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Human Factor Analysis and Classification System (HFACS) in the Evaluation of Outpatient Medication Errors

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Abstract. Medication errors happen frequently, meaning there is an urgent need for a systematic analysis tool to minimize their occurrence. The aim of this study is to implement the Human Factor Analysis and Classification System (HFACS), a tool used in human error identification, in the case of outpatient medication errors. Nine such cases that occurred in a pharmacy unit of an Indonesian hospital were evaluated by 40 participants, consisting of the Head of the Pharmacy Department, the heads of units under this department, pharmacists, and staff of the Patient Safety Unit. An HFACS questionnaire developed by the United States Department of Defense was adopted in an Indonesian context. Each participant was asked to evaluate four or five cases of medication errors based on items in the questionnaire. The results show that the causes of such errors mainly lie in the layers of unsafe acts (performance-based error), precondition of acts (mental awareness), and organizational influence (an organizational instruction or policy which creates an unsafe situation). Breaking down the HFACS into its sublayers, the most prevalent causes of medication error found in this study were information overload and fatigue, although the level of agreement among the participants when giving HFACS ratings was low. The paper concludes by discussing the implications of the results.

Keywords: HFACS; Medication error; Outpatient; Percentage of agreement

1. Introduction

To err is human (Kohn et al., 2000); however, when errors are related to human life their negative consequences are crucial, which is particularly relevant in the case of errors occurring in hospitals. Research emphasis has been on errors in hospitals involving doctors, nurses and other hospital or healthcare system workers in relatation to patient safety, defined as "the prevention of harm to patients" (Institute of Medicine/IOM, in Aspden et al., 2004). Patient safety terms include error prevention; learning from errors that do occur; and a safety culture that involves health care professionals, organizations and patients. There are various types of error in the healthcare system. These can be classified according to where they occurred, incident reports, the individuals involved in the error, and system causes. One common error is related to medication, which is usually referred to as medication error (AHRQ, 2007), which is defined as

"any preventable event that may cause or lead to inappropriate medication use or

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patient harm, while the medication is in the control of the healthcare professional, patient or consumer. Such events may be related to professional practice, healthcare products, procedures and systems, including prescribing; order communication; product labeling, packaging and nomenclature; compounding; dispensing; distribution; administration; education; monitoring and use" (NCCMERP, 1998).

Medication error can occur in all medication processes, including prescriptions, transcriptions, preparation, dispensation and administration (Hussain and Kao, 2005). Most occur during the administration stage, followed by the prescription, preparation and transcription stages. Prescription errors refer to failures in the prescription writing process that result in wrong instructions regarding the identity of the recipient, the identity of the drug, or the formulation, dose, timing or frequency. Transcription errors are related to handwriting, abbreviation use, and unit misinterpretation, while preparation errors occur when there is a difference between the ordered amount or concentration of a medication and what is actually prepared and administered. Dispensation errors refer to those made during the transfer of a prescription drug to a patient or an intermediary who is responsible for the administration of the drug. Finally, administration errors are related to errors in system checks, as most medications are administered by a single nurse.

Medication errors have endangered the health of millions of people and cost billions $ US in extra medical costs around the world. Furthermore, Hussain and Kao (2005) state that medication errors are important causes of patient morbidity and mortality. Finally, the psychological effect of medication errors on patients should also be emphasized. For all of these reasons, medication errors have been gaining the attention of researchers and efforts are being made to observe the causes and find ways to prevent them.

Most research has employed a survey method; for example, a questionnaire that is completed by nurses and pharmacists to observe the causes of medication errors. Exploratory studies have resulted in various causes of medication errors. The Agency for Healthcare Research and Quality (AHRQ, 2007) identified 246 medication errors reported in the United States related to human factors. These factors regard how humans interact with their environment, including tools, tasks and other people, which ultimately influences human performance. In addition, Gorgich et al. (2016) explain that human factors are not the only cause of medication errors; working and environmental conditions, as well as organizational factors, play important roles in determining them. In short, medication errors are multidimensional problems, and in solving them systematic approaches and methods are needed (Gorgich et al., 2016).

Errors and accidents in various environments and fields have been understood as a complex sociotechnical system (Salmon et al., 2012). Salmon et al. reviewed the three accident causation models predominantly used in analyzing errors and accidents, namely the risk management framework, the System-Theoretic Accident Modelling and Process Model (STAMP), and the Swiss cheese model.

The most frequently used model is the Swiss cheese model (Reason, 1990), which was developed into the Human Factor Analysis and Classification System (HFACS; see Shappell and Wiegmann, 2000), which describes the taxonomies of latent failure and unsafe acts. HFACS is a tool for understanding and mitigating human error in various applied settings. Although it starts with "human factors", in fact other related factors are considered in the model, as can be seen in Figure 1.

HFACS has several taxonomic categories to represent layers in the system in which errors can occur. In addition, it has the advantage of being able to link failures across the four taxonomic levels (Salmon et al., 2012). Originally, HFACS was designed to investigate errors within aviation contexts. However, with some revisions and adaptations, it has been

widely used in different work conditions, such as in operating theaters and medical settings (see Hughes et al., 2013 for an example). HFACS has also demonstrated acceptable levels of inter-rater reliability in some studies (e.g., Li et al., 2008), although it has also shown low levels of reliability in others (Olsen, 2011).

In Indonesia, medication errors also occur frequently. Although there have been no official reports from the Indonesian Ministry of Health, such errors have been reported by several researchers in various areas and cities. For example, Purba et al. (2007) identified medication errors in several hospitals in Jakarta, Bandung, Yogyakarta and Surabaya, with most being missing patient information and wrong prescription. Coupled with the fact that the growth of medicine use in Indonesia is relatively high (i.e., 12%–13% per year), the question of medication errors should be given utmost attention.

The aim of this study is to implement HFACS, one form of sociotechnical analysis tool, in analyzing medication errors in hospital pharmacies, in particular involving outpatients in one sample Indonesian hospital. Considering that research related to medication error is limited, and the fact that HFACS has been successfully implemented in other areas of patient safety, such as identification error in surgery (Cohen et al., 2018) and in helicopter emergency medical services (Cline, 2018), it is hypothesized that HFACS can be implemented to reduce medication error. The results of the study will be valuable in providing information about the causes of medication error for hospital outpatients.

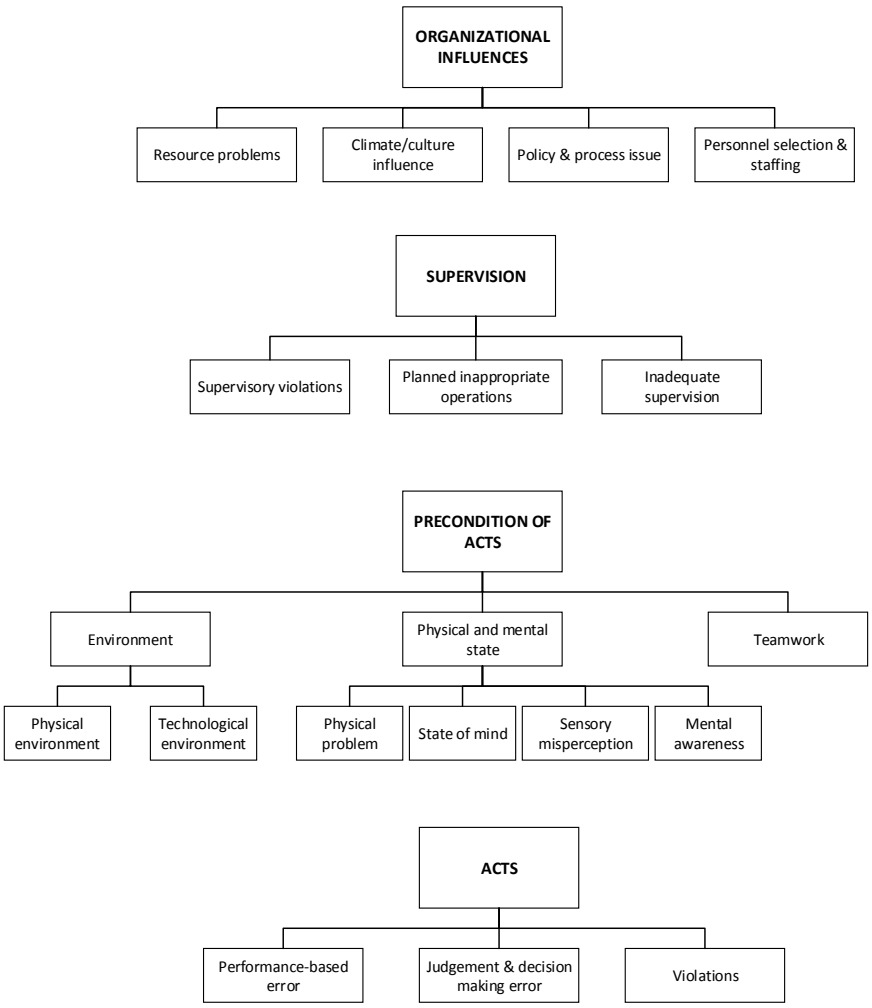

Figure 1 HFACS Classification and Taxonomies (Dod, 2017)

2. Methods

2.1. Participants

Forty hospital workers (mean age = 30 years old, SD = 9.29, 23 female) from the pharmacy department of an Indonesian public hospital in Bandung city participated voluntarily in the study. All had more than one year's work experience. They were recruited based on convenience sampling with permission from the hospital and consisted of one head of the pharmacy department, six heads of units (under the pharmacy department), 30 pharmacists, and three patient safety unit staff members.

2.2. Measures

The HFACS questionnaire items developed by the United States Department of Defense (DOD, 2017) were translated into Indonesian by two bilingual Indonesians with a TOEFL score of more than 550 out of 670. The translation procedure applied followed the International Test Commission (n.d.) and included the involvement of bilinguals in the translation process who were also experts in the field of patient safety. This ensured not only a reduction in language bias (through the TOEFL requirement of the language translation process), but also in misinterpretation of the content (because of the expertise of the bilingual translators in the field of patient safety). The best Indonesian version was then chosen after discussion amongst the authors and validated by the Head of the Pharmacy Department, the Head of the Quality Assurance Unit and the Head of the Patient Safety Unit of the hospital. The validity and reliability of the questionnaire were analyzed and proven to be valid (Pearson correlation > *r* table) and reliable (α Chronbach > 0.7).

2.3. Procedures

The participants were requested to evaluate nine medication errors in the hospital reported in 2015-2016. The reports used were formal reports on medication error as applied in all Indonesian hospitals, based on the Indonesian Ministry of Health Regulation no. 35, 2014. The dataset from 2015-2016 is based on the availability of the data provided by the hospital; the more recent dataset is considered to be strictly confidential, so cannot be accessed for research purposes. The report described the type of medication error, its possible cause based on analysis by the Health & Safety department of the hospital, and suggestions for preventive actions to avoid similar errors in the future. The participants were instructed to read the medication errors; in addition, a review and reconstruction of the errors were conducted through short discussion between the person involved in the error and the participants. The participants also received prior training in relation to HFACS and how to use the DoD questionnaire. Each was assigned to evaluation of four or five medication errors. Therefore, the participants conducted their evaluation based on the reports on the medication errors as well as on their personal experience. The HFACS questionnaire was administered in paper and pencil form.

3. Results and Discussion

A summary of the causes of the medication errors can be seen in Tables 1, 2 and 3 and Figure 2. Since each of the 40 participants evaluated four or five mediation error cases, in total there was a maximum value of 200 medication error observations.

Table 1 Causes of medication errors based on HFACS layers

HFACS Layer	Total
ACTS	
Performance-based error	112
Poor judgment or decision-making error	67
Violation of law or regulations	19

HFACS Layer	Total
PRECONDITION	
Physical environment	78
Physical condition of workers	62
Psychological condition of workers	98
Mental awareness	106
Teamwork	71
SUPERVISION	
Supervisor violated a commonly known law or regulation	61
Supervision failed to plan for or assess known hazards	69
A supervisor or supervision proved inadequate	80
ORGANIZATIONAL INFLUENCE	
Problem with resources	59
Personnel selection & staffing	48
An organizational instruction or policy created an unsafe situation	106
The safety climate/culture contributed to an unsafe situation	20

Table 2 Causes of medication errors based on HFACS layers and sublayers

HFACS layer and sublayers	Total
UNSAFE ACTS	
Performance-based error	
Checklist not followed correctly	27
Procedure not followed correctly	34
Rushed or delayed necessary action	49
Poor judgment and/or decision-making error	
Inadequate real-time risk assessment	29
Failure to prioritize tasks adequately	14
Wrong choice of action during an operation	17
PRECONDITION	
Physical environment	
Vibration affected vision or balance	19
Heat/cold stress impaired performance	15
Noise interference	34
Physical condition of workers	
Fatigue	49
Psychological condition of workers	
Life stressors	18
Mentally exhausted (burnout)	44
Mental awareness	
Fixation	20
Task over-saturation/under-saturation (information overload)	50
Teamwork	
Failed to effectively communicate	20
Task/mission planning/briefing inadequate	15
SUPERVISION	
Supervisor violated a commonly known law or regulation	
Failure to enforce existing rules (supervisory act of omission)	32
Authorized unqualified individuals for tasks	19
Supervision failed to plan or assess known hazards	
Selected individual with lack of current or limited experience	34
A supervisor or supervision proved inadequate	
Failed to provide proper training	14
Selected individual with lack of proficiency	20
ORGANIZATIONAL INFLUENCE	
Problem with resources	
Inadequate infrastructure	47
Personnel selection & staffing	
Failure to provide adequate manning/staffing resources	38
An organizational instruction or policy created an unsafe situation	
Temporal workload	42
Purchase or provision of poorly designed or unsuitable equipment	36
Safety climate/culture contributed to an unsafe situation	

HFACS layer and sublayers	Total
Organizational culture (attitude/actions) allowed for unsafe task/mission	15

Table 3 Percentage of agreement among participants on the rating

HFACS layer	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Overall average
Act	61%	80%	71%	79%	34%	34%	93%	34%	41%	59%
Precondition of acts	20%	24%	27%	24%	25%	14%	29%	19%	13%	22%
Supervisor	24%	27%	47%	27%	34%	35%	30%	39%	25%	32%
Organizational influence	25%	32%	27%	29%	26%	26%	24%	24%	31%	27%
Average of all HFACS layers	33%	41%	43%	40%	30%	27%	44%	29%	28%	35%

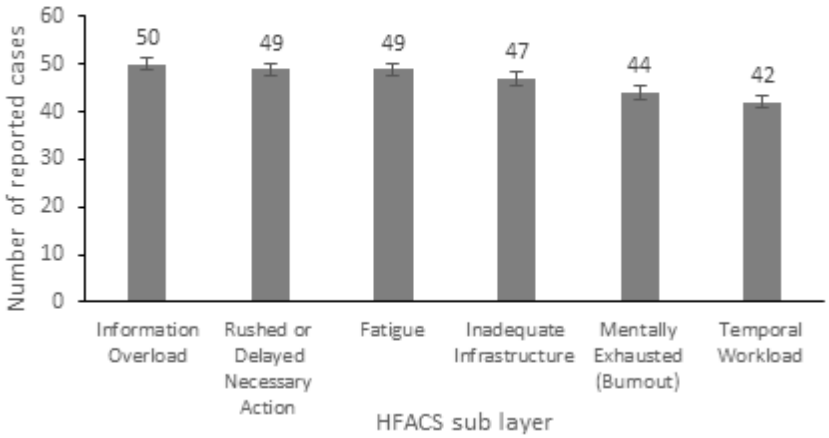

Figure 2 Main causes of medication errors based on HFACS sublayers

The aim of the study is to establish the causes of medication errors using the Human Factor Analysis and Classification System (HFACS) sociotechnical tool. The results show that the causes of such errors are mostly unsafe acts (performance-based error), precondition layers (mental awareness), and organizational influence (an organizational instruction or policy creating an unsafe situation). Breaking down the HFACS into its sublayers, the main causes of medication error found are information overload, inappropriate time of action and fatigue (figure 2).

In relation to information overload, Jackson and Farzaneh (2012) state that the factors that influence this include limited time, information characteristics and personal factors. In this study, the number of outpatients in the pharmacy department is around 700–800 per day, the standard waiting time is around 30 minutes for all medication processes, and the overall workload for each pharmacist is relatively high. Information characteristics during the prescription of medicine are also crucial, since most doctors' handwriting cannot be easily read. This result is in line with the findings of Beasley et al. (2011), who discussed the difficulties for pharmacists in reading the handwriting of doctors.

The fact that fatigue is ranked second as the primary cause of medication error is in line with the results of previous studies; Gorgich et al. (2016) and Moyen et al. (2008) found that fatigue influenced medication errors. The results of this study are supported by the fact that the workers in the pharmacy department work eight-hour shifts and deal with a huge number of outpatients each day. This situation is coupled with the lack of rest time during shifts, combined with a lack of sleep, which trigger fatigue amongst the workers. Fatigue

has also been commonly found as the cause of accidents in other fields, such as in road transportation (Zuraida et al., 2017; da Costa et al., 2018).

Other factors that contribute to medication errors are the lack of time to complete the task. This is supported by the results of Pape et al. (2005) and Malhotra et al. (2012), who found that rushed work conditions result in medication errors in pharmacy departments. Mental fatigue also plays a role in medication error, also as supported by the result of previous studies (Nejati et al., 2016). Finally, this study shows that the infrastructure of the pharmacy installation, in particular the environment, also influences medication error, which in line with the results of Chaudhury et al. (2009).

Some improvements are proposed for the pharmacy department in order to minimize medication errors on the basis of the results of this study and the literature review. Such suggestions have been proposed to the hospital management. To overcome the problem of information overload, these include using computerized systems to reduce error in reading the handwriting of the doctors and in drug labeling. In addition, the use of a work checklist is also proposed (Gautam, 2013). The hospital management has agreed with the suggestions, although implementation cannot be made immediately due to technical constraints. To minimize fatigue, a rearrangement of shift hours and rest times is suggested. The suggestion is in line with Nejati et al. (2016) and OSHA (2011), who state that there is a decrease in errors when workers are given rest time. In fact, by the time this paper is completed, the hospital will have started to implement new policies regarding shift hours and rearrangement of rest times.

HFACS was chosen for this study with consideration of the detailed taxonomies involved in analyzing a system, not only an individual. However, as stated by Salmon et al. (2012), HFACS, which focuses on organizational factors, should also consider outside factors such as government regulations. A great deal of time was spent on conducting the literature review of government regulations on pharmacy service standards in Indonesia. Our findings show that there are Indonesian Ministry of Health regulations and standards on pharmacy services in Indonesia and that these mention medication errors in places (Indonesian Ministry of Health, 2014). In particular, the regulations state that pharmacies must avoid medication errors, with zero error the target. However, these regulations are not followed up by technical guidance about how to prevent or solve such errors.

In addition, HFACS has been used in many fields for error detection and accident analysis, such as in mining, the oil and gas industry, construction, as well as the health industry. Coupled with the possibility to consider outside factors rather than organizational ones, HFACS seems to be attracting more attention and is likely to be used more widely, in particular in relation to patient safety.

It is important to note that the inter-rater reliability of HFACS in this study, measured by the percentage of agreement among participants, is quite low. This is in line with the results of a previous study by Olsen (2011). While other studies do show acceptable inter-reliability of HFACS (e.g., Li et al., 2008), it is also shown that there remains room for improvement in such use. In addition, inter-rater reliability between the participants with regard to the ACT layer showed a value of 59%, which explains that ACT can be observed in a similar manner by participants giving HFACS ratings.

This study has several limitations. First, it is limited to one sample of a pharmacy department in one hospital only. To generalize the results, further research involving more pharmacy installations in more hospitals is needed. Second, because the study used historical data, the people directly involved in the errors or accidents were not able to give their opinions regarding the medication errors. However, there is a mechanism in the hospital by which every medication error is filed and discussed among the workers in the

pharmacy department, so every worker has appropriate information about the historical errors and is able to analyze their causes using the HFACS questionnaire. Third, the translation process of the questionnaire involved two bilingual patient safety experts; involvement of linguists in this process might reduce language bias. Finally, it should be noted that the common method of HFACS analysis is by using ergonomic/human factor experts in the related field. In this study, since the final purpose was to enable HFACS to be used by medical professional, this was the reason hospital workers who had prior training of HFACS were chosen to be the participants.

4. Conclusions

In conclusion, this study provides originality in terms of the use of HFACS to analyze medication errors. To the best of knowledge of the authors, no previous studies have employed HFACS to analyze medication errors involving outpatients, apart from a study conducted by Hughes (2013), who proposed the use of the HFACS to analyze medication errors in emergency medical services. In practice, the study has suggested meaningful improvements for the hospital pharmacy department to minimize medication errors. As Malhotra et al. (2012) state, "Medicines cure, but they can also kill or cause severe adverse reactions if a wrong medicine is administered or if the dosage is wrong. Many disasters have occurred due to the medication errors". Therefore, any effort to reduce medication errors is valuable and should be undertaken urgently.

In the study, the main causes of medication error found are information overload and fatigue. To overcome the first of these, suggestions made include using computerized systems to reduce errors in reading the handwriting of the doctors and in drug labeling. To minimize fatigue, rearrangement of shift hours as well as rest time is suggested.

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Appendix

DoD HFACS in Indonesian

	TINDAKAN
1	Apakah kesalahan yang dilakukan praktisi kesehatan berkaitan dengan performanya?
	Ya, yaitu :
	Ketidaksengajaan dalam pengoperasian alat
	Checklist yang tidak diikuti dengan tepat
	Prosedur kerja yang tidak diikuti dengan tepat
	Aktivitas yang dilakukan terlalu lambat atau terlalu cepat
	Lanjutkan ke pertanyaan 2
	Tidak, lanjutkan ke pertanyaan 2
2	Apakah tindakan kesalahan yang dilakukan praktisi kesehatan merupakan hasil dari penilaian dan pengambilan keputusan yang buruk?
	Ya, yaitu :
	Kesalahan untuk menilai risiko yang dapat terjadi jika suatu aktivitas dilakukan
	Kesalahan untuk mengorganisir atau memprioritaskan tugas
	Individu mengabaikan peringatan atau teguran (*warning*)
	Kesalahan dalam memilih aktivitas dalam operasi
	Lanjutkan ke pertanyaan 3
	Tidak, lanjutkan ke pertanyaan 3
3	Apakah praktisi kesehatan menyalahi regulasi atau aturan yang berlaku secara umum?
	Ya, yaitu :
	Secara sadar melakukan pelanggaran karena itu dianggap pilihan yang terbaik
	Kebijakan yang ditetapkan dari awal salah dan dapat meluas ke beberapa unit kerja
	Individu atau tim secara sengaja melanggar prosedur tanpa sebab atau tujuan
	Lanjutkan ke pertanyaan 4
	Tidak, lanjut ke pertanyaan 4
	TINDAKAN PRASYARAT
4	Apakah lingkungan merupakan salah satu faktor penyebab kecelakaan?
	Ya, yaitu :
	Kondisi lingkungan yang memengaruhi penglihatan (cuaca, kabut, kegelapan, dll)
	Adanya getaran yang memengaruhi penglihatan atau keseimbangan
	Individu terpapar kondisi panas atau dingin yang mengakibatkan kesalahan kerja
	Adanya suara tidak diinginkan yang mengganggu pekerjaan
	Lanjutkan ke pertanyaan 5
	Tidak, lanjutkan ke pertanyaan 5
5	Apakah keadaan fisik, indra, ataupun mental praktisi kesehatan berdampak pada kesalahan yang dilakukan?
	Ya, lanjutkan ke pertanyaan 5a
	Tidak, lanjutkan ke pertanyaan 6
5a	Apakah praktisi kesehatan yang melakukan kesalahan memiliki kondisi fisik atau medis yang berkebutuhan khusus?
	Ya, yaitu :
	Penggunaan obat legal ataupun ilegal (alkohol, suplemen, medikasi)
	Kehilangan kesadaran karena serangan mendadak
	Kelelahan
	Tidak dapat beradaptasi terhadap kegelapan malam
	Dehidrasi
	Ukuran tubuh, ketangkasan, mobilitas, atau keterbatasan gerakan tidak memenuhi kualifikasi untuk mengerjakan tugas
	Kekuatan fisik dan kemampuan kordinasi individu tidak cukup untuk melakukan aktivitas kerja
	Sedang melakukan diet
	Lanjutkan ke pertanyaan 5b
	Tidak, lanjutkan ke pertanyaan 5b
5b	Apakah keadaan psikologi praktisi kesehatan menyebabkan situasi kerja yang tidak aman?
	Ya, yaitu :
	Masalah psikologi
	Adanya penyebab stress (masalah hubungan percintaan, finansial, dll)
	Sedang dipengaruhi emosi kuat (baik positif maupun negatif) yang mengganggu pekerjaan

	□ Interaksi individu dengan orang lain yang berpotensi menurunkan kinerja (otoritas, kekolotan, terlalu patuh, dll)
	□ Terlalu percaya diri
	□ Adanya tekanan terhadap individu diluar batas kemampuannya
	□ Individu tidak menghiraukan risiko keamanan dan tidak memerhatikan potensi bahaya
	□ Motivasi berlebihan, lemah, atau motivasi personal yang melebihi motivasi organisasi
	□ Kelelahan mental karena jam operasional yang tinggi
	Lanjutkan ke pertanyaan 5c
	□ **Tidak, lanjutkan ke pertanyaan 5c**
5c	Apakah kesadaran mental praktisi kesehatan menghasilkan situasi yang tidak aman?
	□ **Ya, yaitu :**
	□ Individu tidak memberikan perhatian karena kebosanan atau pekerjaan yang berulang-ulang
	□ Individu terlalu fokus terhadap sesuatu sehingga tidak awas terhadap sekitarnya
	□ Individu memproses terlalu banyak informasi dalam waktu yang terbatas
	□ Adanya kebingungan atau tidak dapat berpikir jernih
	□ Masih menerapkan cara kerja di sistem yang dulu dikuasai (padahal sistem baru memiliki cara kerja yang berbeda)
	□ Adanya distraksi sehingga salah memusatkan perhatian
	□ Adanya kejadian yang menginterverensi saat bekerja sehingga urutan kerja menjadi tidak sesuai seharusnya
	□ Tidak dapat mengingat informasi mengenai langkah kerja yang aman (informasi tersebut bisa saja didapat saat *training* atau berdasarkan pengalaman lalu)
	□ Ekspektasi yang tidak akurat
	Lanjutkan ke pertanyaan 6
	□ **Tidak, lanjutkan ke pertanyaan 6**
6	Apakah tantangan dalam kerjasama tim berkontribusi pada kesalahan yang dilakukan?
	□ **Ya, yaitu :**
	□ Teknik kepemimpinan gagal untuk memfasilitasi iklim kerja tim
	□ Tim gagal untuk mendistribusikan tugas agar tiap individu mempunyai beban yang seimbang
	□ Adanya intimidasi terhadap tingkatan posisi / jabatan
	□ Individu tidak dapat mengemukakan informasi penting dengan percaya diri
	□ Informasi kritis tidak dikomunikasikan dengan orang yang tepat di waktu yang tepat
	□ Terminologi standar (kata-kata, sinyal, dll) tidak digunakan
	□ Kegagalan untuk berkomunikasi secara efektif (tidak adanya umpan balik yang tepat)
	□ Langkah-langkah dalam perancanaan tugas tidak dijalankan dengan baik
	Lanjutkan ke pertanyaan 7
	□ **Tidak, lanjutkan ke pertanyaan 7**
	PENGAWASAN
7	Apakah pengawasan atau kebijakan pengawasan berkontribusi pada kesalahan yang dilakukan?
	□ **Ya, lanjutkan ke pertanyaan 7a**
	□ **Tidak, lanjutkan ke pertanyaan 8**
7a	Apakah terdapat pelanggaran peraturan yang umumnya diketahui?
	□ **Ya, yaitu :**
	□ Peraturan yang telah ditetapkan belum dilaksanakan oleh pengawas
	□ Terdapat aturan tidak tertulis (tidak resmi) yang dijalankan oleh individu
	□ Pengawas meminta bawahannya untuk melanggar aturan, instruksi, atau arahan teknis
	□ Pengawas membiarkan seseorang yang tidak memenuhi syarat atau belum mengikuti pelatihan untuk menjalankan suatu tugas
	Lanjutkan ke pertanyaan 7b
	□ **Tidak, lanjutkan ke pertanyaan 7b**
7b	Apakah pengawas gagal dalam merencanakan suatu operasi?
	□ **Ya, yaitu :**
	□ Pengawas memerintahkan seorang personel untuk melakukan suatu tugas yang berada di luar batas kemampuan personel tersebut
	□ Komposisi tim yang tidak sesuai
	□ Pengawas memilih individu yang kurang berpengalaman untuk melakukan suatu tugas
	□ Pengawas kurang melakukan evaluasi risiko terkait dengan aktivitas kerja
	□ Pengawas mengizinkan aktivitas yang memiliki risiko tinggi untuk dilakukan
	Lanjutkan ke pertanyaan 7c

	□ **Tidak, lanjutkan ke pertanyaan 7c**
7c	Apakah pengawas atau pengawasan terbukti tidak memadai (dari segi kualitas atau kuantitas)?
	□ **Ya, yaitu :**
	□ Ketersediaan sumber daya, kompetensi, kualitas, atau pengawas tidak memenuhi kebutuhan
	□ Individu belajar dari perilaku pengawas / petinggi yang tidak sesuai atau melanggar prosedur standar
	□ Program pelatihan tidak tersedia atau tidak mencukupi
	□ Adanya kebijakan atau arahan yang mengarah pada situasi yang tidak aman
	□ Adanya konflik personal antara individu dan pengawas sehingga mengarah pada aksi atau pengambilan keputusan yang berbahaya
	□ Informasi penting terkait dengan keamanan sudah tersedia namun gagal untuk dilaksanakan
	□ Pengawas gagal untuk mengidentifikasi atau mengoreksi perilaku yang berisiko
	□ Pengawas memilih individu yang kurang ahli dalam melakukan suatu tugas
	Lanjutkan ke pertanyaan 8
	□ **Tidak, lanjutkan ke pertanyaan 8**
8	Apakah terdapat organisasi atau kebijakan organisasi berkontribusi kepada kecelakaan?
	□ **Ya, lanjutkan ke pertanyaan 8a**
	□ **Tidak, kuesioner selesai.**
8a	Apakah masalah dengan sumber daya menimbulkan situasi yang tidak aman?
	□ **Ya, yaitu :**
	□ Fasilitas pendukung (tempat makan, latihan, dll) atau kesempatan rekreasi/istirahat tidak tersedia atau tidak mencukupi
	□ Terdapat peralatan yang sudah usang namun tidak dihilangkan dari sistem
	□ Kegagalan untuk menyediakan pendanaan yang cukup untuk melaksanakan tugas
	Lanjutkan ke pertanyaan 8b
	□ **Tidak, lanjutkan ke pertanyaan 8b**
8b	Apakah pemilihan atau susunan kepegawaian menjadi faktor penyebab kecelakaan?
	□ **Ya, yaitu :**
	□ Kebijkan proses seleksi dan rekrutasi pegawai tidak sesuai
	□ Kegagalan untuk menyediakan sumber daya manusia (*staffing*, penempatan pegawai) sesuai kebutuhan pekerjaan
	Lanjutkan ke pertanyaan 8c
	□ **Tidak, lanjutkan ke Q8c**
8c	Apakah suatu instruksi atau kebijakan organisasi menimbulkan situasi yang tidak aman?
	□ **Ya, yaitu :**
	□ Adanya beban kerja atau tugas tambahan menciptakan situasi tidak aman dalam individu atau unit
	□ Risiko kebijakan atau program organisasi tidak di *assess* secara memadai
	□ Arahan prosedural (arahan tertulis, grafik, tabel, diagram, dll) tidak memadai
	□ Pelatihan organisasi di luar unit tidak ada atau tidak memadai
	□ Adanya doktrin, filosofi, atau konsep operasi di dalam organisasi untuk menerima risiko yang dapat mengarah pada situasi tidak aman
	□ Program diimplementasikan tanpa pendukung atau perencanaan yang memadai
	□ Adanya pembelian peralatan yang tidak sesuai atau memiliki desain yang buruk (misalnya meja, kursi kerja, dll)
	Lanjutkan ke pertanyaan 8d
	□ **Tidak, lanjutkan ke pertanyaan 8d**
8d	Apakah iklim/budaya keselamatan menimbulkan situasi yang tidak aman?
	□ **Ya, yaitu :**
	□ Budaya organisasi membiarkan dilakukannya pekerjaan yang tidak aman (kegiatan eksplisit atau implisit, pernyataan atau perilaku)
	□ Struktur organisasi atau jalur komando tidak jelas, membingungkan, atau tidak memadai
	□ **Tidak, kuesioner selesai.**