Ongoing benefit of improved control after a short-duration integrated joint clinic intervention in primary care

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Article points

1. An integrated joint clinic in the community run by a hospital consultant and GP for people with poorly controlled diabetes can improve quality of care as measured by HbA_{1c}.
2. This improvement appears to last for at least 7 years after stopping the clinic.
3. Such clinics have the potential to empower GPs, improve patient care and save money.
4. The model of care could be used for other groups of people with diabetes.

Key words

- HbA_{1c}
- Integrated joint clinic
- Long-term benefit

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The National Diabetes Audit has shown that there remains room for improvement in approaches to enhance glycaemic control, with many persisting cases of poorly controlled diabetes. It was previously reported in this Journal that an initiative by a hospital consultant and a GP to run integrated joint clinics over a 6-month period in the community for a small cohort of poorly controlled people with diabetes (HbA_{1c} >86 mmol/mol [>10%]) was associated with good results. The new work presented here analyses the trend in annual HbA_{1c} values of this cohort for up to 7 years after completing the intervention. The results indicate that the initial improvement in HbA_{1c} persisted. It is therefore suggested that this model might be employed for other similar cohorts, with a view to improve glycaemic control, provide better quality of care and make financial savings.

The recent report *State of the Nation: Challenges for 2015 and beyond* introduces diabetes in England as "an epidemic and national crisis" (Diabetes UK, 2015b). If nothing changes, by 2025 more than 4 million people over the age of 16 in England will have diagnosed or undiagnosed diabetes (Public Health England, 2015).

Direct spending on diabetes accounts for approximately 10% of the annual NHS budget, totalling around £10 billion a year or over £1 million every hour (Hex et al, 2012). Eighty per cent of the spend on diabetes goes on managing complications, most of which could be prevented (Kerr, 2011), and new data indicate that, each year, over 200 000 complications are experienced by people with diabetes in England and Wales (Diabetes UK, 2015a). There is an urgent need to improve the quality of care for people with diabetes for clinical and financial reasons. To gauge improvements, it is necessary to be able to measure the quality of care.

Three broad types of measures used in assessing the quality of care relate to structure, process and outcome. Outcomes are often seen as the most important indicators of quality as improving patients' health status is the primary goal of healthcare. However, identifying an outcome that can be attributed exclusively to healthcare is far from straightforward (Donabedian, 2003). In diabetes, HbA_{1c} has been used as a well-defined and reliable indicator of outcomes in the form of glycaemic control.

In 2012–13, more than 90% of people with diabetes in England and Wales were recorded as having had an annual HbA_{1c} check (Health and Social Care Information Centre [HSCIC], 2014). HbA_{1c} is a "SMART" indicator of the quality of care. It is specific to outcome of care, objectively measurable, attributable to quality of care, relevant to the management of the disease, and trackable over a specified time frame. A 1 percentage point (10.9 mmol/mol) reduction in HbA_{1c} in patients with diabetes reduces stroke, myocardial infarction, microvascular complications, amputation or death from peripheral vascular disease, and all diabetes-related death by 12%, 14%, 37%, 43% and 21% respectively (Stratton et al, 2000). Such reductions offer enormous potential cost savings

for the NHS. Accordingly, a number of initiatives have attempted to improve the quality of care for people with diabetes.

While the introduction of various service initiatives such as best practice tariffs and locally enhanced services, alongside the emergence of newer therapeutic agents, has offered significant promise, we believe that there is still much room for improvement, particularly for people with the worst control. The National Diabetes Audit has shown that the proportion of individuals with an HbA_{1c} higher than 86 mmol/mol (10%) has remained fairly static, at around 8%, in the 2011, 2012 and 2013 audit cycles (HSCIC, 2014).

This paper provides further evidence on an alternative approach – a short-duration integrated joint clinic intervention in primary care (Dashora et al, 2011) – focusing on the long-term effectiveness of the intervention. The target patient group for the intervention was identified using risk stratification (i.e. "segmenting", in marketing terms). The specific needs of the group were analysed in planning a clinic that would provide a targeted service to match.

Diabetes is an easily identifiable condition with very precise diagnostic criteria (ADA, 2015; Diabetes UK, 2015c). But there are many different subgroups of people with diabetes, who have differing needs and may require quite different approaches when planning the provision of an appropriate service, including:

- People with type 1 diabetes or latent autoimmune diabetes of adults.
- Children under the age of 16 years.
- Expectant mothers with diabetes.
- People with poorly controlled diabetes.

We believe that the cohort of people with "poorly controlled" diabetes had been largely ignored prior to the introduction of the Quality and Outcomes Framework (QOF). It was generally thought that such individuals were difficult to engage with and had poor compliance with drug and advice (failing to attend clinics and not showing an interest in diabetes education). The incentives offered by QOF have not led to demonstrable improvements in this group (HSCIC, 2014). We chose this difficult niche* for our intervention (Dashora et al, 2011).

Our work identified the poorly controlled people with diabetes as a "niche market" for provision of the service. These individuals were invited into special joint clinics in the community run by a hospital consultant and a GP, supported by practice nurses, for 6 months, and there were positive results (Dashora et al, 2011). The participants were then discharged back to the routine follow-up by the GP. The analysis presented here tracks the outcome of the intervention longitudinally, over a 7-year period.

Identifying the segment

The initial target segment was identified in a small practice using the criterion of an HbA_{1c} in double figures in Diabetes Control and Complications Trial (DCCT)-aligned units (i.e. ≥10.0% [≥86 mmol/mol]). Of approximately 5000 registered patients, there were 85 people with diabetes who had an HbA_{1c} level >53 mmol/mol (>7%), of whom 19 were in the "poorly controlled" category. These individuals were asked on an informal and opportunistic basis about the difficulties in the service provision that might be contributing to the poor control of their diabetes. The problems identified by them included:

- Long waiting times to see a hospital consultant.
- Inability to see the same doctor in hospital clinic visits.
- Conflicting advice and information from different health professionals.
- Repetition of activities at the surgery and the hospital.
- Failure to keep a personalised management plan.
- Failure to access a structured individualised education.

Using this information, a clinic to meet the specific needs of the individuals was designed. The clinics were run jointly by a GP and a hospital consultant after the evening surgery in the practice, to accommodate the needs and requirements of the patients, over a period of 6 months. Initial results of this study showed a significant drop in the mean HbA_{1c} from 105 to 93 mmol/mol (11.8% to 10.7%; $P<0.003$; Dashora et al, 2011). At the end of 6 months, the

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*A niche is a focused, targetable market segment for service provision (Kotler, 1989). It allows planners to focus on specific needs of the segment, which might not necessarily be given detailed consideration by the overall provider of the service.

Table 1 HbA_{1c} (mmol/mol) before and every year up to 7 years after the joint clinic intervention of 6 months.

Participant number	Diabetes diagnosis	Age at time of intervention (years)	HbA_{1c} pre-intervention (mmol/mol)	HbA_{1c} (mmol/mol) after year… 1	2	3	4	5	6	7
1	Type 2	49	127	76	99	92	84	92	71	111
2	MODY	31	119	57	90	67	–	67	57	124
3	Type 2	76	102	76	51	92	53	92	96	106
4	Type 2	59	97	61	75	84	57	76	61	48
5	Type 2	75	87	73	43	–	53	Died		
6	Type 2	63	98	69	69	Moved				
7	Type 1	18	91	82	67	69	81	97	–	–
8	Type 1	32	93	69	69	55	87	109	77	–
9	Type 2	54	113	97	100	71	45	55	–	63
10	Type 2	75	126	108	94	94	78	Died		
11	Type 2	62	93	93	–	113	97	64	Moved	
12	Type 2	41	114	116	–	105	105	98	94	93
13	Type 1	33	114	135	97	89	79	76	79	85
14	Type 2	53	90	147	78	92	80	97	95	90
15	Type 1	17	105	127	124	111	101	86	84	–
Mean		53.3	104.6	92.4	81.2	87.2	76.9	84.1	79.3	90
Standard deviation		19.6	13.4	28.3	22.2	17.6	19.4	16.4	14.4	25.0
***P*-value (Student's paired *t*-test)**		–	–	0.13	0.0002	0.0045	0.0001	0.01	0.008	0.1
n		15	15	15	13	13	13	12	9	8
Median		55	102	82	78	92	80	89	79	91.5

MODY=maturity-onset diabetes of the young.

individuals returned to routine follow-up in the practice, with no specialised follow-up.

Long-term results

The analysis presented here describes the trend in glycaemic control after the termination of active intervention and over the subsequent years. The purpose was to investigate the length of time for which the improvements persisted after the initial intervention and to explore cost-effectiveness aspects of this in the long run. Where more than one reading of HbA_{1c} was available, an average value was taken for that year.

Of the 19 people who initially took part in the clinics, two of these left the surgery and a further two were unable to engage with the team of clinicians. Thus, 15 patients attended clinics for the 6-month duration.

The year-by-year trend (see *Table 1*) shows that the mean HbA_{1c} was significantly lower compared to pre-intervention level except for the year 1 and year 7. Latest HbA_{1c} results (7 years after the intervention) were available for eight patients from the original cohort. Five maintained improvement, two showed deterioration and one remained unchanged after seven years. Among the five people who continued to show improvement after 7 years, four had type 2 diabetes and one had type 1 diabetes. Those with type 2 showed greater adherence to oral therapy (patient #1) or

needed insulin start and dose adjustment as part of intervention (#4, #9 and #12). The glycaemic control of patient #12 had, in fact, deteriorated around the time of the intervention. The person with type 1 diabetes who showed improvement at 7 years actually had not responded at the time of intervention but later on improved with better dose adjustment and improved compliance (patient #13).

Financial effectiveness

The total cost of the original intervention for people with poorly controlled diabetes was £4000 plus 15 hours of time. The cost of running the intervention for all 85 people with an HbA_{1c} >53 mmol/mol can be extrapolated to be just under £18 000 (not including time).

A rough-and-ready estimate of the cost saving from complications avoidance in the cohort can be derived from the fact that a 1 percentage point reduction in HbA_{1c} level reduces chronic complications, which account for the bulk of diabetes spending, by roughly 30% (Diabetes Control and Complications Trial Research Group, 1993; Stratton et al, 2000; Ray et al, 2009). Thus, if this intervention was applied to all 85 people with an HbA_{1c} level >53 mmol/mol, and it is assumed that all achieved a sustained HbA_{1c} reduction of 1 percentage point (10.9 mmol/mol; noting that the reduction seen in our group at 7 years was close to 15 mmol/mol [1.4 percentage points]), the cost savings could amount to around £250 000 each year. This is based on the total diabetes spend for the catchment population of the surgery being estimated at £830 000 a year. This spend, in turn, was calculated by working backwards from the £10 billion spent on the care of people with diabetes for the whole UK population (assuming uniform distribution of costs in the country).

These rough estimates give savings in excess of £13 a year for every £1 spent intitially (not including staff time), if we consider an HbA_{1c} drop of 1 percentage point. A limitation of these figures is the many assumptions that were made in arriving at them (for instance, a similar level of cost savings has been assumed for HbA_{1c} reductions, regardless of the initial level). The figures are therefore indicative only.

Nevertheless, these assumptions are supported by previous research. A number of cross-sectional studies have compared people who have poorer control with those who have good control and shown that the cost of diabetes care might be reduced by 20–30% through improving control (Gilmer et al, 1997; Gilmer et al, 2005; Shetty et al, 2005; Oglesby et al, 2006; Degli Esposti et al, 2013). We also know from some longitudinal studies that improving control in people with diabetes reduces the cost of care significantly (Juarez et al, 2013), particularly in those with an HbA_{1c} >75 mmol/mol (>9%) and when the control can be sustained for 3 years. One study, however, did not find better control to be associated with significant financial savings, although the difference in HbA_{1c} between the two groups was not substantial (Wagner et al, 2001). The true value of the financial savings is likely to be greater than those estimated as there is known to be a legacy effect with the benefits gained from good control (Holman et al, 2008; DCCT/EDIC Research Group, 2011; Hayward et al, 2015).

Discussion

The Department of Health (DH) has a longstanding vision that diabetes care should be made available to people closer to their home (DH, 2006). An integrated clinic run in the community by a specialist team from the hospital and a GP from primary care meets this requirement. A weakness of this vision, when first expressed, was that it was known that such a service would be expensive and had no proven benefits.

There are inspirational examples in the country of a regular intermediate clinic run by diabetes specialist nurses and GPs in the community without input from hospital consultants (e.g. South London Diabetes Network, 2015). This type of intervention might have been less expensive to run, but there does not appear to be published data on the long-term benefits.

In our initiative, the cost was low, as it required a very small resource and the intervention lasted for only a few months; however, the benefits appeared to least for up to 7 years. It is worth noting that HbA_{1c} reduction did not reach statistical significance in year 1 and year 7. In

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1. The apparently long-lasting nature of the effect was a surprising find for the authors, given the brevity of the intervention.
2. Among the five individuals who continued to show improvement after 7 years, there was better concordance with treatment in terms of more effective insulin dose adjustments.
3. The tailored education provided at the intervention, reflecting the specific needs of each indivudal, was perceived to be the single most significant contributing factor by both the patients and clinicians.

the first year after stopping the intervention, it might be because of sudden withdrawal of the intensive support that these patients received for 6 months. In year 7, the number of patients from the original cohort had reduced to an extent that, in spite of numerically lower levels, statistical significance was unlikely to be shown.

The apparently long-lasting nature of the effect was a surprising find for us, given the brevity of the intervention. Legacy effects of intensive interventions that improves diabetes control are well described in studies on type 1 and type 2 diabetes for prevention of complications (Holman et al, 2008; DCCT/EDIC Research Group, 2011; Hayward et al, 2015). However, glycaemic control deteriorated in all of these studies after the intervention period (which was many years in duration), although the cardiovascular benefits persisted. The mechanisms for this that have been suggested include genetic and molecular changes induced at the time of intensive intervention phase (Menini et al, 2015; Reddy et al, 2015; Rajasekar et al, 2015; Stefan et al, 2015).

Our study was, of course, much smaller than those cited above, and did not involve a randomised comparison. But, as noted earlier, we were interested to find that improvements in HbA_{1c} persisted over a number of years. Possible reasons for this were explored informally by the group of clinicians and the patients involved. Among the five individuals who continued to show improvement after 7 years, there was better concordance with treatment in terms of more effective insulin dose adjustments. This possibly related to education on the importance of effective dose manipulation, which was stressed at the initial consultations. In addition, one patient refused to start insulin initially but then agreed to initiate treatment after the joint clinic intervention. This, again, appeared to relate to effective communication about the importance of better control to prevent future complications of diabetes. Two participants who initially showed improvement but deteriorated later had shown evidence of poor concordance with, and tolerance of, treatment (patients #2 and #3). It was not possible to explore associations between the type of diabetes and the response to the joint clinic intervening as the numbers were too small.

The consensus was that the "education" part was a major component of the intervention and was responsible for the persistent long-lasting effect. The tailored education provided at the intervention, reflecting the specific needs of each indivudal, was perceived to be the single most significant contributing factor by both the patients and clinicians. In addition, the single consistent message been given by the consultant and the GP was perceived by the patients as a powerful mechanism for change in self-management of their condition. This resulted in improved concordance and improved trust in the clinicians by the patients. It also appeared that the intervention changed patients' perception of their condition and motivated them to manage their glycaemic control better. The educational experience for the GP, consultant and practice nurse in the clinics was highlighted as being very helpful as well by the clinicians.

Limitations

There are several limitations of our follow-up analysis that are important to mention:

- We had a small sample size and did not have a control group.
- There may be bias if non-reporters were more likely to have lapsed in control.
- Data on complications would have been useful, but our study was too small for this.
- The analysis of data on blood pressure, cholesterol, renal function, and eye and foot care markers would have added to the richness of our findings.
- The study is related to one surgery and one hospital consultant, and the findings and the conclusions may not be generalisable.

Further suggestions

This was a small study that suggested there was a long-term benefit from a simple intervention. We believe that if the intervention is applied to more widely, it could result in considerable health improvements and cost savings. In addition, we picked a difficult segment and the intervention might, in theory, work even more effectively with a group including HbA_{1c} values <86 mmol/mol.

We believe that further segmentation focusing on people with type 1 diabetes would be

worthwhile as this segment shows the worst outcomes in the National Diabetes Audit (HSCIC, 2014) but, in our experience, are generally engaged with the health services and have quite specific needs to suit their lifestyle.

Conclusion

Identifying people with poorly controlled diabetes (HbA_{1c} >86 mmol/mol) and offering them specially designed joint clinics delivered by GPs and consultants in the community appeared to be not only effective in the short term in controlling diabetes but to offer long-lasting benefit, as measured by HbA_{1c} improvements persisting up to 7 years after stopping the intervention. Larger studies and those targeting other "niches" for diabetes care would be a valuable and logical next step. ■

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