# THE GLOVES ARE OFF CAMPAIGN: REDUCING UNNECESSARY NON-STERILE GLOVE USE IN NICU/SCBU, GLOVES OFF TEAM

TEAM MEMBERS:

- Naomi Oxberry, Dietician and Medical Student at University of Swansea
- Amber O'Cliffe, Medical Student at University of Swansea

## Background:

Between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year, as a minimum[1]. In 2010, the NHS emitted 20 million tonnes of CO2 equivalent (MtCO@eq), making it the largest public sector contributor to climate change in Europe. This is equivalent to the entire carbon footprint of Croatia and exceeds the annual emissions from all passengers departing from Heathrow[2]. Although, exact figures vary, a common finding is that emissions related to procured goods are particularly high within the NHS [2]. This is particularly high during the COVID-19 pandemic; between Feb 2020 and Feb 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 in 2019[3]. We would like to reduce the amount of PPE used, in line with NHS guidelines, to reduce our environmental impact.

Overuse of non-sterile gloves have been seen to increase transmission of pathogens, cross contamination**,** and a reduction in hand washing[4,5,6]. We hope to reduce the unnecessary use of non-sterile gloves and improvement in patients quality of care.

## Specific Aims:

To reduce unnecessary non-sterile glove use within the NICU departments at Glangwilli General Hospital (GGH), Carmarthen and Singleton Hospital to;

- improve hand hygiene practices and reduce cross contamination stemming from the overuse of non-sterile gloves.
- Reduce the environmental impact (CO2e) of the NICU.

## Methods:

This project was planned to take place in Singleton Hospital. However, due to additional clinical pressures in Singleton Hospital, we have initiated the project intervention at Glanwilli Hospital only. We have projected anticipated savings for Singleton Hospital in this report.

An initial audit using the validated glove audit tool[7] (Appendix 1) was carried out over 6 hours to obtain baseline data on how non-sterile gloves were used in the department. We then contacted procurement to find out how many units of non-sterile gloves were ordered to the department across the six months prior to our intervention.

Based off audit data and previous research, learning resources (an 8-minute training video (Appendix 4)) was developed to outline the problems with non-sterile gloves regarding infection and cross contamination, update members of staff on what the NHS guidelines are for glove use, outside of the COVID-19 pandemic and to share the results of our audit data. Two posters were created on Canva (Appendix 5) summarising why this project was taking place for family and staff. The other poster was a checklist to remind staff on when non-sterile gloves are indicated. Once these resources were approved by GGH Infection Prevention and Control (IPC), these were then distributed.

We then repeated our audit for an additional 6 hours to calculate a percentage reduction in unnecessary glove use with the same audit tool at Glangwilli hospital.

## Measurement:

Patient outcomes:
We hope to ensure infection rates are not impacted by this project and will measure positive blood culture rates before and after the intervention.

Staff outcomes:
Staff surveys were created covering a range of questions (Appendix 2) to gauge knowledge of correct glove use in the department before and after our intervention. We also presented participants with a list of clinical scenarios and asked them to select when they felt it was appropriate to wear non-sterile gloves. The percentage of incorrect answers before and after were measured to see if there was a change.

Environmental sustainability:
We obtained 6 months of glove procurement data from our procurement team. We are awaiting procurement data following our education intervention and expect to see a reduction in the number of gloves needing to be ordered. We will compare the procurement data with our audit data, and expect them to reflect a similar percentage reduction.

Audit data has been used to estimate potential savings while awaiting procurement data.

We will calculate the carbon saved using emission factor for a single glove taken from Rizan et al 2021[11] The carbon emissions of the gloves were estimated using a Life Cycle Analysis (LCA) and includes production, manufacturing, transport, and disposal of the gloves.

Economic sustainability:
We obtained the cost of gloves from our procurement department. We are awaiting our post intervention procurement data to look at cost savings of the project. There will additionally be a cost saving from reduced disposal of gloves.

Social sustainability:
Staff members were encouraged to given feedback across the whole study.

## Results:

*Patient outcomes:*
We plan to measure infection rates via blood cultures. We anticipate a reduction in infections as our audit reflected there was less cross contamination before touching a patient or key site (see below).

Staff outcomes:
We had a significant improvement in correct glove use knowledge. Participants had to assess which answers out of multiple choice were appropriate to don gloves, to which there was one correct answer (taking blood samples). Before the intervention, 23.53% of people were 100% correct in identifying when it was appropriate to utilize non-sterile gloves. After staff watched our video 57.14% were 100% correct in identifying when to use non-sterile gloves. Therefore, our study has improved glove use understanding by 33.61%.

*Environmental sustainability:*
Audit:
In our initial audit gloves were used correctly 27.3% of the time. Following our intervention, gloves were used correctly 82.7% of the time. This is a 55.41% reduction in glove use. In addition, there were less instances of cross contamination, with the average number of items touched before the patient or a key site was 4.6 times whereas after the intervention it was 0.4 times.

Procurement:
Singleton NICU currently orders 60-90 boxes of nitrile gloves per month and each box contains approximately 100 gloves which equates to 9,000 gloves per month. We are still awaiting our post intervention procurement data to look at actual savings. Based on our audit data, we observed a 55.41% reduction in glove use. This equates to 4,986 less gloves being used per month.

The emissions factor for a singular non-sterile glove is 0.026 kgCO2e. Therefore, the theoretical carbon impact of our intervention is a reduction in 129.636 kgCO2e per month. Projected across a year, **1,555.6 kgCO3e** could be saved. This is equivalent to driving 4,480.4 miles in an average car.

*Economic sustainability:*
We were unable to obtain a cost per box of gloves. A cost of 0.06p per glove was assumed based on data from an NHS Trust (Northamptonshire Hospitals). A reduction in 9,000 gloves per month is equates to a saving of £540. Projected across a year we could save **£6,480.**

Both carbon and financial savings would be significantly increased if this project were to be scaled across the Health Board. This is one ward, estimated to have saved £6480. There are approximately 20 wards at Singleton.

*Social sustainability:*
A reduction in patient infections will also reduce risk of staff illness. A reduction in glove use could also be beneficial to staff members with dermatitis as case reports have linked contact dermatitis to nitrile rubber gloves [9,10] the same material as gloves used in the Health Board.

## Discussion:

In summary, our survey data has shown that our intervention has caused an increase of staff correctly identifying when to use non-sterile gloves 100% of the time by 53.4%. Our post audit data has shown a reduction in glove use by 55.41%.

There were a few challenges to overcome during this process, mainly through communication and clearing infection control procedures. Initially, there was some confusion through process and procedures of completing an audit and therefore we did not register the audit at GGH audit office until quite late in the process, causing a decrease in time available to introduce our intervention and therefore obtain glove procurement data and blood culture results. We therefore changed our outcome measures for this report (survey data).

A risk managed throughout the whole process was ensuring our resources didn't lower staff use of non-sterile gloves when they indeed should be used. IPC were therefore a vital part of our team to ensure our resources were clear to staff. Ensuring that the new changes were in line with IPC guidance was another barrier to overcome as their team mentioned details our team hadn't considered including making sure all our depictions on our poster were bare below the elbow.

In addition, in meetings discussing this project our team were made aware of the complexities of risk assessing when a member of staff might encounter a bodily fluid in NICU, so some staff members opt to use gloves more often because of this. Therefore, it makes glove reduction harder than we initially anticipated. However, this is less of a barrier in adult settings, such as an outpatient department, which indicates a potential for a larger reduction in inappropriate glove use.

When staff were completing our survey, we found we had to remove the multiple-choice answer "Giving an Injection" for question 5 "Which of the following activities requires glove use? (Select all that apply)". This was due to staff commenting that the wording was unclear when our team was there to clarify, so in the interest of members who answered when no members of the team were available to answer queries, we removed the question. In addition, one response indicated they had seen our intervention before it was released, however we were unable to verify due to the anonymity of the survey if it was a member of staff who may have seen our draft interventions. Therefore, we removed this datapoint.

## Conclusion:

Reducing the number of unnecessary non-sterile glove use is an effective way to both improve patient safety, reduce cost and improve our environmental impact. We hope we can now have discussions with GGH as to whether we can roll this out across the hospital.

*Special thanks to:*
Matt Pickup, Madeline Shakeshaft, Rachel Morris, Karen Boyles, Catrin Johns, Tracey Gauci and the IPC team and Everyone in the neonatal team at GGH. We wouldn't have got very far without you.

## References

1. World Health Organisation (WHO). Climate Change https://www.who.int/health-topics/climate-change#tab=tab_1
2. World Health Organisation (WHO). Towards environmentally sustainable health systems in Europe, A review of the Evidence (2016) https://www.euro.who.int/__data/assets/pdf_file/0012/321015/Towards-environmentally-sustainable-HS-Europe.pdf
3. 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 - GOV.UK (www.gov.uk) www.gov.uk/government/statistics/ppe-distributionengland-1-december-to-31-december-2021/experimental-statistics-personal-protectiveequipment-distributed-for-use-by-health-and-social-care-services-in-england-1-december-to-31- december-2 Accessed 14/7/22
4. Mahida N, Beal A, Trigg D, Vaughan N, Boswell T. Outbreak of invasive group A streptococcus infection: contaminated patient curtains and cross-infection on an ear, nose and throat ward. J Hosp Infect. 2014 Jul;87(3):141-4. doi: 10.1016/j.jhin.2014.04.007. Epub 2014 May 10. PMID: 24928787.
5. Wilson J, Bak A, Loveday HP. Applying human factors and ergonomics to the misuse of nonsterile clinical gloves in acute care. Am J Infect Control. 2017 Jul 1;45(7):779-786. doi: 10.1016/j.ajic.2017.02.019. Epub 2017 Mar 29. PMID: 28365143.
6. Fuller C, Savage J, Besser S, Hayward A, Cookson B, Cooper B, Stone S. "The dirty hand in the latex glove": a study of hand hygiene compliance when gloves are worn. Infect Control Hosp Epidemiol. 2011 Dec;32(12):1194-9. doi: 10.1086/662619. Epub 2011 Oct 17. PMID: 22080658.
7. Wilson et al, 2015. The misuse and overuse of non-sterile gloves: application of an audit tool to define the problem. Journal Infect Prev. 2015 Jan; 16(1): 24-31. DOI:10.1177/1757177414558673
8. Great Ormond Street; The Gloves Off Campaign. [Website] https://www.england.nhs.uk/greenernhs/whats-already-happening/great-ormond-street-hospital-reducing-single-use-plastics-case-study/#:~:text=Staff%20at%20Great%20Ormond%20Street,nursing%20staff%20and%20healthcare%20assistants.
9. Iijima S, Numata M, Sasaki K. [ALLERGIC CONTACT DERMATITIS DUE TO NITRILE RUBBER GLOVES: ETHYL ISOTHIOCYANATE AND BUTYL ISOTHIOCYANATE AS POSSIBLE CAUSATIVE CHEMICALS]. Arerugi. 2020;69(8):669-677. Japanese. doi: 10.15036/arerugi.69.669. PMID: 32963190.
10. André R, Alipour Tehrany Y, Bugey A, Edder P, Piletta P. Hand dermatitis aggravated by contact allergy to methylisothiazolinone in protective nitrile gloves. Contact Dermatitis. 2022 Oct;87(4):383-384. doi: 10.1111/cod.14173. Epub 2022 Jun 24. PMID: 35704221; PMCID: PMC9546190.
11. Rizan C, Reed M, Bhutta M. 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, DOI: 10.1177/01410768211001583, https://journals.sagepub.com/doi/full/10.1177/01410768211001583

**Appendix 1**. Glove use Audit, from Wilson et al (2015)

**Clinical glove use audit**

*Commence observation when healthcare worker observed to be commencing a task/procedure and continue until the procedure is completed and gloves are removed or hands decontaminated*

| **Ward:** | **Date:** | **Time start:** |
|---|---|---|
| | | **Time stop:** |

| **1. Discipline** (HCA = healthcare assistant; AHP = Allied health professional e.g. physiotherapist, occupational therapist, pharmacist) | | | **2. Location of task performed?** | |
|---|---|---|---|---|
| | ☐Senior nurse | ☐Domestic | | ☐Clean utility |
| | ☐Sister | ☐Phlebotomist | | ☐Sluice |
| | ☐Staff nurse | ☐Porter | | ☐In bay/room |
| | ☐Agency Nurse | ☐AHP | | ☐Nurses station |
| | ☐HCA | ☐Junior doctor | | ☐Other |
| | ☐Student | ☐Senior doctor | | ☐Unknown |

**3. Sequence of items/objects touched in this episode of care with points of hand hygiene/glove use**
*Use to categorise the risk of cross-contamination in one or more of 'My 5 moments of hand hygiene' at end of the observation*

| Item | HH | G | Item | HH | G |
|---|---|---|---|---|---|
| 1 | | | 7 | | |
| 2 | | | 8 | | |
| 3 | | | 9 | | |
| 4 | | | 10 | | |
| 5 | | | 11 | | |
| 6 | | | 12 | | |

**4. If gloves used?**

| Location put on? | | Location removed? | |
|---|---|---|---|
| | ☐Clean utility | | ☐Clean utility |
| | ☐Sluice | | ☐Sluice |
| | ☐Inside bay/room | | ☐Inside bay/room |
| | ☐Nurses station | | ☐Nurses station |
| | ☐Other | | ☐Other |
| | ☐Unknown | | ☐Unknown |
| *Was this as close to the point of use as possible/practical?* | ☐Yes ☐No ☐U/K | *Was this as close to the point of use as possible/practical?* | ☐Yes ☐No ☐U/K |

**5. Adequate hand hygiene after gloves removed?** ☐Yes ☐No ☐U/K
*According to local policy*

**Analysis**

**Procedure(s) performed during this care episode**

| | ***Procedure*** *Check with healthcare worker if cannot observe* | **Glove used?** | ***Risk of contact with BBF?*** *Was/highly likely to be contact* | ***Glove use appropriate*?*** |
|---|---|---|---|---|
| 1 | | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K |
| 2 | | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K |
| 3 | | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K |
| 4 | | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K | ☐Yes ☐No ☐U/K |

** risk of contact with BBF, mucous membranes, hazardous substances (e.g. chemicals, cytotoxic drugs) or patient under isolation precaution.*

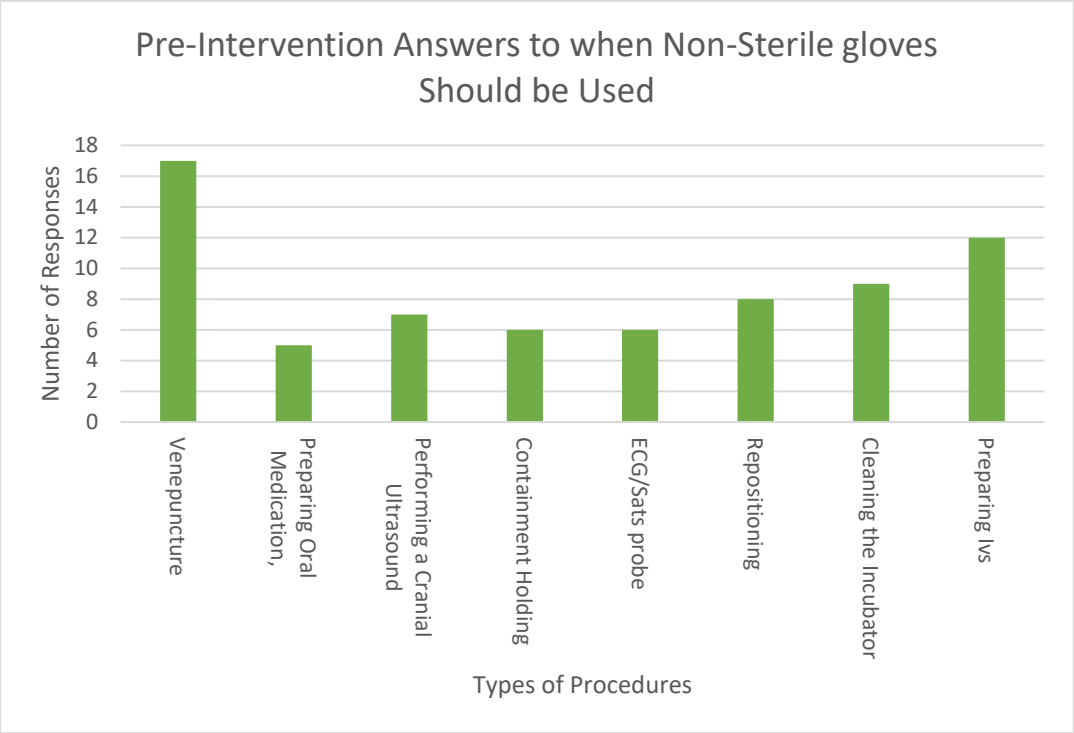
| **Was there a risk of cross contamination?** ☐Yes ☐No ☐U/K | **If yes, which 'moments of hand hygiene'?** | |
|---|---|---|
| *Assess from the list of items touched, time of glove use and hand hygiene and procedures undertaken. Indicate at which 'moment/s' the potential for cross contamination occurred.* | 1☐ | *Before contact with patient zone* |
| | 2☐ | *Before contact with susceptible site^* |
| | 3☐ | *After contact with blood/body fluid* |
| | 4☐ | *After contact with patient zone* |
| | 5☐ | *After contact with healthcare zone* |

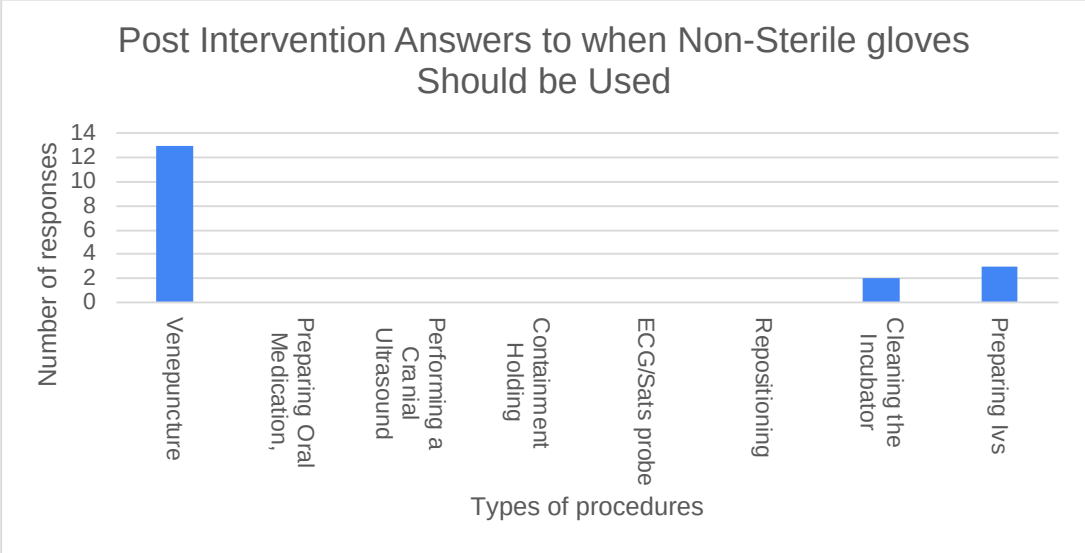
**Comment**

**Appendix 2.** Survey Questions:

1. What is your job title?
2. Have you seen the presentation for the Gloves off Campaign?
3. On a scale of 1-10, how confident are you in your knowledge of when gloves should and should not be worn?
4. Which of the following activities requires glove use? (select all that apply). Taking blood samples. Preparing oral medication, such as paracetamol liquid. Performing a cranial ultrasound. Containment holding. Changing ECG leads/Sats probs on baby. Repositioning baby in their incubator. Giving an injection. Cleaning the incubator. Preparing IVIs such as saline fluid
5. Glove use is more effective than hand washing at preventing infection. True or false
6. Who is protected when clinicians wear gloves? Patient, clinician, or both
7. On a personal level, what do you feel the advantages are in wearing non-sterile gloves?
8. On a personal level, what do you feel the disadvantages are in wearing non-sterile gloves?
9. Do you think it is useful to have reminders on when to use gloves?
10. Any additional thoughts on glove usage?

**Appendix 3.** Bar charts of answers from survey participants pre and post intervention:




**Appendix 4.** Training video on Non-sterile glove use

Final NICU Gloves Off Training Video (Glanwili) 1.mov
(Linked in the submission email also)

**Appendix 5.** Posters on GGH NICU/SCBU

# Risk Assessment for Staff

Should I be wearing gloves for this?

## Any Exposure to:

- Body fluids?
- Cytotoxic drugs/hormones or therapeutically active creams?
- Non-intact skin/mucous membranes/sterile sites?
- Sharps/Contaminated Devices?

**Think Gloves**

**No Exposure, No Gloves**

The Gloves Off Campaign

Naomi Oxberry - 2001261@ swansea.ac.uk
Amber Cleife - 970460@ swansea.ac.uk

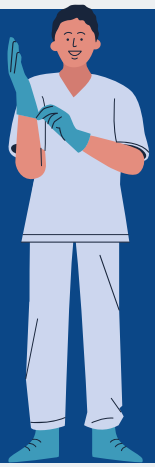
# Are you Glove Aware?


Staff will be focusing on how they use gloves. We have noticed an increase in gloves worn when they are not needed, with 40-70% of glove usage has been highlighted as unnecessary in NICU units.

## Why is this Change Happening?

**Gloves should be worn to protect staff when they have contact with bodily fluids, not for routine duties.**

**Research shows that good hand hygiene protects both staff and patients by removing pathogens from their hands[1]. This is much safer for patients than routinely wearing gloves which can result in cross contamination and healthcare acquired infections[2,3]. We Will be promoting hand hygiene instead of wearing unnecessary gloves.**



## How Will this Affect me?

**Staff might not wear gloves for certain tasks when they have done previously e.g. when giving IV medication or when bottle feeding a child.**

The Gloves Off Campaign

Naomi Oxberry - 2001261@ swansea.ac.uk
Amber Cleife -970460@ swansea.ac.uk

1 - Girou E et al. Misuse of gloves: the foundation for poor compliance with hand hygiene and potential for microbial transmission? J Hosp Infect. 2004 Jun;57(2):162-9.
2 - Mahida N et al. Outbreak of invasive group A streptococcus infection: contaminated patient curtains and cross-infection on an ear, nose and throat ward. J Hosp Infect. 2014 Jul;87(3):141-4.
3 - Patel A et al. Rapid Spread and Control of Multidrug-Resistant Gram-Negative Bacteria in COVID-19 Patient Care Units. Emerg Infect Dis. 2021 Apr;27(4):1234-1237.