



## SUSQI PROJECT REPORT

Sustainable use and reuse of Augmentative and Alternative Communication devices in Great Ormond Street Hospital

**Start/End date of Project:** 27/09/23 - 21/12/23

**Date of Report:** 21/12/23

### Team Members:

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### Background:

The Great Ormond Street Hospital Augmentative Communication Service (GOSH ACS) provides specialised assessment for and supply of complex augmentative and alternative communication (AAC) systems to children below the age of 18 in the Greater London area. The GOSH ACS team is composed of two speech and language therapists (SLT), two occupational therapists (OT) and a speech and language therapy assistant/technician.

*“There is a rapidly growing body of intervention research that demonstrates the positive effects of AAC on the communication skills of individuals with complex communication needs, including, but not limited to, young children with complex communication needs, as well as individuals with autism spectrum disorders; with severe or profound intellectual developmental disabilities; with challenging behaviours; with severe chronic aphasia; with amyotrophic lateral sclerosis; and with motor speech disorders that require multimodal supplementation” (Light & McNaughton, 2015, p85).*

The GOSH ACS has been identified by NHS England as one of 13 services nationwide offering AAC systems to children. We provide assessments for devices, provision of equipment and training, maintenance and support. We work in a ‘hub and spokes’ system, where the ACS is the hub that the local SLT services (spokes) refer to for assessment, equipment and training.

Every hub in England follows the same referral criteria to ensure an equitable service regardless of the child’s location or local offer. Once a child or young person shows that they have met our criteria, we issue them with a long-term loan of an electronic communication device.

The GOSH ACS, along with others in the AAC using population (e.g. Doak, 2021; Moorcroft, Scarinci, & Meyer, 2019; Smidt, & Pebdani, 2023), are aware of a high number of AAC users not making the best use of their device, sometimes even not using it at all. We are keen to explore reasoning for



device abandonment among our patient population. We wanted to examine what changes to our processes could result in better patient outcomes, while ensuring sustainable as well as economically and socially beneficial practice.

Diagram A shows our original long term loaning process. It shows what happened once we gave a child or young person a long-term loan device, how we review it, and what happened to the device when it was no longer operating or being used functionally.

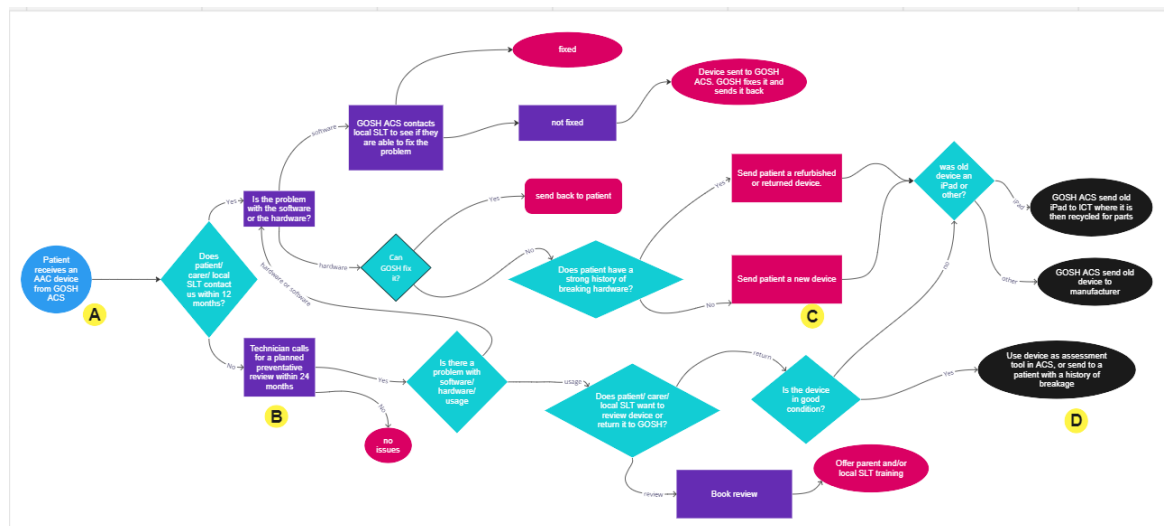


Diagram A, see appendix for more detail

Areas to explore for improvement within the original process were identified:

- We receive roughly four calls/emails per week from local services/parents regarding device maintenance and software issues. We additionally courier iPads from patients to GOSH regularly to have them repaired.
- We conduct a planned preventative review after 24 months, which may be too late to address usage issues, leading to more potential non-users (the child has no communication system), and the device remains at the patients home unable to be repurposed.
- We currently issue approximately 32 devices a year, but have approximately 8 devices returned, a 25% return rate.
- Devices that are not used and returned are either re-purposed for use in GOSH's assessments, sent back to the manufacturer for a 10% discount on a future device purchase (depending on manufacturer) or are given to a child who has a history of breaking devices. We identified 25 devices in the AAC assessment and loans cupboard that were currently unused.
- We have approximately ten inappropriate referrals per year leading to children attending the hospital and leaving without a high-tech device. We receive approximately 25 referrals a year that we reject due to not meeting criteria in the referral form. This may be due in part to local SLTs not being confident in how to support a patient's communication needs with AAC available to them.

### Specific Aims:

We identified areas of the long-term loan process to target for improvement which we felt were achievable within a years' timeframe (see yellow bubbles A-D on diagram A).

Overarching aims:

- 1) To ensure the sustainable use, reuse, and disposal of AAC devices provided to the children and young people who access the GOSH ACS
- 2) To pilot this process within ACS service, then to look at replicating the process for other equipment based SLT services, e.g. cochlear implant, voice.

During the competition timeframe:

- 1) To improve the return rate of devices that are not benefitting or being used by service users
- 2) To agree to extend lifespan of long-term devices for service users (new and returned devices)
- 3) To reduce rates of repairs that require courier journeys to GOSH
- 4) To donate devices to local services when no longer suitable for service users or required by team

Long term:

1. In six months, to measure the return/reusability and patient satisfaction statistics to ensure that our focus on reducing review timeframe is a good use of staff time.
2. To increase local service training to empower local services and reduce patient reliance on our service for troubleshooting
3. To examine how SusQI project goals around device use and reuse can be applied to other SLT services at GOSH, e.g. cochlear implant and voice.

### Methods:

For each of the competition timeframe's aims:

- 1) *To understand current returns process and rate of returns to improve return rate*

We created a process map to understand the current process and highlight possible areas for improvement. We realised through doing the process map that there was little within the current process to encourage patients to return unused or broken devices.

We made the following changes:

- At device handover, including a new trouble shooting proforma which will
  - a) inform parents of the environmental benefit of returning devices back to our service if they are not used and
  - b) help them to troubleshoot simple software and hardware issues that will reduce rate of return and staff hours assigned to troubleshooting.

This was identified as a simple solution to reducing the number of hours we spend on troubleshooting calls. We collated and addressed the most common reasons for the calls were and have supplied all new loans with an A4 troubleshooting page with QR codes to webinars and explanations how to solve simple problems with minimal technical knowledge.

- Emailing families and locals services six weeks after device issue, reminding families to contact us with any problems. A generic proforma email was identified as a non-time-consuming practice we could include in our process to identify early usage issues that users or supporting adults may have noticed since receiving the device, but thought were not significant enough to contact us about. Early identification of problems with device usage is an important consideration for avoiding later difficulties (Smidt & Pebdani, 2023).
- Patient progress monitoring (PPM) moved from 24 months to 12 months: this is designed to increase return rate for unused devices as well as identifying problems earlier thus improving patient outcomes. This aim will be initiated during this project but will take at least 12 months to achieve.

## **2) To agree to extend lifespan of long-term devices for service users (new and returned devices)**

Studying the system, we identified the following issues:

- Current lifespan of devices is approximately 4 years. If a device comes back to us within 2 years, it usually becomes a short-term loan or assessment device for our service
- Currently devices only re-used when user has history of breaking devices and so not given brand new one
- Our service purchased 32 iPads and AAC devices on behalf of our patients (using data from the financial year 2022-2023 as our baseline)

We made the following changes to the process:

- Creating criteria for ensuring an equitable way of weighing up sustainability goals with patient outcomes. This means looking at how old the device is, how often it was used prior to being returned and how much it would cost to repair it (if applicable), then comparing it to the child's needs and their history of requiring repair/ replacement.
- Projecting what a 5-year lifespan of these devices may look like based on our current process in comparison to our proposed process.

## **3) To donate devices to local services when no longer suitable for service users or required by team**

Change: Identifying which devices can be donated. A team day was scheduled to go through inventory and short term assessment loan – seeing what isn't being used and can be donated. We identified 25 devices that were no longer to be used as part of our assessment or short term loan inventory. Of those 12 needed to be recycled as they were defunct. We have planned an information morning for local SLTs in February 2024. We intend to donate the rest of the devices to local SLT services during this morning. This will also achieve our goal of upskilling local services by providing them with the equipment that they can use with their patients, resulting in more accurate referrals to our service, which in turn results in better patient outcomes and better use of staff time



Diagram B shows the new proposed process for long term loans, with the changes proposed here in orange.

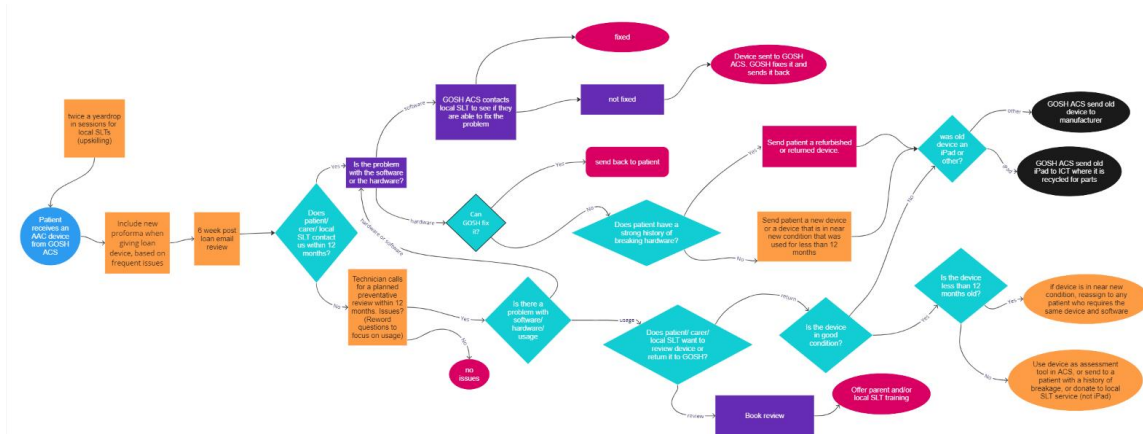


Diagram B, see appendix for more detail

### Measurement:

#### Patient outcomes:

We will send a six-week follow up email to remind parents to contact the department if there are issues. We will calculate how many local SLTs and/or parents contact us after receiving the troubleshooting proforma and email, to be included in PPM stats next year.

We are reducing the PPM timeframe to one year and will measure the effect by calculating the increase in the number of devices being actively and functionally used during our reviews. Data to be included in future updates to Diagram C (see results section)

While more challenging to measure, additional potential patient benefits are highlighted in the results section.

#### Environmental sustainability:

We have calculated how many devices:

- are currently loaned per year: 32
- are returned to the manufacturer due to being defunct: 3
- recycled via ICT department: 3
- donated to other services: 0

We will recalculate all this data in a year's time.

We have calculated the number of courier journeys, distances travelled, cost and emissions related to repairing devices and iPads. On average, there are 15 courier journeys a month of 10.4 miles made to patients (156 miles / month).

We have calculated the cost and emissions related to sending devices (non iPads) back to their manufacturer to repair and to recycle. This ranges from 0.29kgCO<sub>2</sub>e per journey to our closest

manufacturer in Grantham, UK, to 6.66kgCO<sub>2</sub>e for devices returned to Stockholm, Sweden. We hope to see a reduction in courier journeys with our troubleshooting support changes.

#### Economic sustainability:

- Calculated inappropriate referrals 25/64 rejected and accepted with appointments that did not lead to giving high tech device appointments: 10
  - We will measure the above two outcomes in a year's time and hope to see a reduction. We don't currently have a figure for the cost benefit.
- We have calculated how much each ipad/ device costs. We will review saving in one year by reissuing iPads that were identified as being unused during our shorter PPM timeframe
  - iPads: £825 - £1450 depending on software installed.
  - High tech device: £2295 - £6291 depending on manufacturer, software and access method.
- Currently the cost of couriers to and from patients for repairs is £272.94 per month (based on an average of 15 courier journeys of 10.4 miles - 156 miles/month total)
- Currently, sending the device back to the manufacturer is free if returning for parts, or approximately £20 to courier.

#### Social sustainability:

- Calculated inappropriate referrals 25/64 rejected and accepted with appointments that did not lead to giving high tech device appointments: 10
  - We will review in 1 years' time reduction of inappropriate referrals and explore if this is linked to upskilled local SLTs. We will collect data regarding local SLT satisfaction and self-rating of skill via questionnaire.
- Currently check in emails, phone calls and troubleshooting support (including returns to the manufacturer) take an average of 80 mins per week. We will measure how much time is taken for this purpose in a year's time.

#### **Predicted Results:**

##### Patient outcomes:

By conducting the PPM review in 12 months instead of 24 months, we predict we will identify technical or usage problems sooner. This means we will review the patient who is no longer using their device sooner to identify a more suitable communication system to meet their new needs. This will bring positive benefits to patients as they will spend less time without a functioning communication device, leading to improved patient communication both at home and in the classroom. This has benefits for patients socially, which will result in improved patient wellbeing and education attainment.

In the long term, we expect to see a decrease in items returned to our service as we are identifying technical and usage issues earlier and problem solving these to improve device usage for our patients, so they can communicate effectively. However we predict that in the short term, we will see an increase in returns as we will identify devices that are not currently being used because they need repairs, troubleshooting or to be repurposed. Through this process, the number of iPads and



devices being used by patients will be higher, as unused ones are identified earlier and therefore reissued to patients who will benefit from their use.

Environmental sustainability:

Since commencing this project, we identified that one of the iPads that had been returned and was designated to go into our inventory (assessment / not used regularly) was almost brand new and therefore we agreed that according to our new process, it would be designated to a new AAC user. This has now been sent to a recently assessed young person. Reusing this 1 iPad has resulted in a saving of 82 kgCO2e and reusing its software (Grid for iPad) has resulted in saving 52.4 kgCO2e. This has saved us £1,450 + VAT.

Table 1 shows projected financial and environmental impact of implementing our proposed process (assuming a similar number of iPads and devices (34) is required to the previous two years). We have assumed that for each repurposed device we will also be able to reuse the software.

		Without Intervention			With Intervention			Change		
		#	£	kgCO2e	#	£	kgCO2e	#	£	kgCO2e
Additions	New Purchases	32	44,800	3,866	28	39,200	3,383	(4)	(5,600)	(483)
	Re-Purposed	2	-	-	6	-	-	4	-	-

Table 1: Comparison between predicted financial year 2023-2024 with and without intervention

It shows that by repurposing more iPads/ devices, based on a conservative estimate of 4 additional returns a year we would be saving £5,600 per year, and be reducing our emissions by 483 kgCO2e per year.

By improving our PPM process and by introducing our preventative troubleshooting proforma, we are also aiming to

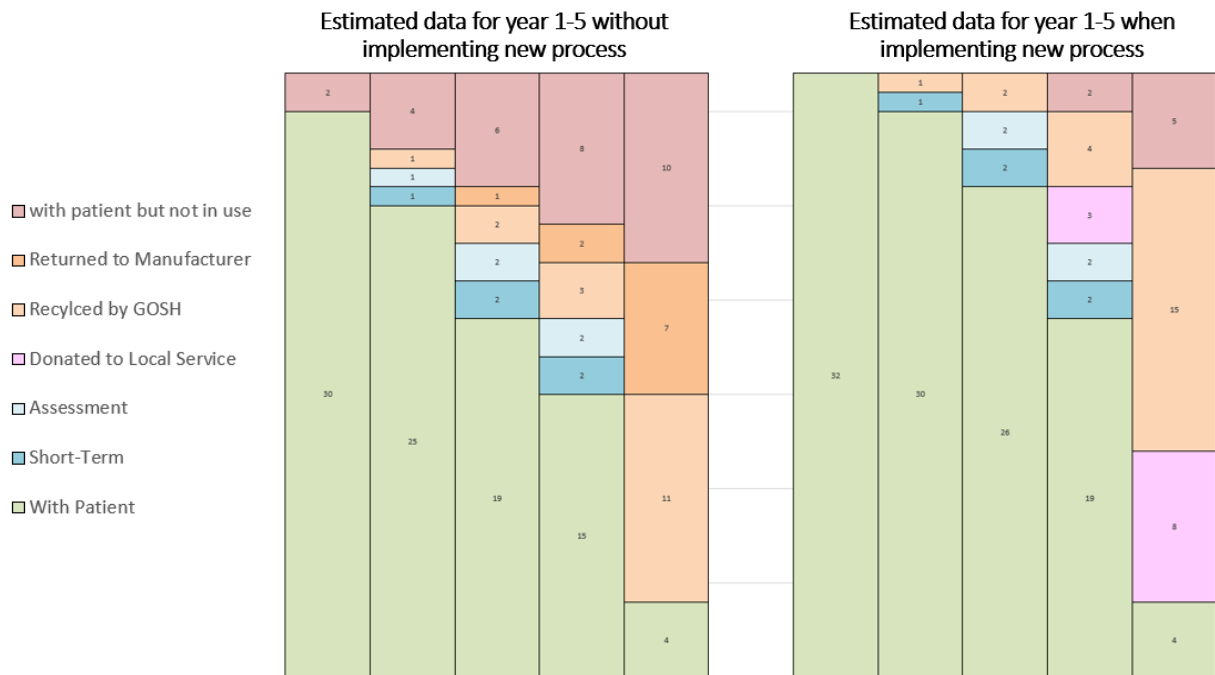
- initially increase the number of returned iPads/ devices to 40% (N=13) of our annual purchases to ensure defunct devices aren't sitting unused, but are either reused or recycled. Donating these devices to local services rather than having them couriered back to their manufacturers has saved approximately 24.68 kgCO2e in transport related emissions for GOSH, however in the long term the local service will need to send the device back to the manufacturer at the end of the device's lifespan.
- Reduce the number of courier journeys to have items repaired. Reducing the current number of items we repair by 1 iPad per fortnight would result in a saving of 289.4 kgCO2e and £473.10 per year.

In total, this is a total projected saving of **£6,073 and 772 kgC2e**, equivalent to driving 2,280 miles in an average car. In a year's time we will evaluate if we have achieved these savings.

iPads use a lot of rare resources such as lithium, gold, silver and neodymium. By reusing hardware, we are reducing the resource depletion involved in the manufacturing of iPads, thus reducing our environmental impact further.

Diagram C shows a comparison of projected outcomes for a typical set of 32 iPads and devices over a 5-year lifespan.





**Social sustainability:**

By introducing our troubleshooting proforma and six-week follow up email, we are expecting the number of troubleshooting calls to our service to drop by 20 minutes/week. This would equate to 60 minutes of clinician time saved per week, including the admin involved, that could be used more efficiently.

By donating old devices to local SLTs rather than sending them back to the manufacturer, we are giving them resources they would not otherwise be able to afford, which they can use for their own training, as well as using to trial with their patients, who may further down the line become our patients. We do not currently have data to evidence this, but will be collecting this through questionnaires.

To support our longer-term aim (to increase local service training to empower local services and reduce patient reliance on our service for troubleshooting) we will be running two drop-in sessions per year where local services can come to learn about our role and our service, but also come and explore the devices in our inventory. We will be collecting data through use of questionnaires at these learning days. Upskilling local services, by donating devices to local services we are not only improving patient outcomes, and reducing GOSH staff time spent with appropriate referrals, but also improving resources and training for local SLTs.

**Discussion:**

We began this project by looking at our current device loaning process and identifying areas of weakness and waste. We identified 4 key areas that we could change and made predictions about how this may affect patient and sustainability outcomes. Over the next year we hope to collect data to evidence our predictions.





By changing our process to reissue iPads and devices that are near new and in good working condition, we have potential to improve patient communication outcomes while reducing financial and environmental waste associated with hardware and software. By donating outdated but functional devices to local services that we support, we are choosing a more sustainable approach to dealing with waste (reusing > recycling) while improving social outcomes by upskilling the local services that we work with, providing them with equipment that they wouldn't otherwise have access to.

Ideas to explore through further research:

- We have now identified further gaps in our baseline data which we have created a proforma to collect during inventory stocktake and during PPM reviews (Appendix C)
- Whether the reuse process or elements of it be replicated for other SLT services at GOSH. For example, the cochlear implant team and the voice team use equipment such as implants and amplifiers. We plan to support them to look at their current processes to see if there are parts that can be streamlined or changed to increase sustainability without impacting on patient outcomes negatively. Could the proforma in appendix C be used for data collection by the other services too?
- Exploring ways that the procurement process could be challenged to not rely on companies that are willing to invoice us, which is likely to result in better economic choices.
- Increasing the number of school appointments rather than making families come to us, which may result in fewer necessary appointments. We've had an increasing number of appointments where we end up doing a second or third assessment at the child's school due to the child behaving unnaturally in the unfamiliar hospital environment. For children without heavy access needs (i.e. who do not require extra mounting or eye gaze/switch access to their screen), it may be possible to have the first appointment at school. This may lead to a less efficient use of staff time and equal emissions due to travel in the short term, but better use of our time and fewer emissions if we don't have to schedule further follow up appointments.
- Exploring more sustainable returns methods, e.g. using green vans or bicycle couriers where possible.
- Assessing future procurement decisions, if choosing between a device that is manufactured in the UK vs Sweden, if the two devices present equal outcomes for the patient, consider purchasing the one manufactured in the UK to support the local economy as well as reducing the emissions associated with sending the device overseas each time it needs to be repaired.
- Exploring how future QI projects could best seek input from external team members when appropriate to enhance the outcome. Two SLTs from completely different teams and specialisms worked on this project, and it has been refreshing to have an external perspective on the processes that the immediate ACS team may not have considered regarding ingrained processes and culture.



## Conclusions:

This project has allowed us to recognise that by making some simple and achievable changes to our current device loaning process, we can improve patient outcomes while increasing our environmental sustainability, economic sustainability and social sustainability targets. It has allowed us to streamline the process, highlighting the data that we are currently missing and need to find methods of collecting. It has helped us to recognise ideas to further our own journey towards sustainability while also improving the efficiency of our sister services in voice and cochlear implants.

This is the start of an ongoing project for our team. We are still in the process of collecting essential data and making predictions based on the changes that we have already started to implement over the last 3 months. We are optimistic that our service is travelling in the right direction to achieve our sustainability goals.

## References and Resources

1. Doak, L. (2021), Rethinking family (dis)engagement with augmentative & alternative communication. *J Res Spec Educ Needs*, 21: 198-210.
2. Light, J. & McNaughton, D. (2015) Designing AAC Research and Intervention to Improve Outcomes for Individuals with Complex Communication Needs, *Augmentative and Alternative Communication*, 31:2, 85-96
3. Moorcroft, A., Scarinci, N., & Meyer, C. (2019). Speech pathologist perspectives on the acceptance versus rejection or abandonment of AAC systems for children with complex communication needs. *Augmentative and Alternative Communication*. 35:3, 193-204
4. Smidt, A. & Pebdani, R.N (2023) Rethinking device abandonment: a capability approach focused model, *Augmentative and Alternative Communication*, 39:3, 198-206

## Appendices

- a) Diagram A [original process, Visual Workspace for Innovation \(miro.com\)](#)
- b) Diagram [BACS long term loan device monitoring, Visual Workspace for Innovation \(miro.com\)](#)



c)

	Period	Baseline	2023	2024	2025	2026	2027	2028	2029
	Start	Apr-22	Sep-23	Jan-24					
	Finish	Apr-23	Dec-23	Dec-24					

**Held by GOSH**

Starting Inventory	80	82	0	0	0	0	0	0	0
New Device Purchased	32	13	24	24	22				
Returned in Reusable Condition	2	1	8	10	12				
Returned in Recyclable Condition	6	1	8	10	12				
<b>Additions</b>	<b>40</b>	<b>15</b>	<b>40</b>	<b>44</b>	<b>46</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Given to Patients	32	1	8	10	12				
Donated to Local Service	0	12	1						
Recycled by GOSH	3								
Returned to Manufacturer	3	13							
<b>Disposals</b>	<b>6</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Closing Inventory	82	0	0	0	0	0	0	0	0
<i>for Short-Term Loans</i>	54								
<i>for Assessments</i>	28								

**Held by Patients**

Starting Inventory	146	0	0	0	0	0	0	0	0
Given to Patients	32	1	8	10	12				
Returned in Reusable Condition	2	1	8	10	12	0	0	0	0
Returned in Recyclable Condition	6	1	8	10	12	0	0	0	0
Not Returnable / Written-Off	0	0	0	0	0	0	0	0	0
Closing Inventory	176	0	0	0	0	0	0	0	0
<i>Used for Intended Purpose</i>	<i>A</i>	0	0	0	0	0	0	0	0
<i>Not Being Utilized Effectively</i>	<i>B</i>		16						

## 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
<input type="checkbox"/> Patient involvement and/or appropriate information for patients - to raise awareness and understanding of intervention <input type="checkbox"/> Staff engagement <input type="checkbox"/> MDT / Cross-department communication <input type="checkbox"/> Skills and capability of staff <input type="checkbox"/> Team/service agreement that there is a problem and changes are suitable to trial (Knowledge and understanding of the issue) <input type="checkbox"/> Support from senior organisational or system leaders	<input type="checkbox"/> clear guidance / evidence / policy to support the intervention. <input type="checkbox"/> Incentivisation of the strategy – e.g., QOF in general practice <input type="checkbox"/> systematic and coordinated approach <input type="checkbox"/> clear, measurable targets <input type="checkbox"/> long-term strategy for sustaining and embedding change developed in planning phase <input checked="" type="checkbox"/> integrating the intervention into the natural workflow, team functions, technology systems, and incentive structures of the team/service/organisation	<input type="checkbox"/> Dedicated time <input checked="" type="checkbox"/> QI training / information resources and organisation process / support <input type="checkbox"/> Infrastructure capable of providing teams with information, data and equipment needed <input type="checkbox"/> Research / evidence of change successfully implemented elsewhere <input type="checkbox"/> Financial investment	<input type="checkbox"/> aims aligned with wider service, organisational or system goals. <input type="checkbox"/> Links to patient benefits / clinical outcomes <input type="checkbox"/> Links to staff benefits <input checked="" type="checkbox"/> 'Permission' given through the organisational context, capacity and positive change culture.