

Analysis of the Implementation of Radiation Occupational Safety and Health Management Systems in Radiology Installations: An Empirical Study at Regional General Hospitals in Banyumas Regency

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Abstract. Objective from study This is analyze application system management safety and health Work radiation on installation radiology at the district hospital Banyumas . Type research used _ in study This is study method mix . Data validation is carried out with use technique triangulation , that is triangulation sources and data. Triangulation source done with method check the data obtained through a number of source . Based on results and discussion can concluded that power in work units district hospital radiology Banyumas has 2 (two) Specialists Radiology , 1 (one) officer Protection Radiation and 5 (five) Radiographers Diploma three . In accordance with Regulation Head of the Nuclear Energy Regulatory Agency Number 8 of 2011. There are 5 variables tested in application System Management Occupational Safety and Health Radiation On Installation Radiology . From fifth variable Licensing , management requirements , requirements security , requirements technical and testing security of the 14 processed components (50 points) 25 points (50.34%) were fulfilled standards / regulations . A total of 11 points (22.45%) were met , however No in accordance with standard . Limitations Focus study This only on one House sick , so the analysis limited . Moment researching more further , preferably use more from one item for can compare result .

Keywords: Banyumas Hospital; Occupational Safety and Health Radiation

INTRODUCTION

Health and safety work is protective tool _ workers , companies , the environment , and society around from risk accident on the spot work . Protection the poured in Occupational Safety and Health Radiation system in place Work with notice management , power work , conditions work and factors environment integrated For prevent and reduce accident work and disease consequence work . Health and safety work is means For create place comfortable work , reflects _ health and free from pollution environment . Safety and health Work can reduce risk accident on the spot work . Injury frequent work _ happened at home Sick or facility radiology specifically CT scan room is risk contamination microbes , the presence of viruses or bacteria ,

Regulation Government Republic of Indonesia No. 33 of 2007 concerning Protection Radiation Ionization and Protection Source Radioactive . Based on matter such , each agencies that use radiation ionizing must apply action protection radiation For prevent and treat accident radiation . Regulation Head of Nuclear

Energy Regulatory Agency No. 8 of 2011 concerning Safety Radiation In Use Equipment Radiology Diagnostics and Interventional X- rays For Safety Radiation Facility Radiology , which includes Condition Administration , Requirements Protection Radiation , Technical Requirements and Requirements Safety (Simanjuntak , 2013). In Indonesia, development House Sick as service health referrals are very fast , good from facet amount nor use technology medicine . As institution health , home Sick must Keep going make an effort safety and health Work for whole employee House sick (Ministry of Health , 2010; Ristiono and Nizwardi , 2010). Effort health and safety must held For reach productivity optimal work in all place work , especially in places that have risk health and vulnerable disease . because _ that , home Sick including in criteria place Work with various potency possible danger _ impact on health , such as : B. potential danger radiation (Ministry of Health , 2010).

House Sick Regency Banyumas which has a radiology unit standard national and classified House which pain _ Already apply system management safety radiation Because matter This

hold role important in prevent and minimize danger radiation . System management protection radiation among others. Protection radiation , because radiation no . No smells , no seen However dangerous for safety and health workers , got cause death worker radiation If radiation Keep going continuously about workers (Martem et al., 2015; Monita, 2011). because _ it , researcher want to know description danger radiation What only have _ given to the system management protection radiation employee . Because it is effort For reduce or minimize radiation as little possible and effort For increase safety work and welfare worker radiation , which is one factor reason enhancement radiation . productivity and quality service House sick (Nasution , 2020; Ristiono , 2010).

Risk potential for worker radiation is effect deterministic and effect stochastic . Effect X -ray can cause damage hematopoietic (abnormalities blood), such as : Anemia , leukemia and leukopenia, ie decline cell blood white (below normal or $< 6,000 \text{ m}^3$). in humans adults , there are not enough more than 7,000 leukocytes per microliter blood (Mayerni et al, 2013; Irawan 2019). Besides That effect deterministic on the reproductive organs or gonads can cause infertility or infertility and early menopause _ as consequence from imbalance hormones in the system reproduction (Fairusiyyah & Ekawati , 2016; Hayani et al., 2013; Sari, 2011). Most _ dose radiation For world's population comes from from use radiation in the field medical , and more of 90% of the dose the originate from diagnostic X- rays . Safety radiation worker related tightly with dose radiation . Based on report monitoring dose worker radiation in Indonesia in 2013, dose exposure worker radiation highest is 21.85 mSv, dose the lowest is 1.20 mSv and the average is 1.20 mSv. In 2011-2012 , dose exposure minimum radiation to workers is 1.20 mSv, and dose maximum 25.03 mSv and 23.64 mSv. If the average total dose received is 1.20 mSv, then mark below the required Dosage Limit Value . of 20 mSv. Dosage limit is dose the maximum Nuclear Energy Regulatory Agency can accepted by workers radiation and society general in time certain without effect genetic and somatic significance _ from use energy nuclear power (Nuclear Energy Regulatory Agency, 2011).

Leave from thinking such , author do study about application system management safety X- rays for workers on the part Banyumas Hospital Radiology . Because workers radiation is groups that are also at risk exposed radiation

and its effects to safety and health workers above a certain level can resulted death consequence disease chronic .

METHODS

Type research used _ in study This is study method mix . Taking sample in study This done with use total sample . Informant key study This is informant key , a radiologists , three people radiographer and a officer protection radiation from Banyumas Hospital so that totaling 5 people. Material study collected through observation Then interview deep with informant . collect fact about phenomenon or incident specific and draw conclusions general . Obtained information _ Then compared to with the provisions stated in Regulation Government No. 29 Years 2009 about Permission Utilization Source Radiation Ionizers and Materials Nuclear , Presidential Decree No. 33 of 2007 Protection Radiation Ionization and Protection Source Radioactivity and Nuclear Energy Regulatory Agency No. 8 2011 is protection radiation moment use diagnostic aircraft and imaging interventional X- rays . Data validation is carried out with use technique triangulation ie . triangulation sources and data. Triangulation source done with method examine data from various source . Reliability study can achieved with method compare results interview with results observation researcher .

RESULTS AND DISCUSSION

Results and discussion are combined in one part. It contains: The results of the findings to answer the research objectives, Figure and table should be clear and the description must be concise and clear, Discussion must reveal the in depth analysis of the obtained results it is critically and in-depth synthesis accompanied by proof of evidence related latest references, Explain the novelty of your research, The benefits and contribution of research for the science/ society.

CONCLUSION

Analysis of Observation Results

For prove results study that , researcher do on- site observation study facility Banyumas Hospital Radiology . Observation personnel , training protection radiation monitoring _ health , equipment protection radiation monitoring _ dose radiation and existing documents . _ In

observation officer of the Radiology Section of Banyumas Hospital there are 2 doctors specialist radiology in accordance Ministry of Health Decree of the Republic of Indonesia No. 1014/MoH/Decree/XI/2008. Physicist Protection Banyumas Hospital Radiation has 1 officer Protection Filling radiation _ conditions . Radiographer at Banyumas Hospital as many as 5 people according to Decree No. 1014/MoH/Decree/XI/2008 for every equipment owned by the Radiology Department must there are 2 radiographers

Training Protection Radiation

Interview results with informant key and informant triangular analyzed that all officer radiology Not yet follow training , only one person gets training and sent to Jakarta. Organizer training protection radiation is the Nuclear Energy Regulatory Agency . According to results a number of interview , reasons lack of training is Because training need big budget and expenses , and home Sick Not yet need send personal to follow training in protection radiation . this _ show that party management Not yet committed For stage training for officer radiologist in charge For give addition useful knowledge and skills _ in application protection radiation . Condition This No in accordance with Nuclear Energy Regulatory Agency Regulation No. 8 of 2011, which makes it mandatory holder permission For give chance training protection radiation as condition system management protection radiation , training protection radiation covers material about regulation legislation nuclear , source radiation , uses . energy nuclear , effect biology radiation , units and quantities radiation , principle protection radiation and safety radiation , measurement radiation , what to be done in circumstances emergency .

Protective Gear Radiation

Researcher analyze worker radiation required use tool protector self moment Work moment condition exposure radiation emitted by aircraft _ X- rays are sufficient high . one _ mandatory research _ use tool protector

themselves by workers radiation is study special Where radiographer is at near with source radiation . because _ that , section radiology must equip employee with tool protector complete self order effect and impact _ radiation received _ employee can minimized . protective gear Banyumas Hospital _ among them is 5 aprons, 4 Pb goggles , 2 pairs of gloves Pb hands , 6 protectors thyroid and 4 gonadal guards . In matter This number of aprons no in accordance protection radiation Because number of aprons no in accordance with amount workers and at least 1 room installed 1 apron. According to Regulation Government Republic of Indonesia Number 33 of 2007 concerning Protection Radiation Ionization and Protection Source Radioactive Government Republic of Indonesia, Article 31 states that holder permission must facilitate tool protector radiation and every employees , patients , partners patient and/ or radiation other . The people involved must use equipment protection radiation . If in every room there is at least one apron and workers working in the field radiation No alternate use it , so worker can Work with comfortable and spared from influence bad radiation to himself itself , then intensity radiation will decrease in a manner exponential with thickness material protector . Material most effective protection to radiation electromagnetic is lead.

Description Application Condition Protection Radiation

Based on results observation , interview and study documentation carried out by researchers at the Radiology Section of Banyumas General Hospital is known that results application condition protection consists from four component (8 points) ie component justification inspection radiology done on reference from doctor (1 point) arrived with 8 points (100%) have fulfill and fulfill standard (Nuclear Energy Regulatory Agency number 8 of 2011 Article 26) , namely (1) reasons use tool X-ray by doctor or doctor teeth in shape claim or reference in framework For enforce diagnosis patient .

Table 1. Description Application Condition Protection

Numb	Component Condition Protection	Conformity (%)			Information
		There is Appropriate	Some don't compatible	No There is	
(1)	(2)	(3)	(4)	(5)	(6)
1	Reason Use Machine X- rays	100	-	-	are 2 points right For component justification use machine X- rays
2	Implementation Optimization and Safety Radiation	-	-	100	There are 2 points that have not fulfilled For component application optimization and safety radiation
3	Dosage Limit	66.66	66.66	66.66	There are 2 corresponding points , 2 points No accordingly and 2 dots No fulfilled For component restrictions dose
4	Monitoring Dose	100	-	-	are 2 corresponding points For component monitoring dose

Component barrier dose (3 points) 2 points (66.66%) have met and fulfilled standard (Nuclear Energy Regulatory Agency no. 8, 2011 § 31a), i.e. . H. (1) Limits of doses received by workers radiation is below the dosage limit ie . H. Average average dose of workers radiation in 2015 was 0.9 mSv . A total of 2 points (66.66%) fulfilled , however Not yet fulfil standard (Regulations Bapeten No. 8 of 2011 § 35 § 6), namely . (1) apron (3 pieces) with thickness 1 mm Pb, Pb - Screen with glass plated (2 pieces) , lead glass (1 pair), sheath lead hands (1 pair), protective thyroid (1 piece) , but in 2022 actually

_ there are 2 aprons that don't good (exists cracks) and the use of aprons by officers radiation No consistent especially at the moment inspection room first , because door No closed meeting so that can caught radiation . Radiology department No fulfil Nuclear Energy Regulatory Agency number 8 of 2011 according to § 33a as many as 2 points (66.66%) namely . (1) Monitoring exposure radiation with tool gauge No done , because agency Not yet own measurement , so measurement only done at the time There is facility new in section radiology facility the .

Table 2. Description Application Technical Requirements

Numb	Component Condition Protection	Conformity (%)			Information
		There is Appropriate	Some don't compatible	None _	
(1)	(2)	(3)	(4)	(1)	(2)
1	Aircraft X- rays	100	-	-	are 2 corresponding points For component machine X- rays
2	Equipment Support Aircraft X- rays	100	-	-	There are 2 points according to component tool support equipment x rays
3	Facility Building	50	50	-	There are 2 corresponding points , 2 points No in accordance For development facility

It is written in one paragraph without numbering. Answering the research objectives.

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