

Evaluation of the Implementation of Occupational Safety and Health at the Radiology Installation of the Madani Regional Hospital, Pekanbaru City in 2021

Alni Diniati¹, Endang Purnawati Rahayu², Doni Jepisah³, Herniwanti⁴,
M. Kamali Zaman⁵

^{1,2,3,4,5}Sekolah Tinggi Ilmu Kesehatan Hang Tuah Pekanbaru, Indonesia
alni.diniaty@yahoo.com

Abstract

Radiological examination is carried out using a diagnostic imaging tool that emits radiation, therefore radiology installations must pay attention to aspects of the application of workers' occupational safety and health. The purpose of this study was evaluation of the implementation of occupational safety and health at the Radiology Installation of the Madani Regional Hospital, Pekanbaru City in 2021. This study uses qualitative research methods through in-depth interviews, observation and document review. The research informants were 8 people, which were determined based on the snowball sampling technique. The results obtained are standard operating procedures (SOP) for services have been made and have been socialized and implemented by officers but special SOP for occupational health and safety (K3) are not yet available, radiology installation permits are still in process, K3 training has not been implemented, installation facilities and infrastructure radiology is adequate but there are still shortcomings, archive records have been neatly and in detail in accordance with applicable regulations, reports cannot be carried out because the radiology installation is still in the permit process; some management requirements, some radiation protection requirements and technical requirements are not in accordance with applicable regulations, radiology installation safety verification is in accordance with applicable requirements. The conclusion of this study is that the application of K3 Radiology Installation at the Madani Regional Hospital is not in accordance with the regulation of the head of the nuclear energy supervisory agency number 4 of 2020. It is recommended that the Radiology Installation and related parties can complete the licensing file that is still lacking, conduct K3 training, report if the permit has been completed, meet management requirements, radiation protection requirements and technical requirements that are still lacking.

Keywords

implementation; occupational safety; health



I. Introduction

Hospitals are health care facilities as well as referral centers that are growing very rapidly in Indonesia, therefore hospitals must prioritize occupational health and safety (K3) efforts for all workers in the hospital. K3 efforts must be realized to optimize work productivity, especially in places that have health hazards and the risk of disease outbreaks, such as radiation hazards. Hospital K3 is one of the efforts to improve the quality of hospital

services in terms of the safety and health of hospital human resources, patients and visitors or patient introductions (Kementerian Kesehatan, 2010).

One of the medical services in hospitals is radiology medical services. The radiology installation uses an X-ray machine for diagnostic and interventional radiology diagnostics (Badan Pengawas Tenaga Nuklir, 2020). Radiological examination is an examination by taking pictures of the inside of the body in order to diagnose a disease or disorder (Patel, 2007). Radiological examination is carried out using a diagnostic imaging tool that emits radiation, therefore radiology installations must pay attention to aspects of the application of workers' occupational safety and health. Patients when arriving in the hospital were reported with the clinical profile, clinical manifestation, GCS score, brain imaging, risk factor, laboratory and outcome (Syahrul, 2020). This examination is carried out using a diagnostic imaging tool, where its development is influenced by advances in physics, chemistry and biology (Kartawiguna and Georgiana, 2014). Therefore, radiology installations must pay attention to the occupational safety and health aspects of workers, especially those exposed to radiation. To ensure that the X-ray machine meets the requirements, a function test and a suitability test are needed so that the dose received is as low as possible (Bachtiar, 2011). The potential danger of radiation to workers in radiology installations is very large, so safety factors are needed to minimize the risk of accidents and or occupational diseases. Therefore, it is necessary to apply K3 in hospitals to protect workers, patients and the surrounding environment from the dangers and impacts of radiation. Lili Suryani in Haslinur (2020) states that the difference in costs is in line with the length of stay of the patient in the hospital. Therefore, the hospital directly has to cut operational costs by considering the quality of service factors that remain maximum to patients (Mulyanti, 2020).

K3 is an effort to protect the workforce so that the workforce is always safe and healthy while doing work in the workplace as well as for other people who enter the workplace. The physical condition of the work environment where workers carry out their daily activities poses a direct or indirect risk of harm to the safety and health of workers (Triyono, 2018). There are some exceptions in the patient referral rules, among others, by considering the condition of health services (Hanum, 2020). The basic philosophy of K3 is to protect the safety and health of workers through various efforts to control potential hazards in the work environment, while the philosophy of applying K3 is not only applied in the workplace but is applied in everyday life to avoid potential hazards (Triyono, 2018).

Based on data from the International Labor Organization (ILO), every year 250 million workers experience work-related accidents and 160 million workers experience occupational diseases and 1.2 million workers die due to accidents and or occupational diseases. Other data based on the ILO, every day workers around the world who die due to work accidents and or work-related diseases amount to more than 2.78 million deaths per year. In addition, there are approximately 374 million non-fatal work-related injuries each year, resulting in workers being absent for more than 4 days.

In Indonesia in 2018, there were 173,105 work accidents and in 2017 there were 123,041 cases. Around 85-96% of work accidents are said to be the result of unsafe acts or human error. In 2010 there were 2,191 deaths and 2,550 people with disabilities due to work accidents. In Riau, in 2014 there were 3,127 people experiencing work-related accidents and 3,398 people experiencing work-related illnesses.

Radiation rays or X rays are electromagnetic waves produced by machines with X-ray particles. These X-ray particles can penetrate body tissues. Radiation exposure has effects and radiation hazards that can be short-lived or chronic. Early effects of high radiation doses appear within minutes or days, while late effects occur within weeks, months or years. Effects arising from exposure to ionizing radiation, namely acute effects and chronic effects.

Government Regulation of the Republic of Indonesia Number 33 of 2007 concerning the safety of ionizing radiation and the safety of radioactive sources explains that every agency that uses nuclear energy is required to have a permit for the use of nuclear energy and must comply with radiation requirements. Radiation safety requirements include: management requirements, radiation protection requirements, engineering requirements and safety verification. This regulation also regulates radiation safety for workers, the public, the environment, security of radioactive sources and inspections for the use of nuclear power (Badan Pengawas Tenaga Nuklir, 2007).

The application of K3 is a statutory regulation and the application of risk analysis with the aim of reducing the danger of accidents or occupational diseases. The implementation of K3 requires cooperation and commitment from various parties to be implemented. This is because without a commitment, the implementation of K3 will not work. The legal basis for the application of K3 is as follows: Law Number 1 of 1970 concerning Occupational Safety, Minister of Manpower Regulation Number 5 of 1996 concerning Occupational Health and Safety Management Systems and Minister of Manpower Number 4 of 1987 concerning the Committee for Occupational Safety and Health. The application of K3 in Radiology Installations is regulated in the Regulation of the Head of the Nuclear Energy Supervisory Agency Number 4 of 2020 regarding radiation safety in the use of diagnostic and interventional radiology X-rays which include the following: licensing, application of management requirements, radiation protection requirements, engineering requirements, safety verification, application of records and reports as well as application of standard operating procedures for K3 (Daryanto and Djainal, 2018).

Madani Regional Hospital is one of the hospitals owned by the Pekanbaru City government which has supporting medical services for radiology installations. Madani Regional Hospital is a class C hospital and has an operational permit with license number 4/05.12/DPMPTSP/XII/2017 issued on 28 December 2017. Based on the hospital profile and from the results of the residency, Radiology Installation of the Madani Regional Hospital have adequate facilities and infrastructure but licensing is still in process, limited human resources, inadequate radiation protection equipment, socialization regarding K3 has not been running optimally and hazard protection at the Madani Regional Hospital has also not run optimally and radiology rooms are not yet optimal. All sides are coated by lead. Based on the Government Regulation of the Republic of Indonesia Number 33 of 2007 and Regulation of the Head of the Nuclear Energy Supervisory Agency Number 4 of 2020, radiology installations must meet the terms and conditions in accordance with regulatory provisions such as established permits, adequate radiology installation buildings and facilities, radiation protection that has been adequate, etc. in accordance with the provisions of the regulations.

The purpose of this study was evaluation of the implementation of occupational safety and health at the Radiology Installation of the Madani Regional Hospital, Pekanbaru City in 2021.

II. Research Methods

This study uses qualitative research. The purpose of qualitative design is phenomenology, namely approaching-understanding, exploring, revealing a phenomenon to the informant or respondent. This qualitative design is used on the grounds that it has several advantages, namely: when dealing with realities in the field, it is easier to make adjustments, obtain a deeper understanding because qualitative methods communicate directly with informants, are more sensitive and sensitive and are more able to adapt to the sharpening of mutual influence on the pattern of values encountered (Pandiangan et al., 2021).

Data collection methods are activities carried out in order to obtain information that is treated in order to achieve the objectives of a study (Pandiangan, 2015). The method of data collection is by conducting methods through in-depth interviews, observation and document review review to obtain data regarding the application of occupational safety and health at the Radiology Installation of the Madani Regional Hospital, Pekanbaru City.

The technique used in determining the informants is using the snowball sampling technique with the principles of appropriates and adequacy. Pandiangan et al. (2018) the principle of appropriates is to select research informants in accordance with the objectives of qualitative research. While the principle of adequacy is an assessment of the adequacy of the data that is measured by the researcher himself, if there is no variation in answers that is quite prominent between one source and another and has reached saturation, the researcher can stop looking for the data. The research informants were 8 people, which were determined based on the snowball sampling technique.

Types of data collection are primary and secondary data, secondary data from library data. Library research of reference sources is a form of research that uses library facilities by examining theoretical discussions from various books, articles, and scientific works related to writing (Pandiangan, 2018).

Data is one of the most important factors in any research. To obtain the correct data, a data validity technique is needed, namely the triangulation technique. Triangulation technique is one of the efforts to check the validity or validity of the data by utilizing informants or other methods to confirm the data that has been obtained, as well as for checking purposes or as a comparison of the data so that the data is more valid (Tobing et al., 2018).

III. Discussion

3.1 Overview of Research Sites

The Pekanbaru City Madani Regional Hospital (RSD) is a hospital owned by the Pekanbaru City government which was inaugurated on January 26, 2018 by the Mayor of Pekanbaru. Madani Regional Hospital is a class C hospital and has an operational permit issued on December 28, 2017 with license number 4/05.12/DPMPTSP/XII/2017. The Regional Hospital (RSD) Madani Pekanbaru City is a Technical Implementation Unit (UPT) of the Pekanbaru City Health Office which is strategically located on the edge of the Garuda Sakti km2. RSD Madani Pekanbaru City was built in 2014 with an area of 30,400 m² and a building area of 13,128 ,51 m².

In 2018, RSD Madani still had limitations in various ways, including facilities and infrastructure, medical equipment and health human resources. Medical devices used are borrowed and used equipment from health centers in the city of Pekanbaru without disturbing the health center services, meanwhile the health human resources are staff at the health centers assigned by the Mayor of Pekanbaru to RSD Madani. Meanwhile, the fulfillment of pharmaceutical preparations and BMHP is carried out through the Department of Pharmacy Installation Health.

In mid-2018, RSD Madani submitted a request for Special Allocation Fund assistance from the Ministry of Health of the Republic of Indonesia to assist in the procurement of medical equipment facilities at RSD Madani. In 2019 financial assistance from the Ministry of Health of the Republic of Indonesia can be realized with the realization of the procurement of medical devices for the ER and outpatient services.

In 2018 to 2019 the services at Madani Hospital are still limited, namely 24-hour emergency room services, outpatient services, pharmaceutical services, laboratory services and medical records. Outpatient services are carried out by several specialist doctors. In April 2020 RSD Madani opened special inpatient services for COVID-19 patients and radiology

services. The Madani Hospital of Pekanbaru City is one of the hospitals serving COVID-19 handlers, based on a decree from the Governor of Riau and a decree from the Mayor of Pekanbaru. As time goes by RSD Madani continues to improve services by continuing to coordinate with the Riau Provincial Health Office and the Ministry of Health for the fulfillment of infrastructure facilities and the fulfillment of Health Human Resources in order to realize quality health services for the people of Pekanbaru City.

3.2 Research Result

Standard operating procedure (SOP) is a guideline on how to work or work process flow for service activities in radiology installations. The radiology installation of the Pekanbaru City Madani Regional Hospital already has an SOP as a guideline for carrying out activities at the radiology installation in accordance with applicable standards.

The results obtained are SOP for services have been made and have been socialized and implemented by officers but special SOP for occupational health and safety (K3) are not yet available.

Based on in-depth interviews, field observations and document review, it can be concluded that the service SOP at the radiology installation of the Madani Regional Hospital Pekanbaru City is available, the SOP has been socialized to the radiology installation officer and the SOP has been applied by the radiology officer at the Madani Regional Hospital Pekanbaru City, however. Special SOPs regarding K3 are not yet available at the radiology installation of the Pekanbaru City Madani Regional Hospital. Based on the document review, obtained SOPs that have been explained in detail. It can be concluded that the SOP for radiology installation services at the Madani Regional Hospital of Pekanbaru City is in accordance with the PP of the Ministry of Health No. 1014/2008, but the availability of special SOPs for K3 is not in accordance with the PP of the Ministry of Health No. 1014/2008.

 RSUD SOKIT SIKERAN MADANI Jl. Lestari 1000 Kota Pekanbaru		PEMERIKSAAN RADIOLOGI STANDAR FOTO THORAK	
No. Dokumen	Rev. / Rpt / REdisi	Ed. Revisi	Halaman
	0001 / 001	0	1
Revisi / Perubahan	Terakhir / Baru	FIDUKSI Nomor FIDUKSI Dr. Anwarul Uta Farid, Sp. RD NIP. 121005 12004 1000	
DEFINISI	• Standar pemeriksaan radiologi dengan menggunakan standar yang ditetapkan.		
TUJUAN	• Untuk meningkatkan kualitas dan pelayanan serta meningkatkan kepuasan dan keselamatan pasien.		
MERUMPAH	• Ruang Pemeriksaan, Ruang Röntgen, Ruang Wait Room, Ruang Ruang tunggu, Ruang Ruang tunggu, Ruang Ruang tunggu.		
PROSEDUR	1. Persiapan dan Pelaksanaan dengan standar yang ditetapkan. <ol style="list-style-type: none"> 1.1. Pasien datang ke Ruang Pemeriksaan dan menunggu di Ruang tunggu. 1.2. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.3. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.4. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.5. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.6. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.7. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.8. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.9. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.10. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.11. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.12. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.13. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.14. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.15. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.16. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.17. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.18. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.19. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.20. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.21. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.22. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.23. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.24. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.25. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.26. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.27. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.28. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.29. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.30. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.31. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.32. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.33. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.34. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.35. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.36. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.37. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.38. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.39. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.40. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.41. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.42. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.43. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.44. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.45. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.46. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.47. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.48. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.49. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.50. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.51. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.52. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.53. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.54. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.55. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.56. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.57. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.58. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.59. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.60. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.61. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.62. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.63. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.64. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.65. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.66. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.67. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.68. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.69. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.70. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.71. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.72. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.73. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.74. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.75. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.76. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.77. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.78. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.79. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.80. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.81. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.82. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.83. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.84. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.85. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.86. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.87. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.88. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.89. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.90. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.91. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.92. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.93. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.94. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.95. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.96. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.97. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.98. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.99. Pemeriksaan dilakukan dengan standar yang ditetapkan. 1.100. Pemeriksaan dilakukan dengan standar yang ditetapkan. 		
REVISI / PERUBAHAN	1. Revisi / Perubahan 2. Revisi / Perubahan 3. Revisi / Perubahan 4. Revisi / Perubahan 5. Revisi / Perubahan		

Figure 1. Service SOP at Madani Hospital Installation

Radiology installation permits are still in process, K3 training has not been implemented, installation facilities and infrastructure radiology is adequate but there are still

shortcomings, archive records have been neatly and in detail in accordance with applicable regulations, reports cannot be carried out because the radiology installation is still in the permit process; some management requirements, some radiation protection requirements and technical requirements are not in accordance with applicable regulations, radiology installation safety verification is in accordance with applicable requirements.

IV. Conclusion

The conclusion of this study is that the application of occupational health and safety (K3) Radiology Installation at the Madani Regional Hospital is not in accordance with the regulation of the head of the nuclear energy supervisory agency number 4 of 2020.

It is recommended that the Radiology Installation and related parties can complete the licensing file that is still lacking, conduct occupational health and safety (K3) training, report if the permit has been completed, meet management requirements, radiation protection requirements and technical requirements that are still lacking.

References

- Bachtiar, S. (2011). Analisis Pembentukan Gambar dan Batas Toleransi Uji Kesesuaian pada Pesawat Sinar-X Diagnostik. Pusat Teknologi Keselamatan dan Metrologi Radiasi - BATAN, 157–163.
- Badan Pengawas Tenaga Nuklir. (2007). Peraturan Pemerintah Republik Indonesia Nomor 33 Tahun 2007 Tentang Keselamatan Radiasi Pengion dan Keamanan Sumber Radioaktif. BAPETEN, 1–58.
- Badan Pengawas Tenaga Nuklir. (2020). Peraturan Kepala Badan Pengawas Tenaga Nuklir Nomor 4 Tahun 2020 Tentang Keselamatan Radiasi dalam Penggunaan Pesawat Sinar X Radiologi Diagnostik dan Intervensional. BAPETEN, 1–55.
- Daryanto, H. & Djainal, H. (2018). Penerapan Sistem Keselamatan dan Kesehatan Kerja (K3) di PT. Pertamina (PERSERO) Terminal BBM Ternate. Jurnal Dintek, 11(1), 34–40.
- Hanum, S.L., Aulia, D., and Rochadi, K. (2020). Patient Decision Making in the Choice of a Referral Hospital in Hospital of Subulussalam City in 2018. Britain International of Exact Sciences (BIOEx) Journal Vol. 2 (1): 368-376.
- Haslinur, S., et.al. (2020). Analysis of Differences between INA CBG's Rates and Hospital Real Rates in Hemophilia Patients at RSUD Zainoel Abidin Banda Aceh. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (3): 1758-1763.
- Kartawiguna, D. & Georgiana, V. (2014). Model Development of Integrated Web-Based Radiology Information System with Radio Diagnostic Imaging Modality in Radiology Department. Journal of Theoretical and Applied Information Technology, 63(2), 350–361.
- Kementerian Kesehatan. (2010). Keputusan Menteri Kesehatan Republik Indonesia Nomor 1087/MENKES/SK/VIII/2010 Tentang Standar Kesehatan dan Keselamatan Kerja di Rumah Sakit. Kementerian Kesehatan RI, 1–44.
- Mulyanti., et.al. (2020). Comparison Analysis of Real Costs with Ina-CBG Rate's Ischemic Stroke Disease in Installations in Regional Public Hospitals X in Banda Aceh 2019. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (3): 2479-2493.
- Pandiangan, Saut Maruli Tua. (2015). Analisis Lama Mencari Kerja Bagi Tenaga Kerja Terdidik di Kota Medan. Skripsi. Medan: Fakultas Ekonomi dan Bisnis, Program Studi

- Ekonomi Pembangunan, Universitas Sumatera Utara.
https://www.academia.edu/52494724/Analisis_Lama_Mencari_Kerja_Bagi_Tenaga_Kerja_Terdidik_di_Kota_Medan.
- Pandiangan, Saut Maruli Tua. (2018). Analisis Faktor-faktor yang Mempengaruhi Penawaran Tenaga Kerja Lanjut Usia di Kota Medan. Tesis. Medan: Fakultas Ekonomi dan Bisnis, Program Studi Ilmu Ekonomi, Universitas Sumatera Utara.
<http://repositori.usu.ac.id/bitstream/handle/123456789/10033/167018013.pdf?sequence=1&isAllowed=y>.
- Pandiangan, Saut Maruli Tua, Rujiman, Rahmanta, Tanjung, Indra I., Darus, Muhammad Dhio, & Ismawan, Agus. (2018). An Analysis on the Factors which Influence Offering the Elderly as Workers in Medan. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 23(10), 76-79. DOI: 10.9790/0837-2310087679.
<http://www.iosrjournals.org/iosr-jhss/papers/Vol.%2023%20Issue10/Version-8/K2310087679.pdf>.
- Pandiangan, Saut Maruli Tua, Resmawa, Ira Ningrum, Simanjuntak, Owen De Pinto, Sitompul, Pretty Naomi, & Jefri, Riny. (2021). Effect of E-Satisfaction on Repurchase Intention in Shopee User Students. *Budapest International Research and Critics Institute-Journal*, 4(4), 7785-7791. DOI: <https://doi.org/10.33258/birci.v4i4.2697>.
- Patel, P. (2007). *Lecture Notes Radiologi*. Jakarta: Erlangga Indonesia.
- Tobing, Murniati, Afifuddin, Sya'ad, Rahmanta, Huber, Sandra Rouli, Pandiangan, Saut Maruli Tua, & Muda, Iskandar. (2018). An Analysis on the Factors Which Influence the Earnings of Micro and Small Business: Case at Blacksmith Metal Industry. *Academic Journal of Economic Studies*, 5(1), 17-23.
<https://www.ceeol.com/search/article-detail?id=754945>.
- Triyono, B. (2018). *Buku Ajar Keselamatan dan Kesehatan Kerja (K3)*. Yogyakarta: FT UNY.
- Syahrul, et.al. (2020). The Clinical Characteristics of Patients with Embolic Strokes among Indonesian Subjects. *Britain International of Exact Sciences (BIOEx) Journal* Vol. 2 (3): 595-602.