INTRODUCTION

According to the basic health research in Indonesia (Riskesdas), the prevalence of diabetes mellitus (DM) increased from 1.1% (2007) to 2.1% (2013). DM was observed more in people with the age range 55-64, who are females, educated, live in urban areas, entrepreneur, and have a high ownership index quintile. DM is included in the 7 most diseases causing death [1].

DM is a common disease, but each patient requires unique treatment. The medication to control blood glucose levels in type 2 diabetes are meal planning, weight loss, and exercise. They are insufficient to lower blood glucose levels closer to normal range. Therefore, it is necessary to combine it with antidiabetic agents. Oral hypoglycemic agents intended to keep blood glucose levels close to normal, thus decreasing the risk of long-term complications and improving the quality of life.

Interestingly, many patients with type 2 diabetes mellitus (T2DM) have poor glycemic control based on the preliminary study. The American Diabetes Association explained that problems were inappropriate in drug selection and dosage [2]. In addition, adherence issues also contribute to poor glycemic control. It is not only the use of drugs but also on lifestyle perform therapy which includes medical nutrition therapy, regular physical activity, adequate rest, behavioral support, smoking cessation, and avoidance of all tobacco products.

This study ensured the medication-related problems through the interview. We considered that interviewing the patient was useful to collect data to augment medication reviews related to the identification of medication therapy problems (MTPs). Patients can describe and elaborate on their medication- and illness-related experiences, thoughts, actions, and their problems [3]. Several other studies identify drug-related problems retrospectively [4,5]. The research objective is to identify MTPs in outpatients with type 2 diabetes.

METHODS

The primary data were obtained from interviewing participants on the basis of a semi-structured interview guide. Secondary data, that is, glycosylated hemoglobin (HbA1c), fasting blood glucose level, lipid profile, weight, and blood pressure of patients taken from medical records as well as the prescribed medication. Interview sessions were audio-recorded.

Study design

A descriptive study conducted to ascertain the diabetes MTPs. Face-to-face interviews were conducted to collect data from each participant.

Setting

The study was conducted in several general hospitals, such as regional Public Hospitals of Sleman and Wates Kulon Progo, representing government hospitals, and Bethesda Hospital-private managed. All public hospitals are located in the province of Yogyakarta have an internal medicine service. The first hospital is located in the district, which has the most population of the province; the second represents the hospital in rural areas; and the latter one is located in the center of the city.
Sample and recruitment
The outpatient with type 2 diabetes was the target population of this study. Participants were recruited by a purposive sampling technique. In qualitative research, there are no standard rules in determining the sample size for the interview, but there is general agreement that the sample size should be determined when the data saturation was reached [4]. The eligibility criteria were male and female, diagnosed with T2DM (written in the medical record), getting oral hypoglycemic agents or insulin, agreeing to participate in the study by signing the consent form. If the patient had hearing loss, unable to communicate, and dementia were excluded.

In Sleman and Wates General Hospitals, participants were recruited in the outpatient clinic’s waiting room. While the other hospitals recruitment participants had been held in pharmacy’s waiting room. If an interview was not completed, it was continued when they were waiting for a prescription service or in other times by appointment.

Data collection
The data were collected by the first author, face-to-face with patients in the waiting room or other agreed locations (such as patient’s home and mall). The interview with Sleman General Hospital’s patients was conducted between November and December 2015, Bethesda Hospital between January and February 2016, Wates General Hospital between April and May 2016.

An hour was allocated for an interview, but the duration of interview depended on the depth of each patient’s response, in an average of 25-40 minutes, not including the process to get the informed consent. The interview guide describes in Table 1.

Interview guide
The interview guide was designed to ascertain in-depth knowledge about each patient’s perceptions experience, judgment, action, and the problems associated with the treatment and their disease. The interview guide was used to frame the topic of the interview. The combination of open- and closed-ended questions was formulated focusing on domains, including medicine- and illness-related knowledge, medication compliance, social support, psychological conditions, use of alcohol and tobacco, and the symptoms of other diseases.

Medication therapy problems (MTPs) documentation
As reported by Adusumilli and Adery [3], as many as 14 systems for classifying drug-related problems, published in the international literature. To ensure a reliable and consistent documentation, identification of problem drug therapies based on a system developed by Pharmaceutical Care Network Europe Version 6.2. It was first developed in 1999 and had been revised several times. The system was also used to document information related to the treatment of problems in the process of pharmaceutical care. This system contains the codes for the problems, causes, and intervention separately. Some studies using this system to determine the nature, prevalence, and Incidence of treatment-related problems [7,8]. A principal investigator using a checklist was developed by Roozenelaal and Kraas [9] to explore medication-related problems.

Data analysis
All audio recording were stored in digital format, in a secure computer network drive. The results of the interview transcribed into the interview guide, either verbatim or with the words of the investigator herself. The interview transcript was encoded by open code 4:03, and the initial coding structure using the “Medication adherence framework” was developed by Wiener et al. [10]. Data were encoded into multiple dimensions. Then, the inductive approach was used to identify the emergence of a second code and concepts in each dimension to explain the phenomenon.

Ethical approval
The study was approved by the Medical and Health Research Ethics Committee Faculty of Medicine Gadjah Mada University - Dr. Sardjito Public Hospital (Ref: KE/FK/576/EC/2015).

RESULTS
Participant characteristics
A total of 46 patients were eligible to the study criteria and signed a consent form, mostly female (61%). The average age was 57. Around, 42 participants completed the interview; there were 23 participants who successfully checked glycemic control. Eleven participants had HbA1c >7%. Nine of the eleven participants with poor glycemic control were analyzed to explore the issues that cause blood glucose was unregulated. The study design can be seen in Fig. 1.

There were three participants lost the interview because of rush and did not meet the investigator at the agreed time. Not all participants were willing to take a blood sample due to sore, fear, and were taking antiplatelet medications, so they worried about longer bleeding time. Characteristics of focus group participants (n=23) were presented in Table 2.

Most participants had hereditary factors, which contribute to the emergence of the disease. Only one participant (male) who reported his disease as a result of unhealthy lifestyle, for example, often got stress at work or many things in daily life that cause psychological effects, irregular meals, and lack of exercise. There were eight participants that lived with diabetes for more than 10 years (range 10-33 years); one participant (male) was newly diagnosed, the other two were less than a year, 12 participants that had experienced DM were between 1 and 10 years. Around, 11 female participants had poor glycemic control. Not all participants with diabetes duration of more than 10 years had poor glycemic control.

Several different themes were identified. The majority of participants informed that they would adhere to medication prescribed. The participants newly diagnosed stated that they did not know much about the disease and how to manage it. Those who suffered with diabetes for long agreed that they have been able to control their lifestyle, including diet, exercise, and smoking. Some patients were less successful in treating the diabetes, particularly because of stress.

Knowledge and behavior associated with diabetes and medicines
In general, the patients recognized the function, dosage, frequency, time, and method of medicine use and storage of drugs, but most of the participants did not understand the name, side effects, the ways to handle adverse effects, and drug interactions. Some patients had taken herbal medicines in decoction to assist lower blood glucose, but most of them did not believe that the traditional medicines could lower blood
Table 2: Demographic and clinical characteristics of participants (n=23)

| Patient characteristics                  | N   |
|------------------------------------------|-----|
| Gender                                   |     |
| Male                                     | 11  |
| Female                                   | 12  |
| Age                                      |     |
| 30s                                      | 2   |
| 40s                                      | 2   |
| 50s                                      | 9   |
| 60s                                      | 8   |
| 70s                                      | 2   |
| Marital status                           |     |
| Married                                  | 23  |
| Unmarried/divorced/bereaved              | 0   |
| Employment                               |     |
| Work                                     | 9   |
| Retired/not working                      | 14  |
| Latest education                         |     |
| Elementary school                        | 1   |
| Junior/senior high school                | 10  |
| Diploma                                  | 5   |
| Bachelor                                 | 6   |
| Master                                   | 1   |
| Doctor/medical/law                       | 0   |
| Patient characteristics                  | Mean or N |
| Duration of diabetes (n=22): Years (range) | 11.2 (0.2-33) |
| Primary treatment                        |     |
| Insulin injections and oral antihyperglycemic | 7   |
| Insulin injections                       | 5   |
| Oral antihyperglycemic                   | 11  |
| HbA1c % (Range)                          | 7.9 (5.8-12.9) |

HbA1c: Glycosylated hemoglobin

Medication adherence
The patients would averagely adhere to take their medicines or inject their insulin. There was a patient who had tried to stop taking the drugs because she felt her condition well-regulated. During withdrawal, she did not control the diet or even exercise. This made her realizes that diabetes cannot be cured but can be controlled, among others, by taking drugs. Such experience was valuable for the patients. The desire to cure was a motivation for most patients to always take medications or inject insulin despite boredom. They believed that the medicines had given more benefits than the risk of adverse effects. They assumed that their medicines had actually passed through various stages of both pharmacological and toxicological studies, to assure the efficacy and safety.

Knowledge practice on disease
Only few patients claimed that they suffered diabetes because of family history, whereas most reported that uncontrolled diet and lack of physical activity triggered the disease, so they were currently practicing a healthy lifestyle by regulating diet and trying to be more active in their daily lives. In general, patients had learned that discipline in managing their lifestyle and taking medication could enhance their glycemic control. They considered that regular physical activity was effective to do so, such as, by gardening in the afternoon daily, playing badminton, cycling, walking, and gymnastics, particularly those with physical ability. However, some patients were not able to do such extra activities because of non-conducive health condition. Having no time for exercise and laziness were particular concerns for the investigator. HbA1c in active patients and inactive ones was different, although the results of assessment indicated that the level of medicine- and illness-related knowledge as well as medication adherence were similarly good. Besides, lack of discipline in exercise and diet, psychological factors caused uncontrolled blood glucose. It was reported that excessive job stress and anxiety could increase blood glucose level. The more severe the responsibility, the higher stress underwent by patients. Most patients stated that they could not overcome it. In the social lives, all patients expressed satisfaction over the support and understanding given by the family. There were some patients who embarrassed if others knew that they were taking a lot of drugs. They were also afraid of the judgment by others about the severity of disease suffered. However, some patients were not burdened when injecting insulin in front of their relatives and friends. The patients’ awareness to visit the doctor regularly and perform blood test was very high because they considered that regular physical activity was effective to do so, such as, by gardening in the afternoon daily, playing badminton, cycling, walking, and gymnastics, particularly those with physical ability. However, some patients were not able to do such extra activities because of non-conducive health condition. Having no time for exercise and laziness were particular concerns for the investigator.

Stress could increase their blood glucose level.

Education would lead to the effect on patients’ mindset and perception on the disease management. The education level determined whether a patient was easy to understand the information provided. The patients’ awareness to visit the doctor regularly and perform blood test was very high because they considered that regular physical activity was effective to do so, such as, by gardening in the afternoon daily, playing badminton, cycling, walking, and gymnastics, particularly those with physical ability. However, some patients were not able to do such extra activities because of non-conducive health condition. Having no time for exercise and laziness were particular concerns for the investigator. The patients’ awareness to visit the doctor regularly and perform blood test was very high because they considered that regular physical activity was effective to do so, such as, by gardening in the afternoon daily, playing badminton, cycling, walking, and gymnastics, particularly those with physical ability. However, some patients were not able to do such extra activities because of non-conducive health condition. Having no time for exercise and laziness were particular concerns for the investigator. The patients’ awareness to visit the doctor regularly and perform blood test was very high because they considered that regular physical activity was effective to do so, such as, by gardening in the afternoon daily, playing badminton, cycling, walking, and gymnastics, particularly those with physical ability. However, some patients were not able to do such extra activities because of non-conducive health condition. Having no time for exercise and laziness were particular concerns for the investigator. The patients’ awareness to visit the doctor regularly and perform blood test was very high because they considered that regular physical activity was effective to do so, such as, by gardening in the afternoon daily, playing badminton, cycling, walking, and gymnastics, particularly those with physical ability. However, some patients were not able to do such extra activities because of non-conducive health condition. Having no time for exercise and laziness were particular concerns for the investigator.

Glucose significantly compared with either insulin or oral antidiabetic agents.
Some patients had diabetes complications. Thus, it was necessary to build a strategy to prevent the disease from becoming complicated.

**Smoking status**
Most of the participants with poor glycemic control were not active smokers. Nevertheless, a number of them had body mass index >25 kg/m².

**Daily life with diabetes**
The daily life of patients with diabetes was as usual as those without diabetes in doing their activities. A homemaker who must cook for her family also prepared a specific menu for herself, which was different from that for other family members. Almost, all the patients did not perform a self-monitoring of blood glucose, but some carried out an experiment by themselves to find out the effect of food on blood glucose alteration. The results of the trial and error were used to regulate a safe portion of diet. A number of patients experienced some adverse drug events or symptoms of other diseases, but based on their reports, it did not disturb and only appeared occasionally. The symptoms disappeared when they took some medication prescribed. Productive age patients asserted that there was no problem in their sexual lives, but some reported their sex ability decreased.

**CONCLUSIONS**
The medication therapy targets in T2DM not be met were not only caused by the inappropriate use of drugs, but also by patients’ lifestyle and psychosocial problems. Pharmacists need to consider the most common MTPs when counseling patients with T2DM.

**ACKNOWLEDGMENTS**
The authors are very grateful to all patients interviewed. We would like to appreciate the doctors, pharmacist, and nursing staff of outpatient department for their contribution to this study. This research is part of dissertation project supported by a grant from Indonesian Ministry of Research, Technology, and Higher Education.

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### Table 3: The MTPs in T2DM patients and the causes

| Problem | Cause |
|---------|-------|
| 1. The clinical effect of the treatment is not as expected (regulating plasma glucose level) | 1. Patient forget to take the pills or use insulin |
| 2. The patient suffers from adverse drug reaction at normal dose | 2. Felt better |
| 3. Nothing seems wrong in the treatment, but patient is unhappy about it | 3. Patient not aware of medication change |
| 4. Patient performed insulin inappropriately, especially along the way from hospital to his/her home | 4. Patient stored insulin inappropriately, especially along the way from hospital to his/her home |
| 5. Patient has disease which affects the result of laboratory test, such as anemia, chronic kidney disease | 5. Patient has disease which affects the result of laboratory test, such as anemia, chronic kidney disease |
| 6. The behavior of the patient related poor eating pattern, lack of physical activity, smoking status, and psychological stress | 6. The behavior of the patient related poor eating pattern, lack of physical activity, smoking status, and psychological stress |
| 7. Lack of knowledge about the nature of her/his disease | 7. Lack of knowledge about the nature of her/his disease |

MTPs: Medication-therapy problems, T2DM: Type 2 diabetes mellitus

Smoking cessation is often occurred with weight gain, and obesity is a risk factor of T2DM [15].

The previous study found that forgetfulness was significantly associated with drug-related problems [16]; nevertheless, the participants rarely miss their medication.
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