

Diabetes journals

Diabetes inpatient costs and associated risk factors



Vinod Patel, Associate Professor, Warwick Medical School, University of Warwick and Honorary Consultant in Diabetes and Endocrinology, George Eliot Hospital NHS Trust, Nuneaton

There is increasing interest in the costs of diabetes management and its cost in relation to expenditure for health care in the general population, as a result of the rising prevalence of this condition worldwide.

The study by Govan et al (2011; summarised alongside) is a well-conducted survey of the costs

of inpatient care for people with diabetes in Scotland. Both people with type 1 or 2 diabetes were included in this study.

The Scottish Care Information–Diabetes Collaboration found that 4.3% (220 183 people) of the Scottish population had diabetes, accounting for 12.0% of the total Scottish inpatient expenditure. Those with type 1 diabetes and aged <25 years had a 4.5-fold increase in hospital admission rates compared with their non-diabetic peers. In health economic terms, the most striking finding was

that this 4.3% of the population accounted for 18% of all hospital days.

The most significant predictors of hospital admission were increasing age, higher creatinine levels and a history of cardiovascular disease (CVD). Higher HbA_{1c} values were strongly associated with increased risk of admission in people with type 1 diabetes only.

The findings from study should help galvanise our combined efforts to achieve excellence in the management of diabetes in both primary and secondary care. Clinical Commissioning Groups should focus their attention on prevention of type 2 diabetes itself and on addressing risk factors for CVD, renal disease, hypoglycaemia and hyperglycaemia admissions.

When people with diabetes are admitted to hospital, optimising their care using a multidisciplinary approach is essential, especially in relation to patient education, care planning and specialist nurse input.

“When people with diabetes are admitted to hospital, optimising their care is essential using a multidisciplinary approach.”

DIABETOLOGIA

High diabetes inpatients costs in Scotland

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| Readability | ✓✓✓✓ |
| Applicability to practice | ✓✓✓✓✓ |
| WOW! factor | ✓✓✓✓✓ |

- 1 With the increasing prevalence of diabetes worldwide, the costs of diabetes management are of interest.
- 2 In this study, the authors sought to determine the total inpatient costs for people with diabetes in Scotland.
- 3 Data were obtained from the Scottish Care Information–Diabetes Collaboration, a national register of nearly all diagnosed cases in Scotland for the period 2005–2007.
- 4 A total of 220 183 people were identified with diabetes (24 750 [11%] with T1D and 195 433 [89%] with T2D), accounting for 4.3% of the total Scottish population.
- 5 The estimated total cost of admission (using the 2007–2008 Scottish National Tariff) was £26 million for T1D and £275 million for T2D; this accounted for 12% of the total expenditure for Scottish inpatients (£2.4 billion).

- 6 Predictors of hospital admission and total cost of admission were female sex, increasing age, higher serum creatinine level and history of vascular disease for people with T1D or T2D.
- 7 Higher HbA_{1c} level was also associated with an increased risk of admission in people with T1D only; a small, but significant, decreasing effect was observed in people with T2D.
- 8 It was concluded that diabetes accounts for a high proportion of total inpatient expenditure in Scotland and HbA_{1c} level might be a useful predictor of risk of admission in people with T1D.

Govan L, Wu A, Briggs H et al (2011) Inpatient costs for people with type 1 and type 2 diabetes in Scotland: a study from the Scottish Diabetes Research Network Epidemiology Group. *Diabetologia* 54: 2000–8

DIABETES CARE

CAC scores predict all-cause mortality in diabetes

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| Readability | ✓✓✓ |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor | ✓✓✓✓ |

- 1 The aim of this study was to investigate the risk of mortality in people with T2D with a range of coronary artery calcium (CAC) scores.
- 2 A total of 1051 participants were stratified according to baseline CAC scores: 0–9, 10–99, 100–299, 300–999 and ≥1000.
- 3 During 7.4 years of follow-up, 178 people (17%) died; cause of death was recorded for 151 of cases.

4 The rate of all-cause mortality was increased in those with higher CAC scores ($P=0.0001$ for the trend).

5 Using the CAC score of 0–9 as a reference, the odds ratios (ORs) for all-cause mortality were CAC 10–99: 1.40 (95% confidence interval, 0.57–3.74), CAC 100–299: 2.87 (1.17–7.77), CAC 300–999: 3.04 (1.32–7.90) and CAC ≥1000: 6.71 (3.09–16.87).

6 The estimated mortality rate for CAC ≥1000 over the 7.4 years was 20%.

7 The authors concluded that CAC score may be an independent predictor of mortality in people with T2D.

Agarwal S, Morgan T, Herrington DM et al (2011) Coronary calcium score and prediction of all-cause mortality in diabetes. *Diabetes Care* 34: 1219–24

“HbA_{1c} level was not significantly associated with any measure of cognitive decline in those with or without diabetes.”

DIABETOLOGIA

Hyperglycaemia does not predict cognitive decline

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| Readability | ✓✓✓✓ |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor | ✓✓✓✓ |

- 1 Diabetes is associated with cognitive decline, but the biological mechanisms linking them are unknown.
- 2 In this study, the authors investigated the association between hyperglycaemia and changes in cognitive function in people with and without diabetes.
- 3 The study cohort consisted of 516 adults with diabetes and 8442 without who were seen at visits approximately 3 years apart. Change in cognition was assessed at visit two (considered baseline; during 1990–1992) and at visit four (1996–1998).
- 4 Participants were grouped according to baseline HbA_{1c} levels: <5.7, 5.7–6.5 and ≥6.5% (<39, 39–48 and ≥48 mmol/mol) in those without diabetes and <7.0, 7.0–8.0 and ≥8.0% (<53, 53–64 and ≥64 mmol/mol) in those with diabetes.
- 5 Three measures of cognitive function were used: the digit symbol substitution test (DSST), the delayed word recall test (DWRT) and the word fluency test (WFT).
- 6 After the 6-year period, diagnosed diabetes was significantly associated with the DSST (odds ratio, 1.42; *P*=0.002). Trends were seen with the DWRT and WFT, but were non-significant.
- 7 HbA_{1c} level was not significantly associated with any measure of cognitive decline in those with or without diabetes.
- 8 It was concluded that hyperglycaemia (measured by HbA_{1c} level) was not predictive of cognitive decline over 6 years in this study population.

Christman AL, Matsushita K, Gottesman RF et al (2011) Glycated haemoglobin and cognitive decline: the Atherosclerosis Risk in Communities (ARIC) study. *Diabetologia* **54**: 1645–52

DIABETIC MEDICINE

High-dose ARBs reduce risk of albuminuria

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| Readability | ✓✓✓✓ |
| Applicability to practice | ✓✓✓✓✓ |
| WOW! factor | ✓✓✓✓ |

- 1 The aim of this study was to determine the effects of different doses of renin–angiotensin inhibitor on renal and cardiovascular outcomes in people with T2D and microalbuminuria.
- 2 This was a meta-analysis of randomised clinical trials comparing doses of angiotensin receptor blockers (ARBs) or angiotensin-converting enzyme inhibitors (ACEIs).
- 3 Trials were identified via a search of EMBASE, MEDLINE and Cochrane Register of Controlled Trials for the period January 2006 to August 2010.
- 4 Four eligible studies comparing doses of ARBs (none comparing ACEIs) were identified including 1051 participants: 523 in high-dose arms and 528 in low-dose arms.
- 5 Over durations ranging 6 months to 2 years, there was an overall 18% (95% confidence interval [CI], 8–28) greater reduction in albumin excretion rate or albumin–creatinine ratio from baseline in the higher-dose groups compared with the lower-dose groups.
- 6 Regression to normoalbuminuria was greater in the higher-dose groups (odds ratio [OR], 1.66; 95% CI, 1.22–2.27) and progression to macroalbuminuria was lower (OR, 0.62; 95% CI, 0.38–1.02). There were fewer adverse events with the lower doses.
- 7 The authors concluded that the evidence from this meta-analysis supports guidance to increase ARB doses to the maximal tolerated dose in people with T2D and microalbuminuria.

Blacklock CL, Hirst JA, Taylor KS et al (2011) Evidence for a dose effect of renin–angiotensin system inhibition on progression of microalbuminuria in type 2 diabetes: a meta-analysis. *Diabet Med* [Epub ahead of print]

DIABETES CARE

Aerobic exercise reduces CV risk factors in T2D

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| Readability | ✓✓✓✓ |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor | ✓✓✓✓ |

- 1 In this meta-analysis, the authors sought to determine which mode of exercise – aerobics, resistance training (RT) or a combination of both – has the greatest impact on cardiovascular (CV) risk factors in T2D.
- 2 A systematic review of the literature focusing on exercise interventions in people with T2D was conducted using the SPORTDiscus, PubMed, SCOPUS and CINAHL databases. The search was limited to studies between 1970 and 2009.
- 3 The primary outcome measure was change in HbA_{1c} level, and the secondary outcome measures were dyslipidaemia, systolic blood pressure (SBP), BMI, waist circumference and weight.
- 4 A total of 34 articles met the inclusion criteria; the duration of exercise interventions in these studies ranged 8 weeks to 24 months.
- 5 Aerobics alone significantly reduced HbA_{1c} levels by 0.6% (6.6 mmol/mol) and when combined with RT reduced levels by 0.67% (7.3 mmol/mol). RT alone did not have a significant effect on HbA_{1c} levels.
- 6 Aerobics alone also reduced triglyceride levels (–0.3 mmol) and SBP (–6 mmHg) and in combination reduced SBP (–3.59 mmHg) and waist circumference (–3.1 cm). RT alone had no significant effect on CV markers.
- 7 The authors concluded that the findings from this study showed no benefit for RT on CV risk factors, but improvements in glycaemic control, SBP, waist circumference and triglyceride levels with aerobic exercise in people with T2D.

Chudyk A, Petrella RJ (2011) Effects of exercise on cardiovascular risk factors in type 2 diabetes. *Diabetes Care* **34**: 1228–37

DIABETES CARE

Effective intravenous to subcutaneous insulin protocol

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| Readability | ✓✓✓ |
| Applicability to practice | ✓✓✓ |
| WOW! factor | ✓✓✓ |

1 The authors examined the efficacy of a standardised protocol for the transition from intravenous to subcutaneous insulin therapy in people with acute coronary syndromes (ACS).

2 Conversion was scheduled when blood glucose (BG) levels remained within the target range of 5.6–7.8 mmol/L for ≥24 hours.

3 The protocol involved receiving 100% of the daily subcutaneous insulin requirement, calculated from the intravenous insulin rate during the previous 12 hours divided into two doses: 50% basal and 50% prandial.

4 The protocol was used in 142 individuals (135 with known diabetes) admitted to hospital for ACS or with BG levels >11.1 mmol/L.

5 On the first day of transition, 44.8% of BG values were in the target ranges of 5.6–7.8 mmol/L before meals and 5.6–10.0 mmol/L after meals; on days 2 and 3 this figure improved to 45.2% and 45.7%, respectively.

6 Hypoglycaemia occurred in 26.8% of the study participants during the 3 days after transition – a rate similar to those seen with other protocols.

7 The variables that predicted unsuccessful transition (<50% of first-day BG levels in the range of 5.6–7.8 mmol/L after meals) were old age, high doses of intravenous insulin and wide BG variations in the 24 hours before transition.

8 The protocol for transition from intravenous to subcutaneous insulin therapy in people with ACS was concluded to be effective and well-tolerated.

Avanzini F, Marelli G, Donzelli W et al (2011) Transition from intravenous to subcutaneous insulin: effectiveness and safety of a standardized protocol and predictors of outcome in patients with acute coronary syndrome. *Diabetes Care* **34**: 1445–50

DIABETES RESEARCH AND CLINICAL PRACTICE

Associations of ageing with HbA_{1c} and glucose levels

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| Readability | ✓✓✓ |
| Applicability to practice | ✓✓✓ |
| WOW! factor | ✓✓✓ |

1 This study explored the effect of ageing on HbA_{1c} and fasting plasma glucose (FPG) and 2-hour PG (2-h PG) levels in apparently healthy people.

2 A random sample from three areas in Finland were selected; HbA_{1c}

level and FPG–HbA_{1c} and 2-h PG–HbA_{1c} ratios in 1453 people aged 45–49, 50–54, 55–59, 60–64, 65–69 and 70–75 years without known diabetes were included in the final analysis.

3 HbA_{1c} level increased with age ($P<0.001$). FPG was associated with higher HbA_{1c} levels, whereas 2-h PG was associated with lower HbA_{1c} in older age ($P<0.001$ for linearity for both).

4 The authors concluded that in older age HbA_{1c} implied lower FPG but higher 2-h PG levels.

Saltevo JT, Kautiainen H, Niskanen L et al (2011) Ageing and associations of fasting plasma glucose and 2 h plasma glucose with HbA_{1c} in apparently healthy population: "FIN-D2D" study. *Diabetes Res Clin Pract* [Epub ahead of print]

DIABETES RESEARCH AND CLINICAL PRACTICE

Improved survival in adults with T2D

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| Readability | ✓✓✓ |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor | ✓✓✓ |

1 This study was conducted to investigate the pattern of survival rates with T2D in people aged 40–64 years who died during 1943–2009 in Bucharest, Romania.

2 A total of 9066 deaths were analysed and split into three time periods: 1943–1965, 1966–1988 and 1989–2009.

3 In the 1943–1965 period, the mean diabetes duration at death was 9.9±7.3 years; this mean age rose significantly to 12.2±8.2 years and 14.0±8.1 years in the 1966–1988 and 1989–2009 periods, respectively ($P<0.001$ for both).

4 The mean age at diabetes onset rose significantly over the three time periods, as did the rates of coronary heart disease and cancer, but infection and end-stage renal disease decreased.

5 The authors concluded that over the last six decades, there was a significant increase in age of onset and survival with T2D.

Iocara S, Guja C, Ionescu-Tirgoviste C et al (2011) Improvements in life expectancy in adult type 2 diabetes patients in the last six decades. *Diabetes Res Clin Pract* **92**: 400–4

DIABETES CARE

Low-dose aspirin in people on insulin

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| Readability | ✓✓✓ |
| Applicability to practice | ✓✓✓ |
| WOW! factor | ✓✓✓ |

1 The authors aimed to determine if low-dose aspirin would be effective in preventing atherosclerotic events (AEs) in people on insulin therapy.

2 The 2539 study participants had T2D and no previous cardiovascular disease and were randomised to receive aspirin 80 or 100 mg/day ($n=1262$) or no aspirin ($n=1277$).

3 Participants were stratified according to antidiabetes therapy: insulin ($n=326$), oral antidiabetes drugs (OADs; $n=1750$) and diet alone ($n=463$).

4 After median follow-up of 4.4 years, aspirin did not affect the incidence of AEs in the insulin and OADs groups (hazard ratios [HRs], 1.19 [$P=0.61$] and 0.84 [$P=0.38$], respectively), but diet-alone reduced the incidence [HR, 0.21; $P=0.0069$].

5 The authors concluded that low-dose aspirin was not beneficial in reducing AEs in participants on insulin.

Okada S, Morimoto T, Ogawa H et al (2011) Differential effect of low-dose aspirin for primary prevention of atherosclerotic events in diabetes management: a subanalysis of the JPAD trial. *Diabetes Care* **34**: 1277–83

“The protocol for transition from intravenous to subcutaneous insulin therapy in people with acute coronary syndromes was shown to be effective and well-tolerated.”