SUSQI PROJECT REPORT
A GREENER HOSPITAL STOREROOM (AGILE)

Start/End date of Project: 26th September 2023 - 24th November 2023
Date of Report: 23rd November 2023

Team Members:

- Dr Caroline Kendrick (Emergency Medicine Consultant)
- Dr Amy Fantham (Emergency Medicine Junior Clinical Fellow)
- Mr Gary Green (Storeroom Manager)
- Ms Amy Page (Deputy Operations Director)

Background:

The Acute and Emergency Medicine Care Group encompasses the specialities of Acute Medicine and Emergency Medicine. Working with a wide range of partners, both internal and external to the Trust, the Care Group aims to provide high quality emergency care to patients present across the spectrum of acuity from minor injury to major trauma.

Within the Emergency Team we have a keen passion for improving sustainability within the department. We have formed a green focus group aimed at reviewing our practices, with an overall aim of reducing waste and therefore lowering our carbon footprint. Many areas of improvement have been identified and projects initiated. Our overall target is for Sheffield Emergency Department to become a national leader on sustainability within the National Health Service.

Following discussions within the multidisciplinary team, it was highlighted that our main storeroom was a cavern of sustainability improvement opportunities. We liaised with the multiple stakeholders and soon realised that duplication, overstocking and presence of products that were no longer required was an issue within the area.

Our green competition project involved a comprehensive storeroom review. The team comprised Emergency Consultants, Clinical fellows, Management, Nursing Staff, Facilities Managers, Reception Staff, logistics, procurement and other speciality Directorates. Several meetings were undertaken and designated days arranged to review every product within the stockroom. The intention was to determine whether items were still in use within the department, if appropriate amounts were being ordered and how decisions were made regarding when and what to reorder.

As a group we were overwhelmed by the amount of stock present and soon realised the enormity of the task ahead. However, pulling together we became enthused by the changing landscape of the room and numerical results being achieved. The initial figures show that, with only approximately 25% of the stockroom being analysed so far, approximately £1700 could be saved monthly. The overall review of our stock storage has also provided a springboard for many other sustainability project ideas within the department.

In summary our main aim was to get to the source of everything that enters our Emergency Department. We were astonished to learn of the potential long-term cost savings and reduction of waste. This has been a catalyst to raise awareness within the Care Group and therefore push at senior level for an improved focus not only in the Emergency Department but across the whole Trust to improve sustainable practices.

We hope you enjoy our project.

Specific Aims:

To assess current practices of stock management with a goal to reduce unnecessary waste by improving inventory management practices of medical equipment along with patient leaflets to demonstrate economic saving and improved social sustainability.

To use the changes as a beacon for awareness of Green projects happening in the Emergency Department and inspire future sustainability projects and ideas from all staff groups.

Methods:

1. Removal and recycling of unused leaflets within the Emergency Department storeroom
    a. Discussion with Emergency Department consultant group
    b. Identified need to reduce amount of paper from leaflet storage
    c. Dedicated day undertaken to remove obsolete or never used leaflets, these decisions were made by a senior clinician.
    d. A separate project in progress to produce easily available QR codes and pdf versions in favour of physical copies
    e. Leaflets will be arranged and placed in dedicated areas where needed

Image 1: Dr C Kendrick with stack of drawers emptied of obsolete leaflets

2. Review of medical equipment stock items within store room
    a. Multiple stakeholder involvement (ED Consultants, Green clinical fellow, Nursing Leads, ED Operations Director, Logistics Manager, Store Room Manager, secretaries, procurement services & finance etc,.)
    b. Dedicated meetings to arrange stakeholder representative availability over next 12 months
    c. Identify senior clinical leads (Dr C Kendrick, Dr S Reid)
    d. First day dedicated to taking stock of current items stored in A&E Storeroom
    e. Items logged clearly
    f. Identify items that no longer need to be ordered
    g. Identify items that needs to be reduced
    h. Identify other means of sourcing/financing equipment to reduce waste e.g sharing rarely used anaesthetic items with ITU & theatres
    i. Items and changes compared with stock catalogues

3. Identify team working strategies to ensure consistency and delivery of improvements
    a. Plans to fund and implement electronic inventory management systems
    b. Introduction of maximum and minimum stock levels to optimise reordering practices
    c. Re-audit of stock practices in 2025
4. Review of guidelines related to new stock practices

5. Working alongside other directorates to share learning experiences

Measurement:

Patient outcomes:
This project was not designed to directly impact on patient outcomes. However, having a stockroom where life saving equipment is easily accessible is clearly of benefit.

Environmental sustainability:
To demonstrate greenhouse gas emission savings, we firstly opted for a top-down option to convert cost saving into CO2 equivalents (CO2e) using data from Greener NHS 2020/21 database. For medical equipment this is equal to 0.46 $kgCO_2e$ per GBP spent.

To demonstrate the same emission equivalents for reduction in paper waste we chose a bottom-up option, converting weight of paper waste disposal to its CO2e. The value given to us by the SusQI Carbon Modelling Assistant was 0.91gCO2e/kg.

The total CO2 reduction was then translated into miles driven to give the values real-world context. We used data from the UK Government Greenhouse gas reporting: conversion factors 2023 to assess kgCO2e per mile driven in an average car with unknown fuel using emission factor 0.3386 and dividing our entire kgCO2e by this number.

Economic sustainability:
We logged the items that we were going to change and compared these with the central supply catalogue used by logistics staff allowing us to estimate total cost savings.

Social sustainability:
We have developed a Google form questionnaire for before and after our intervention. As the task was far bigger than envisaged the final questionnaire will need to be sent after the storeroom is completely reviewed and therefore results are not available at the time of writing this report. However, details of our pre-intervention questionnaire and anticipated impacts are below.

Results:

Patient outcomes:
Our project was not aimed at directly affecting patient outcomes however we can anticipate indirect benefits for patient care such as:

- Latest equipment and up to date leaflets
- Modernisation of leaflet distribution
- Easier to access leaflets for patient convenience
- Easier to locate vital equipment when needed
- CBRN (hazard exposure) stock reviewed and guidelines updated

Economic sustainability:
During the 10-week project we were only able to analyse and alter around 25% of the store room due to time constraints imposed on the full-time clinical staff completing the project. This said, the changes that have been made when compared to the central stock catalogue, amounted to approximately £1,732.16 per month or **£20,785.92 per year.**

If similar improvements are made to stock ordering patterns throughout the rest of the storeroom, we could be looking at a projected saving of a staggering £83,143.68 per year.

Our data spreadsheets are available on request. These are conservative estimates and are marginally higher if the caveat data is included (see below).

There are some caveats to the data that must be raised. Very early on, it was identified that the spreadsheet supplied to the project team by the logistics personnel had various inaccuracies. For example, a product would state that only 1 item was purchased in an entire year, however we found 150 on the shelf. This is likely multifactorial due to naming of similar items and product reference numbers from the suppliers seemingly providing different items that are functionally identical. We have remedied this by manually counting items in cases where the spreadsheet did not at all match the actual stock. The saving was calculated from the difference between current stock levels and the newly implemented minimum stock levels.

Similarly, there were items in the storeroom that had no data regarding current reordering practice. In such cases it was assumed that stock was maintained at the stock levels found, and again, savings were calculated from the difference between current stock and new minimum stock levels. Despite

this limitation, we feel the steps taken to ensure accurate data was analysed are appropriate and ultimately demonstrate valid results.

Environmental sustainability:
This particular project really lends itself to a top-down analysis of carbon footprinting as it pertains mainly to economic change. As documented above, when the cost saving projections are translated to carbon equivalents for medical equipment, we expect to save a staggering **10,809.84 kgCO2e** per year from just 25% of the storeroom being assessed so far.

To put this in perspective this is what an average car would produce when driving 28,539 miles. Or, more plainly, three quarters of the way around the circumference of planet Earth.

The other part of the project, the review of paper leaflets yielded an additional reduction of 62 kgCO2e per month in paper by weight due to no longer ordering this weight of paper.

Image 2: Stacks of items removed from the store room

Our data spreadsheets are available on request.

Social sustainability:

Before starting the project, staff feedback was largely that the storeroom was cluttered, intimidating and made it challenging to find items needed. Staff also commented they think about the amount of waste generated in emergency medicine at least once a month, with a majority every week. On a scale of 1-10, the importance of working in an environmentally friendly department was rated as 8.8. As a result of the project, we anticipate a more organised storeroom and inventory control system will help facilitate saving staff time and improving the overall user experience. **We will re-survey staff on completion of the project.**

Due to the realisation of the enormity of the task inherent to revamp the entire Emergency Department store room, the project is not yet complete and thus we have been unable to send out

a questionnaire to gauge staff feedback of the improvements. We aim to send out the post-project questionnaire when the project is 100% complete in approximately 6 months time.

We anticipate in the long run, that a more organised storeroom and inventory control system will help facilitate saving staff time and improving the overall user experience. Our data spreadsheets for social feedback collated so far are available on request.

Images 3 & 4: Before and after

Image 5: Neater shelves after work

There is a much stronger and closer working relationship forming between the clinical, administrative and logistical staff groups using the storeroom which can be directly attributed to this project. Not only do all parties now share an open and shared vision for the storeroom but feel able to raise concerns and suggest improvements.

Finally, and although not directly quantifiable, during the project there has been an air of enthusiasm within the ED staff group for more focus on reducing waste and multiple staff members have suggested ideas that they wish to take forward. We would hope to see an improvement from only 65% of staff knowing about Green ED projects to 100%!

Discussion:

The Green Team Quality Improvement competition ran for a period of ten weeks but unfortunately, this was not enough time for us to complete our goal. We would say that this is an ongoing project that will likely be completed around May 2024. Despite this, the results generated and the projected forecast are extremely positive and a pleasant surprise.
In summary, the results show an enormous reduction in waste that clearly demonstrates that reviews of medical dry stock and inventory management systems could yield fantastic savings both for the planet and the NHS as we have found in our own ED department. We now have a better understanding of our stock levels, items entering the ED and ways to work together to change and maintain this going forwards thus satisfying our aims laid out in the Project Charter.

One takeaway was recognising that often, the reason there was so much extra stock, was that there were no clear minimum and maximum levels and therefore the storeroom staff had little defined margins in which to work to maintain clinical safety. Not being clinicians, this required senior clinical staff to engage and facilitate introductions of these parameters.

The inaccuracies in the logistic spreadsheets give further credence for the introduction of an electronic system. The non-clinical logistics staff have highlighted the need for senior clinical support when comparing clinical items and electronic systems would help towards facilitating this.

The paper leaflet review was an important milestone that convinced other stakeholders to take note of the project as a whole and is vital in pushing forwards towards an ultimate goal of a paperless ED which is part of the RCEM Green ED bronze certification (RCEM 2023).

Strengths
The biggest strength of our project was our dynamic team working and collaboration with all Emergency Department work groups. Everyone contributed and highlighted particular concerns and viable solutions within their expertise. This was facilitated by a culture of openness and willingness to change the status quo that was already present within our directorate. The success of the above hinged on having a focussed goal, clear project milestones and a desire to improve.

We developed data collection strategies within the context of our project and followed a clear QI framework ensuring valid data and therefore meaningful results. We do realise that other departments may have alternative processes that would work for them but our methodology could be transferable to other departments.

Limitations
We found the time taken to review each item and document change was longer than initially envisioned. Alongside this, organisationally finding times when representation from all work groups were available, is difficult in departments with shift rota patterns. These are critical factors as to why the whole endeavour is not yet completed and should be considered by any team planning a similar project in the future.

Risk Management

By changing minimum stock requirements there is a low risk that during a period of time, we would run out of a vital piece of equipment. This was carefully considered by the senior decision makers and has been constantly audited by the storeroom staff and operations directors since the changes were made. To date there have been no incidences of total stock depletion and no near miss events. No drugs stored in this storeroom so no risks in this area.

The Future

The future is bright and green. As a team we are aware further progress still needs to be made and dates are already in the diary for its continuation. This has been a project that has required the involvement of multiple members of the Emergency Department, all with different backgrounds and ideas. Ultimately, we have joined together to try to improve our department from a sustainability perspective. Although we are only at the tip of the iceberg, making a start and getting people talking is often the biggest step. We have brought green sustainability to the forefront of healthcare workers' thoughts and conversations are now happening at senior level.

In keeping with the Royal College of Emergency Medicine initiative 'Green ED', this project has kickstarted other changes to move us closer towards gold accreditation (RCEM 2023).

- Some examples:
    - 3 way taps/anaesthetic consumables
    - Cannula audit
    - Development of dedicated cannula packs
    - Coagulation testing audit
    - Gas sampling needle audit
    - Gauze packaging
    - New recycle bins
    - Reducing macerator waste
    - Reusable gowns
    - Saving electricity by reducing computer screen brightness & idle times
    - IV vs Oral paracetamol
    - Climate Cafe
    - Recycling coffee grounds
    - Alternatives to polystyrene cups
    - Food packaging alternatives
    - Active commute support

Moving forward, as a group we have proposed funding for green fellows, drafted a job description for a senior green registrar post and have a new research trainee working alongside us to better understand individual's perception of sustainability. Staff members are more engaged, motivated and genuinely excited about what is seen as 'taking action'.

The main message to take away from this project is that if you start with a small snowflake, you could end up making a snowman.

Conclusions:

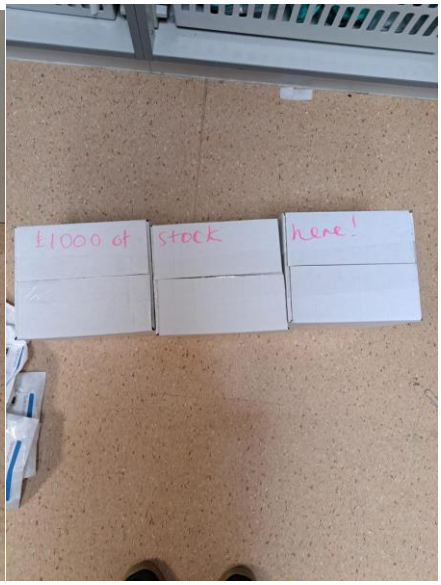
A very enjoyable multi-disciplinary team project that started off as seemingly a simple task which has now snowballed, creating multiple secondary quality improvement ideas. As a team we were not truly aware of the impact that this project could make and the enthusiasm for greener change is now palpable within our department. The long-term benefits, be they financial, social, patient facing or environmental make us PROUD to have been involved in this competition.

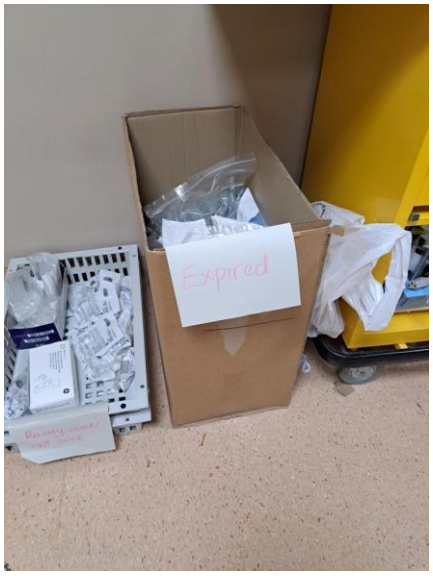
References and Resources

1. RCEM 2023, *Green ED Resources*, RCEM, viewed 30 September 2023, <https://greened.rcem.ac.uk/GreenED/GreenED_Resources.aspx>.
2. Greener NHS 2020/21 database
3. UK Government (2023) Greenhouse gas reporting: conversion factors

Appendices

Other photos:





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 system 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.