CAPILLARY BLOOD SAMPLE COLLECTION AT HOME FOR HBA1C MEASUREMENTS DURING THE COVID-19 PANDEMIC IN CHILDREN WITH DIABETES MELLITUS

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INTRODUCTION

The COVID-19 pandemic saw the UK enter into prolonged periods of lockdown restrictions, where paediatric diabetes clinics had to rapidly transition to delivering routine outpatient care through telephone or virtual consultations.

The large reduction in face-to-face appointments had caused patients to miss their routine point-of-care HbA1c testing - vital for evaluating their long-term glycaemic control, which would guide changes in clinical management.

AIM

- To pilot and implement a new system for remote monitoring of glycaemic control in the setting of pandemic restrictions in Barts Health clinical sites that provide paediatric diabetes care
- Evaluate feasibility of capillary blood sample self-collection at home and identify areas of improvement in clinical processes and workflow
- Evaluate characteristics of patient engagement and identify patient groups that may require more support with engaging in self-management
- HbA1c results obtained would help with evaluating the impact of the pandemic on the patients' control of diabetes

RESULTS

- 58 patients mailed back their capillary blood sample to the laboratory at RLH
- Large variation in mean time period needed for sample return: 15.6 ± 9.8 (range: 4-53 days)

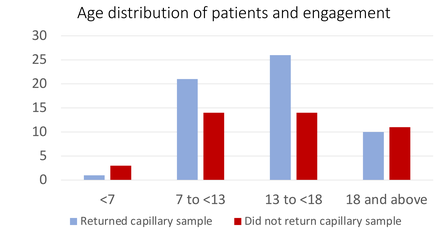


Fig. 2: Completion rate of home capillary blood sample collection across age groups

- Mean age of patients similar across completion and non-completion group
- Wide range in duration of diabetes diagnosis across cohort

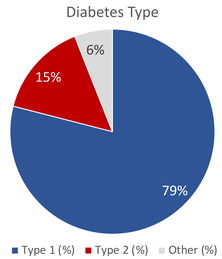


Fig. 3: Distribution of patient cohort according to type of diabetes

- 'Other': Permanent Neonatal Diabetes Mellitus, IGT, MODY

Differences in patient characteristics in completion of home HbA1c testing			
	All Patients	Returned capillary test	Did not return capillary test
	N=100	n=58	n=42
Age at testing (years), Mean (SD)	14.0 (4.2)	13.9 (4.1)	14.0 (4.4)
Diabetes duration (years), Mean (SD)	5.4 (4.0)	5.6 (4.2)	5.3 (3.7)
Range	0.4 to 18.1	0.4 to 18.1	0.5 to 14.8
Pre-covid HbA1c, Mean (SD)	63.2 (19.7)	56.8 (14.7)	65.3 (20.1)
Type 1	64.3 (17.6)	60.1 (8.8)	66.8 (21.2)
Type 2	59.9 (24.8)	56.4 (28.8)	58.5 (13.3)
Other	46.8 (14.2)	44.2 (14.2)	60 (0)

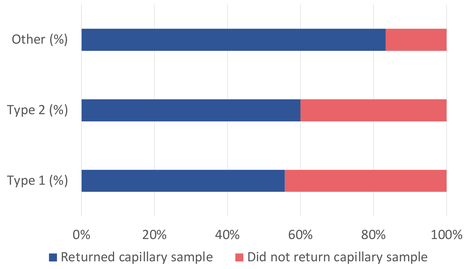


Fig. 4: Completion rate of participants according to type of diabetes

- Participants with diabetes type 'Other' showed the highest completion rate (83%) as compared to the patient groups with T1DM (56%) and T2DM (60%)

- Baseline pre-covid HbA1c was higher in the group that failed to return a sample, as compared to the group that completed a return (p=0.04)
- T1DM Cohort: baseline pre-covid HbA1c was also higher in the non-completion group compared to the completion group (60.1 vs 66.8, p=0.02).
- Overall, HbA1c value remained relatively stable over the pandemic period in the patient cohort that engaged with the remote monitoring system.
- A higher proportion of non-T1DM patients had an increase in HbA1c over the pandemic
  - T1DM (n=41): 49%, T2DM (n=8): 63%, Other (n=5): 80%

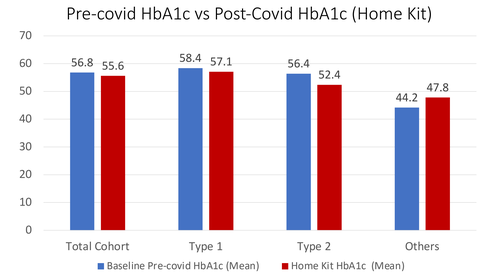
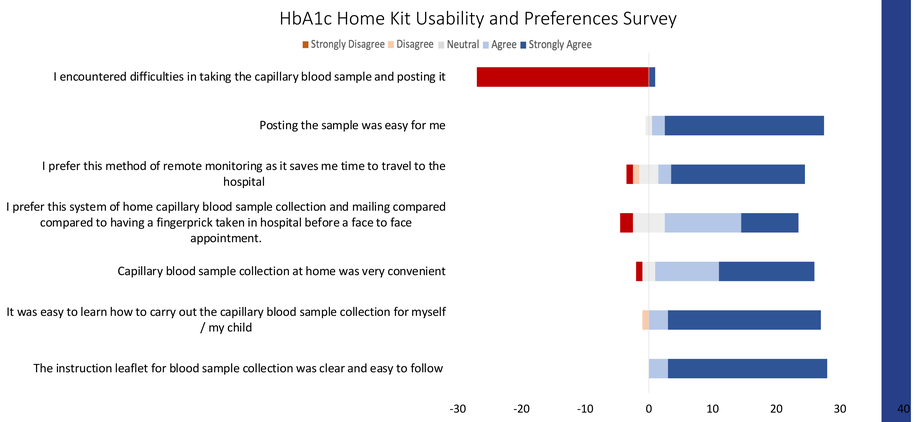


Fig. 5: Comparison of pre- and post-covid HbA1c values in the cohort that completed a sample return



METHODS

Setting and Participants

- 100 participants (age 4-19, Pre-Covid HbA1c: 29-120mmol/mol) were recruited from paediatric diabetes outpatient telephone clinics at Royal London Hospital (RLH) and Whipps Cross University Hospital (WXH) from 18th November 2020 to 30th March 2021
- HbA1c Home Kit used: Bio-Rad Haemoglobin Capillary Collection System (HCCS). Relation between capillary and venous samples is linear (r = 0,998 y = 1,0 x + 0,0 (manufacturer's manual)

Process

1. Identify patients who have not had a routine HbA1c blood test since the onset of the pandemic
2. Informed patient and family about the new remote HbA1c monitoring system and to expect a Home HbA1c kit in the mail for collecting a capillary blood sample at home
3. Project team puts together a Home HbA1c Collection Kit
4. Patient collects a finger prick capillary blood sample at home and mails it back to the Royal London Hospital laboratory using a pre-stamped envelope in the package
5. Blood sample is processed in the lab and results are reported in the electronic medical records for review by the diabetes team

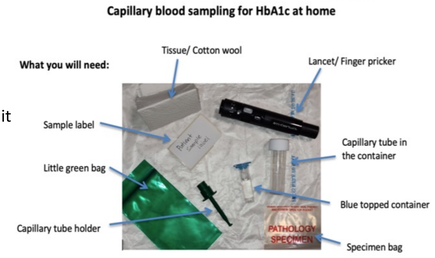


Fig.1: Contents of Home Hba1c collection kit

Survey on HbA1c Home Kit Usability and Preferences

- All patients who had been mailed a home collection kit were emailed an online usability survey which addressed the process of capillary blood sample collection at home and experience with the kit to assess ease of use and preferences regarding monitoring of HbA1c
  - Consisted of 7 questions on a 5-point Likert scale and 2 open-ended questions for patients to describe any difficulties encountered or why they had been unable to mail back a sample to the laboratory
  - To gather patient perspectives for improving the system and provision of diabetes care

DISCUSSION AND CONCLUSIONS

- <7yo had lowest completion rate (25%) – to provide more support with the self-collection process and education on the importance of monitoring glycaemic control
- Results suggest that patients who did not complete home collection have had ongoing poorer glycaemic control than patients who actively engaged with remote monitoring
- Future work to be done to explore other barriers to completion:
  - Potential language barrier in following instructions for self-collection
  - In-person demonstration of capillary blood self-collection process in the next face-to-face appointment
- Patients scheduled for tele-consult to be sent a home HbA1c kit 3-4 weeks in advance so that results are available for review at time of consultation
- High usability ratings from patients who had completed the collection process
- 58% completion rate: Home HbA1c testing has proven to be a feasible system of remote monitoring to assess glycaemic control in children with diabetes mellitus
- Potential use for patients with high HbA1c: to increase frequency of assessment
- Suitable for patients and families who have been highly engaged with self-management of diabetes and have good glycaemic control or those currently utilising continuous glucose monitoring
  - A higher proportion of their clinic appointments could be carried out virtually in the future

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