



SusQI Case Study Report

Greener PPE: How we reduced PPE successfully!

Team Members:

Project managers:

- Holly Slyne - Interim Director of Infection Prevention & Control (IPC)
- Jasmine Lowdon - Personal Protective Equipment (PPE) Co-ordinator

Video designer/ editor:

- Risna Ferrer - IPC Nurse

Significant help was also given by;

- Ros Pounds - IPC Matron
- Meera Antony - IPC Nurse
- Paul Scotland - Procurement Manager
- Rachel Pell - Head of Procurement



Background:

The need for the 'be PPE Free' project was evident because from 25th February 2020 to 24 February 2021, over 8.7 billion items of PPE were distributed to health and social care services in England, compared to approximately 2.43 billion items between 1 January and 31 December 2019¹. Whilst due to the pandemic, this substantial growth in PPE comes with environmental, financial, and social costs.

The manufacturing/ transportations and disposal of PPE increases greenhouse gas admissions and global warming, one of the biggest global threats to mankind². While essential that adequate PPE is provided to keep employees safe³, IPC audits and observations have identified PPE overuse continuing beyond the pandemic. The increased financial cost associated with increased purchase and dispose ultimately reduced money available for other healthcare services. Social costs of excessive PPE usage include communication barriers, and excessive use of gloves has been linked to increased contact dermatitis for staff⁴ and increased infection rates for patients^{5, 6}.

Many companies are manufacturing alternative reusable products⁷ and while the Trust has recently made changes to use some reusable equipment (e.g., eye protection) disposable gloves and aprons continue to be required. Therefore, this project aimed at reducing inappropriate use of single use gloves and aprons. As PPE guidelines are enforced and audited via the IPC team, we were best placed to undertake this project.

Specific Aims:

Within the 10 week competition period to;

- reduce inappropriate PPE usage by 10% at Northampton General Hospital
- increase staff's knowledge on appropriate PPE use by 20%.

Methods:

We reviewed current practice of PPE by;

- Observing usage on a surgical and medical ward (See Appendix 2 for audit data).
- A survey posted on the staff Facebook page to determine whether staff felt PPE was required for a specific task (PPE was not required for the task).
- The PPE policy was updated and emailed out to ward managers asking them to educate their staff on when PPE is and isn't required.

Change implemented:

Using the observation and survey findings, 8 trends of PPE overuse were identified:

- 1) to make a clean bed
- 2) to take patient's observations
- 3) transporting patients
- 4) transferring patients
- 5) wearing the same PPE between patients
- 6) to collect clean linen from the linen trolley
- 7) writing in patient notes
- 8) using the phone / computer at the nurse station

At the Infection Prevention link meeting the project was discussed and the Infection Prevention link nurses were educated on the overuse PPE themes identified. An education package to reduce inappropriate PPE usage in clinical environments was developed (Appendix 1) to address these themes. One theme was targeted in the education campaign per week via;

- short educational videos posted on the staff's Facebook page and on the wards Whatsapp groups.
- A screen saver with the theme was also posted on the staff's intranet
- posters were placed throughout the trust
- Ward sisters and IPC team also educated staff on audits and huddles.

Following the final themes promotion, we repeated our baseline data collections through ward observations and a survey was posted on the staff Facebook page asking staff to determine whether staff felt PPE was required for a specific task. Gloves and Apron usage from the final month of the campaign was compared to the month before the campaign started.

Measurements:

Environmental sustainability:

The environmental impact was measured using raw procurement data. We compared the average number of gloves and aprons used from the 4 months prior to the project to the 2 months during the project. Across the Trust, volumes of PPE delivered is worked out on a rolling weekly basis, so we can assume that any reductions in procurement from implementation of our change is a genuine reduction.

We also gained information via an observational audit pre (Appendix 3) and post (Appendix 4) of both a medical and surgical ward and compared our observations to the procurement data. Carbon emissions factors for gloves and aprons were taken from Rizan et al (2021)⁹. Carbon emissions factors for clinical waste was taken from Rizan et al (2021)¹⁰.



Economic sustainability:

Financial savings were measured by applying the reduction in procurement identified in the procurement data (as above) to the costs of individual items from NHS Supply Chain (2022) data⁸. The waste disposal cost saving was also calculated using the weight of the reduction of PPE from the procurement data and multiplying this by the cost of offensive waste disposal (26.6p per kg).

Social sustainability:

The social impact was measured by qualitative quotes from patients during the pre and post intervention audits and from Ward Managers and Staff that commented on WhatsApp or Facebook when the videos and surveys were posted.

Clinical and health outcomes:

The education campaign and videos will raise awareness of the potential harm caused to patients by spreading pathogens and infections from patient to patient unknowingly. We would expect increased staff awareness and reduced inappropriate use of PPE to have a positive impact on infection rates. We are planning to review and compare rates of common infections (e.g. CPE) in the 12 months pre and post our PPE free campaign.

We will measure health impact on staff by comparing pre and post rates of contact dermatitis reported to occupational health.

Results:

Clinical and health outcomes:

Our pre intervention staff survey (8th June 2022) had 149 votes with 12% answered correctly. Post our education and awareness campaign, the survey (12th July 2022) the survey had 146 votes with 98% answered correct. Therefore, staff knowledge of appropriate PPE increased by 86%, surpassing our goal of 20%. We are planning to review and compare rates of common infections (e.g. CPE) in the 12 months pre and post our PPE free campaign and expect to see a reduction in rates.

Environmental sustainability:

Observational audit results: The number of inappropriate glove and apron uses are summarized below:

	Medical ward	Surgical ward
Number of inappropriate glove uses before intervention in 1 hour	12	16
Number of inappropriate apron uses before intervention in 1 hour	7	10
Number of inappropriate glove opportunities post intervention in 1 hour	4	1
Number of inappropriate apron opportunities post intervention in 1 hour	0	1
Inappropriate glove use difference	8	15
Inappropriate apron use difference	7	9
Percentage difference gloves	66% reduction	94% reduction
Percentage difference aprons	100% reduction	90% reduction



The observational data showed a 66%-94% reduction (mean = 80%) in inappropriate gloves use and 90-100% reduction (mean = 95%) in inappropriate apron use because of the education package intervention. The themes of inappropriate PPE use targeted in our campaign were not observed in our post change observation.

Procurement data: The following table presents the procurement data of gloves and aprons used and the reduction seen over the two-month campaign.

PPE type	Average use in 2 months before project	Average use in 2 months during project	Difference / 2 months	Reduction (%)	Carbon saving
gloves	1,099,700	1,052,600	-47,100	4.3%	1,225 kgCO2e
aprons	216,163	168,406	-47,757	22.1%	3,104 kgCO2e
TOTAL CARBON REDUCTION IN 2 MONTHS					4,329 kgCO2e

The procurement data shows a 4.3% reduction in inappropriate glove use and a 22.1% reduction in inappropriate apron use across 2 months. Therefore, our aim to reduce inappropriate PPE usage by 10% was achieved. If extrapolated across a year, a minimum annual saving of 25,974 kgCO2e would be achieved. This is equivalent to 74,809.9 miles driven in an average car (110 return journeys from Northampton to Glasgow). This is also an average reduction of 96.5kg (gloves) and 222.1kg (aprons) of plastic per month.

It is possible that as the data above was collected during the ‘PPE free’ campaign, there will be further reduction as the change is embedded into everyday practice and further reflected in procurement data. Our observational audit showed an 80% mean reduction in glove use. If an 80% reduction was applied to the procurement data, a significantly higher saving of up to 11,436.5 per months in gloves alone could be achieved.

Social sustainability:

Pre intervention one member of staff commented that

“the aprons are poor quality and you often have to take 2 or 3 before finding one that isn’t broken. I feel there is lots of PPE overuse, for example, staff are wearing PPE when there is no patient contact or just to mobilise a patient it makes no sense to me!”

The feedback from staff on the social media platforms was overwhelmingly positive. They found the videos informative and are clearer about when PPE is required and when it isn’t. This has made them more confident to use PPE appropriately, as reflected in the post intervention audit data. Staff are happier not having to wear PPE when they don’t need to.

The Matrons and Ward Managers really supported and engaged with the videos and asked for them to be shared on Ward Managers Whatsapp groups and ward Whatsapp groups. One Ward Manager commented post intervention

“this is such a great campaign, it is refreshing and so visual you can’t help but think about it the next time you go to grab those gloves, our team have loved it!”



Since implementation of the project the IPC team have been approached by staff asking them to look for more reusable and sustainable PPE options in other areas of practice, which is a fantastic outcome.

Interestingly 2 of the 3 patients that commented within the observational audits felt that staff wore the right amount of PPE, so patient awareness and engagement needs to be addressed as part of the lasting change of this project.

Economic sustainability:

Based on the reduction identified in the procurement data, a financial saving of £3781.14 has been achieved in two months. Additionally. £169.47 was saved from reduction in clinical waste disposal.

Type of PPE	Cost (£ / item)	Weight (kg / item)	Saving from reduced procurement	Saving from reduced waste disposal
Single glove	0.06	0.0041	£2,826	£51.32
Apron	0.02	0.0093	£955.14	£118.15
TOTAL COST REDUCTION IN 2 MONTHS			£3,781.14	£169.47

If extrapolated across a year, a minimum of **£23,703.60** would be saved (£22,686.84 in procurement and £1,016.76 in waste disposal), Approximately 3,822kg of plastic would be eliminated. As in the environmental results, it could be suggested that this would increase as the 'PPE free' campaign embeds further into clinical practice across the Trust.

Barriers encountered

We planned time, added the project to our project team member calendars, discussed with other staff their time and availability and set realistic SMART goals to ensure the project continued successfully despite other clinical and operational pressures.

The weather may potentially have caused bias in the results through staff choosing not to wear PPE in warmer months, however this may have been balanced by entering another wave of COVID mid June requiring more PPE to be worn for some patients.

Communicating messages clearly to all staff member in a large Trust is challenging. Reinforcing the message due to staff turnover, fatigue from the pandemic and decreased memory are also potential barriers to successful implementation and long term change. To overcome this, a range of communication messages were used; social media, link nurses, Whatsapp, posters and screensavers.

On discussing with staff anecdotally they reported having viewed at least one communication method, reinforcing to us that a variety of communication platforms is essential in a workforce that are so varied. It is hoped that the really simple and visual approach used overcomes these potential limitations.

Conclusions:

Our education package was extremely successful in showing that PPE can be reduced, with impressive reductions in just 10 weeks, forecasted to be 25,974 kgCO₂e and £22,687 across a year. The additional benefits to patient safety and staff wellbeing are also significant.



Our project has been a positive social change, delivering key messages in a way in which staff have not only gained knowledge, but applied this knowledge to their practice. We plan to continue creating new monthly PPE videos to sustain and embed the success of this project. The videos created so far have also been incorporated into annual IPC mandatory refresher training and the 'be PPE Free' project has been added to the annual IPC Campaign Plan to have a monthly focus on this important topic once a year to ensure the change is sustained.

This project was delivered Trustwide at our hospital. However, regionally other IPC Teams have seen overuse and inappropriate use of PPE post-pandemic and a regional collaborative piece of work is being organised for September 2022 to improve PPE practice. The method and measures utilised are easily transferrable to other healthcare contexts such as reducing waste from dressing packs, or reducing disposable PPE (e.g. by use of reusable visors or masks). The IPC team are already applying the principles of this project to implement the latter!

The IPC Team are delighted that NHS England have engaged with the project and want us to showcase it regionally to help reduce inappropriate PPE across the whole of the Midlands. Additionally, the project has been accepted as an oral presentation at the national IPC Conference in October 2022 where the project will be shared nationally.

References

1. Department of Health and Social Care, (2022) [Experimental statistics – personal protective equipment distributed for use by health and social care services in England: 1 December to 31 December 2021](https://www.gov.uk/government/statistics/ppe-distribution-england-1-december-to-31-december-2021) - GOV.UK (www.gov.uk) www.gov.uk/government/statistics/ppe-distribution-england-1-december-to-31-december-2021/experimental-statistics-personal-protective-equipment-distributed-for-use-by-health-and-social-care-services-in-england-1-december-to-31-december-2 Accessed 14/7/22
2. World Health Organisation (2022) [Climate change and health](https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health). Available at: <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health> [Accessed on 16/5/22]
3. Health and Safety Executive (2022). Personal protective equipment (PPE) at work regulations from 6 April 2022. Available at: <https://www.hse.gov.uk/ppe/ppe-regulations-2022.htm>
4. Upton. 2021. <https://www.rcn.org.uk/news-and-events/blogs/dermatitis-and-glove-use-make-one-change>
5. Loveday et al (2014) EPIC 3 Guidance [epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England](https://doi.org/10.1017/S0950268814000000) - *Journal of Hospital Infection*
6. Royal College of Nursing (2018) Tools of the Trade Guidance. RCN: London.
7. ScrewFix 2022 [Clear Lens Overspecs | Safety Glasses | Screwfix.com](https://www.screwfix.com/clear-lens-overspecs-safety-glasses)
8. NHS Supply Chain (2022). [online] www.supplychain.nhs.uk. Accessed 15.07.2022.
9. Rizan, C., Bhutta, M. & Reed, M. (2021). Environmental impact of Personal Protective Equipment supplied to health and social care services in England in the first six months of the COVID-19 pandemic. *Journal of the Royal Society of Medicine*. 0 (0) 1-14.
10. Rizan C, Bhutta M, Reed M, Lillywhite R. The carbon footprint of waste streams in a UK hospital. *Journal of Cleaner Production* 286 (2021) 125446. <https://www.sciencedirect.com/science/article/abs/pii/S0959652620354925>



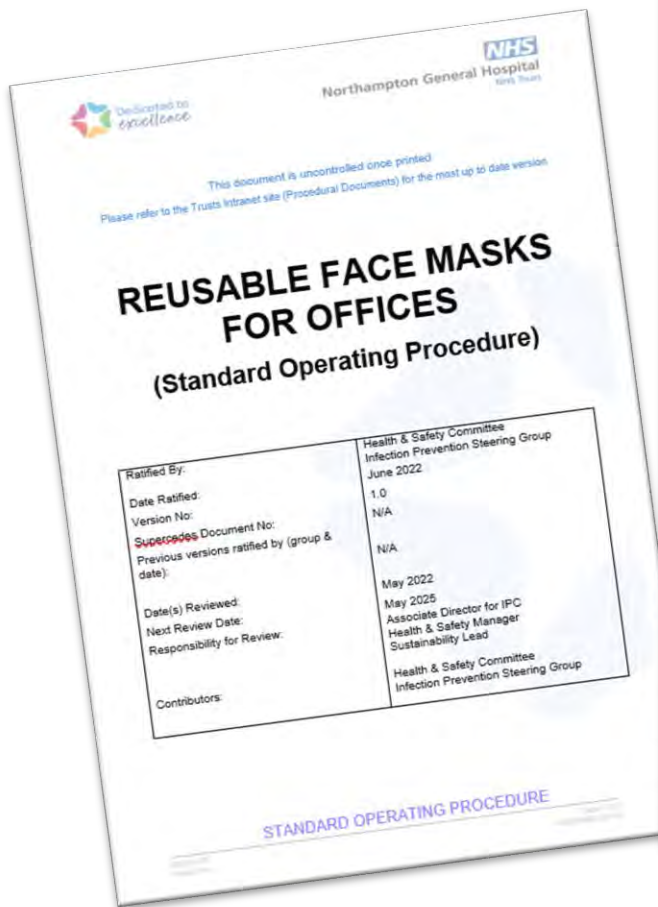
Appendix 1 – Project change package Videos



Posters and screensavers



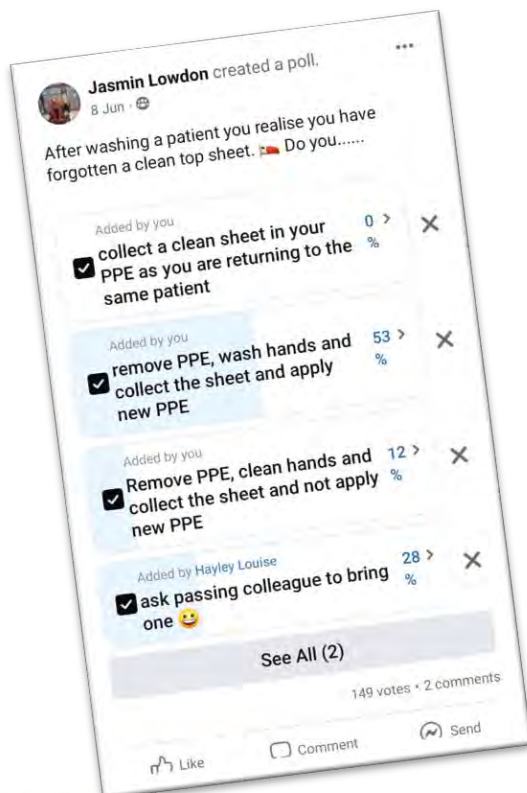
Policy changes



ACTION CARD: PPE and COVID

Ward / zone	PPE required
Blue zone	<ul style="list-style-type: none"> Surgical mask at all times
Green zone	<ul style="list-style-type: none"> Add gloves and apron if: <ul style="list-style-type: none"> at risk of contact with blood & body fluids handling chemicals isolation precautions required e.g. C.diff, CPE Add eye protection if risk of splash to eyes Patients encouraged to wear surgical mask Visitors encouraged to wear surgical mask
Outbreak bays and COVID exposed bays	<ul style="list-style-type: none"> Surgical mask at all times If there is no direct contact with the patient or their environment, gloves and apron are not needed Gloves and apron for direct contact with the patient or their environment – change after each patient Add eye protection if patient is symptomatic / risk of splash to eyes Change mask and clean hands when leaving an outbreak / exposed zone Patients encouraged to wear surgical mask Visitors encouraged to wear surgical mask, add further PPE if they are providing direct patient care
Yellow zone	<p>Only visit the ward if essential</p> <ul style="list-style-type: none"> Surgical mask or fit tested FFP3 at all times If there is no direct contact with the patient or their environment, gloves and apron are not needed Gloves, apron and eye protection for direct contact with patient or their environment – remove after each patient
Red zone	<ul style="list-style-type: none"> Change mask, clean eye protection and clean hands when leaving a red / yellow zone Patients to wear surgical mask if able to tolerate (or oxygen mask if required) Visitors to wear surgical mask, add further PPE if they are providing direct patient care

Staff engagement on hospital closed social media platform



Appendix 2

Surgical ward Pre-Intervention observational audit results: 17/5/22: 10am to 11am

What PPE was the staff member wearing?	What was the task they were doing?	Was the PPE appropriate?	What is their job role?
Gloves and apron	Observations	No	Nurse
Gloves and apron	Observations	No	Nurse
Gloves and apron	Observations	No	Nurse
Gloves and apron	Observations	No	Nurse
Gloves	I.V fluids	yes	Nurse
Gloves and apron	Changing a patient	Yes	Nurse
Gloves	Making a bed	No	HCA
Gloves	Cannulating	Yes	Nurse
Gloves and apron	Giving an injection	No	Nurse
Gloves and apron	Observations	No	HCA
Gloves	Making a bed	No	Nurse
Gloves	Talking to a patient who is in bed	No	Nurse
Gloves	Carrying a tied linen bag outside	No	HCA
Gloves and Apron	Talking to a patient who is in bed	No	Nurse
Gloves and apron	Observations	No	Nurse
Gloves and apron	Transferring a patient	No	Nurse
Gloves	Observations	No	Nurse
Gloves and Apron	Vac dressing	Yes	Nurse
Gloves and apron	Observations	No	Nurse
Gloves	Talking to a patient who is in bed	No	Nurse

Staff comments

Staff were asked what their views were about the current PPE policy, do they feel protected, is it too much PPE, what do they think?

Nursing student	Feels protected	Felt the current policy on aprons and gloves on red wards was needed and didn't feel they were needed on green wards (unless risk of blood or bodily fluids).	Feels eye protection shouldn't be worn if wearing glasses.
Discharge Co-ordinator	Feels Protected	Felt the current policy on aprons and gloves on red wards was needed and didn't feel they were needed on green wards (unless risk of blood or bodily fluids).	Feels surgical masks are not required on green wards.
O.T	Feels Protected	Felt the current policy on aprons and gloves on red wards was needed and didn't feel they were needed on green wards (unless risk of blood or bodily fluids).	Aprons poor quality- thus often take 2 or 3 before finding one that isn't broken. Doesn't feel it is necessary to change surgical masks between green wards. Feels lots of PPE overuse, for example, staff are wearing PPE when there is no patient contact or just to mobilise a patient.



Domestic	Protected	Felt the current policy on aprons and gloves on red wards was needed and didn't feel they were needed on green wards (unless risk of blood or bodily fluids)	Doesn't believe surgical masks on green wards is necessary. Stated when she worked on ITU she had to wear scrubs, which she felt was a waste of resources.
----------	-----------	--	--

Patient comments

Ask 5 patients what their views are about the current PPE they see staff wearing, do they feel protected, do they see staff clean their hands, what do they think?

Bed 19	Feel staff over use PPE	Would like biodegradable PPE. Feels it is unnecessary for patients to wear masks	Stated staff have good hand hygiene with them.
Bed 26 and Bed 23 (spoke to both together)	Feels staff use PPE correctly	None	Staff are struggling to wash hands when removing PPE as the sink in the bay is too hot.
Bed 27	Feels staff use PPE correctly	None	Stated staff have good hand hygiene.

Medical ward Pre Intervention observational audit results: 17/5/22: 10am to 11am

What PPE was the staff wearing?	What was the task they were doing?	Was the PPE appropriate?	What is their job role?
Gloves	Walking between bays	No	Dr
Gloves & Apron	Passed Patient washbag	No	HCA
Gloves & Apron	Getting rid of washbowl	Yes	HCA
Apron	Talking to Patient	No	SN
Gloves & Apron	Walking around bay	No	HCA
Gloves & Apron	@ Linen trolley	No	SN
Gloves & Apron	Mopping around bed spaces	No	Domestic
Gloves & Apron	Doing observations	No	HCA
Gloves	Pushing Trolley	No	Porter
Gloves & Apron	Taking bloods	Yes	Phlebotomist
1 Glove	Cleaning Patient table	No	SN
Gloves & Red apron	Assisting patient in bed	No	SN
Gloves & Apron	Taking bloods	Yes	Phlebotomist
Gloves	@ Linen trolley	No	Nursing associate
Gloves	Taking blood	No	Phlebotomist
Gloves & Apron	Disposing of bedpan	Yes	SN
Gloves & Apron	Sitting patient up in bed	No	HCA
Gloves	Putting clean sheet on bed	No	Student Nurse



Appendix 3

Surgical ward Post Intervention Observational Reaudit. 12/7/22: 1 hour spent auditing

What PPE was the staff member wearing?	What was the task they were doing?	Was the PPE appropriate?	What is their job role?
Nothing	In patient's environment, sitting with patient	Yes	HCA
Nothing	In patient's environment talking to patient.	Yes	Doctor
Nothing	Writing in a patient's notes	Yes	HCA
Gloves and Apron	Assisting a patient.	No	Therapist
Nothing	Assisting a patient	Yes	Therapist
Nothing	Performing observations	Yes	HCA
Nothing	In patient's environment	Yes	Hostess
Nothing	At end of patient's bed	Yes	HCA
Nothing	Assisting a patient with a drink	Yes	HCA
Gloves	Mopping floor/ cleaning	Yes	Domestic

Medical ward Post Intervention Observational Reaudit on 12/7/22

Please note only 30 minutes spent auditing so results have been doubled to equal 1 hour.

What PPE was the staff member wearing?	What was the task they were doing?	Was the PPE appropriate?	What is their job role?
Gloves only	In patient's environment, picking up items off the floor.	No	HCA
Nothing	Performing observations	Yes	HCA
Gloves only	Administering an I.V	Yes	Nurse
Nothing	Transferring a patient	Yes	Porter
Nothing	Performing observations	Yes	HCA
Nothing	Collecting Linen from the Linen trolley	Yes	HCA
Nothing	Performing observations	Yes	Student Nurse
Gloves only	Transferring a patient on to the commode	No	HCA
Nothing	Talking to a patient at the end of their bedside	Yes	Doctor
Nothing	Performing observations	Yes	Student Nurse
Nothing	Repositioning a patient	Yes	Nurse
Nothing	Performing observations	Yes	Student Nurse
Nothing	Transferring a patient from bed to weighing scales	Yes	Student Nurse
Nothing	In patient's environment	Yes	Nurse
Nothing	Assisting a patient with food	Yes	Therapist
Nothing	Repositioning a patient	Yes	Nurse
Gloves and aprons	Meeting a patient's hygiene needs	Yes	Nurse
Nothing	In patient's environment	Yes	Nurse
Nothing	Changing a patient's gown	Yes	HCA
Nothing	Assisting a patient with a drink	Yes	Nurse



Appendix 4

PPE Procurement data from Jan 2022 – June 2022

Code	Item Description	Jan-22	Feb-22	Mar-22	Totals (Each)	Totals (Boxes)
FTG569	XL Gloves	900	2240	4220	7360	37
FTG570	L Gloves	277200	298200	332200	907600	4538
FTG571	M Gloves	422200	468200	480200	1370600	6853
FTG572	S Gloves	333600	320800	356800	1011200	5056
NBTB0017	Aprons	238417	202813	224407	665637	3328

Item Code	Item Description	Apr-22	May-22	Jun-22	Totals (Each)	Totals (Boxes)
FTG569	XL Gloves	3460	5900	2380	11740	59
FTG570	L Gloves	356800	284400	281800	923000	4615
FTG571	M Gloves	435200	452400	432800	1320400	6602
FTG572	S Gloves	317400	330800	323000	971200	4856
NBTB0017	Aprons	199016	168000	168813	535829	267