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Submission date: 24-Mar-2023 01:24PM (UTC+0700)
Submission ID: 2045203608
File name: Artikel Bali Medical Journal.pdf (721.48K)
Word count: 2999
Character count: 16146

ORIGINAL ARTICLE

Bali Medical Journal (*Bali MedJ*) 2022, Volume 11, Number 2: 651-659
P-ISSN.2089-1180, E-ISSN: 2302-2914

Design electronic medical records with clinical decision support system (CDSS) to prevent interaction of drug content in outpatient department

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ABSTRACT

Introduction: Hospitals must provide the best service to patients. The best services include speed in service, being on time, and being safe from medical errors. The best service to patients is to provide electronic medical records. Electronic medical records contain social data and patient medical data. The advantages of medical records are data stored in structured files, timely filling, data can be recalled at any time, patient confidentiality, and patient safety. This study aims to design electronic medical records with Clinical Decision Support System (CDSS) to prevent the interaction of drug content in the outpatient department.

Methods: General background of the research is the design of electronic medical records with a clinical decision support system to prevent interaction of drug content for outpatient Departement. The design included: Business Process, Data Flow Diagram (DFD), and Entity Relationship Diagram. Five doctors, two nurses, and a pharmacist assistant were respondents. Qualitative data from FGD were analyzed by transcripts looking for similarities or differences, finding themes, and developing categories. The Design of Electronic Medical Record with Clinical Decision Support System (CDSS) was designed based on paper forms and the Result of FGD.

Results: Electronic medical records were designed according to the users' needs in the outpatient department. User requirements had been taken by Focus Group Discussion (FGD). User requirements about Electronic Medical records included: Infrastructure Availability, Software (open source and web application because it was easy to develop according to users' needs, and training on electronic medical records. There are steps to designing electronic medical records: Business Process, DFD, ERD, and Data Dictionary.

Conclusion: The design of electronic medical records with CDSS in the form of drug content interactions is a novelty that has the potential to be applied. Implementation of electronic medical records can prevent medical errors and support patient safety.

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Received: 2022-04-15
Accepted: 2022-07-22
Published: 2022-07-31

Keywords: Design, Electronic Medical Record, Outpatient Departement.
Cite This Article: Erawantini, F., Farlinda, S., Suryana, A.L. 2022. Design electronic medical records with clinical decision support system (CDSS) to prevent interaction of drug content in outpatient department. *Bali Medical Journal* 11(2): 651-659. DOI: 10.15562/bmj.v11i2.3117

INTRODUCTION

The healthcare sector has evolved into a fiercely competitive and fast-expanding global industry.[1] The quality of health services is a step toward improving health services for individuals and the population based on the most up-to-date professional data on predicted health outcomes.[2] The health workers must service patients based on their knowledge and skill. So they must be provided that are truly appropriate and ensure patient safety. Providing health services is very complex, so medical errors can occur. Although there are many problems in implementing health services, these problems can be overcome with electronic medical records.

According to the Institute of Medicine's (IOM) renowned report from 1999, human error resulted in 98,000 iatrogenic fatalities, making it the sixth greatest cause of mortality in the United States. Subsequent research in 2010 found nearly twice as many deaths, at 180,000. According to the most current survey from 2013, the number of deaths per year ranges from 210,000 to 440,000.[3] Medical error is described as an unplanned activity or one that fails to accomplish its intended effect, the failure of a planned action to be performed as intended, or a divergence from the standard of care that may or may not harm the patient.[4]

Medical errors are mistakes in health care that could have been prevented. Medical organizations must create a safety culture that emphasizes system improvement and views medical errors as problems to be solved. All healthcare team members must make healthcare safer for patients and healthcare providers.[5] One of the efforts to reduce medical errors by the electronic medical record. Electronic medical records can provide great benefits

for health services because providing the repository data of patients, make the decision of diagnostic by artificial intelligence, and improve patient safety. Many hospitals and clinics in Indonesia have implemented electronic medical records, but they are not paying attention to the reaction of drug content. This study aims to design electronic medical records with Clinical Decision Support System (CDSS) to prevent the interaction of drug content in the outpatient department.

METHODS

General Background of Research

The general background of the research was the design of electronic medical records with a clinical decision support system to prevent the interaction of drug content in outpatient departments. The design included: Business Process, Data Flow Diagram (DFD), and Entity Relationship Diagram.

Respondent of the Research

Five doctors, two nurses, and a pharmacist assistant discussed designing electronic medical records needed for the outpatient department.

Instrument and Procedures

The instruments used for collecting data were checklist and Focus Group Discussion (FGD) guidelines. The Research Procedures Includes:

1. The researcher and team observed all forms used to record data on the patient in the outpatient department.
2. Focus Group Discussion (FGD) with five doctors, two nurses, and a pharmacist assistant to collect qualitative data in February 2020.
3. The researcher and team designed Business Process, Data Flow Diagram (DFD), and Entity Relationship Diagram based on the respondent's needs. The design was presented to the respondent to get feedback from them.

Data Analysis

Transcripts were used to examine qualitative data from focus groups, looking for similarities and contrasts and then constructing themes and categories. Electronic Medical Record with Clinical Decision Support System (CDSS) was designed based on paper forms and the result of FGD.

RESULTS

FGD got the result that the user requirements about electronic medical records included:

1. Infrastructure availability
   The infrastructure was needed in the outpatient department: three computers, a Local Area Network (LAN), and one printer.
2. Software selection
   The software that they needed an open-source electronic medical record web application because it was easy to develop according to the user's need.
3. Training on the use of electronic medical records
   Training on the use of electronic medical records was important for users. After being trained, they can use the application properly to operate the system easily.

Business Process Electronic Medical Record with Clinical Decision Support System (CDSS) for Outpatient Departement can be seen in the following picture (Figure 1).

Data Flow Diagram (DFD) Level 1 Electronic Medical Record with Clinical Decision Support System (CDSS) for Outpatient Departement can be seen in the following picture (Figure 2).

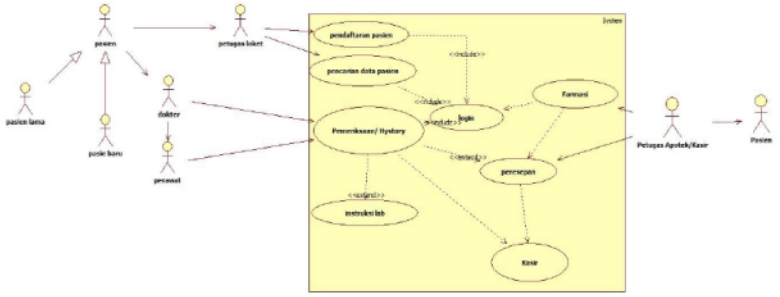

Figure 1. Business Process Electronic Medical Record with CDSS for Outpatient Departement.

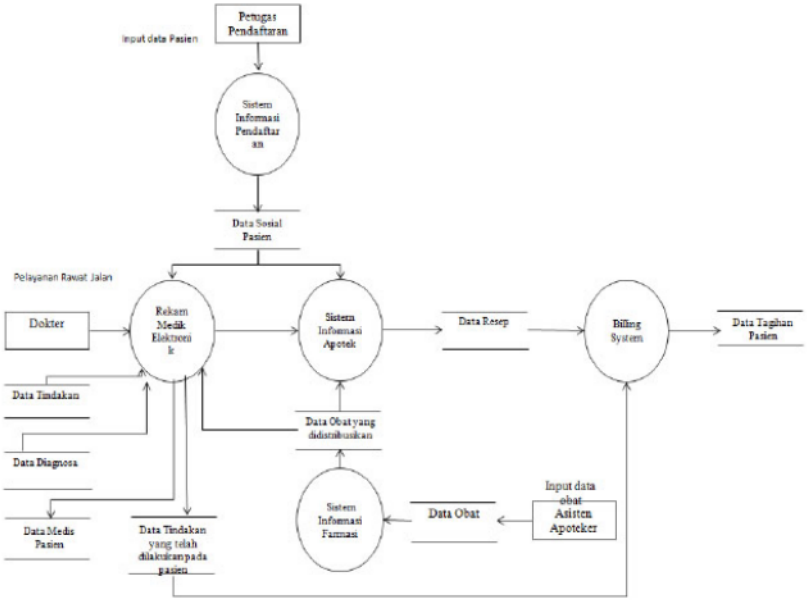

Figure 2. DFD Elektronic Medical Record with CDSS for Outpatient Departement.

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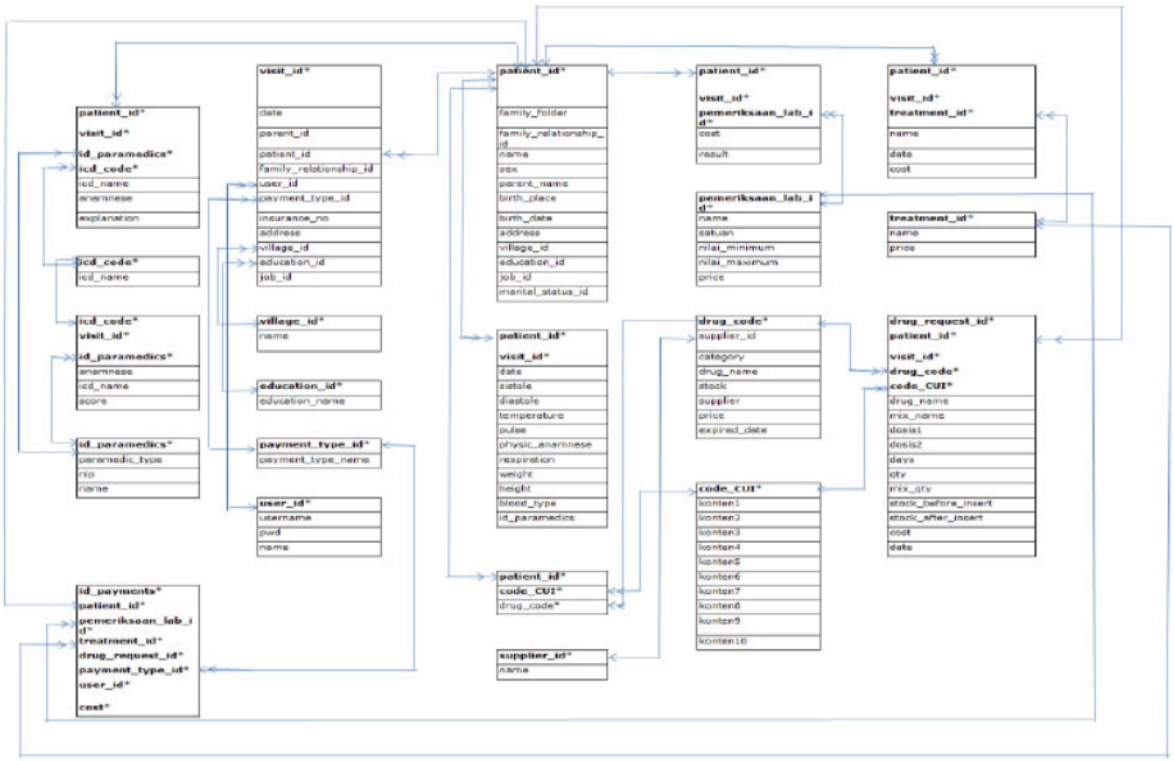

Figure 3. ERD Elektronic Medical Record with CDSS for Outpatient Departement.

Entity Relationship Diagram (ERD) Electronic Medical Record with Clinical Decision Support System (CDSS) for Outpatient Departement can be seen in the following picture (Figure 3).

he following table will show more specific data from the Entity-Relationship Diagram (ERD) Electronic Medical Record with Clinical Decision Support System (CDSS) for Outpatient Department (Table 1 – 21; attachment).

DISCUSSION

The focus group discussion began by delivering material about managing medical data well. The hospital has to provide patients' data and fill after the services are finished.[6] Furthermore, hospitals or health services need the electronic medical record to improve data quality and quality information for a better decisions.[7] The outpatient department users agreed that the implementation of electronic medical records was crucial. They hoped that health services would be fast and easier if they implemented electronic medical records. They advise that the electronic medical record could be considered with the paper-based medical record, although added clinical decision support systems such as drug interaction.

The designed electronic medical record started with the drawing business process. This design showed the foundation for adopting process-centric systems, particularly Enterprise Resource Planning systems.[8] The second step is to design Data Flow Diagram (DFD). Drawing DFD can describe the system automatically or computerized, manualize with interconnected based on the rule.[9] The next step is to design Entity Relationship Diagram (ERD). Because the Entity-Relationship Diagram (ERD) is a popular and important concept in database modeling, it's critical. The correct database design (or good design) is dependent on the accurate ERD, which presents the client with the requirements of the needed system.[10] We make Data Dictionary. Data components, data types, data flows, and other protocols employed in an information system are all part of the data dictionary.[11]

The Novelty of this research is the Clinical decision support system (CDSS) in the form of drug content interaction. The patients can not receive drugs if they have an allergy history to one or more drug contents. That allergy section is essential for the electronic medical record to protect and support patient safety.

CONCLUSION

User requirements about Electronic Medical Records included: Infrastructure Availability, Software (open source and web application because it was easy to develop according to user's needs, and training on electronic medical records. There are steps to designing electronic medical records: Business Process, DFD, ERD, and Data Dictionary. The Novelty of this research is CDSS in the form of drug content interaction. Implementation

of Electronic medical records can prevent medical errors and support patient safety. Also, further research with different study designs needs to be done to identify the effectiveness of this design.

ACKNOWLEDGEMENTS

The authors would like to thank Politeknik Negeri Jember for their financial support of my student's research and the special work who helped.

AUTHOR CONTRIBUTION

All authors contributed to this study's conception and design, data analysis and interpretation, article drafting, critical revision, final approval of the article, and publication.

FUNDING

This research was funded by financial support from Politeknik Negeri Jember.

CONFLICT OF INTEREST

There is no conflict of interest in this manuscript.

ETHICAL CONSIDERATION

This research was approved by the Health Research Ethics Committee of Politeknik Negeri Jember, Jember, Indonesia.

REFERENCES

1. Shafiq M, Naeem MA, Munawar Z, Fatima I. Service quality assessment of hospitals in Asian context: An empirical evidence from Pakistan. Inq (United States). 2017;54.
2. Stefani E. Tinjauan Yuridis Pelayanan Kesehatan Yang Bermutu Menurut Pasal 5 Ayat (2) Undang-Undang Nomor 36 Tahun 2009 Berkaitan Dengan Kekecewaan Pasien Terhadap Perilaku Dokter. Yogyakarta: Universitas Atma Jaya Yogyakarta; 2014. p. 561–5.
3. Hipskind, Carver N, Gupta V, E J. Medical Error [Internet]. StatPearls Publishing. 2021. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430763/
4. Martin A Makary, Daniel M. Medical error—the third leading cause of death in the US. BMJ. 2016.
5. Thomas L. Rodziewicz; Benjamin Houseman; John E. Hipskind. Medical Error Reduction and Prevention [Internet]. StatPearls Publishing. 2021. Available from: https://www.ncbi.nlm.nih.gov/books/NBK499956/
6. Kementrian-Kesehatan-RI. Permenkes 269 Tahun 2008 Tentang Rekam Medis. 2008.
7. Lemma S, Janson A, Persson LÅ, Wickremasinhe D, Källestål C. Improving quality and use of routine health information system data in low- And middle-income countries: A scoping review. PLoS One. 2020;15(10):1–16.
8. Barjis J. The importance of business process modeling in software systems design. Sci Comput Program. 2017;71(1):73–87.
9. Wulandari W, Widiantoro A. Design Data Flow Diagram for Supporting the User Experience in Applications. Des Data Flow Diagr Support User Exp Appl. 2017;25(2):14–20.
10. Otair MA, Odat AM. Enhancing an end user development in database design using entity relationship diagram Mapper. J Theor Appl Inf Technol. 2015;77(2):218–28.
11. Caverlee J. Encyclopedia of Database Systems. Springer link. 2009.

Table 1. **Patient Profiles.**

Number	Field Name	Type	Size
1.	patient_id*	int	6
2.	family_folder	int	10
3.	family_relationship_id	tinyint	2
5.	name	varchar	100
6.	sex	enum('Laki-laki','Perempuan')	
7.	parent_name	varchar	100
8.	birth_place	varchar	100
9.	birth_date	date	8
10.	address	varchar	100
11.	village_id	int	11
12.	education_id	tinyint	3
13.	job_id	tinyint	3
14.	marital_status_id	tinyint	3

Information: * Primary key

Table 2. **Allergy.**

Number	Field Name	Type	Size
1.	patient_id*	Int	6
2.	code_CUI*	varchar	5
3.	drug_code*	Int	20

Information: * Primary key

Table 3. **Patient Visit.**

Number	Field Name	Type	Size
1.	visit_id*	bigint	20
2.	date	datetime	8
3.	parent_id	bigint	20
4.	patient_id	int	6
5.	family_relationship_id	tinyint	2
6.	user_id	int	11
7.	payment_type_id	tinyint	3
8.	insurance_no	varchar	50
9.	address	varchar	100
10.	village_id	int	11
11.	education_id	tinyint	3
12.	job_id	tinyint	3

Information: * Primary key

Table 4. Physical Examination.

Number	Field Name	Type	Size
1.	patient_id*	int	6
2.	visit_id*	bigint	20
3.	date	datetime	
4.	systole	smallint	6
5.	diastole	smallint	6
6.	temperature	decimal	6.2
7.	pulse	tinyint	3
8.	physic_anamnese	text	50
9.	respiration	decimal	6.2
10.	weight	decimal	6.2
11.	height	decimal	6.2
12.	blood_type	char	2

Information: * Primary key

Table 5. List of Diseases.

Number	Field Name	Type	Size
1.	icd_code*	varchar	5
2.	icd_name	varchar	255

Information: * Primary key

Table 6. History Taking.

Number	Field Name	Type	Size
1.	patient_id*	int	6
2.	visit_id*	bigint	20
3.	id_paramedics*	int	11
4.	icd_code*	int	11
5.	icd_name	varchar	255
6.	anamnesis	varchar	255
7.	explanation	varchar	255

Information: * Primary key

Table 7. Enforcement of Diagnosis by Experts.

Number	Field Name	Type	Size
1.	icd_code*	int	11
2.	visit_id*	bigint	20
3.	id_paramedics*	int	11
4.	anamnesis	varchar	255
5.	icd_name	varchar	255
6.	score	int	11

Information: * Primary key

Table 8. Laboratory Examination.

Number	Field Name	Type	Size
1.	pemeriksaan_lab_id*	int	11
2.	name	varchar	255
3.	unit	varchar	255
4.	nilai_minimum	decimal	10.2
5.	nilai_maximum	decimal	10.2
6.	price	decimal	10.2

Information: * Primary key

Table 9. Laboratory Services.

Number	Field Name	Type	Size
1.	patient_id*	int	6
2.	visit_id*	bigint	20
3.	pemeriksaan_lab_id*	int	11
4.	cost	decimal	10.2
5.	result	varchar(255)	255

Information: * Primary key

Table 10. Medical Treatment.

Number	Field Name	Type	Size
1.	treatment_id*	int	11
2.	name	varchar	100
3.	price	decimal	10,2

Information: * Primary key

Table 11. Medical Action Services.

Number	Field Name	Type	Size
1.	patient_id*	int	6
2.	visit_id*	bigint	20
3.	treatment_id*	int	11
4.	name	varchar	100
5.	date	datetime	8
6.	cost	decimal	10,2

Information: * Primary key

Table 12. Paramedic.

Number	Field Name	Type	Size
1.	id_paramedics*	int	11
2.	paramedic_type	tinyint	2
3.	nip	varchar	30
4.	name	varchar	100

Information: * Primary key

Table 13. Drug Company.

Number	Field Name	Type	Size
1.	supplier_id*	int	11
2.	name	varchar	100

Information: * Primary key

Table 14. Drug.

Number	Field Name	Type	Size
1.	drug_code*	Int	20
2.	supplier_id	int	11
3.	category	enum('drug','bhp')	
4.	drug_name	varchar	100
5.	stock	decimal	10.2
6.	supplier	varchar	255
7.	price	decimal	10.2
8.	expired_date	varchar	255

Information: * Primary key

Table 15. Drug Content.

Number	Field Name	Type	Size
1.	code_CUI*	varchar	5
2.	content1	varchar	15
3.	content2	varchar	15
4.	content3	varchar	15
5.	content4	varchar	15
6.	content5	varchar	15
7.	content6	varchar	15
8.	content7	varchar	15
9.	content8	varchar	15
10.	content9	varchar	15
11.	content10	varchar	15

Information: * Primary key

Table 16. Drug Request.

Number	Field Name	Type	Size
1.	drug_request_id*	int	**11**
2.	patient_id*	int	6
3.	visit_id*	bigint	20
4.	drug_code*	Int	20
5.	code_CUI*	varchar	5
6.	drug_name	varchar	100
7.	mix_name	varchar	100
8.	dosis1	int	2
9.	dosis2	decimal	3.2
10.	days	tinyint	3
11.	qty	decimal	10.2
12.	mix_qty	decimal	10.2
13.	stock_before_insert	decimal	10.2
14.	stock_after_insert	decimal	10.2
15.	cost	decimal	10.2
16.	date	datetime	8

Information: * Primary key

Table 17. User.

Number	Field Name	Type	Size
1.	user_id*	int	11
2.	username	varchar	100
3.	pwd	varchar	32
4.	name	varchar	100

Information: * Primary key

Table 18. Type of Payment.

Number	Field Name	Type	Size
1.	payment_type_id*	tinyint	3
2.	payment_type_name	varchar	100

Information: * Primary key

Table 19. **Payment.**

Number	Field Name	Type	Size
1.	id_payments*	tinyint	3
2.	patient_id*	int	6
3.	pemeriksaan_lab_id*	int	11
4.	treatment_id*	int	11
5.	drug_request_id*	int	11
6.	payment_type_id*	tinyint	3
7.	user_id*	int	11
8.	cost*	decimal	10,2

Information: * Primary key

Table 20. **Type of Education.**

Number	Field Name	Type	Size
1.	education_id*	tinyint	3
2.	education_name	varchar	100

Information: * Primary key

Table 21. **Village.**

Number	Field Name	Type	Size
1.	village_id*	int	11
2.	name	varchar	100

Information: * Primary key

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