Progress Report

Name of Organisation: Centre for Sustainable Healthcare

Project Title: Triple C: The Triple Bottom Line for Community Cataract Services

Project Start Date: 1st May 2018

Dates covered by report: 1st May 2019 to 31st October 2019

**Innovation Idea**

*Please copy the 100 word summary of your innovation idea here from section 2.3 of your proposal.*

The **‘TRIPLE C’** project developed a web-based audit tool called Eyefficiency facilitating capture of routine cataract surgical data, e.g. number of staff, costs, and instruments used.

Using this data, the tool calculates carbon and monetary cost per case. Users can benchmark their cataract surgical services against all other users’ (de-identified) inputs, comparing services in terms of surgical productivity (cases/time or cases/physician), costs, and carbon footprint.

This complements Cataract Surgical Rate (CSR), Cataract Surgical Coverage (CSC) and Cataract Surgical Outcomes and provides the first global tool for community cataract surgical services in terms of social, economic and environmental impact (the triple bottom line).

**Summary progress against objectives**

*Please summarise key areas of progress against your project objectives as outlined in section 3.1 of your proposal. Progress against objectives should be itemised in the implementation tracker, separately along with explanations of any significant variances. Please provide two key highlights from the project period.*

The main objective of the scaling-up phase of Triple C is to improve the functionality, accessibility and applicability of the Eyefficiency tool.

## Second round of beta testing

The second round of beta testing ran during April and May 2019. As during the first beta testing round, the beta sites were asked to use the time and motion Eyefficiency App for one week of consecutive recordings or 30 consecutive surgical operations. Since the website had been updated, we also asked them to re-enter their hospital specific data on the Eyefficiency website. To ease the process of the latter, we provided the sites with their hospital data from the first testing round.

Nine beta sites – 1 site each in South Africa, Swaziland, Chile, Hungary, New Zealand, India and UK and 2 in Mexico – completed the second round of beta testing successfully. As last time, the site in the US started using the Eyefficiency App but did not use the Eyefficiency website. The beta site in Guatemala, which had participated in the first round, dropped out.

Following the second round of testing, the Eyefficiency team analysed the data and the site reports which were automatically generated by the website when entering the hospital data and uploading the time-and-motion studies. The individual site reports described visually each beta site’s results and benchmarked them with the beta site groups’ average – please see attached a copy of the site reports.

Any site data which raised some questions were followed up during skype feed-back calls and by email.

A summary of the results of the time and motion studies and the website site entries was presented during the 7th Annual Scientific Congress of the College of Ophthalmology of Eastern, Central and Southern Africa (COECSA) in Kigali on 21st-23rd August 2019, the Council of Members meeting of the International Agency of Prevention of Blindness on 7th-8th October 2019 and during the Annual Congress of the Royal Australian and New Zealand College of Ophthalmologists on 8th to 12th November 2019. Table 1 below sums up some of the results.

Table 1: Summary results of beta sites – second round of testing

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Beta sites** | **Cases monitored (No)** | **Cases per hour per bed** | **Waste per case (kg)** | **Total GHG/case (kgCO2e)** | **Total cost/ case (£)** | **Total cases/ year (No)** | **Total GHG/ year (kgCO2e)** |
| Mexico 1 | 30 | 1.44 | 0.67 | 114.4 | 162.35 | 4,414 | 505,000.19 |
| Mexico 2 | 31 | 0.87 | 1 | 120.92 | 365.75 | 1,128 | 127,734.61 |
| Chile | 50 | 4.48 | 0.94 | 85.72 | 69.69 | 1,002 | 85,905.21 |
| Swaziland | 32 | 2.01 | 0.19 | 98.37 | 66.29 | 862 | 82,312.39 |
| South Africa | 45 | 1.03 | 0.44 | 54.21 | 76.51 | 2,210 | 119,253.31 |
| India | 187 | 2.11 | 0.23 | 40.78 | 31.55 | 47,102 | 1,900,529.35 |
| New Zealand | 38 | 1.65 | 2.2 | 122.53 | 404.65 | 565 | 69,232.82 |
| Hungary | 37 | 4.13 | 1 | 129.71 | 281.54 | 1,630 | 209,869.33 |
| UK | 40 | 1.82 | 4.17 | 67.42 | 211.75 | 4,792 | 323,082.60 |

Lead structural engineer Cassie Thiel and ophthalmologist and tool developer Dr Peter Thomas are currently working on a more in depth analysis of the data looking at variation among the time and motion studies, differences in results between different types of cataract surgery (Phaco, MSICs) and differences in productivity metrics (cases/hr/bed vs cases/hour/surgeon). The results will feed into the final design of the site report and journal publications.

As after the first round of beta testing, a beta site feed-back survey was sent out as soon as the second round of testing had finished and the sites had time to review their reports. Compared to the previous round of testing the beta site feed-back survey was shorter. The questions focussed on the ease of use of the tool, the report format in respect of usefulness of information and the usefulness of the tool in catalysing change. The sites were also asked about computer and wifi access in their surgical units in preparation of the development of the App as a web-based tool.

5 beta-sites filled in the feed-back survey this time round, which included the beta site in the US which had only used the App but not the website and the site in Guatemala, which did not participate in the second round of testing. So, we only included the 3 sites in the evaluation which used the Eyefficiency App **and** website during the second round of beta testing.

3 out of 3 liked the ‘look and feel’ of the website and 2 found it easy to use. 3 out of 3 liked the ‘look and feel’ of the App, found it easy to use and would be able to use it regularly. 3 out of 3 thought that colleagues would also find the tool easy to use. And 2 out of 3 would recommend the tool to their colleagues. The other site had not decided if they would. 2 out of 3 were satisfied with the technical support they received during testing, 1 was undecided.

3 out of 3 found the report easy to understand and would discuss the results with their manager/ administrator. 2 out of 3 mentioned that it helped them identify ways in which they could increase the number of cases in the theatre and reduce costs per case. 3 out of 3 thoughts that it helped them to find ways to reduce the carbon footprint per case.

There were a couple of suggestions of what additional elements sites would like to see integrated in the tool:

* The option of changing language for use.
* The option of being able to go back to the previous step to change the information without wasting the elapsed time, which has been added now.

The first suggestion is reflecting that the feed-back survey has been filled in by 2 sites in South and Central America. The language issue has been raised before during the skype feed-back calls.

The sites also mentioned interventions they developed before or after the second round of beta-testing to improve productivity and/ or to reduce carbon emissions and costs. Please see below the list of potential changes in the Annex.

As after the first round of beta testing, the Eyefficiency team arranged for skype catch-up calls with the beta sites in addition to the feed-back survey. 6 out of 9 sites agreed to a call. Apart from one, none of the beta sites which took part in a skype call had filled in the feed-back survey. The skype meetings were held between the CSH programme manager Ingeborg Steinbach and lead ophthalmologist Dr Andy Cassel-Brown and the local beta site point person and/or lead ophthalmologist. The interviews typically lasted 30-60 minutes and allowed for a more informal feed-back session and enabled our team to discuss some of the data which has been recorded by the sites. Most of the site specific context, was picked up during the skype calls after the first round of beta testing.

In general, all the sites agreed that App and website were much slicker and user friendly after the technical update.

Issues which were picked up concerned

difficulties in working out how to view and download the site report from the website.

the upper limit for some data entries set on the website needed revising.

the question ‘In a typical week, how many hours is a typical cataract OT completely unused ’ still extracted a lot of incorrect answers.

data was not pulled into the calculation correctly.

In combination with the actual data analysis, the feed-back survey and catch-up skype calls enabled us to resolve any data entry issues, improve the Eyefficiency App and website and their reporting.

Since the completion of the second round of beta-testing, App and website have received another upgrade. A function which was still missing has been added. Beta-sites will now be able not only to benchmark themselves against the global average, but also against their previous audit round. This function will allow them to monitor their own progress towards more productive cataract surgery with a lower environmental impact and less costs.

Eyefficiency Tool

The Eyefficiency platform has now been migrated to its final architecture. The website has undergone further improvement and includes the ability to perform time-and-motion studies via a web browser rather than a dedicated app if preferred. The website now supports:

1. Collection of unit-level sustainability data (including estate, surgical equipment, staffing data).
2. Collection of time-and motion studies.
3. Analysis of individual or a collection of time-and-motion studies against regional or global averages.
4. Analysis of efficiency, productivity, carbon footprinting, training, and case mix data against regional or global averages.
5. Ability to perform multiple audits to determine if changes to practice have had an impact on unit performance.

The app has been completely reworked, and now supports the performance of time-and-motion studies for intravitreal injections as well as cataract surgery. The app synchronises seamlessly with the website, allowing time-and-motion studies to be resumed in the event of a smartphone crash. The new design allows rapid development of time-and-motion studies for new types of operating lists and medical procedures on the website. These new studies automatically become available to app users without manual download.

Launch of the completed Eyefficiency platform is planned for October 2020. All functionality is now present in the system, and development prior to launch will focus on usability and visualisation. The beta testing rounds so far have allowed us to develop a good normative dataset against which new units can benchmark their performance. Agreements are currently in place to fund maintenance and hosting of the platform through until August 2021, with a small budget for ongoing development. The final architecture has been developed with sustainability in mind – the platform can continue to be offered at minimal cost in the medium-term.

## Partnerships and engagement

The team has continued to regularly update the IAPB Environmental Sustainability Working Group (ESWG), now rebranded into the Climate Action Work Group, about the progress of the Triple C project.

Following peer review, the team has submitted a revised manuscript on the Eyefficiency data collection and carbon calculation methods to a ‘Sustainable Healthcare’ special issue of the academic journal Resources, Conservation and Recycling (RCR). The manuscript is expected to be officially published, pending word from the editors, within two months time. Once published, this article will serve as a reference point to the methods behind the Eyefficiency tool. RCR was chosen as it is a highly ranked environmental engineering journal (impact factor 7.044) that is indexed with SCOPUS and other journal databases. The special issue represented an opportune time to have Eyefficiency published side-by-side with other important work in medical sustainability.

In addition to the methods paper for RCR, the Eyefficiency team is currently constructing a manuscript to publish the results of the beta test rounds. The intent is to receive peer review on our approaches for constructing individual units’ reports, as well as the global averages. Though we have not selected a specific journal yet, we intend to submit this to a medical-based entity, such as PLoS Medicine or BMJ Open.

The Eyefficiency team have continued to re-engage with the BOOST programme since the last report and right up to the current time. This engagement has been facilitated by the Eyefficiency lead ophthalmologist being appointed (mid-2019) as Medical Director with Fred Hollows Foundation (FHF) who support the BOOST Consortium, and he has become a Co-Investigator with the BOOST programme. Both BOOST and Eyefficiency teams are clear there are potential advantages and disadvantages, both cultural and technical in merging the 2 systems. Currently the two apps remain completely separate but mutually supportive. FHF is now keen to explore potential support for further development of the Eyefficiency tool prior to and beyond its planned global launch in Oct 2020. FHF have entered discussions over potential merge of the two tools or more likely over developing a “Software suite” or more likely a platform which can combine other relevant software programmes eg cataract referral pathway mapping. The possibility of this platform being linked between Eyefficiency’s digital technical expert/Moorfields and FHF/Australia is also being explored as is a social enterprise model.

Financial commentary

*Please provide a commentary on your spend against budget. Your actual spend against target should be itemised and recorded separately in the budget tracker with explanation of any variances greater than 10%. Please highlight any threats to you being able to complete your project on budget. Please advise on any significant budget efficiencies or savings[[1]](#footnote-1). Please indicate whether you intend to make any significant budgetary reallocations across your budget.*

The actual costs vary from the budgeted costs as follows:

We had asked for permission to use US$5,000 allocated as payment to beta sites to support 2 of the beta sites – India and South Africa – to attend the IAPB Council of Members meeting in Dar-es-Salaam in October of this year and present their Triple C findings. These two sites have also been part of the Triple C pilot phase.

Unfortunately, only one of the sites – India - was able to attend the IAPB Council of Members meeting. Vengadesan’s attendance was invaluable. He joined a pre-Council of Members meeting workshop of the IAPB Environmental Climate Action Working Group (ESWG) on developing a strategy for the IAPB ESWG to embed sustainability into IAPB regional programmes, e.g. Africa and the Western Pacific, which will include Eyefficiency as one of the research components. Vengadesan was also nominated as one of IAPB’s Eye Health Heroes 2019.

US$2,427 was spent on his travel, accommodation and subsistence allowance, which leaves US$2,573 in the budget.

There is an additional US$913 left in the expenses budget.

If possible, we would like to request for the left-over funding to be used for the maintenance, hosting and small ongoing developments of the tool which would support the tool until August 2021.

Key risks or concerns

*Please highlight any key risks or concerns that (a) may threaten project delivery and (b) that may impact the success of your innovation idea. Please consider the following areas of risk:*

* *Project risks: risks or problems associated with the implementation of your project plan (e.g. personnel changes, administrative problems). Financial risks should be explained in the financial commentary above.*
* *Product risks: risks relating to the successful development of your innovation e.g. technical issues*
* *External risks: risks to the success of your innovation that originate from the external environment (e.g. regulatory changes, markets risks such as the entrance of competitors).*

There are potentially 2 risk which are not resolved yet.

The Eyefficiency App and website had another upgrade and the web-based App has been developed after the last round of testing. We don’t know yet if the upgrade has introduced any bugs or technical issues. However, we currently have a scholar in sustainable Ophthalmology who is rolling out the tool in 5 surgical units in Wales. This will allow for any bugs or technical issues which might have been accidentally introduced during the upgrade to be picked up and fixed.

The second risk is the sustainability of the audit tool. We have not yet confirmed an organisation which will have capacity and willingness to host and maintain the tool. However, FHF is exploring further development and support of the tool.

Key lessons learnt

*Please highlight any key lessons from the reporting period. Is there anything you did not expect that has occurred? Is there anything that encourages you or confirms your view that the innovation can have impact? Are there any lessons you believe would be worth highlight more widely to external parties? Is there anything that has changed your view of the definition of success for your project?*

Cataract surgery is the most commonly performed medical procedure in the world but there continues to be a large, unmet requirement for more surgery. Moreover, climate change is nearing crisis point and with global healthcare contributing 4.4% to global net emissions, the healthcare sector needs to find ways to mitigate its global warming impact.

At the outset of this project, there was no audit tool which facilitated the capture of routine cataract surgical productivity, solid waste, carbon, and cost-related data which could be used for global benchmarking, learning, and improvement. The Eyefficiency audit tool has filled this gap and provides surgical units with the relevant information to identify opportunities to minimize the carbon footprint of cataract surgical services and increase access to cataract surgery for patients worldwide.

With any audit tool, it is important to find the right balance between being general enough so it can be used by the majority of cataract surgical units across the world, but also providing specific enough information to catalyse change on the ground.

We think that the audit tool has been able to achieve this. Having sites from across the world participating in the beta testing, helped to develop a universal tool. The feed-back surveys complemented by the skype calls after each round, were an effective way to gather site specific information and variation which informed the development and improvement of the tool.

So far, we have been unable to assess the sensitivity of the tool in picking up the impact of any changes the surgical teams implemented during consecutive rounds of audits, due to the data entry or calculation errors and the technical tool update after the first round of testing. However, our current Ophthalmology scholar who is rolling out the tool in Wales will run two audit cycles and therefore be able to evaluate the tool’s responsiveness to change.

There has been a clear response from the beta test sites that this is a very valuable tool as it is the first time, they have been able to collect and analyse data and draw systems improvement conclusions. Teams have been equally engaged with discussions over productivity gains, cost and carbon footprint reductions with some sites already planning when to re-do the audit for the third time at a later stage. For most sites, it is the first time they have started thinking about the broader impacts of healthcare including the environment and their responsibility in addressing these.

From a technical perspective, we have unified the app and website into a single system. This has drastically reduced the effort and cost of further development, and made it substantially more user friendly than our initial approach of an independent app and website.

Priorities for the next reporting period (if applicable)

*Please highlight your priorities and key activities for the next reporting period.*

***After scaling-up phase***

Fred Hollows Foundation is now keen to explore potential support for further development of the Eyefficiency tool prior to and beyond its planned global launch in Oct 2020. FHF have entered discussions over potential merge of the two tools (Eyefficiency and BOOST) or more likely over developing a “Software suite” or more likely a platform which can combine other relevant software programmes eg cataract referral pathway mapping. The possibility of this platform being linked between Eyefficiency’s digital technical expert/Moorfields and FHF/Australia is also being explored as is a social enterprise model.

Until we receive confirmation concerning further support and development of the Eyefficiency tool we would like to – with the approval of SIB - use the left-over funding for the maintenance, hosting and small ongoing developments of the tool which would offer support until August 2021.

See Annex on next page below.

**Annex – Actions/ changes to improve productivity and/or reduce cost and carbon developed by some of the beta sites**

**Reduce**

1. Motion sensor controlled taps
2. Stop putting topical anaesthetic drops on the trolley for cataracts. They have been instilled in the anaesthetic room, and the patient is about to get intra-cameral lidocaine, so these additional drops are seldom helpful
3. Stop printing out anything from Medisoft other than prescriptions (surgical record is on the EPR and a lens sticker is stuck on the clinical notes and theatre log book) , letters can go as emails, print out prescription only when needed (when we give Chloramphenicol from theatre it doesn’t even need prescription printed)
4. Stop putting the gauzes into that disposable plastic gauze counting device. This device makes sense for gynaecology but is a total waste of resource for eyes.
5. Only use 1 blade (i.e. use the Keratome for both main incision and paracentesis)
6. Only 1 rycroft.... it is not hard to switch it over
7. Reduce what is 'standard' in each cataract pack and just open additional items per consultant preference:
   1. Identify the minimum standard set any consultant uses currently
   2. encourage everyone to change their practice to that of the lowest-consuming consultant currently
   3. change packs to reflect this
8. Explore with the suppliers about reducing packaging, getting rid of plastic in their packs, or make the supplier responsible for taking the packaging away
9. Waste - Reduce paper and plastic wrapping use:
   1. Pack reusable phaco and sleeve together rather than individually, reduce steripeel pouches by 2 pieces per case.
   2. Pack one small microscope cap with 2 large caps – reduce pouch x 1 per case.
10. Waste - Investigating using metal instrument sterilising boxes:

They do not require wrapping for cataract instruments and phaco handpieces. Would reduce the use of ‘Kimguard’ wrapper (x1) and steripeel pouches (x2) per case.

1. Waste - eRecords: Move to complete computerising documentation of surveillance and anaesthetic audits in 2019.
2. Encourage use of alcohol/ chlorhexidine hand rub between cases instead of scrubbing/ hand washing for nurses and surgeons
3. Equipment - theatre instrument cleaning: Washing of instruments - consider in house water purification/filtering for rinsing since we have changed the pipes - stop using bottled water which will reduce the cost and speed up the process.

**Reuse**

1. Replace anything plastic on the packs with re-useable metal
2. Do not use 'single-use' Malosa instrument unless absolutely essential. Reusable metal instrument to be encouraged again. Such a waste to throw wonderful scissors only used once to cut a suture or even just the Tegaderm!

**Recycle**

1. Three bins in theatre: 1 for clinical waste, 1 for recycling and 1 for landfill (this could be done in clinic also)
2. Are there any companies that anyone is aware of that produce recycled / recyclable alternatives to any of our current products?

**Increase efficiency of patient flow in theatre**

1. Rotate ward staff through theatres and vice versa to improve team working
2. Hired more staff for the operating room so that patient care times before and after surgery were less
3. Human resource - task shifting: Consider using one or two non-nurses supervised by nurses to help patients in and out of bed, re making beds, washing instruments and other non-nursing duties e.g. month end cleaning, checking drug expiry, laundering of mops, curtains and blankets.
4. Recovery area will be expanded to have more patients ready to operate
5. Have next scrub trolley ready when prior case finished to reduce turnover time.
6. Set down of trolleys in the back corridor does not need to be done by a qualified scrub nurse. They should be preparing the next trolley to avoid delays between cases.
7. Stop counting instruments at the end of the case. It is not possible to leave an instrument in the eye or orbit.
8. Stop counting gauzes at the end of the case.
9. Send for the first patient on the list, brought round by ward staff, before the team brief and have them seated in the corridor outside anaesthetic room so they are ready to start as soon as team brief concludes
10. The majority of cataract patients should be classified by the listing surgeon as “not needing to be seen on the ward prior to surgery” - all necessary examination and discussion should take place in clinic and documented. They just need marking on the ward which could be done by our experienced nursing staff and bringing to theatre.
11. Doubled microscope in 2 bed theatre
12. Change from inefficient sterilizing ovens to newer Statim's.

**Speciality specific**

1. Add sustainability initiatives as a standing item for all theatre and team meetings.
2. For oculoplastics - stop using povidone Iodine in anaesthetic room because we  will be using it again before draping.
3. In cases where MIGS can replace trabeculectomy, especially in lower risk / more elderly patients, the average theatre time for MIGS is around half that of a trab and there are indirect benefits of halving the number of post op follow ups.

1. Seeing is Believing policy on savings is as follows. We are happy for partners to make use of budget savings to further project aims and do not expect savings to be remitted back to Seeing is Believing. However, we expect that budget savings be used in relation to the benefit of the innovation Seeing is Believing supports. It cannot be reallocated for other purposes. If no use can be found for the funds consistent with the aims for which they were originally granted by Seeing is Believing, they must be remitted back to Seeing is Believing. [↑](#footnote-ref-1)