

Diabetes & Obesity Research Review™

Making Education Easy

Issue 86 – 2014

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Abbreviations used in this issue

BMI = body mass index

CV = cardiovascular

HbA1c = glycosylated haemoglobin

QALY = quality-adjusted life-years



Welcome to issue 86 of Diabetes and Obesity Research Review.

The selected papers for this issue include research from the UK showing that plasma glucose level measured during an emergency hospital admission can help predict subsequent type 2 diabetes and mortality risk. Other UK research has looked at the relationship between adiposity and prevalent diabetes according to ethnicity, while a retrospective analysis of the UK-based General Practice Research Database showed that increasing age, renal failure, cognitive impairment/dementia and current insulin or sulphonylurea use were risk factors for severe hypoglycaemia in patients with type 2 diabetes newly treated with antidiabetic agents. This issue concludes with NZ research reporting suboptimal engagement and modest results with a mobile health programme designed to help individuals lose bodyweight.

Also a quick reminder that the [TrialNet study](#) is available for all relatives of those with type 1 diabetes in New Zealand, and provides free screening for increased risk of type 1 diabetes. Local diabetes teams will be able to provide details.

I hope you find these and the other selected studies of interest, and I welcome your comments.

Best regards,

Dr Jeremy Krebs

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Associations between active commuting, body fat, and body mass index

Authors: Flint E et al.

Summary: Data from the UK population-based, cross-sectional wave 2 Health Assessment subsample of Understanding Society, the UK Household Longitudinal Study were analysed to assess the impact of active modes of transport on obesity; samples for impact on BMI and bodyfat included 7534 and 7424 individuals, respectively. Compared with using private transport, commuting by public or active transport modes was independently associated with lower BMI in multivariate linear regression analyses, with fully adjusted models showing that men and women who commuted via public transport had BMI scores that were 1.10 and 0.72 lower, respectively, and those who used active modes of transport had BMI scores that were 0.97 and 0.87 points lower, respectively; the findings for bodyfat percentage were similar in terms of magnitude, significance and direction of effects.

Comment: Cycling to work is dear to my heart, so this paper caught my eye. Although it is an observational study with all the inherent limitations of that, there were large numbers of individuals. Using public transport generally requires a degree of active commuting as well to get to and from the bus or train to the workplace or home. In the UK, especially in London, this is very common, because of an efficient and well-organised network, but also because of the cost and difficulty with the alternative of private transport. The difference in BMI between either 'active' form of transport and private transport is modest, but potentially important at a population level. These findings certainly support efforts to improve public transport and encourage active commutes in NZ.

Reference: *BMJ* 2014;349:g4887

[Abstract](#)

Effect of patients' risks and preferences on health gains with plasma glucose level lowering in type 2 diabetes mellitus

Authors: Vijan S et al.

Summary: These researchers used a Markov model to estimate the effects of intensive versus moderate HbA_{1c} reduction on diabetes outcomes and overall QALYs in simulated adults with type 2 diabetes drawn from NHANES (National Health and Nutrition Examination Study). Based on an assumed low treatment burden (0.001, or 0.4 lost days per year), treatment that resulted in an HbA_{1c} level decrease by 1 percentage point was associated with 0.77–0.91 and 0.08–0.10 QALYs for diagnoses made at ages 45 years and 75 years, respectively. More harm than benefit was seen in simulated patients aged 75 years when the treatment burden was increased (0.01, or 3.7 days lost per year) to lower HbA_{1c} level. Patients of all ages who viewed treatment as more burdensome (0.025–0.05 disutility) had a net loss in QALYs from treatments that lowered HbA_{1c} level.

Comment: Well this is a provocative study. Although this study specifically focussed on glucose lowering therapy, the results may be similar if extended to hypertension and lipid therapy, particularly if looked at on a broad level. It is easy to forget the negative effects that aggressive therapy can have, both physically and psychologically, especially if individuals are not achieving the set targets and are experiencing side effects. The last 5 years has seen an increasing focus on individualised management and treatment goals. This study certainly further supports this, although perhaps pushes it a bit further than I feel comfortable with from an HbA_{1c} perspective. There is no doubt though that overtreatment of the elderly is not a good thing.

Reference: *JAMA Intern Med* 2014;174(8):1227–34

[Abstract](#)



Time spent reading this publication has been approved for CME for Royal New Zealand College of General Practitioners (RNZCGP) General Practice Educational Programme Stage 2 (GPEP2) and the Maintenance of Professional Standards (MOPS) purposes, provided that a Learning Reflection Form is completed.

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Stress hyperglycaemia in hospitalised patients and their 3-year risk of diabetes

Authors: McAllister DA et al.

Summary: This retrospective study of a cohort of 86,512 patients aged ≥30 years with an emergency admission found that the overall risk of developing incident type 2 diabetes during 3 postdischarge years was 2.3%, with risks of <1%, 2.6%, 9.9% and 15% for glucose levels ≤5, 7, 11.1 and 15 mmol/L, respectively; one quarter of patients had a glucose level >7 mmol/L and one in 40 had a glucose level >11.1 mmol/L. The risks of developing type 2 diabetes at the 7 and 11.1 mmol/L blood glucose level cutoffs were 1.0% and 7.8%, respectively, among patients aged 30–39 years, with one eighth and 1% of these patients having glucose levels above the respective cutoffs. Diabetes risk was also associated with age, sex and socioeconomic deprivation, but not specialty, raised white blood cell count or comorbidity. The results were similar for prespecified subgroups of patients admitted with myocardial infarction, chronic obstructive pulmonary disease and stroke. Glucose levels 11.1–15 and >15 vs. <6.1 mmol/L were associated with increased mortality (respective adjusted hazard ratios 1.54 [95% CI 1.42, 1.68] and 2.50 [2.14, 2.95]).

Comment: So-called 'stress hyperglycaemia' has been known as a predictor of future diabetes for a long time. So whilst this paper doesn't break new ground, it is nevertheless useful because of the size of the population studied and the ability to drill down on the level of risk by age and by degree of in-hospital hyperglycaemia. Not surprisingly, the higher the glucose level during 'stress', the greater the risk of future diabetes, and similarly, as we would expect, increasing age was also predictive. The study would be more useful if there was a population denominator of 3-year rates of development of diabetes in an age-matched group with no stress hyperglycaemia. Despite this, it does emphasise again that identification of stress hyperglycaemia provides an opportunity to target individuals for dietary and lifestyle interventions.

Reference: *PLoS Med* 2014;11(8):e1001708

[Abstract](#)

The efficacy of bariatric surgery performed in the public sector for obese patients with comorbid conditions

Authors: Lukas N et al.

Summary: Significant mean bodyweight losses of 22.6, 34.2 and 39.9kg were seen at postoperative months 3, 12 and 24 among 65 obese adults with comorbid conditions who underwent publicly funded bariatric surgery in this longitudinal observational study. BMI decreased significantly from 48.2 kg/m² at baseline to 35.7 kg/m² at 24 months. Nearly half of the patients with type 2 diabetes at baseline experienced resolution of this comorbidity at 18 months, hypertension resolved in nearly two-thirds of those with this comorbidity and three-quarters of those with obstructive sleep apnoea experienced resolution; continued improvements were seen beyond 24 months.

Comment: The question of whether people undergoing bariatric surgery in the public setting will achieve as good outcomes as in a privately funded situation is highly relevant to NZ. In this study in Australia, the majority of operations were sleeve gastrectomy, which is similar to NZ. It is encouraging to see such good results, with excellent weight loss and resolution of comorbidities. Although the ethnic differences between Australia and NZ might be a factor, it is likely that these findings would be similar here. This supports the ongoing funding of a national scheme for bariatric surgery.

Reference: *Med J Aust* 2014;201(4):218–22

[Abstract](#)

Ethnic-specific obesity cutoffs for diabetes risk

Authors: Ntuk UE et al.

Summary: This cross-sectional analysis of data from 490,288 UK residents aged 40–69 years from the UK Biobank explored the relationship between adiposity and prevalent diabetes across ethnic groups. For equivalent diabetes prevalences, BMIs were lower among patients of South Asian, black and Chinese ethnicities compared with white ethnicity (22.0, 26.0 and 24.0–26.0 [across genders], respectively vs. 30 kg/m²), as were waist circumferences among women (70, 79 and 74 vs. 88cm) and men (79, 88 and 88 vs. 102cm).

Comment: It is well accepted that obesity is the primary modifiable risk factor for type 2 diabetes. BMI is the most commonly used estimate for body fatness, with cutoff values nominated for thresholds of risk for metabolic and CV disease. However, BMI is a relatively crude measurement of bodyfat, and there are well validated descriptions of how body composition varies between ethnicities with differing proportions of lean-to-fat mass. Similarly, there have been previous studies proposing differing thresholds for BMI or waist circumference across ethnic groups. The present study is another of these, which again confirms that metabolic risk is greater in nonwhite ethnicities at lower levels of body fatness. This is also highly relevant to NZ with our evolving ethnic demographic. It is also very important to understand the relationship between fatness and metabolic risk in Māori and Pacific Island peoples, who despite having greater lean body mass, from other evidence, also appear to have greater risk at lower levels of fat mass. When it comes to BMI, one size definitely does not fit all!

Reference: *Diabetes Care* 2014;37(9):2500–7

[Abstract](#)

Diabetes & Obesity Research Review

Independent commentary by Dr Jeremy Krebs,

an Endocrinologist with a particular interest in obesity and diabetes. He is a Senior Clinical Lecturer with the University of Otago, and Director of the Clinical Research Diploma at Victoria University. As well as clinical and teaching activities, Dr Krebs maintains active research interests in the area of obesity and diabetes, with a focus on nutritional aspects, bariatric surgery and diabetes service delivery.

For full bio [CLICK HERE](#).



Metabolite traits and genetic risk provide complementary information for the prediction of future type 2 diabetes

Authors: Walford GA et al.

Summary: These researchers sought to determine if genetic and metabolite markers provided complementary information for predicting type 2 diabetes in 206 new cases of diabetes reported in 1622 Framingham Offspring Study participants during 13.5 years of follow-up. The diabetes risk was modelled using a 62-single nucleotide polymorphism genetic risk score, nine metabolites and clinical factors. The predictive capacity of the model combining the genetic risk score and metabolite measurements was significantly better compared with each component on its own (AUC [area under the curve] 0.820 vs. 0.641 and 0.803, respectively [p values <0.0001 and 0.01]). No attenuation of the odds ratios for the associations between genetic risk score or metabolites with type 2 diabetes was seen in the combined model. Compared with clinical traits only, the model containing the genetic risk score, metabolites and clinical traits had significantly greater predictive power for type 2 diabetes (AUC 0.880 vs. 0.856 [$p=0.002$]).

Comment: Just as obesity and sedentary behaviour are the main modifiable risk factors for type 2 diabetes, family history and therefore genetics is the other. Many genetic polymorphisms have been identified that are associated with type 2 diabetes, although none individually are overwhelming. The main purpose of identifying an individual as being at high risk is to be able to intervene to prevent the development of diabetes. Selecting those at greatest risk enables more cost-effective intervention strategies. Identifying these people using readily available clinical information, such as age, family history, bodyweight or waist circumference, blood pressure, etc, is relatively effective. To justify the additional cost, the addition of more sophisticated biomarkers or genetic testing would need to significantly increase the predictive power. This study reported on utilising genetic screening for 62 variants and/or various metabolites. Whilst there was a statistically significant improvement, the absolute difference is very small, and whilst of academic interest, it does not look like a clinically useful addition to practice.

Reference: *Diabetes Care* 2014;37(9):2508–14

[Abstract](#)

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Disclaimer: This publication is not intended as a replacement for regular medical education but to assist in the process. The reviews are a summarised interpretation of the published study and reflect the opinion of the writer rather than those of the research group or scientific journal. It is suggested readers review the full trial data before forming a final conclusion on its merits.

Research Review publications are intended for New Zealand health professionals.

Impact of an intensive lifestyle intervention on use and cost of medical services among overweight and obese adults with type 2 diabetes: the action for health in diabetes

Authors: Espeland MA et al., for the Look AHEAD Research Group

Summary: The use and costs of healthcare associated with an intensive lifestyle intervention were investigated in 5121 overweight or obese Look AHEAD trial participants who had been randomised to an intensive intervention promoting bodyweight loss or diabetes support and education. The intensive lifestyle intervention reduced annual hospitalisations by 11% ($p=0.004$), hospital days by 15% ($p=0.01$) and number of medications by 6% ($p<0.001$), leading to 10% and 7% reductions in costs for hospitalisation and medication, respectively ($p<0.001$ for both). The mean relative per-person 10-year cost savings of USD5280 seen with intensive intervention was not apparent in patients with a history of CV disease.

Comment: The Look AHEAD study was a large prospective intensive lifestyle intervention study in people with type 2 diabetes. The main results have been published showing significant differences between the intervention and control groups for weight loss, but this did not translate into differences in CV events. This latest report from the study focuses on use and costs of healthcare. In those without established CV disease, the intensive lifestyle intervention reduced costs overall, including hospitalisations and medications. As with similar interventions in those with prediabetes, it appears that aggressive lifestyle intervention is effective and important early in the disease evolution, and should continue to be the cornerstone of management of obesity at individual and population levels.

Reference: *Diabetes Care* 2014;37(9):2548–56

[Abstract](#)

Incidence of and risk factors for severe hypoglycaemia in treated type 2 diabetes mellitus patients in the UK

Authors: Bruderer SG et al.

Summary: This was a retrospective nested case-control analysis of 690 patients with a record of severe hypoglycaemia in the UK-based General Practice Research Database (0.5% of all patients with type 2 diabetes in the database; estimated incidence rate 11.97 per 10,000 patient-years) each matched with ten controls. Insulin users had a markedly higher incidence rate of severe hypoglycaemia than nonusers (49.64 vs. 8.03 per 10,000 patient-years). The case-control analysis showed that the risk of severe hypoglycaemia was significantly increased with increasing age (adjusted odds ratio for age ≥ 75 vs. 20–59 years 2.27 [95% CI 1.65, 3.12]), cognitive impairment/dementia (2.00 [1.37, 2.91]), renal failure (1.34 [1.04, 1.71]), current sulphonylurea use (4.45 [3.53, 5.60]) and current insulin use (11.83 [9.00, 15.54]).

Comment: One of the main consequences of intensification of glycaemic control in people with diabetes is the increased risk of hypoglycaemia. This is particularly true of those with type 1 diabetes as seen in the DCCT trial. The ACCORD trial, in type 2 diabetes, has shown us that increased incidence of severe hypoglycaemia is associated with an increased risk of sudden death, and this has prompted guidelines for greater individualisation of glycaemic targets. This present study reports surprisingly low rates of severe hypoglycaemia in primary-care managed patients. Not surprisingly, the risk increased with expected factors such as insulin or sulphonylurea use, cognitive impairment and renal failure, and these factors must be considered when agreeing on targets for patients.

Reference: *Diabetes Obes Metab* 2014;16(9):801–11

[Abstract](#)

Influence of family, friend and coworker social support and social undermining on weight gain prevention among adults

Authors: Wang ML et al.

Summary: These authors used data from 633 employed participants from a cluster-randomised multilevel weight gain prevention intervention to explore longitudinal associations between sources of social support and social undermining for healthy eating and physical activity and bodyweight change. After adjustment for covariates and all primary predictors, bodyweight reduction at 24 months was related to friend support for healthy eating, coworker support for healthy eating and family support for physical activity (respective β values -0.15 , -0.11 and -0.032 [$p < 0.05$]). A significant association was also seen between family social undermining for healthy eating and bodyweight gain at 24 months ($\beta = 0.12$ [$p = 0.0019$]).

Comment: Almost all those who are overweight or obese would prefer not to be, and the vast majority know at a fundamental level that reducing their intake and increasing their activity will help achieve weight loss. Apart from self-motivation, there are many influences on the eating and activity behaviours we strive to achieve. The support or otherwise of family, friends and coworkers is often a critical factor. This study attempted to quantify this effect to some extent. As we would expect, support from these quarters for healthy eating and activity was associated with weight loss. These factors are likely to be important facilitators to the effective implementation of weight loss programmes, and interventions to specifically harness this should be developed and tested.

Reference: *Obesity* 2014;22(9):1973–80

[Abstract](#)



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Feasibility, acceptability and potential effectiveness of a mobile health (mHealth) weight management programme for New Zealand adults

Authors: Ni Mhurchu C et al.

Summary: Using proven face-to-face behaviour change techniques and incorporating target population input, these researchers developed a mobile health weight management programme, the feasibility, acceptability and potential effectiveness of which was assessed over 8 weeks in 53 NZ adults with a BMI ≥ 25 kg/m² (26% Māori, 34% Pacific Island) who wanted to lose bodyweight; 36 participants had follow-up measurements at 12 weeks, with younger, male and Pacific participants less likely to complete the programme. Two-thirds of participants reported reading 'all or most' of the text messages sent, and 96% responded to ≥ 1 text data collection question during the 8-week active intervention period. The study website log-in rate (at least once during the active study period) was 81%. An intent-to-treat analysis showed a mean bodyweight loss of 1.0kg at 12 weeks ($p = 0.024$) and a mean BMI reduction of 0.34 kg/m² ($p = 0.026$); the respective values in the completers only analysis were 1.4kg ($p = 0.023$) and 0.50 kg/m² ($p = 0.025$).

Comment: Traditional models of delivery of weight loss programmes in face-to-face meetings either individually or in groups are modestly effective, but are expensive and often don't reach those at greatest need, with the potential to increase health disparities. Therefore finding effective and affordable innovative ways of facilitating weight loss are urgently needed. The population as a whole are increasingly adopting mobile technologies, and this is therefore potentially an ideal medium to use for such an intervention. This NZ study piloted such a programme. The results are somewhat disappointing. Not only was there limited engagement with the intervention, but the dropout rate was also high, even over the very short 12-week study period. In those who did engage and complete, weight loss was still very modest at an average of 1.4kg. This type of intervention does have potential, but as the authors identify, further work to establish and overcome the barriers to effective utilisation of the intervention is required.

Reference: *BMC Obes* 2014;1:10

[Abstract](#)

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