Many people with persistent sub-optimal diabetes control also have psychological and social problems which interfere with their ability to manage their diabetes. Until these difficulties are addressed, this group of patients struggle to attain optimal glycaemic control.

There are an estimated 28,000 people with diabetes in Lambeth and Southwark, and the Quality and Outcomes Framework data report that 22% have an HbA1c > 9%. The clinical problem is that about a third of people with diabetes (around 8,500) have psychological and/or social problems interfering with their ability to self-manage their diabetes. This leads to poorly controlled blood glucose control, increased risk of diabetes complications, premature mortality, worse quality of life and increased cost to the individual and the NHS.

Our King’s Health Partners research, based in our local community, found that young people with type 1 diabetes are six times more likely to die than their peers, partly attributed to psychological distress during transition into adult diabetes. Research at King’s into patients presenting with their first foot ulcer found that people with type 2 diabetes and depression are two to three times more likely to die over five years compared to those who are not depressed.

Lambeth and Southwark have high levels of socio-economic deprivation. Many of our local patients have social problems such as housing, unemployment, parenting problems, crime and domestic violence, illiteracy, and debt. These difficulties are often prioritised above their diabetes self-management.

The cost to the NHS of depression is estimated at an additional £1.7 billion/year. In the US the health care costs for people with diabetes and depression are double those for diabetes alone and the integrated treatment of depression results in a net economic benefit of $952 (£597) per patient two years later. A Department of Health report modelling treatment of depression in diabetes in the UK concluded that initial investment would result in significant savings.

### Abstract

3DFD (3 Dimensions of Care for Diabetes) is an award winning gold-standard model of integrated care, which was developed and evaluated as a sustainable service for improving glycaemic control and reducing diabetes complications in South London’s multi-ethnic, socio-economically disadvantaged and growing diabetes population. This service is fully integrated into the diabetes services across Lambeth and Southwark boroughs. It consists of a liaison psychiatrist who provides clinical leadership and psychiatric interventions, psychologists and two third-sector social support workers who provide social care in the community, working directly with the diabetes teams across the sectors.

3DFD has completed two consecutive pilot phases during which the components of the service have been refined and effectiveness demonstrated. We found high levels of mental illness and unmet need, and effected improvements in glycaemic control, psychological status and health service use. We have produced outcomes which compare favourably with new antidiabetic medications to the market and to the outcomes of the local intermediate teams.

We believe this provides the best possible model of care for patients with persistent poor diabetes control despite implementing standard pathways.

The full economic evaluation is in progress and preliminary analyses indicate that there will be an annual saving of £33,000, based on the reduction in HbA1c from the first pilot.

### Key words

diabetes mellitus; mental health; social adjustment; psychiatry
What we set out to do

3DFD (3 Dimensions of Care for Diabetes) aims to: (i) improve glycaemic control, (ii) reduce psychological distress, (iii) improve quality of care and patient-reported outcomes, and (iv) reduce short- and long-term health service use costs.

It does this by integrating medical, psychological and social care for patients with persistent suboptimal glycaemic control (HbA1c ≥75mmol/mol (≥29%).

How it works

3DFD is set in the inner-city boroughs of Lambeth and Southwark. The service consists of a liaison psychiatrist, two clinical psychologists (0.5 whole time equivalent in total) and two support workers from ThamesReach, a local third sector social welfare organisation, integrated into the diabetes services across the sector.

Figure 1 illustrates the 3DFD model of care.

The liaison psychiatrist holds clinics at King’s College Hospital and St Thomas’s Hospital diabetes centres. The psychologists hold clinics at King’s College Hospital and all team members hold clinics with the Diabetes Intermediate Care Teams in Lambeth and Southwark. The support workers also see patients in their offices in Stockwell, or sometimes in the patients’ own homes.

Care pathway

The care pathway is embedded in the community and hospital diabetes services. Referrals are accepted from primary care directly or via the community for intensive diabetes management after completing a simple referral form which allows identification of psychological and/or social problems and poor glycaemic control.

The interventions include brief psychological treatments (CBT and family work), optimising psychotropic medication, managing psychiatric risk and social interventions targeting problems such as poor housing, debt management, literacy, occupational rehabilitation.

Once the patient has made progress, 3DFD supports the return of the patient to routine diabetes care.

Treatments

Patients remain under the care of 3DFD during the period of time for which they require the intervention (usually 16 weeks). We aim to provide brief effective interventions across the range of treatments, listed below, in an integrated manner.

Medical. Diabetes medical assessment, treatment plan for medication and education as appropriate.

Psychiatric treatment. Following psychiatric assessment and the establishment of a psychiatric diagnosis, a treatment plan is devised based on the patient’s diagnosis, presenting symptoms and risk, and a letter of assessment is sent to the person’s GP.
and/or referrer outlining the plan, which may include medications, psychological therapies, or further assessment (e.g. cognitive assessment).

The medications include antidepressants (which are also used in the treatment of anxiety disorders), antipsychotics and mood-stabilisers, prescribed in accordance with guidelines.

**Psychological treatments.** The psychological therapies include cognitive behaviour therapy, motivational interviewing and brief psychodynamic therapy, which are offered for a period of four to 16 sessions depending on the presenting difficulties. These range from motivational issues to depression, anxiety, bereavement, family conflict and unhelpful health beliefs. In addition, we address diabetes-specific issues, such as difficulty accepting diabetes diagnosis, needle phobia, fear of insulin, fear of hypoglycaemia (low blood sugars) and eating disorders.

**Social interventions.** The support workers often visit patients at home, or may accompany them to appointments, or to benefit tribunals. If a patient is attending a group activity for socialisation, the support worker might attend with them to increase their confidence, and thus their likelihood of success in this endeavour. The support workers work with patients for a maximum of 16 weeks, and during this time aim to meet the needs identified in the initial assessment. The range of difficulties which these interventions target includes debt, housing, literacy, education, immigration, social isolation and homelessness.

**Evidence and evaluation**

**Clinical findings**

In the first year of the service, 264 people were referred who were at high risk of developing diabetes complications over 12 months (Table 1). The average age was 46 years; the proportion of type 1 to type 2 diabetes was 1:2; the majority of referrals (61%) were of people from ethnic minorities, and had high levels of depression, anxiety and diabetes-related distress. The mean level of HbA1c (a measure of diabetes control) was 95mmol/mol (target is 42–58mmol/mol), which indicates that these patients were at high risk of developing the complications of diabetes.18

The first cohort (n=119) achieved clinically and statistically significant reductions in HbA1c of 14mmol/mol (n=98) over the first year of follow up, and this reduction was also demonstrated in our larger pilot, with reductions of 17mmol/mol. This is a three-fold reduction compared to that of a new diabetes drug brought onto the market. The UKPDS study demonstrated that a reduction of 10mmol/mol results in a reduction in the risk of complications of up to 40%.18

There were significant improvements in lipid control (n=60: mean change in serum cholesterol -0.4mmol/L), and improvements in blood pressure control (n=55: mean change systolic -4mmHg; diastolic -2mmHg), weight control (n=58: mean change in BMI -0.3kg/m²), and significant improvements in depression and anxiety scores. (Table 2).

**Health service usage**

There was a reduction of 45% in emergency department visits in the year after referral, compared with the year prior to 3DFD (Figure 3). There was a reduction of 21.3% in bed-days for acute admissions (381 days/year to 300 days/year). The non-attendance rate fell from 28% to 21%, indicating improved engagement, and there was a reduction in mood and anxiety symptoms and diabetes-related distress.

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**Table 1.** Characteristics of first 264 patients referred to 3DFD – Pilot 2

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean/proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD) age, years</td>
<td>46 (15.3)</td>
</tr>
<tr>
<td>Gender, no. (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>103 (39)</td>
</tr>
<tr>
<td>Female</td>
<td>161 (61)</td>
</tr>
<tr>
<td>Ethnic group, no. (%)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>102 (39)</td>
</tr>
<tr>
<td>African/Caribbean</td>
<td>113 (43)</td>
</tr>
<tr>
<td>Asian</td>
<td>49 (19)</td>
</tr>
<tr>
<td>Postcode deprivation lowest 2 quintiles*, no. (%)</td>
<td>237 (90)</td>
</tr>
<tr>
<td>Type of diabetes, no. (%)</td>
<td></td>
</tr>
<tr>
<td>Type 1</td>
<td>81 (31)</td>
</tr>
<tr>
<td>Type 2</td>
<td>182 (69)</td>
</tr>
<tr>
<td>Mean (SD) HbA1c</td>
<td></td>
</tr>
<tr>
<td>IFCC mmol/mol</td>
<td>95 (20)</td>
</tr>
<tr>
<td>DCCT %</td>
<td>10.9 (1.9)</td>
</tr>
</tbody>
</table>

*Indices of deprivation

**Table 2.** Main outcomes based on a pre- and post-3DFD intervention using paired analyses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-3DFD Mean (SD)</th>
<th>Post-3DFD Mean (SD)</th>
<th>Change score Mean difference (SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot 1: HbA1c (SD) n=98*</td>
<td>11.1 (2.0)</td>
<td>9.7 (1.9)</td>
<td>-1.4 (1.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pilot 2: HbA1c (SD) n=69**</td>
<td>11.5 (1.9)</td>
<td>9.9 (1.8)</td>
<td>-1.6 (1.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes Distress Scale (n=27)**</td>
<td>47.3 (17.10)</td>
<td>36.0 (15.35)</td>
<td>-11.3 (19.1)</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Outcomes Star score (n=27)**</td>
<td>55.9 (11.45)</td>
<td>61.6 (14.87)</td>
<td>+5.7 (9.1)</td>
<td>0.003</td>
</tr>
<tr>
<td>No. of admissions to A&amp;E/previous year (n=119)*</td>
<td>141</td>
<td>77</td>
<td>-64</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No. of bed days in previous year (n=119)</td>
<td>381</td>
<td>300</td>
<td>-81</td>
<td>0.08</td>
</tr>
<tr>
<td>No. of recurrent admissions (days)/previous year (n=119)*</td>
<td>10 (73)</td>
<td>4 (14)</td>
<td>-6 (-59)</td>
<td>0.012</td>
</tr>
</tbody>
</table>

*Pilot 1 over 12 months. **Pilot 2 up to the first 6 months.
Cost savings
Based on pricing of unit costs for one bed day and for each A&E admission, preliminary analysis indicates net savings of £66 000 for the first year of the 3DFD (£33 000 per borough per year). These savings are projected to be cumulative over the years ahead (£132 000 in year 2, £198 000 in year 3 etc). We are awaiting the results of our formal economic evaluation.

Lessons learned
As this was a service innovation, we used the Plan Do See Act (PDSA) cycle to review the service processes to assess whether 3DFD was reaching the complex diabetes group. We observed the following qualitative findings.
- There were high levels of severe unmet need including marked poverty, high debt, profound social isolation, and undiagnosed psychosis in this population, corresponding to levels 2 and 3 of the ‘pyramid of need’ (Figure 4).
- There were high levels of risk to self and others, resulting from both psychological factors such as active suicidal ideation, self-harm or eating disorder, as well as social factors including child protection issues and domestic violence.
- There were high levels of multimorbidities such as rheumatoid arthritis and undiagnosed tuberculosis, and diabetes complications such as painful neuropathy found in this population.
- Considering the high levels of social, economic and educational deprivation, the patient-led case conference was valuable in promoting self-efficacy of diabetes self-care.
- The 3DFD team were able to act as a support structure for subsequently integrating patients into normal diabetes services.

A focus group of 3DFD patients conducted by ThinkPublic identified the ‘high levels of care and reliability’ as being key to its success in engaging patients with their care. In
particular the accessibility of the 3DFD team, and the quality of communication between the team and other professionals involved in their care were noted as being important in the patients’ experience.19

Impact

3DFD effectively integrated social support with diabetes and mental health care, and has received several awards including three Quality in Care Awards in 2012, the BMJ Diabetes Team of the Year Award 2014, and the NHS Innovation Challenge Award in Diabetes 2015, in addition to the Diabetes UK Mary MacKinnon Named Lecture 2015.

In addition to these accolades, 3DFD has been described as an exemplar of best practice by Diabetes UK in the first of their series of case reports, and commissioned to produce a factsheet on mental health in diabetes.20 9DFD has also been cited as an example of integrated care in regional and national policy documents, among others the NHS London Strategic Clinical Networks reports on care pathways for diabetes and primary care mental health.21–26 It has also informed the development of other psychological services in diabetes.27

Declaration of interests

There are no conflicts of interest declared.

References


Key innovations

• Social intervention. Although there is growing recognition of the importance of psychological care in long-term conditions such as diabetes, this is the first service which has integrated social care as well as psychological care into diabetes care for complex individuals in an area of severe socio-economic deprivation and marked health inequalities.
• Integration across 3 sectors – primary care, secondary care and third sector. Unlike traditional liaison psychiatry services, we are not limited to the hospital – 3DFD is integrated with the community diabetes teams and primary care, and with community resources and services via the third sector, allowing the patient access to the full range of treatment, regardless of the site of his/her diabetes care.
• Patient-led management plans. The patient-led case conference was particularly valuable in increasing the patient’s self-esteem and promoting their self-efficacy of diabetes self-care. We found that an intensive case-management approach focusing on adherence and self-efficacy can succeed in engaging patients in treatment.