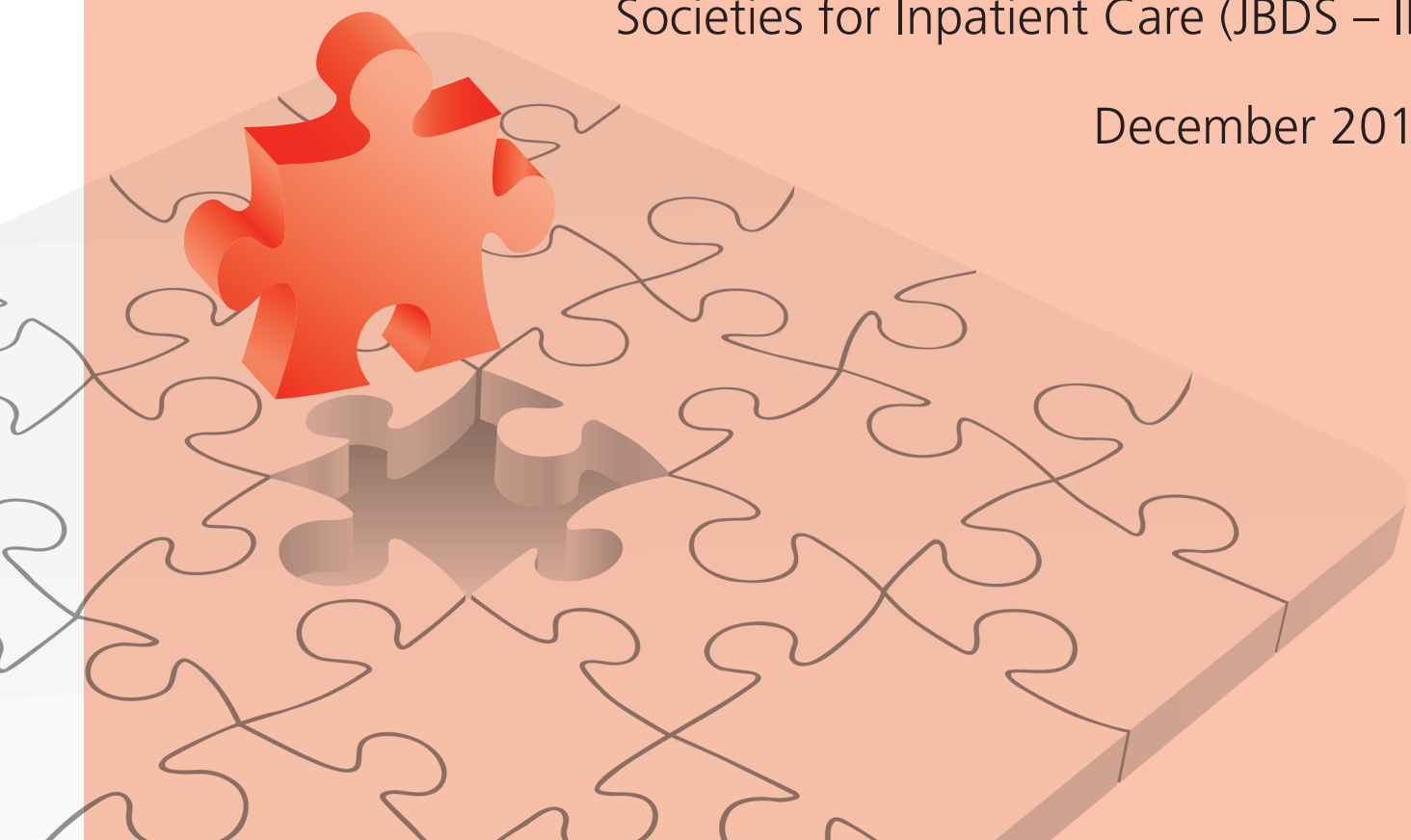


# Admissions avoidance and diabetes: guidance for clinical commissioning groups and clinical teams

Produced by the Joint British Diabetes  
Societies for Inpatient Care (JBDS – IP)

December 2013



**DIABETES UK**  
CARE. CONNECT. CAMPAIGN.

**ABCD**  
Association of British Clinical Diabetologists

**DISN**  
UK GROUP

**PCDS**  
Primary Care Diabetes Society

**WEDS**  
welsh endocrine and diabetes society

**This document is coded JBDS 07 in the series of JBDS documents:Other JBDS documents:**

*The management of the hyperosmolar hyperglycaemic state (HHS) in adults with diabetes August 2012  
JBDS 06*

*Glycaemic management during the inpatient enteral feeding of stroke patients with diabetes June 2012  
JBDS 05*

*Self-Management of Diabetes in Hospital March 2012 JBDS 04*

*The Management of Adults with Diabetes undergoing Surgery and Elective Procedures: improving  
Standards April 2011 JBDS 03*

*The Hospital Management of DKA in Adults Revised September 2013 JBDS 02*

*The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus Revised September 2013  
JBDS 01*

**These documents are available to download from the ABCD website at  
<http://www.diabetologists-abcd.org.uk/JBDS/JBDS.htm> and the Diabetes UK website at  
[www.diabetes.org.uk](http://www.diabetes.org.uk)**

# Foreword and policy context

The NHS faces a relentless and unsustainable rise in emergency hospital admissions, and reversing this trend is an absolute priority for the NHS.<sup>1,2</sup> However, only a minority of primary care trusts (PCTs) in England managed to reduce overall emergency admissions, despite the intense focus on this area by commissioners and health care planners.<sup>3</sup> This problem has had a substantial impact on elective capacity and waiting times, is an issue in across all UK nations, and is of increasing importance in the context of A&E pressures and out of hours (OOH) care.<sup>4</sup>

We now know from the National Diabetes Inpatient Audit (NaDIA)<sup>5</sup> that about 1 in 6 hospital beds in England are occupied by someone with diabetes and health economic analysis suggests diabetes admissions in England alone accounted for 607,581 excess bed days (compared to the equivalent population without diabetes), at a total estimated excess tariff expenditure of £573 million in one year. This is due to increased admission (and readmission) rates, a prolonged length of stay once admitted, disease specific admissions, and a bias against day case surgery in the diabetes population.

We also know there is substantial variability between clinical commissioning groups (CCGs) and Acute Trusts in diabetes admission rates. There is strong evidence for models that reduce variability and overall admission rates, but which are often not commissioned, or are not available. This makes diabetes a priority for commissioning attention, with the potential for real and rapid improvement in admission rates from the UK diabetes population of more than 3 million.

This document has been produced by the Joint British Diabetes Societies for Inpatient Care (JBDS – IP) on behalf of Diabetes UK, the Association of British Clinical Diabetologists (ABCD), and the Diabetes Inpatient Specialist Nurse (DISN) UK Group, in collaboration with NHS Diabetes, and the Primary Care Diabetes Society (PCDS).

This document is not a clinical guideline, but a summary document for health care planners and commissioners in the UK which complements the recent **Best Practice for Commissioning Diabetes Services**<sup>6</sup>

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<sup>1</sup> Sarah Purdy. Avoiding hospital admissions: what does the research evidence say? The King's Fund. 2010. The King's Fund, 11-13 Cavendish Square, London W1G 0AN.

<sup>2</sup> Goodwin Nick et al. Integrated care for patients and populations: Improving outcomes by working together. Report to the Department of Health and NHS Future Forum from the King's Fund and Nuffield Trust. 2012.

<sup>3</sup> Gillam S. Rising hospital admissions: can the tide be stemmed? (Editorial). British Medical Journal 2010; 340: p 636.

<sup>4</sup> www.telegraph.co.uk; 'Casualty Units must be reformed to meet demand' Jeremy Hunt 22.5.2013.

<sup>5</sup> www.hscic.gov.uk/diabetesinpatientaudit\_ (2010)

<sup>6</sup> (<http://www.diabetes.org.uk/Documents/Position%20statements/best-practice-commissioning-diabetes-services-integrated-framework-0313.pdf>).



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This document was reviewed on behalf of the Scottish Diabetes Group, and while there are differences between the healthcare systems North and South of the border, the Scottish Diabetes Group supports the clinical content and broad aims of the document.

# Who this document is intended for

This document is **not a clinical guideline** or a definitive guide to admissions avoidance and inpatient diabetes care. It is a short document directed at clinical commissioning groups (CCGs) in England, health care planners in Scotland, Wales and Northern Ireland, and senior management in UK Acute Hospitals. The document draws together work, projects and data from many different sources into a single place.

We hope it will also be useful for clinical teams in primary and secondary care in their discussions with commissioners about diabetes services in the new NHS.

- The document emphasises the scale of the clinical and financial problem of diabetes admissions to UK hospitals and commissioners, and describes models shown to reduce variability.
- The document may be valuable for health systems looking to reduce A&E attendances, and improve out of hours cover.
- The document concentrates on areas for which there is a reasonable evidence base, and for practical changes which might be achievable in the real world, and avoids options that require massive societal change or immediate huge investment.
- The document emphasises the special case of frail and vulnerable older people with diabetes

either living housebound in the community, or as residents of care homes. Here, proactive intervention to reduce unnecessary hospital admission should be a key objective of most community-based solutions.

- Most of the recommendations could be delivered with modest pathway and service model review and concentration of resources in key areas, and with a reasonable expectation of improvement in the short term.
- The document can be used as a resource for commissioners, clinical teams and Acute Trusts when making the economic argument for change and improvement in clinical services.
- We are very grateful to Naomi Holman and colleagues at the National Diabetes Information Service (NDIS) and to Marion Kerr (Insight Health Economics) and colleagues at NHS Diabetes for their support in developing this document, and for allowing us to quote their exceptionally valuable work. **Please note that NHS Improving Quality (NHS IQ) took over responsibility for the content of the NHS Diabetes website from July 2013.**
- There are other available publications that stress the gaps in clinical care in inpatient diabetes services which complement this document, in particular the data from the national diabetes inpatient audit and other JBDS – IP documents.

# Summary of key points and recommendations

There is substantial and well documented post code variability in diabetes specific admission and readmission rates. There are evidence based service models that have been shown to reduce admission and readmission rates for people with diabetes. These can be put in place relatively quickly with the likelihood of early benefit, and accurate benchmarking between areas for outcomes is possible.

## Recommendations

*To reduce diabetes admissions, clinical commissioning groups and health boards should commission diabetes service models shown to be effective. Commissioners should:*

**1 Obtain** readily available benchmarking data from the National Diabetes Information service (NDIS)<sup>7</sup> and from the National Diabetes Inpatient audit (2012)<sup>8</sup>, for their area and their local providers on overall diabetes admission rates, diabetes specific admission rates (diabetic ketoacidosis, severe acute hypoglycaemia, hospital admission rates of care home residents with diabetes, and diabetic foot disease) and from their regional Ambulance Trusts (for severe acute hypoglycaemia). The national register of patients with diabetes in Scotland (SCI-DC Network) provides comprehensive information and has the ability to link primary and secondary care. In addition, many pharmaceutical companies now have population and case mix adjusted diabetes admission data (derived from HES), accurate to a practice and CCG level to allow benchmarking by CCG area.

**2 Obtain** readily available benchmarking data for their area on day case surgery listing rates, and

readmission rates, for diabetes and non-diabetes patients in local providers.<sup>9</sup>

**3 Commission** a whole systems review of diabetes admissions in collaboration with primary and secondary care, CCG, Ambulance Trusts, industry, and local clinical networks to determine local patterns and triggers for diabetes admissions.<sup>10</sup> This should be linked to a strong local data analysis, to local demographics, and to information on the key decision points in GP surgeries, Ambulance Trusts, out of hours contacts, Emergency Departments, and in pre-operative assessments. This whole systems approach to service delivery and redesign has been used successfully in the UK, in partnership with industry (see 5.3).<sup>11</sup>

**4 Commission** a modelled realistic estimate of what are truly avoidable diabetes admissions based on this data, and a diabetes service shown to reduce avoidable diabetes admissions.

**5 Commission** a service model based on adequate diabetes inpatient specialist nurse (DISN) numbers and diabetes specialist sessional time to develop and sustain an improved day case surgery pathway for people with diabetes that delivers a day case listing surgery rate the same as the non-diabetes population. This has been achieved in large UK Hospitals (see section 6.6).

**6 Commission** a service model based on adequate diabetes inpatient specialist nurse (DISN) numbers and diabetes specialist sessional time based in Emergency Admission Wards and Emergency Departments to provide immediate front door management of diabetes specific admissions, and general medical admissions in people with diabetes.

<sup>7</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

<sup>8</sup> [www.hscic.gov.uk/catalogue/PUB10506](http://www.hscic.gov.uk/catalogue/PUB10506)

<sup>9</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

<sup>10</sup> <http://www.diabetes.org.uk/Documents/Position%20statements/best-practice-commissioning-diabetes-services-integrated-framework-0313.pdf>

<sup>11</sup> [www.nottinghamcity.nhs.uk/healthy-living/nimrod-diabetes.html](http://www.nottinghamcity.nhs.uk/healthy-living/nimrod-diabetes.html)



**7 Commission** a diabetes service that identifies individuals who are frequently re-admitted with diabetes specific emergencies, or who make frequent 999 hypoglycaemia call outs, and support them with intensive education and access. About 30% of diabetic ketoacidosis (DKA) and severe hypoglycaemia admissions are in people who have been re-admitted or who are frequent attenders, and intensive support of these individuals reduces admission risk (see section 7.1), and would be concordant with new best practice tariff (BPT) payments for DKA and hypoglycaemia management.

**8 Commission** a diabetes service that is associated with a lower DKA emergency admission rate in adolescents and adults with Type 1 diabetes, as half of these admissions are avoidable. This service must offer aspects of care shown to reduce DKA admission rates which are (see section 7):

- Intensive home based family support and therapy for adolescents at highest risk (see 7.3)
- Access to collaborative pathways between secondary care teams and mental health professionals for people with diabetes and mental health problems and/or eating disorders (see 7.3).
- Access to **structured educational programmes** such as DAFNE<sup>12</sup> or related programmes, as required by NICE (see 7.4).
- **Intensive education** on insulin management and adherence with rapid access to specialist advice at times of crisis or ill health (see 7.5).
- Motivation of patients and their families to adhere to management goals, increasing adolescent participants' self-esteem, and monthly individual contact by a specialist multi-disciplinary team where necessary (see 7.6).
- Supported patient self-management during ill health ('sick day rules') with patient **testing for blood ketones** (rather than urine ketones) as part of structured insulin management education (see 7.7).

- An **open access phone line** to diabetes specialist teams for advice during 'sick days' or when ketosis develops, provided 24/7 by specialist teams (see 7.8, 7.9).

**9 Commission** an adolescent and transitional diabetes service that identifies highest risk Type 1 patients particularly if they are from dysfunctional families, those who are less able to problem-solve, have poorly defined family rules, have poor control, or co-existing psychiatric or behavioural disorders. This service should ensure structured follow up, a focus on missed appointments, appointment reminders by text or mobile phone, and meet the Best Practice Tariff<sup>13</sup> criteria for paediatric and adolescent diabetes care (7.6).

**10 Commission** a diabetes foot care service, in line with NICE guidance<sup>14</sup> that is associated with lower admission rates for foot ulceration and amputation, and which must include a resourced foot protection team (FPT) for primary care support, and a hospital based multidisciplinary foot team (MDT) for highest risk feet (see section 7.26) that provide:

- Clear **risk based stratification** and referral pathways for highest risk feet (7.27)
- Intensive **personalised education** for highest risk groups (7.29)
- Specialist services such as **total contact casting** (7.26)
- An **inpatient podiatry service** for patients admitted with foot ulceration (7.30)
- **Home antibiotic policies** (7.28)


**11 Ensure** that a functioning diabetes network exists, with clinical leadership and patient membership, with membership from primary care, commissioning groups, Ambulance Trusts, inpatient diabetes services and transitional diabetes care to take a whole system approach (5.1), in line with national commissioning guidance.<sup>15</sup>

<sup>12</sup> [www.dafne.uk.com](http://www.dafne.uk.com)

<sup>13</sup> <http://www.dh.gov.uk/en/index.htm>

<sup>14</sup> [www.nice.org.uk/CG10](http://www.nice.org.uk/CG10) ; [www.nice.org.uk/CG119](http://www.nice.org.uk/CG119)

<sup>15</sup> <http://www.diabetes.org.uk/Documents/Position%20statements/best-practice-commissioning-diabetes-services-integrated-framework-0313.pdf>



**12 Commission** a hypoglycaemia management pathway in collaboration with the Ambulance Trust that:

- Uses a **single point of contact (SPOC)** model
- Uses a clearly defined **'see and treat' policy** with a low carry on rate to Emergency Departments
- Has **clear pathways** for the duration of observation and management of severe hypoglycaemia in Emergency Departments and Emergency Wards, and a clear follow up plan involving the diabetes specialist team
- Links ambulance users to enhanced patient education, medication review and enhanced insulin management from their usual diabetes team (see section **7.11**)
- Identifies **frequent hypoglycaemia callers** to their GP practice for further support

**13 Ensure** local provider Trusts are aware of any shortfalls in local diabetes management guidelines for inpatients with diabetes undergoing surgery or planning surgery. Many UK junior doctors lack confidence in basic pre- and post-operative diabetes management so it is essential that Trusts provide mandatory training of all staff using available e-learning educational tools (see section **6.4**).

**14 Commission** a diabetes service that supports diabetes education, foot care and management in residential and nursing homes, with recurrent staff training in identifying highest risk residents which may reduce admissions by >50% in this population (see section **5.15**); again, this is in line with national guidance<sup>16</sup> (**5.16**), and improved community based programmes should be targeted at frail residents with diabetes and the frail housebound, and emphasis placed on good pre discharge planning for these groups to prevent readmission.

**15 Commission** a service and prescribing models that allow primary care to deliver best practice care for people with diabetes including high influenza vaccination uptake, statin use in Type 2 diabetes (T2) patients >40 years and benchmarking of Quality and Outcomes Framework (QOF) data (England) against comparator areas.

**16 Develop** an out-of-hours (OOH) professionally staffed call pathway for people with diabetes who need OOH advice on managing hyperglycaemia, ketosis, and hypoglycaemia where this service is not available locally.

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<sup>16</sup> <http://www.diabetes.org.uk/Documents/About%20Us/Our%20views/Care%20recs/Care-homes-0110.pdf>

# 1 Overall diabetes bed occupancy and admission rates

**1.1** Overall bed occupancy in England in one year (2009/10) is shown (**Table 1**), where diabetes was recorded as one of the diagnostic fields. Only a minority of these 1.087 million admissions was due to a diabetes specific cause. The estimated tariff

costs associated with this activity was a minimum of £2.315 billion, increasing to £2.510 billion for England if 8.5% additional tariff is added for coding of co-morbidities.

**Table 1. Unadjusted admissions and estimated expenditure for people with recorded diabetes, 2009 – 2010 (2011-2012 prices).**

	Number of admissions with record of diabetes	Estimated average unit cost (tariff)	Estimated annual expenditure (tariff)	Estimated annual expenditure (tariff + 8.5%)
Non-elective admissions	609,452	£2,641	£1,609,736,111	£1,745,875,504
Elective ordinary admissions	150,362	£2,951	£443,660,069	£481,181,507
Elective day case admissions	327,608	£799	£261,646,664	£283,774,774
<b>Total</b>	<b>1,087,422</b>		<b>£2,315,042,844</b>	<b>£2,510,831,784</b>

Reproduced with permission from 'Inpatient Care for People with Diabetes: the Economic Case for Change', Marion Kerr, Insight Health Economics.<sup>17</sup>

**1.2** Non-elective and elective admissions (not day case) accounted for 759,814 admissions of which 80% were non-elective emergency admissions. This represents about 12.2% of all ordinary hospital admissions. The day case activity with a diabetes diagnostic code (327,608 day cases) represents 6.6% of all day case admissions.

**1.3** This prevalence (excluding day cases) of 12.2% is similar to that detected in the National Diabetes Inpatient Audit (NaDIA) data on 12,191 inpatients with diabetes across the UK, where mean prevalence of inpatient diabetes was 15%.<sup>18</sup>

**1.4** The proportion of people admitted as an **emergency** is substantially *higher* in the diabetes inpatient population compared to those without (56% vs. 43%); the proportion of **elective** admissions undergoing day surgery is lower in the

diabetes population (69% vs. 77%). In the NaDIA data (2010), 86.7% of the diabetes inpatient population had been admitted as an emergency.<sup>19</sup>

**1.5** The estimated cost associated with this activity based on 2011/12 payment by results (PbR) tariffs, and using weighted tariff averages for all admissions and an 8.5% uplift for co-morbidities, with a recorded diabetes diagnosis was £2.510 billion (**Table 1**). This figure is clearly an estimate, as it does not adjust for diabetes under recording, and of course not all of these costs are attributable to diabetes itself. Lastly, this data applies to England alone, although it is probable that similar activity levels occur in other UK nations.

**1.6** It is possible to estimate **excess admissions** associated with a diagnosis of diabetes using Quality and Outcomes Framework (QOF) data and

<sup>17</sup> [www.diabetes.org.uk](http://www.diabetes.org.uk)

<sup>18</sup> <http://www.hscic.gov.uk/diabetesinpatientaudit>; NaDIA 2010

<sup>19</sup> <http://www.hscic.gov.uk/diabetesinpatientaudit>

age-specific diabetes prevalence rates for England. This work has been undertaken (2011) in *'Inpatient Care for People with Diabetes: the Economic Case for Change'* by Marion Kerr, Insight Health Economics.<sup>20</sup> These data suggest a 70% higher **non-elective admission rate** for the diabetes population in England compared to an age and

gender matched population without diabetes. These data are summarised (**Table 2**) and suggest a total excess of admissions in the England population of 249,873 (2009 - 2010). It is likely that similar estimates would apply in the rest of the UK.

**Table 2: Non elective admission rates by age band and gender for populations with or without diabetes.**

<b>Male</b>					
	<b>Admissions for males with diabetes</b>	<b>Admissions per 1000 males with diabetes</b>	<b>Admissions per 1000 males without diabetes</b>	<b>Diabetes admissions/ non-diabetes admissions</b>	<b>Excess admissions in diabetes</b>
0-15	3,877	402	106	3.80	2,857
16-24	5,496	172	47	3.65	3,990
25-34	6,463	138	50	2.78	4,136
35-44	16,399	152	58	2.64	10,176
45-54	34,096	151	71	2.13	18,066
55-64	56,198	194	93	2.08	29,171
65-74	82,616	229	160	1.42	24,626
75+	117,855	496	350	1.42	34,675
<b>All male</b>	<b>323,000</b>	<b>246</b>	<b>94</b>	<b>1.65 (age adjusted)</b>	<b>127,698</b>
<b>Female</b>					
	<b>Admissions for females with diabetes</b>	<b>Admissions per 1000 females with diabetes</b>	<b>Admissions per 1000 females without diabetes</b>	<b>Diabetes admissions/ non-diabetes admissions</b>	<b>Excess admissions in diabetes</b>
0-15	4,113	448	88	5.11	3,308
16-24	7,684	225	70	3.19	5,274
25-34	7,028	150	76	1.97	3,463
35-44	13,943	255	63	4.04	10,495
45-54	23,990	174	62	2.82	15,482
55-64	36,709	174	73	2.39	21,359
65-74	60,371	228	121	1.88	28,252
75+	132,080	446	330	1.35	34,542
<b>All female</b>	<b>285,918</b>	<b>271</b>	<b>98</b>	<b>1.75 (age adjusted)</b>	<b>122,175</b>
<b>Total (male and female)</b>	<b>608,918</b>	<b>257</b>	<b>96</b>	<b>1.70 (age adjusted)</b>	<b>249,873</b>

Reproduced with permission from *'Inpatient Care for People with Diabetes: the Economic Case for Change'*, Marion Kerr, Insight Health Economics. [www.diabetes.org.uk](http://www.diabetes.org.uk)

<sup>20</sup> [www.diabetes.org.uk](http://www.diabetes.org.uk)

**1.7** The highest **relative** risk of non-elective admission in either gender is in the younger age bands, largely with Type 1 diabetes. However, the largest **absolute** excess admission numbers are in the older age bands, with 69% of these excess admissions being in those over 55 years old, and 25% in the >75 years age group.

**1.8** These data mask a significantly lower rate of elective admissions (including day cases) in the diabetes population, particularly in older age groups. These data are summarised (**Table 3**) by age and gender, and again show an underuse of **elective and day case admissions** in the diabetes population of 85,512 (2009 -2010).

**Table 3: Elective admission rates (including day cases) by age band and gender for populations with or without diabetes.**

<b>Male</b>					
	<b>Admissions for males with diabetes</b>	<b>Admissions per 1000 males with diabetes</b>	<b>Admissions per 1000 males without diabetes</b>	<b>Diabetes admissions/ non-diabetes admissions</b>	<b>Excess admissions in diabetes</b>
0-15	956	99	50	1.99	475
16-24	1,633	51	43	1.20	274
25-34	3,289	70	57	1.24	627
35-44	10,014	93	79	1.18	1,511
45-54	27,487	122	118	1.04	994
55-64	60,788	210	203	1.04	2,148
65-74	87,207	241	355	0.68	-41,187
75+	77,832	328	413	0.79	-20,344
<b>All male</b>	<b>269,206</b>	<b>205</b>	<b>123</b>	<b>0.82 (age adjusted)</b>	<b>-55,501</b>
<b>Female</b>					
	<b>Admissions for females with diabetes</b>	<b>Admissions per 1000 females with diabetes</b>	<b>Admissions per 1000 females without diabetes</b>	<b>Diabetes admissions/ non-diabetes admissions</b>	<b>Excess admissions in diabetes</b>
0-15	975	106	40	2.63	604
16-24	1,986	58	62	0.94	-136
25-34	3,708	79	91	0.87	-567
35-44	10,390	190	118	1.61	3,942
45-54	23,708	172	160	1.08	1,736
55-64	42,589	202	207	0.97	-1,184
65-74	61,743	233	288	0.81	-14,657
75+	62,924	213	279	0.76	-19,748
<b>All female</b>	<b>208,023</b>	<b>197</b>	<b>137</b>	<b>0.87 (age adjusted)</b>	<b>-30,011</b>
<b>Total (male and female)</b>	<b>477,229</b>	<b>202</b>	<b>130</b>	<b>0.85 (age adjusted)</b>	<b>-85,512</b>

Reproduced with permission from 'Inpatient Care for People with Diabetes: the Economic Case for Change'. Marion Kerr, Insight Health Economics. [www.diabetes.org.uk](http://www.diabetes.org.uk)

**1.9** These data also suggest a bias away from elective day case surgery in older populations with diabetes, particularly in those >75 years old. It is also possible to estimate the age and gender adjusted shortfall in day case elective surgery in

diabetes (**Table 4**). These data suggest a total significant shortfall in day case listing of 41,906 people with diabetes in England (2009 – 2010), largely in the older population with diabetes, with 70% in those >55 years old.

**Table 4: Day cases rates in populations with diabetes, or without diabetes, and estimated shortfall in day case listing rates by age and gender (2009 -2010).**

<b>Male</b>				
<b>Age</b>	<b>Diabetes day cases</b>	<b>Day cases as % of elective admissions, (diabetes)</b>	<b>Day cases as % of elective admissions, (non-diabetes)</b>	<b>Shortfall in day cases, diabetes</b>
0-14	630	66%	73%	64
15-24	1,017	62%	73%	178
25-34	2,248	68%	78%	312
35-44	6,764	68%	79%	1,151
45-54	18,602	68%	78%	2,953
55-64	41,018	67%	77%	5,742
65-74	58,808	67%	77%	8,046
75+	54,363	70%	78%	6,230
<b>All male</b>	<b>183,450</b>	<b>68%</b>	<b>77% (age adjusted)</b>	<b>24,676</b>
<b>Female</b>				
<b>Age</b>	<b>Diabetes day cases</b>	<b>Day cases as % of elective admissions, (diabetes)</b>	<b>Day cases as % of elective admissions, (non-diabetes)</b>	<b>Shortfall in day cases, diabetes</b>
0-14	533	55%	72%	167
15-24	1,170	59%	79%	391
25-34	2,439	66%	80%	534
35-44	6,778	65%	77%	1,239
45-54	15,824	67%	77%	2,441
55-64	28,980	68%	77%	3,788
65-74	42,735	69%	77%	4,559
75+	45,198	72%	78%	4,112
<b>All female</b>	<b>143,657</b>	<b>69%</b>	<b>77% (age adjusted)</b>	<b>17,230</b>
<b>All</b>	<b>327,107</b>	<b>69%</b>	<b>77% (age adjusted)</b>	<b>41,906</b>

Reproduced with permission from 'Inpatient Care for People with Diabetes: the Economic Case for Change'. Marion Kerr, Insight Health Economics. [www.diabetes.org.uk](http://www.diabetes.org.uk)

**1.10** Inpatients with diabetes (regardless of the cause of admission) experience an age and gender adjusted prolonged length of stay. The causes of this excess length of stay are due in part to in-hospital care processes, insulin and glycaemic management, and a higher rate of co-morbidities

in the diabetes population. Analysis of large datasets from UK populations suggests a mean population excess length of stay in diabetes inpatient populations of 0.8 days. This allows estimates of excess bed occupancy associated with prolonged LOS for diabetes admissions (**Table 5**).

**Table 5: Estimated excess bed days in diabetes admissions (2009 – 2010).**

	Ordinary admissions	Excess length of stay	Excess bed days
Non-elective admissions	609,452	0.8 days	487,561 days
Elective admissions	150,362	0.8 days	120,289 days
<b>Total</b>	<b>759,814</b>		<b>607,581 days</b>

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**1.11** It is also possible to estimate the excess costs associated with diabetes admissions using these data<sup>21</sup>. These costs are derived from an estimate of both excess diabetes admissions, and a prolonged length of stay, using a weighted average of PbR tariff costs for non-elective admissions with a diabetes diagnosis, and NHS Institute costs for an inpatient bed day. The estimated costs associated with a lower day case listing rate in the diabetes population are also included.

**1.12 The total estimated excess expenditure associated with diabetes admissions in England in 2009/2010 was £572,685,129, distributed as in Table 6. In addition, if additional tariff costs estimated at 8.5% are incurred in the diabetes population, which seems possible, these costs increase further (Approach 2).**

**Table 6 Estimated excess expenditure on inpatient care related to diabetes admissions in one year (2009 – 2010) in England**

	Ordinary admissions	Excess length of stay	Excess bed days
Excess admissions	164,361 admissions	£434,124,159	£434,124,159
Lower day case rate	41,906 fewer day cases	£9,337,513	£9,337,513
Excess length of stay	574,326 bed days	£129,223,457	
Excess cost of diabetes admissions (8.5%)	1,087,422 admissions		£242,908,334
<b>Total</b>		<b>£572,685,129</b>	<b>£686,370,006</b>

Reproduced with permission from 'Inpatient Care for People with Diabetes: the Economic Case for Change'. Marion Kerr, Insight Health Economics. [www.diabetes.org.uk](http://www.diabetes.org.uk)

<sup>21</sup> Dr Marion Kerr in 'Inpatient Care for People with Diabetes: the Economic Case for Change' [www.diabetes.org.uk](http://www.diabetes.org.uk)

## 2 Diabetes specific admissions

Within the overall bed occupancy associated with diabetes, there are specific conditions due directly to having diabetes, and which can be seen as entirely due to the condition, or where diabetes is a substantial independent contributor to the condition.

**2.1 Admissions due to Diabetic ketoacidosis (DKA)** This usually occurs in people with Type 1 diabetes, always requires hospital admission, and is a serious and life-threatening condition characterised by major metabolic disturbance and coma in severe cases. Revised JBDS – IP national guidelines for the management of DKA are recently available. In 2010/2011 the NDA, which

included 81.1% of people with diabetes in England, showed that 8,742 individuals had at least 1 admission due to DKA.<sup>22</sup> If the number of people with one or more admissions for DKA is adjusted up to reflect 100% participation in the audit, this rises to 10,500. The Hospital Episode Statistics data reported a **total of 21,116 admissions** where DKA was recorded in 2010/2011. Equivalent data for Scotland showed that one third of all DKA admissions were admitted more than once, and one in 6 patients with DKA had been admitted >3 times in (over a 5 year period) due to poor insulin adherence (**Table 7**).

**Table 7: Data derived from 'Short Life Working Group on Type 1 Diabetes: Final Report'<sup>23</sup>**

**Number of patients having one or more emergency admissions with DKA or diabetes in Scotland (2003-2007) all ages.**

Number of admissions per patient	Frequency	Percentage (%)
1	2680	66.1
2	694	17.1
3 to 5	466	11.5
6 to 9	136	3.4
10 or more	80	1.9
<b>Total</b>	<b>4056</b>	<b>100</b>

**2.2 Admissions due to severe acute hypoglycaemia and Ambulance Trusts** Severe acute hypoglycaemia occurs when blood glucose becomes very low in people treated with insulin or diabetes medication, and third party assistance is needed. It is common for people with severe acute hypoglycaemia to be seen by ambulance crews after an emergency call. Most patients are seen and treated at home, but many are taken to Emergency Departments and some are admitted. The available data suggest between 70,000 - 100,000 emergency call-outs per annum in the UK, at significant cost.

**2.3** In the Yorkshire and Humber area (population 5 million) there were 7,071 ambulance call outs for 'diabetic problems' in 2010/11 (mostly hypoglycaemia). This gives a rate of 28 ambulance call outs per 1000 people with diabetes. Nearly half (43%) of ambulance call outs for 'diabetic problems' did not result in taking the patient to hospital with the most common reason being that the patient was treated at the scene. In 2012, over the period January to April there were 1,714 call outs for severe hypoglycaemia. Each call out is charged at a cost of £237.01 thus total costs for this 4 month period were £406,235, equivalent to £1.2million per annum.

<sup>22</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

<sup>23</sup> [www.diabetesinscotland.org.uk/publications](http://www.diabetesinscotland.org.uk/publications)

<sup>24</sup> 'Improving emergency and inpatient care for people with diabetes'; [www.diabetes.org.uk](http://www.diabetes.org.uk)



**2.4** In the area covered by the East Anglian Ambulance Trust (EAAT; 2,173,009 and 86,920 diabetes patients, 2004), there were 2078 emergency call-outs from patients and GPs for severe acute hypoglycaemia in one year. This was equivalent to an average of 0.13 emergency diabetes calls per 100 **general** population, or 2.3 severe hypoglycaemia calls per 100 **diabetes** patients per annum to ambulance crews, and just over 1% of all ambulance crew call outs.<sup>25</sup>

**2.5** Audit of all 12 ambulance trusts in England, suggest that there are approximately 3,800 hypoglycaemia call-outs each month and many of these call-outs may be preventable if appropriate referral pathways were in place. **NICE Quality standard No.14** states that people with diabetes who have experienced hypoglycaemia requiring medical attention should be referred to a specialist diabetes team. In 2011- 2012, there were 11,759 admissions due to hypoglycaemia (NHS Information Centre) accounting for 45,502 bed days.

## **2.6 Admissions due to diabetic foot problems**

are the commonest diabetes specific cause of acute admission. Diabetes is associated with an increased risk of peripheral neuropathy and peripheral vascular disease, with an associated high risk of foot ulceration and amputation. National clinical guidelines on the detection and management of the diabetic foot are available.<sup>26</sup> The estimated expenditure on in-hospital care for diabetic foot ulcers and amputations are readily available in 'Foot care for people with diabetes: the economic case for change' (Marion Kerr; Insight Health Economics; 2012)<sup>27</sup> and are summarised in **Tables 8 and 9**. It should be emphasised that the frail elderly with diabetes in residential and care homes are particularly vulnerable to diabetic foot problems, and problems with foot care models, staff expertise, cognition, and physical function all contribute to this problem.

**Table 8. Expenditure on admitted patient care for diabetic foot ulcers and amputations (England 2010-2011).**

	Admissions	Unit Cost	Expenditure
Ulceration - foot ulcer HRGs	31,391	£3,619	£113,608,050
Ulceration - non-foot-ulcer HRGs (excess length of stay)	34,836	£2,857	£99,543,866
Major amputation	2,608	£9,477	£24,716,787
Minor amputation	3,309	£5,244	£17,353,138
Procedures on amputation stumps	315	£4,689	£1,476,976
<b>Total</b>	<b>72,459</b>		<b>£256,698,817</b>

Reproduced with permission from 'Inpatient Care for People with Diabetes: the Economic Case for Change'. Marion Kerr, Insight Health Economics. [www.diabetes.org.uk](http://www.diabetes.org.uk)

<sup>25</sup> Data derived from EAAT Audit 2005 (Mortley et al; National Diabetes Support Team <http://www.bipsolutions.com/docstore/pdf/16198.pdf>)

<sup>26</sup> [www.nice.org.uk/CG10](http://www.nice.org.uk/CG10) and [www.nice.org.uk/CG119](http://www.nice.org.uk/CG119)

<sup>27</sup> 'Foot care for people with diabetes: the economic case for change' Marion Kerr, Insight Health Economics. [www.diabetes.nhs.uk](http://www.diabetes.nhs.uk)

**Table 9 Estimated total cost of ulceration and amputation in people with diabetes in England 2010/11.**

	Lower estimate	Upper estimate
Primary, community and outpatient care	£306,508,970	£323,062,601
Accident and emergency		£849,278
Inpatient care - ulceration	£213,151,916	£213,151,916
Inpatient care - amputation	£43,546,901	£48,896,735
Post-amputation care	£75,807,423	£75,807,423
<b>Total</b>	<b>£639,015,210</b>	<b>£661,767,953</b>

Reproduced with permission from 'Inpatient Care for People with Diabetes: the Economic Case for Change'. Marion Kerr, Insight Health Economics. [www.diabetes.org.uk](http://www.diabetes.org.uk)

### 2.7 Admissions in diabetes population due to acute coronary syndromes (ACS) or stroke

Diabetes is a significant independent risk factor for ACS, and about 30% of all ACS admissions have diabetes or glucose intolerance. The National Diabetes Audit (NDA 2010) found that 11,625 people with diabetes (0.6%) had had at least one admission with a myocardial infarction in one year in England, and 30,405 people with diabetes (1.6%) had been admitted at least once with cardiac failure. In 2009/10 there were 47,347

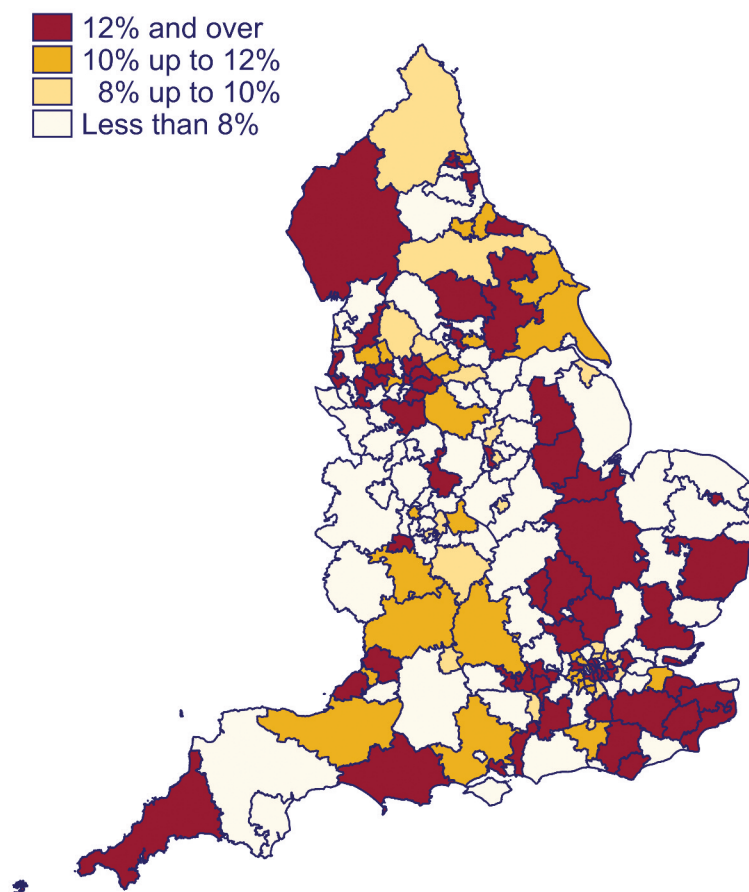
admissions for ACS in people with diabetes, leading to 173,423 occupied bed days in England. This is equivalent to 20.2 episodes and 74.2 nights per 1000 people with diabetes. Diabetes is a significant independent risk factor for stroke. In 2009/10, there were 72,120 admissions for stroke in people with diabetes, leading to 278,410 occupied bed days due to stroke in people with diabetes in England. This is equivalent to 30.8 admissions and 119 bed days per 1000 people with diabetes per annum.

# 3 Re-admission rates for people with diabetes and variability between hospitals

**3.1** Re-admission rates within 28 days for people with diabetes are 59% higher than age-matched populations without diabetes, equivalent to 37,300 excess emergency re-admissions in England in 2009/2010 in the diabetes population.

**3.2** There is substantial variability between previous PCT areas and Hospitals in England in re-admission rates for patients with diabetes; these data are readily available, adjusted for expected admissions and by area and Health Resource Group (HRG).<sup>28</sup>

**Figure 1. Percentage excess emergency re-admissions to hospital within 28 days of an inpatient stay for people with diabetes when compared to the expected number based on the re-admission rate for those without diabetes (2011 – 2012) by England PCT.**



**3.3** Re-admission rates for DKA, severe hypoglycaemia and diabetes foot problems are common, with a small proportion of people

accounting for a disproportionately high number of admissions and clinical contacts. This is described in sections **5.1 – 5.21**.

<sup>28</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

# 4 Admission rates for people with diabetes and variability between Hospitals

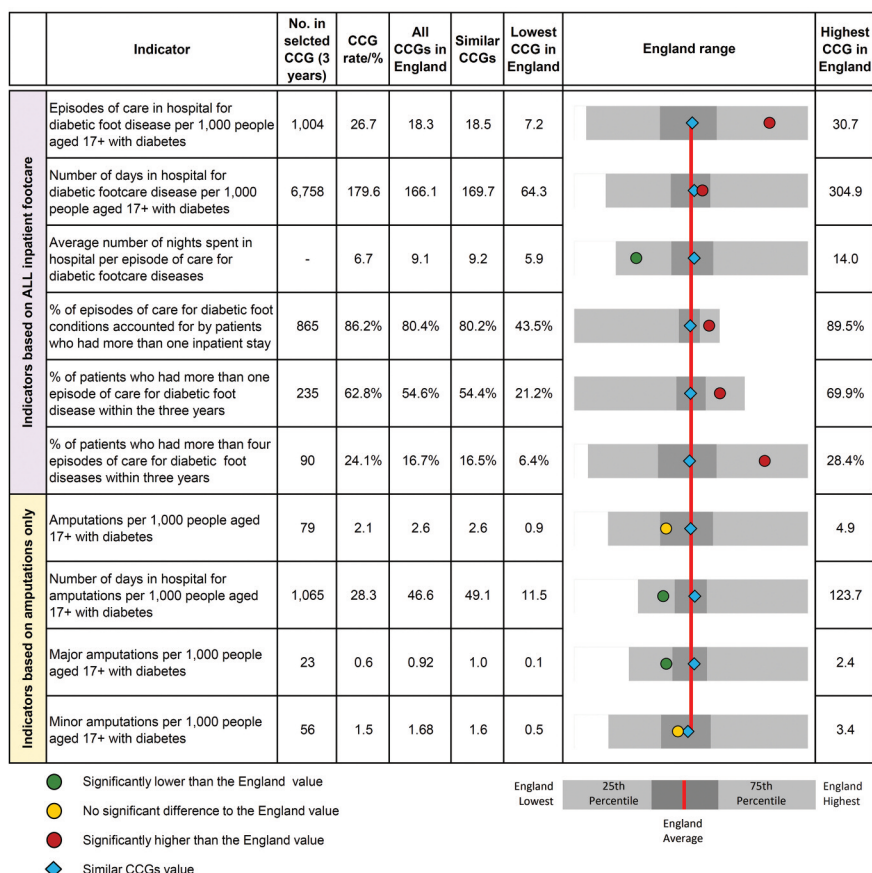
**4.1** The total estimated excess tariff expenditure associated with diabetes admissions in England (2009 /2010) is £572,685,129. This excess cost is due to an excess of admissions in the diabetes population (including diabetes specific admissions), a bias against day case surgery listings for people with diabetes, a prolonged length of stay once admitted, and a higher re-admission rate.

**4.2** There was substantial variability between previous PCTs and Provider Trusts in England in admission rates for diabetes. This suggests there is scope for health care planners to examine variance in local admission rates, local service models, and deliver service and cost improvements.

## Variability in admissions due to diabetic foot disease and amputations

**4.3** There is substantial variability between previous PCT and CCG areas in England in diabetes admission rates, re-admission rates, and bed occupancy for diabetic foot disease. These data are available widely for commissioners and clinicians to allow benchmarking for foot admission rates against overall PCT and CCG data for England (**Figure 2**).

**Figure 2. Typical foot care admissions data for a PCT benchmarked against overall PCT data for England.<sup>29</sup>**



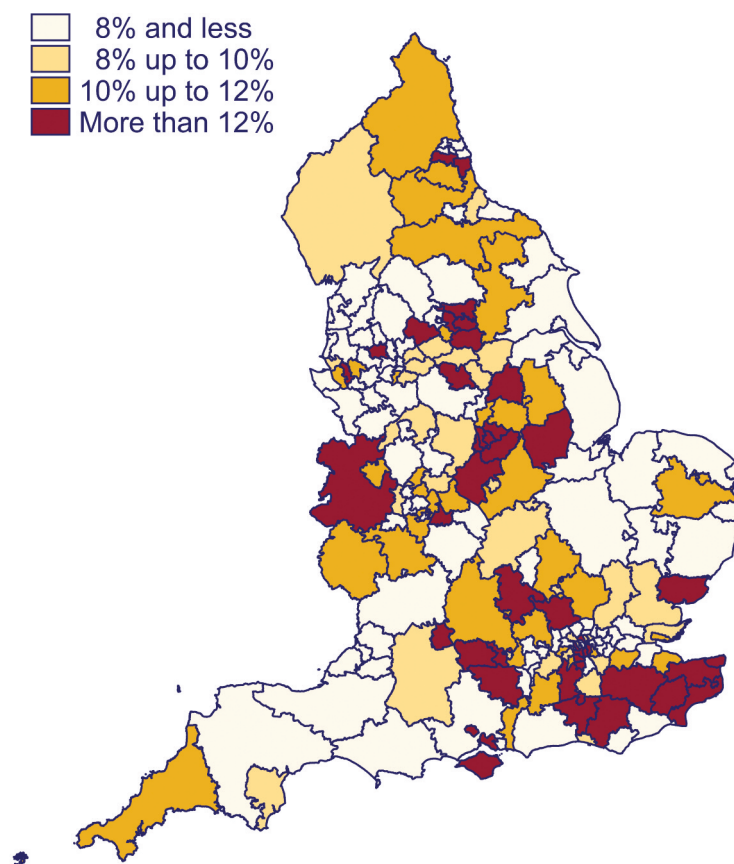
<sup>29</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

## Variability in day case listing rates for people with diabetes

4.4 The age and gender adjusted shortfall in day case elective surgery in diabetes patients is estimated at 41,906 people in England (2009 – 2010), largely in the older population with

diabetes. There is substantial and unexplained variability between Acute Hospitals in day case listing rates for people with diabetes. These benchmarking data are widely available by area and by health resource group (Figure 3).

Figure 3. Percentage shortfall in the observed number of elective admissions performed as day cases for people with diabetes when compared to the expected number based on the rate of day case admissions for those without diabetes (2011/2012).<sup>30</sup>



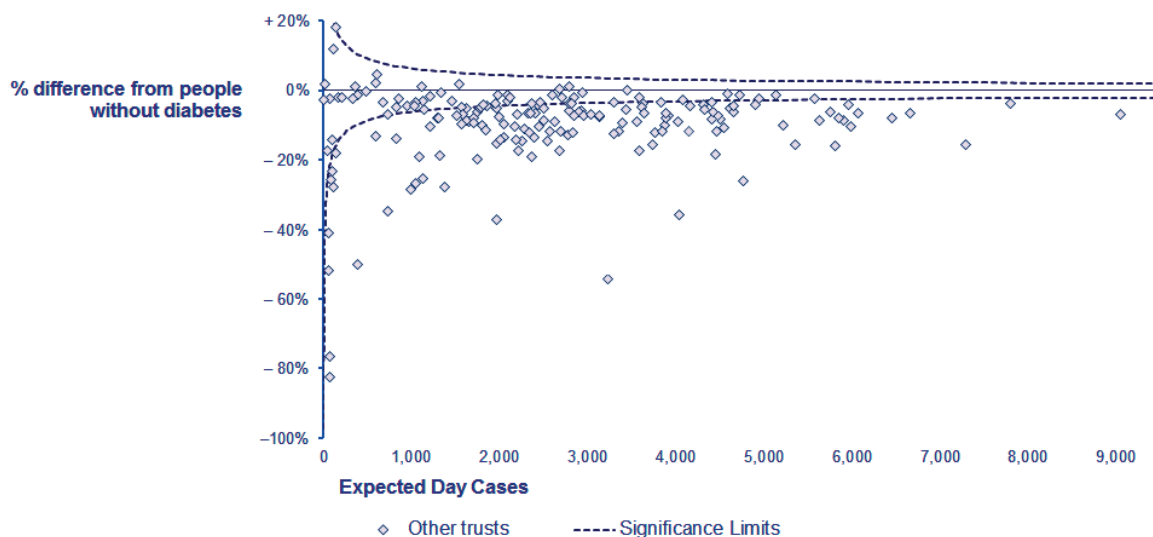
4.5 Figure 4 on the next page displays a typical dataset, for day case listing for Acute Trusts in England and Wales (2011/2012).<sup>31</sup> Each data point represents a Hospital and the blue dotted lines show the significance limits – that is, the range of expected day case listing rates for people without diabetes. Points below the lower line suggests a day

case listing rate for diabetes patients significantly lower than expected from the rates in the non-diabetes population. Points on the horizontal axis suggest a day case listing rate in the diabetes population very close to that seen in the population without diabetes.

<sup>30</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

<sup>31</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

**Figure 4. Day case listings available at English Hospitals showing expected and observed day case listing rates for people with diabetes. Each data point is an Acute Trust.**



### Variability in DKA admission and hypoglycaemia rates for people with diabetes

**4.6** There is substantial variability between PCT areas in England in DKA admission rates, with some PCT areas having a 4-5 fold higher DKA admission rate adjusted for diabetes population numbers.<sup>32</sup> In addition, on average 31% of DKA patients with Type 1 diabetes are readmitted in the following year

with a further DKA, and this value ranges between 24 and 42% by English region.<sup>33</sup> There is also a 4 fold difference by PCT area in emergency call outs to ambulance crew for diabetes emergencies, largely severe acute hypoglycaemia.

**4.7** The reasons for this very marked variability must in part reflect variability in local service models, clinical pathways, and in commissioned diabetes services.

<sup>32</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

<sup>33</sup> <https://catalogue.ic.nhs.uk/publications/clinical/diabetes/nati-diab-audi-09-10-audi-anal-sec-care/nati-diab-audi-09-10-anal-part-sec-care-dat6.xls>

# 5 Reducing diabetes admissions – a whole system approach with primary care

**5.1** A whole system approach to preventing diabetes admissions can show encouraging outcomes with service redesign, and is in line with recent guidance on commissioning diabetes services.<sup>34</sup> There are effective targeted interventions in particular groups of patients with diabetes which are described later.

**5.2** Integrating primary and secondary care service planning in managed disease networks has demonstrated a reduction in emergency admissions for some ambulatory long term conditions (including diabetes) in the three years after networks were implemented in Scotland.<sup>35</sup>

There are now action plans for the delivery of diabetes care in Scotland and Wales. The model of clinically led managed networks for diabetes in England is the approach needed to practically organise the **system of diabetes care to reduce admissions by delivering high quality co-ordinated care using care pathways, guidelines, monitoring outcomes and team-working across the different providers and commissioners to make improvements.**

Recent commissioning guidance re-emphasizes the importance of diabetes clinical networks<sup>36</sup> which will be linked to Strategic Clinical Networks.

## Panel 1 Westminster PCT achieved improved quality and better value for money by investing in community access.

*The Westminster Diabetes Service was launched in 2005 and an integrated care pilot began in November 2011. Over 3 years a Diabetes Incentive Scheme was implemented providing accredited training to primary care, covering 93% of the registered diabetes population. Sub-contracting consultant sessions from the acute provider facilitated integration and collaboration across primary and secondary care and non-elective admissions fell by 50% after the introduction of the service despite a rising prevalence of diabetes:*

### Non-elective admissions for diabetes 2005 – 2009; Westminster PCT

Year	Admission rate (per 100k)	Bed days	Tariff costs (£k)	QOF prevalence(%)
2005	147.02	1355	-	2.50
2006	140.47	2047	498	2.60
2007	83.29	1352	322	2.60
2008	81.09	1623	407	2.70
2009	79.5	1029	218	3.50

<sup>34</sup> Best Practice for Commissioning Diabetes Services. An integrated care framework (2013). [www.diabetes.org.uk](http://www.diabetes.org.uk)

<sup>35</sup> Guthrie B, Davies H, Greig G, Rushmer R, Walter I, Duguid A, et al. Delivering health care through managed clinical networks (MCNs): lessons from the North. Report for the National Institute for Health Research Service Delivery and Organisation programme. Queen's Printer and Controller of HMSO 2010; 2010 Apr.

<sup>36</sup> Best Practice for Commissioning Diabetes Services. An integrated care framework (2013). [www.diabetes.org.uk](http://www.diabetes.org.uk)

**5.3** The presence of 2 long-term conditions predicts a high risk of hospital admission. Diabetes may be only one aspect of an individual's chronic disease state and **identifying those at risk of admission** using prediction models (e.g. PARR++ or EARLI) is valuable in managing susceptible patients and co-ordinating care focusing on the needs and expectations of the patient. Care integration in Torbay has demonstrated a lower emergency admission rate and reduced use of hospital beds.<sup>37</sup> In the elderly, frailty (rather than co-morbidity) is more important than co-morbidity in predicting hospital admission, and there is national and international guidance on the management of the frail elderly with diabetes.<sup>38</sup>

**5.4** The NIMROD programme (*Nottingham NHS and Industry Maximising Resources and Outcomes in Diabetes in Nottingham*) is an ambitious whole systems project that aims to reduce diabetes admissions, and was a partnership between NHS Nottingham PCT, Nottingham University Hospitals NHS Trust, Diabetes UK, Practice Based Commissioning clusters and pharmaceutical industry collaborators. The project aims as a first step to quantify and describe admissions from the diabetes population and reduce the rate of avoidable admissions and unnecessary emergency contacts with Ambulance and Emergency Department services.<sup>39</sup> Some of the key findings from the baseline audit are summarised in **Panel 2**.

### Panel 2 Summary data from NIMROD programme in Nottingham 2010: diabetes admissions

- Most diabetes admissions were between 8 am and 5 pm, with highest rate between 5 pm and 9 pm
- Two thirds of admissions came via A&E
- Around a quarter of patients either phoned or visited their GP or contacted out of hours services some of whom also then called 999
- 63% of patients admitted with a primary diagnosis were admitted for high glucose levels, 23% for low glucose levels and 14% for foot problems
- 34% of diabetic admissions were repeat admissions
- 50% of patients in the 18-24 age group had two or more repeated admissions
- 30% of patients aged 65-74 had one or more repeated admission
- 38% of patients would contact 999 and 12% would contact NHS Direct out of office hours in a diabetes emergency
- 58% of patients would contact their GP in office hours in an emergency related to their diabetes
- In 23% of cases patients felt something could have been done by either themselves or healthcare service to prevent the admission
- In 52% of cases where diabetes was the primary diagnosis, patients felt something could have been done by themselves or the healthcare service to prevent the admission
- In 36% of cases patients felt that something could have been done by themselves or healthcare service to prevent readmission – rising to 71% where diabetes was the primary diagnosis

Data derived from NIMROD audit data ([www.nottinghamcity.nhs.uk/healthy-living/nimrod-diabetes.html](http://www.nottinghamcity.nhs.uk/healthy-living/nimrod-diabetes.html))

<sup>37</sup> [http://www.kingsfund.org.uk/publications/integrating\\_health\\_1.html](http://www.kingsfund.org.uk/publications/integrating_health_1.html)

<sup>38</sup> Sinclair A et al Diabetes mellitus in older people: position statement on behalf of the International Association of Gerontology and Geriatrics (IAGG), the European Diabetes Working Party for Older People (EDWPOP), and the International Task Force of Experts in Diabetes. JAM Dir. Assoc. 2012 13:

<sup>40</sup> [www.nottinghamcity.nhs.uk/healthy-living/nimrod-diabetes.html](http://www.nottinghamcity.nhs.uk/healthy-living/nimrod-diabetes.html)



**5.5** In North West Thames an ambitious integrated care pilot (2011) drew together all interested parties to improve diabetes care across a large diverse population, in collaboration with Diabetes UK and Age UK; although full results are awaited, initial data suggests a reduction in diabetes

admissions equivalent to about 13% lower overall admissions compared to boroughs without this model (**Panel 3**) which is described in more detail elsewhere.<sup>40,41</sup>

### Panel 3 North West London Integrated Care Pilot

- The North West London Integrated Care Pilot (June 2011) was a 12 month pilot that drew together primary, secondary, community, social and mental health care to work in an integrated way for the delivery of diabetes and elderly care in a population of 200,000 with the aim of improving care for adults with diabetes and for all people over 75 years of age. Diabetes UK and Age UK advised on the service modelling.
- The aim was to promote better quality care for patients, a richer, more rewarding and less frustrating professional experience for staff, and lower costs for the health system - these groups accounted for 9% of the population of North West London but 28% of the healthcare expenditure.
- At the heart of the model was the creation of Multi-Disciplinary Groups, comprising professionals from primary care, community care, social care, mental health, and acute care. Each group covers a minimum 30,000 population, and worked to an agreed framework – a single patient registry, stratification of patients by risk, agreed clinical protocols and care packages, the provision of integrated care plans, better coordinated care delivery, multi-disciplinary conferences to discuss the most complex cases, and performance review.
- The aims were to cut hospital use, including non-elective medical admissions, by 30% over five years and nursing home admissions by a tenth, while reducing the annual cost of services for diabetic and older patients by 24% over five years. The savings in non-elective admissions alone were expected to release £10-12m a year for reinvestment.
- Early results suggested the number of non-elective medical admissions among the 28,000 patients aged 75 and over fell 6.6% compared with the same period in 2010-11. Admissions for such patients at practices in North West London boroughs not covered by the pilot rose 6.5%. Comparing the two figures the pilot estimates it helped its patients avoid 304 admissions over 6 months.
- The financial framework provided a degree of alignment of financial risk and profit sharing across the provider organisations.

<sup>40</sup> NHS Diabetes London Regional Briefings Volume 1, Issue 5, July 2011 (p 7-8).  
[http://www.diabetes.nhs.uk/in\\_your\\_area/london/regional\\_briefings/](http://www.diabetes.nhs.uk/in_your_area/london/regional_briefings/) July 2011

<sup>41</sup> Richard Vize. Integrated care: a story of hard won success. BMJ 2012; 344: e3529 doi: 10.1136/bmj.e3529 Published: 31 May 2012.

## Panel 4 Award winning primary care: transforming services in Smethwick, Birmingham

Smethwick Medical Centre, in consultation with Aetna Health Services, set up a programme to focus services around the needs and motivations of patients. This 3 year project aimed to improve the patient experience by making it easier for patients to access services, to enhance self-care and reduce the use of hospital services.

One element of the programme was a telephone service run by nurses for people with long-term conditions deemed to be at high-risk of a hospital admission. Patients (n=256) received a telephone call once a month for a period of 6-9 months. The aim was to help people learn about their role in keeping themselves well, when to contact health professionals for support and how to exercise, eat healthily and take their medicines correctly. Patients were sent printed educational material, workbooks and record sheets to monitor clinical measurements. They were also given individualised care plans that focused on achieving health related goals amassing incentive points in exchange for health related goods when goals were achieved.

After the programme 80% of people said that they knew more about their condition. Eighty four per cent thought the calls showed them how to stay well and feel more confident about looking after themselves. This effect was sustained up to 3 months after the end of the programme (report, Nov 2011). A comparison of people enrolled in the programme and a matched group of similar people found that although unplanned admissions increased in both groups, the increase in admissions was 15% in those participating in care management compared with 28% for those not enrolled. The cost of admissions increased by 11% for those in the programme compared to 55% for those who were not.

Work is on-going to analyse larger numbers over a longer time period.

### Primary care and overall admissions avoidance

**5.6 Structured diabetes clinics** in primary care are significantly associated with reduced admission rates for diabetes.<sup>42</sup> The development of an enhanced community-based service has often relied on the involvement of general practitioners with an interest in diabetes (GPwSIs) or diabetes specialist nurses/nurse consultants who should be supported by the multidisciplinary diabetes specialist team in the delivery of care.<sup>43</sup>

**5.7** Poor glycaemic control is associated with an increased diabetes admission rate.<sup>44,45</sup> The QOF targets for diabetes set a minimum standard for delivery of care and over time this has led to

improvements in overall diabetes management. However, the impact of QOF has not led to lower hospital admission rates.<sup>46</sup>

**5.8** Primary care practitioners should have available a set of local guidelines and/or access to the Diabetes Specialist Team to whom they can refer when deciding if a patient requires admission to hospital with poorly controlled diabetes'. **Access to blood ketone testing** will identify those patients with Type 1 diabetes at risk of diabetic ketoacidosis needing hospital admission, and those who can be managed at home using 'sick-day rules' (section 7), or in the case of Type 2 diabetes, additional oral agent and/or insulin therapy.

<sup>42</sup> Saxena S, George J T, Barber J, Fitzpatrick J, Majeed A. Association of population and practice factors with potentially avoidable admission rates for chronic diseases in London: cross sectional analysis. *J R Soc Med* 2006;99:81-8.

<sup>43</sup> Goenka N, Turner B, Vora J. Diabetes UK Position Statements and Care Recommendations. Commissioning specialist diabetes services for adults with diabetes: summary of a Diabetes UK Task and Finish Group report. *Diabetic Medicine* 28[12], 1494-1500. 2011.

<sup>44</sup> Govan L et al. Achieved levels of HbA1c and likelihood of hospital admission in people with type 1 diabetes in the Scottish population: a study from the Scottish Diabetes Research Network Epidemiology Group. *Diabetes Care* 2011 Sep;34:1992-7

<sup>45</sup> Kornum J B, Thomsen R W, Riis A, Lervang H H, Schonheyder H C, Sorensen H T. Diabetes, Glycemic Control, and Risk of Hospitalization With Pneumonia: A population-based case-control study. *Diabetes Care* 2008 Aug;31(8):1541-5.

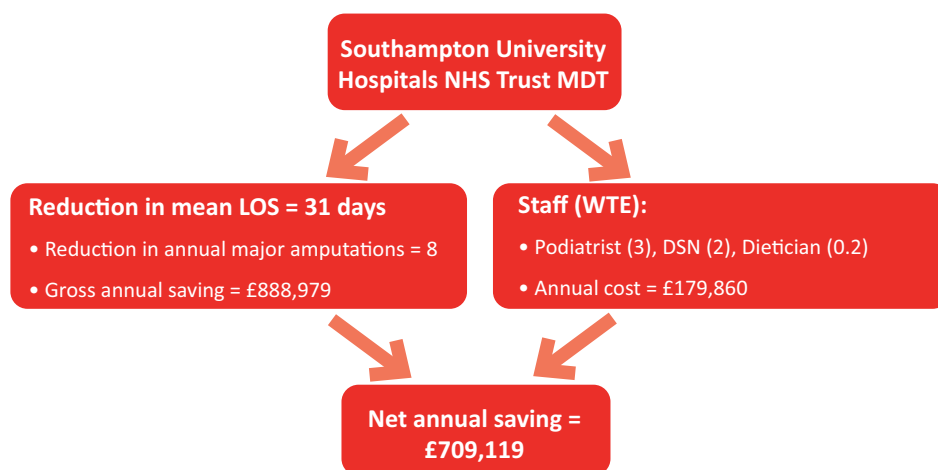
<sup>46</sup> Griffin S, Kinmonth A (2006). 'Systems for routine surveillance for people with diabetes mellitus (Cochrane Review)'. *Cochrane Database of Systematic Reviews*, issue 4.

**5.9** HCPs performing foot examinations in general practice need to be adequately trained to do this.<sup>47</sup> Residents of care homes with foot problems also need to be assessed by HCPs trained in foot examination. Patients identified as having high risk feet should be referred to the **community foot protection team (FPT)** for on-going care as ulcer prevention services have demonstrated a reduction in amputation rates in high risk patients. A prospective observational study of patients attending for routine care showed that foot ulceration was 83 times more

common in those with high risk feet and 6 times more common in those with moderate risk feet at <2 year follow-up.<sup>48</sup>

**5.10** Patients presenting with foot ulceration should be referred to a foot MDT within 24 hours. Early management of foot infection and rapid access to a foot MDT can lead to a shorter duration of infection and shorter time to healing. Foot MDTs working across primary and secondary care have been shown to reduce expenditure on hospital admissions and amputations.<sup>50</sup>

**Panel 5 Southampton University operated a foot MDT working across primary and secondary care (2004-2007) which offered telephone advice and emergency access line for patient and staff, weekly podiatry clinics at 8 primary care locations, secondary care outpatient clinics and multidisciplinary foot care for inpatients.**



**5.11** Primary care practitioners should be able to access **local structured education programmes** to refer those with Type 1 and Type 2 diabetes. Better self-management through structured education has been shown to reduce admission rates in Type 1 diabetes.<sup>51</sup> There is no available evidence that structured education in Type 2 diabetes reduces admissions.<sup>52</sup>

**5.12** People with diabetes require an **annual assessment of cardiovascular risk**. The quality of structured care in chronic disease management, appropriately delivered, will determine the success of clinical outcomes associated with risk factor management. There is a good evidence base for the use of aspirin in secondary prevention<sup>53</sup> and statin therapy for both primary and secondary prevention in reducing the incidence of acute coronary events<sup>54</sup> and admissions.

<sup>47</sup> Diabetes UK and NHS Diabetes. Putting feet first: national minimum skills framework. 2011 Mar.

<sup>48</sup> (Foot Care for People with Diabetes: The Economic Case for Change, Marion Kerr, Insight Health Economics; NHS Diabetes.

<sup>49</sup> Diabetes UK ND. Putting Feet First. 2009.

<sup>50</sup> Foot Care for People with Diabetes: The Economic Case for Change, Marion Kerr, Insight Health Economics; NHS Diabetes

<sup>51</sup> Loveman E, Cave C, Green C, Royle P, Dunn P, Waugh N. The clinical and cost-effectiveness of patient education models for diabetes: a systematic review and economic evaluation. Queen's Printer and Controller of HMSO 2003.

<sup>52</sup> Davies MJ, Heller S, Skinner T C, Campbell M J, Carey M E, Craddock S, et al. Effectiveness of the diabetes education and self management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes. Br Med J 2008;336(7642):491-5.

<sup>53</sup> Antithrombotic Trialists' (ATT) Collaboration, Bagnett C, Blackwell L, Collins R, Emberson J, Godwin J, et al. Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomised trials. Lancet 2009;373(9678):1849.

<sup>54</sup> Shepherd J, Cobbe S M, Ford J, et al for the West of Scotland Coronary Prevention Study Group. Prevention of coronary heart disease with pravastatin in men with hypercholesterolaemia. New Engl J Med 1995;333:1301-7.

**5.13 Influenza vaccinations** Department of Health recommends that all patients with diabetes attend for 'flu' immunisation. There is evidence for reducing hospitalisations following immunisation in Type 1 diabetes.<sup>55</sup>

**5.14 Structured and on-going education** plus risk stratification, delivery of the 9 care processes, a care planning approach to agreeing goals and informing people with diabetes about how to prevent emergencies is crucial to avoiding hospital admissions.

## Vulnerable Groups

**5.15** Diabetes UK estimated that 1 in 4 care home residents have diabetes and that a person with diabetes is admitted to hospital from residential care every 25 minutes.<sup>56</sup> A report by the Institute of Diabetes for Older People<sup>57</sup> noted that the median age of inpatients in over 200 Acute Trusts was 75, and that the majority had been admitted as an emergency. Factors which increase the likelihood of hospital admission of older people include care home residency, mismanagement of medication and carer fatigue among others. There are successful models shown to reduce admissions from Care Homes (**Panel 6**).

### Panel 6 South Staffordshire Primary Care Trust; Care Homes Project

*A District Nurse was appointed to the Diabetes Team in South Staffordshire and after a training period, began to provide an educational programme within care homes, promoting residents' self-management skills, identifying problem areas in diabetes management and providing on-going support to the care homes. Importantly, the skills of some care home staff were extended to testing of capillary blood glucose and giving of insulin injections. The outcomes showed a reduction in emergency admissions of over 60% and a total reduction in admissions of over 70%:*

	12 months before intervention	12 months after intervention (6 months real-time, 6 months projected)
Number of admissions (elective)	3	0
Number of admissions (emergency)	39	12
Number of bed days spent in hospital	236	116
Total reduced admissions		71.5% = £30,600*
Total reduced bed days		51%

\* 1bed day=£255

**5.16** Older adults with diabetes have a 2-4 fold increase in the risk of hospitalisation and pre-admission medical co-morbidities and disability often results in poor clinical outcomes and prolonged length of stay. Major vascular episodes such as a stroke or myocardial infarction are common causes of admission in older patients with diabetes. Older people may experience discrimination in the degree of active management offered compared with younger people, often have

more complex needs and require well co-ordinated multidisciplinary care. Many care home providers do not follow good practice guidelines or provide adequate diabetes training for staff, with consequences for the quality of care.

**5.17** Vulnerable patients who are frail or house-bound, or who live in a nursing or residential home, may not readily access primary care practitioners yet need to have an annual foot examination. This should be performed by a

<sup>55</sup> Colquhoun A J, Nicholson K G, Botha J L, Raymond N T. Effectiveness of influenza vaccine in reducing hospital admissions in people with diabetes. *Epidemiol Infect* 997 Dec;119(3):335-41.

<sup>56</sup> Diabetes UK. Diabetes in care homes. Awareness, screening, training. 2010 Nov.

<sup>57</sup> Sinclair A et al. Good clinical practice guidelines for care home residents with diabetes. A revision document prepared by a Task and Finish Group of Diabetes UK. 2010. Diabetes UK.

trained individual who should have the necessary updated knowledge and skills to perform such an assessment. Education of residential care staff on practices to promote healthy feet should be provided by the specialist diabetes team as part of a wider package of accredited diabetes education for care home staff.

**5.18** It is important to recognise those groups with diabetes who have a higher risk of developing complications and admission. These include the prison population, those with mental health problems and black and minority ethnic groups

(BME). The National Diabetes Audit demonstrated that young people in the BME community, who also fall into the lower quartile of socioeconomic deprivation, are associated with higher risk glucose control.<sup>58</sup>

**5.19** The complications of diabetes are more prevalent in areas of socio-economic deprivation.<sup>59</sup> A project in NE Essex has demonstrated a reduction in admissions with intensive diabetes specialist nurse support in an area of deprivation and high 'did not attend' (DNA) rate (**Panel 7**).

### Panel 7 Diabetes Inequalities Outreach Project: North East Essex

Jaywick is ranked as the 3rd most deprived town in England and Wales whilst the adjacent coastal neighbourhood of Pier Ward is the 775th (indices of deprivation). Jaywick has a higher than average incidence of cardiovascular disease and low level of skills and educational attainment. A high number of people of working age are receiving unemployment benefits. During 2009, N.E. Essex had a slightly higher than national incidence of diabetes at 3.9%. The local diabetes service reported poor clinic attendance.

The Outreach initiative involving joint working with primary and secondary care, public health and local authorities, aimed to give extra support to people with diabetes closer to home. Key performance indicators were BP, lipids and diabetes. Patients with A1c >10% and QOF excluded due to non-attendance, were identified within 4 practices. Patients were invited by letter to attend for an appointment. In addition, the Emergency Department provided weekly updates of patients attending to the Outreach team.

It was identified that the clinical management of these patients required a high level of skill and experience. Many of the patients were young with Type 1 diabetes and had complex needs without the remit of the patient's GP or who had opted out of secondary care services. Other patients were those with complex needs and co-morbidities such as renal disease, mental health problems, COPD and morbid obesity. In the first 6 months, the Outreach team had a caseload of 49 and reduced hospital admissions by 33, improved glycaemic control in 25 patients with an average A1c reduction of 2.2%. All patients felt more confident about managing their diabetes. The patients responded well to the continuity of care.

The key to the success of this project was flexibility in appointment times, locations and home visits as well as the use of alternative consulting rooms in pharmacies at times convenient for the patient. The contact was made by an experienced DSN who was able to work autonomously and make instant changes to medication supported by the GP, Practice Nurses and Diabetologist. For those who regularly DNA clinic, it often takes several 'phone calls from the Outreach DSN before the patient has sufficient confidence to be seen.

In addition, the team in N.E. Essex is piloting an admission avoidance scheme whereby the DSN is on-call 8-8 Monday-Friday; on average this is preventing around 2 admissions per week usually in those with new Type 1 diabetes or hyperglycaemia in those with Type 2 diabetes who would normally be admitted overnight.

<sup>58</sup> National Diabetes Audit

<sup>59</sup> Ham C, Imison C, Jennings M. Avoiding hospital admissions: Lessons from evidence and experience. 2010. The King's Fund.

**5.20** People with severe and enduring mental health problems have a greater risk compared with the general population of long-term physical health problems including diabetes which can lead to increased hospitalisation and early mortality. In addition, mental health workers are not trained in diabetes care thus leaving the mental health patient vulnerable to the development of complications. The NHS Operating Framework 2012/2013 highlights the need to focus on the physical healthcare of those with mental illness to reduce excess mortality.<sup>60</sup> Introducing Diabetes Specialist Nurse time to support

mental health units has been shown to increase staff confidence in managing diabetes. The development of guidelines on the management of glycaemic emergencies supported the teams caring for individuals with mental health problems and diabetes and has led to a reduction in emergency department attendances for glycaemic issues. Additional Diabetes Specialist Nurse intervention also led to the promotion of good physical health and cardiovascular risk management for patients with diabetes and mental health problems (**Panel 8**).

### **Panel 8 Preventing admission of vulnerable people with mental health problems; Birmingham and Solihull Mental Health Foundation Trust.**

- A diabetes specialist nurse was employed within the mental health trust to tackle the increased risk of hospitalisation and early mortality associated with chronic mental ill health and diabetes. The DSN monitors all patients with diabetes in inpatient mental health units by reviewing medication, providing educational programmes tailored to the needs of patients, their families and carers, and mental health professionals.
- Guidelines for the management of hyperglycaemia and hypoglycaemia were developed to support staff thus preventing unnecessary acute hospital visits. Distribution of a 'Safe use of Insulin' pack to reduce the risk of insulin errors, promotion of good physical health and identification of cardiovascular risk factors has also been implemented. The development of an expert practitioner programme has supported the delivery of care to those with severe mental health problems. The Diabetes Inpatient Team is now able to refer mental health patients for follow-up after discharge.
- Staff in the mental health units have a greater confidence in the management of diabetes and emergency attendances at A&E for glycaemic issues have fallen. Wards are better equipped with treatment options for the management of diabetes. Mental Health Teams have reported that since diabetes has been more intensely managed, the ability to improve the acute mental health problems has also improved.

### **Specialist Care**

**5.21** In Wolverhampton<sup>61</sup> a service redesign in New Cross Hospital led to the development of a diabetes outreach service (DOS) **within** the Acute Trust, with an enhanced presence of Diabetes Specialist Nurses, Consultant Diabetologists and Specialist Registrars in Acute Admission Wards, all high risk surgical wards, and in an early post discharge service. The DOS in the Acute Admission areas focussed on the immediate triage of people with a diabetes specific condition, or with a 'general medical' diagnosis and concurrent diabetes. The DOS concentrated on enhanced discharge, effective gate keeping, and early

structured follow up. The average number of inpatients with diabetes admitted each day in this Trust fell from 83 to 54 and the diabetes specific and general medical /diabetes admission rates fell by more than 50% after the introduction of the service. Similar models have been used elsewhere with significant clinical and cost benefit (**see panel 9**).

**5.22** In Emergency Departments, rapid access to the Diabetes Specialist Team, ready availability of local guidelines and blood ketone testing are important elements in reducing hospitalisation for patients with diabetes. Medical Ambulatory Care Pathways in the Emergency Department for the

<sup>60</sup> <https://www.gov.uk/government/publications/the-operating-framework-for-the-nhs-in-england-2012-13>

<sup>61</sup> Mahto R et al. The effectiveness of a hospital diabetes outreach service in supporting care for acutely admitted patients with diabetes. QJM 2009; 102(3):203-207

management of hyperglycaemia have shown cost-savings through reductions in admission, in addition to improving the quality of care for the patient.<sup>62</sup> **(Panel 10).**

and primary care,<sup>63</sup> as patients aged 65 and over who do not see their GP within 30 days of discharge are 3 times more likely to be readmitted than those who are seen.

**5.23** An integrated information system would support good communication between hospital

### Panel 9 East and North Hertfordshire Acute Trust: Diabetes Inpatient Specialist Service in the Emergency Department

The introduction of a diabetes inpatient specialist service to reach into the emergency department, led to rapid discharge of newly presenting patients with diabetes from the emergency department and rapid access to the diabetes specialist team. The avoidance of 92 admissions over the course of 4 years led to a cost-saving of £42,496, a conservative estimate. The introduction of a hyperglycaemia pathway in the emergency department is now facilitating early insulin initiation and rapid access to the specialist team without the need for admission, and leading to predicted greater cost-savings in the future.

Inpatient Specialist Team Cost	Admitted Overnight stay Patients
DSN Time £20.00 per hour	Overnight stay in MAU (bed & food only) £205.00
X 4 hours of DSN time £80.00	Medical costs in the region of £200.00
1 set of bloods £7.00	2 sets of bloods £14.00
Total £87.00	Total £419

QEII Hospital	Lister Hospital
2007 9 patients seen (9 x £332.00) = £2988	n/a
2008 16 patients seen (16 x £332.00) = £5312	n/a
2009 32 patients seen (32 x £332.00) = £10624	2009 18 patients seen (18 x £332.00) = £5976
2010 35 patients seen (35 x £332.00) = £11620	2010 18 patients seen (18 x £332.00) = £5976
<b>Grand Total £30,544</b>	<b>Grand total £11,952</b>
<b>£42,496 across both sites</b>	

<sup>62</sup> Herring R et al . Management of raised glucose, a clinical decision tool to reduce length of stay of patients with hyperglycaemia. Diabetic Medicine 2013 30:81-87

<sup>63</sup> Ham C, Imison C, Jennings M. Avoiding hospital admissions: Lessons from evidence and experience. 2010. The King's Fund

**Panel 10 The Management of raised glucose (MORG) pathway – an algorithm for managing hyperglycaemia in MAU and A&E (based on Herring R et al 2013 <sup>61</sup>)**

**Management of patients with raised glucose above 11.1 in MAU and A&E**

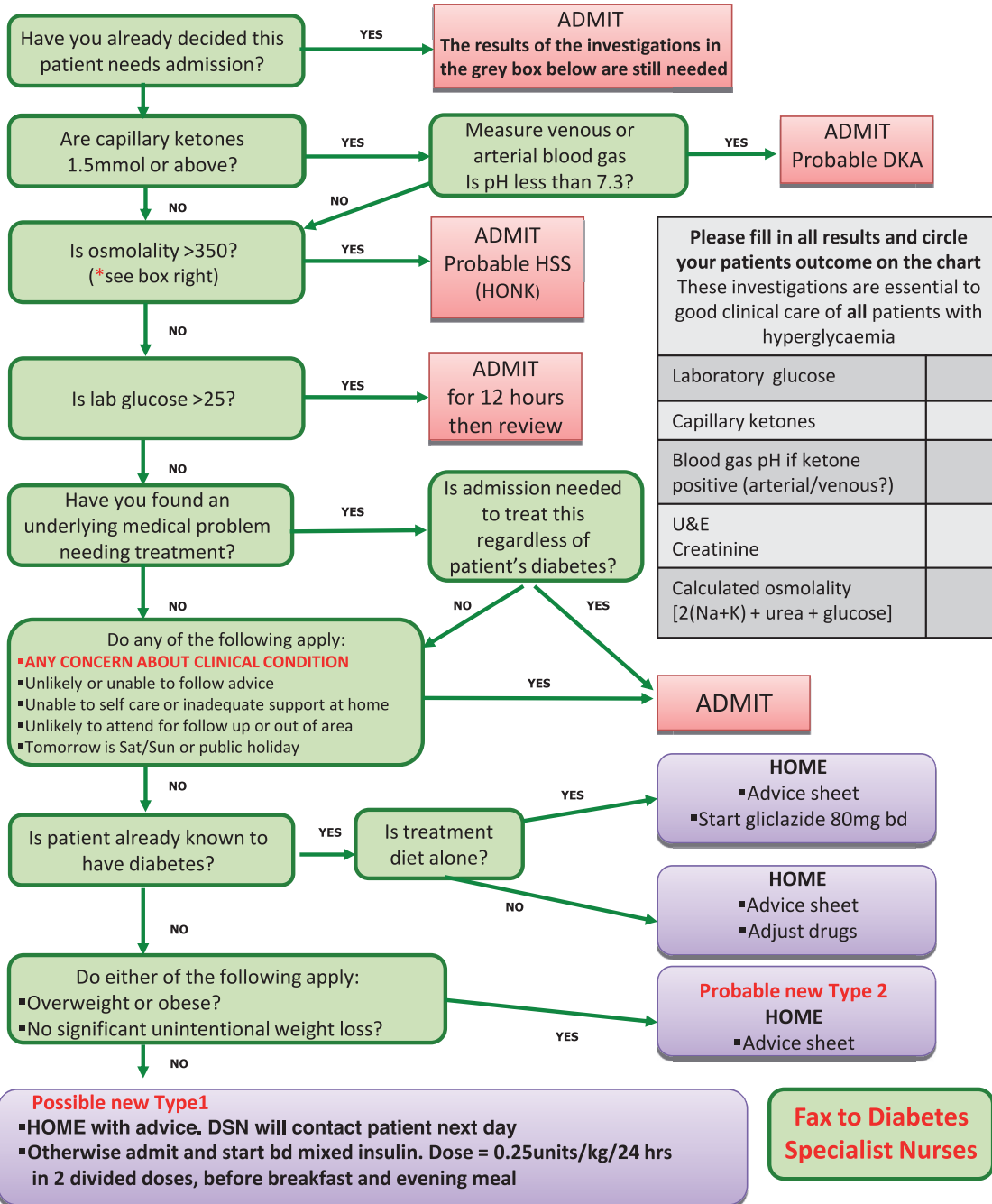
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# 6 Improving elective and day case listing for people with diabetes

**6.1** The annual shortfall in day case elective surgery in diabetes patients was estimated at 41,906 people in England alone (2009–2010). There is substantial variability between Acute Hospitals in day case listing rates for people with diabetes, and benchmarking data is available for day case listing rates through the National Diabetes Information Service.<sup>64</sup> The Modernisation Agency identified **day surgery (rather than inpatient surgery) as the norm for elective surgery**, as a high impact change that could release nearly half a million inpatient bed days each year. There are recent JBDS – IP guidelines on the pre-operative assessment of people with diabetes,<sup>65</sup> and also British Association of Day Surgery guidance.<sup>66</sup> Improvements in care planning for patients with diabetes needing elective surgery would reduce unnecessary overnight hospital admission.

**6.2** Increased day case surgery rates are a central part of the NHS plan, with a target of 75% of elective admissions being undertaken as day cases, and an estimated day case shortfall of 74,000 cases per annum due to low day case listing rates in some Trusts.<sup>67</sup> The JBDS – IP document on pre-operative assessment also includes a simple algorithm for assessing suitability for day case surgery.<sup>68</sup>

**6.3** It is likely that low day case listing rates in the diabetes population may be in part due to a higher prevalence of co-morbidities in the older

diabetes population, lack of confidence in insulin management perioperatively, and difficulty for day procedure units in managing patients using insulin if they are unable to eat, or likely to vomit, after day procedures.<sup>69</sup>

**6.4** National online surveys of more than 2000 UK Junior Doctors in 2011 showed that only 18% were fully confident in altering diabetes therapy prior to surgery and that only one third reported their postgraduate training had prepared them adequately in optimising diabetes management.<sup>70</sup> In addition, 29.9% of UK Hospitals did not have specific day case surgery guidelines for the management of diabetes patients, and 13.9% of UK hospitals did not have guidelines for the perioperative management of patients on oral hypoglycaemics.<sup>71</sup> There are substantial shortfalls in diabetes training and day surgery guidelines use in the UK.

**6.5** Some UK centres have shown much improved day case listing rates with increased involvement of the diabetes specialist team. In Plymouth,<sup>72</sup> an enhanced inpatient diabetes team has been developed consisting of 4.3 WTE diabetes specialist nurses and a health care assistant in a 1,200 bed Acute Hospital. This team worked closely with the surgical, nursing and anaesthetic teams involved in elective surgical admissions and day case listing. The inpatient diabetes team developed protocols for referral for specialist diabetes team input based on clinical triggers

<sup>64</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

<sup>65</sup> <http://www.diabetes.org.uk>

<sup>66</sup> <http://daysurgeryuk.net/bads/joomla>

<sup>67</sup> Healthcare Commission, Robertshaw 2010

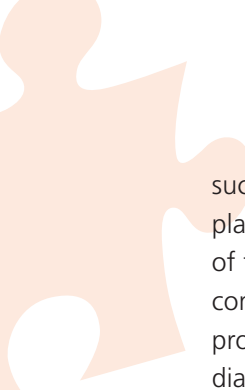
<sup>68</sup> <http://www.diabetologists-abcd.org.uk/JBDS/JBDS.htm>

<sup>69</sup> Healthcare Commission, Robertshaw 2010

<sup>70</sup> George J T, Warriner D, McGrane D J, Rozario K S, Price H C, Wilmot E G, et al. Lack of confidence among trainee doctors in the management of diabetes: the Trainees Own Perception of Delivery of Care (TOPDOC) Diabetes Study. *Q J Med* 2011 April 21

<sup>71</sup> Sampson M J, Brennan C, Dhataria, Jones C, Walden E. A national survey of inpatient diabetes services in the United Kingdom. *Diabetic Medicine* 2007;24:643-9.

<sup>72</sup> Flanagan D, Ellis J, Baggott A, Grimsehl K, English P. Diabetes management of elective hospital admissions. *Diabetic Medicine* 2010;27(11):1289-94.



such as treatment regimens and co-morbidity, planned time of day for surgery, estimated length of fast required, and linked to improved communication of management plans with day procedure staff. The total number of people with diabetes undergoing day case surgery increased from 1,080 to 1,456 (a 34.8% increase) in one year, significantly higher ( $p < 0.05$ ) than day case listing rate improvements for people without diabetes. This Trust now has a day case listing rate for diabetes little different from that of the non-diabetes population.<sup>73</sup>

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<sup>73</sup> Flanagan D, Ellis J, Baggott A, Grimsehl K, English P. Diabetes management of elective hospital admissions. *Diabetic Medicine* 2010;27(11):1289-94.

# 7 Reducing diabetes specific bed occupancy:

## Diabetic ketoacidosis (DKA)

**7.1** In 2010/2011, the National Diabetes Audit (which included 81.1% of people with diabetes in England) recorded 8,742 individuals with at least one admission due to DKA. There is significant variation between areas in DKA admission rates, and many DKA admissions can be avoided. DKA is the commonest cause of death in children and adolescents with Type 1 diabetes, and accounts for half of all deaths in those with diabetes <24 years of age.<sup>74,75</sup>

**7.2** About half of DKA hospitalisations could be avoided with better **outpatient and self-delivery of care**.<sup>76,77</sup> One study of a multi-ethnic population identified that of 167 admissions with DKA over a one year period, 18% were due to acute illness, 23% due to new-onset diabetes and 59% due to non-compliance.<sup>78</sup> A significant proportion of DKA admissions are due to recurring episodes in a minority of adults.<sup>79</sup> Risk factors for DKA include higher mean A1c level, higher reported insulin

dose, puberty, female gender, lower socioeconomic status and the coexistence of psychiatric disorders.<sup>80</sup>

**7.3 Structured educational programmes.** It is a NICE requirement that people with Type 1 diabetes should be offered structured education such as DAFNE<sup>81</sup> or one of the programmes developed and adapted for the needs of local UK populations. DAFNE is the most widely-used structured education programme in the UK for Type 1 diabetes. There are observational data suggesting these highly structured, intense Type 1 diabetes education programmes reduce DKA admissions by 39%<sup>82</sup> or 58%<sup>83</sup> with an estimated reduction in DKA events of 10 events avoided per annum per 100 Type 1 diabetes patients. The cost benefits of DAFNE in part accrue from reduced ambulance call outs and DKA admissions.<sup>84</sup>

**7.4 General insulin adherence and structured diabetes care.** Discontinuation of insulin, or poor adherence to prescribed insulin, is common in Type

<sup>74</sup> Secrest A M, Becker D J, Kelsey S F, LaPorte R E, Orchard T J. Cause-specific Mortality Trends in a Large Population-Based Cohort With Long-Standing Childhood-Onset Type 1 Diabetes. *Diabetes* 2010 Dec;59:3216-22.

<sup>75</sup> Basu A, Close C F, Jenki D, Krentz A, Natrass M, Wright D. Persisting mortality in diabetic ketoacidosis. *Diabetic Medicine: A Journal Of The British Diabetic Association* 1993 Apr;10(3):282-4.

<sup>76</sup> Kaufman F R, Halvorson M. The treatment and prevention of diabetic ketoacidosis in children and adolescents with type I diabetes mellitus. *Pediatric Annals* 1999;28:576-82.

<sup>77</sup> Curtis J R, To T, Muirhead S, Cummings E, Daneman D. Recent trends in hospitalization for diabetic ketoacidosis in Ontario children. *Diabetes Care* 2002;25:1591-6.

<sup>78</sup> Maldonado M R, Oehl M A, Chong E R, Balasubramanyam A. Economic Impact of Diabetic ketoacidosis in a Multiethnic Indigent Population. *Diabetes Care* 2003 Apr;26(4):1265-9.

<sup>79</sup> Morris AD, Boyle D I, McMahon A D, Greene S A, MacDonald T M, Newton R W. Adherence to insulin treatment, glycaemic control, and ketoacidosis in insulin-dependent diabetes mellitus. The DARTS/MEMO Collaboration. *Diabetes Audit and Research in Tayside Scotland. Medicines Monitoring Unit. Lancet* 1997;350:1505-10.

<sup>80</sup> The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complication in insulin-dependent diabetes mellitus. *Journal of Pediatrics* 1994;125:177-88.

<sup>81</sup> [www.dafne.uk.com](http://www.dafne.uk.com)

<sup>82</sup> Kahal H, Bansiya V, Tharby L, Mellor D, Ng J, Rogby A, et al. The effects of a structured educational programme (DAFNE) for individuals with type 1 diabetes on DKA admissions. *European Association for the study of Diabetes Annual Meeting (Stockholm)* . 2010.

<sup>83</sup> Lawrence IG, Hopkins D, Mansell P, Thompson G, Amiel S, Heller S. DAFNE (Dose Adjustment For Normal Eating) training delivered in routine clinical practice is associated with improved glycaemic control and a reduction in severe hypoglycaemia. *Diabetic Medicine* 2008;25:P115:72.

<sup>84</sup> Keen AJ, Duncan E, McKillop-Smith A, Evans ND, Gold AE. Dose Adjustment for Normal Eating (DAFNE) in routine clinical practice: who benefits? *Diabet Med* 2012;29(5):670-6.

1 diabetes and a common contributor to DKA.<sup>85,86</sup>

In Scottish populations,<sup>87</sup> the adherence to prescribed insulin was inversely related to hospital admissions for DKA ( $p < 0.001$ ) and all hospital admissions related to acute diabetes complications ( $p = 0.008$ ).

Enhanced insulin management and adherence education, intensive patient education programmes, specialist intervention, a rapid response system and improved access reduce DKA admissions and readmission. A randomised controlled trial in the USA determined that a 6-month intensive, home-based family therapy programme significantly reduced rates of emergency room visits and hospitalisations amongst 127 adolescents with Type 1 diabetes at 6 months.<sup>88</sup>

### 7.5 Intensive glycaemic management

The level of care provision seen in the intensive treatment group in large clinical trials (DCCT) is associated with a lower DKA rate in young adults/adolescents with Type 1 diabetes, at 2.8 per 100 compared to 4.7 per 100 patient-years in the conventional therapy group.

Interventions associated with less DKA included multiple daily insulin injections or CSII, specific diabetes-related education, motivation of patients and their families to adhere to management goals, increasing adolescent participants' self-esteem, and monthly individual monitoring by a specialist multi-disciplinary team.<sup>89</sup>

### 7.6 Engaging groups at highest risk of DKA

**Adolescent and transitional** Female teenagers with Type 1 diabetes are the group most commonly quoted as at highest risk of DKA, particularly if they are from dysfunctional families, are less able to problem-solve and have poorly defined family rules.<sup>90</sup> In one UK study, 4.8% of patients accounted for 22.5% of all episodes of DKA over a 3-year period. Simple appointments coordination, and ensuring structured follow up and avoidance of missed appointments for adolescents and young adults in transitional clinics has reduced DKA admissions by one third in some health care systems.<sup>91</sup> Using mobile telephone/text reminders to check blood glucose levels has also been shown to reduce the incidence of DKA in the young adult population.<sup>92</sup>

**Recurrent DKA** Interventions to reduce the frequency of DKA have included (for patients previously admitted with DKA) participation in an intervention called the Diabetes Treatment Unit (DTU)<sup>93</sup> programme. Although this was non-randomised and subject to bias the intervention group had a lower frequency of readmissions for DKA (16% vs. 43%,  $p = 0.001$ ) and a lower number of readmissions per patient (0.22 [SD 0.6]; vs. 1.17 [SD 2.2];  $p = 0.003$ ). Addressing psychosocial issues, if at all possible, is often key to preventing recurrent admission for some individuals, and improved working between diabetes specialists and mental health professionals may improve outcomes (**see Panel 11**).

<sup>85</sup> Maldonado M R, Balasubramanyam A, Chatha G. Ethnic influence on precipitaton of ketoacidosis in adult diabetics. *Diabetes* 50. 2001.

<sup>86</sup> Musey VC, Lee J K, Crawford R, Klatka M A, McAdams D, Phillips L S. Diabetes in urban African-Americans. I. Cessation of insulin therapy is the major precipitating cause of diabetic ketoacidosis. *Diabetes Care* 18, 483-489. 1995.

<sup>87</sup> Morris AD, Boyle D I, McMahon A D, Greene S A, MacDonald T M, Newton R W. Adherence to insulin treatment, glycaemic control, and ketoacidosis in insulin-dependent diabetes mellitus. The DARTS/MEMO Collaboration. *Diabetes Audit and Research in Tayside Scotland. Medicines Monitoring Unit. Lancet* 1997;350:1505-10.

<sup>88</sup> Maldonado M R, D'Amico S, Rodriguez L, Iyer D, Balasubramanyam A. Improved outcomes in indigent patients with ketosis-prone diabetes: Effect of a dedicated diabetes treatment unit. *Endocrine Practice* 2003;9:26-32.

<sup>89</sup> Ellis D A, Templin T, Naar-King S, Frey M A, Cunningham P B, Podolski C L, et al. Multisystemic therapy for adolescents with poorly controlled type 1 diabetes: Stability of treatment effects in a randomised controlled trial. *Journal of Consulting and Clinical Psychology* 207;75:168-74.

<sup>90</sup> Liss D S, Waller D A, Kennard B D, McIntire D, Capra P, Stephens J. Psychiatric illness and family support in children and adolescents with diabetic ketoacidosis: A controlled study. *Journal of the American Academy of Child and Adolescent Psychiatry* 998 May;35(5):536-44.

<sup>91</sup> Farrell K, Holmes-Walker D J. Mobile phone support is associated with reduced ketoacidosis in young adults. *Diabetic Medicine* 2011 Aug;28(8):1001-4

<sup>92</sup> Farrell K, Holmes-Walker D J. Mobile phone support is associated with reduced ketoacidosis in young adults. *Diabetic Medicine* 2011 Aug;28(8):1001-4.

<sup>93</sup> Maldonado M R, D'Amico S, Rodriguez L, Iyer D, Balasubramanyam A. Improved outcomes in indigent patients with ketosis-prone diabetes: Effect of a dedicated diabetes treatment unit. *Endocrine Practice* 2003;9:26-32

### Panel 11 Improved working patterns between clinical diabetes teams, mental health Trusts, and clinical psychology can be valuable when targeted at highest risk individuals, particularly those with eating disorders or significant psychological and family problems.

In Cambridge University Hospitals NHS Foundation Trust (Dr David Simmons), a service to prevent diabetes specific readmissions (particularly DKA) was commissioned for 12 months (total cost £173,228).

The service commenced in August 2012 and included 2.0 WTE diabetes specialist educators, a 0.1 WTE diabetologist, 0.05 WTE psychiatrist, and 0.4 WTE psychological wellbeing practitioner.

An inpatient identification/adoption process with enhanced post-discharge ambulatory diabetes, social and mental health management programme was implemented for those at highest risk of re-admission.

The intervention adopted 44 patients of whom 23 (52%) had a mental health issue. Initial data from this pilot has shown:

- Acute readmission prevention: reduced from 15/month to 4-6/month, a 60% reduction.
- Improved glucose control: achieved - mean HbA1c in hyperglycaemic patients with a repeat test has already fallen from 97+/- 20 to 90+/-21mmol/mol (p=0.035).
- Improved mental health: uptake of CBT (n= 6), and CAT (2 patients) and on-going psychological support in place if accepted.
- Reduced length of stay: reduced from 4.3 days to 2.5 days/admission comparing before and after index admission.
- Estimated financial savings from admission avoidance £265,032 - predicted overall saving per annum and return on investment approximately 1.5:1.

*For more information please contact Dr David Simmons (david.simmons@addenbrookes.nhs.uk)*

#### 7.7 Sick Day Rules and Blood Ketone testing

Patient self management of blood glucose, fluid and food intake when unwell is essential in reducing the risk of DKA. The approach to this common problem of 'sick day rules' is important, and central to this is the measurement of ketones, which indicate a high risk of having, or developing DKA. In many areas, urine ketone testing is taught, but the evidence is that in younger patients with Type 1 diabetes, patient testing for **blood ketones** is more sensitive and translates into lower DKA admission rates and better outcomes. In UK and European studies, this approach has led to 50%

fewer emergency hospital attendances or admissions, with significant cost savings.<sup>94,95,96</sup> It is essential that patients admitted with DKA are reviewed by the Diabetes Inpatient Team to opportunistically educate the patient on how to avoid a recurrence of DKA and use this opportunity to facilitate follow-up and educate patients on DKA avoidance. Managing insulin effectively during intercurrent ill health ('sick day rules') is a central element of DKA avoidance and there is national guidance on this area with sensible insulin management algorithms.<sup>97</sup>

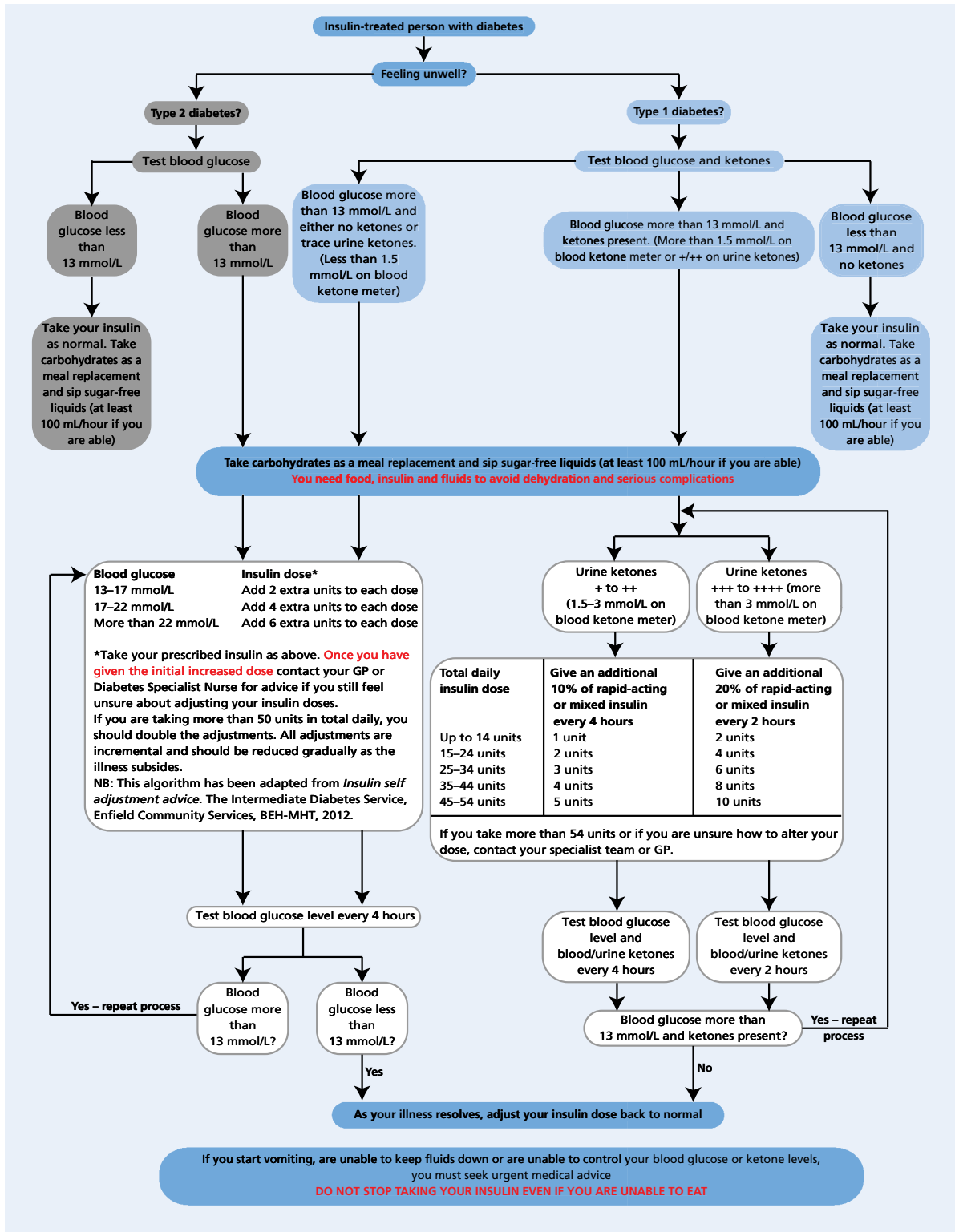
<sup>94</sup> Vanelli M, Chiari G, Capuano C. Cost effectiveness of the direct measurement of 3-beta-hydroxybutyrate in the management of diabetic ketoacidosis in children. *Diabetes Care* 3 A.D. Mar;26(3):959.

<sup>95</sup> Laffel L M B, Wentzell K, Loughlin C, Tovar A, Moltz K, Brink S. Sick day management using blood 3-hydroxybutyrate (3-OHB) compared with urine ketone monitoring reduces hospital visits in young people with T1 DM. A randomized clinical trial. *Diabetic Medicine* 2006;23:278-84

<sup>96</sup> Kysh et al 2007; NHS Cornwall. [www.abbottdiabetescare.co.uk](http://www.abbottdiabetescare.co.uk)

<sup>97</sup> [www.trend-uk.org](http://www.trend-uk.org); Managing intercurrent illness in the community.

Figure 5. Managing diabetes during intercurrent illness in the community (2013) – advice for people with Type 1 or Type 2 diabetes for managing their insulin during illness. The TREND consensus guidelines (www.trend-uk.org)



### 7.8 Access to specialist advice by phone

Telephone help-lines provided by diabetes specialist teams for patients with diabetes are associated with reduced DKA admission rates.<sup>98,99</sup> A toll-free telephone helpline, with a physician available 24 hours a day, was introduced in Parma, Italy.<sup>100</sup> The helpline received 9,125 calls over 5 years, and patients were encouraged to call during sick-days instead of attending hospital. A large proportion of calls (6,935 of 9,125 calls) were not 'emergency' calls, and related to issues such as prevention of hypoglycaemia (36%) but of those who called in with concerns about emergency situations, none were later admitted to hospital. Similar data exist for the UK, and may be cost effective. Evans et al<sup>101</sup> reviewed all 3,459 patient initiated advice phone calls to Diabetes Specialist Nurses in one large UK University Hospital in one year. Of these, 103 (1.8%) were from patients with 'sick day' problems and ketonuria who were managed successfully as outpatients, and 304 (5.3%) with acute severe hypoglycaemia who received telephone advice.

**7.9 Out of hours (OOH) advice** Many telephone help lines provided by specialist teams are not available out of hours (OOH). In Scotland an audit of out of hours emergency advice (for adult diabetes patients 2009)<sup>102</sup> revealed that most centres had no dedicated OOH support and advised their patients to call NHS 24 (NHS Direct). Almost all (96%) of the adult centres voiced concern that the advice given OOH was inadequate. The paediatric centres by contrast all had OOH help lines which in the majority of cases are staffed by a paediatrician on call usually the paediatric registrar.

### 7.10 Vulnerable groups

**Prisoners** A close working partnership between the prison health care team and local diabetes service is essential. Access to blood ketone testing will identify those who require transport to hospital, as opposed to those who can be managed in the prison under close supervision with additional quick-acting insulin using available 'sick-day rules'.

### Housebound and Care Home residents

Community diabetes teams including primary care services should be alert to the special vulnerabilities often present in frail older patients with diabetes including those living in residential and nursing homes. Educational strategies implemented by these teams should involve families and carers (including HCA staff in care homes). Creating a practice based or CCG register of older people with diabetes at increased risk of hospitalisation is important and should include those aged 80 years and over, residents of care homes, those with recent hospital admission, with recent disabling stroke, significant frailty and increasing cognitive impairment.

**Mental health problems** Providing education to local mental health teams about the complications associated with diabetes and the risks of DKA in patients with Type 1 diabetes will help to raise awareness of the condition. Contact numbers for the diabetes specialist team, and written materials to guide mental health teams caring for patients with diabetes should be routine practice, and in particular the signs that should alert the patient or their carers to seek an urgent assessment.

**Eating disorders** Referral for psychological assessment and treatment should be offered if appropriate, and referral to Diabetics With Eating Disorders may be the first step in helping the patient to accept that a problem exists (<http://www.diabeticswitheatingdisorders.org.uk>). One of the most important factors associated with ketoacidosis is insulin omission. This occurs more commonly in women than men. In one study from the USA, 31% of women aged 13-60 years admitted to intentional insulin omission, and 8.8% reported frequent omission. There were only two variables that predicted omission of insulin: diabetes-specific distress and fear of improved glycaemic control leading to weight gain.<sup>103</sup>

<sup>98</sup> Farrell K, Holmes-Walker DJ. Mobile phone support is associated with reduced ketoacidosis in young adults *Diabet Med.* 2011; 28; 1001-4.

<sup>99</sup> Wolfsdorf J et al Diabetic Ketoacidosis in Infants, Children and Adolescents *Diabetes Care* 2006; 29:1150-1159.

<sup>100</sup> Chiari G, Ghidini B, Vanelli M. Effectiveness of a toll-free telephone hotline for children and adolescents with type 1 diabetes. A 5-year study *Acta Biomed.* 2003;74 Suppl 1:45-8.

<sup>101</sup> Evans NR et al Diabetes specialist nurse telemedicine: admissions avoidance, costs and casemix *European Diabetes Nursing* Volume 9, Issue 1, pages 17-21, March 2012

<sup>102</sup> Diabetes Action Plan 2010: Quality Care for Diabetes in Scotland [www.diabetesinscotland.org.uk/Publications/DAP2010.pdf](http://www.diabetesinscotland.org.uk/Publications/DAP2010.pdf)

<sup>103</sup> Polonsky WH et al Insulin omission in women with IDDM *Diabetes Care.* 1994 Oct;17(10):1178-85

## Severe acute hypoglycaemia

**7.11** The central role of Ambulance crew and Trusts in managing severe acute hypoglycaemia is now recognised, and ascertainment of local hypoglycaemia call out rates to Ambulance crews, and examining the local management pathway and patient education should be central to addressing this issue.

**7.12** Severe acute hypoglycaemia attendance is one of 5 National Clinical Performance Indicators for Ambulance Trusts, with substantial routine data collection available for commissioners and care planners in 2012, with pilot indicators for onward referral to a health care professional and new care bundles.

**7.13** Hypoglycaemia remains the commonest diabetes specific contact with Ambulance crew and in A&E; and many Ambulance Trusts have 'see and treat' protocols which mean that patients are treated by crew, and not transported onwards to A&E or admitted. UK studies have shown that there is a wide range of treatments used for severe acute hypoglycaemia, and wide variability in the way 'see and treat' policies are applied, and how commonly patients are transported to A&E. See and Treat policies for hypoglycaemia are not applied in all areas in the UK, although they do appear to be safe, with only 2 – 7% call - outs having a further episode in 48 hours. There is also no consensus on the duration of observation or inpatient stay needed for patients with severe hypoglycaemia.<sup>104,105</sup>

**7.14** Data from Tayside suggests a severe hypoglycaemia rate requiring clinical management of 11.5 and 11.8 events per 100 patient-years for Type 1 and Type 2 diabetes patients treated with insulin, with one third treated solely by ambulance crew.<sup>106</sup>

There is a significant variability between areas in 999 call outs for hypoglycaemia, and many calls are made by people who are frequent callers. In West Yorkshire, 39% of ambulance call out patients had made a similar call in the previous 6 months, while 51.5% of 169 emergency hypoglycaemia call outs to ambulance staff in the EAAT had made at least one other call in the previous 12 months, and 4% had made > 5 calls in the previous year. In the EAAT analysis of 168 patients hypoglycaemia call outs (2005),<sup>107</sup> many did not know how to use glucagon injections to treat hypoglycaemia (66.2%), did not have good warning signs of hypoglycaemia (43.6%), and reported that they had not had a specific education session with a Doctor or Nurse about hypoglycaemia and how to avoid it in the previous year (54.9%), or indeed at any time (34.8%).

**7.15** There are recent UK data that allow a rough estimate of costs associated with severe hypoglycaemia attended by Ambulance crew. An upper cost for 'see and treat' episodes is £92, and for a patient carried on to A&E the cost is estimated at £314.<sup>108,109</sup> In addition, health economic modelling for days off work and lost productivity following hypoglycaemia has been estimated at £60 per episode.<sup>110</sup> On the assumption that 40% of these subjects are transported to A&E departments, this suggests direct and indirect costs of severe acute hypoglycaemia attended by Ambulance crew of £240,800 per 1000 ambulance attendances.

**7.16** Much of this cost is generated by people who are frequent callers of ambulance services – improved educational support and pathways linking Ambulance Trust callers with enhanced education and understanding of hypoglycaemia avoidance would translate into lower call out rates and significant savings.

<sup>104</sup> A.J. Farmer et al Incidence and costs of severe hypoglycaemia requiring attendance by the emergency medical services in South Central England. *Diabetic Medicine*. 2012; 29 (11): 1447–1450

<sup>105</sup> Walker A et al Evaluation of a diabetes referral pathway for the management of hypoglycaemia following emergency contact with the ambulance service to a diabetes specialist nurse team *Emerg Med J*. 2006 Jun;23 (6):449-51

<sup>106</sup> Leese G et al Frequency of severe hypoglycemia requiring emergency treatment in type 1 and type 2 diabetes: a population-based study of health service resource use *Diabetes Care*. 2003 Apr;26 (4):1176-80.

<sup>107</sup> EAAT Audit 2005 Mortley et al; National Diabetes Support Team <http://www.bipsolutions.com/docstore/pdf/16198.pdf>

<sup>108</sup> A.J. Farmer et al. Incidence and costs of severe hypoglycaemia requiring attendance by the emergency medical services in South Central England *Diabetic Medicine* 2012; 29 (11):1447–1450

<sup>109</sup> Khunti K et al. Severe hypoglycaemia requiring emergency medical assistance by ambulance services in the East Midlands: a retrospective study *Primary Care Diabetes* 2013; (7(2) 159-65

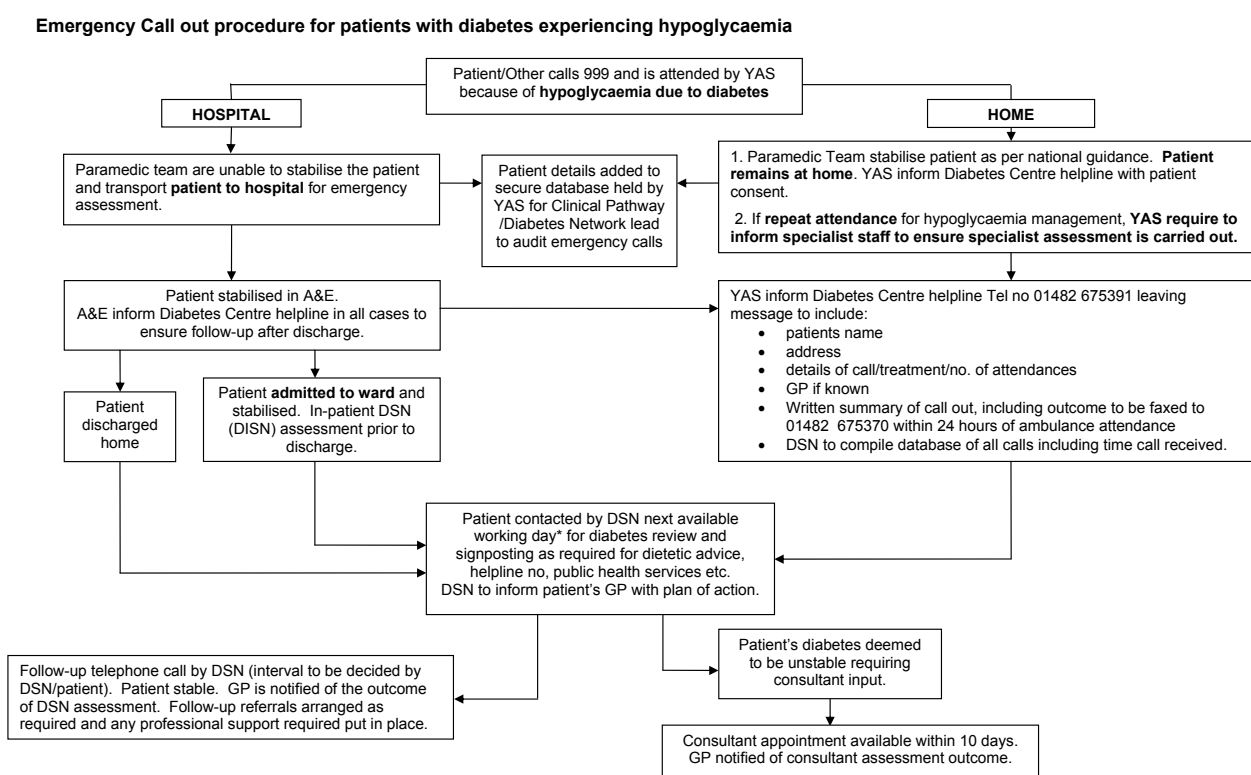
<sup>110</sup> Brod M et al Nonsevere nocturnal hypoglycemic events: experience and impacts on patient functioning and well-being *Journal of Medical Economics* 2012; 15(1) 77-86



**7.17** Many people with diabetes are increasingly concerned about DVLA guidance on restrictions and the loss of licence with recurrent hypoglycaemia and may be reluctant to report hypoglycaemia to their normal clinical team, or to have this reported by ambulance crew. There are now effective pathways linking Ambulance attendance and clinical teams (see **Figure 6**), and other pathways have addressed consent and confidentiality issues by requiring patients to **opt out** within 24 hours of their clinical staff being informed of a severe hypoglycaemic episode.<sup>111</sup>

**7.18 Structured education** for Type 1 diabetes patients provides information on the detection and management of hypoglycaemia and translates into lower hypoglycaemia rates.<sup>112</sup> Structured education in Type 2 diabetes has not been demonstrated to reduce admissions but nevertheless is important in empowering the person with diabetes to better understand their condition and medication, and may be especially important for carers who may be managing tablets and insulin on behalf of the person with diabetes. In addition to structured education, there is also an online resource available to support people with Type 2 diabetes.<sup>113</sup>

**Figure 6. Hull Diabetes Network : Out of Hospital Hypoglycaemia Care Pathway, developed in conjunction with the Yorkshire Ambulance Service (YAS).**



\*72hrs. in event of bank holiday

<sup>111</sup> James, J et al Practical Diabetes Innovative hypoglycaemia care pathway for admissions avoidance: a partnership with a local ambulance trust May 2013; 30 (4): 151-153

<sup>112</sup> Keen AJ et al Dose adjustment for normal eating (DAFNE) in routine clinical practice: who benefits? Diabet Med. May 2012; 29 (5):670-6

<sup>113</sup> <http://www.type2diabetesandme.co.uk/Int/Login.aspx?ts=635099248425348750>.

## Diabetic foot admissions

**7.19** In 2009/2010 there were 116,884 admissions for inpatient care for diabetic foot problems in England, leading to 1,222,200 bed days. This is equivalent to 17.6 admissions per 1000 people with diabetes, or 184.1 occupied bed days per 1000 people with diabetes. There is substantial variability in admissions rates in the UK geographically, with benchmarking data available through the National Diabetes Information Service.<sup>114</sup>

**7.20** Standards for the delivery of high quality foot care were defined by the National Institute for Clinical Excellence in 2004 (CG 10) and in 'Putting Feet First'<sup>115</sup> which defined the standards of care that should be available to all people admitted to hospital with diabetes. There are also more recent NICE and other guidelines in this area.<sup>116,117</sup>

**7.21** Commissioning guidance on diabetes foot care services is also available,<sup>118</sup> which allows estimates of commissioned activity needed for a given UK population. For an average practice with a list size of 10,000, the average number of people with diagnosed diabetes would be 370 (3.7% of the population), of which 13 (3.5% of 370) may require emergency foot care, and 135 (36.5% of 370) may require foot care. This suggests about 0.37% of the population as a whole are likely to be at high risk of diabetes foot ulceration, and 0.13% of the population as a whole are likely to require emergency foot care.

**7.22** To achieve the clinical standards outlined in NICE CG 10, there needs to be a significant cohort of appropriately skilled healthcare professionals. This will become increasingly apparent as the QOF for primary care changes from a process-driven to an outcome-oriented function.<sup>119</sup>

**7.23** The changes in the QOF for diabetes foot care will have a significant impact on the workload of those performing expert assessments. Rationalising current service provision and commissioning of local pathways and resources to be able to deliver expert foot assessments will be needed to ensure that primary care providers fulfil the new QOF targets. The National Minimum Skills Framework 2011 sets out the competencies and components of the teams necessary to co-ordinate diabetes foot services. These teams should include the hospital-based Foot Multidisciplinary team (MDT) whose primary purpose is to manage established disease, and a Foot Protection Team (FPT), often with a primary care responsibility. The MDT and FPT will need to work closely together bridging the gap between primary and secondary care.

**7.24** Commissioning of local pathways to deliver expert foot assessments will be needed to ensure that primary care providers fulfil the new QOF targets in England and the foot screening triage stratification in Scotland.<sup>120</sup>

**7.25** Many UK health planners recognise the importance of this area and have developed regional or national programmes to reduce diabetes foot admissions.<sup>121</sup> Many of these have common themes, and the following points stress service models and interventions shown to reduce foot ulcer admissions and/or amputations.

**7.26 A Foot MDT** needs to be able to provide interventional podiatry supported by microbiology, radiology (X-ray/CT/MRI), diabetes specialist nurses, dietitians, doctors, vascular surgeons and orthotists which allows specialist and complex treatments including total contact casting and negative pressure management.<sup>122</sup> The foot MDT should be a highly specialised integrated service with links to

<sup>114</sup> <http://www.yhpho.org.uk/resource/view.aspx?RID=102082>

<sup>115</sup> [http://www.diabetes.nhs.uk/areas\\_of\\_care/footcare/](http://www.diabetes.nhs.uk/areas_of_care/footcare/)

<sup>116</sup> <http://www.nice.org.uk/cg119>

<sup>117</sup> <http://www.sign.ac.uk/pdf/sign116.pdf>

<sup>118</sup> <http://www.nice.org.uk/usingguidance/commissioningguides/footcare/footcareservicediabetes.jsp>

<sup>119</sup> Jeffcoate William. NICE, National Minimum Skills Framework and QOF 2011: is the quality of care of the foot in diabetes about to be changed utterly? *Pract Diab* 2011;28(6):247-8

<sup>120</sup> <http://www.diabetesinscotland.org.uk/Groups.aspx?catId=C4>

<sup>121</sup> [http://connect.qualityincare.org/diabetes/Admissions\\_Avoidance\\_andor\\_Safe\\_Discharge\\_Initiative/case\\_studies](http://connect.qualityincare.org/diabetes/Admissions_Avoidance_andor_Safe_Discharge_Initiative/case_studies)

<sup>122</sup> Noble-Bell G, Forbes A. A systematic review of the effectiveness of negative pressure wound therapy in the management of diabetes foot ulcers. *Int Wound J* 2008;5(2):233-42.

community podiatry (or FPT) and primary care to which it provides guidance and education. The presence of a Foot MDT reduces the risk of ulcers progressing to amputation, accelerates wound healing, offers specialist foot protection measures for those at highest risk, and allows access to orthopaedic and vascular surgery expertise.<sup>123,124,125,126,127</sup> The presence of a **foot MDT and well defined foot care pathways** are associated with a long term fall in amputation rates.

**7.27 Risk stratification and triage** The QOF now follows the NICE Clinical Guideline for ‘Type 2 diabetes: the prevention and management of foot problems’ which advises that foot risk be stratified as either low current risk (normal sensation, palpable pulses), increased risk (neuropathy or absent foot pulses or other risk factor), high

current risk (neuropathy or absent foot pulses with skin changes or deformity or previous ulceration) or ulcerated foot. In Scotland, the SCI-DC network has similarly produced a foot risk stratification tool based on a traffic light system to indicate risk (low, moderate, high), alongside triage recommendations when assessing diabetic feet.

**7.28 Antibiotic protocols** The use of intramuscular antibiotics for the treatment of ‘borderline’ infected diabetic foot ulceration (rather than inpatient intravenous antibiotics), is an effective admission avoidance strategy. Intramuscular Ceftriaxone 1g once daily, oral Ciprofloxacin 500mg twice daily and Metronidazole 400mg eight hourly in an outpatient specialist foot clinic prevented 14 of 23 (61%) of these patients being admitted over 22 months.<sup>128</sup>

**Intramuscular antibiotic protocol for managing patients with diabetic foot ulceration ‘borderline’ for foot admission, that prevents admission and allows home management**

FIRST CHOICE		PENICILLIN ALLERGY		DURATION
PARTIAL OR FULL THICKNESS	EXTENDING TO UNDERLYING SOFT TISSUE/BONE	PARTIAL OR FULL THICKNESS	EXTENDING TO UNDERLYING SOFT TISSUE/BONE	
Ceftriaxone 1-2g od IM in 3.5 ml of 1% lidocaine Ciprofloxacin 500mg bd PO Metronidazole 400mg tds PO  If MRSA positive use Teicoplanin in place of Ceftriaxone		Ceftriaxone 1-2g od IM in 3.5ml of 1% lidocaine Ciprofloxacin 500mg bd PO Metronidazole 400mg tds PO  In true penicillin allergy or if MRSA positive use Teicoplanin 400mg od IM Ciprofloxacin 500mg bd PO Metronidazole 400mg tds PO		2-4 WEEKS

<sup>123</sup> Faglia E, Aldeghi A, Calia P, Quarantiello A, Barbano P, uttini M, et al. Change in major amputation rate in a center dedicated to diabetic foot care during the 1980s: prognostic determinants for major amputation. J Diabetes Complications 1998;12(2):96-102

<sup>124</sup> Albrektsen et al. Minor amputations on the feet after revascularization for gangrene. A consecutive series of 95 limbs. Acta Orthop Scand 1997;68(3):291-3.

<sup>125</sup> Apelqvist J, Ragnarson-Tennvall G, Larsson J, Persson U. Long-term costs for foot ulcers in diabetic patients in a multidisciplinary setting. Foot Ankle Int 1995;16(7):388-94.

<sup>126</sup> Frykberg RG, Zgonis T, Armstrong DG, Driver VR, Giurini JM, Kravitz SR, et al. Diabetic foot disorders. A clinical practice guideline (2006 revision). J Foot Ankle Surg 2006 Sep;45(5 (Suppl)):S1-S66.

<sup>127</sup> Canavan RJ, Unwin NC, Kelly WF, Connolly VM. Diabetes- and nondiabetes-related lower extremity amputation incidence before and after the introduction of better organized diabetes foot care: continuous longitudinal monitoring using a standard method. Diabetes Care 2008;31(3):459-63.

<sup>128</sup> [http://connect.qualityincare.org/diabetes/Admissions\\_Avoidance\\_andor\\_Safe\\_Discharge\\_Initiative/case\\_studies/an\\_analysis\\_of\\_the\\_impact\\_of\\_intramuscular\\_antibiotics\\_for\\_the\\_treatment\\_of\\_severe-borderline\\_foot\\_infections\\_in\\_diabetes\\_an\\_admission\\_avoidance\\_strategy](http://connect.qualityincare.org/diabetes/Admissions_Avoidance_andor_Safe_Discharge_Initiative/case_studies/an_analysis_of_the_impact_of_intramuscular_antibiotics_for_the_treatment_of_severe-borderline_foot_infections_in_diabetes_an_admission_avoidance_strategy)

**7.29 Patient education** Patient education programmes may have a positive impact on outcomes relating to ulceration and amputation due to diabetes. A prospective randomised study of 2 patient groups with diabetes showed that the ulceration and amputation rate was 3 times higher in the group not receiving education on prevention of foot complications.<sup>129</sup>

**7.30 In hospital foot care and readmissions rates** NICE CG 119 'Inpatient management of the diabetic foot' highlighted the importance of rapid early assessment on arrival to the ED/AAU. All hospitals should have procedures in place to ensure that all patients admitted with diabetes are assessed for the risk of new onset foot disease.

### **What foot care service should be commissioned: best practice to reduce ulceration, admission and amputation (based on NICE CG10, CG 119 and SIGN 116)**

- **Access to a Multidisciplinary foot team (MDT)** which should consist of a diabetologist, a vascular surgeon and orthopaedic surgeon, a diabetes nurse specialist, a specialist podiatrist, tissue viability expertise, and with access to radiology and microbiology expertise.
- **Access to Intensive patient education for high risk groups.** Serious lesions and amputations may be reduced by intensive personalised education for high risk groups.
- **Access to a service that provides preventative footwear and orthoses.**
- **Access to an MDT service that provides specialist techniques such as total contact casting** which improves ulcer healing time and amputation risk.
- **Access to an MDT service that has clear antibiotic protocols** that can be delivered without admission.
- **Access to an MDT service that can offer specialist negative pressure wound therapy** which significantly enhances ulcer healing and lowers amputation rates in patients with diabetes and foot ulcers.
- **Access to an MDT familiar with the investigation and management of patients with Charcot foot.**
- **Access to a service with a diabetes inpatient podiatrist service for inpatients** admitted with foot ulceration or high risk feet.
- **Access to a MDT or FPT service that offers innovative methods of patient education.**
- **Access to a MDT or FPT service that has agreed clinical guidelines** for the identification and immediate management of diabetic foot ulceration.
- **Access to a MDT or FPT service that has a demonstrable competency and training programme** for non-specialist community podiatrists.

<sup>129</sup> Malone JM, Snyder M, Anderson G, Bernhard VM, Holloway GA Jr, Bunt TJ. Prevention of amputation by diabetic education. Am J Surg 1989;158(6):520-4.

# 8. Commissioning care to reduce hospital bed occupancy

**8.1** The 'Equity and Excellence: Liberating the NHS Health White Paper' has led to a major reorganisation of the NHS in England and places most of the budget in the hands of clinical commissioning groups (CCGs).<sup>130</sup> One of the concerns highlighted by this change is the potential for lack of commissioning knowledge and expertise surrounding diabetes care and the importance of a whole systems approach.

**8.2** Health and Wellbeing Boards will drive the strategic intent around commissioning and it will require CCGs to 'make or buy' services for local populations based on a robust assessment of population need.<sup>131</sup> It is essential for Diabetes Networks and CCGs to establish effective links with each other and with Health and Wellbeing Boards to influence the strategic direction of diabetes services. Building relationships and establishing service improvement partnerships between primary and secondary care, and other health and social care providers, to develop local care pathways is an important element of inclusive commissioning. The role of diabetes clinical networks is outlined in recent commissioning guidance.<sup>132</sup>

**8.3** CCGs need to be aware that patient experience-led commissioning may be more successful than one driven by biometric outcomes alone.<sup>133</sup> Improving patient choice, patient control and better information is central to many of the proposals put forward by the coalition. 'Liberating the NHS' emphasises the need to design services around the needs of individuals and their involvement in decision-making is formalised through local Health Watch organisations. Health Watch organisations will act as local champions across health and social care and provide feedback on services to the Health and Wellbeing boards.

**8.4** The NHS Outcomes Framework aims to provide a national overview of how well the NHS is performing and to provide an accountability mechanism between the Secretary of State for Health and national NHS Commissioning Board. In turn the NHS Commissioning Board will develop a new Commissioning Outcomes Framework to which CCGs will be accountable. The NHS Outcomes Framework, together with the Adult Social Care Outcomes Framework and forthcoming Public Health Outcomes Framework, aim to support service integration.

## The 5 domains of the NHS Outcomes Framework

<b>Domain 1</b>	Preventing people from dying prematurely
<b>Domain 2</b>	Enhancing quality of life for people with long-term conditions
<b>Domain 3</b>	Helping people to recover from episodes of ill health or following injury
<b>Domain 4</b>	Ensuring that people have a positive experience of care
<b>Domain 5</b>	Treating and caring for people in a safe environment and protecting them from avoidable harm

<sup>130</sup> Department of Health. Equity and Excellence: Liberating the NHS. Crown; 2010 Jul 12.

<sup>131</sup> NHS Diabetes. Commissioning Diabetes Without Walls. 2009.

<sup>132</sup> [www.diabetes.org.uk/Documents/Reports/implementing-local-diabetes-networks-0113.pdf](http://www.diabetes.org.uk/Documents/Reports/implementing-local-diabetes-networks-0113.pdf)

<sup>133</sup> Silow-Carroll S, Edwards J N, Lashbrook A. Reducing Hospital Readmissions: Lessons from Top-Performing Hospitals. The Commonwealth Fund; Apr 2011.

**8.5** Integrated systems show a significant reduction in admissions (e.g. Kaiser Permanente) by considering an individual's risk of

readmission.<sup>134</sup> Top-performing hospitals in the USA with the lowest readmission rates are characterised by the following:

- 1. Investment in quality and focus on quality measures (savings are realised as by-products)**
- 2. Use of Health Information Technology to improve quality and integrate care**
- 3. Care management and discharge planning start early, target high-risk patients and ensure frequent communication across care teams**
- 4. Education of patients and their carers in managing their condition(s) in a way they can understand**
- 5. Maintain a 'lifeline' with patients after discharge using telemonitoring/telephone contact**
- 6. Align hospitals' efforts with community providers to create a continuum of care**

In other words, interventions to reduce readmissions should target both inpatient care (through efforts to **improve the quality and safety of care by utilising diabetes inpatient teams**<sup>135</sup>), and the transition to outpatient care (through efforts to ensure continuity and coordination between providers and timely access to needed follow-up services). The Local Basket of Inequalities Indicators (LBOI) is a collection of 70 indicators which can help organisations to measure health and other factors

(such as unemployment, poverty, crime and education) which influence health inequalities when assessing population needs.<sup>136</sup>

**8.6 Clinical teams and commissioners should map any initiatives for diabetes admissions against these domains which will become the familiar language of commissioning over the next few years.**

<sup>134</sup> Silow-Carroll S, Edwards J N, Lashbrook A. Reducing Hospital Readmissions: Lessons from Top-Performing Hospitals. The Commonwealth Fund; 2011 Apr

<sup>135</sup> Kerr M, Insight Health Economics, NHS Diabetes. Inpatient Care for People with Diabetes: The Economic Case for Change. 2011 Nov. [www.diabetes.org.uk](http://www.diabetes.org.uk)

<sup>136</sup> <https://indicators.ic.nhs.uk/webview/>

# 9 A national Out of Hours (OOH) contact service for people with diabetes

## **9.1 There is intense interest at the moment in A&E pressures and out of hours (OOH) care**

**9.2** Many patients with diabetes need advice on high blood glucose levels, ketosis, or hypoglycaemia and this forms a substantial part of the work of many diabetes teams. Access to specialist advice by phone reduces the risk of these problems progressing to emergency call out and/or hospital admission. This service is commonly unavailable in the UK out of hours (OOH), when patients at risk would contact on-call GP services, call NHS24 or 111, attend A&E, or contact untrained junior medical staff in Acute Hospitals.

**9.3** NHS24 set up subspecialist advice lines for dental, pharmacy, and mental health problems, but not for diabetes and a symptom based diagnosis is not safe in diabetes where specialist guidance OOH is needed on the management of blood glucose, insulin handling, eating, and ketone testing during insulin adjustment. Much of this advice would be generic but would need specialist availability OOH.

**9.4 The model of a central contact point for OOH diabetes emergencies locally, regionally, or nationally for adult patients is an attractive one. It is unlikely that all specialist teams in the UK would be able to offer a 24:7 local service in the present financial position, but it is possible that a national or regional OOH advice line in collaboration with industry could work. This model would require:**

- Political will and leverage regionally or nationally
- Support from UK professional organisations and Diabetes UK
- Clear governance and risk management arrangements
- Diabetes specific algorithms for all aspects of acute diabetes care
- Agreed staff training and experience
- Steering group and pilot evaluation
- Communication strategy – links with local diabetes teams
- Communication strategy – patient awareness of service
- Audit of activity and outcomes

The at-a-glance guide summarises the diabetes admission avoidance recommendations. As there are a number of interventions, it will be for CCGs and Acute Trusts, working with their local Diabetes Network, to agree on the priorities for delivering admission avoidance.

PROVIDER		COMMISSIONERS
Integrated Diabetes Care	Primary Care	<ul style="list-style-type: none"> <li>Obtain readily available benchmarking data for diabetes specific admissions- (DKA, hypoglycaemia, foot admissions) using national data, and in collaboration with Ambulance Trust and local diabetes network.</li> <li>Obtain benchmarking data for local day case surgery listing rates in the diabetes population</li> <li>Commission a whole systems review of diabetes admissions in collaboration with primary and secondary care, Ambulance Trusts, industry, and local clinical networks to determine local patterns and triggers for diabetes admissions.<sup>3,7</sup> This should be linked to a strong local data analysis and to information on the key decision points in GP surgeries, Ambulance Trusts, out of hours contacts, Emergency Departments, and in pre-operative assessments. This whole systems approach has been used successfully in the UK, in <i>partnership with industry</i> (see 5.3).<sup>1,38</sup> and should include a health economic assessment of diabetes admission rates, and model avoidable diabetes admissions (elective and emergency). The necessary benchmarking data on admissions is commonly available through industry sources.</li> <li>Consider commissioning evidence based and effective models of care that reduce admissions in the diabetes population. These could include :               <ul style="list-style-type: none"> <li>A primary care foot protection team (FPT) with risk stratification</li> <li>A specialist MDT for highest risk diabetic foot problems</li> <li>Improved pathways between Ambulance Trusts and normal providers for severe hypoglycaemia call outs, and single point of contact model</li> <li>An out of hours support line for patients at greatest risk and during sick days</li> <li>A diabetes specialist nurse helpline during working hours for 'sick days'</li> <li>Enhanced diabetes education of HCPs in residential and care homes for the frail elderly with diabetes</li> <li>Commissioning structured education for T1 (and T2 diabetes) and transitional care for adolescent and young adult patients in line with Best Practice Tariff</li> <li>Developing a model in local providers that support day case listing of diabetes patients through better preoperative management, and supports direct specialist presence in the MAU and ED</li> <li>Ensuring transitional and young adult services have access to dedicated clinical psychology services for the highest risk diabetes population</li> <li>Supporting integrated care pathways and the maintenance of clinical diabetes networks as outlined in recent national commissioning guidance</li> </ul> </li> </ul>
	Social Care	<ul style="list-style-type: none"> <li>Provide access to blood ketone testing (Type 1 diabetes) and sick day rules</li> <li>Referral for structured education for Type 1 diabetes patients</li> <li>Identify High Risk foot patients and refer to local Foot Protection Team</li> <li>Refer acute foot problems to Foot Multidisciplinary Team within 24 hours</li> <li>Clinical Commissioning Groups should sustain and engage with local Diabetes Networks</li> <li>Use risk assessment tools to identify patients at high risk of admission/readmission collaborating with specialist and social care providers (e.g. PPAR++ tool)</li> <li>IT integration with primary and secondary care</li> <li>Promotion of healthy foot care practices within care homes</li> <li>Facilitate patient attendance at diabetes-related appointments</li> <li>Participation in staff education programmes with accreditation scheme</li> <li>Identify complex needs and hard-to-reach patients who require diabetes specialist team involvement</li> </ul>
	Vulnerable groups	<ul style="list-style-type: none"> <li>Access to blood ketone testing (T1 DM) and structured education if appropriate</li> <li>Access to referral for psychological support for any person with diabetes where behaviours may be a barrier to good self-care</li> <li>Text/email reminders for clinic appointments in the Young Adult Population</li> <li>Identify complex need patients who may require intensive specialist input</li> <li>Structured Diabetes Care including annual foot assessment and referral to FPT/Foot MDT as appropriate, CVS risk assessment, retinal screening</li> </ul>
	Ambulance Trusts	<ul style="list-style-type: none"> <li>Out of Hospital Hypoglycaemia Care Pathway: joint working with specialist teams and primary care</li> </ul>
	Emergency Department	<ul style="list-style-type: none"> <li>Implement guidelines and protocols for rapid diabetes assessment and treatment</li> <li>Identification of diabetes patients suitable for ambulatory care using proven pathways</li> <li>Refer all patients with active foot disease immediately to the Foot Multidisciplinary Team.</li> <li>Commence all patients with foot infection on antibiotics according to the local hospital antibiotic policy for diabetic foot infection</li> <li>Engagement with MDT diabetes inpatient team to optimise diabetes care planning and discharge from ED when appropriate</li> </ul>
	Elective procedure	<ul style="list-style-type: none"> <li>Increase day surgery rate for diabetes patients to one comparable to non-diabetes patients</li> <li>Diabetes Care Planning supported by the Specialist Diabetes Inpatient Team/DSNs</li> <li>Implement management protocols for fasting diabetes patients pre-operatively</li> <li>All people with diabetes should have a foot examination and those at risk should receive increased attention to foot protection</li> <li>Mandatory staff education on pre and postoperative diabetes management</li> </ul>
	Specialist Care	<ul style="list-style-type: none"> <li>Provide accredited structured patient education programmes</li> <li>Patient support through helplines/drop-in service /OOH service</li> <li>Hypoglycaemia telephone follow-up for ambulance/Emergency Department referrals</li> <li>Diabetes In-Reach to ED/AMU/Wards through a dedicated Diabetes Inpatient Team</li> <li>Diabetes Foot MDT</li> <li>Provide Care Home Diabetes Education Programmes</li> <li>Access to psychological referral</li> <li>Text/mobile reminders for Young Adults</li> <li>Identify lead DSN/Consultant to work with vulnerable groups</li> </ul>





