



Time to Clean:

Estimated time spent by healthcare workers on decontamination of communal reusable patient care equipment

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Background

Over recent years Healthcare Environment Inspectorate (HEI) Annual Reports¹ have continually highlighted cleanliness of the healthcare environment and reusable patient care equipment as requiring improvement within NHSScotland hospitals. As a result Healthcare Improvement Scotland (HIS) recommends that NHS boards should establish systems to ensure a sufficient 'time to clean' between patients and for routine cleaning.

Since the introduction of HEI inspections in 2009–2010 there has been an overall, 50% reduction in the average number of requirements arising from each inspection since the inspections began. There has also seen a corresponding 86% reduction in the average number of recommendations made in each inspection over the same time period.¹ However despite these improvements cleaning of reusable care equipment and the healthcare environment continues to be identified as a problem which poses HAI risks for patients but is also detrimental to public confidence in health care facilities and services.

In 2016 Health Protection Scotland (HPS) undertook a project to gather evidence regarding time to clean communal reusable patient care equipment within the healthcare environment. The aim of the study was to develop an evidence base for cleaning times on a national level and conclude with recommendations for improving hospital cleanliness through the modification of existing cleaning times. The data from the study found that within a general ward area nursing staff spent an estimated 181.1 minutes (25%) per 12 hour shift cleaning, 53.3 minutes (7.33%) within an intensive therapy unit (ITU) area and 125.8 minutes (17.41%) within an operating theatre. The data collected during the study was limited and as a consequence conclusions or recommendations could not be made for practice within NHSScotland. The Scottish Government requested additional data be collected to provide the evidence required to inform NHSScotland workforce planning.

The original study involved the completion of a systematic review of the published literature on cleaning times, an observational study and a health board survey to answer the study question.

“How long do healthcare workers spend on decontamination of communal reusable patient care equipment?”

The NHSScotland National Infection Prevention and Control Manual² currently recommends that decontamination of communal reusable patient care equipment should be undertaken at the following times:

- Between each use;
- After blood and/or body fluid contamination;
- At regular predefined intervals as part of an equipment cleaning protocol; and
- Before inspection, servicing or repair.

According to the manual, local decontamination protocols should state who has responsibility for the decontamination of care equipment and how frequently routine cleaning should be undertaken.

The NHSScotland National Cleaning Services Specification³ offers a template for the required minimum frequency of routine cleaning for the hospital environment and patient care equipment; however, it does not indicate how much time healthcare workers should spend on cleaning tasks. Despite its ostensibly prescriptive structure, it continues to acknowledge the significance of local factors in determining appropriate cleaning duties.

Understandably, in practice there exists a considerable overlap in the cleaning responsibilities of nursing and domestic staff, further complicated by the competing demands on nursing staff in relation to direct patient care. In 2012, Health Protection Scotland (HPS) held a series of focus groups with senior charge nurses to identify the barriers to compliance with equipment decontamination in NHS Boards.⁴ Following on from these findings, HPS undertook the National Time to Clean a Bedspace Study (discharge), leading to a recommended minimum time of 40 minutes to clean a general bedspace and 60 minutes to clean a bedspace in a specialty area.

The Scottish Government assisted by Information Services Division (ISD) of National Services Scotland (NSS) undertake regular healthcare audits of workforce practices to inform the development of the NHS Workforce Plan for Scotland. The audit in part

reviews tasks undertaken by nursing staff. These are broken down in to task groupings and observed at ten minute intervals. Data is collected every 10 minutes and the tasks being performed at each observation are recorded.

In order to judiciously distribute limited hospital resources, it is imperative to provide an estimate of the average time currently spent by nursing staff on patient care equipment decontamination. This study aims to update the previous Time to Clean study and develop an evidence base for cleaning times on a national level and develop recommendations for improving hospital cleanliness through the modification of existing cleaning times.

Method

The original study involved the completion of a systematic review of the published literature on cleaning times. The systematic review was updated in August 2018 to inform this updated study and ascertain if any new evidence was available. Two data collection methods were also employed for the study in an attempt to answer the study question.

“How long do healthcare workers spend on decontamination of communal reusable patient care equipment?”

Systematic Review

The databases MEDLINE, CINAHL and EMBASE were searched to identify relevant published literature. A combination of Medical Subject Headings (MeSH) and free-text search terms were developed and adapted to suit each database, including the following: “housekeepers”, “cleaners”, “domestics”, “medical equipment”, “shared equipment” and “non-invasive equipment”. In addition, Google Scholar was used to search for grey literature relevant to the subject. All literature searches were conducted in May 2016 and updated August 2018. Articles were excluded from the review on the basis of the following criteria: article was published in a language other than English; article did not concern the decontamination of reusable communal patient care equipment (i.e. off-topic); or article concerned reusable medical devices (e.g. ultrasound transducers). The time period 2000–2016 was chosen for the database search, following a scoping exercise on publication activity relevant to the subject.

The systematic review followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) format for study identification and selection. Initially the title and abstract of each article were screened for relevance by the lead reviewer. Of those articles that were deemed potentially relevant, the full text was retrieved and screened against the exclusion criteria. For situations in which it was unclear whether studies should be included, consensus was reached through discussion with the other reviewers. Reference Manager (Reference Manager Version 12, Thomson Reuters) was used for bibliographic management.

Critical appraisal of the studies was carried out using the Scottish Intercollegiate Guidelines Network methodology (SIGN).⁵ As a further measure, the McDonald-Arduino evidentiary hierarchy was used as a framework for assessing the evidence relevant to the impact of time spent on equipment cleaning.⁶ Together, these two systems classify evidence on the basis of both study design (e.g. interrupted time series) and outcome measure (e.g. reduction in microbial bioburden); such a combination allows the evidence to be graded on multiple parameters of quality.

Observational Study

A list of general equipment used within a standard ward, a critical care ward and a theatre area was generated. A visit to the clinical skills laboratory at the Glasgow Caledonian University was arranged over two days for a group of volunteers to undertake timings to clean each piece of equipment.

The volunteers involved nursing staff, domestic staff and non-healthcare staff. Non-healthcare workers without any previous training in equipment cleaning were included to represent the variable experience of healthcare workers currently working in Scotland. The observers were not masked to the occupation of participants, although data collection forms were subsequently made anonymous using randomly allocated numbers. This measure ensured that the data analyst remained unaware of participant occupation until data analysis had been completed.

All participants were provided with a participant information sheet (Appendix 1) which provided information on the study, instructions for the day, data collection method, and the cleaning method to be followed during the cleaning timings (which follows

best practice). Each participant was asked to sign and date their participants form as evidence to their informed consent to participate and follow the instructions laid out.

Participants were divided into pairs with one healthcare worker (nurse or domestic) working in partnership with a non-healthcare worker. This would allow those with experience of cleaning healthcare equipment to instruct those with no healthcare cleaning experience. Instructions were given that the healthcare worker cleaned each piece of equipment first and the non-healthcare worker could observe how the cleaning should be done. In order to validate the process the equipment was deemed clean if it was visibly clean. No other method to determine cleanliness was used. Within the clinical area visual inspection is generally used to determine whether equipment has been sufficiently cleaned. The timings to be recorded only included the time it took for the piece of equipment to be cleaned. No allocation of time for hand hygiene or donning/doffing of PPE was incorporated. Each study pair was provided with a data collection sheet (Appendix 2) which was relevant to the clinical room. For the purposes of this study a general ward area, a critical care area and a theatre area were used. The three rooms chosen reflected the equipment which would be captured within the majority of acute areas.

The data collection was undertaken over a two day period and due to availability of the skills lab which allowed sufficient time for all available equipment to be cleaned at least once and for mean timings to be calculated. The observational study did not require to be repeated to inform this update as the timings recorded for cleaning of equipment would remain unchanged.

Health board survey

The second data collection component of the study was to determine how many times per shift healthcare workers would clean pieces of equipment. This would allow the organisers to determine the time spent by healthcare workers per shift on cleaning. By collecting timings (mean) for cleaning of each piece of equipment and determining how many times per shift (mean) each piece of equipment was cleaned, an overall time spent cleaning each piece of equipment per shift can be estimated as can whole time spent cleaning per shift.

Data collection on the number of times equipment would be cleaned per shift was achieved by organisers requesting the participation of health boards in NHSScotland by e-mail via members of hospital senior management teams. Responses were limited and therefore the request was made on numerous occasions over 2017 and 2018 via e-mail to the infection prevention teams, Senior Nurse Executive Directors and the Equipment and Environment Decontamination Expert Advisory Steering group.

Results

Systematic Review and Update

The literature search identified 509 articles (367 articles in the original search and a further 142 identified in the 2018 update search) following de-duplication. After the first screening stage (by title/abstract), 62 (43 in the original search and 19 in the update search) proceeded to the subsequent stage. Following the second screening stage (by full text), 33 (24 in original search and 9 in the update search) were included for critical appraisal. No articles were excluded on the basis of critical appraisal. Of the 33 articles, there remained: five evidence-based clinical guidelines;⁸⁻¹² one systematic literature review;¹³ three control cross-over studies;¹⁴⁻¹⁶ four before-and-after studies;¹⁷⁻²⁰ one interrupted time series;²¹ thirteen cross-sectional studies;²²⁻³⁴ one prospective cohort study;¹⁶ one case study;³⁵ one observational study;³⁶ and three non-systematic literature reviews or expert commentaries.³⁷⁻³⁹

The cross-over studies typically constituted level 2+/2++ evidence (well-conducted or high-quality controlled analytic studies with a low to very low risk of confounding, bias, or chance and a moderate to high probability that the relationship is causal), while the before-and-after studies, interrupted time series and cross-sectional studies typically constituted level 3 evidence (uncontrolled analytic studies). Four of the evidence-based clinical guidelines were rated as 'recommended' or 'strongly recommended', with the exception of one,¹² which due to lack of underpinning evidence was considered to be level 4 evidence. Additionally, the non-systematic literature reviews and expert commentaries, or uncontrolled analytic studies

downgraded due to significant design faults, were considered to be of level 4 evidence.

The evidence-based clinical guidelines took their origin from a range of developed regions, including the USA,⁸ Asia-Pacific,⁹ Canada,¹⁰ England,¹¹ and the UK.¹² The three controlled analytic studies derived from England,¹⁴ Scotland,¹⁵ and Canada,¹⁶ while the uncontrolled analytic studies were drawn from a wider variety of countries, including the USA,^{17;18;24;27;29;33;35} England,²¹ Canada,^{22;23;32} Scotland,^{26;36} France,²⁸ Germany,^{20;40} Austria³⁴ and China.^{19;30;41} Three studies were based in surgical wards,^{15;21;26} four studies were located in intensive care units,^{14;19;20;34} one study was situated in an acute admissions ward,³¹ one was within acute medical wards,¹⁶ one study was within the anaesthesia area of operating rooms,⁴⁰ eight studies took place across hospital wards of multiple types,^{24;27-30;32;33;35} and one was based within a clinical skills laboratory.³⁶

The results are largely applicable to Scotland, and the findings are relatively amenable to generalisation. Since the articles primarily concerned the allocation of healthcare workers to cleaning and disinfecting tasks, rather than the use of novel cleaning technologies, it is unlikely that the results would show significant bias through manufacturer funding. Accordingly, the authors of these articles declare few conflicts of interest.

Observational Study

From the items of communal patient care equipment found in a general area the bedframe required the longest mean 'time to clean' (181.1s), followed by the patient monitoring system (170.3s), hoist (152.7s), patient locker (124.2s), and commode (111.6s). In contrast, pillows underwent the shortest mean cleaning times (9.9s) followed by stethoscopes (13.6s), feed pumps (16.2s) and reusable basins (18.0s).

Despite variation in the experience of participants, there was broad uniformity in the time taken by different occupations to clean the selected items. One-way ANOVA determined that there were no statistically significant differences between non-clinical, nursing and domestic staff in the mean 'time to clean' ($p = 0.69$). A full list of the data from the observational study can be found in Appendix 4.

Health board survey

From the health board survey there was a total of 81 responses over the 3 year study period; 58 from General areas, 5 from ITU's and 18 from theatres. This is a very poor response rate considering the number of requests made to all health boards via a number of senior management. Changes to the survey questionnaire were made following the 2016 survey to provide a clearer explanation of the study aims and how to complete the data collection; however this did not improve the data returns. The reasons for the poor response rate are not know but verbal feedback has been reported as lack of time by staff to complete the data despite agreement from national stakeholders that the study was important.

The most frequently cleaned items of patient equipment were the patient bedtable (median=11) followed by blood pressure cuffs (median=9) and pillows (median=8). The least frequently cleaned items were the phlebotomy trolley (median=1), feeding pumps (median=1) and linen trolleys (median=1).

The length of time to clean items of equipment did not always correlate to the overall time spent cleaning those items per shift. For example, a mean of 6 beds were cleaned by a nurse on shift equating to 18.1 minutes bed cleaning per shift.

Bedframes are large items of equipment and it could be expected they would take more time than others. However wash basins which have a mean clean time of 18.0 seconds are cleaned frequently (median=20) per shift which equates to 19.3 minutes per shift, more than bed cleaning.

Table 1 shows the total time spent by one nurse cleaning reusable communal patient equipment per shift within a general area is 181.1 minutes (3.01hours) in 2017 and 184.5 minutes (3.07hours) in 2019 when the mean equipment times are multiplied by the mean times cleaned data. For ITU it was 53.3 minutes (0.89 hours) in 2017 and 105.41 minutes (1.76 hours) in 2019. Theatres were 125.8 minutes (2.09 hours) in 2017 and 80.4 (1.34 hours) in 2019. The timings remained similar for the general area and can probably be taken as a reflection of practice within general wards areas. The responses from general ward areas came from a variety of clinical specialities (surgical, medical, acute receiving and long stay) however it should be noted that the majority of study responses did come from one health board and therefore may not be a reflection of practice throughout Scotland. ITU and Theatres

showed marked variation between the 2017 and 2019 studies. This may be due to the data being so small for the areas that figures are being bias with additional datasets.

Table 1: Estimated time spent cleaning according to clinical area

Area	2017		2019	
	Minutes	Hours	Minutes	Hours
General	181.1	3.01	184.5	3.07
ITU	53.3	0.89	105.4	1.76
Theatre	125.8	2.09	80.4	1.34

From the items of communal patient care equipment found in an ITU the bedframe required the longest mean 'time to clean' (181.1s), followed by the patient monitoring system (170.3s), resuscitation trolley (143.8s) and patient locker (124.2s). In contrast, pillows underwent the shortest mean cleaning times (9.9s) followed by stethoscopes (13.6s), pulse oximeter (17.0s) and sharps trays (23.1s).

The most frequently cleaned items of patient equipment within ITU was pillows (median=7) followed by chairs, infusion pumps and patient bedrails (each median=5) and bed tables, lockers and dressing trolleys (each median=4). The least frequently cleaned items were the resuscitation trolley, closed suction system and ventilators (each median=1).

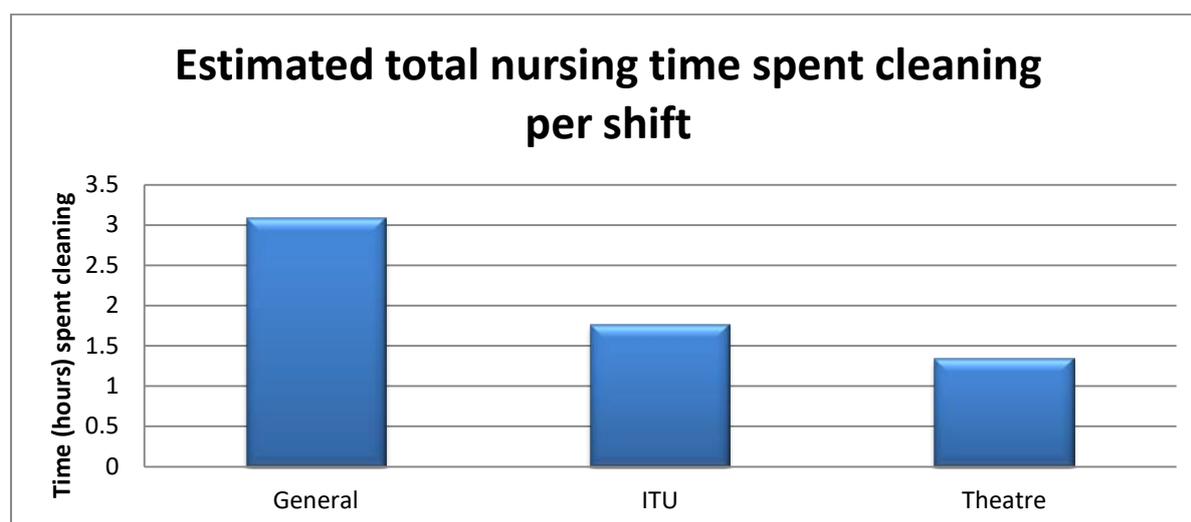
From the items of communal patient care equipment found in operating theatres the anaesthetic machine required the longest mean 'time to clean' (287.3s), followed by the operating table (193.2s), monitoring system (170.3s) and table attachments (97.7s). In contrast, pulse oximeters underwent the shortest mean cleaning times (17.0s) followed by reusable basins (18.0s), thermometers (18.8s) and sharps trays (23.1s).

The most frequently cleaned items of patient equipment were anaesthetic machines (median=7) followed by pulse oximeters (median=6) and blood pressure cuffs (median=5). The least frequently cleaned items were the stethoscope (median=1; Range 1 – 1), thermometer (median=2) and computers/keyboards (median=2). Anaesthetic machines and operating tables were identified as taking the longest

mean time to clean from the theatre environment data (287.3 & 193.2 seconds respectively) with a total clean time per shift (28.99 & 14.5 minutes respectively).

Figure 1 shows the estimated total time taken per shift nurses spend cleaning reusable communal patient care equipment within a general ward, ITU ward and operating theatre area. The figures were calculated from the mean time to clean for each piece of equipment multiplied by the median number of times the equipment is cleaned in the clinical area. The greater amount of time spent cleaning was within a general ward area followed by ITU and then the theatre area.

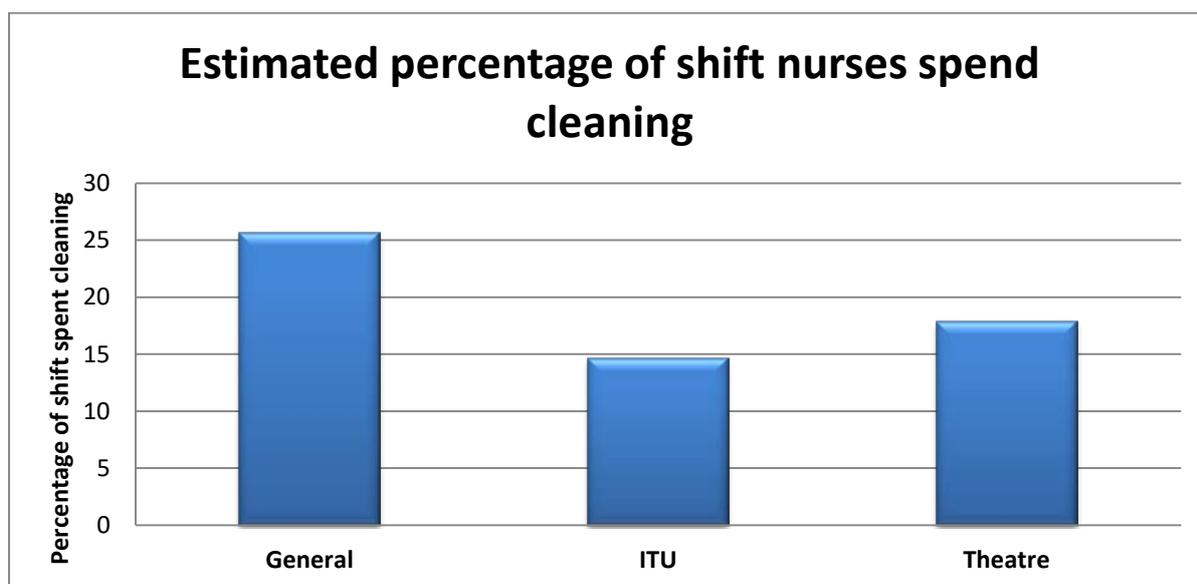
FIGURE 1: Estimated total time taken per shift each nurse spends cleaning reusable communal patient care equipment



Data was further analysed to equate the amount of time spent cleaning as a percentage of the overall shift worked.

Figure 2 shows a comparison of the percentages per shift staff spend cleaning within a general ward area, an ITU and a theatre relative to the shift patterns they have worked. From the data received it is clear that nurses within general ward areas spend a greater percentage of time cleaning (25.63%) for a 12-hour shift than staff within an ITU (14.64%) and theatre staff (17.87%) for a 7.5-hour shift.

FIGURE 2: Estimated percentage per shift staff spend cleaning



Data was collected over a three year period and as part of the survey questions participants were asked what Agenda for Change grade they were. This would allow for additional analysis of the data to ascertain how much cleaning was being performed by trained nurses and nursing assistant groups.

Figure 3 shows the percentage of time spent by trained nurses and nursing assistants during a 12 hour shift within a general area. The data from 2016 did not include details of grade so we can only ascertain a total figure for that year. However for 2017 and 2018 nursing assistants (NA) cleaned 33% and 19% of their shift with trained nurses (TN) cleaning 25% and 8% respectively. With the overall total nurse cleaning times for both studies being 25%

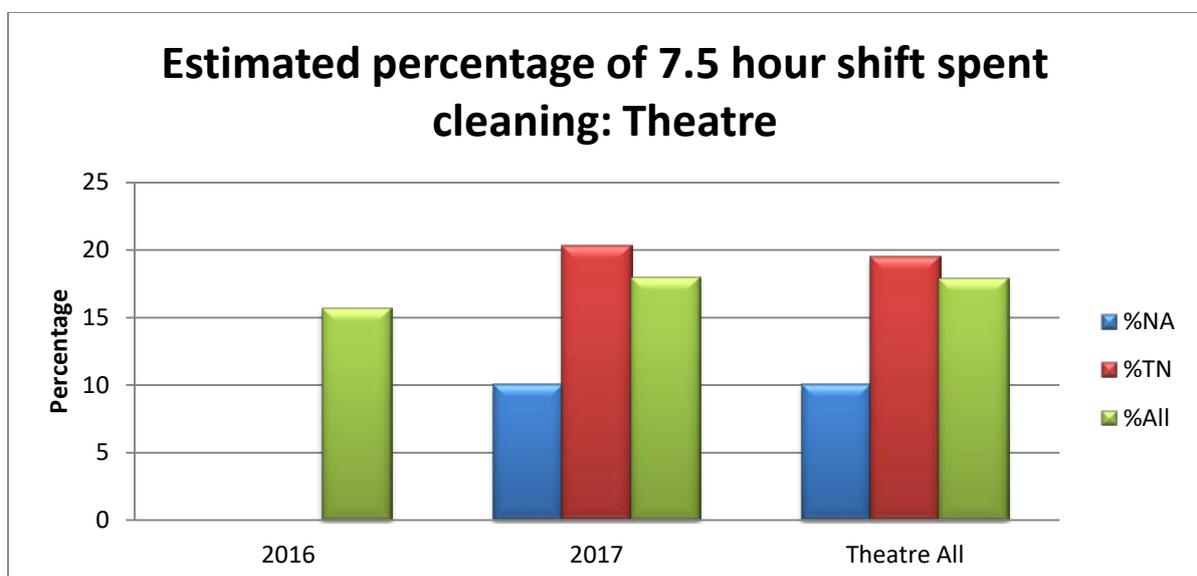
FIGURE 3: Estimated percentage of time spent by staff groups cleaning



The only data returns from ITU areas were for nursing assistants. Therefore no comparisons can be drawn from the data. In 2016 the percentage of time cleaning was estimated at 6% and 20% for 2017 however there were only two and three data returns respectively and therefore impossible to draw conclusions for the limited data. The overall total for ITU is estimated at 15%.

Data was available for 2017 for the theatre areas to compare the cleaning estimates between staff groups. Figure 4 identified trained nurses performed more cleaning than nursing assistants within the theatre (20% and 10% respectively).

FIGURE 4: Estimated percentage of time spent cleaning: Theatres



The data was further reviewed to ascertain how long staff would spend cleaning items of equipment from the lists only once per shift compared to the total time cleaning per shift shown in Table 2. It is clear from the figures that in all three areas staff are cleaning items of equipment more than once per shift.

TABLE 2: Total time to clean each item of equipment once

Clinical area	Time to clean each piece of equipment X1	Total time spent cleaning
General	58.03 minutes	184.5 minutes
ITU	47.86 minutes	105.41 minutes
Theatre	32.73 minutes	80.43 minutes

Discussion

The limited evidence retrieved for the literature review is indicative of the lack of original research conducted in the field of decontamination more generally. Perhaps unsurprisingly, the evidence base was of low quality, particularly with regard to the impact of increased cleaning times on the occurrence of HCAs.

The only available estimates of the time spent by healthcare workers on cleaning were provided by studies conducted in Canada and the USA and may not be representative of cleaning times in North America, let alone accurately depict cleaning times in Scotland. Differences internationally regarding responsibilities for cleaning reusable communal patient equipment can pose challenges for gathering evidence which can be transferable to the Scottish workforce planning methodology. Even within NHSScotland the Nursing and Midwifery Workload and Workforce planning (NMWWP) group findings from national observational studies allocate 6% of nursing time to cleaning. This figure is achieved through direct observations within the clinical environment every 10 minutes. At these intervals it is noted down what activities are being performed by staff. The full list of procedures can be found in Appendix 5. The majority of clinical procedures however will require an element of cleaning (before and after each use) but may not be captured within the observational study. Therefore the total amount of time spent by nursing staff may not be fully estimated within the NMWWP study.

There is also a lack of clarity over the terminology used to distinguish communal reusable patient care equipment from reusable medical devices (RMDs), reusable care equipment or fixtures and fittings in the patient environment. For example, listing ultrasound transducers as non-invasive portable items potentially shared between patients¹², which might otherwise be categorised as RMDs or ward furniture, i.e. bedside tables described as 'fixed surfaces' being a separate category from patient care equipment.⁸ Such confusion interferes with attempts to provide accurate estimates of the time spent on cleaning communal reusable patient care equipment.

From the focus groups, undertaken by HPS in 2012, senior charge nurses (SCN) raised the issue that nurses perceived they were increasingly spending more time

cleaning communal reusable patient care equipment. The findings of this study estimate each nurse spends 188.35 minutes within a general ward area cleaning equipment per shift, 105.42 minutes within ITU and 80.43 within an operating theatre. It is not possible to conclude that these figures are representative of the situation in practice; however, this is the first study to estimate time spent cleaning in NHSScotland and the data obtained does provide baseline data for future research. It can be concluded from this study that nurses spend a substantial percentage of their day cleaning reusable communal reusable patient care equipment.

The percentages of time per shift staff spent cleaning were valuable and somewhat surprising. It was not expected staff would be spending such a large proportion of their time cleaning during the 2017 study but the findings from the 2019 study have supported the original findings where 25% of nursing time is estimated to be spent cleaning on a 12-hour shift within a general area. This reflects clinical practice within a general ward area where a nurse is allocated to care for a number of patients over a shift and responsible for cleaning a number of items of care equipment i.e. bed tables, lockers or bedrails.

Theatre responses also indicated multiple cleans of equipment where the time to clean each item of equipment in 2019 once took 32.73 minutes however the total reported time cleaning was 80.43 minutes (less than the 125.8 minutes reported in 2017). The findings however still reflect theatre clinical practice where all equipment is cleaned before and after each surgical case during a theatre session. The number of patients booked for a theatre session will determine how many times equipment will require to be cleaned.

The ITU area also showed a difference in the times for cleaning items once and the total cleaning time per shift. In 2017 to clean items of equipment once was calculated at 47.86 minutes with a total equipment cleaning time of 55 minutes. However in 2019 the total time spent cleaning was reported at 105.41 minutes, almost double than the previous study. The large variation on results can be due to the very small data received causing a bias to the overall figures.

It must also be considered the data findings are representative of one nurse on a shift and therefore must be multiplied by the number of nurses working per shift to understand the overall impact cleaning may have within each clinical environment

and/or direct patient care. It is acknowledged that not all nurses will clean the same amount on a shift and why the study provided estimates based on mean times to clean and mean times equipment was cleaned, however there is an expectation that all nurses will undertake cleaning on each shift. Additionally it is recognised that local health boards will have local policies and practices in place regarding roles and responsibilities for cleaning of equipment and the healthcare environment.

Further work was attempted to breakdown respondents into staff bands to ascertain how much cleaning was being performed by each staff band. Within the general areas nursing assistants undertook a larger proportion of cleaning and trained nurses within the theatre areas. This is reflective of the general working practices within these respective clinical areas but cannot draw any conclusions for national recommendations. Unfortunately no data for staff banding was available for the ITU areas and could not be analysed.

Whilst HPS recognise cleaning of patient care equipment is an integral part of patient care practices and must be performed the data collected showed nursing staff were undertaking a large proportion of routine cleaning tasks which are not linked to direct patient care but ensuring equipment is clean for general use. Whilst routine cleaning is also important for patient safety it raises questions regarding who should be responsible for routine cleaning. Based on the findings of this study nursing staff are responsible for the majority of cleaning of communal reusable patient care equipment, domestic staff for the healthcare environment and allied health professionals and medical staff for the equipment they use during patient care interventions. Building on the findings of this study would allow a more detailed breakdown of time allocated to cleaning reusable communal equipment and possible impact if any on patient care and HCAI.

Limitations

The format of the observational component of the study did incur a number of limitations: in particular, the study did not intend to evaluate the effectiveness of cleaning by different occupations. Rather, it aimed to provide cleaning time estimates that represented the variable experience of healthcare workers in the NHS.

However, despite the broad occupational range of participants, only nine individuals

volunteered for the study and a larger sample size might have improved external validity of the estimates.

Not all participants were able to clean every single item in the time allocated. Recognising this limitation, the missing data (7.9%) was balanced across both occupations and items, and is therefore unlikely to have influenced the findings of the study. Additionally, the study was conducted within a simulated teaching ward, instead of a clinical ward with ongoing patient care; hence, the circumstances may not have been entirely representative of cleaning duties in the near-patient environment (e.g. patient belongings on bedside tables necessitating removal prior to cleaning). With this in mind what we can demonstrate is that this study offers strength in being the first study, following a systematic search of the literature, to provide estimates of the time required for healthcare workers in the NHS to clean items of communal reusable patient care equipment.

Data received from health boards was limited regarding how many times per shift items of equipment were decontaminated, only providing 58 data returns for the general ward area, 5 from ITU areas and 18 operating theatre areas over the three year period. Therefore the returns will not truly reflect the potential differences in cleaning of equipment between differing clinical specialities within general wards, ITU and theatre specialities. What the data has told us is a generic estimate of cleaning within those clinical specialities.

Whereas the observational study gathered data on cleaning times for both nursing and domestic staff, the health board survey only collected cleaning frequencies for nursing staff. The frequency of cleaning for items that are typically cleaned by domestic staff is therefore likely to be under-reported. Similarly, the observational study provided an estimate of ideal cleaning times, in the absence of competing priorities, while the survey offered more realistic estimates for the frequency of cleaning in practice. However, the survey method may be less reliable due to bias in reporting. The differences between the two approaches suggest that any conclusions drawn from the combined estimates should demonstrate a degree of caution.

Recommendations

This review makes the following recommendations based on an assessment of the extant scientific literature on nurse cleaning times in addition to the observational study and health board study of time spent by nursing staff cleaning.

- The study in its present format should not be repeated. To repeat this study and achieve meaningful data collection for analysis staff would require to be observed on an individual basis and have cleaning times measured.
- Consideration to be given to undertaking a joint observational study between HPS/HFS and NMWWP to further ascertain how much time nursing staff spend cleaning and incorporating the work from both studies which may provide a more accurate analysis of cleaning data.
- Consideration to be given to any future workforce planning or time and motion study recognising and including the cleaning component within all tasks (clinical and non clinical) to ensure the time spent by clinical staff undertaking the duties are fully captured

Appendix 1 - Information for Participants – Time to Clean data collection Tuesday 13th & Wednesday 14th Sept 2016 GCU

Background

Following Senior Charge Nurse (SCN) focus groups HPS identified a need to quantify how much time on average, per shift, nursing staff and domestic staff spend on cleaning communal patient care equipment. SCNs anecdotally believed they were spending more and more time cleaning and less time on direct patient care. HPS detailed a project which would identify time spent on cleaning which has been approved and funded by the Scottish Government for completion of the project.

What can I expect today?

We have been allocated the 6 bed simulation lab for the 13th and the ITU and theatre areas for the 14th. Equipment appropriate to the areas has been placed in the rooms for us to undertake the data collection and we have detergent wipes provided to use for cleaning.

Participants will work in pairs to collect data. This will allow one participant to clean and the other to time the cleaning. We request that one clinical (nurse/domestic) participant works with a non-clinical (HC scientist/information officer/project/programme manager, etc). This allows our experienced colleagues to support our non-clinical colleagues undertake cleaning in the correct manner.

Data collection

The data to be collected is the time it takes to clean each piece of equipment. Timings should be marked beside the equipment name in the columns identified (timing 1 and timing 2) and will be anonymised. Each participant will be given an envelope with a number inside. We would ask that you write this number at the top of your timings column at the end of your data collection. This will allow us to analyse the data in more detail in relation to job role and not person specific.

Cleaning method

Decontaminate equipment with disposable **detergent wipes**.

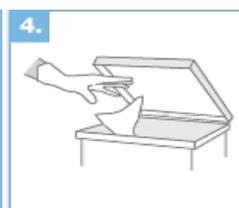
- Clean the piece of equipment from the top or furthest away point
- Use a one wipe, one surface, one direction method (see below)
- Discard disposable wipes into the healthcare waste receptacle.



2. Remove one wipe from the bucket.



3. Working from clean to dirty, wipe in an 'S' shaped pattern, taking care not to go over the same area twice.



4. Change wipe if it becomes dry or soiled and discard. Let the surface air dry.

Name:..... Signed:..... Date:.....

Appendix 2 – Data collection tool; general ward area

Equipment	Number of times cleaned per shift
Basins - reusable (cleaning)	
Bath (adult)	
Bath Mats	
Bath/shower stools/chairs	
Bedframe	
Bedpan Holders	
Bed cradles	
Bed tables	
Bed rails/bumpers	
Blood glucose machines and boxes	
Blood pressure cuffs	
Cardiac monitor	
Catheter stands	
Chairs (patient)	
Chairs (visitor)	
Commodes	
Computer keyboard/mouse	
Crutches	
Dressing trolley	
Drip stands	
Electric fans (Portable)	
Electrocardiograph ECG machine	
Feed (enteral) Pumps	
Footstools	
Fridge (drug)	
Fridges – specimen	
Hoists	
Hoist slings/straps	
Infusion pumps	
Light - overbed	
Linen buggies	
Linen trolleys	
Lockers/pods	
Mattress - specialist	
Mattress - standard	
Medicine trolley	
Nebuliser masks	
Nebuliser units	
Nurse call system	

Time to Clean: Estimated time spent by healthcare workers on decontamination of communal reusable patient care equipment

Ophthalmoscope	
Oxygen flowmeter	
Oxygen masks/nasal prongs	
Oxygen - portable	
Phones	
Patientline	
Patient chart holder	
Patient height measurer	
Patient monitoring systems - e.g. criticare	
Patient transfer trolleys - theatre/general/x-ray	
Patient transfer boards - patslide	
Pillows	
Pulse oximeter	
Raised toilet seats	
Resuscitation Trolleys	
Scales (standing)	
Scales (sitting)	
Sharps tray	
Sharps trolley	
Showers	
Sphygmomanometer - electric	
Sphygmomanometer - manual	
Stethoscopes	
Suction machine (portable)	
Suction system/bottles	
Stools	
Tables - coffee	
Tables - dining	
Televisions	
Thermometer (mercury)	
Thermometer (Tympanic)	
Tourniquets	
Trolley - phlebotomy	
Ward tables/desks	
Washbasins - patient	
Waste bin (clinical)	
Wheelchairs - self propelling	
Wheelchairs - porter	
Working surfaces	
X-ray box	
Zimmer	
Other -	

Appendix 3 – Characteristics of included studies

Studies estimating current cleaning times					
Authors (date)	Study design	Country	Population		Outcome
Saito et al, (2015)	Cross-Sectional Study	USA	144 healthcare workers, including 31 housekeepers and 34 registered nurses, across three general hospitals and two university teaching hospitals.		Observed frequency of cleaning and disinfecting tasks (recorded at five-minute intervals) as a proportion of shifts (% of total shifts) and observed time spent performing cleaning and disinfecting tasks per shift (min/shift).
Zoutman et al, (2015)	Cross-Sectional Study	Canada	50 senior managers responsible for environmental services/housekeeping across acute care hospitals.		Estimates of the time required to perform routine cleaning and terminal cleaning of private, semi-private and ward rooms.
Studies evaluating increased cleaning times					
Authors (date)	Study design	Country	Population	Time-based intervention	Outcome
Wilson et al, (2011)	Randomised Cross-Over Study	UK	Two intensive care units.	Twice daily cleaning, in addition to usual once daily cleaning for three 2-month periods.	Statistically significant reduction in environmental methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) per bed-area day from 14.6% to 9.1% ($p = 0.006$), sampled from five randomly selected sites around the bed areas, staff hands and communal sites.
Dancer et al, (2009)	Non-Randomised Cross-Over Study	UK	Two matched surgical wards.	An additional member of cleaning staff introduced for a period of six months.	Statistically significant reduction in levels of environmental contamination of 32.5% ($p < 0.0001$), by weekly sampling of ten hand-touch sites and a borderline statistically significant reduction in new MRSA infections of 26.6% ($p = 0.032$).
Rampling et al, (2001)	Interrupted Time Series	UK	One general surgical ward.	An increase in routine domestic cleaning time from 66.5 to 123.5 hours per week for a period of six months.	Reduction in patient acquisition of an outbreak strain of MRSA from 30 cases in the six months prior to the intervention to three cases over the following six months.

Appendix 4:

ACTIVITY ANALYSIS – Nursing and Midwifery workforce planning observational audit.

The procedures highlighted in yellow would require an element of cleaning prior to and after procedures. Whilst there is a section dedicated to cleaning the cleaning during observations the majority of clinical procedures require some degree of cleaning which may not be captured during the observational audit.

DIRECT CARE ACTIVITIES

Outpatient

1. Caring for an outpatient attending the ward for treatment

Medical Procedures

2. Extended-role procedure, including: taking venous blood; intravenous drugs; bladder cytotoxic therapy; defibrillation; inserting venous cannula; suturing; prostaglandin pessaries; genital wart treatment; intubation; local anaesthetic; IM methotrexate; cervical smear; vaginal packing; endocervical swab; arterial line sampling; epidural anaesthesia; PCWP pressures; theatre first assistant; IV morphine; post-coital test; immunising; curettage; punch and shave biopsy; and PCAS.

Communicating

3. Supporting and reassuring
4. Teaching
5. Explaining procedures
6. Demonstrating, for example, how to use a wheelchair.
7. Showing a patient around a ward
8. Assessing a patient's physical and mental state
9. Preparing a nursing care plan for or with a patient
10. Observing
11. Psychological and spiritual support.
12. Watching and waiting (recorded as G for group).

Nutrition

13. Cutting food
14. Feeding a helpless patient
15. Encouraging a patient to eat and drink
16. Feeding a patient via a nasogastric or PeG/RIG tube
17. Preparing diets for patients with special needs

Hygiene

18. Helping a patient to wash, bathe, shower, dress
19. Bathing a bedfast patient
20. Checking or looking after a patient's pressure areas
21. Supervising a patient in the bathroom
22. Washing a patient
23. Facial shaving
24. Cleaning an incontinent patient
25. Attending to a patient's hair, nails, mouth, teeth or dentures
26. Stripping and making an occupied bed
27. Making a patient comfortable in bed
28. Tidying an occupied bed

Elimination

29. Giving or removing bedpans
30. Recording drainage from a wound

31. Giving and removing vomit bowls

32. Assessing elimination

Medication

33. Administering medication by mouth, feeding tubes, parenteral or other routes

34. Intravenous therapy

35. Checking drugs

36. Monitoring patient's self-medication regimen

37. Maintaining syringe drivers

Movement

38. Turning and repositioning a patient

39. Looking after a patient on an orthopaedic frame or bed

40. Helping porters to lift a patient onto a trolley

41. Helping a patient to exercise

42. Assisting a patient with active or carrying out passive movements

43. Assisting a patient to walk

44. Helping the patient to sit up/out

45. Adjusting traction or other bed equipment

46. Assisting a patient with breathing exercises

Vital Signs

47. Weighing a patient

48. Measuring and recording a patient's blood pressure

49. Measuring and recording a patient's temperature, pulse and respiration

50. Measuring and recording neurological signs

51. Measuring and recording central venous pressure

52. Cardiac monitoring

53. Blood glucose monitoring

54. Interpreting vital signs

Specimens

55. Gathering and labelling specimens for the laboratory

56. Gathering specimens for testing in the ward

57. Testing specimens in the ward

Nursing Procedures

58. Catheterising a patient

59. Starting, maintaining or discontinuing oxygen

60. Starting, maintaining or discontinuing suction

61. Assembling or dismantling traction

62. Applying orthopaedic braces

63. Applying or modifying plaster casts

64. Treating pressure sores

65. Giving an evacuant enema

66. Irrigating bladder, ostomies or douching

67. Redressing a wound using an aseptic/clinically clean technique

68. Inserting or removing a naso-gastric tube

69. Sterilising equipment

70. Preparing trolleys for nursing/medical procedures

71. Applying or removing anti-embolism stockings

72. Cooling or warming a patient

73. Dealing with a patient who died

74. Procedures that require 'scrubbing up'

75. Removing an intravenous cannula

76. Hand washing before or after a procedure

Escorting/Admitting/Discharging

77. Supervising a patient moving from the ward to another department

78. Transferring a patient to another hospital

79. Escorting a patient to theatre

80. Escorting a patient to another area in the ward

81. Admitting a patient to the ward

82. Discharging a patient from the ward

83. Discharge planning

84. Transferring bodies to the mortuary

Teaching

85. Instructing patients or demonstrating

Assisting Doctors

86. Assisting doctors on a ward round

87. Assisting doctors with technical procedures

Assisting Others

88. Assisting other staff, e.g., radiographer, with technical procedures

INDIRECT CARE ACTIVITIES

Charting

89. Starting a nursing record

90. Maintaining nursing record

Reporting

91. Recording/retrieving patient information on/from the computer patient administration system

92. Contributing to team conferences about a patient

93. Giving or receiving information about a patient

94. Handing over to nurses on the next shift

Communicating with Staff

95. Arranging investigations, for example, x-rays

96. Liaising with other health/social care professionals

Communicating with Relatives

97. Asking/answering questions

Teaching

98. Instructing or assessing staff

99. Being taught

ASSOCIATED WORK ACTIVITIES

99A. Walking, moving between areas within the ward.

Cleaning

100. Stripping, cleaning and making an empty bed

Time to Clean: Estimated time spent by healthcare workers on decontamination of communal reusable patient care equipment

101. Cleaning equipment not in use
102. Cleaning and tidying store cupboards
103. Light cleaning and dusting
104. Tidying the ward
105. Changing curtains
106. Washing crockery and tidying the kitchen
107. Cleaning the bathroom or sluice
108. Disinfecting
109. Washing soiled clothing etc:
110. Laundering items such as sheepskins
111. Disposing of soiled linen
112. Emptying bins and disposing of rubbish
113. Moving beds, lockers and chairs
114. Flower care
115. Hand washing un-associated with any procedure

Meals and Drinks

116. Setting meals
117. Distributing food and drinks
118. Collecting and clearing meals
119. Distributing and collecting water jugs

Clerical

120. Completing (not choosing food) menu lists
121. Completing daily bed returns
122. Delivering mail and flowers
123. Making out patient's identification bracelets and assembling notes
124. Dealing with deceased patient's belongings
125. General clerical duties
126. Recording/retrieving information on/from the computer nursing information management system
127. Dealing with information on the ward computer system
128. Assessing/recording a patient's dependency

Communication

129. Dealing with administrative telephone calls
130. Compiling duty rotas
131. Advice line calls

Errands

132. Delivering or collecting patient's notes/reports
133. Collecting drugs from the pharmacy
134. Collecting blood from the blood bank
135. Looking for staff or patients off the ward

Supplies

136. Borrowing or lending equipment or stores
137. Safety checks on fire equipment, televisions etc:
138. Checking, reordering, and issuing routine ward supplies
139. Restocking emergency trolleys or trays

Meetings

140. Attending management and administrative meetings

Time to Clean: Estimated time spent by healthcare workers on decontamination of communal reusable patient care equipment

Supervising

- 141. Supervising nursing assistants
- 142. Completing learners' reports
- 143. Showing new staff around the ward
- 144. Staff appraisals

UNPRODUCTIVE TIME

Personal

- 145. Official and unofficial meal and drink breaks
 - 146. Other personal time, including studying
- Unoccupied

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