

Hospital Occupational Safety and Health Management System based on Internet of Things (IoT)

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Abstract: The Hospital as the intensive of labor, expert, capital and technology industries have potential hazards and complexity of risk that could increase work-related accidents or occupational diseases. To solve that, the hospital has to implement the occupational safety and health which integrated into hospital management system. The purpose of this research is to develop the implementation of Occupational Safety and Health Management System (OSH-MS) that integrated to services for reach patient and hospital safety. The output of this research is the Guidelines of Occupational Safety and Health Procedures based on technology 4.0 (Internet of Things). This study is explanatory research conducted at Hospital University of North Sumatra Medan from January 2018 to November 2018. The populations are Occupational Safety and Health teams and the management board of the hospital and sample selected by purposive technique sampling. Data collected by observation and interview and will be analyzed by using descriptive statistics based on the basic principles of OSH Management System and applicable regulatory standards. The result showed that the base principal case of uncomplete OSH-MS application cause by lack of human resources that competence in OSH management. For implement the program just doing by one staff and lack of coordination with each unit at hospital. The impact of that, all program couldn't be realize by schedule. The one of difficulties of OSH-MS implementation is over tasking in duty and low of OSH socialization for overall unit of hospital. Recommended to H-OSH management system implementation could be planned programmatically and executed by applying computer-based information system of the computer.

1 INTRODUCTION

In globalization period, the demand for management of Occupational Safety and Health (OSH) programs increased, especially Hospitals Occupational Safety and Health (H-OSH). It caused of the medical provider, paramedics, and others, visitors, patients and communities around the hospital should be protected from occupational Regulation of the Minister of Health Republic of Indonesia Number 66 of 2016, requires hospitals to implement OSH that integrated into hospital management system. health problems and accidents, either as the impact of health service delivery activities or due to the condition of facilities and infrastructure in hospitals that have not met the standards. Based on the Decree of the Minister of Health Number 1087 / MENKES / SK / VIII / 2010 which was renewed to hospitals in the intensive of labor, expert, capital and technology industries have potential hazards and complexity of

risk that could increase work-related accidents or occupational diseases. In addition to

Paper will be part of the conference proceedings therefore we ask that authors follow the guidelines explained in this example and in the file «FormatContentsForAuthors.pdf» also on the zip file, in order to achieve the highest quality possible (Smith, 1998). being required to provide quality services and treatment, the hospital has to be a hospital safety to protect patients, visitors, workers and communities around the hospital from various potential hazards in the hospital. For that, the purpose of H-OSH program must be implemented and developed in an integrated and comprehensive.

Implementation of health services and management systems in the hospital strived to follow the development of technology by the development of industrial revolution 4.0. The industrial revolution 4.0 is characterized by a cyber-physical system which every industry uses a virtual

world, in the form of human connectivity, machines, and data otherwise known as the Internet of Things (IoT). The implementation of IoT could improve the quality of life and make the hospital able to compete with the other hospital services.

Hospital University of Sumatera Utara is a hospital that provides health care nuanced education and global to the community, especially the people who are in Medan. Based on the preliminary survey conducted, the hospital has H-OSH team in hospital management structure. Fulfillment of OSH signs for building safety is quite well done, including signs of building safety and fire safety with the APAR and evacuation routes. However, H-OSH implementation is still not optimized to implement the program into services or guarantee activities of health provider. This condition caused by the absence of H-OSH Management System which is fully integrated into the hospital environment.

The purpose of this study is to develop the implementation of Occupational Safety and Health Management System (OSH-MS) integrated into hospital service process to reach patient and hospital safety. The development adapted to the industrial

2 MATERIAL AND METHOD

Materials in this study are documents and activities of health workers in the hospital environment related to the implementation of OSH in hospitals. This is an explanatory research using the qualitative approach. This study was conducted in the period from January 2018 to June 2018. The populations were the H-OSH team and the management board of the hospital. The sample reach by purposive technique sampling.

The method of data collection is done by observation and in-depth interview about H-OSH implementation and conformity of OSH-MS. Secondary data is collected by conducting the re-evaluation of supporting documents including policies, Standard Operating Procedure, technical guidelines as well as matters relating to H-OSH implementation. The result will be analyzed by using phenomenology analysis with themes as an analytical unit based on the basic principles of OSH-MS and applicable regulatory standards

3 RESULT AND DISCUSSION

The Occupational Safety and Health Management System (OSH-MS) is a reference for hospital management to create a safe, healthy and productive work environment for hospital staff, patients, visitors, communities and the environment of the hospital that create the hospital services process in the running well and smoothly. Implementation of OSH-MS refers to the Regulation of the Minister of Health Republic Indonesia Number 66 of 2016 on Hospital Occupational Safety and Health. The implementation of OSH-MS cycle includes H-OSH Policy, H-OSH Planning, Implementation of H-OSH Plan, Monitoring and Evaluation of H-OSH Performance and Review and Improvement of H-OSH Performance. Implementation of OSH-MS is responsible by Hospital-OSH Unit that divide in little structure of organization with two persons as the staff. Based on the interview and discussion with staff of H-OSH Unit and develop by observation to identify the OSH-MS implementation, it found some problems divided into five basic principal of OSH-MS.

3.1 Establishment of H-OSH Policy

The determinate of H-OSH policy has been well implemented. This is indicated by the positive appreciation and commitment from the management. Initially, the existing H-OSH consisted of only one person with multiple roles and within the structure of the H-OSH Team which included the section on the Patient Quality and Safety Committee. Given the widely and comprehensive scope of H-OSH implementation, the H-OSH team's research turned into the H-OSH Unit consisting of three people with one H-OSH expert and more structured

Establishment of H-OSH Unit is by the provisions outlined in Labour Regulation No. Per-04/ Men /1987. However, in the implementation, the H-OSH Unit should be integrated with the representation of each competency by the complexity of positions in the hospital resulting from the complexity of the services provided. The hospital demands the presence of doctors, nurses, midwives, dentists, labors, analysts, pharmacists, paramedics and other competencies. The complexity of these competencies surely provides different roles and hazards in the service delivery process at the hospital. Therefore, the cooperation between these competencies must be incorporated within the scope of OSH to create a safe and healthy work environment as a form of achievement of good OSH

performance. Based on some previous research states that competence has a significant effect on employee performance.

3.2 H-OSH Planning

Based on the results of research, the OSH team said that the Hospital had the H-OSH planning as stated in OSH Program. The work program is prepared to refer to the applicable regulations. The planning is arranged in one period of 2016-2017. However, the program has not yet covered decomposed in the Decree of the Minister of Health Number 1087 / MENKES / SK / VIII / 2010. OSH planning also has not been contained in technical guidelines or the existence of written forms and procedures. This can affect how the next implementation in work programs that have been prepared.

Therefore, OSH planning should also be contained in hospital strategic plan and can be disseminated through computer-based hospital information system. Hospital Information System should be developed to overcome the shortcomings and inconsistencies between work units. For example, the incongruence begins with the complexity of the types in actions and services that must be provided to each unit in unified coordination.

3.3 Implementation of H-OSH Plan

The schedule of the programs has prepared in well-timed. But the program has not been implemented maximally. Based on interview, it causes by the lack of OSH executive staff in hospitals and the implementation still not integrated also cultivation of safe and healthy work in the hospital environment. Occupational Safety and Health culture is a combination of attitude, beliefs, norms, and perceptions of certain organizations related to OSH climate and safe and healthy practice. The most important issue in establishing a safety culture is based on the working climate of a supportive workplace to promote safety and health behaviour at all times during work. Implementation OSH plan also indicated by the absence of implementation guidance H-OSH socialized to all units in the hospital. Therefore, the pattern of health care work in given the patient priorities and not paying attention to safety and the risk that could be experienced by the health provider. This situation is supported by the knowledge of health care workers who prioritize the target achievement of the work than to maintain the safety and health. According to

WHO, a person can behave certain regarding applying OSH due to four main reasons namely knowledge, perception, attitude and trust. These four things must support each other. By the results of research which states that the implementation of OSH in hospitals can be quite good as much as 68% associated with knowledge of OSH enough, good individual attitude and information of OSH that reach by health workers.

Implementation of H-OSH can also be hampered by the lack of facilities used in the services provided. For example one of the units studied in this research is the hemodialysis section. From observation, it found that the sake of safety, the user is required to have differentiation in sterilizing the tube hemodialysis, but the hospital has only one unit of sterilization equipment. This situation requires officers to sterilize infectious patients manually to avoid transmission of the disease to other non-infectious patients. This manual work pattern may increase the risk of workplace accidents or illnesses because the possibility of direct contact may occur concerning biological factors derived from pathogenic germs from patients.

Also, hospitals waste management hampered due to the minimum housekeeping officers to collect medical and nonmedical waste. In collected the medical or non-medical waste from each room, officers still combine the medical and nonmedical waste in a trolley/garbage train even it has been classified in different colour plastics from each unit. Medical waste is very important to be managed properly and specifically because it can be categorized as hazardous and toxic waste and classified as an infectious. Improper management will pose a risk for disease transmission. Based on the results of interviews conducted, some of the phenomena is due to lack of officers' knowledge about occupational safety and health. Officers also adjust the work with existing tasks and facilities to avoid repeated collection. The work environment of the hospital should consider the physical aspects that may affect the work. Based on the results of the study found many health and safety risks that can occur in workers at hospital include eye exhaustion due to poor lighting, the risk of falling, work time that exceeds standards and workloads are not in accordance with the capacity so that increasing fatigue in workers, limited work space, and poor APAR evaluation.

3.4 Monitoring and Evaluation of H-OSH Performance

Monitoring and evaluation of H-OSH performance has not been done well where the implementation cycle of risk management not in Plan of Action periodically. The process of supervision of OSH implementation also has not run because of the lack of members in organizing OSH Unit. It also has not developed with maximum considering the competence of officers arranged in organizing H-OSH units still have one person who has the competence of OSH. Workload to be carried out exceeds the amount and capacity owned, so that reasonable program that has been arranged well couldn't be done perfectly. The results show that workload and individual characteristics in significantly positive effect on burnout and worker performance. The impact of this maximal performance can lead to dissatisfaction in working. Therefore, the factors that trigger this dissatisfaction must be anticipated for the sake of management's sustainability in hospital. Based on research the factors of dissatisfaction related to policy and reward. The dominant factors of work content that lead to job satisfaction are the factors of appreciation and autonomy, the dominant factors of the work environment are the relationships with colleagues, relationships with the direct supervisor and workplace conditions (Subhan, 2018).

3.5 Review and Improvement of H-OSH Performance

The review and improvement of H-OSH performance have not been carried out according to the circumstances of the four cycles described earlier. This cycle could be done if the hospital can jointly conduct an internal audit of OSH implementation as an effort to maintain occupational safety and health. The results of the audit become inputs for the continuous improvement of the OSH programs that have been prepared by the H-OSH Unit. This is certainly supported by relevant management inputs from resources, work facilities, finances, and method. Based on the development of industrial revolution 4.0, to support socialization and OSH culture in hospital to be integrated as a whole can be done by socialization using cyber physics. The communication of safety messages is not only done manually through safety briefing, posters, banners or safety signs, but supported by online such as the socialization of H-OSH implementation

guidelines in every computer window, the video Tron explaining about the hospital and safety video in case of accident or even disaster (extraordinary events), as well as safety messages delivered through running text in strategic places and can be known to every user of hospital services.

4 CONCLUSIONS

Based on the results, it concluded that the implementation of OSH Management System at USU Hospital has not been in maximum implemented. The factors that need to be considered include the lack of human resources, facilities that need to be improved along with the increase of hospital service users, the maintenance of the work environment, job satisfaction and the lack of socialization of the OSH implementation which is integrated as a whole in the hospital environment. Recommended to H-OSH management system implementation could be planned programmatically and executed by applying computer-based information system of the computer. Socialization to integrate of OSH to all parts in hospital could be done openly through the service information contained in cyber physics and known by all users of the hospital through computers, banners, video Tron, and running text.

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REFERENCES

- Berawi, M.A., 2018, *The Fourth Industrial Revolution: Managing Technology Development for Competitiveness*. International Journal of Technology 1; 1-4.
- Decree of Minister of Health Number 1087/MENKES/SK/VIII/2010 about *Health and*

- Safety Standard in Hospital*. Directorate of BinaKesehatanKerja 2010.
- Dula C., S. 2006. *Creating a Total Safety Traffic Culture*. United States, East Tennessee State University; p 27-28 .
- Dito, N., Hariyono W., 2016. Hubungan Tingkat Pengetahuan, Dukungan Manajemen dengan Penerapan K3 pada Paramedis di Rumah Sakit Codong, Catur, Kabupaten Sleman.
- Gatot, D.B., Adisasmito, W. 2005. *Hubungan Karakteristik Perawat, Isi Pekerjaan dan Lingkungan Pekerjaan Terhadap Kepuasan Kerja Perawat di Instalasi Rawat Inap RSUD Gunung Jati Cirebon*. MAKARA, Kesehatan 9(1); p.1-8.
- Hanifa, N.D., Respati, T., Susanti, Y. 2017. *Hubungan Pengetahuan dengan Upaya Penerapan K3 pada Perawat*. Proceeding Bandung Meeting on Global Medicine & Health (BaMGMH), 1(1); p. 144-149.
- Health Department Republic Indonesia. 2009. Occupational Safety and Health Standard in Hospitalst (H-OSH), Directorate of BinaKesehatanKerja, Jakarta, www.depkes.go.id
- Ismail, R., & Abidin, S.Z. 2010. *Impact of Worker's Competence on Their performance in the Malaysian Private Sector*. Business and Economic Horizons, 2(2); 25-36.
- Keputusan menteri Kesehatan Republik Indonesia Nomor 432/Menkes/SK/IV/2007 tentang Pedoman Manajemen Kesehatan dan Keselamatan Kerja (K3) di Rumah Sakit.
- Loekito, R., 2014. *Outsourcing Sistem Informasi Rumah Sakit*. Artikel di @MedWeb, [diakses 01 Juli 2018].
- Regulation of Ministry of Labour No.PER. 04/MEN/1987 about tentang Panitia Pembina Keselamatan dan Kesehatan Kerja (P2K3) and Tata Cara Penunjukan Ahli Keselamatan Kerja
- Regulation of Ministry of Health Republic Indonesia Number 66 of 2016 about *Hospitals Occupational Safety and Health*.
- Saleh, C. 2016. *Pengaruh Beban Kerja dan Karakteristik Individu terhadap Kinerja Perawat Melalui Burn Out Sebagai Variabel Intervening pada PT. Nusantara Medika Utama Rumah Sakit Perkebunan (Jember Klinik)*. Bisma; Jurnal Bisnis dan Manajemen 10 (3); p. 329-342.
- Silfa, A.B., 2013. *Pengelolaan Sampah/Limbah Rumah Sakit dan Permasalahannya*. Artikel di internet, [diakses 02 Juli 2018].
- Siswanto, Susila, and Suyanto. 2017 *Metodologi Penelitian Kombinasi Kualitatif-Kuantitatif Kedokteran dan Kesehatan*. Klaten: Bossscript.
- Subhan, Z. A., Widodo, H. 2018. *Analisis Penerapan Budaya Perilaku Keselamatan dan Kesehatan Kerja di Rumah Sakit*. KesMas 12(1): pp 15-20.
- Zaim, H., Yasar, M.F., & Unal, O.F. 2013. *Analyzing the Effects of Individual Competencies on Performance*. A *Field Study in Service Industries in Turkey*. Journal of Global Strategic management, 14;67-77.