RESEARCH ARTICLE

E-Knowledge Module Development with Sprint Method in Dr. Ramelan Navy Hospital

Indarti Caecilia*, Saerah Siti**, Chalidiyanto Djazuli***
*Department of Dental Public Health, Faculty of Dentistry, Hang Tuah University
**Ramelan Navy Hospital Surabaya
***Faculty of Public Health, Master Program Health Policy Administration Program, Airlangga University

ABSTRACT

Background: *Hospitals need to manage document systems well. Dr Ramelan Navy hospital only 15% of the training materials have been documented. Knowledge of basic infection control programs only reached 57.2% and effective communication reached 56%.* ***Objective:*** *The purpose of this study is to analyze the factors causing the documentation of training materials under the standard, to determine solutions to improve the documentation of training materials to reach the standard and to develop an activity plan in overcoming the problem of documentation of training materials that have not reached the standard.* ***Methods:*** *This study uses the analytical observational method. The method used is the Problem Solving Cycle (PSC) approach. Data obtained through interviews, observations, and documentation in several departments and work units, then processed through a number of stages in overcoming the problem of documentation of training materials. Problems are solved by using a problem solving cycle approach with five stages of problem analysis, strategy design, development strategy, implementation, monitoring, evaluation and feedback. Solution of problems with the development of knowledge modules in hospital management information system.* ***Results:*** *The results at the strategy development stage of the development of the module named E-Knowledge was developed using the Sprint method with five stages of map, sketch, divide, prototype and test.* ***Conclusion:*** *E Knowledge increase knowledge and improve personnel performance.*

Keywords: Problem solving cycle, E knowledge, Sprint method

Correspondence: *Indarti Caecilia, Department of Dental Public Health, Faculty of Dentistry, Hang Tuah University, Jl. Arif Rahman Hakim 150, Surabaya, Indonesia. Phone: 08124678171. Email: caeciliaindarti@ymail.com*

INTRODUCTION

Dr. Ramelan Navy Hospital is a public health service provide managed the Indonesian Navy. The hospital has the main task of providing health services and health support to members of the Indonesian Navy and their families as well as serving general patients, with the vision of becoming the primary hospital of choice for the TNI and the community. Efforts to achieve this vision must be able to provide excellent quality health services based on patient needs and satisfaction.

In organizational systems such as hospitals which are very complex, several problems, so there needs to be optimal handling to formulate an appropriate solution. Problem solving cycle (PSC)[1] which is carried out in stages through certain phases, it can help management within an organization to identify problems so need the right solution can then be found.

The results of the analysis of the problems and based on the results of observations, document reviews and interviews with several department officer and section officer, can identify problems in the emergency departement, infection prevention and control committee, outpatient, education and training units and problems related to infrastructure. After determining priorities using the CARL method[2] (Capability, Accessibility, Readiness, Leverage) it is concluded that external training in 2019 has only been documented 15% of the standard 100%.

The problem is that the training knowledge documentation system (E knowledge)[3,4,5] has not been managed properly. This is shown by the results of a questioner which shows the level of knowledge of personnel about basic infection prevention and control and effective communication in 2020 is still below the standard.

The purpose of this study is to analyze the causes of the documentation of training materials that have not reached the standard, determine solutions, and develop an activity plan in overcoming the problem of documentation of training materials.

MATERIAL AND METHODS

This study use the analytical observational method. Data collection through document tracing and interviews with officers in related units. The method used is the Problem Solving Cycle (PSC)[1,4] approach which consist of five stages. First stage is to determine problem analysis. In conducting a problem analysis there are three activities that must be carried out i.e. problem determination, determination of cause of the problem and priority causes of problem. Problem determination in the unit were obtained through brainstorming with several department officer and section officer, total of them fifteen people. The priority of the problem using the CARL method (Capability, Accessibility, Readiness,Leverage) by giving a score or value for each criterion on the problem list. Scoring is based on mutual aggrement on the value of 1 to 10 CARL criterion (C x A x R x L). Furthermore, priority determination is based on the ranking results. Determination of the cause of the problem is finding the cause of the problem through fish bone method consist of four aspects of Man, Method, Machine, and Materials. Priority causes of problems is to analyze the priority of causes using the CARL method.

Second stage is to determine strategy design. At this stage determine alternative solutions to solve the problem. In solving the problem, it is carried out in stages according to its potential. At this strategy design stage, the steps for compiling alternative solutions are discussed, and then prioritized alternative solutions are carried out. The researcher and staffs conduct discussions in determining alternative solutions documentation of training materials through the CARL method.

Third stage is strategy development. At this stage, the priority of alternative solutions is the development of the knowledge documentation module at hospital management

information system using the sprint technique with 5 stages : map, sketch, decide, prototype and test. Reseacher condacted a survey on the identification of module development according to the needs of Ramelan Navy Hospital with on line questionnaire was filled out by fifty nurses from each unit. Fourth stage is implementation, monitoring and evaluation.This research is only up to the implementation stage of module development E knowledge, has not yet the stage of monitoring and evalution, and fifth stage is follow up and feedback.

RESULTS

Based on the CARL method, result of this study are consist of problem determination, determination of the cause of the problem, priority causes of the problem, strategy design and strategy development. Problems in the unit were obtained through brainstorming with several department officer and section officer.Then the priority of the problem is determined using the CARL method in table 1.

Table 1. Identification of Problems in Ramelan Navy Hospital 2020

Problem	C	A	R	L	Total	Ranking
The waiting time for emergency room patients to outpatient is still long.	8	7	7	8	3136	II
The assessment of compliance with Hand hygiene personnel carried out by IPCNs cannot be maximized in the pandemic era (still using paper, not yet based on Android).	5	6	6	8	1440	IV
The registration flow is not in accordance SOP for outpatient registration	5	7	8	8	2240	III
External training in 2019 totaled 90 trainings, 15% documented training materials with 100% standards	8	9	9	8	51284	I
Incomplete sign for the place/room	5	6	6	7	1439	V

Based on table 1, the problem with the highest priority ranking in the education and training unit is that the external training material documentation standard has not been achieved, 15% from 100%.

After the priority of the problem has been determined, the next step is to identify the cause of the problem. The approach used to obtain the risk factors that influence the occurrence of the problem is the fishbone diagram analysis method[6] in Figure 1. Based on Figure 1, information is obtained that the factors causing the documentation of training materials have not reached the standard by covering four aspects; Man, Method, Machine and Materials.
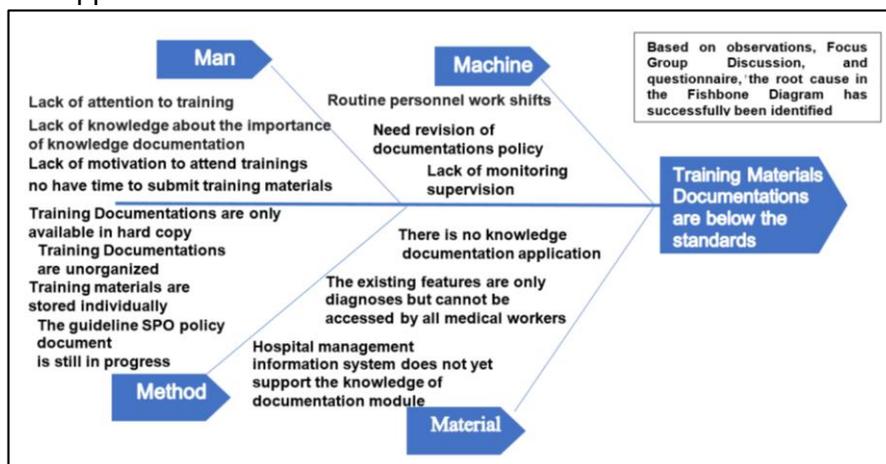

Figure 1. The root cause of training materials documentations that below the standard
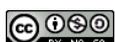
Table 2. Priority Causes of Problem

Alternative Solution	C	A	R	L	Total	Ranking
Development of documentation module for training materials at SIMRS	8	9	9	8	5184	I
Development of training material documentation modules on the website	7	8	9	8	4032	II
There is an application / training documentation module in the training unit	6	7	7	8	2688	III

The priority causes using the CARL method can be studied in table 2. Table 2 shows that the priority of causes is based on ranking using the CARL method,, there is no training material documentation module.

Discussions in determining alternative solutions were conducted between researchers and related staff. Alternative solutions provided by the team include: development of training material documentation module at hospital management information system,[7,8] development of training material documentation modules on the website and application / training documentation module in the training unit. This stage is to determine the priority of alternative solutions in overcoming the problem of knowledge management which is considered appropriate, effective and efficient in table 3.

Table 3. Priority of Alternative Documentation Solutions Training Materials at Ramelan Navy Hospital 2020

Alternative Solution	C	A	R	L	Total	Ranking
Development of documentation module for training materials at SIMRS	8	9	9	8	5184	I
Development of training material documentation modules on the website	7	8	9	8	4032	II
There is an application / training documentation module in the training unit	6	7	7	8	2688	III

Based on table 3, the priority of alternative solutions is the development of a documentation module for training materials at Ramelan Navy Hospital System Information Management.

At the strategy development stage, the researcher prepares a strategic plan in the development of the module. This module development strategy is the result of discussions with Departement Information Technology team using the Sprint method[9] in Figure 2.

Stage 1. Map

1. Identify long-term goals
2. Determine the target to be achieved
3. Determine responsible personnel (PIC) in module development

Stage 2. Sketch

4. Designing the documentation module
5. Define use cases

Stage 3. Decide

6. Determine the design of the knowledge documentation module

Stage 4. Prototype

7. Collaborating with the IT team in making prototypes

Stage 5. Test

8. Presenting prototype trials to PIC
9. Facilitate PIC in uploading documents (training prototype)
10. Documenting suggestions for improvement of the prototype from the PIC

Figure 2. Strategy for developing the E Knowledge Module on Hospital System Information Managemen[10,11]

The initial step in achieving the objectives of module development: researchers conducted a questionnaire survey on the identification of module development according to the staff needs of. Dr. Ramelan Navy Hospital. Information obtained from the questionnaire survey is shown in table 4.

Table 4. Features of Module Development at Dr. Ramelan Navy Hospital 2020.

Features	Percentage	Rating
Knowledge documentation / articles	58.8%	1
Discussion forum	27.5%	4
Document search/search knowledge / articles	37.3%	3
Mailing lists	3.9%	8
Download / upload documents (document management)	41.2%	2
Database contains experiences about solving cases with solutions that have been achieved	19.6%	5
Chatting / video conference	13.7%	6
Others	5.9%	7

Based on table 4, it can be seen that the features to be developed according to personnel needs are that personnel need knowledge/article documentation features, download/upload document management and search for knowledge documents. Information on the results of the questioner regarding module development was discussed with Information Technology team, so that the module to be developed was named "E-Knowledge"[12] which not only contained training materials but contained knowledge content needed by personnel. Knowledge content consists of four categories in the form of regulations, training materials, references and journals. Determine the target to be achieved in the development of this module are all training materials are well documented 100% and the level of personnel knowledge about accreditation material reaches 80%. Fourteen PICs were appointed to represent the professions responsible for managing the E Knowledge module.

DISCUSSION

The PSC method consists of 5 stages, include: (1) Problem Analysis, (2) Strategic Design, (3) Strategy Development, (4) Implementation, Monitoring, Evaluation, and (5) Feedback. The problem analysis stage has three stages, namely determining the problem, determining the cause of the problem and determining the priority of the cause of the problem at Dr. Ramelan Navy Hospital. To properly identify the problem, an evidence-based approach or accurate data is used, so that

it can give confidence to hospital personnel, and believe that it is really a problem. Identify the problem at Dr.Ramelan Navy Hospital is obtained by examining secondary data in the form of quantitative data and/or qualitative data, enter and report data/information from other sectors or sources, focusing on issues refers to accreditation standards and discuss (brainstorming) with the official in charge of the relevant unit.

It was found that the problem was that 15% of 100% of external training material documentation standards had not been achieved. The causes of the problem are various factors related to the problem of managing the documentation of training materials. To identify risk factors, it is necessary to process the root causes of problems in a systematic way and based on data/facts, theories or concepts as well as logic thinking. After knowing the priority of the problem, then brainstorming is continued to find the cause of the problem with root cause analysis. The root cause of the problem consists of 4M (machine, method, material and man). The results of the root cause analysis are as illustrated in Figure 1. From the aspect of various causes of problems, a scoring is carried out using the CARL method to determine the priority of the causes of the problem so that it can be concluded that the priority of the cause of the problem is that there is no documentation module for training materials.

The strategy design stage is the second stage in the problem-solving cycle, which is to determine alternative solutions to solve the problem. In solving a problem, it is carried out in stages according to its potential. At the strategy design stage, the steps for preparing alternative solutions are discussed in solving a problem. There are three alternative solutions that were decided in the discussion, namely the development of a training material documentation module at hospital management information system[12], the development of a training material documentation module on the website. and the development of an application / training documentation module at the education

and training unit. The priority of alternative solutions is determined based on scoring using the CARL method which is the priority, namely the development of the documentation module.

In the strategy development stage, the development of the E-Knowledge module[13] is adjusted to the allocation of resources, time, and finance. From the allocation of resources, there are no obstacles because the personnel who will later spearhead the success of the E-Knowledge module are carried out with responsibilities in units and professions and are involved in fulfilling SNARS 1.1 standards/elements. Judging from the time allocation, a model that can be completed in a short time was chosen. In terms of the allocation of funds, the researcher conducted interviews with the head of the hospital managemen information system and did not experience any obstacles due to the budget program related to module development at Dr. Ramelan Navy Hospital has been budgeted annually. a module development procedure has been proposed so that the E-Knowledge module development project can be started. In the development of the E-Knowledge module through several stages. Based on the previous description, the module development stages in the hospital management information system vary according to three aspects; human resource allocation, time allocation and financial allocation. The limited time allocation required the researcher and the team to decide to use a simple, effective and efficient model. The sprint development model is the right model to use in a short time. Supported by an adequate information technology infrastructure for the Dr.Ramelan Navy Hospital. The stages of the sprint model are map stage, sketch stage, decide stage, prototype stage and test stage.

Map stage is identify the long - term goals of the knowledge documentation module development. The aims of this stage are supports knowledge sharing between personnel to increase knowledge accurately because it comes from the same module source; improve personnel performance because it is faster to acquire knowledge and facilitate the

dissemination of knowledge to all personnel; to facilitate the needs of personnel in obtaining knowledge from various sources whose credibility is recognized nationally and internationally. To achieve this goal, the researcher conducted a questioner survey on the identification of the development of knowledge documentation modules on the hospital management information system. The module which was originally intended for training materials has developed into a module containing the latest regulations, references and journals. Regulations contain SOPs, Guidelines, References include information/users processes and procedures that apply in military hospitals as well as through discussions with the Nursing Committee and other Health Committees, resulted in tens names of PICs / persons in charge of filling out this module. The PIC consists of 3 nursing sub-committees and 7 professions from other health committees. The objectives of the establishment of this PIC are to monitoring the charging of the E-Knowledge module to run continuously, there are personnel who are responsible for documenting knowledge according to their respective professional fields, prevent misuse of important documents/accreditation standard documents by certain parties.

At the sketch stage the researcher makes an initial sketch of the module design based on literature studies and previous journals/research that have used the knowledge management system in hospitals.[14,15] This chapter contains the design and design of the knowledge documentation module required by personnel in the form of a flowchart of knowledge documentation flowcharts carried out by the PICs and then personnel can access the knowledge content by logging into the hospital management information system[16]. The login mechanism has three access rights granted to the user, as a user, PIC and a team of experts. Access rights / use cases are determined based on needs. The role of the PIC in this module is very important because all access is given to be responsible for managing the E-Knowledge

module[17]. Users are given limited access to regulatory documents and can only view documents without being able to download regulatory documents. This is a form of anticipation to prevent duplication of regulations from outside parties and unwanted problems. The other three documents, namely references, training/seminar materials and journals can be viewed and downloaded for proper use. The expert team has access to manage configurations and manage users as well as overcome obstacles in the implementation of the E-Knowledge module.[18]

At decide stage, the design of the knowledge documentation module was decided upon which was agreed upon by all relevant parties. Then the results of the decision are presented to the PIC as the spearhead of the successful development of this knowledge documentation module[19,20]. The objectives and targets for the development of the module were conveyed to the PICs at the inaugural meeting which was held on November 17, 2020. This module was well received by the PICs because this module in addition to facilitating as a forum for knowledge documentation as well as a method in various standards/elements of SNARS accreditation edition 1.1

At the prototype stage collaboration is carried out with the Information Technology (IT) team in making prototypes. The expert team played a major role in the success at this stage. The expert team for developing this module is a vendor / 3rd party who has collaborated on the development of Dr. Ramelan Navy Hospital. The allocation of time needed by the IT team in designing the prototype module is 10 days. It is planned to be completed and can be tested before December 4, 2020. Prototype testing is carried out at test stage. Before the trial day was carried out, the PIC was informed to prepare knowledge content to be included in the module when the pilot was carried out on December 2, 2020. This stage went smoothly and some content was successfully included in the module. After testing the prototype on several users, inputs were obtained for the improvement of the

features to be developed. The inputs for confidential accreditation documents, access rights are given only to the PIC according to their professional field and the PIC is responsible for its distribution. To upload documents in the form of articles/journals, the publication period is limited to a maximum of 5 years. Types of document formats that can be entered in PDF and image formats. Format documents and videos cannot be entered. Need further development content is included in folders and sub folders. At the implementation stage it has been implemented and will be re-evaluated.

CONCLUSION

Based on the results of the study, it can be concluded that E Knowledge increase knowledge and improve personnel performance. It acquires knowledge more quickly, and facilitates the dissemination of knowledge to all personel, as a means to facilitie personel needs in obtaining knowledge from credible various sources.

REFFERENCES

1. Pudjirahardjo, W & Susanto, A. Intervensi Problem Solving Cycle (PSC) Berdasarkan 7 Prinsip Menuju Keselamatan Pasien Rumah Sakit Problem Solving Cycle (PSC) Intervention Program Based on 7 Principles to Hospital Patient Safety. 2019; 11: 76-9.
2. Amrin, M. Menetapkan Prioritas Masalah dengan Metode CARL, Agustus 10, 2018. Available From: https://www.mitrakesmas.com/2018/08/menetapkan-prioritas-masalah-dengan.html
3. Roohi, G., Mahmoodi, and Khoddam,H. Knowledge implementation in health care management: a qualitative study. BMC Health Serv Res. 2020; 20: 188. doi: 10.1186/s12913-020-5043-8.
4. Ghosh, M and Sobek,D. A problem-solving routine for improving hospital operations. Journal of health organization and management. 2015; 29: 252-70. Doi: 10.1108/JHOM-09-2013-0191.
5. Ayatulloh,D., Nursalam,N., Kurniawati, N.D., The Effect of Knowledge Management in Healthcare Services: a Systematic Review. Jurnal Pendidikan Keperawatan Indonesia. 2021; 7(1): 84-94.
6. Coccia, M. Fishbone diagram for technological analysis and foresight. International Journal of Foresight and Innovation Policy. 2020. 14: 225-47. doi: 10.1504/IJFIP.
7. Fadilla, NM, Setyonugroho,W, Sistem Informasi Manajemen Rumah Sakit Dalam Meningkatkan Efisiensi: Mini Literature Review Jurnal Teknik Informatika dan Sistem Informasi. 2021; 8(1): 357-74.
8. Shalannanda, W. and Hakimi,R. IT Governance design for Hospital Management Information System case study: X hospital. The 10th International Conference on Telecommunication Systems Services and Applications (TSSA). 2016: 1-8. Doi: 10.1109/TSSA.2016.7871108.
9. Anand, A., Singh, O.,and Alhazmi,O. Optimal Sprint Length Determination for Agile-Based Software Development. Computers, Materials & Continua. 2021; 68. 3693-3712. doi: 10.32604/cmc.2021.017461
10. Mahmood, N., Burney, S., Aqil,M., Abbas, Z., Rizwan, K. Data and Knowledge Management in Designing Healthcare Information Systems. International Journal of Computer Applications. 2013; 50: 34-9. doi: 10.5120/7745-0798.
11. Sutrisna, E. Implementasi Knowledge Management system berbasis website dengan model spiral pada PT Trans Retail Indonesia. Jurnal Informatika Univeristas Pamulang. 2018; 3(2): 64.
12. Perdana, T.R., Mujiatun,S., Sfenrianto, S., and Kaburuan, E.R. Designing Knowledge Management System with Big Data for Hospital Inpatient Services : (Case Study at Islamic Hospital XYZ Pekanbaru). International Conference on Information and Communications Technology (ICOIACT). 2019: 851-56. doi: 10.1109/ICOIACT46704.2019.8938469.
13. Matayong,S., and Mahmood, A.K. The studies of Knowledge Management System in organization: A systematic review. International Conference on Computer & Information Science (ICCIS). 2012: 221-6. doi: 10.1109/ICCISci.2012.629724.
14. Alsaqqa, H.H. Knowledge Management and Sharing in Hospitals: A Systematic Review. SG/NJ. 2020: 25:27.
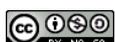
15. Meylasari U.P and Qamari I.N. Faktor-Faktor yang Mempengaruhi Knowledge Sharing dalam Implementasi E learning. Program Studi Manajemen Fakultas Ekonomi Universitas Muhammadiyah Yogyakarta. 2017; 8(2): 238 Available from: https://media.neliti.com/media/publications/273159-faktor-faktor-yang-mempengaruhi-knowledge c02c972.pdf

16. Karna,N., Supriana, I., and Maulidevi,N. Implementation of e-Learning based on Knowledge Management System for Indonesian Academic Institution. The 1st International Conference on Information Technology, Information Systems and Electrical Engineering (ICITISEE). 2016: 43-48. doi: 10.1109/ICITISEE.2016.7803045.

17. Bowden, D.S., and Andrews, M. The Challenge of Knowledge Management in Healthcare. 13th Annual Conference of the EuroMed Academy of Business. 2020. Available from: https://www.researchgate.net/publication/344475542

18. Mohajan, H. An Analysis of Knowledge Management for the Development of Global Health. American Journal of Social Sciences. 2016; 4(4): 38-57.

19. Kurniawan,Y.,Johan and Sudiana. The Impact of Knowledge Management System in Hospital, International Conference on Information Management and Technology (ICIMTech). 2019: 641-5. doi: 10.1109/ICIMTech.2019.8843825.

20. Hujala T, Laihonen, H. Effects of knowledge management on the management of health and social care: a systematic literature review. Journal of Knowledge Management. 2021; 25(11): 203-21. https://doi.org/10.1108/JKM-11-2020-0813