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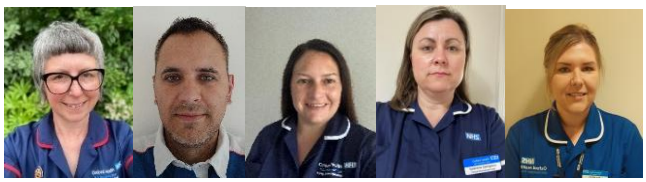
SUSQI PROJECT REPORT

Comprehensive reviews for patients on insulin, including the use of continuous monitoring technology.

Start date of Project: April 2025

Date of Report: August 2025



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Background:

Patients with Type 2 diabetes, who become acutely unwell and need hospitalisation, may have insulin prescribed in hospital, which can continue after their discharge. Oxford Health District Nursing Service has a caseload of around 300 patients across the county of Oxfordshire with diabetes (majority Type 2 diabetes) who are unable to manage their own injections, and require daily or sometimes twice daily insulin administration by the District Nursing service. This represents approximately 33% of District Nursing (DN) visits undertaken per day in Oxfordshire.

Some of this patient cohort, once they have recovered from their initial illness, do not require insulin to manage their diabetes. If it is required, some can learn to be self-caring with their insulin regimes. As patients age, perhaps become more frail, lose weight, or experience metabolic changes, their insulin requirements alter, and in some cases, is no longer required. Despite these changes in clinical needs, insulin regimes for these patients may not be reviewed for quite some time and in the majority of cases, patients continue to have insulin prescribed for the rest of their lives. Patients not having a review of their care can lead to life threatening complications such as hypoglycaemia (low blood glucose) and hyperglycaemic (high blood glucose) diabetic ketoacidosis events that require hospital admission.

GP surgeries receive funding per patient to provide annual health reviews for people with diabetes (Diabetes UK) and District Nursing and community diabetes services are not contracted or funded to deliver these in Oxfordshire. While GP surgeries offer routine annual diabetes monitoring reviews to those who can attend the surgery for an appointment, those who are housebound are often not seen by the practice nurses at home for a review and are "exempted" from the review. This means that some of the most unwell with diabetes are not being reviewed, except in the case of an emergency situation such as a hospital admission. This may further exacerbate health inequalities.

Each DN visit involves a clinician driving in a car to a patient's home with single-use equipment including lancets, syringes, needles, personal protective equipment etc, and represents around 33% of the visits undertaken by the District Nursing service each day. Insulin administration is therefore time and resource intensive from both a financial and environmental perspective for the DN service. These visits are deemed essential 'high-priority' care in the service clinical prioritisation framework, due to the potential for rapid deterioration and serious harm from unstable blood glucose levels without timely intervention.

The DN service undertakes approximately 1000-1100+ visits per day in Oxfordshire. Approximately 400-700 patients on the caseload have to be deferred daily due to a large capacity/demand imbalance in the service (an average 28% gap when last measured in 2023). The deferred patients often have wound care requirements, which have a lower clinical prioritisation than insulin. Deferrals for those with wounds can lead to delayed healing and wound deterioration which increases their pain and affects their quality of life. In turn, this increases their wound care requirements and as a result, the demand on the DN service. In addition, these patients have an increased risk of developing wound complications, and other harms that may result in hospital admissions.

Forecasts suggest that the numbers of patients requiring insulin is likely to increase with an ageing population, therefore adding more pressures on DN services to cope with these demands. Demand is significant on all DN services nationally, and is seen as one of the priorities to address in the national and local reviews in order to ensure a sustainable future for the DN service.

The increasing use of technology is helping to optimise care and reduce demand across healthcare services. One example is the adoption of continuous and flash glucose monitoring, which provides a full 24-hour picture of blood glucose levels, in comparison to the snapshot offered by traditional finger-prick tests. This advancement is particularly valuable for people living with frailty, where previously undetected episodes of hypoglycaemia are now being identified. With this insight, District Nursing teams can proactively review and adjust insulin regimens, improving safety and outcomes for this vulnerable group.

Specific Aims:

1. To establish a review process to assess and optimise insulin regimens for all District Nursing patients with Type 2 diabetes, using continuous or flash glucose monitoring to guide safe, individualised care.
2. To ensure safe, effective and individualised diabetes management - and avoiding the consequences of unstable blood glucose levels
3. Support equity of care for both patients with diabetes and those with different needs (e.g. wound care) by freeing nursing capacity to reduce unmet needs (deferral rates).

Methods:

Change 1: Joint reviews

In January 2025, the team proposed a project to ensure comprehensive specialist diabetes reviews were undertaken for all patients on the District Nursing caseload in Oxfordshire, with a diagnosis of Type 2 diabetes and on insulin administration regimes. Those who had Type 1 diabetes were excluded as they were being monitored regularly by the local secondary care specialist diabetes service. 3 District Nursing Leads volunteered to be part of this project.

This was discussed with Oxford Health NHS Trust's Community Diabetes Specialist Nurse service Clinical Lead for advice and the initial plan was for this service to undertake the reviews internally. Initially, it was assumed that GP practice nurses would not want to be involved in the reviews as this is a cohort of patients not previously on their caseload, which would add to their workload. However, through early discussions in February 2025, undertaken by the 3 local District Nursing leads around our proposal with practices in their local area (supported by a project proposal letter) we found that this wasn't the case and they were keen to lead the reviews. 3 GP trial sites (Manor Surgery, White Horse Surgery and Banbury Cross Health Centre) agreed to participate in the project including 3 practice nurses with expertise in diabetes care.

The project group, with input from the participating surgeries, then amended the process to become a joint District Nursing/Practice Nursing review, with guidance around the roles and responsibilities of both services and aims of the project. Practice Nurses had access to the patient's medical history, medications, previous blood test results and additional training in diabetes care. District Nursing had the knowledge of the individual patient, their environment, cognition and abilities. These elements were shared in different ways with the 3 trial surgeries, District Nurses being more or less directly involved with the review depending on the review method preference of the Practice Nurse. The first reviews took place in March 2025 and were finished by August 2025 and aimed to assess the safety of current treatment regimes, to ensure they were tailored and patient appropriate to promote safety.

Practice Nurses led the reviews, organising in-person (in the patients' homes) reviews and reviews carried out virtually (through video or telephone calls) according to their and the patient's preferences. Any changes to their treatment were communicated to both the patient and the District Nursing team by the Practice Nurse, with direction to administer forms amended as required by the surgery.

An outcome Measures template was developed for all aspects of the reviews, which included patient postcodes to calculate travel data.

There was a theoretical risk that Practice Nurse training, expertise and competence in diabetes reviews varied, and may not always align with Trust Community Diabetes Specialist Lead's expertise. This could lead to differences in insulin regimes and prescribing that increase patient harm. However, 2nd opinion review checks were undertaken, with a sample of patients from each trial surgery, by the Community Diabetes Clinical Lead. Results did not show any significant clinical differences in decision-making. Furthermore, the diabetes clinical lead provided additional suggestions to the DIstrict Nursing and Practice Nursing team around treatment options to enhance patient care.

Change 2: Continuous flash blood glucose monitoring technology

Prior to the project the method used to monitor the patient's blood glucose varied. Approximately half of the patients in the trial had once daily capillary blood glucose (finger prick) tests performed by the DN service on their insulin administration visit. The remainder had mostly flash glucose monitoring systems and a smaller number, continuous blood glucose monitoring systems.

The project involved the implementation of continuous or flash blood glucose monitoring (BGM) technology for all patients being reviewed, to allow fluctuations in blood glucose levels to be monitored over a 24 hour period. If the patient was unable to use a reader to scan their sensor every 8 hours, then the continuous BGM was used. The patient or DN service would monitor blood glucose levels transmitted from the sensor in the patient's arm to either the patient's mobile phone or a specific reader device. This allowed the detection of any hypoglycaemic or hyperglycaemic episodes over the 24 hour period (these would not have been detected by the once or twice daily intermittent testing carried out at previous insulin administration visits.) The DN then downloaded the blood glucose results and sent them to the Practice Nurse for review.

The sensor was used for 10 days. In some cases, a second sensor was provided for another 10 days. Following this review period, the service would return to use of finger prick testing unless the Practice Nurse wished for them to continue on continuous or flash BGM for any reason.

Change 3: Changes to insulin treatment regimes

If as a result of the review, the patient's insulin regime needed amending then the following took place:

- Patient's prescription was changed by Practice Nurse or GP
- Direction to administer was updated by Practice Nurse or GP and emailed to DN service
- New prescription was sent to the patient's community pharmacy if different medications were needed
- Community pharmacy delivered the new prescription to the patient's house

Measurement:

Patient outcomes

Patient outcomes were measured in terms of their clinical condition which included the following clinical measurements, pre and post reviews:

- Blood glucose monitoring methods
- Blood glucose control results
- Type, frequency and dose of insulin
- Number of invasive procedures

Patients were surveyed, using an MS Forms survey, administered by a District Nursing team member, using their ipad, post-review. Questions around their reviews, their involvement, their blood glucose monitoring and the impact of the review were asked.

As part of the survey, we asked patients their views on, and frequency of diabetes reviews prior to this project, to ascertain whether they were receiving care according to national standards. Patient outcome measures exploring their levels of independence were included in the patient outcome

measures data and patient survey. These measures indicate whether patient safety, quality and personalised care are maintained or optimised.

There is a possibility that this project will lead to a reduction in hospital attendances and admissions. Measurement of this is not feasible within our current systems. However possible implications of this are outlined in the results.

Population outcomes

DN visit deferral rates were measured pre and post the project.

Environmental sustainability

To measure the carbon impact of the intervention (the review meeting plus continuous glucose monitoring for 10 days) the carbon footprint of DN visits to administer insulin before and after the continuous blood monitoring, the carbon footprint of the review meeting and the carbon footprint of the continuous blood glucose monitoring was estimated.

The carbon footprint of a DN visit which includes the prick test to check blood glucose levels and the administering of insulin was based on the following items and their assumptions:

- Blood glucose test solution - lasting 6 months
- Blood glucose strip for calibrating the blood glucose level reader - 1 per day
- Blood glucose strip to test blood glucose level of patient
- Ketone test strip - assumed that on average 1 has to be used every 10 patients
- Finger prick needle
- Yellow sharps bin - changed every 3 months
- Insulin pen - lasting 4 weeks
- Insulin pen needles - one per dose
- PPE: pair of gloves and apron per visit
- Hand gel - 5ml per use
- Glucose tablet - one every 28 days

A hybrid carbon footprinting methodology was used to estimate the GHG emissions of the district nurse's visit. The carbon footprint of blood glucose test solution and test strips, ketone test strips, insulin pen and hand gel was based on cost, converting cost to greenhouse gas emissions using the UK government carbon conversion factors for SIC codes.

A process based carbon footprinting methodology was used to estimate the carbon footprint of the sharps bin, finger prick needle, insulin pen needle, PPE and glucose tablet taking into account materials of the items and disposal method. The yellow bin is made of polypropylene. It was assumed that it is disposed of using high temperature incineration. The finger prick needle and insulin pen needle is made of polypropylene and stainless steel and also disposed of as clinical waste. The carbon footprint of the glucose tablet took into account the glucose and the plastic tube the tablets are sold in, assuming that the tube is made of polypropylene and disposed of as domestic waste, incinerated at low temperature.

If the review meeting took place during a home visit, the carbon footprint was based on the district nurse's travel and use of PPE. The carbon footprint of a review meeting by phone and video was calculated using the Greener NHS Business Case Carbon Impact Tooling version 3.

To estimate the carbon footprint of the continuous blood glucose monitoring, the following items and assumptions were included:

- Blood glucose monitoring sensor including the applicator - lasting 10 days
- 5L blue bin for sensor - needed for 10 days

The carbon footprint of the sensor has been based on cost, converting cost to greenhouse gas emissions. A process based carbon footprinting methodology was used to estimate the carbon footprint of the blue bin taking into account the material, polypropylene, it is made of and disposal method. It was assumed that the blue bin is also disposed of using high temperature incineration.

The emissions factors were sourced from:

- Department for Energy Security and Net Zero (DESNZ) database for carbon conversion factors (1)
- DESNZ carbon conversion factors for SIC codes (2)
- Rizan C et al. (3)
- Carbon Cloud (4)
- Greener NHS Business Case Carbon Impact Tooling version 3 (5)

Economic sustainability

There were no upfront staff costs for this project as all staff involved completed this project as part of their existing roles. There were no travel costs involved to administer the project as all meetings and documentation were hosted on MS Teams.

There was no cost associated with changing patients to continuous blood glucose monitoring for the purpose of the reviews, as the initial blood glucose sensors and readers were supplied free of charge by the manufacturer. However, we have included a cost per sensor per appointment in our calculations as the sensors are single use and discarded after 10 days. Moving forward it is likely the service will be required to purchase additional sensors.

Item cost per visit	Finger Prick Test	Sensor Monitoring
Test solution	£0.003	-
Blood glucose strip	£0.39	-
Ketone test strip	£0.195	-
Non-sterile gloves	£0.064	£0.064
Cleaning wipes	£0.014	-
Insulin pen needle	*£0.255*	*£0.255*
Insulin pen	£0.26	£0.26
Handgel	£0.089	£0.089
Glucose tablets	£0.53	£0.53

Yellow sharps bin	£0.01	£0.01
Blue waste bin (sensor battery)	-	£0.157
Sensor	-	£.4.50
Consumables Subtotal	**£1.81**	**£5.87**
Travel cost (based on reimbursement of 15.7 miles per visit at cost of 0.59p per mile)	£9.30	£9.30
Total Cost per Visit	**£11.11**	**£15.17**

Cost of staff time

An average DN service visit to a patient for blood glucose monitoring and insulin injection is priced at approximately £18 for the staff time. Therefore, there is a theoretical saving of £72 in staff costs a day. However in reality, the staff time is diverted to other patients who can then be allocated a visit rather than be deferred or cancelled that day.

Social sustainability

Surveys for the following groups involved in this project were constructed on MS Forms and completed after the reviews took place. The survey included questions question to gather their views on collaboration and relationships related to this project and on the importance of environmental sustainability

- Patients (or their informal carers/relatives if they were unable to respond)
- Practice Nurses completing the reviews
- District Nurses leading the project
- District Nursing teams caring for the patients involved in the project

District Nursing staff sickness and turnover rates were tracked before and during the project.

Results:

Patient outcomes

Patients involved in this trial have now achieved the national standard of care for reviews of their diabetes. Patient care has become safer and more effective.

Of the 30 patients reviewed in this project:

- 8 (27%) were experiencing previously unknown hypoglycaemic episodes
- 13 (43%) were experiencing previously unknown hyperglycaemic episodes

As a result, 77% of patients reviewed, had their insulin regimes changed so that their treatment was more individually tailored and appropriate, as follows:

- 11 patients (37%) insulin regime/dose was reduced
- 11 patients (37%) insulin regime/dose was increased
- 2 patients (7%) insulin regime was discontinued

Additionally,

- Invasive procedures administered to patients per day reduced by 4 insulin injections and 32 finger prick tests a day

- Risk of harm and hospital admissions as a result of uncontrolled diabetes and complications reduced for 24 patients (77% of those reviewed)
- 2 patients were enabled to become fully independent with their diabetes management (7%)
- District nursing visits reduced by 4 per day (32 down to 28).

Patients who were reviewed as part of this trial were asked to complete a survey to gather their feedback. 17 surveys were completed, across the 3 trial sites - 14 by patients and 3 by relatives. 94% felt that the review had been impactful.

The impacts reported by patients were:

- Change of medication
- Better blood glucose visibility, independence and control through having the sensor in place
- Less hypos and feeling better and more in control of those
- More awareness of what they were eating
- A change to the quality of their life

The majority of patients (88%) felt it was important to have a diabetes review.

However, only 53% felt they had had a review of their diabetes in the past 2 years:

Patients' feedback showed that they were happy to have their long-term condition reviewed by someone from the GP practice and talk to them about it, with comments ranging from "*I'm just happy with it, it has helped me a lot*" and "*very pleased as this has supported me to understand better my diabetes".*

Importantly, this project supports equity of access and care by enabling those in a vulnerable housebound group, who hadn't had their diabetes reviewed according to national standards, to achieve parity of esteem and expert input.

<u>Population outcomes</u>

A 12.5% drop in demand in the insulin caseload freed up 4 additional visits a day that can now be given to other patients on the caseload who were previously having their care deferred. This contributes to the services ability to provide the correct standard of care. This in turn helps avoid the risks around deferrals, in the case of people with wounds, which can include delayed healing, poorer quality of life, wound infection requiring treatment, cellulitis, amputation and sepsis requiring hospital admission and even death.

If the results observed in this trial were scaled across the entire District Nursing (DN) service's insulin caseload, there is potential to release up to 40 visits per day. This could reduce the average daily deferral numbers (currently around 397) by approximately 10%. Within this, the number of "high priority" patients deferred, currently averaging 105 per day, could be reduced by 38%. This shows potential to substantially decrease risk for the most vulnerable patients. It is not feasible to measure a reduction in hospital attendances and admissions due to our current systems. It is also very challenging to show what did not happen as a result of the reviews.

The impact of this project could lead to fewer hospital admissions related to diabetic complications and those resulting from deferred or missed care. In turn, this would help free up ambulances and hospital beds, benefiting the wider Oxfordshire population. While environmental and financial benefits were not quantified in this project, they are likely to be positive and meaningful and may be measured manually for a small number of patients involved in the trial, in the future.

<u>Environmental sustainability:</u>

The carbon footprint of daily community nurse visits to check patients' blood glucose levels and administer insulin was 5.75 kgCO2e per visit, with the biggest GHG emissions contributor being staff travel, followed by the blood glucose test strip, glucose tablet, handgel and insulin pen (see figure below for breakdown of carbon footprint). Before the review meeting and continuous blood glucose monitoring period, the community nurses carried out 32 visits, amounting to 185.9 kgCO2e per day.

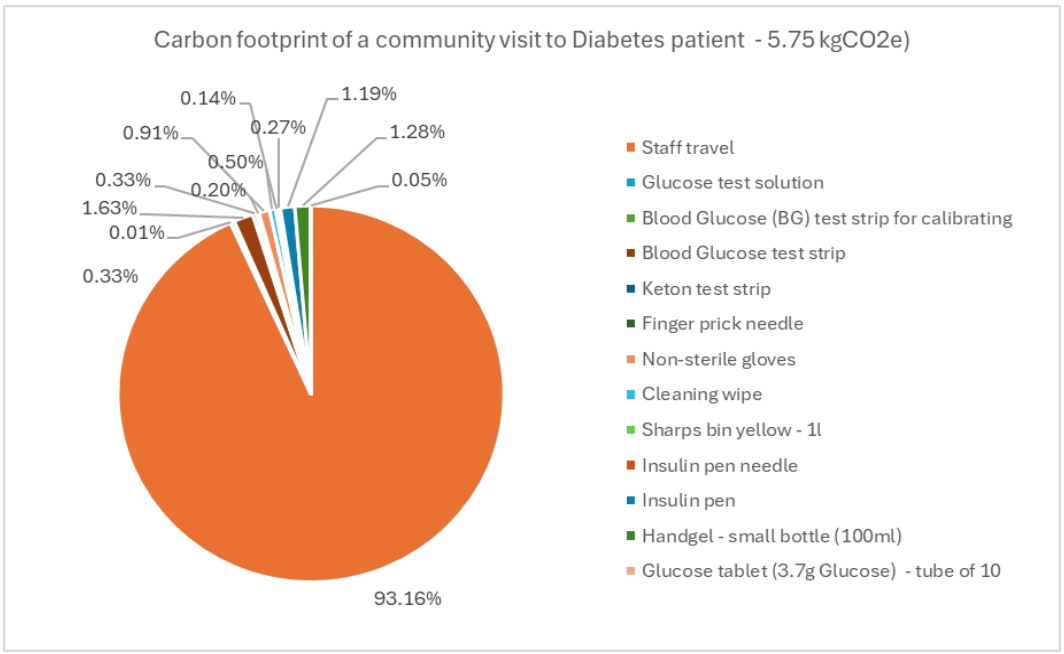


Figure: Carbon footprint break-down of a community visit for checking blood glucose and administering insulin.

The carbon footprint of the 30 joint review meetings contributed 12.3 kgCO2e. Six of the review meetings were conducted over video, six over the phone, 15 at patients home by the community nurse and 3 with no direct contact but via district nurse. Travel of the community nurse to the patients contributes the majority of the GHG emissions of the review meeting. It was estimated that community nurses travel on average 15.77 miles to a patient. The travel to 15 patients for the review meeting was responsible for 82.5 kgCO2e.

The carbon footprint of the 30 patients receiving continuous blood monitoring was 273.1 kgCO2e per day. The biggest contributor with 171.3 kgCO2e, 63%, was staff travel, followed by the sensor for continuous blood monitoring, which added 95 kgCO2e, 35%. Over the 10 day period, the lifetime of the sensor, the carbon footprint of reviewing and monitoring 30 patients amounted to 2,813.3 kgCO2e.

District nurse - home visit	Before - prick test (kgCO2e/day)	Continuous BG monitoring (kgCO2e/day)	After - prick test (kgCO2e/day)
Number of visits/day	32	32	28
Travel to patients' homes	171.3	171.3	149.9
Prick test	7.9		6.9
Sensor		95.0	
Blue bin		0.001	
PPE: non-sterile gloves	1.7	1.7	1.5
PPE: apron	2.1	2.1	1.8
Insulin			
Dose of insulin	2.2	2.2	1.9
Safety needle	0.5	0.5	0.4
Sharps bin	0.3	0.3	0.2
Glucose tablet	0.10	0.10	0.9
Total	**185.9**	**273.1**	**162.7**

Please note: The carbon footprint of the continuous blood monitoring sensor was estimated using a cost-based approach due to limited data availability; therefore, it is not directly comparable to the prick test. For a product comparison, a process-based carbon footprint analysis should be conducted.

After the review and 10 day period of continuous blood glucose monitoring, the number of daily visits reduced to 28 visits per day, leading to savings of 23.2 kgCO2e per day. With the review meeting and

sensor contributing 177.5 kgCO2e, it will take 76.4 days for the reduction in community visits to have off-set the carbon footprint of review meetings and continuous blood monitoring. After 76.4 days, the reduction will lead to net GHG emissions savings. Extrapolating the results, the reduction in home visits will lead to annual GHG emissions savings of **6,707 kgCO2e.**
If each patient required a second sensor for another 10 days of monitoring, it would take 85.3 days and the annual saving would reduce to 6,500 kgCO2e. If the sensor is used on an ongoing basis in place of prick testing for 28 patients, there would be a carbon increase of 76 kgCO2e per day (27,740 kgCO2e per year).

Additionally, as the leadership team for this project was spread across the county in different bases, all the project meetings were undertaken remotely, using MS Teams to meet and share documents. This made the project work much more efficient and meant no travel was required, saving 182 miles of travel emissions per meeting. There were 5 meetings held to date, therefore saving 910 miles equating to 2,677 kgCO2e.

Economic sustainability

Finger prick testing includes more individual consumables (e.g., test solution, strips, wipes), but they are relatively low-cost, with sensor monitoring costing £4.04 more per visit.

The cost of using the sensors for 30 patients across 32 visits is £485.44 per day. Across 10 days this equates to £4,854.40. Prevention of 4 appointments a day (with finger prick testing) saves £44.44 per day. It would take 109 days following the intervention for the reduction in appointments to become a financial saving to the service. After 109 days, the service will save £44.44 per day. Across the remaining 256 days of the year, this is a saving of **£11,376** from reduced appointments. If a sensor was used for 20 days instead of 10, the breakeven point would occur on day 218.5, for the remainder of the year (146.5 days), savings will be £6,510.46.

Freeing up 4 visits per day will save DN staff approximately 2 hours/£72 a day, or £26,280 per year. While not a cash-releasing saving, this staff time will be diverted to high priority work, visiting patients who would otherwise not be seen.

In total, **£37,656** in cost efficiency savings are projected per year from reducing 4 appointments a day on the insulin caseload (assuming the sensors are used for 10 days per patient).

While there will be variation across the caseload, extrapolating the savings assuming a similar impact across 300 patients (assuming 320 visits required per day), the daily cost for sensor usage would be £4,854.40. Across 10 days, this would cost £48,544. Assuming 40 appointments (with finger prick testing) could be avoided, this would save £444.40 per day. It would take the same number of days, 1109, following the intervention for the reduction in appointments to become a financial saving to the service. The projected annual saving would be £113,766.40. If a sensor was used for 20 days instead of 10, the breakeven point would occur on day 220, annual savings will be £64,438.

Additionally, there were no direct financial costs to the Trust or the GP practices when undertaking this project. By administrating the project remotely, 910 miles of travel claims were avoided at a cost of £455 to the Trust.

Social sustainability

Patients

Patients' views were sought as part of this project. When asked how important the ecological aspects of this project were such as travel, equipment etc, 87% said this was indeed important for the NHS. And whilst not directly surveyed around this aspect, one relative commented "*I feel this has definitely improved my wife's diabetes control and hopefully have saved some money for the NHS*."

Many of the patients fed back that their understanding and independence around managing their diabetes control had improved. This was largely due to the impact that continuous blood glucose monitoring gave them in terms of understanding and self-management. In addition patients told us they felt more safe and well as a direct result of their treatment reviews.

When patients (or their informal carer) were surveyed, 75% were not using a continuous blood glucose monitoring system before this project. Those who went on to have continuous monitoring, gave mixed feedback.

5 patients felt it was better/easier than finger prick testing

5 said it was comfortable when it was applied and to wear

1 expressed concerns and said 'it plays up and sometimes fails'.

Another patient said they didn't like it, as the reader kept bleeping and they didn't want to pay electricity charges to charge it up, and preferred finger prick testing.

The District Nurses involved found, in some cases, that patients and their relatives were more engaged with their diabetes control, as they were able to monitor readings more closely. As a result, patients took more responsibility for what, and when they ate, and took action based on the readings. This was supported by the following feedback:

- "..it supported us to know more about my wife's diabetes" (relative)
- "I have better control over my blood glucose, and has changed my view on how much food impacts my diabetes"
- I am "Mindful of what I am eating. If I'm high, normal or low"
- "Makes me aware of my high levels"
- "Change of diet" (the patient changed their diet in response to having more visibility of their blood glucose levels)
- "I changed my eating habits and I am now able to monitor my glucose on my own with the sensor. I check a few times a day, especially if I feel under the weather."
- "Sensor is good to get readings throughout the day"
- "Better control of my diabetes. I am independent and can go out when I want. I am happy with the arrangement of having nurse to call me as I am independent in administering my own injections"
- "I had no more hypos. I used to have hypos every morning and had to wake up to eat something I am now ok since the assessments and since having the sensor"

When asked about the District Nursing time delivering diabetes related care, 87% of the patients considered this was important for the service.

One patient commented "*the sensors could be lasting longer, will save NHS money and time spent by nurses to visit me to change it as I can't change it on my own. Overall, having the sensor and the regular assessments supported me being seen only 2/3 times a week instead of 7 times a week.*"

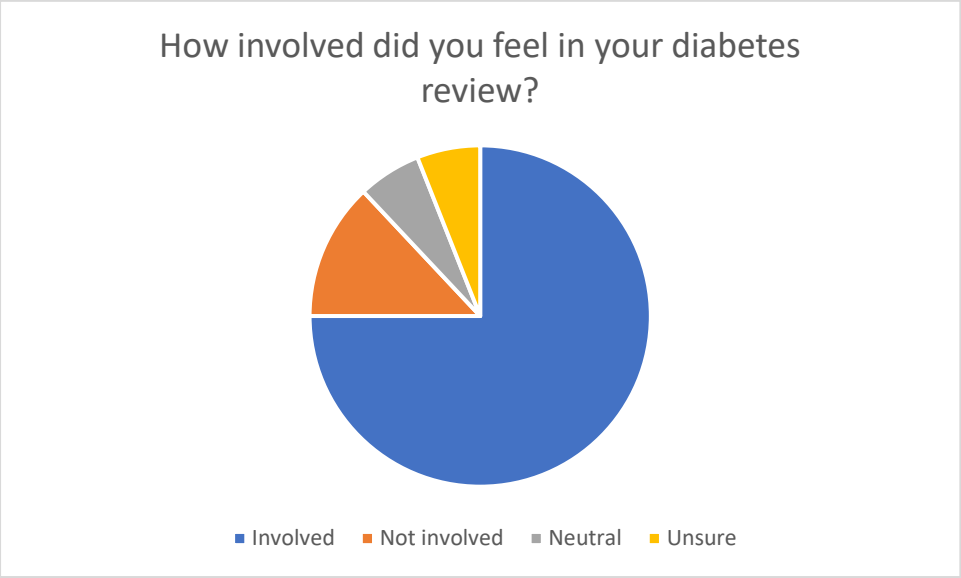
While it is not possible based on manufacturer guidance to use the sensors for longer at present, this patient feedback was shared with the supplier representative, who provided the following rationale for the current 10 day usage period.

All continuous BGMs measure glucose in the interstitial fluid using an enzyme-based electrochemical reaction and over time:

- The enzyme (typically glucose oxidase) degrades.
- The sensor's ability to produce accurate readings diminishes.
- Skin irritation or inflammation around the insertion site can also affect performance.

This degradation typically begins around day 7–10, which is why the limit is set at 10 days to ensure consistent accuracy and reliability. The sensors are FDA-approved and CE-marked for 10-day use. Extending beyond that would require additional clinical trials and regulatory submissions to prove safety and efficacy over a longer period.

When asked how involved they felt in their review, the majority felt involved



<u>Staff</u>

The Practice Nurses and members of the District Nursing teams involved were surveyed (staff ranged from senior leads to Health Care Assistants). All agreed that considering the environmental impact was either very, or somewhat important to them.

When Practice Nurses and District Nursing team members involved were surveyed to get their views on the importance of the financial cost of care provision to this project, 100% also agreed this was very, or somewhat important to them.

All felt the 'patient safety' aims of the project were very important, as was equity and expertise when undertaking diabetic patient reviews. Staff reported that collaboration with other teams had been helpful and that joint working had positively impacted on patient care and safety.

District Nurses involved in leading this project were also surveyed. All had improved their knowledge around diabetes management due to patient discussions with the Practice Nurse and the Community Diabetes Lead. When asked about recent diabetes training - some nurses replied that they'd not received training, some that this had been over 5 years ago. District Nurses reported improved relationships with Practice Nurses and felt the project was patient centered and promoted safe care. Several reported it had reduced some demands on the District Nursing service and others said, whilst it hadn't reduced demand, it had been positive and worthwhile.

Staff sickness and turnover rates in the trial localities were generally lower than non-trial localities pre and post project. It is too early to say whether the effect of the project will impact statistically on this.

Discussion:

Prior to the project, we identified that patients on the DN caseload weren't having parity of esteem of diabetes reviews and this raised concerns informally amongst staff regarding the safety of patients receiving insulin in the community setting. As a result of our study, we advocate the proactive and regular review of the DN insulin administration patient caseload, regardless of ambulatory status, to optimise diabetes management in this setting.

In terms of the quality improvement methodology, there were several PDSA cycles and adjustments made as the project progressed. For example, an adjustment that was made was around the patient survey. We wanted this to be anonymous. However, as multiple nurses within the DN teams were administering the surveys using ipads, it was not always clear which patients had been surveyed. We therefore added patient initials to the survey to avoid patients being surveyed multiple times and others missed completely. One area of the trial noted there was some difficulty obtaining continuous blood glucose sensors via the local community pharmacy. However, this appears to have been a short-lived issue and resolved quickly.

Due to a theoretical risk that Practice Nurse and Trust Diabetes Specialist may practice differently, 2nd opinion review checks were undertaken with a sample of patients. While this did not show any significant clinical differences in decision-making, Practice Nurse feedback showed that they weren't expecting their reviews to be audited and as a consequence, felt they were being checked up on. This was learning for the project group and as a result, future communications to practice nurses will outline clear explanations about review checks and processes of the trial.

Overall, the project has resulted in closer working relationships between primary and community nurses. It is hoped this will continue with projects in the future.

This project could be replicated in any District Nursing team nationally, using either Community, Hospital or Practice Nursing diabetes expertise. The safety risks to patients uncovered through this project, and the impact on the District Nursing service demand from insulin administration were

significant, both of which are national issues. Diabetes specialists from all settings should be actively and regularly reviewing patients on insulin regardless of their ambulatory status to ensure parity of esteem and safety for housebound patients, particularly following a hospital admission where insulin was commenced.

Conclusions:

It was important that we took a plan, do, study, act (PDSA) approach to the project trial areas so that we could quickly and flexibly adjust the plan and outcome measures as more knowledge was gained or opportunities were offered.

This project will now be rolled out to the whole District Nursing service in Oxfordshire as it was so useful to improve patient safety, independence, quality of life and manage District Nursing service demand.

Outcomes measures will be collected for all areas to get full service results. The nurse leading the project has shared its successes through various national Community Nursing Groups and plans to publish the work nationally.

The willingness of GP surgeries and Practice Nurses to engage in trials was key to its success. It is hoped that this can be replicated across other areas during its roll out. A back up plan involving community diabetes specialist reviews will be implemented to support scaling up, although may slow down the roll out process.

The engagement of the community diabetes specialist lead was critical in ensuring governance and safety around this project. The insulin review processes were robust and the aims of the project were clinically appropriate for this cohort of patients.

The support and guidance of the SusQi team was essential in identifying and measuring the sustainability aspects of the project as the project group had no experience or expertise in this field. The sustainability learning gained by the project group will now be applied to all other projects in the pathway.

References

(1) Department of Energy Security and Net Zero. Greenhouse gas reporting: conversion factors 2025: full set. https://assets.publishing.service.gov.uk/media/6846a4f55e92539572806125/ghg-conversion-factors-2025-full-set.xlsx

(2) UK Government full data set 1990 – 2022, including conversion factors by SIC Code. https://assets.publishing.service.gov.uk/media/68220f6dd9c9bb76078f7f5f/Defra22_results_UK.ods

(3) Rizan C et al. The carbon footprint of waste streams in a UK hospital. Journal of Cleaner Production 286 (2021) 125446. https://doi.org/10.1016/j.jclepro.2020.125446

(4) Climate Hub. Carbon Cloud. https://apps.carboncloud.com/climatehub/product-reports/id/162562918348 [accessed 22nd Sep 2025]

(5) Greener NHS Business Case Carbon Impact Tooling version 3 (5)

Critical success factors Please select one or two of the below factors that you believe were most essential to ensure the success of your project changes.			
People	**Process**	**Resources**	**Context**
☐ Patient involvement and/or appropriate information for patients - to raise awareness and understanding of intervention ☐ Staff engagement ☐ MDT / Cross-department communication ☐ Skills and capability of staff ☐ Team/service agreement that there is a problem and changes are suitable to trial (Knowledge and understanding of the issue) ☐ Support from senior organisational or ystem leaders	☐ clear guidance / evidence / policy to support the intervention. ☐ Incentivisation of the strategy – e.g., QOF in general practice ☐ systematic and coordinated approach ☐ clear, measurable targets ☐ long-term strategy for sustaining and embedding change developed in planning phase ☐ integrating the intervention into the natural workflow, team functions, technology systems, and incentive structures of the team/service/organisation	☐ Dedicated time ☐ QI training / information resources and organisation process / support ☐ Infrastructure capable of providing teams with information, data and equipment needed ☐ Research / evidence of change successfully implemented elsewhere ☐ Financial investment	☐ aims aligned with wider service, organisational or system goals. ☐ Links to patient benefits / clinical outcomes ☐ Links to staff benefits ☐ 'Permission' given through the organisational context, capacity and positive change culture.