ISSN 2085-4579

Needle Stick Injury Report Application Design at XYZ Hospital in Tangerang

Haditya Setiawan[1], Suryasari[2]
[1,2] Program Studi Sistem Informasi, Universitas Multimedia Nusantara, Tangerang, Indonesia
haditya.setiawan@lecturer.umn.ac.id
suryasari@umn.ac.id

Accepted on September 25th, 2025
Approved on December 24th, 2025

Abstract — **Needlestick injuries are common among healthcare workers. There is a potential risk of transmitting HBV, HCV, and HIV infections to healthcare workers due to needlestick accidents. At XYZ Hospital, reporting is done manually using paper-based forms that must be completed and submitted to other departments. To expedite the process, the forms are photographed and sent via WhatsApp. Manual reporting is still considered inefficient, so a web-based reporting application was created that can be accessed quickly and easily via mobile phones, tablets, and laptops. To ensure the project meets user needs, this application is created using a prototyping methodology, so that it can be completed on time according to user needs. By implementing a web-based reporting application, reporting, tracking, and documentation can be simplified and streamlined by reducing physical/paper documents and shifting to digital documents. This could simplify the reporting process and organize archives efficiently using digital technology.**

Keywords — **Application, Hospital, Needle Stick Injury, Prototype, Web Responsive, Website.**

I. PRELIMINARY

Safety, security, and health are important things that need to be achieved in various types of work. To achieve safety, security, and health in the workplace, it is necessary to pay attention to several factors that can endanger workers. Based on research conducted by Wayan et al [1], workload, work stress, and sleep quality have a significant impact on work fatigue so that it can have a fatal impact on worker safety. At the end of 2019, the world of health was overwhelmed by the Corona Virus Disease 2019 or also known as COVID-19. COVID-19 has caused a global health crisis, Indonesia is also not immune to the transmission of COVID-19. In March 2020, the COVID-19 pandemic hit Indonesia, resulting in an increase in infection cases. The increase in patients also had an impact on health workers. Based on research conducted by Hendrastutik et al [2] regarding the Prevention of Covid-19 Transmission in Health Workers at Sebelas Maret University Hospital, one of the problems experienced by health workers is fatigue due to the increase in patients and busy schedules.

According to Dadan et al [3], the impact of fatigue on healthcare workers is negligent actions (unsafe actions) that can lead to needle stick injuries. According to Chiarello et al [4], needle stick injuries are a term used to describe injuries caused by needles or other sharp medical instruments contaminated with patient blood. Needle stick injuries themselves have a significant impact on healthcare workers' health, such as the risk of contracting diseases present in the patient's blood.

At XYZ Hospital in Tangerang, needle stick injuries are also common among healthcare workers. One contributing factor is the busy schedules of healthcare workers, which leads to fatigue and negligence, which can have fatal consequences, such as needle stick injuries.

According to Brela et al [5], there are several potential risks of transmission through needle stick injuries accident to healthcare workers include infection with Human Hepatitis B Virus (HBV), Human Hepatitis C Virus (HCV), and Human Immunodeficiency Virus (HIV). According to Amilah, incidents with acute impacts resulting from needle stick injuries are more common among hospital workers than in other occupations [6]. With the probabilities of HIV of 4:1000, HBV of 27-37:100 and HCV of 3-10:100 [6].

Based on the needle stick injury reporting guidelines published by the Faculty of Medicine at sebelas maret university, contaminated needle stick injuries must be immediately disinfected with isopropyl 70% alcohol antiseptic, then washed with flowing water and soap or antiseptic [7]. Reports should then be made to superiors, the Patient and Public Involvement (PPI) Committee, and the Hospital Workers Health and Safety Care or well known as “Kesehatan dan Keselamatan Kerja Rumah Sakit” (K3RS). In the next steps, the HIV/HBV and HCV status will then be determined based on the source of exposure/infection. The K3RS procedures is needed to be implemented properly to minimize various cases of work accidents [8].

According to an article published on the Sardjito Hospital website, exposed personnel are required to report to the person in charge of the room or the person in charge of supervising care [9]. Needle stick injuries reporting is generally still done by manual process, it’s all done by delivered the consultation letter from the doctor in charge. Healthcare workers who experience needle stick injuries accident must done the reporting

activities to the internal medicine clinic during working hours, if the accident happened in off-hour, they needed to do the reporting to the Emergency Department (ED) for further treatment [6]. At XYZ hospital, reporting is done manually using paper-base form that must be completed and submitted to other departments that handle the needle stick injury reporting. To expedite the process, the form is photographed and sent via WhatsApp.

In the reporting and documentation process, there are several things need to be included such as the time, day, and date accident happened, location, chronology of the incident, the exposed area, the cause, the source of exposure (blood, feces, or urine), and the volume of exposure/contaminations. The status of the exposed healthcare worker (patient with a history of certain medical conditions) will then be determined. After determining the healthcare worker's status as a patient, the exposed healthcare worker's status will be determined whether they infected by hepatitis B or not. If the source of exposure is unknown, HCV, HIV, and HBV status will be examined. If the exposed healthcare worker is free of HCV, HBV, or HIV and is not in the incubation period, no special action is required, but counseling is still permitted if there is any doubt [6].

At XYZ Hospital, the reporting process is carried out by standard procedures, but the reporting system is done manually, which can be time-consuming. Given the need for immediate treatment, a computerized system is needed to make the reporting easier and digitize reporting to make it more efficiently. According to Cusumano et al [10], digitalize documentations are essential for improving data quality and standardization for automation.

According to Scott et al [11], digitizing hospital records reporting will be more consistent and clear, and it can optimize the reliability and usability of digital medical records, even for internal employee medical records, such as needlestick injuries.

Based on case at XYZ Hospital, reporting needs to be done quickly, so website-based reporting was chosen. Using a web-based application is considered easier because it can be accessed from a hospital desktop, a personal laptop, a tablet, or a mobile device like a cell phone/mobile phone. By using a web-based application, it allows faster reporting without the need to install any software.

II. *METHODOLOGY*

The project will be carried out using the prototype methodology, which is a methodology that focuses on the main functions and initial testing. This methodology has proven effective in creating applications within a limited time and is able to meet user needs as shown in the creation of the Syllabus Management System and Coordinator Recommendation System application at Multimedia Nusantara University [12]. In the “Syllabus Management System and Coordinator Recommendation System application at Multimedia Nusantara University” project development, the prototype methodology has proven to be able to be used to build web-based applications that focus in detail on user needs.

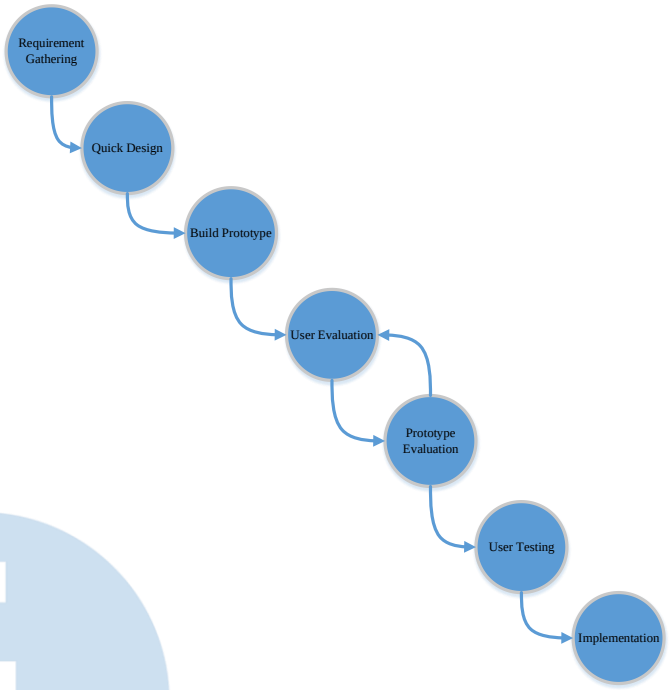

Fig. 1 7 steps prototype methodology

The prototype methodology consists of 7 steps as shown in fig 1, here are the 7 steps.

1. In the initial stage, Requirement Gathering will be carried out to obtain user needs, after which analysis and design will be carried out related to the requirements obtained.
2. In the second stage, a Quick Design will be conducted so that users can view and check the input and output in the draft/sketch as a form of confirmation to the user. At this stage, users will check and confirm the completeness of the application in draft/sketch form.
3. In the third stage, a prototype will be created based on a draft/sketch in the form of a usable application (demo app).
4. In the fourth stage, the prototype will be evaluated by the user. At this stage, the user will determine whether the prototype meets their needs or not. If the prototype does not meet these requirements, revisions will be made to the previous stage.
5. In the fifth stage, the prototype will be evaluated and improvements made to better meet the project's needs. Iterations will occur at this stage, repeating the process until the prototype meets user expectations.
6. In the sixth stage, user testing is conducted. If there are still deficiencies, further improvements will be made.
7. In the seventh stage, implementation and maintenance are carried out to ensure the application can be used by all users in real time. Regular

maintenance is performed to ensure the project runs smoothly in the future.

Prototypes, also known as "Proof of Concept," emphasize the successful achievement of the main idea or concept, rather than a perfect final product. This is because the website-based application being developed needs to focus more on its functionality as a reporting application. By using the prototype methodology, the project can be completed by a relatively small development team, thus reducing costs.

III. RESULTS

1. In the initial stage, user requirements were gathered through documentation samples and user needs analysis. Users explained that the current needlestick injury reporting system was paper-based and manual, and the system was difficult to monitor due to the loss of paper documentation.

Furthermore, in the reporting standards based on the documentation sample provided there is information/data that must be filled in and meet standards. In addition, there is some additional information related to the needs of XYZ Hospital. Some of the standard information required includes:

a. The date of incident happened, uses the time of reporting as the default for user convenience but can be changed according to the time of the incident.
b. The date of reporting, by using the time of the report submitted based on system date and cannot be changed manually.
c. Victim identification data including the victim's name, telephone number, occupation, location of the incident, immediate supervisor, and the supervisor's telephone number.
d. Route of exposure, users can choose several option due to route of exposure, bite, mouth (exposure via oral splashes), skin injury, eye (exposure via splashes to the eye), and other options that can be filled in by the user.
e. Source of exposure that can be filled with text. In the process, all forms of date and time will use the current default date and time so that it can make input easier for users.

Users also need an article features to post any information about prevention and treatment methods for workers who experience needle stick injuries. The article also required multiple images inside the content to improve the reader experience with rich text format by adding picture or graphic, tables, videos and other rich formats just like an article.

This web apps has 2 types of users : as a User and an Admin.

1. Users can use the apps as a reporting system for needle stick injuries. Additionally, users can read articles on the website about initial treatment steps and steps to prevent needle stick injuries.
2. Admin uses the application to receive reports submitted by the users. These reports will then be followed up on or added to a list of monitored users. Additionally, admin can input articles to help users better understand how to handle and anticipate needle stick injuries.

When a needle stick injury incident happened, users can report it by filling out a digital form on the website, either personally or with the assistance of another healthcare professional.

After reporting, the needle stick injury wound will be treated by professional while the report will be received by an administrator. The administrator will then review the report and action taken to ensure the users receives an appropriate safety precautions.

Admin can print/download the report form format according to the hospital's standard format and mark the report status as has been handled/complete/done.

2. Based on the user requirements, the process continues to the second stage. The quick design conducted by using HTML & CSS to build the reporting input form and output based on the required data in previous stage as showed in figure 2. This step focuses on the NSI reporting input form and output design to ensure the design meets user needs.

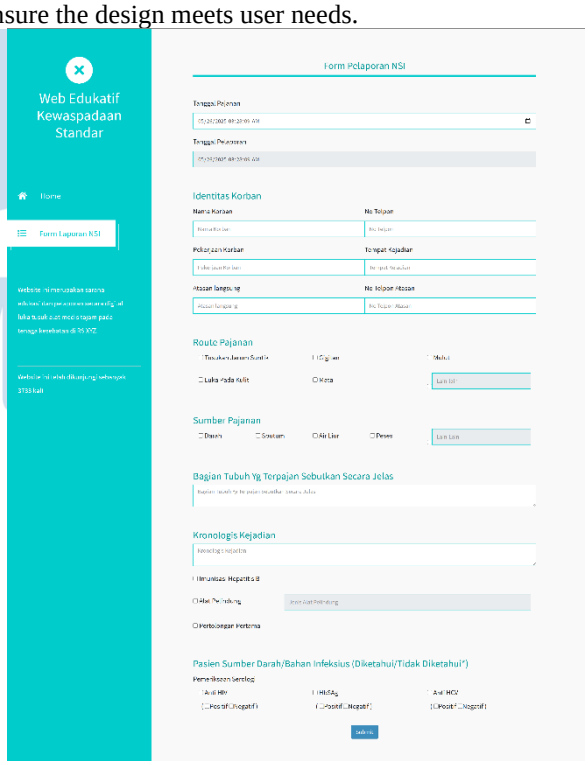

Fig. 2 Needle stick injury reporting form in desktop view mode

The application made using a web-based application to make it accessible from any device such as hospital desktop/PC, a personal laptop, a tablet, or a mobile device like a cell phone. Further more the website needed responsive features to fit the desktop or mobile phone view mode as showed in figure 3. To achieve responsive technology, bootstraps are used. Bootstraps

are used to create websites using a 12 column grid system produces a website layout that automatically adjusts to the width of the user's browser [13].

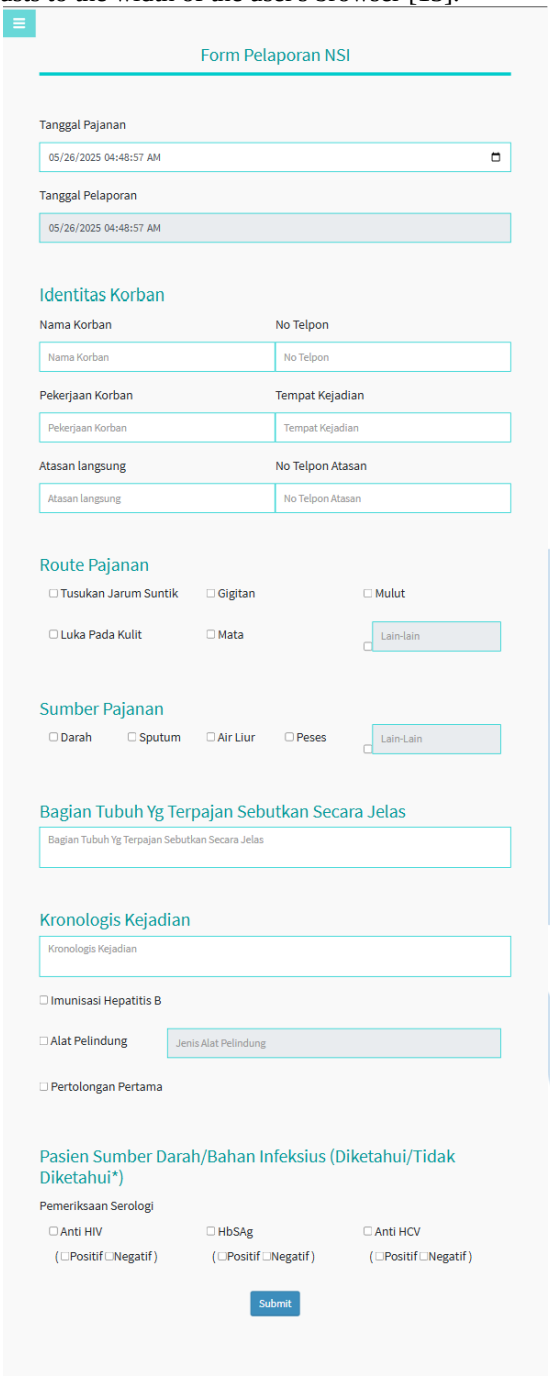

Fig. 3 Needle stick injury reporting form in mobile view mode

To ensure that the output has exactly the same design as the official form, layout adjustments are made to ensure the design is appropriate as showed in figure 4. The output format stored in the database and can be accessed via website, and can also be printed or saved in PDF format.

FORMULIR LAPORAN INSIDEN TERTUSUK JARUM/TERPANJAN CAIRAN TUBUH

Tanggal Pelaporan : 2025-05-26 Jam : 05:05:04
Tanggal Pajanan : 2025-05-26 Jam : 05:03:04

Identitas Korban :
Nama : Yuni
Pekerjaan : Dokter
Atasan Langsung : dr. Amirudin
No Telp : 081234567890
Tempat Kejadian : IGD Bed 1
No. Telp. Atasan : 08098765432 1

Route Pajanan :
☑ Tusukan Jarum Suntik ☐ Gigitan ☐ Mulut
☑ Luka Pada Kulit ☐ Mata ☐ Lain-lain

Sumber Pajanan :
☑ Darah ☐ Sputum ☐ Air Liur ☐ Peses ☐ Lain-lain

Bagian Tubuh Yang Terpajan Sebut Secara Jelas :
Lengan tangan kanan

Kronologi Kejadian :
Jarum suntik bekas pasien terlepas dan tertusuk secara tidak sengaja

- Imunisasi Hepatitis B Sudah ~~Belum~~
- Alat Pelindung Dipakai ~~Tidak~~ Jenis APD standard
- Pertolongan Pertama Ada ~~Tidak~~

Pasien Sumber Darah/Bahan Infeksius (Diketahui/Tidak Diketahui*)
Pemeriksaan Serologi
☑ Anti HIV (~~Positif/Negatif~~) ☐ HbSAg (Positif/Negatif) ☐ Anti HCV (Positif/Negatif)

Mengetahui
Atasan Langsung

Tanggal : 2025-05-26
Pegawai Terpajan

(_____) (_____)

Fig. 4 NSI report output format

3. The process then continues to the third stage. Build prototype conducted by using HTML & CSS continues the previous process by combining with Javascript to make the webpage more interactive and PHP & MySql as the server side combined to make the website complete.

In this step the website build using a PHP custom framework. This framework could generate backend UI, database query connectivity, security, encryption etc easily. The custom framework is also lighter to run on servers with low specs.

Apart from the primary features, there are also article feature requirements. Based on those requirements, the article features need rich text format. To meet these requirements, What You See Is What You Get (WYSIWYG) technology is used to make things easier for the users to add images within text, list items/bullets for steps, highlight text with colour, colorize text, bold text, underline text, resize text, etc as showed in figure 5. Thus WYSIWYG features also make the audience easier to understand the articles [14]. NicEdit was chosen as the WYSIWYG plugin used in this project, because NicEdit is a WYSIWYG integrated with the custom framework. Also NicEdit is a Lightweight, Cross Platform, Inline Content Editor for web.

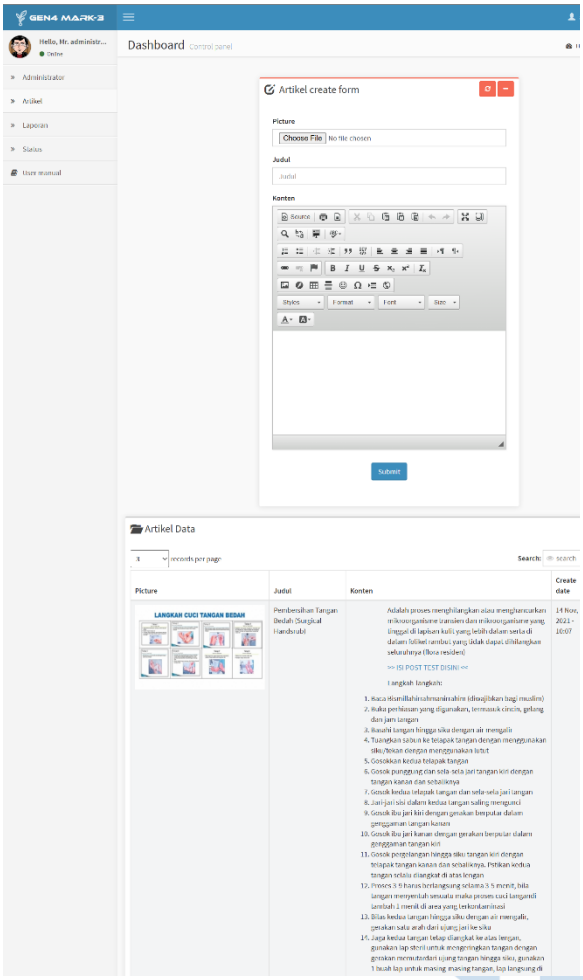

Fig. 5 The admin article input page with WYSIWYG feature

The submitted articles are showed in tiles form with a limit of 6 content per page as shown in figure 6.

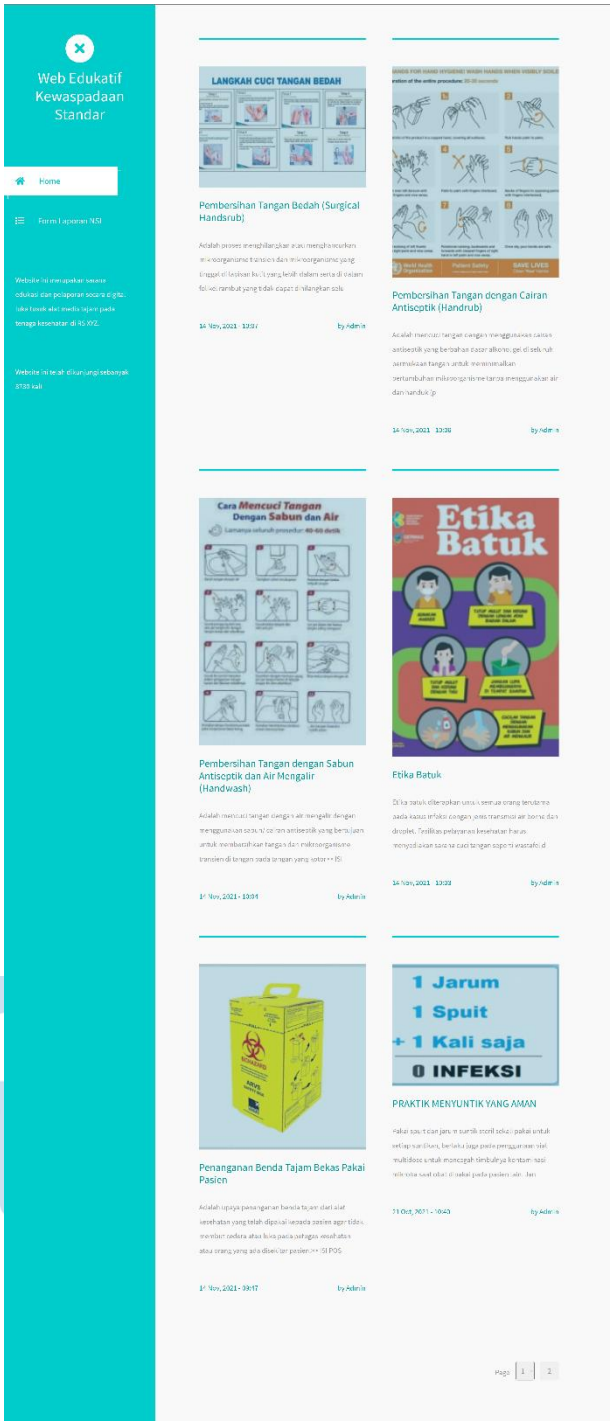

Fig. 6 Articles page in the front page showed in tiles format with a limit of 6 content per page

The posted articles also need to be displayed exactly as the admin inputs, so the WYSIWYG feature also needs to be adjusted on the front page as showed in figure 7.

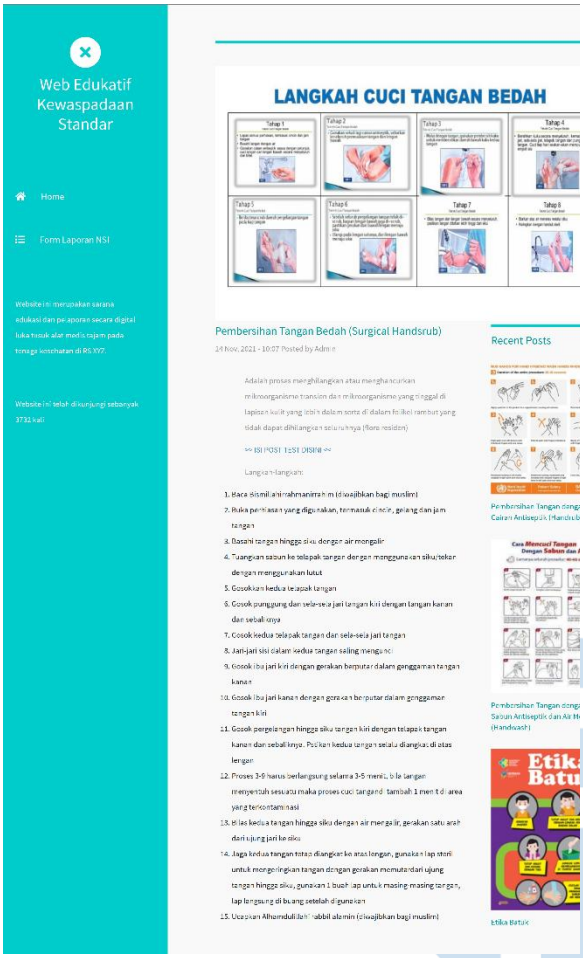

Fig. 7 Article details page showed in the front page

In the admin reporting page which shown in figure 8, there's main feature for receiving and monitoring the needle stick injury report. On this page, the admin can download the reports in PDF format or print them as shown in figure 4. Admin can also mark the NSI victim report as handled (Sudah ditangani).

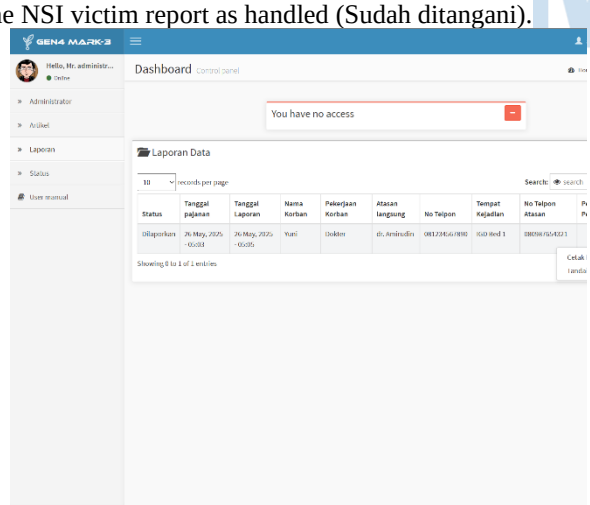

Fig. 8 Admin report page

4. The process then continues to the fourth stage. The user evaluates pages that do not meet expectations and then makes changes until they meet the user expectations. During the evaluation process, the front page of the article is adjusted to meet user needs, such as the font format which is required to follow the website font standard to standardize the format by disabling the feature to change the font face on the WYSIWYG admin page.

5. The process then continues to the fifth stage. The prototype is evaluated by collecting direct feedback based on a demo given to 1 user to identify incompatibility in both design and features. In this step, the user requests to simplify the data displayed on the admin report page and only provide a mark as handled (Sudah ditangani) button as shown in figure 8.

6. In the sixth stage, users perform testing to ensure the website is functioning properly. This stage runs smoothly on both mobile devices and laptops.

Because this website has quite simple features, the users have no difficulty in using it. The WYSIWYG feature is also similar to the typical Word application, making it easier to use.

7. The process then continues to the seventh stage. Implementation conducted to make sure the user understand how to use and access the entire system.

This web app is implemented online so it can be used anywhere using any kind of networks (The hospital Wifi or the users personal mobile networks) to make it easier to be accessed. However, the web app link will not be published as global website as it is intended for use only at XYZ Hospital.

To make it accessible for all the users smartphone and tablets there is will be a Quick Response (QR) code in every serving desk, all the users needed to do just scan through their smartphone or tablets. By using QR codes requires no specific or additional hardware for scanning and visualization (just a mobile device) to implement the desired functionality [15], since QR codes can be applied in a variety of scenarios, such as access website applications by scanning the QR codes. For the PC users, there will be a shortcut link and bookmark. All the PC users have to do is click the shortcut and the web apps will be appeared.

After the implementation, users found that reporting needle stick injury become easier and the documents stored more effective because they were digitalized, and they able to searches it quickly. The observed healthcare workers can easily be tracked through the application by viewing users who have not set as "Done" yet by filtering the data.

Compared to the previous manual reporting system, the previous manual reporting is considered quite difficult because the user needed to take a reporting form in paper form and write it down manually, then the tracing process also become easier because the observed healthcare workers are listed and can be sorted by name, status, exposure date, report date, and status. Admins can also search using the search bar, as shown in Figure 6. Furthermore, archives can be printed or downloaded as PDFs in hospital-standard formats and stored in a computer folder, so they don't get mixed up with other files and become difficult to find later.

IV. CONCLUSION

Most healthcare institution choose not to create apps for small systems like needle stick injury reporting. They prefer to use existing facilities like paper reporting and sending it via WhatsApp. By doing so, documentation can become messy and difficult to track, which can become a big problem later on. In this paper, a web application for reporting needle stick injuries was created to simplify reporting and simplify documentation and tracing.

By using a web-based reporting system, the reporting process is able to access anytime through any device anywhere. This could simplify the reporting process and organizes archives efficiently using digital technology.

The needle stick injury reporting application is a highly efficient tool for reporting needle stick injuries. This has been proven by the fact that tracing needle stick injuries is more organized and coordinated by both the admin and the user, eliminating the clutter of documents by turn it into digital files and allowing for efficiency and orderly monitored through the applications.

Besides the application itself, user awareness also needs to be increased through educational articles that can be added to the website.

As a suggestion for future development, a web application with a small system like Needle stick injury report can also be created and implemented in hospitals or other healthcare institutions, making it easier for other hospitals to handle all kinds of reporting, tracking, observation, and maintenance of documentation properly by reducing physical/paper documents and switching to digital documents.

REFERENCE

[1] N. W. Dimkatni, O. J. Sumampouw, and A. E. Manampiring, "Apakah Beban Kerja, Stres Kerja dan Kualitas Tidur Mempengaruhi Kelelahan Kerja pada Perawat di Rumah Sakit?," *Sam Ratulangi J. Public Heal.*, vol. 1, no. 1, p. 009, 2020, doi: 10.35801/srjoph.v1i1.27273.

[2] H. Apriningsih, N. A. Prabowo, R. Myrtha, C. S. Gautama, and M. M. Wardani, "Prevention of Transmission of Covid-19 in Health Workers in Sebelas Maret University Hospitals," *J. Ilm. Pengabdi. Kpd. Masy.*, vol. 4, no. 2, pp. 556–564, 2020.

[3] D. Sungkawa, R. Ginanjar, and A. Asnifatima, "Accident Investigation Needle Stick Injury Pada Petugas Medis Dan Non-Medis Di Bmc Maya Pada Hospital Tahun 2019," *Promotor*, vol. 3, no. 3, pp. 222–230, 2020, doi: 10.32832/pro.v3i3.4171.

[4] L. Chiarello *et al.*, "Preventing needlestick injuries in health care settings," 1999.

[5] B. A. Motulo, P. A. T. Kawatu, and E. M. Mantjoro, "Hubungan Pengetahuan dan Sikap Terhadap Kecelakaan Kerja Tertusuk Jarum Suntik pada Perawat di Rumah Sakit Anugerah Tomohon," *J. KESMAS*, vol. 11, no. 5, pp. 137–142, 2022, [Online]. Available: https://ejournal.unsrat.ac.id/index.php/kesmas/article/view/41675

[6] A. E. Putri, "ANALYSIS OF RISK FACTORS FOR NEEDLE STICK INJURY IN NURSES AT RSUP DR. WAHIDIN SUDIROHUSODO MAKASSAR," UNIVERSITAS HASANUDDIN MAKASSAR, 2023.

[7] Fakultas Kedokteran Universitas Negeri Sebelas Maret, "ALUR PELAPORAN TERTUSUK JARUM." Accessed: Jan. 10, 2025. [Online]. Available: https://prodiprofesidokter.fk.uns.ac.id/archives/589

[8] Z. Meutia, "Pengaruh Kesehatan dan Keselamatan Kerja Terhadap Kinerja Karyawan Pada Rumah Sakit Malahayati Medan," *Informatika*, vol. 9, no. 3, pp. 120–128, 2021.

[9] RS Sardjito, "Jangan Anggap Remeh Kasus Needle Stick Injury." Accessed: Jan. 20, 2025. [Online]. Available: https://sardjito.co.id/2019/06/24/jangan-anggap-remeh-kasus-needle-stick-injury/

[10] L. Cusumano, O. Farmakis, M. Granath, N. Olsson, and R. Rempling, "Current benefits and future possibilities with digital field reporting," *Int. J. Constr. Manag.*, vol. 25, no. 5, pp. 572–583, 2025, doi: 10.1080/15623599.2024.2340923.

[11] P. J. Scott, P. J. Curley, P. B. Williams, I. P. Linehan, and S. H. Shaha, "Measuring the operational impact of digitized hospital records : a mixed methods study," *BMC Med. Inform. Decis. Mak.*, pp. 1–13, 2016, doi: 10.1186/s12911-016-0380-6.

[12] Jovanca, Suryasari, H. Setiawan, and Wella, "Syllabus Management System and Coordinator Recommendation System on Universitas Multimedia Nusantara," in *2023 8th International Conference on Business and Industrial Research (ICBIR)*, 2023, pp. 597–602. doi: 10.1109/ICBIR57571.2023.10147476.

[13] J. Wiratama, F. Adline, and T. Tobing, "Analysis and Design of an Web-Based Ticketing Service Helpdesk at Food and Packaging Machinery Company," *Ultim. InfoSys J. Ilmu Sist. Inf.*, vol. 13, no. 1, 2022.

[14] J. Galindo-losada, C. Ayala-tipan, M. Santórum, M. Carrión-toro, and P. Acosta-vargas, "WYDISWYG : A Method to Design User Interfaces Combining Design Principles and Quality Factors," pp. 1–15, 2023.

[15] R. Hernando and J. A. Macías, "Development of usable applications featuring QR codes for enhancing interaction and acceptance : a case study," *Behav. Inf. Technol.*, vol. 0, no. 0, pp. 1–19, 2022, doi: 10.1080/0144929X.2021.2022209.