

# An evidence-based approach to quality improvement in diabetes care

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## Article points

1. The current period of transition in the NHS presents an opportunity for clinical commissioning groups to reconfigure diabetes services to improve the quality of care.
2. The authors evaluate the evidence supporting the quality improvement strategies relevant to the reconfiguration of services.
3. In all cases, a clear collaboration between multidisciplinary diabetes teams is essential for the implementation of quality improvement and to support the needs of people with diabetes.

## Key words

- Primary care
- Quality improvement
- Specialist care

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Diabetes care is now being primarily delivered in primary care and so the current transitional period in the NHS presents an opportunity for clinical commissioning groups to reconfigure diabetes services, drawing on the best available evidence required for the improvement of the quality of care for people with diabetes. This review evaluates the evidence on the quality improvement strategies relevant to the reconfiguration of diabetes services.

Diabetes has now been recognised as a global epidemic. In 2011, the prevalence of diabetes was estimated to be 366 million worldwide and this is expected to rise to 552 million by 2030 (Whiting et al, 2011). In the same period, the prevalence in the UK was estimated to be 2.9 million (Diabetes UK, 2012). The burden of the disease and its complications are outstripping the capacity of healthcare systems to respond worldwide (World Health Organization, 2011). The rising prevalence, coupled with the increasing life expectancy, makes it impossible for secondary care to cope with the demands of diabetes care, which was the case until 20–30 years ago, thus necessitating a left shift to primary care (Khunti and Ganguli, 2000). Braga et al (2010;

2012) and Millett et al (2007) show that there are wide variations of care in the management of cardiovascular risk in diabetes both within the UK and globally, despite the evidence that people with diabetes can achieve good outcomes when various quality improvement strategies concerning the prevention and management of their condition are implemented (American Diabetes Association, 2010). Consequently, innovative evidence-based approaches are needed to increase awareness of the risks, encourage changes in lifestyle, support improved self-management and provide access to integrated diabetes care services.

The Health and Social Care Bill requires clinical commissioning groups (CCGs) to adopt evidence-based practice, and promote research and innovation (Department of Health, 2011).

The lack of a connection between the evidence generated by researchers and the use of this evidence by healthcare providers in the field of diabetes is owing to a complex interplay of factors, ranging from poor coordination between primary and secondary care to difficulties in implementing lifestyle changes in people with diabetes (Kogan, 2009).

### Practical examples of models of diabetes care

The changes occurring in the NHS present an opportunity for clinicians in primary and specialist care to collaborate to bring about improvements in the quality of diabetes care. In recent times, a number of exemplary models have been rolled out in England, demonstrating some early successes, including the “Portsmouth Super Six Model” (Kar, 2011), the “Derby Integrated Diabetes Care Model” (Rea et al, 2011) and the “NHS Westminster Model of Care for Diabetes Services” (London Councils, 2011).

In the Portsmouth Super Six Model, the collaboration between primary and secondary care clinicians has resulted in “ring-fenced” specialist areas in diabetes in secondary care, co-located for expert input from diabetologists and multidisciplinary care teams. The six specialist diabetes areas include antenatal diabetes; renal diabetes (estimated glomerular filtration rate  $<30$  mL/min/1.73 m<sup>2</sup>), diabetic foot care, insulin pumps, type 1 or adolescent diabetes (unstable control), and inpatient diabetes. Hospital diabetes clinics developed historically from the need for the supervision of insulin treatment. Inevitably, they also recruited a large number of people with diabetes where the condition was not managed by insulin, a problem that has been compounded by increases in life expectancy.

The workload has increased over the decades and the specialist’s role in insulin management has now been limited to acutely ill people with diabetes, including individuals with diabetic ketoacidosis, those with acute myocardial infarctions, intensive care patients and those on renal wards who require meticulous insulin management to foster early recovery.

Patients requiring very complex insulin regimens for the control of their condition, such as those needing very large doses and those requiring insulin in combination with glucagon-like peptide-1 analogues, are best treated by a specialist. According to the model, all other diabetes care can be delivered in the primary care setting, with specialists providing educational support and advice for primary care clinicians in the management of complex diabetes.

Contrastingly, in the Derby Integrated Diabetes Care Model, innovative collaboration between primary care and specialists has resulted in the creation of a new NHS organisation providing integrated diabetes care for the local population. The new NHS organisation is jointly and equally owned by an acute hospital trust and local GPs. For the patient in the “hub”, delivery of care revolves around them, with the organisational structure, clinical pathways and financial planning all aligning seamlessly (Rea et al, 2011).

Another established model is the “NHS Westminster Model of Care for Diabetes Services” (London Councils, 2011). In this model, integration of care is fostered by an emphasis on the primary, intermediate and secondary care of type 2 diabetes largely using common locally agreed pathways. The integration also includes social services, giving patients a seamless pathway of care irrespective of their health and social requirements. Through these pathways, patients are triaged to either secondary care or intermediate care and no patients are referred directly to secondary care (level 4) without first going through the community-based specialist diabetes services (level 3). See *Figure 1* for more information.

Building on early reports of the successes in the aforementioned models, further critical evaluation will need to be completed to establish longer-term clinical outcomes.

### Strategies for quality improvement in diabetes care

The “pay-for-performance” initiative, which began in the UK in 2004, is one of the most extensive quality improvement (QI)

### Page points

1. In the “Portsmouth Super Six Model”, the collaboration between primary and secondary care clinicians has resulted in “ring-fenced” specialist areas in diabetes in secondary care, co-located for expert input from diabetologists and multidisciplinary care teams.
2. In the “Derby Integrated Diabetes Care Model”, a new NHS organisation has been created, providing integrated diabetes care, in which the patient is in the “hub”, with the organisational structure, clinical pathways and financial planning all aligning seamlessly.
3. The “NHS Westminster Model of Care for Diabetes Services” involves the integration of primary, intermediate and secondary care using common locally agreed pathways.

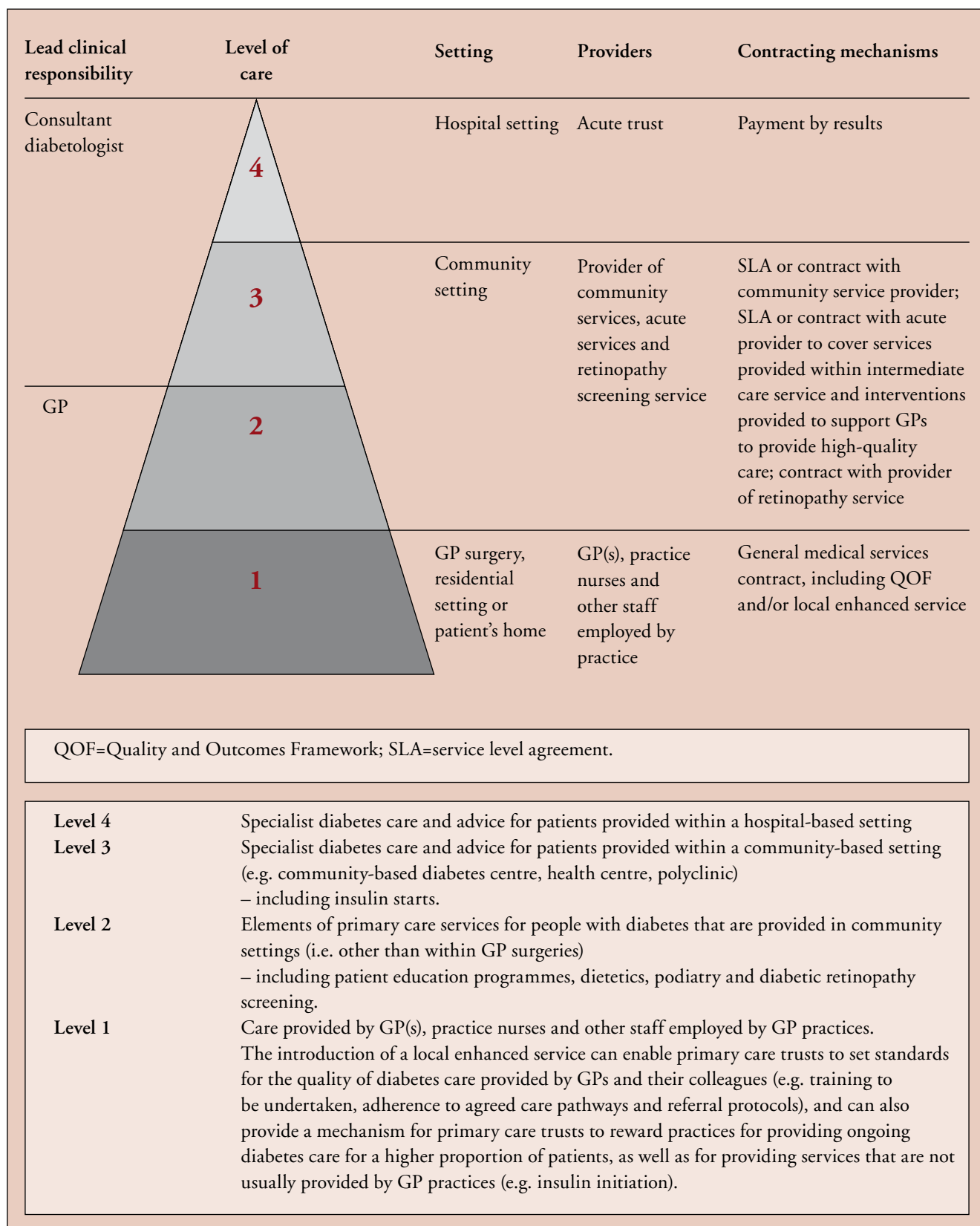


Figure 1. Westminster diabetes service model.

strategies. However, though it has yielded some clear improvements in the care of people with diabetes, it has not succeeded in significantly reducing the variation in diabetes care (Millett et al, 2007; 2009). Furthermore, Doran et al (2011) suggest that the beneficial effects of incentivised measurements and prescribing seem to have hit a plateau across the populations. Thus, a more wide-ranging set of initiatives and strategies may be required to improve outcomes and specifically address the needs of certain sections of the UK population.

The choice of QI strategy in diabetes care depends on the pre-defined desired outcomes. A systematic review focusing on glycaemic control over a median follow-up of 13 months showed a reduction in HbA<sub>1c</sub> of 4.6 mmol/mol (0.42%; 95% confidence interval, 3.2–5.9 mmol/mol [0.29–0.54%]) when QI strategies were employed. This review identified team changes and case management as the only two strategies to significantly reduce HbA<sub>1c</sub> if combined with other strategies; both strategies were associated with improvements in HbA<sub>1c</sub> of at least 5.5 mmol/mol (0.5%; Shojania et al, 2006).

A more recent systematic review assessed the role of QI strategies more broadly across the clinical spectrum of diabetes care, from glycaemic control to vascular risk management, microvascular complications and smoking cessation. Eleven QI strategies were identified. Various strategies targeting teams, healthcare providers and people with diabetes achieved varying outcomes (Tricco et al, 2012). *Table 1* summarises the various QI strategies, their target population and the outcomes they are likely to achieve. Over a year median follow-up period, QI strategies were shown to improve screening for diabetic retinopathy, as well as kidney and foot care; however, smoking cessation was not improved. For individuals with poor baseline markers, QI strategies were associated with greater reductions in HbA<sub>1c</sub>, systolic and diastolic blood pressures and low-density lipoprotein (LDL-c) cholesterol levels. The following quality indicators appeared to have a marked effect on glycaemic control and vascular risk management:

- Team changes.
- Case management.

- Patient education.
- Facilitated relay of information (clinical information collected from patients and transmitted to clinicians by means other than the existing medical records, such as structured diaries for patients to record self-monitored glucose values).
- Promotion of self-management.

#### **Team changes, promotion of self-management and patient education**

These QI strategies can all be adequately delivered within the community setting. Some methods may include the reconfiguration of services and processes delivered to people with diabetes. These could involve optimising the role of the diabetes specialist nurse (DSN) in most QI and diabetes reconfiguration strategies. DSNs work primarily with people with diabetes, helping them control, understand and manage their condition, and helping physicians provide the appropriate care. The role of the DSN is to educate and support people living with diabetes, and their families, at all stages in their lives (Castledine, 1989). This education and support can also be of benefit to other healthcare professionals, such as practice nurses.

The role, first introduced over 60 years ago, became more established in the 1980s with the advent of differing strengths of insulin and the introduction of the self-monitoring of blood glucose (Davies et al, 2001). The management of diabetes includes activities such as medication optimisation, the monitoring of blood glucose control and insulin requirements, and the treatment of diabetes complications. DSNs currently play a vital role in insulin initiation, regimen changes and intensification. Moreover, it appears to cost less for a patient with a routine diabetes problem needing a routine check-up to see a nurse practitioner or specialist nurse. In order to evaluate the effectiveness and cost implications of a hospital diabetes specialist nursing service, Davies et al (2001) conducted a prospective, open, randomised, controlled trial of standard inpatient care for adults with diabetes, with and without the intervention of a DSN service.

*“The role of the diabetes specialist nurse is to educate and support people living with diabetes, and their families, at all stages in their lives. This education and support can also be of benefit to other healthcare professionals.”*

**Table 1. Elements of quality improvement strategies associated with improvements in diabetes outcomes.**

Quality improvement strategy	Target population	Likely clinical outcome
Team changes	Health systems	HbA <sub>1c</sub> improvement of 0.5%* or over LDL-c reduction Reduction in SBP Reduction in DBP
Case management	Health systems	HbA <sub>1c</sub> improvement of 0.5%* or over LDL-c reduction Reduction in SBP Reduction in DBP
Electronic patient registry	Health systems	Reduction in SBP
Facilitated relay of information	Health systems	HbA <sub>1c</sub> improvement of 0.5%* or over LDL-c reduction Reduction in SBP
Continuous quality improvement	Health systems	No significant outcome measures
Audit and feedback	Healthcare providers	Reduction in SBP
Clinician education	Healthcare providers	Reduction in DBP
Clinician reminders	Healthcare providers	LDL-c reduction
Education of patients	Patients	HbA <sub>1c</sub> improvement of 0.5%* or over LDL-c reduction Reduction in SBP Reduction in DBP
Promotion of self-management	Patients	HbA <sub>1c</sub> improvement of 0.5%* or over LDL-c reduction Reduction in SBP Reduction in DBP
Reminder systems	Patients	Reduction in SBP

\*5.5 mmol/mol. DBP=diastolic blood pressure; LDL-c=low-density lipoprotein-cholesterol; SBP=systolic blood pressure.

It was concluded that DSNs are potentially cost-saving by reducing the length of stay in the hospital, for which there was no adverse effect on the number of re-admissions, use of community resources or patient perception of quality of care.

Another crucial role played by DSNs in reconfiguration strategies is the provision of telephone helpline support for patients undergoing insulin treatment. Many of these helplines are operational 24 hours per day, offering advice on:

- Devices.
- Insulin regimen changes.
- Travel.
- Sickness.

- Fasting and feasting.
- Exercise.
- Diet.

While simple regimens are recommended for the initiation of insulin therapy in primary care in people with type 2 diabetes, it is important to note that most patients on insulin will, in time, require intensification (Liebl et al, 2009). Once the regimens start to become complex, the associated side-effects and confusion on what type of insulin to give and when to give it will serve as a barrier for most generalists without an interest in diabetes. A structured programme of collaboration between GPs, practice nurses and DSNs will be an important team change in this situation. The crucial role of DSNs in diabetes

care reconfigurations will cover a moderately sized population of people with diabetes whose needs are potentially too complex for the primary care physician but not complex enough for the specialist physicians, thus bridging the gap between primary and secondary care.

In a typical diabetes population pyramid model (as in the case of the Westminster diabetes service model), the base includes the majority of patients, in which primary care physicians have the principal role, and the middle section represents those cared for mostly by DSNs, while the small minority of patients with complex diabetes are located at the apex and seen by specialists (see *Figure 1*).

#### **Clinician education**

In terms of glycaemic control alone, all QI strategies have been shown to be associated with a significant lowering of glycaemic control when the baseline HbA<sub>1c</sub> and sample size are corrected for, with the exception of clinician education (Tricco et al, 2012). There was, however, no distinction amongst which clinicians were being educated. It could be argued that educating GPs in diabetes care could potentially lead to significant improvements in glycaemic control, as DSNs and specialists are likely to already possess these skills. A recent observational study concluded that primary care physicians were less likely to follow the prescribed guidelines for diabetes care than their secondary care colleagues (Jiwa et al, 2012).

Rayman and Kilvert (2012) also highlighted the poor infrastructure in primary care to deal with the increasing workload related to diabetes care. Despite this, most people with type 2 diabetes in many European countries are now being treated in primary care (Khunti and Ganguli, 2000). GP education in the complex areas of diabetes care, such as insulin initiation and intensification, is therefore desirable. Changes in various national guidelines have resulted in GPs adopting the responsibility for initiating insulin, which was previously the sole responsibility of the secondary care teams.

In 2006, the Dutch recommended insulin initiation by all primary care physicians if

it is indicated (van Avendonk et al, 2009). The guidelines in the Netherlands provided detailed information on appropriate therapeutic regimens and also recommended that any individuals on two or more oral hypoglycaemic drugs but with an HbA<sub>1c</sub> of more than 58 mmol/mol (7.5%) should be initiated on a long-acting basal insulin. This simple and straight-forward guide resulted in 67% of primary care physicians initiating and monitoring insulin rather than referring to the hospitals, and another 17% monitoring insulin regimens initiated in secondary care (van Avendonk et al, 2009).

Another simplified algorithm that can be used by primary care physicians was recently produced by the American Diabetes Association and the European Association for the Study of Diabetes. This algorithm recommends early initiation of insulin when lifestyle interventions and metformin are not achieving targets within 3 months or at any time when glycaemic levels are not within target (Inzucchi et al, 2012).

#### **Audit and feedback**

The routine collection of data on the performance of healthcare practitioners at, say, regular 6-month intervals, when bench-marked against the recommended targets and performance of other clinicians, can be a motivating factor for driving QI (Braga et al, 2012; Jamtvedt et al, 2012).

Improvements in outcomes usually vary from small to moderate changes depending on the baseline data and the intensity with which the auditing and feedback is conducted. It is not a measure of the clinical skills of the healthcare provider but simply about the data they present for the auditing process. In the review by Tricco et al (2012), audit and feedback showed a modest improvement in HbA<sub>1c</sub> of 2.8 mmol/mol (0.26%; 95% confidence interval, 0.9–4.8 mmol/mol [0.08–0.44%]) and an improvement in systolic blood pressure of 2.52 mmHg (95% confidence interval, 1.00–4.04). The reductions in the diastolic blood pressure and LDL-c cholesterol were not significant (Tricco et al, 2012).

*“The routine collection of data on the performance of healthcare practitioners over a period of time, when bench-marked against the recommended targets and performance of other clinicians, can be a motivating factor for driving quality improvement.”*

**“Quality improvement strategies are more likely to be effective if resources are channelled towards team changes, as exemplified by the Portsmouth Super Six Model and the Derby Integrated Diabetes Care Model.”**

#### Case management

This QI strategy occurs in the context of diabetes when any person or member of the team other than the usual GP is able to organise routine diagnostic and management plans including referrals (Tricco et al, 2012). This process is supplementary to the role of the GP and it can be described as similar to that of the role of a midwife in seeing and referring a pregnant woman directly to the obstetrics team without necessarily asking permission from the GP.

Information governance can be a major stumbling block in the effective implementation of case management, since the other team members will need signed data-sharing agreements in order to gain access to patient records. Effective diabetes reconfiguration should create some flexibility in its structure for case managers to operate without excessive bureaucratic and confidentiality constraints. The ideal case scenario will be for all team members to have the same diabetes register and use the same computer system.

#### Conclusion

QI strategies in diabetes care are more likely to be effective if resources are channelled towards team changes, as exemplified by the Portsmouth Super Six Model and the Derby Integrated Diabetes Care Model, with a process of case management between clinicians and particular emphasis on patient education and promotion of self-care. The development of teamwork and input from individual healthcare specialists, such as DSNs, and hospital specialists is crucial in ensuring effective QI strategies. It is immensely important to ensure that, at all stages of any diabetes reconfiguration, people with diabetes themselves are made the central figure and provided with the requisite knowledge to be able to deal with lifestyle changes, monitoring, dieting and the detection and management of complications. QI and the reconfiguration of diabetes services should therefore result in the formation of multidisciplinary diabetes teams, fostering the merging of roles and encompassing the needs of people with diabetes. The recent configuration

of CCGs is going to provide not only challenges but also opportunities. This may be the time for CCGs to meet with all stakeholders in diabetes management to develop models of diabetes care based on available evidence, with the ultimate aim of improving outcomes in those with diabetes. ■

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