Patient Empowerment Programme (PEP) and Risk of Microvascular Diseases Among Patients With Type 2 Diabetes in Primary Care: A Population-Based Propensity-Matched Cohort Study

Carlos K.H. Wong,[1] William C.W. Wong,[1] Y.F. Wan,[1] Anca K.C. Chan,[1] Frank W.K. Chan,[2] and Cindy L.K. Lam[1]

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The benefit of structured diabetes education programs has been confirmed in systematic review (1) and meta-analysis (2). Although the explicit changes in glycemic control after structured education have been well established, limited evidence (3) has demonstrated the effect of structured education on diabetes-related complications. Recent studies (4,5) underwent an investigation of the effects on glycemic control and incidence of cardiovascular complication in a structured diabetes education program, Patient Empowerment Programme (PEP), versus the usual clinical practice in a Hong Kong primary care setting. Detailed description of PEP setting and mode of education delivery have been reported previously (4,5). However, whether the structured education would be associated with a lower risk of diabetic retinopathy, nephropathy, neuropathy, and composite microvascular complication events remains questionable. The aim of this population-based, propensity score–matched cohort study was to evaluate the influence of PEP implemented in primary care as compared with the alternative usual clinical practice.

This study included 13,280 patients with type 2 diabetes mellitus (T2DM) who attended at least one session of PEP from 1 March 2010 to 30 June 2012 and had no prior diagnosis of microvascular complication before the baseline date. Each patient was observed from baseline date to whichever following event came first until 31 December 2013—the date of an incidence of a microvascular event, date of death, or last follow-up as censoring. To assess the net effect of PEP, an equal number of 13,280 T2DM patients who had not ever participated in PEP on or before 31 December 2013 were matched to PEP subjects on propensity score matching. Four events were outcomes of interest: *1*) first microvascular event with one of the following diagnoses, retinopathy, nephropathy, or neuropathy; *2*) retinopathy; *3*) nephropathy; and *4*) neuropathy. Incidence of microvascular events was identified by the ICPC-2 and ICD-9-CM diagnosis coding systems.

In intention-to-treat analysis, multivariable Cox proportional hazards regression was performed to estimate the effect of PEP on the dependent variable of first microvascular event, accounting for all baseline characteristics of patients. Per-protocol analysis was performed using PEP participants who had completed the program and the propensity-matched non-PEP participants. For each model, survival curves were estimated by Kaplan-Meier method.

Kaplan-Meier survival curves are shown in Fig. 1. As observed, PEP participants generally suffered from fewer cases of composite microvascular disease and diabetic nephropathy. In intention-to-treat analysis, PEP participants were associated with a lower incidence of first microvascular event (HR 0.85, 95% CI 0.78–0.94, $P = 0.001$) and nephropathy (HR 0.71, 95% CI 0.62–0.80, $P < 0.001$) than non-PEP participants, after adjusting for confounding variables. Similar findings were obtained for those PEP participants with the completion of the program in per-protocol analysis.

Enrollment in PEP that enhances both knowledge and self-care of diabetes was associated with decreased microvascular complication events. Program completion was related to the reduction in microvascular complication events, mainly driven by diabetic nephropathy. Findings of this propensity-matched cohort study add to the growing body of literature supporting structured diabetes education as one of the essential and effective components in multifactorial intervention for T2DM in primary care setting.

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[1]*Department of Family Medicine and Primary Care, The University of Hong Kong, Ap Lei Chau, Hong Kong*
[2]*Integrated Care Programs, Hospital Authority Head Office, Hong Kong Hospital Authority, Kowloon, Hong Kong*

Corresponding author: Carlos K.H. Wong, carlosho@hku.hk.

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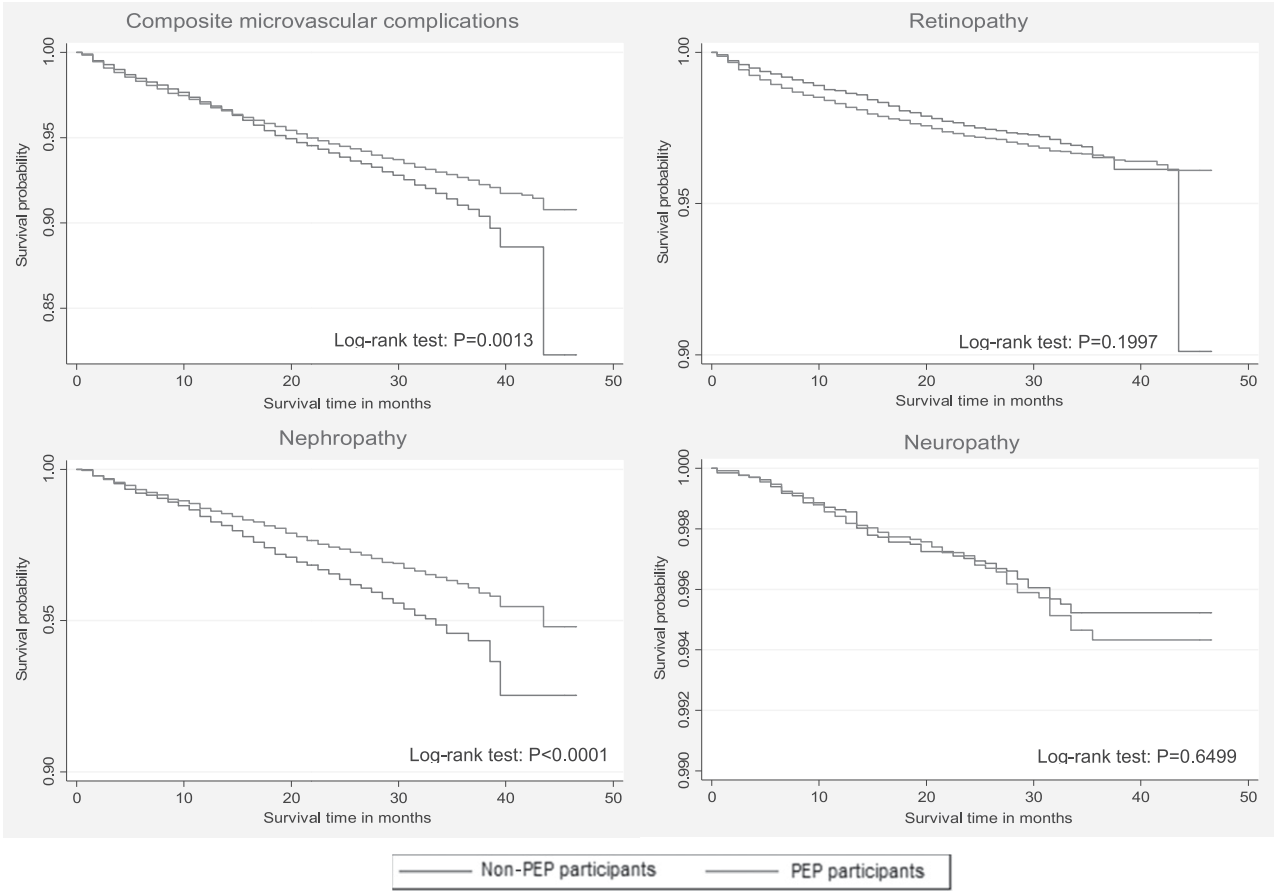

Figure 1—Kaplan-Meier survival curves of the composite microvascular complication, retinopathy, nephropathy, and neuropathy. Log-rank test compared the difference between PEP and non-PEP groups.

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References

1. Loveman E, Frampton GK, Clegg AJ. The clinical effectiveness of diabetes education models for type 2 diabetes: a systematic review. Health Technol Assess 2008;12:1–116.iii

2. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. Diabetes Care 2002;25:1159–1171

3. Ko SH, Song KH, Kim SR, et al. Long-term effects of a structured intensive diabetes education programme (SIDEP) in patients with type 2 diabetes mellitus—a 4-year follow-up study. Diabet Med 2007;24:55–62

4. Wong CKH, Wong WCW, Lam CLK, et al. Effects of Patient Empowerment Programme (PEP) on clinical outcomes and health service utilization in type 2 diabetes mellitus in primary care: an observational matched cohort study. PLoS One 2014;9:e95328

5. Wong CKH, Wong WCW, Wan YF, et al. Patient Empowerment Programme in primary care reduced all-cause mortality and cardiovascular diseases in patients with type 2 diabetes mellitus: a population-based propensity-matched cohort study. Diabetes Obes Metab 2015;17:128–135