Description of High-alert Drug Storage Management in Pharmacy Installation of UNS Surakarta Hospital

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Abstract

Errors in giving first rank drugs in the pharmaceutical field, especially high alert drugs that must be made a top priority. The purpose of this study was to describe the management of high alert drug storage at the Pharmacy Installation at UNS Surakarta Hospital. This research is a descriptive study with a cross sectional approach. Data collection techniques were carried out by direct observation using checklist sheets and interviews with pharmacists based on pharmaceutical service standards in hospitals. The analyzed data is described in the form of words. The results showed that the value of 100% high alert drug list was in the appropriate category, the high alert drug management policy was 85.7% (inappropriate category), stock card recording at the emergency room depot, outpatient and inpatient care was 85.7% and in warehouse 71.4% (inappropriate category). Labeling of high alert drugs in warehouses, emergency department depots, and 80% inpatient and 60% outpatient (categories not suitable). The layout of high alert drug storage is not suitable because inpatient care shows 80% (inappropriate category) and in warehouses, emergency rooms, and outpatient care 100% (appropriate category). Storage temperature and storage system show 100% (appropriate category). Based on the results of the study it can be concluded that the management of high alert drug storage at the Pharmacy Installation at UNS Surakarta Hospital does not meet the standards of pharmaceutical
services at the Hospital.

Keyword: management, drug storage, high alert, drugs, pharmacy installation

1. INTRODUCTION

A hospital is an important health service network or health service institution that provides complete individual health services, providing inpatient, outpatient and emergency care services. Hospitals that carry out medical procedures that can carry potential risks. Hospitals are an inseparable part of the hospital health service system (Kemenkes RI, 2016).

One of the important health services is patient safety. Patient safety is a priority in aspects of hospital services and has become something that is considered important in health service needs. The implementation of

Patient safety in hospitals is sought to minimize the risk of undesirable events, reduce conflicts between health workers and patients, and reduce lawsuits or legal processes as well as eliminate accusations of malpractice that are rampant against hospitals (Salawati, 2020).

Hospitals must develop medication management to improve safety, especially high alert medications. High alert medication is a drug that must be watched out for because it often causes serious errors or mistakes (sentinel event) and drugs that pose a high risk of causing unwanted drug reactions (ROATD). High alert drugs consist of highly concentrated electrolytes, Look Alike Sound Alike (LASA), and cytotoxic or cancer drugs. So

hospitals must develop policies related to effective management of drug use (Kemenkes RI, 2016).

Based on the National Patient Safety Incident Map Report, errors in medication administration were ranked first (24.8%) of the top 10 reported incidents. Data from these incidents and research are located in pharmaceutical services and general data on the high risk of errors occurring in the pharmaceutical sector, especially high alert drugs which must be made a top priority for officers to understand and implement (Sofiani, 2016).

Research conducted by (Chotimah et al., 2022) explains that the labeling of high alert drugs in the Emergency Room Pharmacy Installation at X Gresik Hospital is 79.77% which does not comply with standard labeling indicators. High alert drug labeling must be done to avoid undesirables. Research conducted by (Saputera et al., 2019) explains that the storage of high alert drugs in 4 Pharmacy Installation Service Units at RSD Idaman Banjarbaru was 83.48%. Each of the high alert drug groups is described, namely High Concentrate Electrolytes as much as 95% which is appropriate, LASA as much as 67.95% which is appropriate, and high alert (apart from the LASA and High Concentrate

Electrolytes) as much as 82.50% is not in accordance with the SPO RSD Idaman Banjarbaru . This can pose a risk of errors in drug distribution to patients, errors in taking high alert drugs which can endanger patient safety (Saputera et al., 2019).

The most effective treatment for high alerts to reduce errors in drug administration is by improving the storage process for drugs that need to be alerted. So the hospital must make a list of medicines to be wary of. Hospitals also need to develop a management policy to improve security and patient safety incidents related to high alert drugs (Saputera et al., 2019).

This research was conducted at the UNS Surakarta Hospital because this hospital functions as a place for education, research and integrated health services in the fields of medical and/or dental education, continuing education and other multi-professional health education. Apart from that, UNS Surakarta Hospital has many high alert drugs which can cause errors in storing the drugs. The aim of this research is to describe High Alert Medication Storage Management in the UNS Surakarta Hospital Pharmacy Installation.

2. METHODS

Method

This research uses observational with a cross sectional approach obtained from data in the form of checklists and interviews. Research regarding the description of high alert drug storage management was carried out at the UNS Surakarta Hospital Pharmacy Installation and was carried out in January – May 2023.

Research subject

Head of Room at each Pharmacy Installation depot at UNS Surakarta Hospital. The population is the totality of research objects whose characteristics are the center of attention and the source of research data (observations).

Population and sample

The population used in this research was all drugs in the UNS Surakarta Hospital Pharmacy Installation. The sample used in this research was high alert medication at the UNS Surakarta Hospital Pharmacy Installation. The sampling method used in this research was total sampling. Total sampling is a sampling technique where the entire population is used as a sample.

Research variable

The single variable is the management of high alert drug storage at the UNS Surakarta Hospital Installation. This research uses a checklist measuring tool and interviews regarding the description of high alert drug storage management in the UNS Surakarta Hospital Pharmacy Installation.

Research Instrument

The measuring instrument in this research is a modification of pharmaceutical service standards in hospitals, the (Direktorat Jenderal Bina Kefarmasian, 2010) and (Haryadi & Trisnawati, 2021). The method used in data analysis is descriptive. The data is analyzed and described in the form of words to clarify the results obtained. This data includes checklist data regarding storage management of high alert drugs.

This research has been approved for ethical Cleareance at KEPK RSUD Dr. Moewardi with Number 186/II/HREC/2023

3. RESULTS AND DISCUSSION

Results

1. List of High Alert Medications

The high alert drug list is a document that contains drugs that are included in the drugs that must be alerted. This list is for information or data related to drug use in the hospital, data about unexpected events or near-injuries. The results of observations on the list of high alert drugs can be seen in table 1.

The results of observations in table 1 regarding the list of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation are 100% appropriate. This is the same as the results of interviews with 4 informants who served as Room Heads in each pharmacy depot, namely the Pharmacy Warehouse, IGD depot, Outpatient depot, and Inpatient depot, namely:

Table 1 Observation Results of High Alert Drug List

Storage Aspects	Warehouse	Emergency departments	Inpatient	outpatient
1. A list of high alert drugs is available at the pharmacy installation	√	√	√	√
2. A list of high alert medications is posted on the hospital installation	√	√	√	√
3. Columns in the high alert drug list consist of therapeutic class, drug preparation name, trade name, and type	√	√	√	√
Percentage of Conformity based on Hospital Standards Information	100%	100%	100%	100%
Information	appropriate	appropriate	appropriate	appropriate

"Yes, there is a list of high alert drugs posted on the shelf. The aim is to find out which drugs are included in high alert drugs. A list of high alert drugs is compiled by the Team and updated every time there is a change to the drug list. The column form for the high alert drug list consists of therapeutic class, generic drug name, storage outside the pharmacy, and information." (Head of Pharmacy Warehouse)

"A list of high alert medications posted on a special high alert shelf. So that you know which drugs are included in the emergency medicine category. The preparation of a list of high alert drugs is carried out every year by the LWG Team, which is adjusted to drugs that are included in emergency situations. "The high alert drug list column contains therapeutic class, description, generic drug name, and storage." (Head of IGD Depot Room)

"Yes, the list is taped to the shelf. Preparation of a list of high alert drugs based on hospital formularies which are included in high alert drugs carried out by the LWG Team. "The contents of the columns are therapeutic class, generic drug name, and information such as the drug's performance time." (Head of Inpatient Depot)

"Yes, there is a list of high alert drugs posted on the high alert drug shelf. The list of medicines is carried out by the LWG Team
every time there is a change, every depot is the same. "At the depot, we receive it in the form of a list which includes high alert drugs, either LASA or high concentrated electrolytes." (Head of Outpatient Depot).

The results of the interviews showed that in every Pharmacy depot at the UNS Surakarta Hospital there was already a list of high alert drugs and this was in accordance with the results of observations. The purpose of attaching a list of high alert drugs to every high alert drug shelf is to indicate that the drug is a high alert. The column form for the high alert drug list consists of therapeutic
class, generic drug name, storage outside the pharmacy, and additional information regarding high alert drugs. Where a list of high alert drugs is posted on each shelf that is classified as high alert drugs.

Table 2 Observation Results of the High Alert Drug Management Policy

Storage Aspects	Warehouse	Emergency departments	Inpatient	outpatient
1. Standard Operational Procedures for storing high alert drugs are available	√	√	√	√
2. Storage of high-allet medicine is kept separately and clearly marked or stickered	√	√	√	√
3. Store LASA drugs not close to each other.	-	-	-	-
4. The availability and quality of high alert drugs is monitored every day by the head of the room	√	√	√	√
5. There is a high alert medication storage plan available	-	-	-	-
6. Available cupboards or shelves for storage	√	√	√	√
7. Pallets are available to accommodate more medicines.	√	√	√	√
8. Do not stack medicine boxes too high	√	√	√	√
9. The physical outer cardboard and packaging are in good condition	√	√	√	√
10. There is no excess stock of medicines	√	√	√	√
11. Regular monitoring (for example every month) of high alert drug storage areas	√	√	√	√
12. Expired medication is placed separately	√	√	√	√
13. Recording of dispensing of drug items issued	√	√	√	√
14. Dispensing of high alert drugs is carried out by officers	√	√	√	√
15. Percentage of Conformity based on Hospital Standards Information	85,7%	85,7%	85,7%	85,7%
Information	**Inappropriate**	**Inappropriate**	**Inappropriate**	**Inappropriate**

2. High Alert Medication Management Policy

The high alert drug management policy is a series that regulates management activities

managed in the Pharmacy Installation. The results of observations on the list of high alert drugs can be seen in table 2

The results of observations of the high alert drug management policy at the UNS Surakarta Hospital Pharmacy Installation were not appropriate, showing a percentage of 85.7%, namely that there was still LASA drug storage close to each other and there was no high alert drug storage plan. This is also accompanied by documentation which can be seen in attachment 11 regarding procedures for managing high alert drugs where high alert drugs are placed on separate shelves and LASA drugs are not placed close to each other. Racks and pallets are spaced between walls and ceilings. The availability and quality of high alert drugs is monitored by the head of the room. Regular monitoring every month by checking the physical preparation of drugs with the drug stock card. Expired medication is placed separately, recorded and returned. Every medication dispensed is recorded by officers.

The results of interviews conducted with 4 informants who served as Room Heads in each pharmacy depot, namely the Pharmacy Warehouse, IGD depot, Outpatient depot, and Inpatient depot, namely:

"There is no floor plan yet, because the high alert medicine shelf already exists itself. "For LASA drugs, there are still some nearby, it's possible that when we return them, they won't be in the right place." (Head of Pharmacy Warehouse)

"There is no floor plan yet, but high alert drug storage has been allocated to a different location. "And the storage of LASA medicine is actually spaced out, when we take the medicine and return it, we put the LASA medicine together." (Head of IGD Depot Room)

"There is no floor plan yet, because the shelves for high alert medicines are separate from other medicines. "Yes, we have actually spaced them out and our shelves are few so there are several medicines that are still close together." (Head of Outpatient Depot)

"Yes, there is no floor plan yet, because the high alert medicines are on separate shelves and have special markings. "For the placement of LASA drugs, there is actually already a distance, maybe we have a lot of drugs so there are still some close to each other." (Head of Inpatient Depot)

The results of the interview showed that in each UNS Surakarta Hospital Pharmacy depot the high alert drug management policy was in accordance with the results of observations. There is no floor plan for high alert medicines because the shelf is separate from other medicines and there is special marking. There are still places where LASA drugs are placed close together, where there should be a distance of 1-2 other drugs.

1. Stock Card Recording

Stock card recording is a system for recording all stock movements including stock entry and exit. The person in charge of stock is required to record on the stock card to determine remaining stock. The results of stock card recording observations can be seen in table 3.

Table 3 Stock Card Recording Observation Results

Storage Aspects	Warehouse	Emergency departments	Inpatient	outpatient
1. Card stock available	√	√	√	√
2. A receipt book is available	-	-	-	-
3. There is a stock card for each high alert drug item	√	√	√	√
4. The stock card is placed next to the medicine	-	√	√	√
5. The physical amount of remaining stock is the same as the stock card	√	√	√	√
6. Calculate the physical quantity of high alert drugs periodically, for example once a month, once every 3 months, and once every 6 months	√	√	√	√
7. Stock card recording is carried out by pharmacy staff	√	√	√	√
Percentage of Conformity based on Hospital Standards Information	71,4%	85,7%	85,7%	85,7%
Information	**Inappropriate**	**Inappropriate**	**Inappropriate**	**Inappropriate**

Based on table 3 regarding stock card recording at the UNS Surakarta Hospital Pharmacy Installation, it is not appropriate. The percentage of emergency room, outpatient and inpatient deposits showed 85.7%. Meanwhile in the warehouse the percentage shows 71.4%. This is the same as interviews conducted with 4 informants who are Heads of Rooms in each pharmacy depot, namely the Pharmacy Warehouse, IGD depot, Outpatient depot, and Inpatient depot, namely:

"Stock card recording is carried out when receiving and dispensing medicines, usually it is recorded by the pharmacy staff who do it. The stock cards already exist for each drug and are placed next to the drug but sometimes they don't fit in the right place. "We also ensure that the physical quantity and stock cards are the same, usually when we check at the end of the month." (Head of Pharmacy Warehouse)

"Stock card recording is carried out when goods are received from the warehouse and medicines are released every time the box is released. There is no medicine receipt book, but at the time of receipt it was accompanied by a withdrawal sheet from the warehouse. The stock card for each drug available is usually placed next to the drug container. The remaining drug stock must be the same as the stock card." (Head of IGD Depot Room).

"Stock card recording is carried out when goods are received from the warehouse and medicines are released every time the box is released. There is no medicine receipt book, but when receiving it, you use the medication sheet. There is a stock card for each medicine, usually placed next to the medicine box. We do SO every month, the rest of the medicine is definitely the same. "If it's different, we'll search every depot." (Head of Outpatient Depot)

"Stock card recording is carried out when goods are received from the warehouse and medicines are released every time the box is released. There used to be a receipt book, but now there isn't one, but you use a receipt sheet. There is a stock card for every medicine, usually placed next to the medicine. "The rest of the medicine will definitely be the same as the stock card. If it's different, we'll trace it at each depot." (Head of Inpatient Depot)

The results of the interview showed that recording of drug stock cards was carried out when receiving and dispensing drugs by officers. There is no receipt book for each

depot but they use an amrahan sheet. Place the drug stock card next to each drug. However, there are still officers who say it doesn't match the medication. The physical condition of the drug is the same as card stock. Every month a stock take is carried out to match medicines with stock cards. If stock is found to be different from the stock card, a check is carried out at each depot. This is also documented which can be seen in attachment 18 regarding card stock and it was also found that the placement was not appropriate.

2. High Alert Drug Labeling

High alert drugs are managed in such a way as to avoid undesirable events in storing, arranging and using them, including administration such as labeling. Labeling with a red sticker on drug packaging, ampoules or vials, and storage shelves. The results of observations on high alert drug labeling can be seen in table 4

Based on table 4, the labeling of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is not appropriate. The percentage in warehouses, emergency room depots and inpatient depots shows 80%, while in outpatient depots the percentage Based on table 4, the labeling of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is not appropriate. The percentage in warehouses, emergency room depots and inpatient depots shows 80%, while in outpatient depots the percentage conducted with 4 informants who were Heads of Rooms in each pharmacy depot, namely the Pharmacy Warehouse, IGD depot, Outpatient depot, and Inpatient depot, namely:

Table 4. High Alert Drug Labeling Observation Results

Storage Aspects	Warehouse	Emergency departments	Inpatient	outpatient
1. High alert drug labels are available	√	√	√	√
2. Standard Operating Procedures for Labeling are available	√	√	√	√
3. There is a high alert label on the packaging or on the medicine box	√	√	√	-
4. There is a high alert label for ampoules or vials	-	-	-	-
5. There is a high alert label for the storage shelf	√	√	√	√
Percentage of Conformity based on Hospital Standards Information	80%	80%	80%	60%
Information	Inappropriate	Inappropriate	Inappropriate	Inappropriate

"The labeling has 3 stickers, namely the high alert double check sticker, high concentrate electrolyte and LASA. Red stickers are attached to every medicine item, medicine box and storage shelf. Red sticker labeling is affixed to each tablet, vial and ampoule. "It's actually been given, but there was something that was missed during distribution, it wasn't given or the label was removed." (Head of Inpatient Depot)

The results of the interview showed that there are 3 labels for high alert drugs, namely high alert double check stickers, high concentrate electrolytes, and LASA. Attach red stickers to each medicine item, medicine box and red solatip on the storage shelf. Labels are attached to each tablet, vial and ampoule. where storage is according to existing procedures at the UNS Surakarta Hospital Pharmacy Installation. High alert drugs are given a sticker on each package or carton. However, there is still negligence among officers in labeling them.

1. High Alert Medication Storage Layout

Storage of high alert drugs is carried out by separating high alert drugs from other drugs and giving them special marking. The goal is to prevent errors when taking medication in an emergency. The results of observations of the layout of high alert drug storage can be seen in table 5

Based on table 5 regarding the storage layout for high alert drugs in the UNS Surakarta Hospital Pharmacy Installation, it is not appropriate. The percentage in the warehouse, emergency room and outpatient care shows 100%. Meanwhile in inpatient settings the percentage is 80%. This is the same as interviews conducted with 4 informants who are Heads of Rooms in each pharmacy depot, namely the Pharmacy Warehouse, IGD depot, Outpatient depot, and Inpatient depot, namely:

Table 5 Observation Results of High Alert Drug Storage Layout

Storage Aspects	Warehouse	Emergency departments	Inpatient	outpatient
1. High alert medication is placed separately from other medications	√	√	√	√
2. High alert narcotics and psychotropic drugs are stored in separate cupboards with 2 doors and 2 locks.	√	√	√	√
3. High alert drugs are arranged alphabetically	√	√	-	√
4. High alert drugs are stored according to the dosage form	√	√	√	√
5. Plan of the direction of the flow of receiving and dispensing medicines using a straight line direction system, U flow and L flow	√	√	√	√
Percentage of Conformity based on Hospital Standards Information	100%	100%	100%	100%
Information	appropriate	appropriate	appropriate	appropriate

"Storage high alert drugs separately from other drugs and with special marking. For high alert drugs, narcotics and psychotropics, they are stored in separate cupboards with 2 doors and 2 locks. Because it is dangerous and afraid of being misused. The shelves are arranged separately based on dosage form, alphabetically, and the shelves are marked with red solvent. "If there are the same drugs or LASA, they are spaced 1-2 drugs apart." (Head of Pharmacy Warehouse)

Table 6 Storage Temperature Observation Results

Storage Aspects	Warehouse	Emergency departments	Inpatient	outpatient
1. A thermometer is available	√	√	√	√
2. Storage of high alert medicines at 2-8°C for refrigerator temperature	√	√	√	√
3. Store high alert drugs at room temperature 15-30°C	√	√	√	√
4. Regular monitoring (for example twice a day) of storage temperature.	√	√	√	√
5. Temperature recording is carried out by the pharmacist	√	√	√	√
Percentage of Conformity based on Hospital Standards Information	100%	100%	100%	100%
Information	Appropriate	Appropriate	Appropriate	Appropriate

"The storage location for high alert drugs is on a separate shelf from other drugs and is marked. It is stored separately in a cupboard with 2 doors and 2 locks and is marked with red tape because there is a high risk of administering the wrong medication. "The arrangement is alphabetical, dosage form, and the red solatip is on the storage shelf." (Head of IGD Depot Room)

"It is stored separately from other medicines, specially marked, and arranged alphabetically. "High alert narcotics and psychotropic drugs are stored separately in a
cupboard with 2 doors and 2 locks." (Head of Outpatient Depot)

"It is stored on separate shelves and given special marking based on the dosage form in alphabetical order. But sometimes when we return the medicine it doesn't fit in the right place. Narcotics and psychotropic substances are kept separately in a cupboard with 2 doors and 2 locks." (Head of Inpatient Depot)

The results of the interview showed that the storage location for high alert drugs was separate from other drugs, arranged alphabetically based on dosage form, and given special marking. High alert drugs for narcotics and psychotropics are stored in a cupboard consisting of 2 doors and 2 locks. This is also accompanied by documentation which can be seen in attachments 11, 13, 14, 15, 16, and 19. Procedures for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation where pharmacy staff store drugs on shelves that have been labeled with high alert stickers and grouped by dosage form and arranged alphabetically. Providing

special marking so that there are no errors in taking or administering the drug because there is a high risk if misused.

2. Storage Temperature

When storing high alert drugs, you need to pay attention to the storage temperature. Temperature is one factor that can affect the quality of medicine. The results of observations of high alert drug storage temperatures can be seen in table 4.6

narcotics and psychotropics are stored in a cupboard consisting of 2 doors and 2 locks. This is also accompanied by documentation which can be seen in attachments 11, 13, 14, 15, 16, and 19. Procedures for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation where pharmacy staff store drugs on shelves that have been labeled with high alert stickers and grouped by dosage form and arranged alphabetically. Providing special marking so that there are no errors in taking or administering the drug because there is a high risk if misused.

Based on table 6 regarding the storage temperature for high alert drugs in the UNS Surakarta Hospital Pharmacy Installation, it is 100% appropriate. This is the same as interviews conducted with 4 informants who were Heads of Rooms in each pharmacy depot, namely the Pharmacy Warehouse, IGD depot, Outpatient depot, and Inpatient depot, namely:

“The thermometer used in the warehouse is a digital thermometer installed in the refrigerator and in the room. The storage temperature is room temperature between 15-30°C and refrigerator temperature between 2-8°C. Checks are carried out twice a day, namely in the morning and afternoon." (Head of Pharmacy Warehouse)

“The type of thermometer used is a digital thermometer. Installation of thermometers in the refrigerator and in the room. There are 2 storage temperatures, namely room temperature between 15-30°C and refrigerator temperature between 2-8°C. "Recording is done at every shift change (morning, afternoon and evening)." (Head of IGD Depot Room)

“The thermometer is installed in the refrigerator and in the room, it is a digital thermometer. There are 2 storage temperatures, namely room temperature between 15-30°C and refrigerator temperature between 2-8°C. Checks are carried out every shift change.” (Head of Outpatient Depot)

“We use digital thermometers installed in the refrigerator and in the room. The storage temperature is room temperature between 15-30°C and refrigerator temperature between 2-8°C. Checks are carried out 3 times during shift changes." (Head of Inpatient Depot).

Based on the results of the interview, it was found that the thermometer used was a digital thermometer. This is also accompanied by documentation which can be seen in attachment 17 where the thermometer is installed on the refrigerator and in the room. The storage temperature used is refrigerator temperature between 2-8°C and room temperature between 15-30°C. Storage temperature recording is carried out 2-3 times a day, namely morning and afternoon or morning, afternoon and evening when changing shifts.

3. Storage System

The results of observations of the high alert drug storage system can be seen in table 7.

Table 7 Storage System Observation Results

Storage Aspects	Warehouse	Emergency departments	Inpatient	outpatient
16. Implement a FIFO (First In First Out) system	√	√	√	√
17. Implement the FEFO (First Expired First Out) system	√	√	√	√
18. Storage system by paying attention to usage temperature	√	√	√	√
19. Storage system that takes into account regulatory provisions for certain drugs (for example narcotics and psychotropic substances)	√	√	√	√
Percentage of Conformity based on Hospital Standards Information	100%	100%	100%	100%
Information	appropriate	appropriate	appropriate	appropriate

Based on table 7 regarding the high alert drug storage system in the UNS Surakarta Hospital Pharmacy Installation, it is 100% compliant. This is the same as interviews conducted with 4 informants who were Heads of Rooms in each pharmacy depot, namely the Pharmacy Warehouse, IGD depot, Outpatient depot, and Inpatient depot, namely:

“In the warehouse, the high alert drug storage system pays attention to temperature.

For example, tablets, capsules and injections are kept at room temperature and insulin is stored at refrigerator temperature. "Our drug dispensing uses the FEFO system because drugs that expire quickly are released first." (Head of Pharmacy Warehouse)

"Yes, when storing medicines we still pay attention to temperature, for example tablets and injections are kept at room temperature and insulin is stored at refrigerator temperature. "As for the storage system, we prefer FEFO." (Head of IGD Depot Room)

"Here, when the medicine arrives, we pay attention to the temperature of the medicine, such as tablets and injections, at room temperature and insulin stored at refrigerator temperature. "For our system, we have FEFO/FIFO, but it's more like FEFO." (Head of Outpatient Depot)

“The storage system is FEFO. Yes, still pay attention to the temperature. for example, tablets and injections are kept at room temperature and insulin is stored at refrigerator temperature" (Head of Inpatient Depot)

Based on the results of the interview, it was found that the storage system at the UNS Sat Home Pharmacy Installation uses a First In First Out (FIFO) and First Expired First Out (FEFO) system. However, the system used is more First Expired First Out (FEFO) because drugs that expire more quickly will be released first. When storing high alert drugs, pay attention to the temperature before storing. For example, to prepare tablets at room temperature and insulin at cold temperature. This is also accompanied by documentation which can be seen in attachment 11 regarding procedures for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation where pharmacy staff store drugs on shelves that have been grouped based on dosage form, alphabetically, temperature, and pay attention to the First In First Out system (FIFO) and First Expired First Out (FEFO).

DISCUSSION

High Alert Medication List

Based on research at the UNS Surakarta Hospital Pharmacy Installation, the list of high alert drugs is 100% in accordance with the pharmaceutical standards applicable at UNS Hospital. These results are in line with the procedures and explanation of the Head of the Room at the Pharmacy depot that a list of high alert drugs is affixed to each high alert drug shelf because it indicates that the drugs on the shelf are included in the high alert. The column form for the list of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation consists of therapy class, generic drug name, storage outside the pharmacy, and additional information regarding high alert drugs.

The Joint Commission has standards that state that hospitals must develop their own lists of high alert drugs, have a process for managing high alert drugs, and implement that process. The list of high alert drugs must be kept up to date and supplemented with more effective risk reduction strategies. Hospitals need to think carefully about the list of high alert drugs and have effective processes that reduce the risk of errors with these drugs (Luci, 2013).

The list of high alert drugs that have been determined can be added to certain types of drugs in the high alert drug formulary. Apart from that, the list of high alert drugs must be updated according to needs and the results of periodic reviews. The list of medicines at the UNS Surakarta Hospital Pharmacy Installation is updated every time there are changes made by authorized officers.

The list of medicines at the UNS Surakarta Hospital Pharmacy Installation is available. This research is supported by research by (Akidah, 2020) which states that pharmaceutical installations have a list of high alert drugs which are posted in every room to find out the list of drug names that are included in high alert drugs. Another research conducted by (Rahmi, 2022) shows that at the RSI Ibu Sina Pharmacy Installation there is already a list of high alert medicines posted in every medicine room.

High Alert Management Policy

Hospitals must develop effective drug use policies that are carried out through review. Review to help hospitals understand the needs and priorities of the drug procurement system according to treatment needs. Policies in drug management, especially for drugs, require caution because they have very serious impacts if errors occur in their use and management (Fatkhiya & Chyaningtyas, 2023).

Based on research at the UNS Surakarta Hospital Pharmacy Installation, there are Standard Operating Procedures (SPO) for storing high alert medicines. Standard Operational Procedures (SPO) have been created since 2017, if there has not been a revision of the Standard Operational Procedures (SPO), they will still be carried out. High alert drugs are stored separately and given special marking. Shelves, cupboards and pallets are spaced so that they do not touch the floor and walls. High alert drug cartons are not stacked high.

The availability and quality of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is monitored by the head of the room. There is no excess stock in medicine storage. Regular monitoring every month by checking the physical preparation of drugs with the drug stock card. Expired medication is placed separately, recorded and returned. Every medication dispensed is recorded by officers.

The policy for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is not in accordance with the standards of pharmaceutical services at the hospital. The high alert drug management procedure at the UNS Surakarta Hospital Pharmacy Installation is that LASA drug storage is not placed in adjacent areas. However, when observing the LASA drug storage there were still close to each other and the storage plan was not yet available. This result is in line with the explanation from the Head of the Room at the pharmacy depot that the shelves for high alert medicines were separated from other medicines, while there were still LASA medicines nearby because the officers returned them incorrectly.

The results of this research are the same as research conducted by (Tusholihah, 2018) that all high alert drugs in the Kanjuruhan Kepajen Hospital Pharmacy Installation have been placed separately and labeled with a warning sign that says "high alert" according to standards. In the guidelines created by the (Direktorat Jenderal Bina Kefarmasian, 2010), it is stated that the use of pallets is highly recommended before goods are placed on the floor. Cardboard boxes not stacked too high are placed on pallets with spacing. Providing distance between the shelves/cupboards and the walls and the storage floor like this can prevent medicines from being damaged due to the temperature of the walls or floor.

Storage of LASA drugs in the UNS Hospital Pharmacy Installation is not appropriate because there are still several LASA drugs stored close to each other. The results of this research are the same as the research of (Khaidayanti, 2021) LASA drug storage is still nearby. Another research conducted by (Hidayati et al., 2021) that similar drugs in the Mitra Plumbon Hospital Inpatient Pharmacy Installation are still placed close together without any distance between other drugs. As for a different study conducted by (Khaidayanti, 2021), the Prima Medika Pemalang Hospital Pharmacy Installation of LASA drugs was stored with a distance between 1-2 other drugs. Providing stickers on medicine containers as a sign of LASA medicine and writing Tallmen letters for Sound Alike medicines to avoid administration errors (Tusholihah, 2018)

Stock Card Recording

Based on research at the UNS Surakarta Hospital Pharmacy Installation, this was carried out when receiving and dispensing medicines. Receipt books for each deposit are not available but use a receipt sheet or receipt sheet. The stock card is with each drug and is placed next to the drug. The physical condition of the drugs at the UNS Surakarta Hospital Pharmacy Installation is the same as the stock cards. Every month a stock take is carried out to match medicines with stock cards. If stock is found to be different from the stock card, a check is carried out at each depot. The recording is carried out by officers, namely pharmacists.

The recording of high alert drug stock cards at the UNS Surakarta Hospital Pharmacy Installation does not comply with pharmaceutical service standards at the hospital. This is in accordance with the explanation from the Head of the Room at the pharmacy depot that there are still officers who are negligent in placing stock cards that do not match the medication.

There is research that supports the results of this research, such as that carried out by (Hidayati et al., 2021) that the storage of high alert medicines without a stock card in the medicine container can cause undesirable impacts. Another research conducted by (Haryadi & Trisnawati, 2021) shows that the system for monitoring the availability and quality of medicines is carried out every month by

means of stock taking which is monitored by the Head of the Pharmacy Installation.

There is a different research, namely research conducted by (Titien et al., 2020) which states that drug storage must be accompanied by a stock card because it is used to record all movements of drugs received or delivered. In 1 drug product there is a stock card.

High Alert Drug Labeling

High alert drugs are managed in such a way as to avoid undesirable events in storing, arranging and using them, including administration such as labeling. Storage of high alert drugs with other drugs is specially marked so that errors do not occur when taking the drug in an emergency. Providing labels with red stickers on drug packaging, ampoules or vials, and storage shelves (Rahmi, 2022).

Based on research at the UNS Surakarta Hospital Pharmacy Installation, there are 3 labels for high alert drugs, namely high alert double check stickers, high concentrate electrolytes, and LASA. Attach red stickers to each medicine item (tablets, vials and ampoules), medicine boxes and red solatip on the storage shelves. The labeling of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation does not comply with pharmaceutical service standards at the hospital. The procedure for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is to label high alert drugs with a sticker on each package or carton. However, during the observation, we still found supplies in warehouses, emergency room depots, inpatient and outpatient facilities that were not affixed with high alert stickers. This result is in line with the observations and explanation of the Head of the Room at the pharmacy depot that there were still drugs that had not been labeled because the officers forgot to attach them and during distribution some of the labels were removed. According to (Fahriati et al., 2021) high alert drugs are labeled, with a red sticker that says high alert drug on each high alert drug packaging. High alert drugs prepared in the form of injections require a red sticker to be attached to each ampoule or vial and for tablet or capsule preparations a red sticker is attached to each drug strip. The purpose of this labeling is to reduce medication errors due to unlabeled medicines (Rahmi, 2022). The labeling of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is not appropriate because there are still some officers who are negligent in attaching them. This can cause errors in administering medication.

The results of research conducted by Rahmi (2022) showed similar results that at the RSI Ibu Sina Pharmacy Installation, labels had been given but there were still officers who were negligent in attaching the labels. Another research conducted by (Putra, 2016) stated that not all of the pharmacy depots at Hospital X storing high alert medicines had stickers. There is a different research, namely research conducted by (Khaidayanti, 2021) that high alert drugs are marked or labeled with red tape around the storage of high alert drugs. Storage of high alert drugs, concentrated concentrate injections are marked high alert.

High Alert Medication Storage Layout

Storage of high alert drugs is carried out by separating high alert drugs from other drugs and giving them special marking. The goal is to prevent errors when taking medication in an emergency. Apart from that, it is also to obtain convenience in storing, arranging, searching and monitoring medicines according to the dosage form in alphabetical order in the direction of receipt and disbursement flows, and controlling medicine stocks.

Based on research at the UNS Surakarta Hospital Pharmacy Installation, high alert drugs are separated from other drugs, arranged alphabetically based on dosage form and have special labeling. High alert narcotics and priscotropic drugs are stored in a separate cupboard consisting of 2 doors and 2 locks. However, in the inpatient depot for preparing high alert drugs, there are still some that are not arranged in alphabetical order. This result is in accordance with the explanation from the Head of the Room at the inpatient depot that there was negligence by the staff when returning the medicine.

Drug storage is carried out by paying attention to the dosage form and drug therapy class and is arranged alphabetically. This will make it easier for pharmacists to find medicines (Tusholihah, 2018). The layout of high alert drug storage in the UNS Surakarta Hospital Pharmacy Installation does not comply with the standards of pharmaceutical services in hospitals. The procedure for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is that pharmacy staff store high alert drugs on shelves that have been grouped based on dosage form and arranged alphabetically. However, during observations there were still those who were careless in not alphabetically arranging the high alert drugs. This can cause errors in administering medication (Rahmi, 2022).

Another research conducted by (Trilaksha, 2022) stated that at the Ibnu Sina Islamic Hospital the arrangement of high alert medicines was not neatly arranged in the medicine storage cupboard. Another research conducted by Akidah (2020) states that the way to store high alert medicines in pharmacy installations is by separating high alert medicine shelves from other medicines. High alert medicine shelves are given red solatip and labeled with high alert medicines. The storage of narcotic and psychotropic drugs at RSUI Mutiara Bunda is classified as high alert drugs which must be stored in a special cupboard which has 2 doors with double locks, and the keys must be held by two different people (Akidah, 2020).

There is different research, namely research conducted by Tusholihah (2018) that all high alert drugs in the Kanjuruhan Kepajen Regional Hospital Pharmacy Installation comply with pharmaceutical service standards which are arranged alphabetically and according to type of preparation. Another research conducted by (Fatkhiya & Chyaningtyas, 2023) stated that the storage of high alert drugs at the Inpatient Hospital of RSI PKU Muhammadiyah Pekajangan was stored using an alphabetical system which made it easier for officers to find the location of the drugs.

Storage Temperature

Based on research at the UNS Surakarta Hospital Pharmacy Installation, the storage temperature for high alert drugs used is a refrigerator temperature between 2-8°C such as insulin detemir, aspart, LiSpro, and novomix. Meanwhile, the room temperature is between 15-30°C, such as amiodarone, warfarin, glimepirid, and glicazide. The thermometer used is a digital thermometer which is placed in the room and in the refrigerator. Temperature is monitored 2-3 times a day, namely morning, afternoon and evening when changing shifts. Temperature recording is carried out by officers, either pharmacists.

The storage temperature for high alert medicines in the UNS Surakarta Hospital Pharmacy Installation is in accordance with hospital pharmaceutical service standards. These results are in line with the explanation of the Head of the Room at the Pharmacy depot that storage of high alert drugs is based on their storage temperature.

Storage temperature is always monitored 2-3 times a day.

The storage temperature for thermolabile or cold drugs is stored in the refrigerator at 2-8°C and thermostable or room temperature drugs are stored at 15-27°C. by using AC in the room. Research conducted by Khaidayanti (2021) shows that high alert drugs that require cold temperatures are stored in a refrigerator with a temperature of 2-8°C. Medicines stored at room temperature are stored at room temperature 15-30°C. The temperature in the medicine storage room is monitored every day by pharmacy staff to ensure the temperature is appropriate (Khaidayanti, 2021).

Storage System

Based on research at the UNS Surakarta Hospital Pharmacy Installation, the storage system applies a First In First Out (FIFO) and First Expired First Out (FEFO) system. However, at UNS Hospital the First Expired First Out (FEFO) system is implemented because the preparations have a quicker expiry date. Storage of high alert drugs also pays attention to the temperature of use, such as amiodarone, warfarin, glimepirid, and glycazide at room temperature (15-30°C) and insulin such as detemir, aspart, LiSpro, and novomix are stored at refrigerator temperature (2-8°C). Narcotic and psychotropic drugs are in separate cupboards with 2 doors and double locks.

According to Pertiwi et al., (2020) storing high alert drugs using the First Expired First Out (FEFO) method or items with the closest expiry date are placed at the front. Because goods that have just arrived do not necessarily have a further expiry date than the existing drug stock. First In First Out (FIFO) method, namely the drug that arrives first, the drug is distributed first (Pertiwi et al., 2020). According to Saputera et al. (2019) the storage temperature for high alert drugs is stored in the refrigerator at a temperature of 2-8°C and drugs stored at room temperature, namely 15-30°C using air conditioning in the room. Narcotic and psychotropic drugs are classified as high alert drugs which must be stored in a special cupboard that has 2 doors with double locks, and the keys must be held by two different people (Saputera et al., 2019).

The high alert drug storage system at the UNS Surakarta Hospital Pharmacy Installation is appropriate. The procedure for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is that pharmacy staff store high alert drugs paying attention to the First In First Out (FIFO) and First Expired First Out (FEFO) systems. These results are in line with the explanation of the Head of the Pharmacy depot that the storage system applies a First In First Out (FIFO) and First Expired First Out (FEFO) system, based on storage temperature, and paying attention to the provisions for certain drugs.

The research that supports the results of this research was conducted by (Kharisma, 2022) that in the Citra Husada Hospital Pharmacy Installation, storage was carried out based on storage temperature which had temperature monitoring such as air conditioning and thermometers.

Obstacles in storing high alert drugs often occur, such as negligence by staff in storing high alert drugs. The weakness of this research is that it only identified the storage of high alert drugs using a checklist sheet and interviews with the Head of the Pharmacy Depot Room so that no treatment and follow-up was carried out on employees at the UNS Surakarta Hospital Pharmacy Installation.

4. CONCLUSION

Conclusion

1. The existence of a list of high alert drugs in each depot of the UNS Surakarta Hospital Pharmacy Installation states that high alert management is 100% appropriate.
2. The policy for managing high alert drugs at the UNS Surakarta Hospital Pharmacy Installation states that they are not appropriate, showing a percentage of 85.7%.
3. Stock card recording at the UNS Surakarta Hospital Pharmacy Installation is not appropriate. The percentage of emergency room, outpatient and inpatient deposits showed 85.7%. Meanwhile in the warehouse the percentage shows 71.4%.
4. The labeling of high alert drugs at the UNS Surakarta Hospital Pharmacy Installation is not appropriate. Warehouses, emergency room depots, and inpatients showed 80% and outpatients 60%.
5. The storage layout for high alert drugs in the UNS Surakarta Hospital Pharmacy Installation is not appropriate because the percentage of inpatients is 80%.
6. The storage temperature for high alert medicines in the UNS Surakarta Hospital Pharmacy Installation is 100% appropriate.
7. The high alert drug storage system at the UNS Surakarta Hospital Pharmacy Installation is 100% compliant

Suggestion

1. For hospitals, it is hoped that the UNS Surakarta Hospital Pharmacy Installation will pay attention to the placement of LASA drugs so that there is a distance between 1 other drug, the availability of receipt books, the placement of stock cards for each drug, the labeling of high alert drugs, and the arrangement of high alert drugs alphabetically.
2. For researchers, it is hoped that for further research, they will carry out intervention research by training employees at the UNS Hospital Pharmacy Installation regarding the storage of high alert drugs

5. BIBLIOGRAPHY

Akidah, A. N. (2020). *Gambaran Penyimpanan Obat High Alert Di Instalasi Farmasi RSUI Mutiara Bunda*. Karya Tulis Ilmiah. Politeknik Harapan Bersama.

Chotimah, D. I. N., Nasyanka, A. L., & Na'imah, J. (2022). Tingkat Kesesuaian Pelabelan Obat High Alert dengan Standar Prosedur Operasional di Instalasi Farmasi IGD Rumah Sakit X Gresik. *Jurnal Kefarmasian Dan Gizi*, *2*(1).

Direktorat Jenderal Bina Kefarmasian. (2010). *Pedoman Pengelolaan Perbekalan Farmasi di Rumah Sakit*. Peraturan Menteri Kesehatan Republik Indonesia.

Fahriati, A. R., Aulia, G., Saragih, T. J., Wijayanto, D. A. W., & Hotimah, L. (2021). Evaluasi Penyimpnana Obat High Alert Medication di Instalasi Farmasi Rumah Sakit X Tangerang. *Jurnal Edu Masda*, *5*(2), 56–63.

Fatkhiya, M. F., & Chyaningtyas, P. L. (2023). Gambaran Penyimpaan Obat High Alert di Instalasi Farmasi RSI PKU Muhammadiyah Pekajanngan. *Jurnal Farmasetis*, *12*(1), 77–82.

Haryadi, D., & Trisnawati, W. (2021). Evaluasi Penyimpanan Obat High Alert di Instalasi Farmasi Rumah Sakit Juanda Kuningan. *Jurnal Farmasi Muhammadiyah Kuningan*, *7*(1), 7–13.

Hidayati, N. R., Indawati, I., Indriaty, S., & Lestiyani, S. (2021). Evaluasi Kesesuaian Penyimpanan Obat High Alert di Instalasi Farmasi Rawat Inap Rumah Sakit Mitra Plumbon. *Jurnal*

Farmacopilum, *4*(3), 230–241.

Kemenkes RI. (2016). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 72 Tahun 2016 Tentang Standar Pelayanan Kefarmasian di Rumah Sakit*. Kementerian Kesehatan RI.

Khaidayanti, N. (2021). *Gambaran Penyimpanan Obat High Alert di Instalasi Farmasi Rumah Sakit Prima Medika Pemalang*. Politeknik Harapan Bersama Tegal.

Kharisma, L. (2022). *Evaluasi Kesesuaian Penyimpanan Obat High Alert di Instalasi Framasi Rumah Sakit Citra Husada Pangkalan Bun Kota Waringin Barat*. Skripsi. Sekolah Tinggi Ilmu Kesehatan Borneo Cendekia Medika, Pangkalan Bun.

Luci, E. I. (2013). *Your High-Alert Medication List-Relatively Useless Without Associated Risk-Reduction Strategies*. https://www.ismp.org/resources/your-high-alert-medication-list-relatively-

Putra, A. M. P. (2016). Kesesuaian Penyimpanan Obat High Alert di Depo Obat Rumah Sakit X di Kalimantan Selatan Tahun 2015. *Jurnal Ilmiah Farmasi Terapan Dan Kesehatan*, *1*, 42–47.

Rahmi, S. (2022). *Gambaran Pengelolaan Obat High Alert di Instalasi Farmasi RSI Ibnu Sina Padanng Pajang*. Karya Tulis Ilmiah. Universitas Muhammadiyah Sumatera Barat.

Salawati, L. (2020). Penerapan Keselamatan Pasien Rumah Sakit. *Jurnal Kedokteran Dan Kesehatan Malikussaleh*, *6*(1), 98.

Saputera, M. M. A., Niah, R., Rini, P. P., Soraya, A. S., A., M. M., Niah, R., Rini, P. P., & Soraya, A. (2019). Kesesuaian Penyimpanan Obat High Alert Di Instalasi Farmasi Rsd Idaman Banjarbaru. *Jurnal Insan Farmasi Indonesia*, *2*(2), 205–211.

Sofiani, I. (2016). Efektifitas Pelatihan High Alert Medication Terhadap Pengetahuan dan Sikap Petugas di Rumah Sakit Khusus Ibu dan Anak PKU Muhammadiyah Kotagede. *Jurnal Medicoeticolegal Dan Manajemen Rumah Sakit*, *5*(2), 120–123.

Titien, S. H., Wijoyo, Y., & Djaman, G. M. (2020). *Manajemen dan Pelayanan Kefarmasian di Apotek*. Buku.

Trilaksha, N. (2022). *Gambaran Penyimpanan Obat di Instalassi Farmasi Rumah Sakit Islam Ibnu Sina Padang Pajang*. Karya Tulis Ilmiah. Universitas Muhammadiyah Sumatera Barat, Bukittinggi.

Tusholihah, L. (2018). *Gambaran Penyimpanan Obat-Obat High Alert diUnit Pelayanan Instalasi Farmasi RSUD Kanjuruhan Kepanjen Kabupaten Malang*. Artikel Ilmiah. Akademi Farmasi Putra Indonesia.