

SUSQI PROJECT REPORT TEMPLATE

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Project Title:	Start/End date of Project:
<u>OFFICE BASED BIOPSY CLINIC.</u>	21/12/2021

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Background:

The Covid-19 pandemic has strained the delivery of healthcare on a global scale. Patients suspected to have cancer were amongst the worst affected cohorts due to the limited availability of operation theatre time. In the NHS, operating theatres were not able to function at full capacity due to various constraints. There was a shortage of beds for patients to get procedures done in operating theatres under general anaesthesia (The BMA, 2022). Patients had to wait longer for cancer treatment (Gregory, 2022). In the available theatre time, diagnostic biopsy work was taking quite a lot of time and major cancer operations could not be done in a timely manner. There was a need to find alternative solutions for diagnostic work to delegate more time for therapeutic cancer work in the operating theatre.

During the pandemic, CTMUHB ENT department has purchased new equipment to keep staff safe from aerosol risk. This new equipment had the provision where biopsies could be done under local anaesthetic in a clinic setting. In order to undertake this initiative, training was required. When travel restrictions reduced within the UK, a training opportunity was identified, and relevant training was conducted sequentially at a trainer's clinic in Wigan so that Office Based Biopsy Clinic can be started at our local hospital.

Specific Aims:

The scope of this project was to perform biopsies of the throat in a clinic setting under local anaesthesia. This would reduce bed occupancy, the need for operating theatre time and moreover, improve convenience for patients. The development of lean pathways would reduce expenses for the Health Board and make it more environmentally friendly. Additionally, the secondary aim was to calculate and compare the expenses and carbon footprint of performing biopsies under general anaesthetic and local anaesthetic.

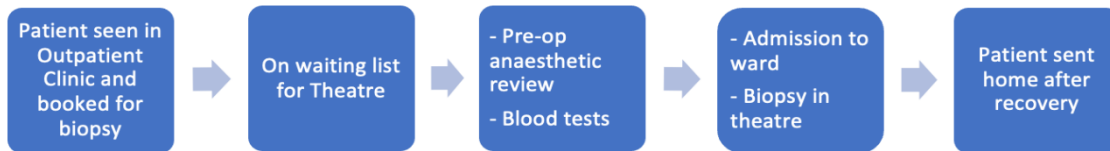
Methods: In the pre-existing Conventional Pathway multiple processes were involved. The fundamental steps required to undertake a biopsy were highlighted and incorporated for the



Novel Pathway (Figure 1). After sufficient training for the selected healthcare professional, the proposed Novel Pathway was discussed initially in departmental meeting. Clinic based biopsies in ENT department were then introduced to CTMUHB.

Design

Conventional Pathway (CP)



Novel Pathway (NP)

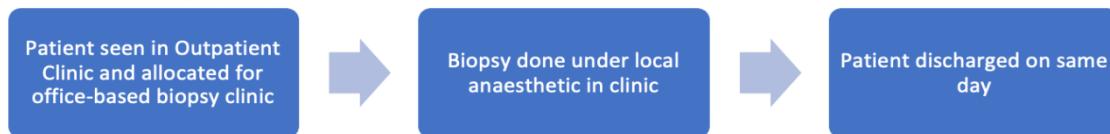


Figure 1: Showing the steps for the Conventional Pathway (CP) and The Novel Pathway (NP)

To measure the sustainability of this new initiative an inventory list of various aspects such as medications, equipment, laboratory investigations and many more have been created on a spreadsheet for CP and compared against NP (Table 1). The two parameters evaluated from the inventory list were used to calculate the cost incurred and the carbon footprint of the various disposables, non-disposables and structural facilities, produced from biopsies performed under general anaesthesia compared to the biopsies performed under local anaesthesia. The financial information was obtained from the health board's finance department regarding the theatre charges. Expenses related to lab charges have been obtained from Greener NHS 20/21 database. The cost for each procedure with reusable scope has been obtained from an article published in Laryngology (Mistry et al., 2020).

Categories	Carbon Footprint (KgCO ₂ e)		Cost (£)		Source of Carbon Footprint
	CP	NP	CP	NP	
Medications	11.96	0	93.40	0	<i>Greener NHS 20/21</i>
Anaesthetic	26.5	4.1	29.76	32	<i>Greener NHS 20/21</i>
Sterilisation	2.25	2.25	40	40	<i>(Rizan et al., 2021)</i>
Equipment	70.88	5.95	155.51	12.95	<i>(SusQI, 2022)</i>
Clinical waste	2.51	0.17	0.95	0.06	<i>(Rizan et al., 2021)</i>
Travel	67.05	22.35	0	0	<i>(Department for Energy Security and Net Zero, 2023)</i>
Blood test	32.4	0	108	0	<i>Greener NHS 20/21</i>
Facilities	62.5	87.08	298.43	94	<i>(Pegg et al., 2022)</i>
Total	276.05	121.9	726.05	179.01	

Table 1: Showing the carbon footprint (kgCO₂e) and cost (£) of CP and NP for one micro laryngoscopy biopsy procedure, respectively.

Measurement:

Patient outcomes: This novel pathway has helped to cut down the waiting times for the patients to get an appointment in the theatre for a biopsy. Traditionally, patients need a Pre anaesthetic check-up first before getting an appointment for a theatre slot. There is approximately 2-3 weeks waiting time for pre anaesthetic clinic appointment after the initial consultation in clinic. If the patient is declared fit in the pre anaesthetic check, they must wait another 2-3 weeks to get a theatre appointment. All the above delays can be surpassed in the NP.

Population outcomes: The NP follows the Welsh Government Principles of Prudent Healthcare delivery, prioritising the patients with greatest need while reducing the waste and unnecessary interventions as part of lean pathways. By this method, more patients can be seen within a given time compared to pre-pandemic approaches.

Environmental sustainability: A hybrid carbon footprinting methodology was used to estimate the carbon footprint of throat biopsies conducted in clinics as opposed to theatres, combining environmentally extended input-output analysis with a process-based analysis. An inventory list was created which lists anaesthetic medications and gases, surgical and anaesthetic equipment, lab investigations, water and clinical waste. Electricity usage in the theatre has been excluded due to lack of data. However, it is included as part of the in-patient bed day and outpatient appointment. Clinical waste generated by both pathways has been weighed and noted separately. Rather than cost, the carbon footprint generated by each pathway from travel was compared. The

maximum distance covered by the health board from where these procedures are conducted is 40 miles. An assumption has been made that an average of 20 miles is taken for patient travel as patients would come from different corners of catchment area. The carbon footprint is calculated using carbon emission factors of various inventory items by referring to databases like www.gov.uk, Greener NHS20/21, and applying them to the activity data collected (SusQI, 2022).

Economic sustainability: The cost involved for medication and equipment have been obtained from the theatre procurement department. Cost of operation theatre codes have been obtained from the finance department of the Health Board. Although the number and roles of staff involved in the CP are vastly different to the NP, their wages are not calculated due to the complexity involved in obtaining their salary scales. As the novel pathway includes fewer staff, this exclusion means the results presented are an underestimate of its reduced financial cost, compared to the conventional pathway.

Social sustainability: With reduced number of journeys for in clinic biopsies, patients and relatives do not lose wages for the time spent travelling and staying at the hospital. This also helps reduce traffic and carbon emission.

Results:

Patient outcomes: Patients have expressed great satisfaction through verbal comments and have sent written compliments after receiving service at this clinic. The patients also felt that this service is very convenient for them as they do not need to undergo the stress of admission process and general anaesthesia. We have applied for formal Patient Reported Outcome Measures (PROMS) and Patient Reported Experience Measures (PREMS) for obtaining formal feedback.

Population outcomes: This project successfully met the initial targets of reducing bed occupancy and better utilisation of theatre time. This service has helped both patients, relatives whilst also promoting for staff well-being.

Although not specifically measured in this project, but pertinent to CTM UHB, people from more deprived areas are not only more likely to get cancer, but they are also more likely to be diagnosed at a late stage for certain cancer types (Roberts, 2023). Reducing waiting times and improving accessibility are important strategies to help address this.

Environmental sustainability: Through data analysis, it was determined that the carbon footprint was 276.05kgCO₂e for biopsies performed in theatres under anaesthesia as compared to 121.9 kgCO₂e for biopsies performed in clinic for a procedure called Micro laryngoscopy and biopsy. The above values show an approximate saving of 154.15kgCO₂e. This value is quite a significant reduction of carbon footprint.

The carbon footprint savings are mainly due to reduction in use of equipment and patient travel in the NP. Patient and attendant travel journeys are reduced significantly from 6 journeys in CP to 2 journeys in NP thereby not only reducing carbon footprint but also reducing road traffic and air pollution. Clinical waste generated through the conventional pathway is calculated as 2340g by weighing the waste in clinical practice. This is in comparison to 154g in novel pathway thereby reducing the clinical waste by 93%. In effect, the carbon footprint for clinical waste is 2.51kgCO₂e in CP whereas 0.17kgCO₂e in NP (Figure 2).



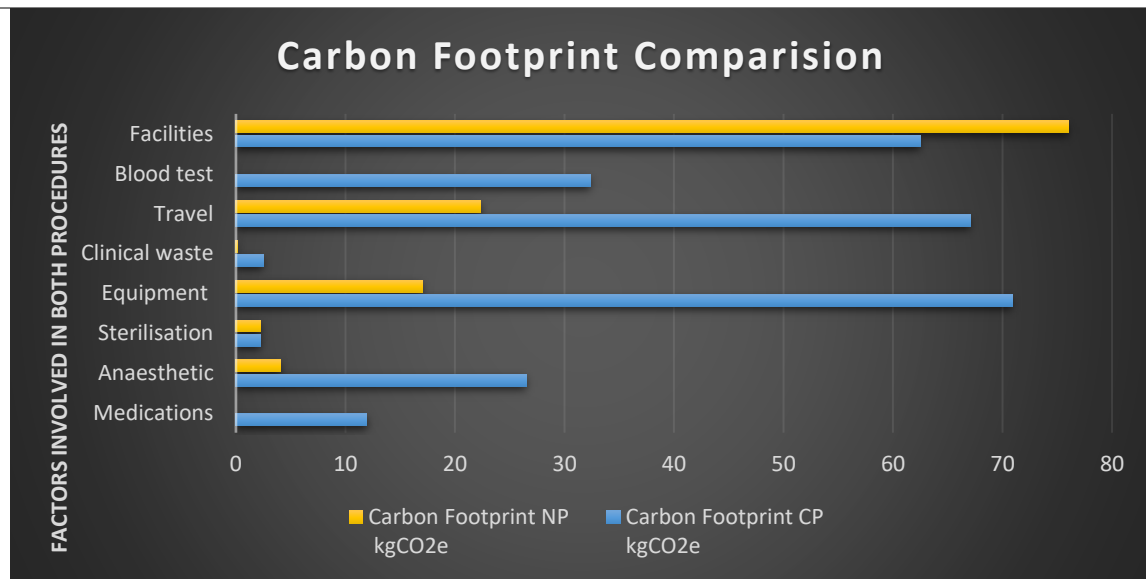


Figure 2: Carbon Footprint comparison (kgCO₂e) between the two pathways

At CTM UHB ENT department in 2021-2022, there were an estimated 50 procedures carried out in the outpatient department using the novel pathway over one year. This special clinic is currently scheduled once every 2 weeks. It is possible that 12% of the entire waiting list for ENT operations can be carried out under this novel pathway. If the clinic frequency is increased to 2 clinics per week, an estimated 300 to 350 outpatient biopsies can be done in the outpatient clinic per year. There are a variety of other procedures done in the clinic in addition to Micro laryngoscopy and biopsy. In this study we have calculated the economic and carbon footprint savings only for Micro laryngoscopy and biopsy. Over a time period of one year, the cost of savings for carrying out 300 procedures in the novel pathway can amount to £164,112. This was calculated by deducting the cost of the novel pathway (£179.01) from the conventional pathway (£726.05) and multiplied by 300. Using the same calculations for carbon footprint, we can infer that a saving of 46,245kgCO₂e can be saved per year.

Economic sustainability: From the inventory spreadsheet, the expenses incurred were calculated for various consumables. The total cost of performing biopsies in theatre under general anaesthetic has costed £726 and on the contrary Office Based Biopsy cost £179 showing a net savings of £547.

Social sustainability: The quantitative and qualitative data on social benefit assessment is yet to begin. It is obvious that this service has made great impact on patients' and their relative's quality of life and contributed for staff wellbeing.

Discussion:

This new initiative of Office Based Biopsy clinic is being developed at other sites across the country at a rapid pace. It has the effect of reducing pressure on theatre capacity. This clinic has been used for carrying out various biopsies from the head and neck, but financial and carbon footprint calculations are done only for micro laryngoscopy and biopsy (MLB). This new initiative has shown that we save 154.15kgCO₂e and £547 by performing a MLB in clinics under local anaesthesia. The carbon savings are likely to be an underestimation as the electricity use in the theatre has been excluded. Studies have shown that electricity use in theatres can be 3-6 times higher than in the rest of the hospital. Having said that, office-based procedures cannot completely replace the conventional method of performing biopsies in theatre. Careful selection of patients, willingness from patient cohort, staff training, and commitment are vital for the smooth running of the service.

The remit of this office-based biopsies is not currently limited to micro laryngoscopy and biopsy but also include biopsies from nose, nasopharynx, tongue base and hypopharynx and biopsies from skin in head and neck area. So far, there has also been successful attempts at completing balloon oesophageal dilatation in the office-based clinic. It is evident that such procedures, which were previously done under general anaesthetic in theatre are currently now being done in clinic. This further extends the sustainability benefits of such initiation to more commonly practised procedures within healthcare.

This project is in an early stage hence to further analyse the data, a formal audit to measure the overall reduction in waiting times needs to be conducted next. The cost calculations for equipment usage were also impractical to formulate for each procedure as this equipment is also used on regular basis for examination of patients in regular clinics. Therefore, it must be considered that the values made for comparison were made on nearest, most accurate calculation based on available data.

Conclusions:

In its early stages, this innovative biopsy clinic has been successfully running in this Health Board since December 2021 and has the potential to be transferrable across other surgical specialities. Therefore, the carbon footprint of secondary healthcare can be vastly minimised which is very promising and sustainable for the future. To enable this outcome, further work is required to reproduce similar results for other biopsies.

References and Resources

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Template References

- [SQUIRE | SQUIRE 2.0 Guidelines \(squire-statement.org\)](#)
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