**Online Appendix. Pharmacist intervention package for patients with diabetes mellitus**

## Stage one

1. Assessment of baseline fasting glycemic control
   - Fasting blood glucose (FBG) measurement

Method: Cross-sectional study. FBG measurement with glucometer

2. Baseline assessment of the following regarding Diabetes mellitus using Michigan Diabetes Knowledge Test instrument (MDKT)
   - Knowledge of the disease
   - Risk factors
   - Complications
   - Importance of healthy diet
   - Physical activity
   - Self-monitoring of blood glucose
   - Prescribed medications and
   - Management of hypoglycaemia and hyperglycaemia.

Method: face-to-face interview session with pharmacist

3. Collection of baseline patient's data
   - Socio-demographic characteristics-age, gender, marital status, level of education, occupation, height, and weight
   - Biochemical parameter- fasting blood sugar, glycated haemoglobin, low density lipoproteins, high density lipoproteins, triglycerides, and total cholesterol
   - Clinical parameter- blood pressure, dyslipidaemia, body mass index, alcohol consumption, smoking, activity level and family history of diabetes

Method: face-to-face interview and blood sample collection

## Stage two

Patient education regarding diabetes, symptoms, risk factors, complications, and types of diabetes

Method: One-to-one educational intervention

Education package

1. **Knowledge about diabetes mellitus**
   - Definition of disease: diabetes mellitus is a condition which occurs when there is no secretion of insulin or insufficient quantity of insulin in the body. This situation makes the blood sugar (glucose) level to rise above normal (≥7mmol/L or ≥7%)
   - Diabetes risk factors: Alcohol consumption, nutrition, obesity, sedentary lifestyle, physical inactivity, age, family history, ethnicity, and race
   - Symptoms of diabetes: frequent hunger, frequent thirst, frequent drinking of water, blurred vision, weight loss and FBG ≥7mmol/L, or ≥7% A1C or 2 hours postprandial glucose ≥11.1
   - Types of diabetes mellitus: type 1 diabetes (complete lack of insulin secretion), type 2 diabetes (insufficient insulin secretion and/or insulin resistance), gestational diabetes (diabetes in pregnancy) and other specific types (related to genetic disorders of the pancreas)
   - Complications of Diabetes: retinopathy, neuropathy, nephropathy, coronary artery disease, peripheral arterial disease, and stroke
2. **How to maintain a healthy weight** (body mass index (BMI) $<25Kg/m^2$): This is a key nondrug measure in the management of diabetes mellitus and could be achieved through lifestyle modification (diet and exercise)
   - Observing a good (balanced) diet culture: Mediterranean diet is encouraged, including a calibrated blend of high amount of olive oil, fruits, nuts, legumes, seeds, vegetables, beans, grains, spices, medium amounts of seafood, medium to low amounts of poultry and low amounts of beef and goat meat
   - Physical activity: Graduated aerobic or cardio activities including brisk walking, taking the stairs, jogging, riding a bicycle, gardening, shoveling sand and washing windows, floors or cars should be included in daily activity schedule. Participants were encouraged to sustained activity for 2 hours 30 minutes (150 minutes) per week

3.  **Special care:** Participants were taught how to take care of parts of the body that requires extra attention, especially for people with diabetes. This includes the eyes, heart, kidneys, and foot:

    - **Eye care:** Patient were counselled to get a comprehensive eye examination at least once a year as retinopathy often goes unnoticed until permanent vision loss occurs. Early detection, timely intervention and appropriate follow-up are the backbone to preventing vision loss. Patients with eye problems were referred to the clinic consultant
    - **Heart care:** Participants were counselled to get comprehensive and regular heart examination to prevent cardiovascular problems. Other related risk factors to watch against include overweight or obesity, high blood pressure, high blood cholesterol, smoking, and family history
    - **Kidney care:** Steps to maintaining healthy kidneys in diabetes mellitus include:
        o   Avoid smoking and alcohol consumption
        o   Develop a diabetes meal plan with the help of a dietician and limit salt and sodium intake
        o   Take sufficient water daily (At least 2 litres)
        o   Make physical activity part of daily routine
        o   Maintain healthy weight: body mass index (BMI) <25kg/m$^2$
        o   Get enough sleep, between 7 to 8 hours each night
        o   Ensure blood glucose, pressure and cholesterol are all well controlled
        o   Ensure relevant kidney investigations are conducted at least once a year
    - **Foot care:** Participants were provided with the following steps for proper foot care:
        o   Personally, check feet daily
        o   Wash and dry feet every day
        o   Protect feet from heat and cold, wear comfortable, loose fitting socks and shoes
        o   Keep moving to improve blood flow
        o   Keep toenails trimmed
        o   Never go bare foot
        o   Ensure healthcare provider checks feet at least once a year
        o   Report any redness, cuts, swelling, blisters, or sores to healthcare provider
        o   Don't smoke because it slows down blood flow

4.  **Blood pressure monitoring:** Participants were encouraged to maintain blood pressure below 140/90mmHg in accordance with JNC 8 specifications through appropriate diet intake, exercise, and regular check up

5.  **Healthy cholesterol status:** Participants were encouraged to maintain total blood cholesterol status below 200mg/dL through appropriate diet intake, exercise, and regular check up

6.  **Blood glucose monitoring:** participants in the intervention group were trained on the steps involved in Self-monitoring of blood glucose (SMBG) and the need for daily record keeping. Participants were also encouraged to own a personal glucose meter.

    - Steps for efficient use of the glucose meter and test strips:
        o   Meter and test strips should be handled with clean, dry hands
        o   Test strips must be kept in their original canister and airtight to prevent moisture
        o   Ensure strips are not expired
        o   Keep meter in cool, dry area, not in the car or in sunlight
        o   Insert strip into the glucose meter
        o   Clean the area to prick with a cotton wool swab, usually a finger
        o   Apply a lancet to the clean, dry finger firmly but not forceful – side of the third, fourth or fifth digits may be preferable
        o   Collect blood sample directly on the inserted test strip
        o   Take glucose reading after 30 seconds or less (documentation)

7.  **Hypoglycaemia Management**
    Participants were taught how to recognise hypoglycaemia (low blood sugar) and how to manage it before seeking for medical attention.
    - Causes of hypoglycaemia (<4mmol/L FBG or <4% A1C)
        o   Taking too much of the prescribed diabetes medication
        o   Going for too long without eating
        o   Not eating enough
        o   Exercising more than usual

- o Drinking alcohol without food
- Symptoms of low blood sugar: shakiness, sweating, headache, dizziness, trembling, anxiety, confusion, convulsion, hunger
- Management of low blood sugar: ingest some candy or get some soft drinks, take 1 teaspoon of sugar or honey, check blood glucose after 15 minutes, if blood glucose is not up to 7mmol/L, repeat the process and check after another 15 minutes, then call for help.

8. **Symptom of hyperglycemia and management**
- High blood sugar, increased thirst and/or hunger, blurred vision, frequent urination (peeing), headache, fatigue, slow-healing cuts or sores, weight loss and dehydration. Management include exercise, follow meal plan, limit alcohol intake, do not smoke

9. **Medication validation and counselling**
Individualised counselling based on prescribed medication(s)
- The highlight of counselling include:
  - o Right medication: Pharmacist assured that the prescribed medication was right for the patient
  - o Right indication: Pharmacist assured that the medication was right for the indication
  - o Right dosage: Pharmacist assured that the dosage of the medication was appropriate
  - o Right therapy combination: Pharmacist assured that the therapy combination was right
  - o Right therapy information: Pharmacist assured each patient was given the right information regarding the prescribed medication. E.g., how, and when to use the medication, knowledge of the side effects, interactions, and the need to quickly report any untoward effect to the care centre
  - o Patients were counselled on medication adherence strategies such as use of alarm watches for reminders, labels, pillbox, forming support groups
  - o Therapy related problems were identified and resolved by pharmacist. E.g., medication overdose or under dose, unnecessary drug therapy or noncompliance

10. **Referral intervention**
Patients who needed further medical attention were referred appropriately. E.g., for eye care and heart examination

## Stage Three
Patients follow up
1. Six weeks post-intervention (intervention group)
- Patients were called via phone/ text messages six weeks after receiving the pharmacist care package to receive their comments on the intervention. Individual patient and drug-related issues were identified and rectified, patients' queries were answered, and medication adherence was re-enforced. They were also reminded of clinic visits, and those who needed more help were referred to the right resources.
2. Three months (12 weeks) post- intervention (intervention group)
- Three months following baseline data collection, the research pharmacist met with each participant in the intervention group for a second face-to-face contact. They gave feedback on the previous session, and interventions were given based on the needs of each patient.
3. 18 weeks post-intervention (intervention group)
- Patients were contacted six weeks after their second face-to-face meeting with the study pharmacist through phone call/text messages, as described in stage three above. Patients were reminded of their next clinic appointment date for data collection after receiving and assessing feedback. The research pharmacist also called patients in the usual care group to remind them of the study and the requirement to be available for data collection during the next clinic session.
4. Six months post intervention (intervention and usual care group)
- The second round of data collection took place six months from baseline. Patients were evaluated clinically, and blood samples were collected for laboratory analysis of the following biochemical parameters: Fasting blood glucose, glycated haemoglobin, blood pressure, low density lipoproteins, high density lipoproteins, triglycerides, and total cholesterol