Metabolic Profiles of Maori, Pacific, and European New Zealanders With Type 2 Diabetes Over 25 Years

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The population of New Zealand includes a high proportion of Maori (Indigenous Polynesian) and Pacific (Pasifika) people, who have been shown to experience worse type 2 diabetes mellitus (T2DM) outcomes than New Zealand Europeans (NZE), a phenomenon persisting for >20 years (1). It remains unclear which metabolic targets are not being achieved concurrent with these long-standing disparities in diabetes complications. In this study we compared five key clinical measurements routinely assessed in primary care (systolic blood pressure [SBP], BMI, HbA_{1c}, total cholesterol [TC], and triglyceride [TG]) over time among patients with T2DM from these three main ethnic groups (Maori, NZE, and Pasifika).

For this study we used the Diabetes Care Support Service (DCSS), a primary care diabetes audit program linked with national death registration, hospitalization, pharmaceutical claims, and socioeconomic databases, to identify a cohort of patients with T2DM (1). Ethics review was waived by the New Zealand Health and Disability Ethics Committees on 25 March 2019. Signed consent to participate was provided by an authorized signatory for each general practice.

Adjusted marginal mean SBP, BMI, HbA_{1c}, TC, and TG over baseline and 1, 2, 3, 4, and 5 years of follow-up among Maori, Pasifika, and NZE patients were estimated with mixed-effects models with adjustment for baseline characteristics (age, sex, smoking, socioeconomic status); baseline outcomes (e.g., baseline BMI, HbA_{1c}, TC, and TG for comparing SBP over time); baseline antihypertensive, antidiabetes and lipid-lowering treatments and anticoagulant therapy; and the enrollment period as fixed effects. Multiple imputation with chained equations was used to tackle the missing values. All statistical analyses were performed with Stata/MP 16.1.

Overall, 32,327 patients with T2DM (49.4% of whom were female and 47.9% NZE, 19.9% Maori, and 31.8% Pasifika; mean [SD] age 57.1 [13.8] years and diabetes duration 4.8 [1.2] years) were enrolled between 1 January 1994 and 31 December 2013, had baseline measurements, and were followed up over the following 5 years. At baseline, 70.0%, 55.1%, and 2.8% of patients took antihypertensives, statins, and anticoagulants, respectively, with 10.0% using insulin alone, 58.0% oral antidiabetes agents alone, and 17.6% both oral antidiabetes agents and insulin. Compared with Maori and Pasifika patients, the NZE patients group was older, had the lowest deprivation scores, and included fewer women and fewer current smokers. Antihypertensive and statin therapy use was lowest among Pasifika patients. Use of antidiabetes agents and insulin was lowest among NZE patients.

Fig. 1 shows that the overall adjusted marginal estimation (95% CI) of SBP at baseline and 1, 2, 3, 4, and 5 years of follow-up was significantly higher among NZE than Maori and Pasifika patients, while HbA_{1c} was significantly higher among Pasifika than among Maori patients, who had a higher HbA_{1c} than NZE patients. The overall adjusted marginal estimation of TC was similar across the three ethnic groups at each time point, the overall adjusted marginal estimation of TG was higher among Maori and NZE than Pasifika patients, and the

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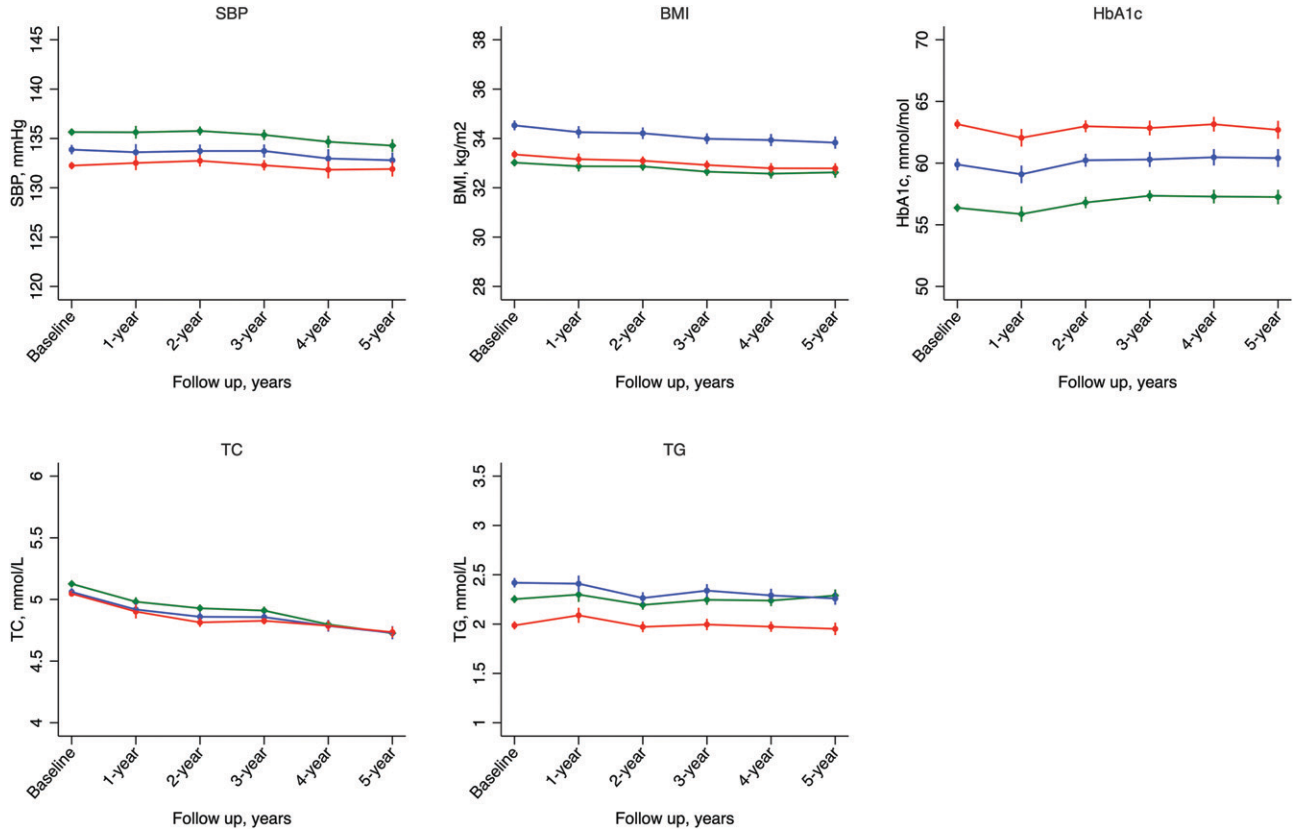

Figure 1–Adjusted marginal estimation of measurements over time. Green, blue, and red line indicates estimation for NZE, Maori, and Pasifika patients, respectively. For adjusted marginal estimation of SBP at each time point, age, sex, index of multiple deprivation, smoking status, duration of diabetes, antihypertensive treatment, statin treatment, antidiabetes treatment, and antiplatelet and anticoagulant treatment were adjusted for as well as BMI, TC, TG, albumin-to-creatinine ratio, and HbA_{1c} at baseline. For adjusted marginal estimation of BMI at each time point, age, sex, index of multiple deprivation, smoking status, duration of diabetes, antihypertensive treatment, statin treatment, antidiabetes treatment, and antiplatelet and anticoagulant treatment were adjusted for as well as SBP, TC, TG, albumin-to-creatinine ratio, and HbA_{1c} at baseline. For adjusted marginal estimation of HbA_{1c} at each time point, age, sex, index of multiple deprivation, smoking status, duration of diabetes, antihypertensive treatment, statin treatment, antidiabetes treatment, and antiplatelet and anticoagulant treatment were adjusted for as well as SBP, TC, TG, albumin-to-creatinine ratio, and BMI at baseline. For adjusted marginal estimation of TC at each time point, age, sex, index of multiple deprivation, smoking status, duration of diabetes, antihypertensive treatment, statin treatment, antidiabetes treatment, and antiplatelet and anticoagulant treatment were adjusted for as well as SBP, HbA_{1c}, TG, albumin-to-creatinine ratio, and BMI at baseline. For adjusted marginal estimation of TG at each time point, age, sex, index of multiple deprivation, smoking status, duration of diabetes, antihypertensive treatment, statin treatment, antidiabetes treatment, and antiplatelet and anticoagulant treatment were adjusted for as well as SBP, HbA_{1c}, TC, albumin-to-creatinine ratio, and BMI at baseline.

overall adjusted marginal estimation of BMI among Maori patients was significantly higher than among NZE and Pasifika patients. The discordance between the ethnic groups in SBP, TC, and HbA_{1c} levels continued over the 25-year period and after adjustment for confounders.

Ethnic disparities in glycemia, but not SBP or lipids, among patients with T2DM have presented a major and consistent health challenge in New Zealand for 25 years. These ethnic differences remain after adjustment for sociodemographic, period effect, and other clinical factors. The discordance in ethnic differences between glycemic and SBP/TC suggests that the substantially increased risks of cardiovascular and end-stage renal disease hospitalization among Maori and Pasifika patients with T2DM than among NZE patients (1) are largely due to greater hyperglycemia. A previous cross-sectional study also found that Maori and Pasifika patients with T2DM were receiving antihypertensive and lipid-lowering therapy similar to that of NZE patients (2). Answering the question of whether there are ethnic differences in harm at the same SBP and TC after adjustment for confounders requires further research. Comparable U.S. data have not been reported. The National Health and Nutrition Examination Survey (NHANES) has monitored T2DM complications and metabolic measures over 30 years but as a series of cross-sectional, not longitudinal, studies (3). The HbA_{1c} findings were similar to those for NZE and SBP findings similar to Maori and Pasifika patients here.

This study raises the question of how (predominantly) primary care can achieve comparable blood pressure control between the ethnic groups (especially when blood pressure may have commenced higher among Maori and Pasifika than among NZE patients [4]) but not address disparities in glycemia. Addressing these disparities likely requires greater integration between primary and secondary care and culturally tailored interventions to address the multiple barriers that exist in

the day-to-day lives of people with T2DM.

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