Long-term Clinical and Cost Outcomes of a Pharmacist-managed Risk Factor Management Clinic in Singapore: An Observational Study

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ABSTRACT

Purpose: Few studies have determined the benefits of pharmacist-run clinics within a tertiary institution, and specifically on their capability to improve clinical outcomes as well as reduce the cost of illness. This study was designed to investigate the effectiveness of a pharmacist-managed risk factor management clinic (RFMP) in an acute care setting through the comparison of clinical (improvement in glycosylated hemoglobin level) and cost outcomes with patients receiving usual care.

Methods: This single-center, observational study included patients aged ≥21 years old and diagnosed with type 2 diabetes mellitus (DM) who received care within the cardiology department of a tertiary institution between January 1, 2014, and December 31, 2015. The intervention group comprised patients who attended the RFMP for 3 to 6 months, and the usual-care group comprised patients who received standard cardiologist care. Univariate analysis and multiple linear regression were conducted to analyze the clinical and cost outcomes.

Findings: A total of 142 patients with DM (71 patients in the intervention group and 71 patients in the usual-care group) with similar baseline characteristics were included. After adjusting for differences in baseline systolic blood pressure and triglyceride levels, the mean reduction in glycosylated hemoglobin level at 6 months from baseline in the intervention group was significantly lower by 0.78% compared with the usual-care group. Patients in the usual-care group had a significantly higher risk of hospital admissions within the 12 months from baseline compared with the intervention group (odds ratio, 3.84 [95% CI, 1.17–12.57]; $P = 0.026$). Significantly lower mean annual direct medical costs were also observed in the intervention group (US $8667.03 [$17,416.20] vs US $56,665.02 [$127,250.10]; $P = 0.001$).

Implications: The pharmacist-managed RFMP exhibited improved clinical outcomes and reduced health care costs compared with usual care within a tertiary institute. (*Clin Ther*. 2017;∎:∎∎∎–∎∎∎) © 2017 The Authors. Published by Elsevier HS Journals, Inc.

Key words: cardiovascular risk factors, clinical outcomes, cost outcomes, pharmacist clinic, risk factor management, type 2 diabetes mellitus.

INTRODUCTION

Diabetes mellitus (DM) has become a major health concern in many developed nations because it is frequently associated with comorbidities and complications,[1,2] as well as increased health care expenditures.[3,4] There is also a strong correlation between

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DM and cardiovascular diseases (CVDs); patients with DM have a 2 to 4 times higher risk of CVD-associated mortality[3,5] and higher annual direct medical costs.[6] With the rising disease burden of DM in Singapore, the societal costs associated with DM is expected to rise from US $787 million in 2010 to US $1867 million by 2050.[7] Hence, it is crucial to actively manage DM and its associated cardiovascular risk factors to prevent undesirable clinical outcomes and to reduce health care costs.

To achieve optimal control of DM, a collaborative and integrated team approach has been recommended by the American Diabetes Association.[8] Given that pharmacists are experts in pharmacotherapy, they are an excellent addition in the collaborative management of DM, which requires complex drug regimens, intensive monitoring, and self-management education to optimize drug therapy.[3,9] It has also been shown that clinically trained pharmacists working in collaboration with primary care providers could lead to improvement in DM-related outcomes.[10] In 2010, the first pharmacist-managed risk factor management clinic (RFMP) was established in a tertiary institution in Singapore as part of the integrated collaborative care model to manage and care for patients with DM, hypertension, and/or dyslipidemia referred by the cardiologists.

In the literature, pharmacist-run clinics in various settings have shown favorable clinical outcomes through significant reductions in glycosylated hemoglobin (HbA_{1c}),[3,11,12] LDL,[11–14] and systolic blood pressure (SBP)[12,15] levels compared with patients who received usual care. Furthermore, patients with DM receiving pharmacist-run services have experienced lower health care spending with higher quality-adjusted life years[16] due to significant reductions in hospitalizations and emergency department (ED) visits.[11] However, the majority of such studies were conducted in the primary care or community setting, with very few studies determining the benefits of pharmacist-run clinics within a tertiary institution that could cater services (eg, intensive glucose monitoring, medication titration) to patients with unstable HbA_{1c} levels and with complications. This approach differs greatly from pharmacists in the primary care or community delivering DM care, where they mainly conduct regular glucose monitoring as well as medication titrations in stable patients.

In view of the limited research conducted on pharmacists' interventions in the tertiary setting, the present study was designed to explore the effectiveness of an RFMP through the comparison of clinical outcomes between patients who received pharmacist clinical services at an RFMP versus patients who received usual care in an acute care setting. The primary objective of this study was to compare the management of DM (namely, reduction in HbA_{1c} levels) between the 2 groups. The secondary objective was to compare the management of other cardiovascular risk factors and cost outcomes between the 2 groups.

PATIENTS AND METHODS

Study Design and Setting

This single-center, observational study was conducted at the Cardiology Department of Tan Tock Seng Hospital, a 1400-bed acute care facility in Singapore. This study was approved by National Health Group Domain Specific Review Boards with a waiver of informed consent.

Study Participants

Patients aged ≥21 years, diagnosed with type 2 DM who were followed up at Tan Tock Seng Hospital for the management of these comorbidities, were included in the study. Patients diagnosed with type 1 DM and missing baseline HbA_{1c} values were excluded from the study. Patients enrolling in the RFMP clinical service and patients receiving usual care from the cardiologist between January 1, 2014, and December 31, 2015, were found in the hospital database and were screened for eligibility to be included in the intervention and usual-care groups, respectively. Each eligible patient included in the intervention group was matched 1:1 with a patient in the usual-care group based on the baseline HbA_{1c} value (±0.2%).[17] The baseline HbA_{1c} level for the intervention group was the HbA_{1c} value obtained at the first visit to the RFMP; the baseline HbA_{1c} level for the usual-care group was the first HbA_{1c} value obtained between January 1, 2014, and December 31, 2015.

Intervention Group (RFMP)

The intervention group comprised patients who attended the RFMP for at least 3 to 6 months and had HbA_{1c} levels measured at baseline. The RFMP is