The GooD Pregnancy Network: an alternative approach for gestational diabetes.

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Abstract: Basildon and Thurrock University Hospital witnessed rapidly increasing numbers of pregnant women with diabetes, causing overburdened specialist clinics, poorer patient experience and worsening clinical outcomes. This prompted the multidisciplinary team's remodelling of care pathways, launching the General ownership of Diabetes (GooD) Pregnancy Network in 2014. Contrary to conventional limitation of care to specialist diabetes antenatal clinics, this novel initiative highlights contemporary necessity to equip and empower all maternity stakeholders to deliver basic care of gestational diabetes (GDM). It strategically connects a Midwife Tele-Clinic "hub" to Educating Gestational diabetics Group Sessions (EGGS) and standard antenatal clinics. Patients were key partners, regularly participating in feedback surveys and promoting public awareness by co-producing local newspaper articles that served up their stories as case studies. Furthermore, the EGGS "faculty" includes a former GDM patient whose video testimony has inspired almost 2000 patients and their families; aiming to foster long term healthy lifestyle changes. Final summative evaluation in November 2019 showed the new culture of wider consciousness has shortened 'diagnosis to first consultation' intervals, eliminated overbooked specialist clinics (none since January 2016), substantially improved clinical outcomes, boosted research recruitment and avoided additional running costs to the tune of £66,384 a year.

Keywords: Pregnancy; Diabetes; Screening; Lifestyle

1. Introduction

Basildon and Thurrock University Hospital experienced an unprecedented increase in the prevalence of diabetes in pregnancy contributing to worsening operational performance. Such increases are fast becoming a major health problem in the UK and worldwide [1-3]. Routinely collated annual service data at this hospital had demonstrated a 200% increase in the prevalence of diabetes in pregnancy between 2004 and 2013, predominantly due to gestational diabetes (GDM). Members of the specialist maternity team had increasingly recognised the adverse effect of this increased workload on care quality and in August 2013, we received our first ever written complaint relating to clinic waiting time. A significant sentinel 'event' was the increase in the number of diabetes related stillbirths, which peaked at three deaths over a four-month period (July to October 2013). The Root Cause Analysis investigation reports highlighted a recurring theme of suboptimal clinical decisions in overburdened specialist clinics. At a time of ever-widening gaps between hospital income and expenditure, we set ourselves the pertinent challenge of unfunded remodelling of care pathways to safely deal with increasing caseloads. Failure to do so would potentially be detrimental to long term patient safety and experience, not to talk of the risk to the reputation of our Maternity unit. We therefore set up a five-year plan that aimed to demonstrate the sustainability of our proposed solutions.

2. Materials and Methods

2.1. Design

Once concerns were formally raised, we set up a multidisciplinary scoping team to assess the scale of the problem and examine for possible contributing factors, with a view

to finding a way forward. This team consisted of a consultant obstetrician, a consultant diabetologist, a specialist diabetes midwife and a specialist diabetes nurse. For a better understanding of the scale of our caseload challenge, the team reviewed the associated health and demographic trends in the local catchment population and made the following stark findings in relation to our rising prevalence of gestational diabetes:

1. National census data (2001 – 2011) had demonstrated a 3-fold increase in the proportion of ethnic minority residents locally.
2. Local health profile reports (part of the National Public Health report) dating back to 2006 showed rising rates of obesity and diabetes, culminating as significantly worse than the national average in our 2013 district profile report.

The team also gleaned baseline information by analysing routinely collated maternity diabetes service data and this revealed the following problematic aspects of the 2013 dataset:

1. The year marked a major inflection point in our prevalence of diabetes in pregnancy, rising from 67.3/ 1000 deliveries in 2012 to 91.6/ 1000 in 2013.
2. Outpatient clinic logs showed overbooked specialist (diabetes) antenatal clinics with more than 90 face to face consultations occurring every month (100%) from July to December 2013.
3. Annual outcome data unveiled our lowest ever, live birth rate (92.6%) in Type 1 and 2 diabetics (highest risk patients); significantly worse than the corresponding national rate (98.6% in 2013) according to the National Pregnancy in Diabetes (NPID) Audit report 2013 [4].
4. Suboptimal rates of some relevant outcomes like big baby (> 4 kg) which occurred in 13.2% of our GDM cases and obstetric interventions like Caesarean section which occurred in 43% of our GDM cases.

Therefore, a decision was made to apply quality improvement (QI) methodology in addressing the identified problems. The focus was to keep monitoring the relevant routinely collated measures at yearly intervals, once changes were implemented.

The selected process measure was the percentage of months every 6months when specialist clinic capacity (90 clinic slots per month) was exceeded. The selected outcome measures were live birth rate in Type 1 and 2 diabetics, big baby (birth weight > 4kg) and caesarean section rates in GDM cases.

2.2. Strategy

This consisted of 3 components which were run in parallel throughout the duration of the project.

2.2.1. Remodelling and implementation of a new care pathway:

The first step was a series of brainstorming meetings of the multidisciplinary team members and this conceived the idea of the GooD (General ownership of Diabetes) pregnancy network, an innovative initiative that emphasises contemporary necessity to equip and empower all maternity stakeholders to deliver the basic management requirements of gestational diabetes. Contrary to conventional limitation of care to specialist diabetes antenatal clinics, it advocates setting up of a service hub of Midwife led Tele-consultation clinics and strategic linkage of these to group clinics (Educating Gestational diabetics Group Sessions: EGGS) [5-7], specialist clinics and standard antenatal clinics, thereby creating a shared care network. We then took a bottom-up approach by informally engaging with both staff (including community midwives and line managers) and patients, about this idea, towards the end of 2013. The majority were positively receptive to the proposal and these discussions informed the final decision to implement this new care framework in January 2014. After initial set up, a pilot questionnaire based feedback from 17 service users (January - March 2014) showed 100% preferred the option of tele-consultation to physical attendance. An overriding theme of greater patient convenience based on time off work, childcare arrangements and parking costs became evident.

2.2.2. Staff engagement and behavioural change:

Initial consultations with general staff members of the maternity workforce highlighted a need to widen consciousness and clinical knowledge of GDM to enable a positive impact of the new shared care pathway. This proved to be our biggest challenge, especially as management had declined our request to incorporate this domain of care into the mandatory training programme. We coped by grasping 'windows of educational opportunity 'such as rotational attendance of specialist clinics (including EGGS) by non-specialist staff, remote support for non-specialist staff by the specialist team, selecting and training diabetes champions in all clinical areas, holding weekly multidisciplinary team meetings with an open invitation to non-specialist staff members, launching a departmental poster campaign reminding all staff to routinely enquire about glycaemic control when in contact with diabetic women and to escalate when necessary, general circulation of diabetes annual reports, development and implementation home - grown decision support aids. The DRRiP (Diabetes Related Risk in Pregnancy) score is our simple checklist tool that converts evaluation of discrete clinical parameters into a single composite score, thus creating a common language between patients, midwives and doctors. DIALD (Diabetes And Latest Delivery date) is our decision aid that stipulates the timing of delivery according to the emerging clinical picture

2.2.3. Collaboration with patients

Public health data shows that after delivery, women from Basildon and Thurrock face a greater risk of cardio metabolic complications and lower life expectancy. For this reason, we decided to make public engagement a crucial component of this initiative and made a commitment to Patients and Public Involvement and Engagement (PPIE) [8]. After the pilot survey confirmed collective endorsement of the new service, all GDM patients were routinely offered participation in feedback surveys, revealing the consequential extent of empowerment and psychological adjustment. Furthermore, patients joined to co-produce a series of 5 newspaper articles since 2015, serving up their stories as case studies promoting 'general ownership'. Meaningful public engagement was also evident in 10,882 views of our 2016 social media post and as a direct consequence, the EGGS 'faculty' has since included a former GDM patient. Her involvement has enabled the group clinics to always end on an encouraging note by showing a short film of her testimony. Despite requiring insulin treatment 16 years earlier, she remained diabetes free and both her teenage children were lean and fit, reiterating tangible linkage of parental lifestyle choices to childhood obesity and glycaemic impairment [9-12].

From March 2014 onwards, we proceeded to embed the new pathway and outlined a five-year timeframe during which we aimed to hopefully demonstrate longer term benefits and sustainability of the new initiative. The previously listed measures were monitored yearly and results were reported in shared annual service reports, each representing the end of a plan, do, study, act (PDSA) cycle [13]. A final summative evaluation was done in November 2019.

The setting for this final summative evaluation was our secondary care maternity unit, with an outreach that included community midwifery clinics. The subjects were patients with a working diagnosis of diabetes in pregnancy based on the 2010 International Association of Diabetes and Pregnancy Study Groups (IADPSG) [14] diagnostic criteria between January 2014 and December 2018. The evaluation involved annual reviews of routinely collected data and consisted of 2970 diabetic pregnancy outcomes and corresponding outpatient clinic logs.

3. Results

3.1. Process measures

3.1.1. Specialist Clinic capacity:

The rate of months when specialist clinic capacity was exceeded reduced to 8/12 (66.6%) in 2014 with further reduction to 5/12 (41.6%) in 2015 and has remained at 0% since 2016. (Figure 1).
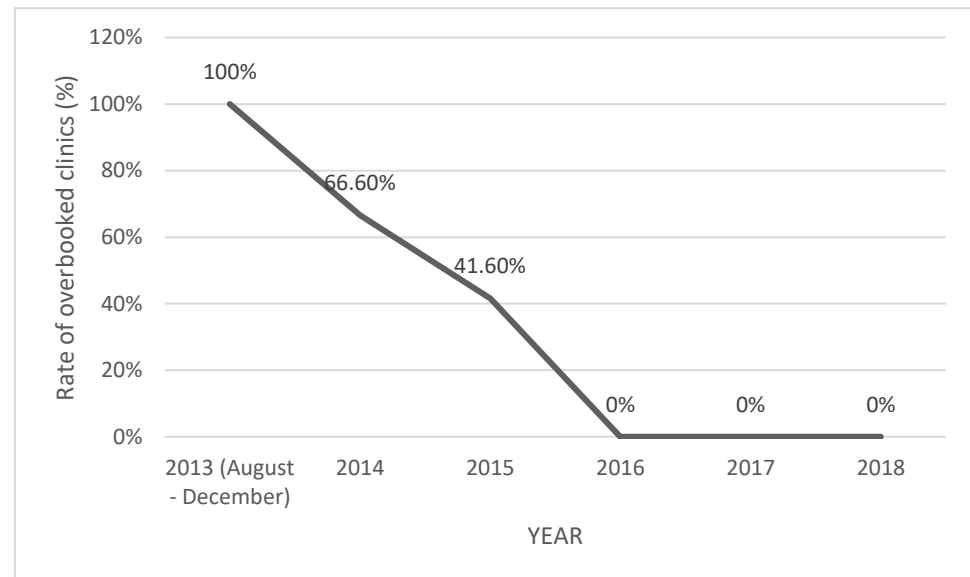
Figure 1. Trend in overbooked specialist diabetes antenatal clinic rates following implementation of the GooD Pregnancy Network in January 2014.

3.1.2. Rate of first clinic attendance within 7 days of GDM diagnosis:

In February 2015, new national guidelines stipulated a new standard in ensuring first clinic attendance within 7 days of a new diagnosis of GDM [15]. For this reason, this process measure was introduced as part of the monitoring programme. During the year we noticed gradual reduction in performance, hitting a nadir of 31.8% at the start of 2016. This speeded up our planned introduction of group clinics which were implemented in March 2016, immediately quadrupling our weekly capacity for seeing new patients. Significant improvement was apparent by the end of the 2nd PDSA cycle in May 2016 but this was short-lived with a subsequent nadir of 28.75% at the end of the 4th PDSA cycle in November 2016. It transpired that this was a direct consequence of relocation of the pathology reporting system to an off-site facility, resulting in delays in reporting of Oral Glucose Tolerance Test results. Following a resolution meeting with the relevant biochemistry team, the issues were addressed and the frequency of PDSA cycles was increased to monthly. Consequently, attendance rate within 7 days of GDM diagnosis soared to consistently hover around 94% between February and July 2017. The details are shown in Figure 2.
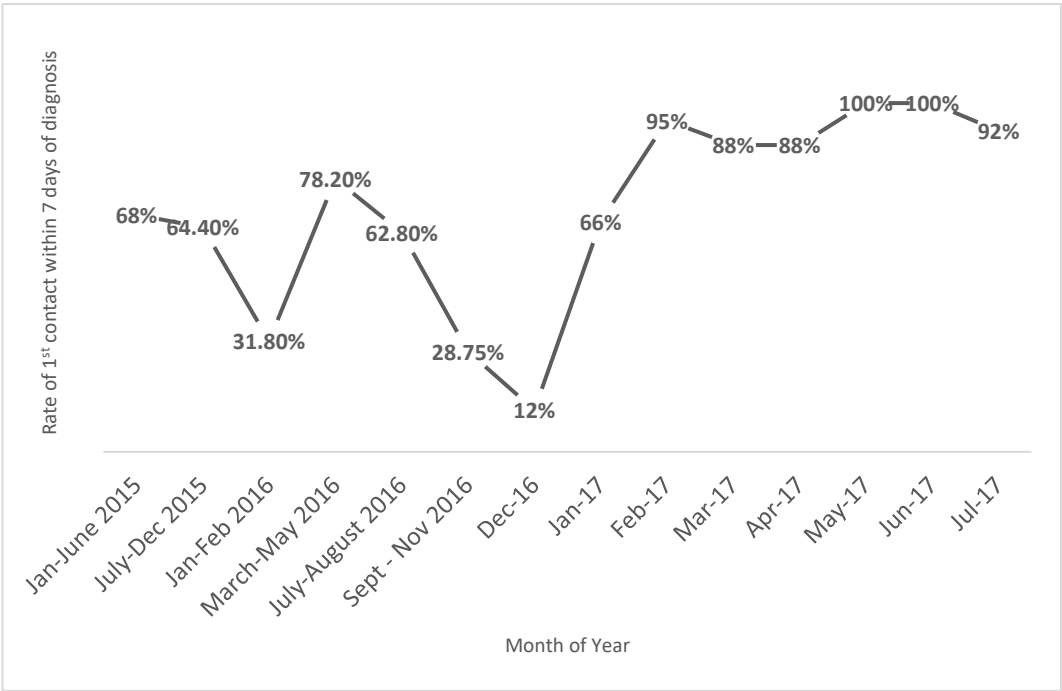
Figure 2. Trend in rate of first clinic appointment within 7 days of a new diagnosis of GDM, before and following implementation of group clinics in March 2016.

3.2. Outcome measures

3.2.1. Live-birth rates in Type 1 and 2 diabetic women:

The rate of live-births of Type 1 and 2 diabetic women increased to 'bridge the gap' in 2014 (97.3% vs. national rate of 98.9%), and finally 'hit the mark' in 2015 (100%) where it has remained since. (Figure 3). Concurrently in this group of patients, there was continuous improvement in our rate of ideal 3rd trimester glycaemic control (HbA1c level of < 48 mmol/ mol), achieving our best ever result of 72.7% in 2018, compared to the corresponding national rate of 57.5%.
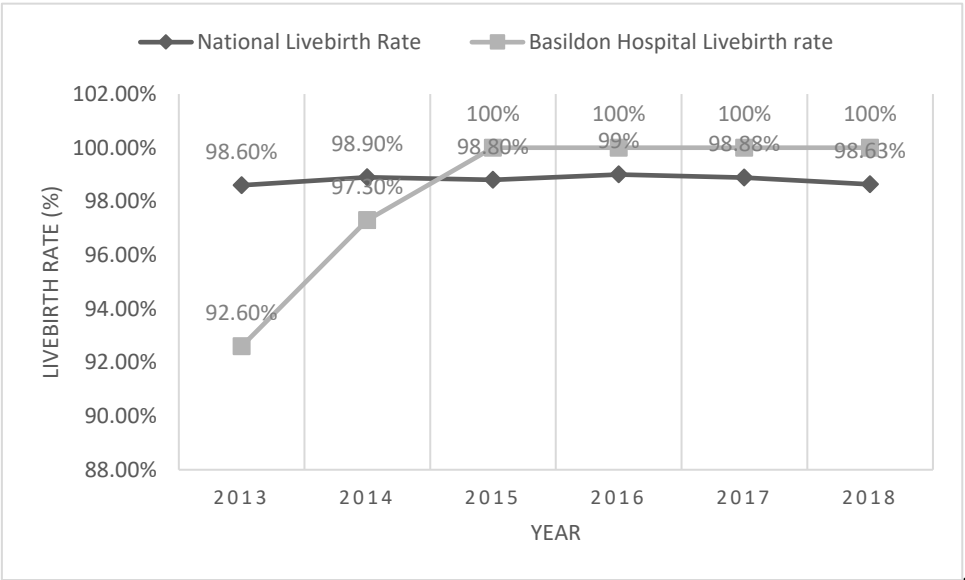
Figure 3. Trends in live birth rates in Type 1 and 2 diabetic women following implementation of the GooD Pregnancy Network in January 2014.

3.2.2. Caesarean section and big baby rates in GDM women:

We witnessed a downward trend in annual caesarean section and big baby rates compared to the 2013 baseline, averaging 36.9% and 7.7% respectively between 2014 and 2018. (Figure 4). The levelling up of the downward trend of both rates was noticeably related to a reduction in the rate of pharmacological treatment after 2016 and reflection resulted in a strategic lowering of our threshold to commence pharmacological treatment with Metformin and/ or Insulin.
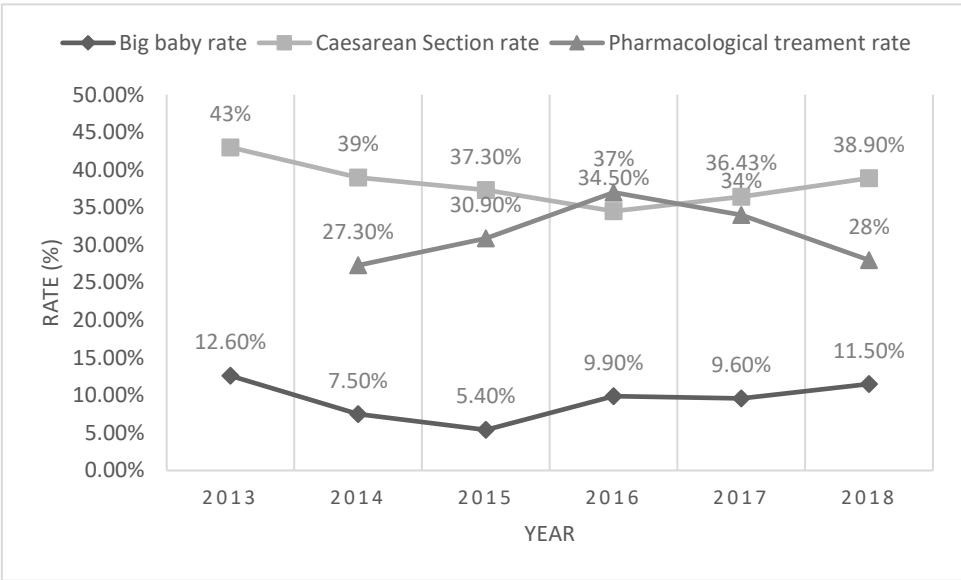
Figure 4. Trends in big baby, caesarean section and pharmacological treatment rates in gestational diabetic women following implementation of the GooD Pregnancy Network in 2014.

3.2.3. Patient experience:

A 2017 survey of 338 GDM patients showed 98% concurred on successful achievement of the four main educational objectives, including psychological adjustment. (Figure 5a). The central theme was positive engagement due to support received from carers. However, patients also expressed concerns about 'general ownership' potentially detracting from the attentiveness of the specialist team. The 2019 survey of 231 patients reaffirmed the previous result but also revealed that 96% valued diabetes support from their routine carers (Figure 5b).

(**a**)   (**b**)
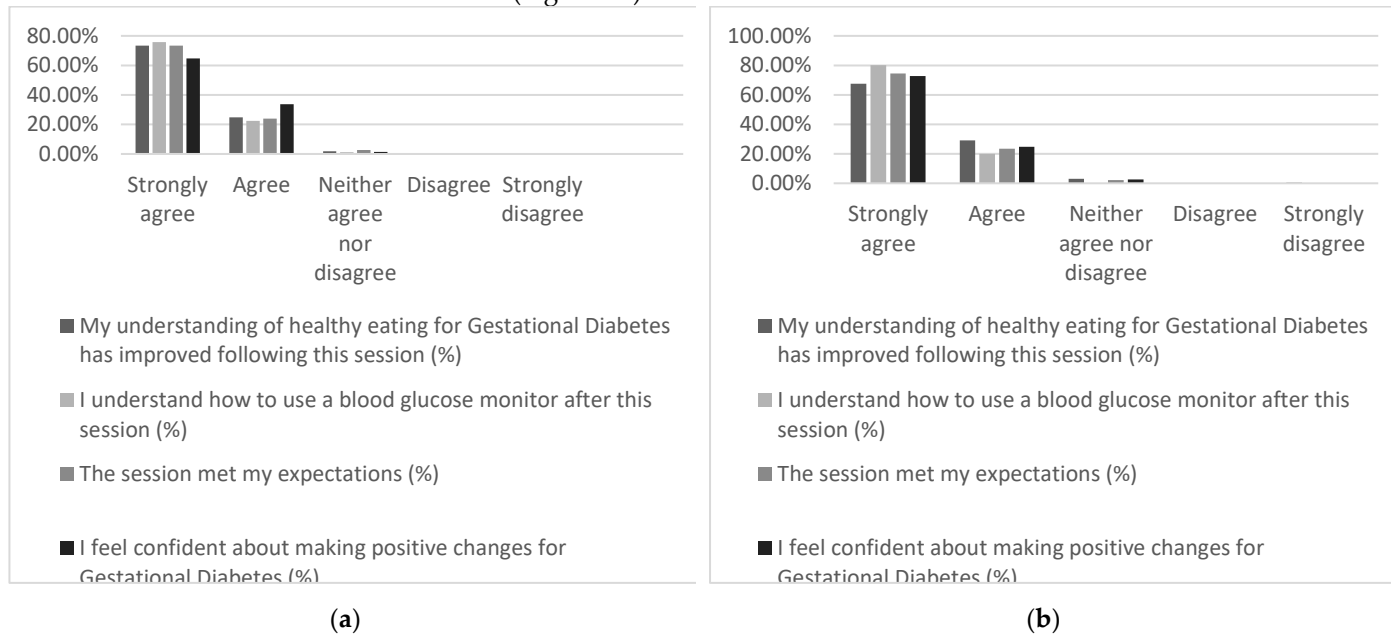
Figure 5. Patient feedback following attendance of group clinics: (**a**) Survey results from 338 patients in 2017; (**b**) Survey results from 231 respondents in 2019.

3.2.4. Additional benefits:

The camaraderie of the group clinic also boosted recruitment to national research studies e.g. for the DARE study [16], this clinic enrolled 640 (38%) of the hospital's 1677 recruits, resulting as the top recruiter in North Thames region and fifth nationally. The final realised benefits were cost savings to the tune of £66,384 a year and the details of this are outlined in Table 1.

Table 1. Cost implications of implementing the new GooD Pregnancy Network pathway.

Type of appointment	Type of antenatal clinic	Cost details	Cost status
1st contact	Group clinic	Prevented the need for three additional conventional clinics/ week. (Band 7 midwife: £36,000/ year, Band 6 nutritionist: £30,000/ year). [1]	Cost saving of £1728/ month.
1st follow-up	Tele – consultation clinic	Average of 91 tele-consultations/ month means phone cost of £259 [2] and midwifery time cost of £450, leading to an estimated monthly running cost of £709. Equivalent number of conventional consultations involves running eight additional multidisciplinary specialist clinics/ month at a monthly salary cost of £4513.8.	Cost savings of £3804.8/ month.
2nd follow-up	Specialist clinic	Was already running.	Cost neutral.
Final follow-up	Standard clinic	Was already running	. Cost neutral.

[1] Salary values that applied at time of implementation. [2] Assuming a phone call tariff of 19p / minute (landline to mobile) and fifteen-minute consultations.

4. Discussion

National guidelines [15] stress the importance of confining care of diabetes in pregnancy to specialist multidisciplinary antenatal clinics so the concept of 'general ownership' of diabetes in pregnancy is somewhat new. Following it's implementation using QI methodology we have demonstrated an improvement in clinical performance.

The strengths of this project are the reporting of patient satisfaction data, application of PDSA cycles and an overall time frame that provides evidence of sustainability. The

main limitation is the lack of data on other neonatal morbidity outcomes such as neonatal hypoglycaemia and admission to Neonatal Intensive care units. Staff engagement and education proved to be our biggest challenge during this journey. Sadly, at the outset, management declined our request to incorporate this domain of care into the mandatory training programme. In hindsight we now feel we should have worked harder at trying to convince them otherwise, as it became clear that instituting mandatory training before commencement would have enabled a smoother transition.

Our inclusive network structure is an alternative care framework that offers a 'right care, right place, right time' model for delivering the stipulated elements of care. It features a modified role for the specialist team that concentrates on the highest risk cases, whilst attentively overseeing the care of all others by their usual carers. Essentially, systems leadership has successfully eliminated elitism by demystifying definitive care, embedding a culture of wider consciousness and connectivity that enables consistency during holistic care.

One of the criticisms of IADPSG diagnostic criteria for GDM is the association with increased caseloads. However, the proven connection of this criteria to long-term risks of maternal and childhood glycaemic impairment [17, 18] makes it a crucial component of contemporary public health initiatives for the diverse population we serve. It is especially noteworthy that during the corresponding time period (2014 - 2018) there was a 44% surge in caseload and our official district health profile reports showed concurrent increases in rates of overweight adults and obese children, respectively peaking at 72.8% and 25.6% in 2018 (higher than corresponding national rates, highest in East of England and 10th highest of 325 national districts). This poor ranking on the health profile scale adds far-reaching value to our project, as a long-term prevention initiative. Therefore, the GooD Pregnancy Network initiative offers a pragmatic balance of minimal additional resource costs against the markedly reduced costs of improved perinatal outcomes and long-term health.

This organisational journey demonstrates cost-effective realignment of clinical capacity to increasing demand by minimising duplication of care and improving patient empowerment. Furthermore, aside from upholding stipulated values of inter-professional education, the group clinic provide an additional dimension by enabling patients, partners and professions to learn with, from and about each other [19].

In conclusion, the message is simple: 'Prevalence of diabetes is set to skyrocket. Rising to this challenge requires basic involvement of **all** health professionals in prioritising early prevention strategies that target parents of unborn children, embodying larger societal needs'.

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Institutional Review Board Statement: Ethical review and approval were not necessary as this was not applicable to this Quality Improvement (QI) project.

Informed Consent Statement: Not applicable due to QI project.

Data Availability Statement: QI project, not research.

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Conflicts of Interest: The authors declare no conflict of interest.

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