The potency of drug reconciliation need on elderly diabetic patient at Kandou Hospital Manado

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Abstract. Drug reconciliation is needed on Diabetic Mellitus patient, specially geriatry patient. North Sulawesi include in 17 provinces with high Diabetic Mellitus prevalence in Indonesia, so drug reconciliation is needed. The aim of this research is to identify the potency of drug need reconciliation on elderly Diabetic Mellitus patient. This research method was divided into two stages to identify treatment discrepancies in elderly DM patients who left the Kandou Hospital. The second stage is a qualitative descriptive study with in-depth interviews with patients including perception, choice tendency and patient willingness to pay for drug reconciliation services. Interviews were done on health service staff about perception, tendency of choice and willingness of service providers to be paid for the implementation of drug reconciliation. The results of the study included 11 intentional discrepancies from 32 patients. The most accidental nonconformity in the form of omission medication was 28.12%. Patients don't know about drug reconciliation and service providers don't know about drug reconciliation. All the parties support drug reconciliation service. Drug reconciliation has the potential to be implemented in Manado, especially in Kandow Hospital as a referral center.

1. Introduction

Drug Reconciliation is a process of evaluating a patient’s medication regimen that is carried out regularly which aims to prevent medication errors that can include omission, duplication, dose errors, or drug interactions, as well as compliance and adherence of patients [1]. Drug reconciliation is needed to the patients who receive drugs that include high alert, one of them is a patient with Diabetes Mellitus (DM) who get insulin and oral antibiotics [2]. In patients with diabetes mellitus, the risk factors for incompatibility medication are greater.

The prevalence of diabetes mellitus in Indonesia has increased. The research of Basic Health (Riskesdas) in 2007 showed the prevalence of DM in Indonesia was 1.10% while in 2013 it was 2.01% [3,4]. One of the 17 provinces with a percentage of DM prevalence that is greater than the national DM prevalence percentage is North Sulawesi with the prevalence of DM diagnosed by doctors and the symptoms of 1.60% [4].

The aim of this study is to identify the potential needs of drug reconciliation in elderly people with diabetes mellitus. This aim can be achieved through identifying; the first, discrepancies that occur in the administration of diabetes mellitus patients at the time of admission to hospital and out of hospital. Second, in-depth interviews with patients and health care providers regarding their choice of perception and tendency towards drug reconciliation services. This research will be useful for the development of health services, especially drug reconciliation and as input for health services at Kandou Hospital Manado and health community in Manado.
2. Methods

2.1 Study design, Setting and Participant
The study was divided into two stages, namely: the first stage, quantitative descriptive study to identify medication discrepancies in elderly DM patients who left Kandou Hospital. This was done by comparing the treatment data of patients when they were discharged from the hospital with the best source of information related to the patient's medical history (Best Possible Medication History/BPMH) before the patients entered the hospital adjusted to the patient's condition in the medical record.

The second stage is a qualitative descriptive study with in-depth interviews with patients including perception, preference, and patient willingness to pay for drug reconciliation services. Interviews are also conducted with health care providers regarding perceptions, preferences, and willingness of service providers to be paid for implementing drug reconciliation.

The study was conducted for 8 months from January to October 2018. Samples which taken in the first stage were 32 elderly patients who were diagnosed with diabetes mellitus who came out of Kandou Hospital Manado, while in the second stage there were 32 patients with Elderly Diabetes Mellitus and as many as 29 service providers included 15 pharmacists and 14 doctors.

2.2 Outcome
In qualitative research, the outcomes produced according to the nonconformity criteria based on Herrero-herrero et al [5], include:

A. There is no medication discrepancies: the medication upon discharge from the patient in the patient's medical record is the same as the medicine before entering the hospital obtained from BPMH.

B. Medication discrepancies: the difference between the patient's medication when he was discharged from the hospital and the drug before entering the hospital obtained from BPMH.

The medication discrepancies in this study included:
1. Unintentional discrepancies), such as:
   a. Omission medication: drugs that patients use before entering the hospital are not re-prescribed when they leave the hospital without a clinical explanation in the patient's medical record.
   b. Giving new prescriptions at the time of hospital discharge: change in dosage, route of administration or frequency of medication when exiting the hospital in the patient's medical record compared to the dose, route of administration or frequency of the drug before entering the hospital without any changes in the patient's condition.
   c. Commission medication: patients who were prescribed at the time of discharge did not use by the patient before entering the hospital. There is no clinical explanation for the addition of the drug in the patient's therapy in the patient's medical record.
   d. The prescription is incomplete: dosage, frequency or duration of use is not recorded for one prescription drug upon discharge.
   e. Treatment duplication: prescribe more than one drug with the same class.

2. Intentional discrepancies are discrepancies between drugs obtained when patients are out of hospital compared to before entering the hospital and the changes are based on the patient's condition in the medical record or carried out with the aim of correcting medication errors that occur at the time before entering the hospital. New therapies or changes in route of administration include intentional discrepancies if according to the patient's clinical status or the diagnosis recorded in the report upon discharge

C. Cannot be identified is unable to identify because there is no information related to the treatment history of BPMH patients.
2.3 Data Analysis
In the first stage, data collection was carried out in the period of 21 May 2018 to 9 July 2018. The obtained data were in the form of patient demographics, drugs before the patient was admitted to the hospital were obtained from the patient himself or care giver, while the patient's medication at the time of leaving the hospital obtained from the patient's medical record.

Medicines data before hospital admission and medication discharged from the hospital were compared to identification of the percentage of nonconformities that occurred based on the Hererro-Herrero classification [5].

In the second stage, the obtained data in the form of interview transcripts were conducted based on thematic analysis [6]. Transcripts are read repeatedly, coded and if there are the same main ideas and keywords, they will be listed and produce a theme. Analysis is done until saturation data is obtained.

3. Result
Based on research conducted on 32 inpatients, demographic data obtained as follows:

| Characteristics                          | Total | Percentage |
|------------------------------------------|-------|------------|
| Sex                                      |       |            |
| Male                                     | 12    | 37.5%      |
| Female                                   | 20    | 62.5%      |
| Age                                      |       |            |
| Early Elderly 46-55 years                | 10    | 31.25%     |
| Late elderly 56-65 years                 | 14    | 43.75%     |
| Aged >65 years                           | 8     | 25.00%     |
| The number of diagnosis per patient      |       |            |
| 1-2                                      | 3     | 9.37%      |
| 3-4                                      | 13    | 40.63%     |
| ≥5                                       | 16    | 50.00%     |
| The number of drug items obtained at the time of the patient's hospital discharge | | |
| 3-4                                      | 6     | 18.75%     |
| 5-6                                      | 8     | 25.00%     |
| ≥7                                       | 18    | 56.25%     |

*Age grouping based on Department of Health 2009

3.1 Medication discrepancies
There are 34 discrepancies were obtained from 32 inpatients which included the following:

| Classification                          | Total | Percentage |
|-----------------------------------------|-------|------------|
| There is no medical discrepancies       | 0     | 0.00%      |
| Unintentional discrepancies             |       |            |
| Omission Medication                     | 9     | 28.12%     |
| Giving new recipes                      | 1     | 3.12%      |
| Commission Medication                   | 0     | 0.00%      |
| Not complete prescription               | 0     | 0.00%      |
| Duplication of medication               | 1     | 3.12%      |
| Intentional discrepancies               | 23    | 71.87%     |
| Cannot be identified                    | 0     | 0.00%      |
Of the 32 patients, as many as 11 patients experienced unintentional discrepancies and as many as 2 patients experienced 2 nonconforming discrepancies. Based on data obtained shows the need for drug reconciliation for patients with chronic disease patients who tend to get a lot of drugs.

3.2. Knowledge, Perception, Choice Trends and willingness to pay for Diabetes Mellitus patients for drug reconciliation services

3.2.1 Knowledge of Diabetes Patients regarding drug reconciliation services

All Patients do not know about drug reconciliation.

Some statements that show patients' ignorance about drug reconciliation.

"not know. What is that? (Patient 1, Female, 61 years old)

"I've never heard about that" (Patient 4, female, 59 years)

3.2.2 Perception of Diabetes Patients towards drug reconciliation services.

Based on in-depth interviews conducted with DM patients, all patients did not know about drug reconciliation services. This shows a lack of patient knowledge of drug reconciliation. The patient's perception of the service of drug reconciliation is very supportive and considers good service of drug reconciliation. Some statements that support this.

"Very good to be done to be sustainable" (Patient 4, female, 59 years old)

"Very good, because I've experienced drug interactions" (Patient 12, female, 61 years old)

"Good to be controlled" (Patient 30, female, 63 years old)

The patient's statements show the patient's support and desire to get drug reconciliation services. There is one patient who has experienced drug interactions so that the service of reconciliation is very necessary

3.2.3 Trends in the Choice of Diabetes Mellitus Patients for Drug Reconciliation services

3.2.3.1 Types of patient-selected drug reconciliation services

The type of service that patients want is to call the patient and visit the house. Some patients prefer the service provider to call the patient shown in the following statement:

"Just call. The problem is more practical " (Patient 1, female, 61 years old)

"Calling saves more time, cost and distance" (Patient 10, male, 50 years old)

"More comfortable on the phone" (Patient 11, female, 59 years old)

Some patients who choose to call a patient care provider think it is more practical and convenient if over the telephone. Some patients who choose to call consider the distance of the house of patients who live far away in other cities or outside the island. Some patients do have a place to live far from the hospital. Some patients choose service providers to make a home visit. This is shown in the following statements:

"If you go home it's clearer to ask anything" (Patient 6, Female, 69 years)

"A direct visit so I can ask right away the right direct information to" (Patient 9, male, 72 years old)

‘Better visit home to be more monitored” (Patient 14, Female, 54 years old)

The patient chooses the service provider to make a home visit assuming that with a home visit, the
patient can communicate directly with the service provider, have the flexibility to ask health care providers and feel more monitored. These statements show the patient's desire to interact directly with health care providers

3.2.3.2 Frequency of patient selected medication reconciliation services
Patients choose the frequency of drug reconciliation services 1x a week, 2x a week, 1x monthly and 2x monthly. Some statements that show frequency selection of drug reconciliation services are:

"2 times a week so that my communication with the pharmaceutical department is smooth"
(Patient 5, Female, 50 years old)

"It is better 1x per week, so it can be controlled"
(Patient 28, Female, 55 years old)

"1x a month only because for chronic diseases the drug is prescribed for 1 month better one month visit”
(Patient 30, Female, 63 years old)

"If I am rarely at home, it's better for 2x a month."
(Patient 3, Male, 61 years old)

The frequency of services both home visits and calling depends on each patient's situation from time availability, the patient's need for communication with the service provider and the patient's desire for the service provider to control the medication that the patient is drinking. Research on the frequency of follow-up in diabetics shows an intensive frequency of improving quality of life and clinical indications [11]

3.2.4 Willingness to pay for Diabetic Mellitus patients for drug reconciliation services
The willingness to pay patients is very diverse. There are some patients who object to paying 50,000-100,000, transportation and voluntary money.

Some patients do not have the willingness to pay. Some statements indicate the patient's objection to pay, ie

"I don't want the problem, because I entered a BPJS patient so I shouldn't pay it, right?"
(Patient 1, Female, 61 years old)

"If I just say thank you."
(Patient 9, Male, 72 years old)

"Not because I already entered the health insurance”
(Patient 26, Male, 50 years old)

Some patients who are willing to pay 50,00-100,000. Several statements that show the patient's choice are as follows:

"I was able to pay 100,000 / visit"
(Patient 3, Male, 61 years old)

"Thank you, only 50,000"
(Patient 11, Female, 59 years old)

Some patients show willingness to pay transportation money
"Will you pay for transportation money?"
(Patient 25, Female, 63 years old)

There are patients who show willingness to pay voluntarily
"Can I pay, but for the sake of gratitude, just be a participant."
(Patient 28, Female, 55 years old)

Patient willingness to pay for drug reconciliation services depends on the patient's economic condition and the health insurance that the patient has.
3.3. Perception, Choice Trends and willingness to be paid by Health Service providers for drug reconciliation services

3.3.1 Knowledge of health care providers regarding drug reconciliation services
Some health care providers do not know about drug reconciliation. Statement that shows this, namely:
"Not yet. Just heard first" (Service provider 3, Female, 49 years old)
"For reconciliation ever. Yes unite, combine opinions so that it is in line. If the reconciliation of medicine has never been" (Service provider 5, Female, 28 years old)
Some health care providers know about drug reconciliation. Some statements that show this, namely:
"Ever. Hospital reconciliation compares treatment obtained patients before entering the hospital. See the interview data for patients come to the hospital" (Service provider 26, Female, 27 years old)
Service provider knowledge is based on training and seminars followed by service providers because some service providers have conducted training on drug recommissioning usually carried out by service providers in hospitals.

3.3.2 Perceptions of Service Providers for Drug Reconciliation services
The service provider supports the service of drug reconciliation. This is indicated by the statement of the following statement:
"Nice. Very helpful on the part of the patient especially us as medical personnel" (Service provider 7, Female, 24 years old)
"It is important, so that we can monitor the adherence to taking medication, whether the patient is regular or not" (Service provider 14, Male, 27 years old)
There are also service providers who consider drug reconciliation services to be ideal services.
"Ideally treatment must be like that, it must be sustainable, because we are also did not close my eyes from previous treatment" (Service provider 2, Female, 33 years old)
Statements from service providers indicate support and consider it important to carry out drug reconciliation. Service provider perceptions affect the willingness of service providers to carry out drug reconciliation.

3.3.3 Trends in the choice of service providers for drug reconciliation services

3.3.3.1 Types of Reconciliation services Drug choices of service providers
Some service providers prefer to call the patient. A statement that shows the choice of calling the patient as follows:
"It's better to call if the choice is just that. The reason is saving time, power saving, time, funds more efficiently" (Service provider 9, Male, 24 years old)
Many service providers prefer a patient's home visit. Statements that indicate this as follows:
"From myself it's better to face-to-face, because in terms of direct explanation to patients is better" (Service provider 7, Female, 24 years old)
"If the phone is likely the patient can lie, it's better direct visit to home" (Service provider 12, male, 67 years old)
Some service providers choose both depending on the patient's condition. This can be seen from the following statements.
"If you choose depending on the patient's condition, if you adhere to taking medication via the call is enough, if the patient's specific condition is certain, for example the patient is not can move or have a wound, then we also visit directly"
"It's better both. There is also a home visit for patients limitation of motion. Telephone to remind and home visit for see the situation."

Many service providers choose home visits to see the patient's condition directly and interact with patients directly, while those who choose to call are due to a lack of time available from the service provider.

**3.3.3.2 Frequency of Reconciliation services Drug selected by the service provider**

The frequency chosen by the service provider for drug reconciliation services are 1x per month, 1x 2-3 weeks, and 1x a week. Many service providers choose the frequency of drug delivery 1x per month. A statement that shows this as follows:

"Maybe once a month while checking fasting blood sugar"

"Once a month, because the average DM patient takes medication a month once"

Some service providers choose once every 2-3 weeks. Statement that shows this, that is "2-3 weeks more efficient time"

Some service providers choose 1x a week. Statement that shows this, that is "Once a week at home, because compared to once a month it can while at home, patients take other drugs (because of other illnesses), can seen from there"

The frequency of drug reconciliation services chosen by the service provider depends on the time availability of the service provider, the use of drugs by the patient, the desire of the service provider to control the condition and treatment of the patient.

**3.3.4 Willingness to be paid by service providers for drug reconciliation services**

Willingness of service providers to be paid for drug reconciliation services, ie no need to be paid, 20,000-50,000, 50,000-100,000, transportation money, voluntary patients.

"Obviously, patients don't pay. Now the era of JKN, let alone patients routine"

"If patients are willing to pay around 20,00-50,000"

"The applicable price range is between 50,000-100,000"

"For a visit, it takes a fee, so maybe it's just transportation money"

"If I am just patient,"

The willingness of health care providers is influenced by health insurance that patients have, the type of service provided by service providers such as home visits requires more money than calling patients and a sense of service from the service provider to the patient.

**4. Discussion**

This study shows the need for drug reconciliation services. In the first phase of the study, 11 out of 32 patients experienced unintentional discrepancies and 2 patients experienced 2 nonconforming discrepancies. The most accidental nonconformity in the form of omission medication was 28.12%.

These results are the same as those of Herrero Herrero and García-Aparicio [5] showing the highest nonconformity of omission medication was 84.6% of 52 reports of unintentional medication.
discrepancies. In a systematic review by Michaelsen MH et al, the general discrepancies that occur are omission medication of more than 56% and the second is a new prescription in the form of inaccuracies in dosing, route and frequency of 44% of nonconformities [7].

In the second phase of the study, it was found that there was no patient knowledge about drug reconciliation. This was due to the absence of drug reconciliation services in the community while few were in the hospital. Drug reconciliation carried out in hospitals is limited to certain diseases and DM disease is not one of them. For service providers, few know about drug reconciliation. This shows the need for socialization and drug reconciliation training to service providers. Patients and service providers support drug reconciliation. Both patients and service providers consider drug reconciliation to be an important and good service.

The tendency of patients to choose the type of drug reconciliation service is home visits and calling, while those who provide services other than home visits and calling are those who choose both depending on the patient's condition. Some studies that show both calling and home visits have a positive effect on the patient's condition and the patient's response to treatment. Research conducted on the usefulness of telephones for health services shows that the telephone is useful for motivating and reminding patients of their treatment in patients with chronic diseases. Digital communication can improve patient interpersonal relationships with service providers. [8] A meta-analysis study by Ploeg et al. showed that home visits for elderly patients reduced mortality by around 17%. [9] Home visits make patients feel care for patients and improve patient trust in health care providers. [10]

The frequency of drug reconciliation services selected by patients is 1x per week, 2x weekly, 1x monthly and 2x monthly, while the service providers choose 1x monthly, 1x 2-3 weeks and 1x a week. The choice of patient frequency is more frequent than the choice of the service provider due to the availability of the time of the service provider and depending on the medication that the patient gets.

Willingness to pay patients for drug reconciliation services, namely objection to pay, 50,000-100,000, transportation and voluntary money. Willingness to be paid by service providers does not need to be paid, 20,000-50,000, 50,000-100,000, transportation money, voluntary patients. Willingness to pay patients and readiness is paid by the service provider depending on the economic conditions of the patient and the existence of health insurance. For Service Providers the type of service performed also affects the example of a home visit requires more costs than when calling a patient. The results obtained are in accordance with research on the willingness to pay patients for health services in Aceh by Rina S, where willingness to pay patients is influenced by the patient's ability to pay and the existence of health insurance [12].

This research limitation is only can be applied to a hospital like Kandou Hospital Manado as type A of as Type A Referral Hospital. The second stage of research can only be applied to economic conditions in countries with low to middle economies. In addition to the large number of samples that are not representative due to the length of time to get medical record data from the Hospital, for the future research there is more time span of the study.

5. Conclusion
The results of the study indicate that there is a large amount of mismatch, and the presumption of drug reconciliation is needed by health workers and patients. Drug reconciliation has the potential to be implemented in Manado, especially in Kandow Hospital as a referral center.

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References

[1] The Joint Commission, Sentinel Event Alert, 2006, available from: www.jointcommission.org/SentinelEvents/SentinelEventAlert/sea_35.htm?print=yes[9/20/2010: 35.

[2] Institute for Safe Medication Practices, 2011, ISMP List of High-Alert Medications in Community/Ambulatory Healthcare, available from www.ismp.org.

[3] Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia, Riset Kesehatan Dasar, Jakarta, 2007.

[4] Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia, Riset Kesehatan Dasar, Jakarta, 2013.

[5] Herrero-Herrero JJ, García-Aparicio J, 2011. Medication discrepancies at discharge from an internal medicine service, European J of Internal Medicine ; 22: 43–48.

[6] Braun V, Clarke C, Using thematic analysis in psychology, Qualitative Research in Psychology. 2006 : 3; 77-101.

[7] Michaelsen MH, McCauge P, Bradley CP, Sahm LJ. Medication Reconciliation at Discharge from Hospital: A Systematic Review of the Quantitative Literature. Wilson KA, ed. Pharmacy : Journal of Pharmacy, Education and Practice. 2015; 3(2): 53-71. Doi: 10.3390/pharmacy3020053.

[8] Watkins JOTA, Goudge J, Gomez-Olive FX, Griffiths F. Mobile phone use among patients and health workers to enhance primary healthcare : A qualitative study in rural South Africa. Science Direct Journal. 2018; 198: 139-147. Doi: 10.1016/j.socscimed.2018.01.011

[9] Ploeg J, Feightner J, Hutchison B, et al. Effectiveness of preventive primary care outreach interventions aimed at older people; meta-analysis of randomized controlled trials. Can Fam Physician. 2005;51: 1244-1245

[10] Van Kempen JAL, Zuidema SU, Rikkert MG MO, Schers HJ. Home Visit for frail older people: a qualitative study on the needs and preference of frail older people and their informal caregivers. Br J Gen Pract. 2012; 62(601): e554-e560

[11] Hu M, Zhou Z, Zeng F, Sun Z. Effect of frequency of follow-up on quality of life of type 2 diabetes patients on oral hypoglycemics. Diabetes Technol; Ther. 2012 Sep; 14(9): 777-82. Doi: 10.1089/dia.2012.0037

[12] Rina S, Rosminah M. Willingness top ay and ability to pay for health care service at Zainoel Abidin public hospital Banda Aceh, Indonesia, Proceedings of Annual International Conference Syiah Kuala University. 2011; Nov 29-30:242-246