and the health installation facilities. [(6)]

One analysis of the causes of accidents is root cause analysis (RCA). [(7)] Root cause analysis (RCA) is a structured method for identifying various factors, including nature, situation and conditions, location, people, and the time a problem occurs, to determine the causes of the problem that can be corrected to prevent the same problem from happening again. Apart from that, based on research conducted by Dogget, RCA practices are based on the belief that the issues are best solved by correcting and eliminating the root cause, not just by immediately treating the apparent symptoms. [(7)] Directing corrective steps to the root of the problem will reduce the possibility of the recurring problem. Scientific studies in the form of RCA, which have been published and tested, will examine the results in assessing

the problems faced, especially in identifying work accidents that occur among workers on Company projects. [8]

Many theories explain the causes of work accidents. One of these theories is the Domino theory, which was put forward by Heinrich in 1941. Heinrich's theory (1941) examines the causes of accidents; generally, 85% occur due to human factors (unsafe acts) and unsafe working conditions (unsafe conditions) [9]. Apart from the Domino theory, there is also the Loss Causation Model theory, which is a modification of Heinrich's theory using management theory. Frank E. Birt said that the application of Heinrich's theory contained a principle error. People are fixated on picking one of the dominoes that addresses the leading cause of accidents: unsafe conditions and actions. Still, they need to trace the source that causes accidents. [10] In this theory, Bird states that there are two causes of work accidents, namely the basic causes that occur from human or personal factors of workers and work or environmental factors and direct causes, namely unsafe actions and unsafe conditions [11]. The primary difference between the two theories lies in the starting point of the cause of a work accident. Domino's theory explains that the starting point for accidents lies in working conditions. In contrast, in the loss causation model, Bird explains more specifically that working conditions are also influenced by weak control from management. [12]

In a preliminary study conducted by researchers, it was also discovered that the current implementation of the K3 program at the Sumber Asih 1 Bitung Clinic has yet to be fully implemented according to the plans that have been made. This is because funds have yet to be budgeted for K3 programs. The K3 programs that have been implemented are the only programs that can be carried out in line with programs in other service departments, such as the K3 promotion program, which is carried out in line with health promotion carried out by the health installation health promotion section and new employee health checks 12. Based on data, Work accidents at the Sumber Asih 1 Bitung clinic are known to have occurred ten times during the last year. To find out the causes of accidents, the author feels it is necessary to research the factors that cause work accidents at the Sumber Asih 1 Bitung Clinic using the RCA method.

METHOD

This research was conducted at the Sumber Asih 1 Bitung clinic from August 2023 to December 2023. This research used the root cause analysis (RCA) method with the five why analysis technique. The selection of respondents in this study used a total sampling method, namely, four workers who were directly involved at the Asih 1 Bitung Clinic. Data were collected using in-depth interviews and observation and then validated using triangulation.

RESULT

The results of interviews with four informants highlight the picture of work accidents that occurred at the Sumber Asih 1 Bitung Clinic.

"The work accident at the Sumber Asih 1 Bitung Clinic involved incidents where employees or clinic staff experienced injuries or health hazards in the work environment. This could include physical injuries, slips, falls, chemical contamination, or other events threatening employee safety and health." (**Key informant**)

"Work accidents at the Sumber Asih 1 Bitung Clinic can be categorized as incidents that cause physical injury or health problems to our employees while carrying out their duties. "This kind of accident could be a slip, fall, needle stick, or other incident related to work at the clinic." (**Main informant**)

Many work accidents have occurred in the last year at the Sumber Asih Bitung Clinic. The results of interviews with various informants show that in the past year, the Sumber Asih Bitung Clinic has experienced around ten recorded work accidents.

"In the past year, this clinic has recorded around ten recorded work accidents." (**Key informant**)

Types of work accidents that most often occur at Sumber Asih 1 Bitung Clinic.

"The most common types of accidents include slips or falls, especially in wet or slippery areas such as areas around reception rooms and treatment rooms." (**Key informant**)

"The type of work accident that most often occurs in our clinic is needle sticks during medical procedures, such as birth control injections and when administering anesthesia." (**Main informant**)

The Most Recent Occupational Accidents. The results of the latest interviews reveal several work accident incidents that occurred at the Sumber Asih 1 Bitung clinic.

"One recent example of a work accident involved a nurse who slipped on the floor near the operating room while carrying medical instruments due to droplets of cleaning fluid that were not cleaned immediately." **(Key informant)**

"The most recent accident I can tell you about is a nurse who injured her finger while trying to open a syringe box. The wound requires medical treatment." **(Main informant)**

"The most recent accident I remember was when a patient collapsed in the waiting room, and I fell while trying to approach him. I had a slight injury to my arm." **(Supporting Informant 1)**

"The most recent accident I witnessed was when a nurse was pricked by a syringe while administering anesthesia to a patient." **(Supporting informant 2)**

Steps That Have Been Taken After an Accident Occurs

The results of interviews with several informants revealed the steps taken after the accident at the Sumber Asih 1 Bitung Clinic.

"After an accident occurs, steps taken include providing medical treatment to injured employees, securing the incident area, and reporting the incident to management." **(Key informant)**

"After the accident, we immediately provided medical treatment to the injured nurse. We also noted this incident in our accident report and reported it to management." **(Main informant)**

Main Causes of Work Accidents. Interviews with several informants revealed the leading causes of work accidents at the Sumber Asih 1 Bitung Clinic.

"According to preliminary information, the main cause of this accident was inadequate cleaning measures and handling of cleaning fluid droplets in the operational area." **(Key informant)**

Factors that influence the incidence of work accidents The interviews with several informants revealed that environmental factors, equipment, and individual behavior influenced the incidence of work accidents at the Sumber Asih 1 Bitung Clinic.

"Contributing environmental factors include floors that are slippery due to liquid drops, as well as equipment that is not stored properly after use. Individual behavior such as not reporting liquid spills and walking too quickly in potentially slippery areas also contribute." **(Key informant)**

"Individual behavioral factors contributed to the accident, such as lack of attention when handling sharp medical tools. However, there are also environmental factors, such as inadequate lighting in medical equipment storage areas." **(Main informant)**

"Individual factors and environmental factors contribute. For example, there is a lack of lighting in some areas of the clinic and a lack of occupational safety training."**(Supporting informant 1)**

"Individual factors, such as inattention, and environmental factors, such as completeness of protective equipment, contribute to these types of accidents." **(Supporting informant 2)**

There are work regulations or procedures that are not followed or ignored in cases of work accidents.

"In this case, there was a violation of work procedures regarding handling liquid droplets and cleaning operational areas, which should have been immediately reported and dealt with." **(Key informant)**

"In this case, no regulations or work procedures were ignored. However, we can strengthen training and ensure that all staff know how to handle medical devices safely." **(Main informant)**

"In this case, no regulations or work procedures were ignored. However, we must increase safety training and attention to fall risks." **(Supporting informant 1)**

"No regulations or work procedures were ignored in this case, but we need to improve understanding and implementation of procedures for using sharp medical tools." **(Supporting informant 2)**

Implementation Plan for Preventive Actions Against Work Accidents at Sumber Asih 1 Bitung Clinic. The results of interviews with several informants regarding plans to implement preventive measures

against work accidents at the Sumber Asih 1 Bitung Clinic reflect a serious commitment to improving employee safety and health in the work environment.

> "The first step is to develop a detailed prevention plan with clear responsibilities. "Furthermore, employee training will be carried out, as well as the installation of warning signs and stricter supervision of compliance with work procedures." **(Key informant)**
>
> "We will work with management to develop a stronger workplace safety training program. In addition, we will carry out regular inspections of equipment and create stricter storage regulations." **(Main informant)**
>
> "We will hold regular training sessions and work closely with management to improve the safety infrastructure at the clinic. We will also engage staff to ensure awareness of these risks." **(Supporting informant 1)**

Plan to Monitor and Evaluate the Effectiveness of Work Accident Prevention Measures at the Sumber Asih 1 Bitung Clinic

The results of interviews regarding plans for monitoring and evaluating the effectiveness of work accident prevention measures at the Sumber Asih Bitung Clinic show a solid commitment to maintaining employee safety and health.

> "Preventive measures will be evaluated periodically to ensure success in reducing the risk of accidents. This evaluation will involve relevant management and staff to ensure preventive measures remain effective." **(Key informant)**
>
> "Evaluations will be carried out periodically, perhaps once every six months. We will hold an evaluation meeting to ensure the prevention measures are effective." **(Main informant)**
>
> "To monitor and evaluate the effectiveness of preventive measures, we will take the following steps: Hold regular meetings to check work accident rates, Conduct periodic safety inspections to ensure warning signs and floor conditions remain in good condition, Collect feedback from medical staff on understanding them to safety training and the obstacles they may encounter." **(Supporting informant 1)**

Additional Information You Want to Add Regarding Work Accidents

The results of additional interviews with various informants show the Sumber Asih 1 Bitung Clinic's strong commitment to overcoming and preventing work accidents in the future.

"If there are new developments or important information regarding future work accidents, we are committed to involving all relevant parties and making necessary changes to the prevention plan." **(Key informant)**

> "I want to emphasize the importance of occupational safety awareness throughout the clinic. All staff must understand that these precautions are to protect themselves and our patients." **(Main informant)**

Table 1. *Root Cause Analysis (RCA) Sources of Physical Injury*

WHY 1	Slipped in the clinic.
WHY 2	The clinic floor is slippery.
WHY 3	There was a liquid spill that was not cleaned up immediately.
WHY 4	There are no clear procedures or adequate cleaning tools available.
WHY 5	Lack of training and safety awareness regarding cleanliness of work areas.

Based on Table 1, the direct cause of the physical injury incident was a slippery floor, slippery shoe soles, no anti-slip rubber, and no signs of a slippery floor. Meanwhile, indirect causes include officers needing to be more careful and pay attention to the environment. The solution that must be taken is to install anti-slip anti-slip on the floor, including the descent, and put up a sign that the floor is slippery.

Table 2. Root cause analysis (RCA) of sources of needle sticks

WHY 1	The syringe was not disposed of properly.
WHY 2	More clarity is needed on medical waste disposal procedures.
WHY 3	Lack of training: officers needed to follow the socialization of closing the needle using one hand.
WHY 4	Lack of regular training or strict supervision in medical waste management.
WHY 5	Not being careful in taking actions

Based on Table 2, the direct cause was a lack of lighting in the room; the officer needed to be more careful about tightening the cap and the syringe, using two hands to cover the syringe. Indirect causes: officers are in a hurry and must be more cautious about the environment. The solution that needs to be implemented is to socialize, cover needles with one hand, dispose of waste according to the SOP, be more careful in carrying out aseptic procedures on patients, use PPE during injections, injecting actions carried out by trained personnel, improving lighting in the room.

Table 3. Root cause analysis (RCA) of sources of chemical contamination

WHY 1	There are no adequate measures to protect staff from chemical exposure.
WHY 2	Lack of understanding of chemicals used or lack of protective equipment provided.
WHY 3	Lack of chemical safety training and knowledge of the potential risks..
WHY 4	Limitations of PPE

Based on Table 3, the direct causes are a lack of appropriate SOPs and limited PPE (personal protective equipment. Indirect causes include a lack of protective measures and officers' understanding of chemicals. The solution that needs to be done is to prepare SOPs for handling chemical spills and conduct training regular K3 training.

Table 4. Root cause analysis (RCA) of sources of injury when treating patients

WHY 1	The patient may be uncooperative, or the situation may be complex.
WHY 2	Lack of training in handling difficult situations or managing challenging patient behavior.
WHY 3	Lack of focus on communication and conflict management training.

Based on Table 4, there are direct causes: lack of training in handling difficult situations and narrow space. Indirect causes: lack of caution, lack of concentration at work, lack of concern for the environment. The solution that needs to be done is to train employees at least once every six months and expand the workspace.

Table 5.Root cause analysis (RCA) of sources of infection due to contamination

WHY 1	Failure in sterilization procedures or correct use of medical equipment.
WHY 2	Lack of understanding of the importance of sterilization or lack of appropriate equipment.

Based on Table 5, the direct causes are limited PPE, not carrying out sterilization after the procedure, and not disinfecting the room. Indirect causes are failure of sterilization procedures and non-compliance with the correct and appropriate use of medical equipment. Solutions that need to be done are providing sufficient PPE, routinely carrying out sterilization after the procedure, and routinely disinfecting the room.

DISCUSSION

Analysis of the factors causing work accidents using the RCA (Root Cause Analysis) method at the Sumber Asih 1 Bitung Clinic in 2023 revealed that physical injuries occurred due to a lack of training and safety awareness regarding the cleanliness of the work area.[13] This reflects the importance of training and safety awareness to prevent work accidents. According to the literature on work accidents, a lack of training and understanding of safety protocols can increase the risk of accidents in the work environment.[12] In this case, a lack of knowledge of the importance of cleanliness of the work area and liquid spills that are not cleaned immediately

can result in the clinic floor becoming slippery and potentially causing accidents.(14) The most common causes of work accidents are communication problems between professionals, human error, and errors in organizing the health service process. Therefore, proper training and safety awareness instilled in all employees are important factors in preventing work accidents in the clinic. (15) Healthcare systems are emulating the industry in implementing root cause analysis (RCA) for error identification and mitigation, improving safety and quality.(16)

RCA uses a team approach that emphasizes systems to collect empirical data about what is happening and why. (17) Apart from that, the analysis results also show that liquid spills that are not immediately cleaned up contribute to this physical injury incident. This reminds us of maintaining a safe and clean work environment. According to occupational safety principles, a clean and orderly work environment can reduce the risk of accidents. Therefore, managing the cleanliness of the work area, including handling liquid spills quickly and effectively, is an essential element in maintaining employee safety. Research by Yik Ting Kwok found that most of the root problems were caused by staff behavior factors, and most recommendations needed to be stronger. (18)

Reasons include lack of training, tools, and expertise, suitability of panel composition, and the complexity of the process for large-scale repairs. The results of this RCA analysis align with these findings and emphasize the importance of investing in quality safety training and ensuring that every employee understands the importance of safety. in every aspect of their work. States that the causes of serious work accidents are due to the company's lack of attention to the work equipment used by workers and the lack of safety equipment provided by the company. (19) Stated that based on data from the company, almost all work accidents at Semen Padang are caused by low employee knowledge and inadequate communication tools.(20) It is estimated that the non-implementation of Occupational Safety and Health regulations caused work accidents at Semen Padang. The results of this research are in the form of proposed improvements to prevent work accidents in the future, such as adding labels and displays made to Occupational Safety and Health Regulation standards that have been determined so that workers are safer at work. (21)

The results of the RCA analysis found that management of work area cleanliness, temperature, light, and workplace conditions must be integrated into a broader work safety program to reduce the risk of work accidents in the workplace. (22) This aligns with the work safety principle that the work environment's clean and orderly conditions can reduce the risk of accidents.(23) This research also reflects the importance of strict supervision in managing risks

in the work environment. Effective monitoring can help identify potential problems before they become actual accidents and ensure safe procedures are followed correctly. Awareness of possible risks and close supervision are essential to creating a safer work environment for all employees.[24] These findings underscore that adequate training and careful supervision are critical factors in preventing workplace accidents, especially in medical waste management. This is in line with general efforts to mitigate the risk of work accidents and maintain the safety and health of employees in various types of work and industries. [25]

CONCLUSIONS AND RECOMMENDATIONS

Factors related to work accidents consist of environmental factors such as lack of lighting in several clinic areas, limited space for workers to move, and slippery floors; human factors such as lack of work safety training, lack of concentration at work, and lack of awareness of workers in using personal protective equipment, not working according to SOP; equipment factors such as lack of personal protective equipment. Work accidents that occurred at the Sumber Asih 1 Bitung clinic included needle sticks, chemical contamination, and falls/slips. The results of the Root Cause Analysis (RCA) method with the five why analysis technique are the discovery of the root causes of work accidents, which are caused by lack of training, lack of awareness of workers in using PPE (Personal Protective Equipment), lack of understanding of workers in creating a safe situation at work, lack of direct supervision and checking from the clinic on services and work that do not comply with the SOP. Suggestions for improving the implementation of Occupational Health and Safety at the Sumber Asih 1 Bitung clinic include holding K3 training, installing warning signs, and stricter supervision of compliance with work procedures.

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