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The Integrated Excel Based K3 Recording System for Occupational Incident Monitoring

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Abstract
This study addresses an important research gap in Indonesia's hospital safety practices, namely the limited availability of practical and low cost Excel based Occupational Safety and Health (OSH) reporting systems. The study aims to develop and implement an integrated Microsoft Excel recording system to enhance the accuracy and efficiency of reporting Occupational Accidents (OA) and Occupational Diseases (OD) in a lung specialized hospital. Using an action research approach consisting of problem identification, system design, staff training, implementation, and evaluation, an innovative Excel Planner was produced that combines a centralized multi sheet template with an interactive dashboard. The template incorporates standardized fields, data validation, dropdown lists, and automated analytical features such as pivot tables and filters, while the dashboard provides real-time visual summaries to support managerial decision making. Following implementation, reporting time decreased from an average of three days to one day, and data completeness increased from 65 percent to 95 percent. The analytical functions also improved the hospital's ability to identify high risk areas and determine root causes of incidents. These findings indicate that a structured and integrated Excel based solution can strengthen OSH surveillance and improve decision-making processes. Continuous updates and future integration with hospital information systems are recommended to sustain the system's effectiveness.

Keywords**: **Occupational Accident, Occupational Disease, Excel Planner, Hospital OHS, Digital Reporting

INTRODUCTION

Occupational Safety and Health (OSH) is an essential component in healthcare institutions, where complex procedures, high risk clinical activities, and intensive interactions between patients and healthcare workers create a substantial potential for occupational hazards. Hospitals, as stated by the World Health Organization (WHO), function not only as providers of curative and preventive services but also as environments where exposure to biological, physical, and chemical risks is unavoidable (WHO, 2009). In Indonesia, the regulatory framework, such as the Ministry of Health Regulation No. 3 of 2020 regarding hospital classification and the Ministry of Health Regulation No. 7 of 2019 concerning hospital environmental health, emphasizes that hospitals must ensure safe working conditions to prevent the transmission of diseases and other environmental hazards (Kemenkes, 2020; Kemenkes, 2019). These mandates reinforce the obligation of healthcare institutions to implement robust Occupational Safety and Health Management Systems (OSHMS/SMK3).

Despite these requirements, many hospitals in Indonesia still rely on manual documentation systems for reporting Occupational Accidents (OA) and Occupational Diseases (OD). Manual systems often result in delayed reporting, fragmented data, and incomplete incident records, limiting the hospital's ability to identify trends, analyze root causes, and develop preventive strategies. Previous studies have noted that inefficient OSH reporting mechanisms hinder timely corrective actions and weaken institutional capacity for hazard mitigation (Yulyanti et al., 2023). At the UPTD Special Lung Hospital Medan, similar issues

were identified: slow reporting processes, scattered documentation, and inconsistent data quality. These problems illustrate the urgent need for an integrated, efficient, and data driven reporting system to strengthen incident surveillance and safety governance.

Digital tools, including Microsoft Excel based systems, are increasingly recognized as practical and low cost solutions for improving occupational safety data management. Excel Planner, with its customized templates, automated calculations, filter functions, and visualization capabilities, offers a feasible alternative to more complex hospital information systems that may not be readily available in all institutions. Studies have shown that simple digital interventions can significantly enhance data completeness, worker participation, and incident trend analysis when supported by adequate training and user engagement (Muhtar, 2022; Dian Safitri et al., 2023). Therefore, developing an integrated Excel Planner for OA and OD documentation has the potential to provide a significant leap forward in OSH reporting performance.

Based on these problems, this study aims to design, implement, and evaluate an integrated Excel Planner based system to improve the accuracy, completeness, and timeliness of OA and OD reporting at UPTD Special Lung Hospital Medan. The objectives are: (1) to identify weaknesses in the existing manual reporting system, (2) to develop a standardized and user friendly Excel Planner template, and (3) to assess the impact of implementation on reporting speed, data completeness, and analytical capability of the OSH team. Through this initiative, the study seeks to contribute to the enhancement of hospital safety practices by demonstrating that a structured, participatory, and technology supported approach can significantly strengthen occupational health surveillance.

RESEARCH METHODS

This study applied a Research and Development (R&D) design with a descriptive qualitative approach to develop an integrated Excel Planner based system for documenting Occupational Accidents and Occupational Diseases at the UPTD Special Lung Hospital Medan. The research stages included problem identification, system design, staff training, implementation, and evaluation. Participants consisted of Occupational Safety and Health (OSH) personnel selected through purposive sampling, including K3 officers and unit representatives who were directly involved in incident reporting. Data were collected through workflow observation, in depth interviews, and document analysis of existing manual reports. Microsoft Excel served as the primary development tool, utilizing functions such as data validation, pivot tables, filters, and graphical visualization to construct an integrated and user friendly reporting template.

Data analysis combined qualitative thematic analysis to identify issues and improvements in reporting practices, and quantitative descriptive analysis to compare reporting speed and data completeness before and after system implementation. The variables assessed included system usability, reporting timeliness, data accuracy, and user participation. No complex statistical models were employed, as the objective was to measure practical enhancements in reporting efficiency rather than conduct inferential testing. This methodological approach ensured that the system development was closely aligned with user needs and operational realities while providing a solid basis for evaluating the effectiveness of the integrated Excel Planner.

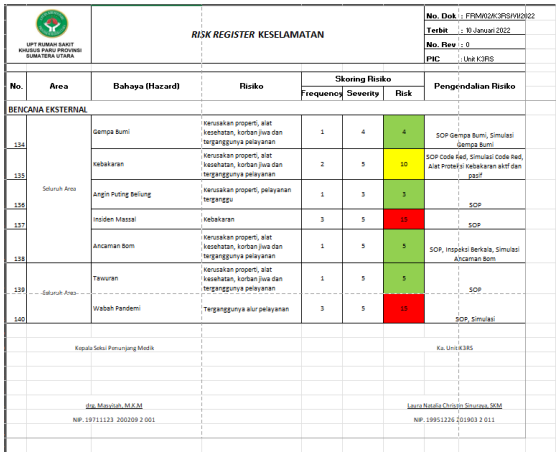
RESULTS AND DISCUSSION

The development and implementation of the integrated Excel Planner based recording system at the UPTD Special Lung Hospital Medan produced substantial improvements in the overall reporting workflow of Occupational Accidents (OA) and Occupational Diseases (OD). The results are presented in an integrated format, supported by figures illustrating the transition from conventional fragmented documentation to a consolidated, user friendly digital system. The analysis addresses the research objectives by evaluating weaknesses in the manual system, presenting the structure of the newly designed Excel Planner, and discussing its impact on reporting accuracy, completeness, and timeliness.

Problems and Root Causes in the Manual Reporting System

The initial assessment revealed that the hospital relied heavily on conventional manual documentation, where reporting files were scattered across multiple separate spreadsheets and paper based records. This fragmentation created operational inefficiencies, including delays in incident reporting, inconsistent entries, duplicated data, and limited analytical capability. The average reporting time reached three days, and data completeness stood at only 65%, demonstrating a significant gap in the hospital's Occupational Safety and Health (OSH) surveillance.

The weaknesses were traced to several structural and procedural issues. First, there was no centralized repository for incident data, forcing OSH personnel to track information across different departments and files. Second, the absence of standardized templates led to inconsistent data formats, complicating trend analysis and comparison between periods. Third, limited digital literacy among staff contributed to human errors and incomplete inputs, further reducing data quality. These root causes highlighted the urgent need for a comprehensive, integrated digital solution.



UPT RUMAH SAKIT KHUSUS PARU PROVINSI SUMATERA UTARA

RISK REGISTER KESELAMATAN

No. Dok : FRM/02/K3RS/VII/2022
Terbit : 10 Januari 2022
No. Rev : 0
PIC : Unit K3RS

No.	Area	Bahaya (Hazard)	Risiko	Skoring Risiko			Pengendalian Risiko
				Frequency	Severity	Risk	
BENCANA EKSTERNAL							
134	Seluruh Area	Gempa Bumi	Kerusakan properti, alat kesehatan, korban jiwa dan terganggunya pelayanan	1	4	4	SOP Gempa Bumi, Simulasi Gempa Bumi
135		Kebakaran	Kerusakan properti, alat kesehatan, korban jiwa dan terganggunya pelayanan	2	5	10	SOP code Red, Simulasi code Red, Alat Proteksi Kebakaran aktif dan pasif
136		Angin Puting Beliung	Kerusakan properti, pelayanan terganggu	1	3	3	SOP
137		Insiden Massal	Kebakaran	3	5	15	SOP
138		Ancaman Bom	Kerusakan properti, alat kesehatan, korban jiwa dan terganggunya pelayanan	1	5	5	SOP, Inspeksi Berkala, Simulasi Ancaman Bom
139	Seluruh Area	Tawuran	Kerusakan properti, alat kesehatan, korban jiwa dan terganggunya pelayanan	1	5	5	SOP
140		Wabah Pandemi	Terganggunya alur pelayanan	3	5	15	SOP, Simulasi

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Figure 1. Example of separated Safety Risk Register file

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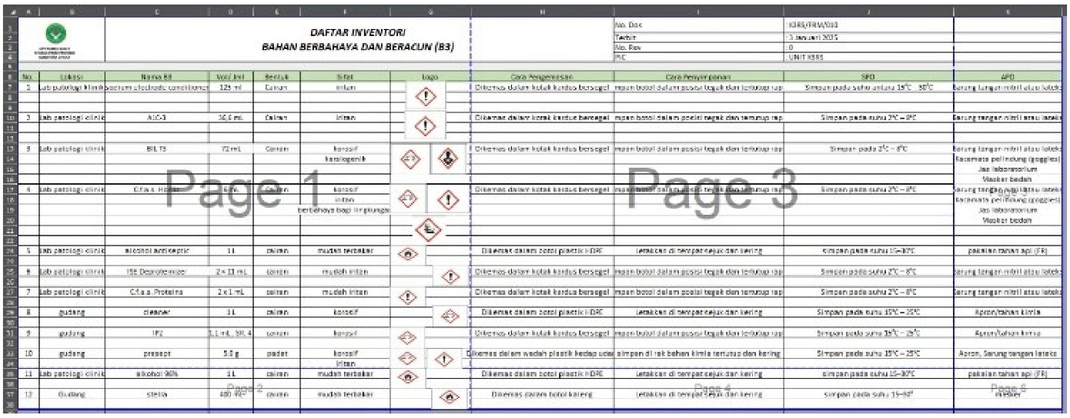
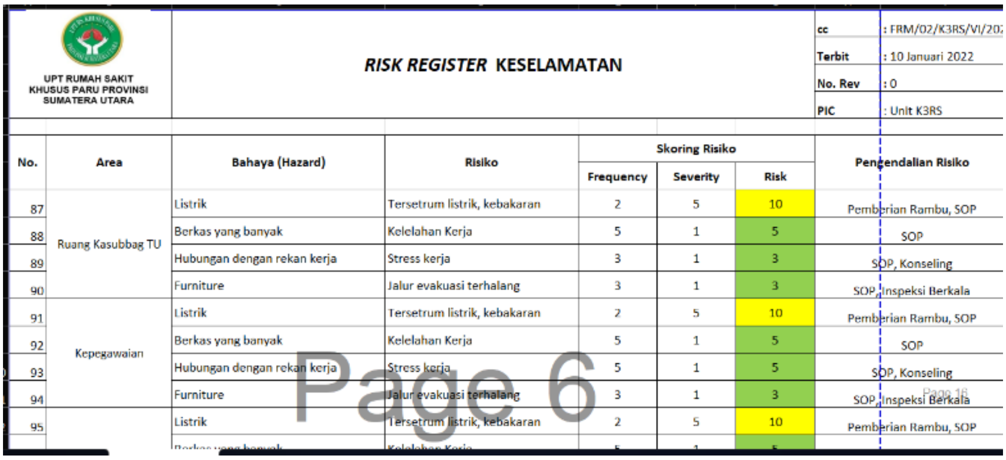


DAFTAR INVENTORI
BAHAN BERBAHAYA DAN BERACUN (B3)

No. Doc	: K3RS/FRM/010
Terbit	: 3 Januari 2025
No. Rev	: 0
PIC	: UNIT K3RS

No.	Lokasi	Nama B3	Vol/ Jml	Bentuk	Sifat	Logo	Cara Pengemasan	Cara Penyimpanan	SPO	APD
1	Lab patologi klinik	sodium electrode conditioner	125 ml	Cairan	iritan		Dikemas dalam kotak kardus bersegel	mpan botol dalam posisi tegak dan tertutup rap	Simpan pada suhu antara 15°C - 30°C	Sarung tangan nitril atau lateks
2	Lab patologi klinik	ALC-3	16,6 mL	Cairan	Iritan		Dikemas dalam kotak kardus bersegel	mpan botol dalam posisi tegak dan tertutup rap	Simpan pada suhu 2°C – 8°C	Sarung tangan nitril atau lateks
3	Lab patologi klinik	BIL T3	72 mL	Cairan	korosif karsinogenik		Dikemas dalam kotak kardus bersegel	mpan botol dalam posisi tegak dan tertutup rap	Simpan pada 2°C – 8°C	Sarung tangan nitril atau lateks Kacamata pelindung (goggles) Jas laboratorium Masker bedah
4	Lab patologi klinik	C.f.a.s. H[illegible]	[illegible]	Cairan	korosif iritan berbahaya bagi lingkungan		Dikemas dalam kotak kardus bersegel	mpan botol dalam posisi tegak dan tertutup rap	Simpan pada suhu 2°C – 8°C	Sarung tangan nitril atau lateks Kacamata pelindung (goggles) Jas laboratorium Masker bedah
5	Lab patologi klinik	alcohol antiseptic	1 L	cairan	mudah terbakar		Dikemas dalam botol plastik HDPE	Letakkan di tempat sejuk dan kering	Simpan pada suhu 15–30°C	pakaian tahan api (FR)
6	Lab patologi klinik	ISE Deproteinizer	2 × 11 mL	cairan	mudah iritan		Dikemas dalam kotak kardus bersegel	mpan botol dalam posisi tegak dan tertutup rap	Simpan pada suhu 2°C – 8°C	Sarung tangan nitril atau lateks
7	Lab patologi klinik	C.f.a.s. Proteins	2 x 1 mL	cairan	mudah iritan		Dikemas dalam kotak kardus bersegel	mpan botol dalam posisi tegak dan tertutup rap	Simpan pada suhu 2°C – 8°C	Sarung tangan nitril atau lateks
8	gudang	cleaner	1 L	cairan	korosif		Dikemas dalam botol plastik HDPE	Letakkan di tempat sejuk dan kering	Simpan pada suhu 15°C – 25°C	Apron/tahan kimia
9	gudang	IPZ	1,1 mL, 5M, 4	cairan	korosif		Dikemas dalam kotak kardus bersegel	mpan botol dalam posisi tegak dan tertutup rap	Simpan pada suhu 15°C – 25°C	Apron/tahan kimia
10	gudang	presept	5,0 g	padat	korosif iritan		Dikemas dalam wadah plastik kedap udara	simpan di rak bahan kimia tertutup dan kering	Simpan pada suhu 15°C – 25°C	Apron, Sarung tangan lateks
11	Lab patologi klinik	alkohol 96%	1 L	cairan	mudah terbakar		Dikemas dalam botol plastik HDPE	Letakkan di tempat sejuk dan kering	simpan pada suhu 15–30°C	pakaian tahan api (FR)
12	Gudang	steria	[illegible]	cairan	mudah terbakar		Dikemas dalam botol kaleng	Letakkan di tempat sejuk dan kering	simpan pada suhu 15–30°	[illegible]

Figure 2. Inventory file of hazardous and toxic materials (B3)



UPT RUMAH SAKIT KHUSUS PARU PROVINSI SUMATERA UTARA

RISK REGISTER KESELAMATAN

cc	: FRM/02/K3RS/VI/202
Terbit	: 10 Januari 2022
No. Rev	: 0
PIC	: Unit K3RS

No.	Area	Bahaya (Hazard)	Risiko	Skoring Risiko			Pengendalian Risiko
				Frequency	Severity	Risk	
87	Ruang Kasubbag TU	Listrik	Tersetrum listrik, kebakaran	2	5	10	Pemberian Rambu, SOP
88		Berkas yang banyak	Kelelahan Kerja	5	1	5	SOP
89		Hubungan dengan rekan kerja	Stress kerja	3	1	3	SOP, Konseling
90		Furniture	Jalur evakuasi terhalang	3	1	3	SOP, Inspeksi Berkala
91	Kepegawaian	Listrik	Tersetrum listrik, kebakaran	2	5	10	Pemberian Rambu, SOP
92		Berkas yang banyak	Kelelahan Kerja	5	1	5	SOP
93		Hubungan dengan rekan kerja	Stress kerja	5	1	5	SOP, Konseling
94		Furniture	Jalur evakuasi terhalang	3	1	3	SOP, Inspeksi Berkala
95		Listrik	Tersetrum listrik, kebakaran	2	5	10	Pemberian Rambu, SOP

Figure 3. Inspection checklist files used every two days

These examples show how the OSH reporting system was dispersed across various Excel sheets without linkages, creating administrative burdens and reducing the hospital's responsiveness to potential hazards. The conditions were inconsistent with recommended hospital safety management practices, which emphasize standardized, real time, and easily traceable documentation (WHO, 2019).

Results of System Development: Integrated Excel Planner Structure

Following the identification of weaknesses, an integrated Excel Planner system was designed using a Research and Development (R&D) approach. The system utilized Microsoft Excel as its core platform due to its accessibility, low cost, and compatibility with existing hospital technology. The development process resulted in a multi sheet structured template that centralized all OA and OD records while providing analytical tools for risk monitoring. The Excel Planner consists of six primary components:

1. Employee Data Sheet, containing demographic and job related information.
2. OA Reporting Sheet, recording details of occupational accidents.
3. OD Reporting Sheet, documenting suspected or confirmed occupational diseases.

4. Analysis Sheet, using pivot tables and filters for trend analysis.
5. Dashboard Sheet, providing visual summaries of key indicators.
6. Reporting Sheet, generating monthly and annual summaries.

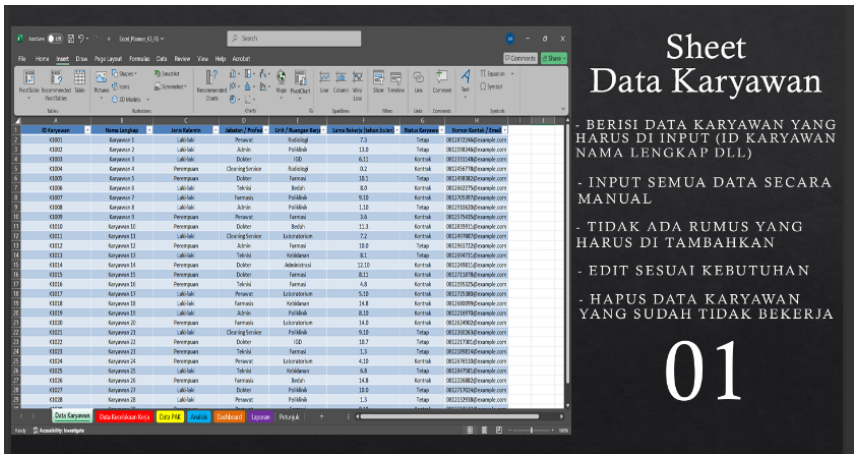


Figure 4. Employee Master Sheet

This sheet consolidates all worker information, enabling automatic linking across other sheets and reducing repeated data entry.

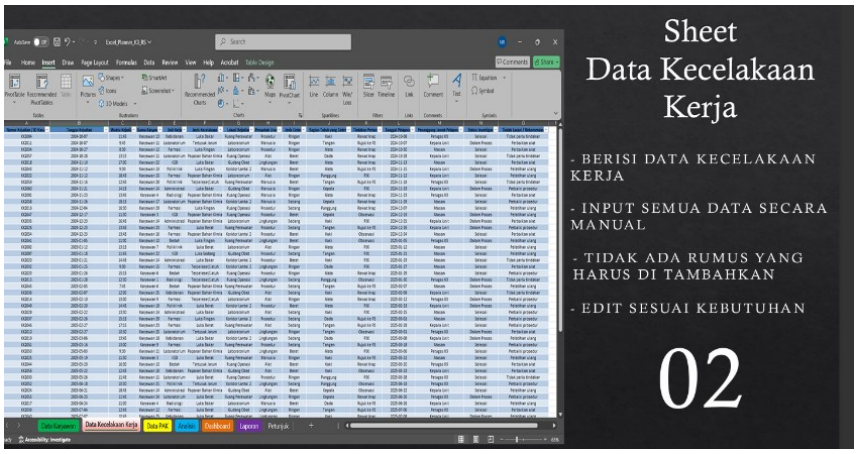


Figure 5. Occupational Accident (OA) Reporting Sheet

This component uses standardized fields for incident type, location, severity, and corrective action, ensuring consistency across reports.

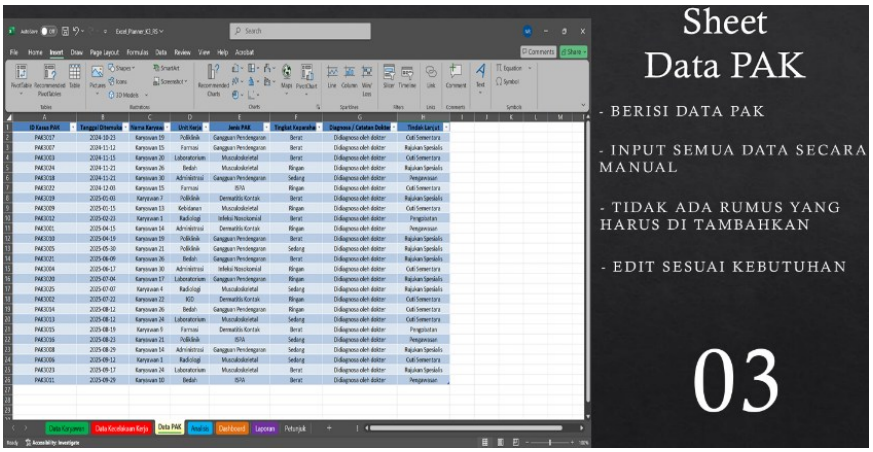


Figure 6. Occupational Disease (OD) Reporting Sheet

This sheet facilitates the documentation of symptoms, suspected exposures, and clinical findings, supporting early detection of OD risks.

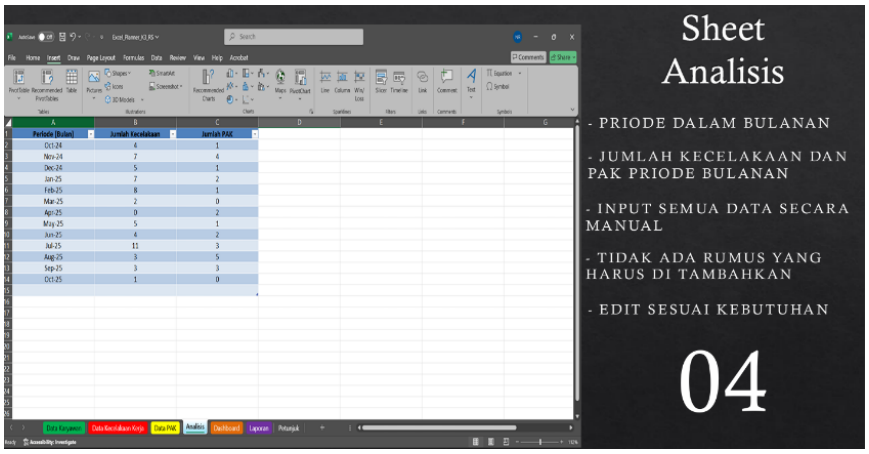


Figure 7. Analysis Sheet (Pivot Table and Filters)

This analytical module allows the OSH team to explore patterns, such as high risk units or recurring hazard sources, enabling targeted interventions.

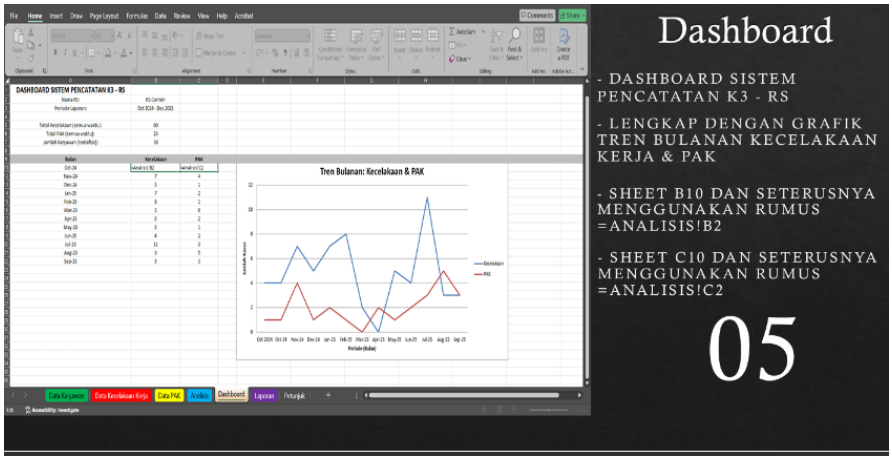


Figure 8. Dashboard Sheet (Visual Summary)

This dashboard presents key metrics including monthly OA frequency, OD trends, severity categories, and high risk areas in a visual format.

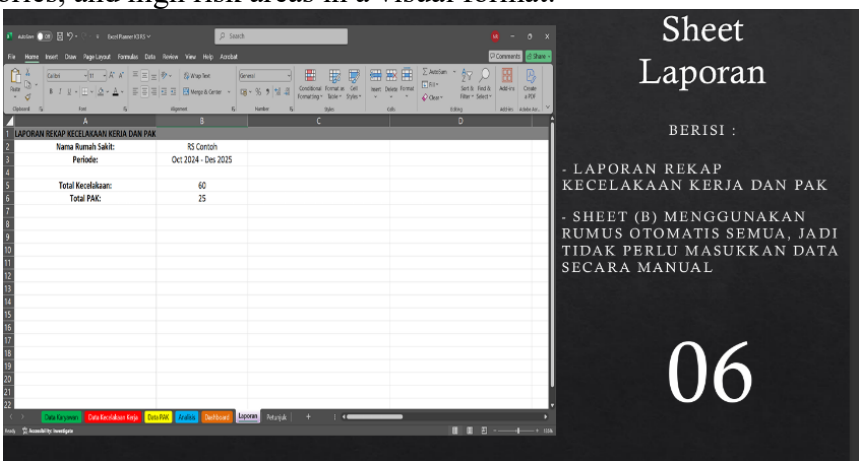


Figure 9. Automated Reporting Sheet

This sheet generates formatted summary reports for leadership review, facilitating faster decision making. Overall, the integrated structure transforms fragmented manual files into a streamlined, user centered digital system, addressing the second research objective related to system development.

Improvements Achieved After System Implementation

The implementation of the Excel Planner resulted in significant advancements in OSH reporting performance. The most notable improvement was in reporting timeliness, where the average submission time decreased from three days to one day. This acceleration reflects more efficient workflows, reduced duplication, and easier data entry made possible by the integrated system. Another critical improvement was the increase in data completeness, rising from 65% in the manual system to 95% after implementation. The use of mandatory fields, dropdown lists, and automated validations helped prevent missing data and minimized the possibility of inconsistent entries. This increase in completeness also strengthened the reliability of trend analyses and root cause identification.

In addition to these improvements, the integrated dashboard enabled clear visualization of OA and OD trends over time. Monthly OA patterns, severity fluctuations, and the emergence of recurring OD symptoms could be observed through line charts and bar graphs. These visual trends helped the OSH team detect spikes in particular months, identify seasonal variations, and recognize units with consistent increases in incident frequency. The visualizations provided stronger evidence for targeted interventions and helped leadership understand the trajectory of workplace risks in a more intuitive manner.

Furthermore, the system enhanced worker participation in reporting occupational incidents. The clearer structure and ease of access encouraged staff to submit reports more proactively, resulting in higher frequencies of early hazard identification. This aligns with previous findings indicating that user friendly digital systems increase engagement and safety culture within hospital environments (Haniffudin, 2021). Excel's analytical functions, including pivot tables and graphical tools, played a central role in elevating OSH team capabilities. Through the Analysis Sheet, the team was able to identify recurring hazard patterns, such as specific units with frequent minor injuries or recurring chemical exposure

risks. These insights informed evidence based preventive strategies, leading to more targeted inspections and corrective actions.

The integrated dashboard further supported managerial decision making by presenting real time visualizations of incident trends. This allowed OSH leaders to detect spikes in OA or OD cases more quickly and respond accordingly. The dashboard also facilitated communication with stakeholders by providing clear, concise visual reports during monthly coordination meetings.

Discussion: Interpreting the Impacts on Safety Culture and System Performance

The improvements observed through the implementation of the Excel Planner align strongly with established literature on digital reporting systems in healthcare. Studies have consistently emphasized that accessible and standardized reporting tools enhance worker participation and reduce administrative errors (Haniffudin, 2020; Depi & Yulyanti, 2021). The findings of this study reinforce these claims by demonstrating significant gains in accuracy, timeliness, and completeness. From a managerial perspective, the reduction in reporting time is particularly important. Faster reporting allows quicker corrective actions, reducing the likelihood of incident recurrence and improving hazard control. This aligns with OSH management principles that emphasize early detection and timely intervention as key components of effective risk mitigation.

The improvement in data completeness also demonstrates the value of structured templates. In manual systems, inconsistencies often arise from varying staff practices or time pressure, resulting in incomplete records. The Excel Planner addresses this through data validation and uniform layouts, which reduce ambiguity and standardize documentation practices across all units. The system also contributes to strengthening the hospital's safety culture. Increased reporting frequency suggests that staff feel more supported and confident in documenting incidents. A strong safety culture is correlated with lower injury rates, as organizations with open reporting practices can detect and address hazards earlier.

Despite these successes, some challenges remain. Resistance to change was observed among senior staff who were accustomed to manual documentation. This is consistent with findings from the Ministry of Health, which reports that digitalization efforts in hospitals often face cultural and generational barriers. Continuous training, supportive supervision, and gradual integration into daily routines are recommended to overcome this challenge. Another important limitation of the system is the subjectivity of data input, as the accuracy of OA and OD reports still depends on the precision and honesty of staff during documentation. In addition, the system remains dependent on users' Excel skills, meaning that variations in digital literacy can influence data quality, increase the risk of incorrect entries, and potentially hinder the system's optimal use.

Another area for improvement is the long term sustainability of the system. Although Excel provides a practical and flexible platform, periodic updates to the template and continuous technical support are essential to ensure relevance. Integration with broader hospital information systems, such as SIRKAS, would further enhance data flow and minimize manual entry. Additionally, developing a real time dashboard accessible across devices would elevate the system to higher levels of digital maturity.

CONCLUSION

The development and implementation of the integrated Excel Planner based recording system successfully addressed the core challenges in the hospital's manual Occupational Accident and Occupational Disease reporting process by replacing scattered and inconsistent documentation with a centralized, standardized, and user friendly digital template that improved reporting accuracy, completeness, and timeliness at UPTD Special Lung Hospital Medan. Although the system demonstrated significant benefits, several limitations remain, including a relatively short implementation timeframe that restricts long term evaluation, the absence of large scale testing across hospitals with different characteristics, and continued dependence on staff Excel skills which may influence data quality. Nonetheless, the findings emphasize important policy implications, particularly the potential for simple and low cost digital systems to strengthen OSH reporting in other healthcare settings, suggesting that similar Excel based tools could be adopted by various types of hospitals as part of broader efforts to enhance digitalization, standardize documentation practices, and promote a more proactive safety culture.

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