Bundle of documents for Oral hearings commencing from 19 August 2024 in relation to the Queen Elizabeth University Hospital and the Royal Hospital for Children, Glasgow

Bundle 27

Miscellaneous Documents

Volume 13

SCOTTISH HOSPITALS INQUIRY

Table of Contents

From: Jones, Brian [redacted]
Sent: 28 February 2019 17:07
To: Dancer, Stephanie [redacted]
Subject: [ExternaltoNHSL] RE: IPC support for NHS GGC

Dear Stephanie,

Thanks for your reply. I appreciate your frustration and have escalated your email. These are difficult times indeed and we are trying to restructure and fund additional resource.

Kind regards,

Brian

From: Dancer, Stephanie (WG) - Consultant Microbiologist
[redacted]
Sent: 28 February 2019 11:54
To: Jones, Brian
Subject: [ExternaltoGGC]RE: IPC support for NHS GGC

Dear Brian,
This is really rather shabby treatment, is it not? I would never have done this to a colleague.
Clearly, the 'Glasgow boys' have put the boot in (again) based on preconception, ignorance and petty jealousies. No surprises there. Did you stick up for me??
I would have made patient safety an absolute priority as well as supporting and helping the local infection control team. I'm sure you know that. As it was, even after just two visits, it wasn't difficult to get the measure of QEUH –or the culture- and I would have engineered a raft of interventions that would have immediately reduced the HAI risks for everyone. These are evidence-based and cost-effective.
I'm surprised that none of your resident experts have already suggested the more obvious amendments.
There are serious environmental deficiencies at the QUEH. Protecting your patients now, and for the future, needs courageous people to speak out and resolve the problems. I would have done that for you with diplomacy and humour. I do not support, nor would contribute towards, a witch hunt or a culture of blame. I abhor irresponsible media liaison. I only wanted to help resolve issues that I understand and care about.
GG&C can no longer paper over the cracks in this multi-million pound flagship hospital.
Kindest regards
Stephanie
Dr Stephanie J. Dancer, Consultant Medical Microbiologist, NHS Lanarkshire and Professor of Microbiology, Edinburgh Napier University, Scotland.
Tel: [redacted]

From: Jones, Brian [redacted]
Sent: 27 February 2019 12:28
To: Dancer, Stephanie (WG) - Consultant Microbiologist; [redacted]
Cc: Leanord, Alistair; Green, Rachel (NHSmail)
Subject: [ExternaltoNHSL] IPC support for NHS GGC

Dear Stephanie,

I very much regret to inform you that NHS GGC has reviewed current staffing for IPC and clinical microbiology and wishes to restructure and support these services internally, incorporating the two sessions intended for yourself into a more substantive post to support the services in the longer term. Unfortunately, this means we will not require your assistance in IPC at this time.

I apologise for any inconvenience this may cause and wish to thank you for your willingness to have taken on this role at such short notice.

Kind regards,

Brian

Professor Brian L. Jones
Consultant Medical Microbiologist
Head of Service, NHS GGC

SCIENTIFIC REPORTS
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Influence of ventilation use and occupant behaviour on surface microorganisms in contemporary social housing

T. Sharpe[1]✉, G. McGill[1]✉, S. J. Dancer[2,3], M.-F. King[4], L. Fletcher[4] & C. J. Noakes[4]

In the context of increasingly airtight homes, there is currently little known about the type and diversity of microorganisms in the home, or factors that could affect their abundance, diversity and nature. In this study, we examined the type and prevalence of cultivable microorganisms at eight different sites in 100 homes of older adults located in Glasgow, Scotland. The microbiological sampling was undertaken alongside a household survey that collated information on household demographics, occupant behaviour, building characteristics, antibiotic use and general health information. Each of the sampled sites revealed its own distinct microbiological character, in both species and number of cultivable microbes. While some potential human pathogens were identified, none were found to be multidrug resistant. We examined whether the variability in bacterial communities could be attributed to differences in building characteristics, occupant behaviour or household factors. Sampled sites furnished specific microbiological characteristics which reflected room function and touch frequency. We found that homes that reported opening windows more often were strongly associated with lower numbers of Gram-negative organisms at indoor sites ($p < 0.0001$). This work offers one of the first detailed analysis of cultivable microbes in homes of older adults and their relationship with building and occupancy related factors, in a UK context.

Homes satisfy our most basic needs for shelter and should be designed to provide a comfortable and safe environment. However, provision of housing is constrained through cost and legislation encompassing appearance, structure, materials, provision of services and energy performance. Most of the time these align to human needs, but there are conflicts, particularly with respect to energy and ventilation and their influence on health. In a bid to reduce energy and carbon emissions, the building sector is delivering increasingly airtight homes that aim to reduce uncontrolled ventilation losses[1]. There are concerns that without improved designed ventilation provision this strategy may lead to a range of unintended consequences including impacts on occupant health[2]. Ventilation affects exposure to a number of elements that are known to influence health, including chemicals, moisture, temperature and microorganisms. There is evidence that poor ventilation may be linked with poor physical and mental health in a number of non-domestic building types[3], but whilst the literature points to detrimental effects in housing[2,4], this remains seriously under investigated. In particular, there are currently gaps in knowledge about the range and diversity of microorganisms in the domestic environment, particularly in the context of modern airtight homes[5]. People spend a great deal of time in their homes, especially those at the extremes of age, and therefore the indoor microbiome could impact upon human health in ways not yet understood[6].

Recent research into the real world performance of buildings has begun to reveal significant performance gaps in environmental conditions, especially poor rates of ventilation, particularly in bedrooms[7]. This has led to studies that have examined the consequences of increasing airtightness of modern construction, lack of ventilation, occupant interaction with ventilation, and increasing use of mechanical ventilation[8,9]. Recent reviews in the UK by the Royal College of Paediatrics and Child Heath[10] and the National Institute for Health and Care Excellence[11]

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have undertaken systematic reviews of the literature and recognised the importance of indoor air quality on health and the need to address challenges including with building design. Making buildings resistant to heat loss and draughts has important benefits; higher levels of insulation and airtightness can improve health, for example, through a reduction in cold-related deaths, condensation and mould indoors and reduced fuel poverty[12,13]. However, one of the consequences is a separation from the outdoor environment and lower ventilation rates. Theoretical analysis of housing types indicates that potential health consequences of reduced ventilation may include transmission of infectious diseases[14], and there is emerging evidence that building design affects indoor microflora, with artificial environments created by mechanical ventilation having less diverse microbial communities with a higher presence of pathogens[15,16]. Whilst a small number of US studies have demonstrated that architectural design features (such as spatial arrangement or room type) can have an impact on the microbial biogeography of buildings, it remains unclear whether generalizable patterns exist that can be used to inform practice (e.g. through 'bio-informed' design)[17]. Moreover, the impact of improved thermal performance (and comfort) standards, energy conservation measures[18] and the creation of hygrothermally stable indoor environments in contemporary housing[8] on indoor microbiology have yet to be fully understood.

There is growing evidence that both building design and human behaviour determine the microbial species present in homes. Care homes have been shown to be a reservoir for antibiotic resistant bacteria including *Klebsiella* spp. and *E. coli*[19], and environmental sampling has shown that high-touch surfaces in home environments may harbour methicillin-resistant *Staphylococcus aureus* (MRSA)[20]. Multi-drug resistance is having a huge impact in hospitals worldwide but is not commonly investigated in people's homes; exceptions are the studies by Lax et al., who investigated antimicrobial resistance (AMR) in a hospital setting as well as private homes[21,22]. Use of antimicrobial cleaning products have also been highlighted as an emerging AMR risk factor in community settings[23] including use of microbiocidal products used for routine cleaning following confirmed links between disinfectants and resistance[24]. There has even been a call for regulatory use of these products in hospitals[25]; powerful disinfectants harm the surface ecology, much like antibiotics harm healthy gut flora, permitting naturally tolerant or resistant microflora to survive and create reservoirs of increasingly resistant microbes[26,27].

A number of previous studies have applied DNA sequencing methods to demonstrate the huge diversity in microorganisms present in the built environment[28]. Microbial control and building confinement are known to affect the composition and functional capabilities of the residing microbiome[26]. For example, fungi isolated from home surfaces tend to reflect species found in outside air (where there is no significant moisture damage in the building envelope), while bacterial contamination is more likely to derive from colonised inhabitants and/or their practices[28]; this suggests that ventilation provision and use may influence the fungal content of the home microbiome. Studies show that the microbial community in a building is influenced by several factors including location and climate[29], occupant presence and behaviour (including antibiotic use)[30], presence of pets[28] and ventilation approach[31]. They have also shown that mechanically ventilated buildings have a lower microbial diversity than those that are naturally ventilated, and that the microorganisms present in mechanically ventilated buildings are dominated by human related species, with a much lower presence of environmental species[16].

Exposure to a wide diversity of microbes has been found to confer protection against certain diseases which has led researchers to suggest that mechanical ventilation may be altering the microbial balance in a building, and could lead to "selection" of microorganisms that are more likely to cause disease or allergies[15]. However, the majority of these studies are conducted outside the UK, with a large proportion in US homes which have different construction, ventilation and climatic conditions. Few studies have performed systematic screening of sites in social housing in order to provide cultivable microorganisms, with a view to establishing the presence of human pathogens and AMR. As drivers for energy reduction have led to buildings becoming more airtight, with reduced ventilation rates and increasing use of mechanical ventilation, insight into the potential consequences of these measures is needed. Given the changes in housing design and construction we need to understand whether our approaches might encourage environmental persistence of a range of pathogens, and evidence from a UK context to support guidance and practice is required.

This study examined methodologies for assessing surface microorganisms in homes and investigated relationships between microorganisms and building characteristics to better understand how they may be affected by the design and use of buildings. The hypothesis is that with reduced ventilation and interaction with the external environment, there will be less diversity in the indoor microbiome and certain organisms may predominate. Whilst ventilation has been identified as a primary driver in the structure of the microbial community in buildings[16,31,32], the impact of ventilation type, effectiveness and operation warrants further investigation[33]. In particular, the aim is to examine whether ventilation use leads to a change in the persistence of microorganisms, and to explore both design and lifestyle to assess potential reasons for this.

The study was conducted in two phases, the first of which conducted a household survey and microbial sampling of 100 homes and is reported here. The second undertook more detailed monitoring and analysis of 21 selected homes. We systematically screened specific sites in suburban social housing in order to determine the amount and type of cultivable aerobic bacteria and fungi at key sites in the home. Microbiological data is compared against responses to an extensive household questionnaire containing occupant and housing information. Through this we explore a range of different ventilation and occupancy factors that influence the indoor microbiology of homes and may potentially have an impact on occupant health. We also discuss research methods and protocols that could be applied to larger studies.

Results

Building and occupancy characteristics. The age of the homes ranged from 1995 to 2017, with 34% constructed pre-2010, when building regulations were revised to require airtightness reporting (see Table 1). The majority had either one or two bedrooms (94%), with 5% reporting three bedrooms and 1% reporting four or

Development code	Ventilation type	Build year	Typology	No. beds	Airtightness ($m^3/h/m^2$)	No. homes surveyed
BS	Intermittent	1998	Flats	1 bed	n/a	6
CC	Intermittent	2000	Flats	1 bed	n/a	5
CG	Intermittent	2013	Cottages	2 bed	7.3	5
DR	Intermittent	2016	Flats/terraced	1–3 bed	4.72	13
FR	Intermittent	2013	Flats	2 bed	5.39	6
HC	Intermittent	2010	Cottages	1 bed	4.15	1
KP	Intermittent	1995	Flats	1–3 bed	n/a	5
KC	Intermittent	2009	Flats	2 bed	n/a	10
LA	dMEV	2017	Flats	2 bed	4.65	17
LR	Intermittent	2009	Flats	2 bed	n/a	1
LC	MVHR	2017	Flats/terraced	1–3 bed	2.96	11
MB	dMEV	2016	Flats	1–2 bed	4.68	5
MN	Intermittent	2003	Flats/cottages	1–2 bed	n/a	5
MP	Intermittent	2011	Flats	2 bed	5.53	6
NR	Intermittent	2010	Terraced	2 bed	n/a	2
MS	EAHP	2010	Flats/terraced	2–3 bed	n/a	6
WC	Intermittent	2016	Flats	2 bed	4.68	5
						109

Table 1. Building and ventilation characteristics of sampled homes in and around Glasgow. *n/a* not available.

more. Where data was available, air tightness levels ranged from 2.96 to 7.3 $m^3/h/m^2$. Airtightness is important in terms of the context for this study as airtight dwellings are entirely reliant on the ventilation provision, and its use by occupants.

Occupancy. The majority of homes were occupied by one or two persons (91%), with a small number of three (2%), four (6%) and five (1%) person households. The reported prevalence of smoking among surveyed households (29.4%) was slightly higher than the Scottish average of 21%[34]. 94% of households had at least one person over the age of 50.

Occupancy levels did not vary much between times of the day or days of the week and show consistent occupancy, suggesting relatively stable indoor conditions. The majority of households were typically occupied during the weekday by one (65%), two (22%) or three (2%) persons. Higher occupancy levels of four (6%) or five persons (1%) were reported in a small number of homes during the evening and at night. Of the 109 homes who completed the household survey, 25% of households reported the presence of pets, including dog(s) (18%) and cat(s) (5%). In 3% of households, pets (all dogs) had been prescribed antibiotics in the last six months.

Respondents were asked about recent antibiotic use, general health and recent hospital exposure. 60% of households reported visiting a hospital, doctor's surgery or clinical environment in the month prior to the survey, 17% in the previous week. 38% of households reported taking antibiotics in the last year mostly to treat chest infections (19%), with a small number of households (5%) reporting antibiotic use in the last month. Of those who reported taking antibiotics, 98% stated that they completed the full course. A high percentage of respondents reported health conditions including arthritis (41%), respiratory disease (28%), diabetes (14%), and heart disease (17%).

The majority of households reported brushing floors (73%), dusting (75%) and vacuuming (74%) on a weekly basis. Most respondents cleaned the homes themselves (82%), although 8% of homes used a cleaning service/cleaner. 97% of households reported using antibacterial cleaning agents including disinfectants, the most common being anti-bacterial surface sprays, washing-up liquid and wipes. Over half of homes (51%) reported using bleach to clean their home. The majority of homes (96%) reported using an antibacterial cleaning product in the home in the week prior to sampling.

Ventilation. Of the surveyed homes, the majority (64%) used natural ventilation (windows and trickle vents) and intermittent (controlled by manual use, humidistat control or lighting) mechanical extract fans located in kitchens and bathrooms. Whole house mechanical ventilation with heat recovery (MVHR) systems was installed in 10% of homes. A small number of homes (6%) utilised an exhaust air heat pump system (EAHP), which extracts air from rooms via ventilation ducts, with background ventilation provided by wall mounted vents. 20% of homes were ventilated with decentralised mechanical ventilation (dMEV) which provides low level continuous extract from kitchens and bathrooms with make-up air provided by trickle vents.

Window opening frequency can influence the prevalence of human and outdoor-associated microorganisms present in the indoor environment[32]. The results from the household survey indicate that almost half of households open windows on a daily basis during winter. Daytime window opening was much more prevalent than night-time. Window opening was found to be most prevalent in bedrooms, followed by living rooms and kitchens. The most predominant barrier to window opening was weather (73%), followed by heat loss (42%) and cold draughts (40%), suggesting window opening behaviour was dominated by thermal comfort as opposed to

Site	Mean (ACC) (n = 100)	Standard deviation (ACC) (n = 100)
Bathroom door handle (bathroom)	9.5	14.3
Phone[a]	9.6	11.0
Kettle (kitchen)	11.7	17.6
Bedside table (bedroom 1)	23.4	34.6
Door top (bedroom 1)	52.6	53.2
TV remote[a]	16.3	17.9
Toilet flush handle (bathroom)	12.0	20.2
Window sill (bedroom 1)	16.6	23.1

Table 2. Summary statistics of $\log_{10}$ ACC on nutrient agar categorised by sample location. [a]Phone and TV remote were located at various sites in the home.

air quality considerations. The duration of window opening is not known. However, is it more likely that window opening for thermal comfort would be time limited, being driven by adaptive comfort, whereas window opening in bedrooms at night would be continuous overnight, albeit as a smaller aperture.

Bedroom conditions. The bedroom environment is of considerable interest as people spend one-third of their lifetime in their bedroom, with time-use studies suggesting this may be higher for older adults[35,36]. It is estimated that exposure to indoor air pollution may be up to 16 times higher in the bedroom compared to the rest of the home[36]. Bedrooms with doors closed for privacy and windows closed for energy conservation are often poorly ventilated[37], with studies highlighting poor bedroom ventilation in modern Scottish homes[38,39]. In addition, bedrooms overnight typically present steady-state conditions with limited adaptive behaviour, which can be useful when examining the effects of ventilation where confounding factors are minimised.

Reported occupancy in the main bedroom varied from one (70%) to two adults (30%). The majority of second bedrooms (where present), were occupied by a single adult, however 5% of homes reported children present. Overall, 19% of households stated that they normally open their bedroom window(s) at night during the winter. A further 4% of households reported opening their bedroom window on a weekly basis at night. All households reported closing curtains/blinds at night with 46% also reporting closing the bedroom door. This could have implications on the effectiveness of ventilation strategies due to the occlusion of trickle vents by curtains or blinds, or the obstruction of internal ventilation pathways by the closing internal doors[39].

Microbial results. Sampling sites covered a range of locations that were considered to be high touch (bathroom door handle, kettle handle, phone, toilet flush handle, TV remote) and lower touch where environmental contamination may be more important (bedside table, windowsill, door top). Each site presented specific microbiological characteristics which reflected the room function and touch frequency. Most sites yielded a mixture of coagulase-negative staphylococci, *Bacillus* spp., and micrococci, with occasional filamentous fungi and yeasts. Summary statistics of Aerobic Colony Count (ACC) on nutrient agar across all 100 homes are given in Table 2, and Fig. 1 shows the distribution of ACC and microbial diversity for the different sites.

Post-hoc analysis shows significant differences of ACC between certain pairs of sample sites and not others (see Fig. 2). Most notably the ACC counts on the door top are higher and significantly different to all other surfaces, whereas ACC from frequently touched surfaces like the kettle handle, toilet handle and the phone could not be distinguished. This suggests that the contamination of the door top is unaffected by cleaning behaviours and occurs through deposition of microorganisms over a period of time rather than hand contact. As seen in Fig. 1b the lower touch sites appear have a higher diversity of microorganisms although the significant variability between houses mean that this is not statistically significant.

Two or more sites were positive for *S. aureus* and Gram-negative bacilli in 23% and 63% homes, respectively; these were mostly found on the TV remote and kettle handle which are high hand-touch sites. Gram-negative bacteria included *Pantoea* spp., *Acinetobacter* spp., *Serratia* spp. and a range of pseudomonads. Coliforms such as *Klebsiella pneumoniae* and *Enterobacter cloacae* were recovered from less than 10% of homes. No *Escherichia coli* were isolated. Fungi including Aspergillus spp. and yeasts (mostly Candida spp.) were found on bedroom door top, bedroom windowsill and bedside table, and these sites were also the most heavily contaminated. Logistic regression suggests there is no significant correlation between the presence of fungi and total ACCs (odds ratio − 0.03, 95%CI − 0.06–0.003, $p = 0.11$). Surprisingly, the sites most likely to yield 'no growth' were toilet flush and bathroom door handles. None of the bacterial pathogens identified were multiply resistant to antibiotics.

Relationships between microorganisms and building and occupant characteristics. Regressing microbial diversity with $\log_{10}$ACC (Fig. 3) shows a statistically significant positive relationship ($F = 22.76$, $p = 6.415E{-}06$), indicating that surfaces with higher numbers of microorganisms tend to also have a higher number of different species present.

There were no statistically significant relationships between reported window opening frequency ($F = 0.13$, $p = 0.72$), trickle vent usage ($F = 0.69$, $p = 0.41$), or difference between ventilation type reported ($F = 0.947$, $p = 0.391$) and either the total ACC or with ACC at three specific sites in the bedroom: bedside table, window

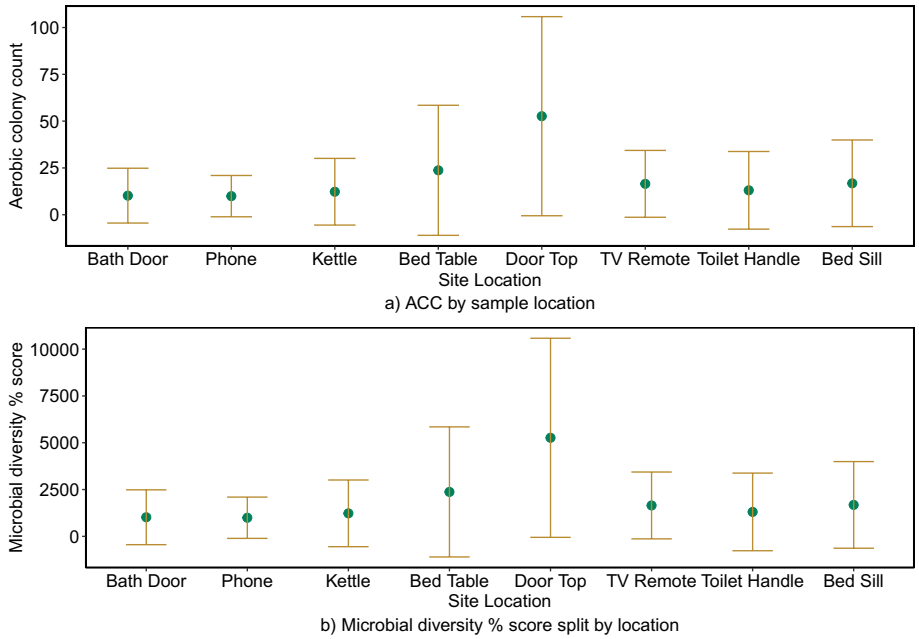

Figure 1. Mean and standard deviation of microorganisms across the eight sample locations over all homes.

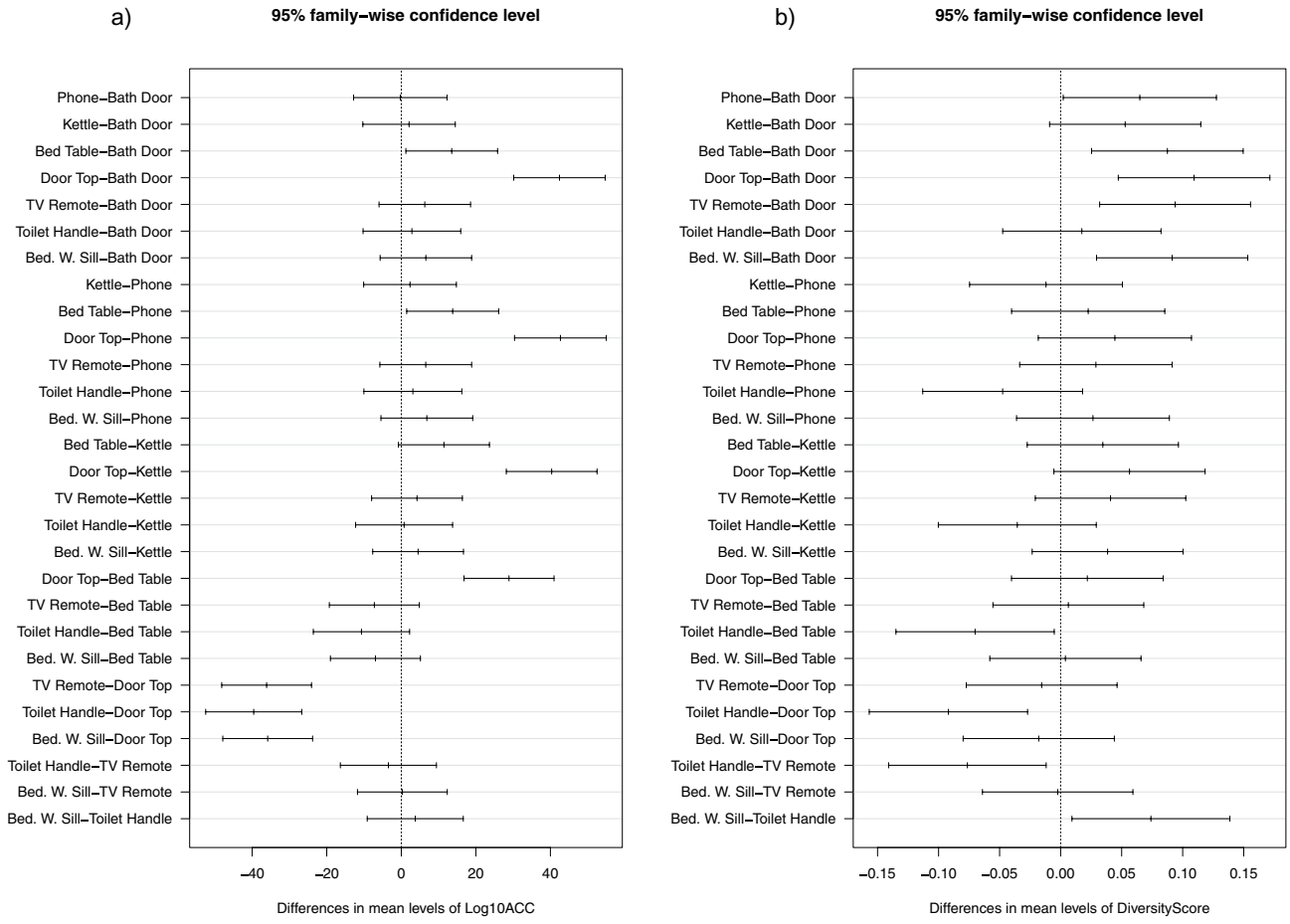

Figure 2. Mean difference plots representing Tukey HSD post-hoc comparisons between sites. Comparisons that do not pass through 0 are significantly different.

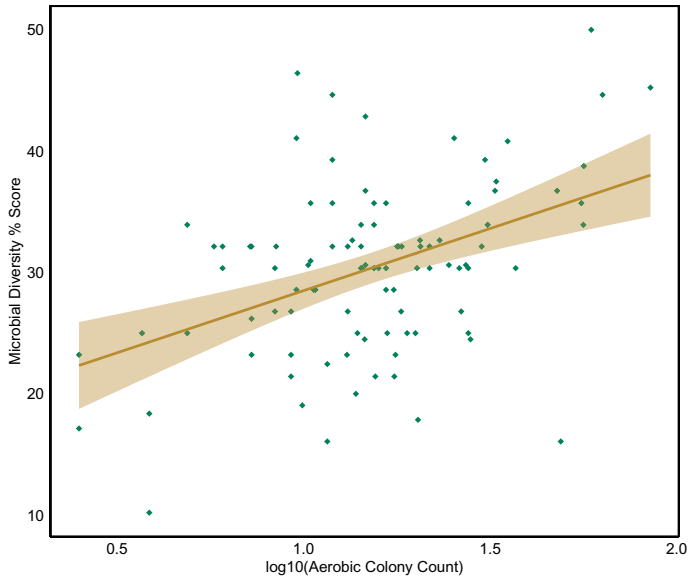

Figure 3. Microbial diversity % score plotted against $\log_{10}$ ACC on nutrient agar including a 95% confidence interval.

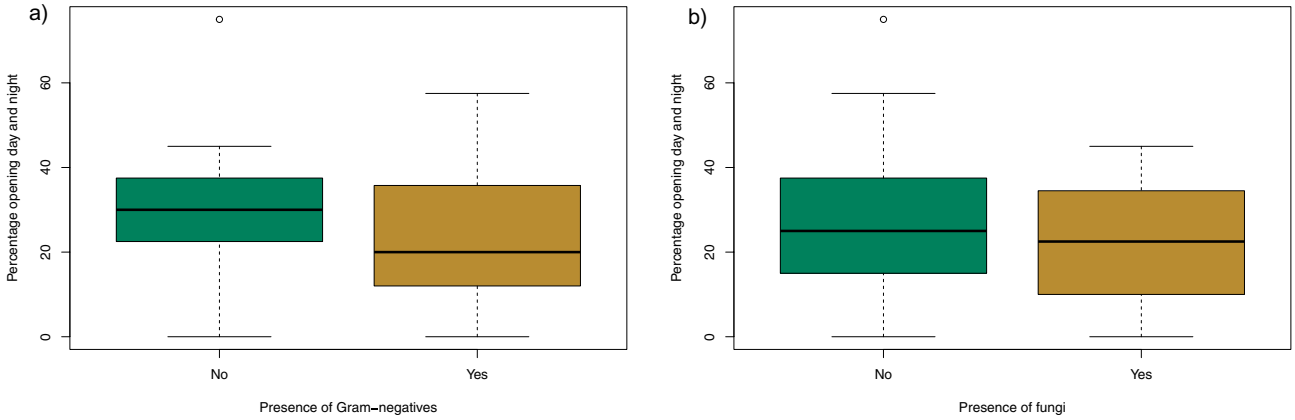

Figure 4. (**a**) Presence of Gram-negatives and (**b**) Fungi vs percentage of window opening day and night combined.

sill and door top. These sites were selected for analysis as they were considered to be the sites which might be most influenced by deposition of microorganisms from the air. Ventilation type was not associated with presence of fungi ($p = 0.82$). Similarly, there were no statistically significant relationships between pet presence, ventilation type or building age in terms of total ACC or microbial diversity.

However, there is an association between the frequency of window opening and presence of Gram negative microorganisms (Fig. 4a). Logistic regression was performed on overall percentage of window opening day and night vs whether Gram negatives were reported. The Wald test's chi-squared value of 18.9 ($p = 7.9E{-}05$) suggests that the percentage of window opening is a strongly statistically significant factor in finding Gram negatives. For every unit of opening frequency increase, the chance of finding Gram negatives decreases by 0.97 units (odds ratio 95% confidence interval = 0.94–0.99). Figure 4b shows the same comparison between window opening and the presence of fungi; although there appears to be a qualitative reduction in chance the result is not significant ($t = 1.62$, $p = 0.11$).

No significant influence was found of the number of occupants, length of time in the property, age of occupants or pet ownership on either the total ACC or the ACC diversity score. There was a significant difference between ACC in smoker vs non-smoker households ($t = 2.468$, $p = 0.017$). Linear regression shows a significant reduction in ACC as the number of smokers increase ($F = 4.163$, $p = 0.044$) however, there was no difference in microbial diversity between smoking or and non-smoking households ($F = 11.998$, $p = 0.162$). Smokers also had no effect on the presence of fungi (odds ratio 0.77, 95% CI 0.29–1.96, $p = 0.55$).

There was insufficient data to see significant differences in $\log_{10}$ACC or ACC diversity scores between categories of usage of antibiotics as described in the survey. However, by grouping responses as Yes or No there is

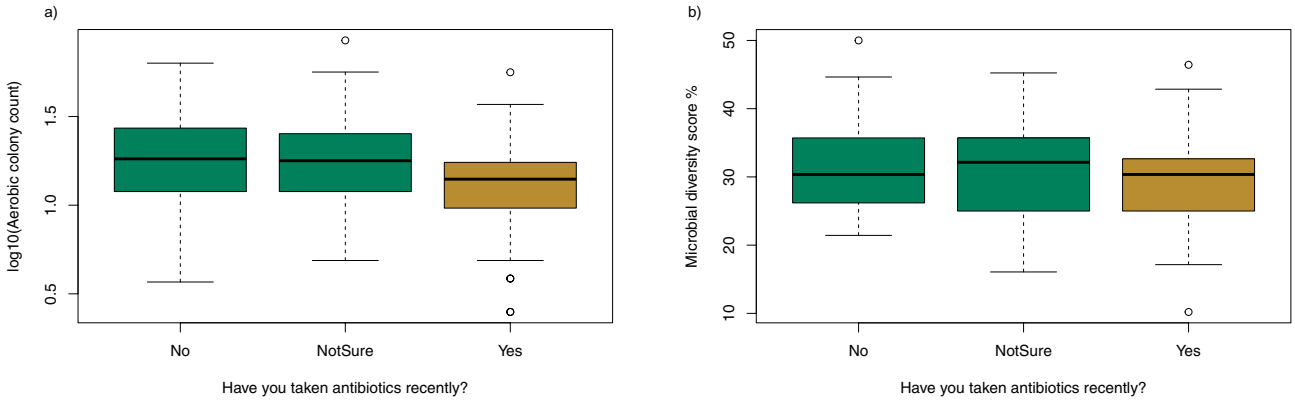

Figure 5. Boxplots of (**a**) microbial diversity and (**b**) $\log_{10}$ ACC on nutrient agar in relationship to: "Have you taken antibiotics recently?".

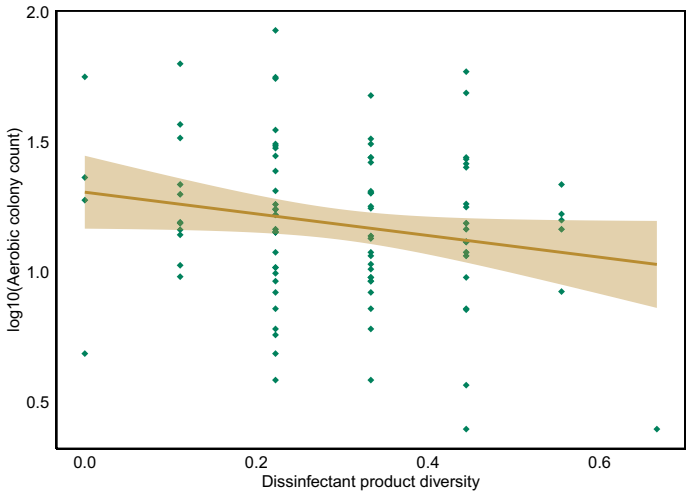

Figure 6. Plot of disinfectant diversity score against log10 ACC including a 95% confidence interval.

a significant difference in $\log_{10}$ACC between groups regarding antibiotic usage (t = 2.51, p = 0.014) as shown in Fig. 5. There was no relationship between antibiotic usage and the presence of fungi (odds ratio 0.99, 95% CI 0.42–2.33, p = 0.55).

Figure 6 shows a linear regression of $\log_{10}$ACC compared with disinfectant use mean, which reveals a statistically significant reduction of 0.42 $\log_{10}$ACC per 1 unit of disinfectant diversity score increase (F = 3.77, p = 0.05). There is no effect of disinfectant use on microbial diversity score (F = 0.4, p = 0.53) and no statistically significant difference in $\log_{10}$ACC between bleach users and non-bleach users (t = 0.07, p = 0.94). There was also no influence of bleach usage on the presence of fungi (odds ratio 1.28, 95% CI 0.52–3.04, p = 0.55).

Discussion

This study presents a detailed analysis of the relationships between cultivable microorganisms and building and occupant parameters in a sample of 100 homes, predominantly occupied by older adults. It is one of a very small number of studies in a UK context and the first to explicitly look for the presence of pathogens and relate this to the building design and use.

Each of the eight sampled sites revealed its own distinct microbiological character, both in the type and number of cultivable microbes. Human pathogens, particularly *S.aureus*, were more likely to be associated with commonly touched sites such as TV remote, kettle handle and telephone[40]. Whole houses also demonstrated unique microbiological characteristics, with morphologically similar and identifiable microbes observed at multiple sites within the same home[21]. Each home thus displayed its own unique microbiome but with identifiable similarities between other homes according to site.

There was a statistical relationship between homes that opened windows and presence of Gram-negative organisms on sampled sites. This is significant in that it demonstrates a potential effect of window opening on the microbiome and suggests that ventilation design and/or practice may be an important parameter for reducing exposure to specific microorganisms in the home environment. This is likely to be particularly relevant in bedrooms as window opening in these rooms impacts more on long term ventilation rates (i.e. overnight), whereas

window opening for thermal comfort will be more short term. It is also possible that bedroom window opening may be an indicator of other health behaviours, for example, occupants who are more health conscious. The presence of both filamentous and yeast-like fungi were not significantly altered by ventilation practices, although the data suggest that fungi were more likely to be found on surfaces if windows are opened infrequently (Fig. 4). Environmental Gram-negative organisms are affected by the use of bleach, so it is also possible that cleaning regimens including the use of disinfectants could confound any effect from ventilation practices.

Despite reports of AMR transmission among households, the study offers some grounds for relief, as there was no evidence for multi-drug resistance among recovered isolates that might have pathogenic potential, i.e. *S. aureus* and human coliforms[39,41]. One important reason for this might be the lack of antibiotic pressures in the home as compared with hospitals. Once this pressure is alleviated by patient discharge, home conditions are unlikely to maintain or drive persistence of MDR organisms unless the patient is immunosuppressed or the organism colonises a major carrier site, e.g. MRSA. None of the latter were found among all recovered *S.aureus*, although it was noted that if one site in the home was positive for *S.aureus*, it was highly likely to find several other sites contaminated, particularly those that are frequently touched. It is possible that eight sites screened per household were insufficient to isolate the full range of viable microorganisms recoverable. Studies similar to this one in the future should include more surface sites in order to gain a more comprehensive view of the range of recoverable organisms on surfaces in peoples' homes. It should also be possible to cultivate viral organisms as well, which might offer future recommendations for cleaning the home to minimise transmission of colds and flu among inhabitants.

One of the aims of the study was to develop methodologies for assessing the prevalence of pathogens in housing; this has been rarely undertaken, certainly in the UK. There are a range of practical and ethical issues that arise when gathering data in people's homes and in this case developing a protocol to gather bacteriological samples alongside survey data was an important outcome. The study methodology was able to gather survey data and microbiological samples from the planned number of sites. The original aim had been to target fewer housing development sites with larger numbers of houses. This would have given greater consistency of location and construction systems; however, these types of development were not available within the timescale of the project. Gaining access to homes, in which there is also accurate constructional information, can be difficult. Approaches were made to larger commercial housing providers for older and retired people, but they were not willing to participate in the research. The study was therefore reliant on using housing associations as gatekeepers which narrows the tenure type. The use of more development sites introduced a larger number of variables and controlling these in studies within housing remains a particular challenge. The study developed a sampling strategy to enable the collection of in-situ samples through the use of dipslides on selected sites, using trained personnel in a commercial survey company. This was a cost-effective method and enabled greater number of surveys in shorter periods of time. However, it was important to ensure that clear protocols were in place to facilitate timely transport of samples to the laboratory. This methodology could be applied to larger studies and, given access to facilities for culturing the samples, could be included as a process on other studies that gather data in homes. It could also be undertaken by healthcare professionals in homes, who could also use the building and occupant survey pro-forma for collection of data about the home. We deliberately used microbiology methods analogous to those used in hospital settings to sample microorganisms, as our primary objective was to determine the presence of potential pathogens in a way that is comparable to healthcare studies. Other studies have made use of sequencing techniques[28–33] which may be a more appropriate methodology where the goal is to characterise the whole of the indoor microbiome. It is recognised that culture-based methods used here have limitations, as they are only able to detect those microorganisms that are both viable and culturable. Sampling efficiency is also a factor that may affect the under reporting of microorganisms, however the dipslides used in this study have been shown to give a comparable recovery to swabbing methods[49] and contact plates[50].

The survey data is reliant on reported behaviour. Whilst the results are comparable with other similar studies[9], it should be noted that some differences were noted between reported and actual behaviour, and actual effects of window opening would be dependent on a range of factors such as door opening and external weather conditions. The study was predominantly carried out during the winter months (Nov-April), however the households may have experienced a range of different weather conditions during this period, which may also influence occupant behaviours such as window opening, use of heating and time spent indoors. It is not possible to evaluate the influence of season on the samples collected, but it is acknowledged that this may influence some microbial species, particularly those associated with environmental sources. Previous microbiome studies have shown relationships between outdoor climate conditions and the species found indoors[29,31]. The sample used in this study was also small, and on relatively new homes, without obvious defects, or problems such as dampness and mould. A further area of research would therefore be on older existing homes, which may have other environmental and bacteriological characteristics, for example, problems of mould growth may lead to increased ill-health and consequent antibiotic use, potentially increasing the antibiotic pressures in the home environment. While we did not find any significant influence of pet ownership it is possible that pets and indeed family demographics such as children and work patterns of adults may affect behaviours in a way that is not captured within the study. Even within the limitations of the study, the research was able to demonstrate an effect of ventilation on the nature and distribution of bacteria within homes. However, other occupancy and behavioural factors, including cleaning habits clearly influence the presence of bacteria in the home, and larger studies are needed to consider how to separate these effects out.

Overall the study was successful in implementing methods and protocols for the collection of survey data and in particular bacteriological samples within homes in a reasonably efficient and cost-effective manner. The key conclusions from the study are:

Figure 7. Study dwelling locations (created using Google My Maps: Mapdata©2020).

- The distribution of microorganisms in homes differs between low touch and high touch sites. Low touch locations that are more likely to be contaminated through environmental deposition tend to have higher numbers of microorganisms present and a greater range of different microorganism species.
- Homes tended to show consistent characteristics, with specific microorganisms found at one site likely to be found at several other sites. High use of disinfectants appeared to reduce the diversity of microorganisms found within a home, and both smoking and recent antibiotic use were shown to be correlated to a reduced presence of bacteria.
- Ventilation provision and use has an impact on the presence of Gram-negative bacteria, with increased window opening reducing the likelihood of finding Gram-negative isolates. There is some indication that reduced ventilation also reduced the microbiological diversity, and in the context of a shift to mechanical ventilation, this is of further interest. Greater evaluation of the hygrothermal conditions of homes that contribute to environments that may support pathogens (for example warmer, wetter homes) is also of further interest.
- The data presented here identified a number of microorganisms that could be pathogenic, including *Klebsiella pneumoniae* and *Enterobacter cloacae,* however we found no evidence for home contamination of multidrug resistant pathogens. This may perhaps inform policy about the relative benefits of the home environment in terms of exposure to bacteria, which may be relevant to processes for hospital discharge. However, in this study the homes were selected from a constructional perspective, and recent antibiotic consumption was low. An alternative approach would be to identify households through a clinical route, for example patients being prescribed antibiotics or with chronic health conditions to evaluate conditions in homes where antibiotic use is more prevalent.

Methods

Recruitment of homes. The study was conducted between November 2017 and April 2018. Households were recruited from seventeen developments across Glasgow, Livingston and Ayr in Scotland UK, covering both urban and rural areas (Fig. 7). Of the 312 households that were initially approached, 109 participated in the occupant survey and 100 agreed to microbial sampling.

The study targeted managed (not sheltered) social housing developments predominately occupied by older people for several reasons. Firstly, older populations are more vulnerable to both environment related health effects and infections and therefore demonstrate increased consumption of antimicrobial agents; consequently, they are also more likely to harbour resistant organisms[42,43]. Secondly, they spend longer periods in the home and so their home environment is important for their health and wellbeing; this also provides more stable conditions for monitoring. Thirdly, the size and nature of this type of accommodation does not vary greatly (similar space standards, occupancy and construction), making comparisons between homes more straightforward.

Several housing associations were approached to identify suitable contemporary housing developments specifically for older people in the Greater Glasgow area. Sites were selected with multiple houses to ease logistical issues of locating and accessing houses and to control for possible confounding variables such as location and weather.

Figure 8. Double-sided dipslide: example from bathroom door handle.

Occupant survey. The key objective of the survey was to gather a broad range of data across a large number of homes. Letters were distributed by housing associations to tenants of selected developments to provide details of the survey, which was followed up with a house visit from a member of the survey team. In the letter households were advised that in addition to the survey, they would be asked if it is possible to collect environmental samples in their home. Specific details of the microbial sampling (including sampling sites) were not disclosed in advance. The letters also provided tenants with contact details of the survey team, enabling them to opt-out or reschedule ahead of the visit, if required. The door-to-door survey was carried out by a qualified survey company and informed verbal consent was obtained from all participants. An information sheet was provided which included details of the right to withdraw. Experimental protocols were approved by the Glasgow School of Art Research Ethics Committee.

The questionnaire consisted of 55 questions that collected information on household demographics, cleaning and ventilation behaviour, presence of pets, recent hospital exposure, building related factors, general health information and recent antibiotic use. Full details of the survey are provided in Supplementary Information.

The survey data was cross-matched with construction data acquired from the Housing Associations and/or the project architects. This information included dwelling typology and age, orientation, floor area, construction type, energy efficiency measures and ventilation characteristics, including air tightness where this had been measured within a particular group of homes.

Microbial sampling. At the same time as the household survey, microbial samples were collected in 100/109 homes from eight different surfaces in the home. This was undertaken by the survey team, but training for correct sampling procedures was provided before the study began. Sampling personnel washed hands with soap and water and dried them with a clean disposable towel directly before and after sampling in one home.

A pilot study was undertaken to example the location, nature, replicability and efficacy of sample sites. These needed to be in locations that would be expected to be touched; but also, sites that may be less affected by touch and cleaning that may be more indicative of the overall indoor environment. The sites needed to be consistent across a large number of homes, and also have surfaces onto which a dipslide could be placed. The possibility of collecting dust samples was considered, but this was excluded due the complexity, equipment requirements and additional time required. The sites chosen for screening were: indoor bathroom handle; telephone; kettle handle (kitchen); bedside table; top of bedroom door; TV remote; toilet handle; and bedroom window sill[41]. The site selection deliberately included frequent hand touch sites as well as surfaces such as the bedroom windowsill and top of the bedroom door where microbial contamination would be expected to be related to deposition of microorganisms from the air.

Surfaces were screened using double-sided dipslides coated with nutrient and staphylococcal selective agars (Hygiena Ltd, Watford, UK) to recover total aerobic colony count and an indicator pathogen, Staphylococcus aureus (Fig. 8). These provided quantitative (cfu/cm^2) and qualitative (MSSA/MRSA) data from hand-touch surfaces[44–47]. S.aureus is the best marker of environmental hygiene in hospitals as well as being the most common cause of bacterial infection worldwide. We also specifically looked for human coliforms from the elemental agar, such as *Escherichia coli* and *Klebsiella pneumoniae*. This was because these organisms have a propensity to be multiply drug resistant in the hospital setting and we wanted to see if any could be recovered from the community. Fungi and yeasts were also readily identified from the elemental agar, but without further identification.

Dipslides were pressed onto chosen sites (if present) for 5–10 s at a pressure of approximately 25 g/cm^2 without overlap between sampled areas[48]. The slides were replaced in sterile containers and transported to the microbiology laboratory on the day of collection. After loosening caps, the dipslides were incubated for 48 h in air at 35 °C before processing. Sampling was performed in accordance with recognised practices from the Food Standards Agency. Bacteria and fungi were quantified for each site by assessing growth on nutrient agar according to manufacturer's instructions. Growth on nutrient agar supplied total aerobic colony counts (ACC) per cm^2 which were classified as follows: no growth (NG) 0 cfu/cm^2; scanty growth (SG) 2.5 cfu/cm^2; light growth (LG) 12 cfu/cm^2; moderate growth (MG) 40 cfu/cm^2; heavy growth (HG) 100 cfu/cm^2); and very heavy growth (VGH) 250 cfu/cm^2. This is comparable to approaches used previously in hospital sampling studies[46–48]. Selective agar highlighted potential coagulase-positive staphylococci, which were sub-cultured onto *Staphylococcus aureus* Identification (SAID) agar (Oxoid Ltd, UK), followed by automated susceptibility testing (VITEK2™) according to routine laboratory protocol. The reader also noted colonial types, morphology and fungi on nutrient agar and performed Gram-stains on a maximum of four cfus per slide, thought to indicate Gram-negative species. Those confirmed as Gram-negative bacilli were screened on UTI selective agar, plated out for purity and identified and characterised by VITEK2, including antimicrobial susceptibility testing.

All methods were carried out in accordance with relevant guidelines and recommendations. The microbial analysis was performed in a CPA accredited clinical laboratory, in accordance with recommendations and standard practices from the Institute of Biomedical Sciences and the Royal College of Pathologists.

Quantitative analysis. Data from the microbial sampling was combined with occupant survey data for each house. Quantitative analysis of microbial data was carried out using the contamination values indicated above, enabling a mean concentration for ACC across all sites in each house to be calculated. We recorded presence/absence of seven categories of microorganisms identified on the nutrient agar samples: *Staphylococcus* spp.; *Micrococcus* spp.; *Bacillus* spp.; filamentous fungi and yeasts; other Gram positive cocci and rods; Gram negative rods; Gram negative cocci. A diversity measure was calculated to indicate the proportion of these categories present at each site; a diversity of 1 would indicate that all 7 species were present, a diversity of 0 would indicate none.

Household survey data was converted into numerical responses. Questions with a yes–no answer were allocated a value of 1 or 0 respectively, questions with more than one response were given a number for the category. Some additional values were calculated for the analysis based on the survey responses. The questionnaire asked participants how often windows were usually opened in the home during the day and at night, throughout the winter season. Participants responded using a 5-point Likert scale, from 'Never' to 'All the time' for specific rooms including the kitchen, living room, bedroom(s) and bathroom(s). A total window opening frequency value (%) for winter was calculated by assigning scores to the ordinal data and converting to interval data, using the following weighting: no window/never = 0, monthly = 1, weekly = 2, daily = 3, all the time = 4. A whole house percentage was calculated based on the number of rooms. The value represents the weighted frequency of window opening in the home in winter, during the day and at night. For instance, a value of 0% indicates that windows were reportedly never opened (or no window was present) in all rooms (living room, kitchen, bathroom and bedroom(s)) during the day or night, with 100% indicating all windows were reportedly opened all the time.

The survey asked for information about eight common disinfectant products as well as an additional question that asked about other products used. Almost all of the homes indicated that they had used a disinfectant product or bleach in the last week. To capture the level of disinfectant use, a numerical average was taken of the responses to disinfectant products; a value of 1 indicates the household used 8 different products, a value of 0 indicates none. An additional variable was constructed to indicate whether bleach was used as a yes–no response.

All statistical analysis was carried out using R software (version 4.3). Shapiro–Wilk test was used to examine non-normally distributed microbial counts for ACC on both nutrient agar ($p = 2.94E{-}10$) and the selective agar ($p = 3.23E{-}12$). Log_{10} transformation returns normally distributed variables ($p = 0.44$ and $p = 0.137$ respectively) and hence was used in linear regression analysis. Welch's t-test was used to compare between means with unequal group variances, and ANOVA enabled assessment of the difference between sample sites. Where appropriate the Kruskal–Wallis test is used normality is not upheld, sample sizes were small. Post-hoc testing using Tukey HSD after ANOVA or Dunn's test with Holm-Sidak correction after Kruskal–Wallis allowed multiple site comparison where appropriate.

Data availability

Data is available at [redacted].

Received: 31 January 2020; Accepted: 8 June 2020
Published online: 16 July 2020

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Acknowledgements

The authors would like to acknowledge Janice McLaren and Louise McNally in the Microbiology laboratory at Hairmyres hospital for supporting the microbial analysis. The study was funded by the UK Arts and Humanities Research Council (Grant Ref. AH/R00207X/1).

Author contributions

T.S., S.D., C.N., G.M., L.F. designed the study, G.M. coordinated the survey, S.D. undertook the microbial processing and analysis, M.K., C.N. and G.M. carried out the data analysis, all authors contributed to writing the manuscript.

Competing interests

The authors declare no competing interests.

Additional information

Supplementary information is available for this paper at [redacted].

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Cite this as: *BMJ* 2021;375:n2895

[redacted]

Published: 26 November 2021

Why don't we just open the windows?

The evidence for preventing covid-19 is lost in translation

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The world is finally coming to terms with the realisation that transmission of SARS-CoV-2 is airborne.[1] First came the modelling studies, sizing up airborne particles, their trajectories, and viral load; and then came examples from the real world, completing the gaps in the models and confirming that the pandemic virus is chiefly spread through tiny aerosolised respiratory particles.[2-5] Trying to validate this by detecting live virus, however, is fraught with technical difficulties.[6] Hence, the frenetic attempts at measuring the quantity of infectious virus in breath as well as revisiting knowledge on ventilation sciences.[7 8] While keeping your distance, wearing a mask, and getting vaccinated have provided much protection, one intervention that would have a significant impact is adequate indoor ventilation. Healthcare, homes, schools, and workplaces should have been encouraged to improve ventilation at the very beginning of the pandemic, but tardy recognition of the airborne route by leading authorities in 2020 stalled any progress that could have been made at that stage.[9-11] This was compounded by controversies over the terms "droplet" and "aerosol," as the definition of these dictates different infection prevention strategies, including type of mask.[6]

Inserting the term "ventilation" into a covid-19 policy document might appease readers, but ensuring people get enough fresh air in indoor environments seems to have fallen by the wayside.[12] Why is this? Can we establish the reasons for this seemingly lethargic response to improving indoor air quality?[9]

In order to answer, it is imperative to understand three fundamental principles of infection prevention and control.[13] Firstly, most pathogens are invisible; secondly, you know the system has failed only when there is an outbreak; and, finally, you cannot always identify a specific cause, making it difficult to implement the most appropriate intervention. Infection control relies on a bundle of measures that are assumed to cover most transmission routes, explaining initial misguided emphasis on droplets and surface risk rather than unconstrained aerosol.[11]

Common sense dictates so much of what is done for infection control, since most funding bodies consistently prioritise the most immediate, urgent, or commercially beneficial societal problems. Furthermore, current guidelines tend to focus on solid bodies, such as people; surfaces, both hard and soft; equipment; and water. Air is literally nebulous. Just as cleaning was the Cinderella of infection control during the past decade or so (and methicillin resistant *Staphylococcus aureus* sorted that out), we must now confront the neglected, but substantive, role of air in transmitting infection.[14] It is fair to say that air could be the final medium to define and standardise within the infection control itinerary.[15]

Another major compelling reason that air quality has been side lined is cost. Most buildings are neither designed nor well operated from the air quality aspect, with energy conservation and thermal comfort at the top of the list of requirements.[16 17] Pumping in adequate amounts of fresh outside air, however engineered, will challenge running costs as well as carbon status.[18] Outdoor air generally differs from indoor air in terms of temperature and humidity, and conditioning outdoor air needs significant energy. While evolving green technologies might be able to offset some of these increased energy requirements, any revision or upgrade of existing systems is a big undertaking and enormously expensive. Additionally, ventilation is usually controlled by building operators and owners, not necessarily individuals, and the former are not yet mandated by law to improve ventilation in public venues.[18]

Ventilation and air cleaning systems are noisy, drafty, and require fine tuning and regular maintenance.[19] Even simple window opening invites discussion over chill, airflow, and security. There are some standards for indoor air quality, notably through proffered air changes, but these chiefly concern specialist healthcare environments such as operating theatres.[20] Indeed, existing ventilation standards hardly consider the risk of airborne infection in non-specialist public spaces at all.

So where are we now with indoor air quality? Clearly, better ventilation requires planning and investment, but who is going to ensure this and how should it be done? Upgrading internal air quality for billions of indoor environments in the world needs solid research, funding, and mandated standards. Those that we have are variable or are applied inconsistently. We have established public health strategies for foods and water and even pollution, but air quality inside most public venues in our communities resembles nothing more than miasmic uncertainty.[14 15]

As with all major shifts in scientific understanding, tackling the final medium requires courage, investment, and political support for scientists and policy makers.[21] The same applies to business and industry, who are already producing a range of air cleaning technologies and equipment. We cannot ignore airborne transmission any longer, however difficult or costly it may be to control.[22] It is time to accept the fact that most people acquire SARS-CoV-2 by breathing in contaminated air. Window opening is a start, but it is not a panacea for covid-19 or, for that matter, any other airborne viruses in the 21st century.

Commissioned, not peer reviewed.

We have read and understood BMJ policy on declaration of interest and we have no interests to declare.

We wish to acknowledge scientists and clinicians working towards recognition of airborne transmission of SARS-CoV-2, especially the Group of 36, led by Lidia Morawska.

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Greater Glasgow and Clyde NHS Board

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Private and Confidential
Ms Beth Armstrong

Via email: beth.armstrong[redacted]

Date: 10 May 2019
Our Ref: 47599

Enquiries to: Jennifer Haynes
Direct Line: [redacted]
E-mail: Jennifer.Haynes[redacted]

Dear Ms Armstrong

Thank you for your emails to colleagues within NHS Greater Glasgow and Clyde between 13 March 2019 and 21 April 2019, in which you express a number of concerns following the death of your [redacted], [redacted].

Before I respond to these, I would like to express to you my most sincere condolences for your loss. I fully realise that the death of a parent is a very significant event in a person's life, and I am so sorry you have had such serious concerns about all that transpired when your [redacted] died in our care.

In this response I will aim to respond to the points you have noted, and also address issues your [redacted], raised with us. I have tried to do this honestly and clearly, but please be assured that in doing so, I have not lost sight of the fact that I am writing about your late [redacted], and I have therefore done my upmost to express my compassion and empathy throughout.

I should alert you at the start of this letter that due to ongoing work looking into many of the points you have raised, I am afraid I do not have answers to everything at the moment. I sincerely apologise for this, as I realise that having waited for a reply to your questions, you will most likely be frustrated and upset that I have not responded in detail to all that you have asked.

One of the main active pieces of work currently underway is a Significant Clinical Incident (SCI) investigation into your [redacted] care. An SCI investigation is an established process that is commissioned by Senior Management in the event of any unplanned or unexpected serious clinical incident. I was keen to respond to your aforementioned emails now so that you and your family were not kept waiting any longer than absolutely necessary, but please be aware that the SCI will provide a detailed account of all that happened with your [redacted] care, and will look to understand the root causes. We will engage with you throughout this process, and you will receive a copy of the final report when it is completed.

I am aware that in your correspondence with Mrs Jennifer Haynes, Board Complaints Manager, she sent you a list of points which she understood to be the main points of your complaint. For ease of reference, I have responded to each of these in turn.

1. **Family has unanswered questions regarding the circumstances in which Cryptococcus spores managed to infiltrate a sterile area**
   Whilst I am keen to give you a full answer, an Expert Advisory Group has been established, which includes external industry experts, to look at this very issue. Their work is ongoing, and we do not yet have their conclusion. I fully understand why this question is so important to you, and I am sorry I not able to answer it at the moment.

2. **Impact this had on [redacted] treatment, length of life and death**
Once the aforementioned SCI report has been completed we will be able to give you a detailed account of all that happened with your [redacted] care. In the meantime, I can confirm that clinical colleagues feel that the infection in question did not alter your [redacted] treatment or length of life. It may have had an impact on whether we would have been able to [redacted], however, it is unfortunately not possible to know this with any certainty.

3. **Issues regarding the presence of pigeons on the roof overlooked by the 4th floor and also a hole on 12th floor roof. These potential breaches of the sterile integrity of the hospital were presumably risks addressed by the people responsible for building maintenance. Is the hospital's risk assessment policy document clear in identifying such risks and the steps to be taken to address those risks?**
Whilst a hospital is not a sterile environment by its very nature, we do take every precaution to minimise the risk of infection for our patients, which is why we have taken what happened to your [redacted] so seriously.

   In terms of the fabric of the building, for the entire hospital site, there are regular reviews to minimise the risk of birds congregating and nesting, and we also monitor and carry out actions related to pest control on a frequent basis. There was not a hole in the roof, but there was a gap in the vertical cladding. This point is being considered as part of the work by the Expert Advisory Group referenced in response to your first point.

   In terms of risk, we have a system for reporting maintenance defects, but we were not aware of the aforementioned issue. As soon as we became aware of the defect, we took action.

4. **In terms of the press release, the hospital's failure to communicate effectively with the family. The press releases were inaccurate and distressing in terms of wrongly detailing [redacted] discharge history and also the uncomplimentary reference to elderliness**
I fully accept that we caused you distress in this regard. Although this was unintentional, I am truly sorry that we upset you and your family.

   Regarding inaccurate information, I am aware that this is in reference to a quote from the Cabinet Secretary in a BBC article, stating that your [redacted] had been discharged into [redacted], when in fact that was not the case, and also that your [redacted] 2018, when in fact [redacted] 2019. I am afraid I have not been able to establish where this information came from, as we could not find any evidence of us releasing this incorrect information.

   I have noted your comment about the uncomplimentary reference to your [redacted] being elderly. We did respond to [redacted] on this point, but I would like to take the opportunity within this letter to say how sorry I am for the upset this caused, and to explain why we used this term.

   Following the release of a public statement, we received media enquiries asking for information about the two patients affected; one was your [redacted], and the other patient was a child. We used the term 'elderly' because of your [redacted] age, and also to differentiate between [redacted] and the child patient, but with the benefit of hindsight, we should not have chosen this word. From what [redacted] told us about your [redacted], [redacted] sounds like [redacted] was a very vivacious [redacted], and for that reason, I realise that the image one would associate with the word 'elderly' would not accurately portray what your [redacted] character was. I therefore sincerely apologise.

5. **The press releases were issued without reference to any family members and in the absence of consultation had a consequence in terms of stress to the grieving**
This is something [redacted] also raised with us, and I very much regret that this has caused your family additional stress. In our response to [redacted], we confirmed that our press officers do not routinely liaise with families over press statements, as due to our observation of patient confidentiality, the press office are not provided with the specific details of patients, including their name and address.

   That said, from both your and [redacted] contact, I recognise why this would be so distressing, and for that I am sorry. I will address this more fully in Section 8.

6. **When last spoke to Dr Inkster, requested that the family be kept informed of any development with the inquiry, and also any further press releases. Therefore very disappointed to read an article in the Independent 'i' newspaper on 9/3/19 'Superhospital Criticised for Failings on Cleanliness' that the HIS report was released on 8/3/19. Is this the hospital inquiry previously discussed?**
The HIS report was commissioned by the Cabinet Secretary and was a hygiene inspection of the full Queen Elizabeth University Hospital and Royal Hospital for Children site. This inspection was not specifically in relation to Cryptococcus. The investigation Dr Inkster referred to was the internal SCI process which has now commenced. I am sincerely sorry for any misunderstanding regarding this. We will absolutely keep you informed of the SCI process and you will receive the outcome report when it is complete.

7. **The article raises significant questions regarding hospital management not reacting to staff concerns about the patients' environment. Were such concerns raised about [redacted] environment and not reacted to? (complainant requests copy of HIS report and any further press releases)**
Senior colleagues responsible for the ward your [redacted] was in have confirmed that they were unaware of any environmental issues prior to the Cryptococcus being isolated, and therefore did not raise any concerns about this.

   I am aware that Mrs Jennifer Haynes, Board Complaints Manager, has sent you copies of press releases and the HIS report.

8. **At no time does it appear that there has been, or will be, a period of reflection, discussion and liaison in order to improve current process and practice. Fully contrary to the aim of achieving a quality driven and patient/relative focused service**
I was so disappointed to read of the impression given, as this is absolutely not the case. We have taken what happened to your [redacted] extremely seriously, and I cannot stress enough how sorry I am for all that has happened.

   With regards to the media handling, I do understand the view on this, and why it has been so upsetting. Our primary concern in a situation like this is to protect and support patients and families, which is why I regret this is the feeling your family has on this.

   We have consistently sought to strike a balance between providing enough information to satisfy public demand, and withholding some details so as to protect patient and family details. This has proved a difficult situation, as we have been criticised by media and politicians for not being sufficiently transparent, and at the same time we have received your complaint, where you and your family have clearly and understandably been affected about the level of information in the public domain.

   In terms of the learning regarding your [redacted] care, the purpose of the SCI investigation I referenced earlier in this letter is to provide a detailed account of what happened, and take lessons from it. I am acutely aware that nothing we do now can undo what has already been done, but I hope this does give you some assurance at least that we are trying to learn and make improvements.

In conclusion, I would once again like to offer my genuine apologies for all that your family has been through, which I realise must have been so difficult. If you would like to meet the senior team and I, either at this stage or once the SCI investigation has been completed, we would very much welcome the opportunity to discuss your concerns with you. If this is something you think would be useful, please contact Jennifer at Jennifer.haynes[redacted].

You also have the option of contacting the Scottish Public Services Ombudsman (SPSO) to consider the complaint further if you are unhappy with my response. The SPSO is the final stage for considering complaints about public sector services in Scotland. If you do decide to take your complaint to the SPSO, please be aware that they do not normally investigate complaints if you have known about the problem for more than 12 months before complaining. The contact details for the SPSO are:

Freepost SPSO *(this is all you need to write on the envelope, and you do not need to use a stamp)*
Tel: [redacted]
Online form: www.spso.org.uk/contact-us

Yours sincerely

[redacted]

Jonathan Best
Chief Operating Officer – Acute Services
NHS Greater Glasgow and Clyde

Significant Clinical Incident: Investigation Report – Confidential

Directorate/Partnership/Sector: Regional – Haemato-Oncology

Datix ID: 560572

Date of incident: 7 January 2019

Commissioned date: 11 March 2019

Date of report: March 2020 Report version: Final

If this is a joint review, which services are involved? n/a

Is this incident a Duty of Candour Event?No

Contents **Page**

Purpose

To identify the root causes and key learning from an incident and use this information to significantly reduce the likelihood of future harm to patients.

Objectives

- To establish the background and sequence of events that led up to the incident.
- To identify underlying contributing factors in management and organisational systems.
- To identify lessons learned and develop a list of recommendations that would prevent similar incidents occurring in the future.
- To communicate any findings and recommendations across the organisation including those individuals directly affected or involved.
- To provide a means of sharing learning from the incident
- To provide a report and record of the investigation process and outcome.

It is important to note that whilst acknowledging the professional responsibility and accountability of all staff and departments involved in this incident, it is **NOT** the purpose of this report to apportion blame.

Section 1: Terms of Reference *This section should detail the specific Terms of Referenceprovided to the Investigation Team.*
The SCI has been commissioned to review the care received by a patient who contracted a cryptococcal infection whilst an inpatient. The initial terms of reference included consideration of the potential source of the organism but this was revised as the Board commissioned a specific review of these matters)

Section 2: The Investigation Process *This section should include the name and roles of members of the review team as well as a description of the data gathering process. GP as well as patient & family involvement in the review should be highlighted, as well as contact with staff. If a Duty of Candour incident, details in relation to apology and how this was communicated are to be included. A timeline of key events relating to the incident should be considered.*
Review Team Consultant Haematologist Consultant Microbiologist Lead Nurse in Infection Prevention & Control Clinical Service Manager Lead Clinical Risk Coordinator **Review Process** Review of patient records Construction of timeline Review of any relevant policies, procedures and literature **Family Involvement** The patient's family has been notified of the SCI and will receive a copy of this report once complete

Section 3: Incident Background &Detailed Description of Events

This section should provide a brief summary of events including any relevant background information and events immediately preceding the incident, including immediate actions taken.

Patient Background

[redacted] was a [redacted] patient who was diagnosed with [redacted] Lymphoma in 2016. [redacted] underwent [redacted] chemotherapy from [redacted] 2016 to [redacted] 2017 as part of the [redacted]. [redacted] had a relapse of the disease 8 months later and was commenced on [redacted] chemotherapy from [redacted] 2017. This was intended to be indefinitely in order to control the progression of the disease.

[redacted] appeared to be responding well to treatment until [redacted] became unwell on a trip to see relatives in [redacted] 2018. [redacted] was admitted [redacted] October 2018 feeling generally unwell with fever and sweats. [redacted]

A bone marrow biopsy performed in [redacted] 2017 showed findings consistent with relapse of lymphoma. [redacted] were commenced on [redacted] October. It was recognised that [redacted] needed continuing inpatient care and [redacted] was transferred to the Queen Elizabeth University Hospital (QEUH) in Glasgow on [redacted] November.

Inpatient Course at QEUH

On transfer to QEUH, [redacted] remained pancytopenic with continuing fever and sweats, but was not noted to have any infection at this stage. [redacted] remained on antibiotics due to fever. On [redacted] November, [redacted] was commenced on [redacted] chemotherapy. A CT and MRI scan were carried out on [redacted] head due to intermittent confusion, although no findings of concern were noted on these.

On [redacted] November, clinicians noted worsening LFTs (Liver Function Test) and ordered an ultrasound of [redacted] liver. [redacted] was receiving Fluconazole at this point, an antifungal drug given to patients at risk of fungal infection whilst receiving the drugs regime [redacted] was on. This medication has known side effects related to liver toxicity and as such it was stopped.

[redacted] fevers started to settle on [redacted] November and [redacted] was reporting to staff that [redacted] was feeling better. By [redacted] November, [redacted] fevers had returned. Blood cultures were taken over the next few days and on [redacted] November, Microbiology contacted the ward to advise that the first of these were positive for Cryptococcus neoformans. Antifungals were commenced and by [redacted] December, [redacted] blood cultures were negative which indicated a response to antifungals.

Blood cultures remained negative; however, there was a positive culture for Staphylococcus epidermis, although this was not cultured on subsequent blood tests, which were all negative. Chemotherapy continued with a [redacted] commenced on [redacted] December.

On [redacted] December, observations showed a clinical deterioration and that [redacted] was not responding to chemotherapy. Antifungal medication continued although [redacted] continued to have negative blood cultures. It was agreed that treatment would move to palliation and medication was given to keep [redacted] comfortable. [redacted] remained in hospital until [redacted] January 2019 [redacted].

Section 4: KeyIssues Identified& Lessons Learned

This section should detail key issues/learning relating to care and service delivery and be clear on their relation to the outcome of the incident. The findings from the accident causation model should be included here.

What was the source of the Cryptococcus infection?

Estates and Environment Considerations

The presence of Cryptococcus in the hospital environment is subject to wider review by the Board and Scottish Government.

Clinical Care

The Review Team looked through the patient's records to see if there was anything in the clinical input which could have been done differently. It was noted that [redacted] was previously receiving Fluconazole antifungal therapy. This was a standard protocol due to [redacted] being on steroid medication which increased the likelihood of a fungal infection; however, for a patient such as [redacted], that risk would more likely be a Candida infection. Cryptococcus infections are rare and when they do occur, it is more likely to affect immunocompromised patients with HIV.

It was clinically appropriate to stop the antifungal medication as [redacted] was experiencing deranged liver function tests and the correct course of action to prevent any further liver compromise would be to stop any medication which may be hepatotoxic, such as Flucanazole. The Review Team considered whether in stopping Flucanazole, another antifungal should have been considered. There were no indications to clinicians at the time that this was the case and there was an extremely low risk of such an organism infecting a patient such as [redacted]. Whilst clinicians now may be sensitized to the risk of this recurring and are more likely to consider secondary antifungal cover in such circumstances, clinicians at the time could not have reasonably been able to expect that [redacted] was at risk of Cryptococcus infection and the care was appropriate.

Recognition and Response to the Infection

The Review Team agreed that [redacted] received appropriate monitoring throughout [redacted] care and the Cryptococcus infection was recognised at the earliest possible opportunity. The subsequent response was appropriate and followed expected treatment protocols in appropriate timescales.

What was the impact of the infection on [redacted] condition?

[redacted] had a serious underlying disease with a poor prognosis. [redacted] deterioration and death followed a course that is not unusual for this disease. The Review Team did not feel that it was likely that the Cryptococcal infection affected the disease progression. [redacted] health was deteriorating prior to the infection, when [redacted] blood cultures were negative, and after the cultures returned to normal. When [redacted] suffered an acute deterioration of [redacted] condition around [redacted] December, this was in the context of negative blood cultures. It is therefore thought unlikely that [redacted] were significantly influenced by the infection, rather as a result of [redacted] lymphoma.

Section 5: Conclusions
This section should address the findings of sections 3 and 4, as well asoutlining areas of good practice.

The SCI has concluded that [redacted] contracted a Cryptococcal infection; however, clinical care was appropriate with no missed opportunities to prevent the infection and timely recognition and response to the infection from clinicians.

The infection was not thought to have made a significant contribution to [redacted] subsequent [redacted], which was thought to be as a result of the natural progression of [redacted] underlying lymphoma.

Investigation Conclusion Code (tick to indicate which description best applies)
This is not the patient outcome.

1	Appropriate care: well planned and delivered	
2	Issues identified but they did not contribute to the event	✓
3	Issues identified which may have caused or contributed to the event	
4	Issues identified that directly related to the cause of the event	

Section 6: Recommendations (if required)
Recommendations should be written in such a way that corresponding SMART actions can be developed.
***S**pecific, **M**easurable, **A**chievable, **R**ealistic and **T**imely.*

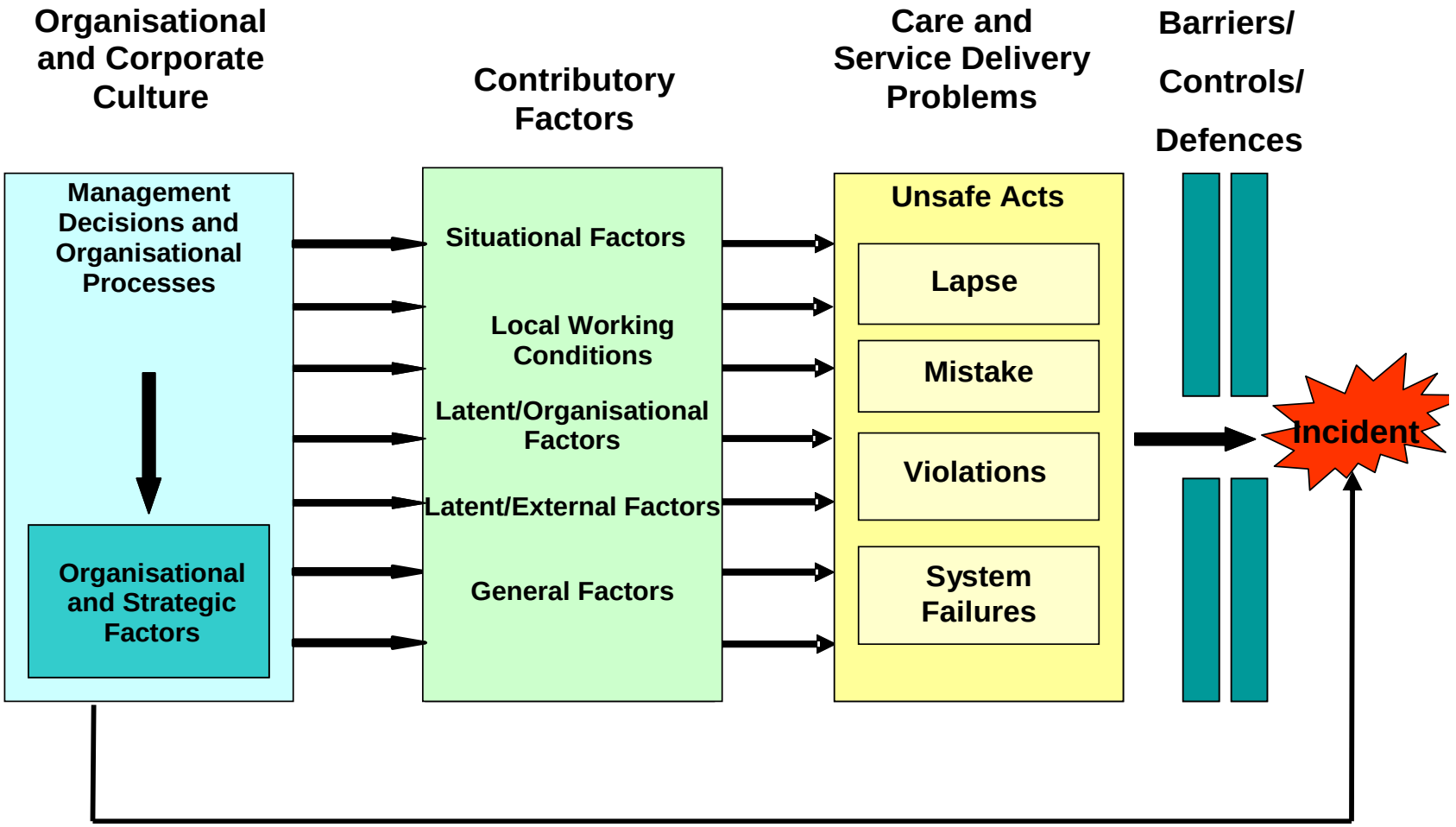
Be clear why a recommendation is being made and what the desired outcome will be.

The SCI notes the ongoing review of the wider issues surrounding this episode which would address the likely source of the infection in this case; however, there were no specific recommendations related to the clinical care of [redacted].

Section 7: Arrangements for Shared Learning
List how the learning will be shared and the level of this i.e. Local, Directorate, Board.

A copy of this report should be tabled at the Regional Governance Committee and the Haematology Clinical Governance Forum.

Signed off by Commissioner	
Name: Melanie McColgan	**Date:** 6 April 2020


Organisational and Corporate Culture
Contributory Factors
Care and Service Delivery Problems
Barriers/ Controls/ Defences
Management Decisions and Organisational Processes
Organisational and Strategic Factors
Situational Factors
Local Working Conditions
Latent/Organisational Factors
Latent/External Factors
General Factors
Unsafe Acts
Lapse
Mistake
Violations
System Failures
Incident

Appendix i - Cause Effect Model

Organisational and Corporate Culture	Contributory Factors		Care and Service Delivery Problems	Barriers / Controls / Defences
Building design and environmental protection	**Situational Factors** Team, Individual, Staff, Patient, Task	Highly unusual infection in this patient group; Liver complications meant reduced antifungal cover	**Lapse:** .n/a	
→	**Local Working Conditions** Workload & Staffing. Leadership, Supervision& Roles. Drugs, Equipment & Supplies	n/a	**Mistake:** .n/a	
→	**Latent/Organisational Factors** Physical environment. Support from other departments/services. Scheduling and Bed Management. Staff training/education, Polices/ Protocols/ Procedures		**Violations:** .n/a	→
	Latent/External Factors Design of equipment, supplies & drugs. National Policies		**System Failures:** n/a	
	General Factors Safety Culture Communication			

If no contributory factors or other problems have been identified, mark the relevant sections as 'Not Applicable'

Meeting with QEUH Wednesday 30th September 2020

Dr Scott Davidson, Deputy Medical Director for Acute Services
Mr Jonathan Best, Chief Operating Officer for Acute Services
Dr Teresa Inkster, Consultant Microbiologist
Dr John Hood, Consultant Microbiologist
Dr Alistair Hart, Consultant Haematologist

Proposed Agenda:

- **The SCI report contained misinformation regarding communication with your family, as well as the timings of your [redacted] physical deterioration through the period**
- **Confidence in the management of QEUH is now so damaged it has become very distressing to engage with it, and your trust is completely broken**
- **Further distress was caused by the publication of the independent review which claims there is no connection between Cryptococcus and the pigeons on the site, but did not disclose any evidence to support this. It is appalling that the hospital board did not contact your family prior to the publication go through the document and invite any questions**
- **The review stated that communication with families on the whole was positive – what is the evidence of that claim?**
- **An [redacted] said in the BBC1 documentary that [redacted] had been instructed not to put anything in writing. This reflects your family's experience – you consistently asked for communication to be put in writing and minutes of meeting, none of which have been forthcoming.**
- **It is unthinkable that the health board response should be anything other than an unreserved apology, and instead we have tried to deny**
- **You wish evidence that refutes any link between the pigeons and the Cryptococcus infection that your [redacted] had, and want an expert at the meeting to go through the evidence**

Questions we want to ask and things we want to say:

1. We would like to reiterate our gratitude for the excellent care [redacted] received from the doctors, nurses and health support staff throughout [redacted] care both as an outpatient at the [redacted] and an inpatient at the QEUH. [redacted] always felt well cared for and in good hands. Their communication with [redacted] and with us as a family was always excellent. Our complaint is not with them, it is with the senior management of the QEU and health board who we feel have acted in their own interests and not in the interests of patients. A lack of transparency from the hospital has damaged our confidence in them. We feel that the hospital and the SCI

report has taken the approach of downplaying the seriousness of the Cryptococcus infection, its link to the known building issues and its impact on [redacted] treatment and death. We do not believe that the priority has been to investigate the source of the Cryptococcus infection to ensure that the issue is resolved so that it never happens again. Rather we feel that the priority has been to protect their own reputation.

2. Press releases described [redacted] as elderly and frail and stated that there was no connection between the Cryptococcus and [redacted] death before an appropriate investigation had been undertaken - who made this decision? We would like an explanation and apology from this person.

3. Timings of press release [redacted] resulting in no option for post mortem to be instructed by the PF. What is the hospital's policy on this? Who made this decision?

4. Death Certificate - who was in the clinical meeting that decided not to put Cryptococcus as a contributory factor on the death certificate? What was the discussion and what is Dr Hart's view on the decision?

5. Why was there no post mortem instructed by the hospital?

6. Is there an option for reviewing the SCI report as it may become an important document and we feel it is incomplete and contains innacuracies?

7. The SCI report took 2 months to be commissioned and a further year to be written after [redacted] death. Why was the SCI commissioned at this late date? What are the guidelines around this? Why did it take so long?

8. What triggered the Cryptococcus tests? Was it the diagnosis and/or death of the boy?

9. What medications were prescribed (not stated in SCI) for the Cryptococcus? When, for how long and what are the known side effects? What were the observed side effects in [redacted]? How did this impact on [redacted] health and [redacted] cancer treatment?

10. When the Cryptococcus was clear from [redacted] blood we were verbally told that this could hide in [redacted] system for up to a year, hence the need for continuing oral treatment after the intravenous treatment was stopped. The SCI states that the Cryptococcus was clear from [redacted] system. Is this contradictory? Please clarify how long it can live in the body. Are there any other tests that could have been done?

13. What was the air refresh rate in [redacted] room and the corridor outside - did it meet minimum standards for [redacted] medical condition?

14. We were verbally told by Dr Inkster on 27th December of the hole in the roof on 12th floor machine room with pigeons roosting. There was no further mention of this - why?

12. [redacted]. What information did they have that you didn't have or disagreed with? What is Dr Inkster / Dr Hart's view on this?

15. Re Independent Review - Dr Inkster subsequently said to BBC that she had only been consulted once and was not given opportunity to give evidence. What is the evidence that she wanted to give?

16. Dr Inkster - What inaccuracies did you see in the independent review and why did you think it should be rescinded?

I would like to suggest that I email the detailed questions and notes below on the SCI Report to the hospital ahead of the meeting with a request to respond in writing. We will also have the opportunity to discuss at the meeting.

- **The SCI report contained misinformation regarding communication with your family, as well as the timings of your [redacted] physical deterioration through the period**

Dates in SCI

[redacted] Nov - chemo started
Nov - [redacted] reported feeling better
Nov - Fever returned
Nov - Cryptococcus diagnosed treatment started (Flucytosine 1650mg - not in report)
[redacted] Dec - Blood cultures negative for Cryptococcus (but told verbally can hide in system for up to 1 year) If it can hide for a year how can you conclusively say it was not a contributory factor?
[redacted] Dec - Chemo restarted - dates missing of when it was stopped
Dec - Clinical deterioration ???? Palliation
[redacted] - [redacted]

Section 2 - The review process P3

- This section should contain the name and roles of members of the review team. Why is it not there? I have requested this information several times by email and never received a response.
- None of us have any recollection of being informed of the SCI - what evidence do you have for this?

Section 3 - Incident background & detailed description of events P4

- Wrong date on bone marrow biopsy - should say [redacted] 2018, not 2017. Indicates lack of care in writing the report
- 'A CT Scan and MRI were carried out due to intermittent confusion, although no findings of concern were noted' - It is our observation that [redacted] confusion was not intermittent, it was persistent and alarming and accompanied by hallucinations, nightmares and the loss of use of [redacted] legs. What was the explanation for this and why is it not in the report?
- Why was [redacted] tested for Cryptococcus given that it is rare? Did you have other information at this point?
- '[redacted] blood cultures were negative' - although we were verbally told that despite negative blood cultures it can hide in the body for up to a year. If this is true does it contradict the narrative that Cryptococcus did not affect the disease progression? (P5)
- 'Antifungals were commenced' - what antifungals and what dose? Why is this omitted? What effect did these antifungals have on [redacted] health and [redacted] ability to commence chemotherapy?
- '[redacted] continued to have negative blood cultures' If it can hide, how can you be conclusive that it was not still present in [redacted] system and a contributory factor to [redacted] ongoing decline?

- Positive culture for Staphylococcus epidermis - what is this and what is its significance?
- It is our observation that [redacted] deterioration began when [redacted] contracted Cryptococcus and began antifungal treatment in late November and was a steady downhill decline from there. The report creates the impression [redacted] deterioration began after the Cryptococcus was 'clear'.

Section 4 - Key Issues identified and lessons learned P5

- '[redacted] had a serious underlying disease with a poor prognosis' - Why was [redacted] a week spent on antifunglas if [redacted] prognosis was so poor? [redacted]. As a family we are very aware that [redacted] overall prognosis was poor - Dr Hart had been very clear about this to us and to [redacted]. However the lack of attention to detail here does not deal with our question that [redacted] may have had a few more months or even years and may have been well enough to spend [redacted] last days at home were it not for the physical assault that [redacted] experienced as a result of the cryptococcus infection. It also does not answer the question of how the anti fungal medication and the temporary stop to [redacted] chemotherapy affected [redacted] prognosis.
- '[redacted] health was deteriorating prior to the infection, when [redacted] blood cultures were negative, and after the blood cultures returned to normal' - [redacted] reported feeling better on [redacted] November following the recommencement of chemo which had to be stopped due to the cryptococcus. We are unclear that negative blood cultures are conclusive evidence that the infection is no longer present due to conversations with Dr Ferguson and the plan to keep [redacted] on oral antifungals for 1 year following the negative cultures.
- 'When [redacted] suffered an acute deterioration of [redacted] condition around 29 December this was in the context of negative blood cultures.' Our observation is that the deterioration began much earlier in late November.
- 'It is therefore thought unlikely that [redacted] deterioration and death were significantly influenced by the infection, rather as a result of [redacted] lymphoma' - the language in this sentence is confusing and vague and the report does not offer the evidence to back it up. What facts lead the review team to 'think' it was 'unlikely' and what is the threshold for the term 'significantly'?

Appendix I - Cause Effect Model

Organisational and Corporate Culture - Why is there no mention here of the known historical issues with the ventilation in the building or the hole in the roof of the 12th floor machine room where pigeons were found to be roosting?

Latent / Organisational factors - There is no reference here to the air quality tests carried out before and after [redacted] death in [redacted] room and the corridors of the ward where the physiotherapist told [redacted] to walk daily. Were the areas of the hospital where [redacted] was taken for CAT scans, MRI scans and eye tests also checked? Bed management - what were the reasons for not moving [redacted] to another area of the ward or the hospital as a protective measure whilst the possibility was being investigated that the Cryptococcus entered the room via the ventilation system?

<u>Notes on the other agenda items - just for our information in case we are put on the spot.</u>

- **Confidence in the management of QEUH is now so damaged it has become very distressing to engage with it, and your trust is completely broken**

- No notes forthcoming of minutes of meeting with Sandie, Dr Inkster and Dr MacDonald on 4th January despite a notetaker present and repeated requests for minutes
- Promised air tests results but only given verbally - despite repeated requests for results in writing
- Communication only by phone call and offering to come in for a chat - no emails despite repeated requests and explanation of need to disseminate information to family in UK and abroad.
- No mention of known historical issues with the building. Eg ventilation refresh rate.
- Lack of communication around news items eg claims that there was no link between pigeons and Cryptococcus, despite being told contradictory information previously. No evidence or explanation offered
- Sudden dropping of story of the pigeons roosting in the machine room
- Press office verbally telling reporters that [redacted] was elderly and 'very frail'
- Inaccuracies in press releases regarding timeline, place of death, date of death with no subsequent apology

- **Further distress was caused by the publication of the independent review which claims there is no connection between Cryptococcus and the pigeons on the site, but did not disclose any evidence to support this. It is appalling that the hospital board did not contact your family prior to the publication go through the document and invite any questions**

It appears that the hospital has now contradicted its previous position that a) Cryptococcus Neoformans comes from pigeons and b) is likely to have come from the machine room via the ventilation system. Please show us the evidence and talk us through it.

- **The review stated that communication with families on the whole was positive – what is the evidence of that claim?**

- **An [redacted] said in the BBC1 documentary that [redacted] had been instructed not to put anything in writing. This reflects your family's experience – you consistently asked for communication to be put in writing and minutes of meeting, none of which have been forthcoming.**

- **It is unthinkable that the health board response should be anything other than an unreserved apology, and instead we have tried to deny**

- **You wish evidence that refutes any link between the pigeons and the Cryptococcus infection that your [redacted] had, and want an expert at the meeting to go through the evidence**

Who is the expert? When was the report written? Please show us the evidence and talk us through it.

Meeting with [redacted] Family
30 September 2020 at 2pm – via Microsoft Teams

Present:
Beth Armstrong (BA) – [redacted]
Sandie Armstrong (SA) – [redacted]
Scott Davidson (SD) – Deputy Medical Director, Acute Services
Jonathan Best (JB) – Chief Operating Officer, Acute Services
Alistair Hart (AH) – Consultant Haematologist
Teresa Inkster (TI) – Consultant Microbiologist
John Hood (JH) – Consultant Microbiologist
Jen Haynes (JHaynes) – Board Complaints Manager

1. Introduction
SD opened the meeting, and introductions were made. SD offered his sympathies for the family's loss, and apologised for the incredibly difficult time the family had been through, made worse by the publicity, and issues that would be covered in this meeting.

2. Family Statement
BA read out a statement on behalf of the family, which expressed gratitude to the clinical team who cared for [redacted], and confirmed the complaint was with the Health Board, not the clinical care team. The family felt the Health Board had acted in its own interest, and the priority had been on their own reputation, and not with the family, or on establishing the source of the issues.

3. Questions from Family

a. How did Cryptococcus get into the hospital and into [redacted] system?
The family directed this question to TI, who confirmed that two inpatients in the Queen Elizabeth University Hospital (QEUH) site had Cryptococcus at the same time, which was very unusual. A Problem Assessment Group (PAG) was set up, whose role was to gather information, consider the patients' underlying illnesses and establish if the patients had anything in common. Because of the type of infection, Estates colleagues were involved, and there was concern about evidence of pigeons having been in a Plant Room within the QEUH and elsewhere on the site.

TI confirmed that because of the unusual infection, and the commonality of time, place and person, an Incident Management Team (IMT) was set up, which was more formal than a PAG. The two patient cases were presented to the IMT, and it was agreed there should be an investigation.

TI explained that with infection control incidents, there is always a need to work backwards. An IMT generates hypotheses, and works on the basis of probability. A range of control measures are implemented to target all hypotheses. For these reasons, it is often the case that definitive answers could not be given, which TI recognised and acknowledged could be hard for families. TI explained there was discussion about what happened when a patient was exposed to Cryptococcus, and the difference between latent infection (lies inactive or dormant in a patient) and an acute infection (a 'live' infection, where symptoms are present). TI stated she could not say with certainty, but it was her opinion that [redacted] probably had an acute infection, which she felt was linked to pigeons on the QEUH site.

b. Did TI visit the plant room?
TI confirmed that she had visited the Plant Room area, where ventilation systems for the hospital were situated, and saw that pigeons had been within all four of the level 12 Plant Rooms.

c. TI was asked what the relationship was like with the team, and whether discussions were free, open and honest

TI confirmed she had a good relationship with the Infection Control Team, including the nurses.

d. TI was asked where the report from the IMT was sent to

TI confirmed that rather than a report, there were minutes taken of every IMT meeting. The IMT considered a range of different hypotheses and theories, and as a result, a sub team was set up following the IMT the Cryptococcus Advisory Group. This group has been led by JH.

e. Independent Review

BA noted that she was upset by a statement the Cabinet Secretary for Health had given saying a patient had died, but this was unrelated to Cryptococcus. [redacted] asked if TI was shocked that the Independent Review had not asked her for her view on Cryptococcus, and TI confirmed she was, given that she was Chair of the IMT and the Lead Clinician for Infection Control at the time, and she had publically challenged the Independent Review.

SA noted that TI had stated on a BBC documentary that she felt part of the Independent Review Report should be rescinded, and asked why she felt that way. TI noted that it was because she was unclear on how they had reached their conclusions, and she also felt there was no scientific evidence or witness statement attached to definitive statements.

f. SA asked about air quality, and whether the ward [redacted] was on was on special measures

There was some discussion around what was meant by special measures, and it was confirmed that there had been a response to the issues that had emerged, for example, reviews of hand hygiene, cleaning regimes, storage and so on, as well as putting in portable HEPA (High Efficiency Particulate Air – a type of high quality air filter) units. The ventilation system was discussed, and it was noted that the adjacent ward (for Bone Marrow Transplant) had received an upgrade.

SA asked about the air refresh rate in [redacted] room. TI confirmed that air sampling was undertaken, which picked up a Cryptococcal species (i.e. Cryptococcccus neoformans). An external expert in Bristol was consulted, and although it was initially thought that the Cryptococcal species isolated could act as a surrogate marker for the Cryptococcal species responsible for the two case patient infections, the external expert subsequently changed their view, and noted that this was not the case.

g. Source of Cryptococcus

JH noted the Plant Room source as a hypothesis, but explained that when this was investigated further, the Plant Room where most evidence of the presence of pigeons (and guano, which is bird excrement) had been found did not serve the areas of the hospital that either of the two case patients (including [redacted]) had been in.

The detail of this hypothesis was that air from the Plant Room (postulated to contain aerosolised spores of *Cryptococcus neoformans*, from the presence of pigeon guano) could have possibly accessed the patients via the ventilation - Air Handling Units (AHUs) - when they were shut down and opened to replace the final filer, thus allowing aerosolised spores (if present in the Plant Room air) down the then filter-less duct. The theory therefore was that the Plant Room air would be pulled into the AHU through the open door, and proceed down the duct to patients. JH advised that when this hypothesis was investigated, it was confirmed that in reality, the opposite happens. When the AHU is shut down and the door opened, and when the final filter is removed, air is driven at some force out of the duct and into the Plant Room, which is a presumed thermal effect; the air is not sucked down the duct to patients.

No AHUs that served any of the wards the 2 case patients (including [redacted]) were in were shut down and opened during the time [redacted] and the other patient were in these wards.

SA noted that [redacted] had been in various parts of the hospital, including for MRI scans. JH explained that radiology areas were the areas least likely to have fungi of any sort, including Cryptococcus, in the air, and that for it to have been acquired in a public area (such as corridors, lifts and so on) would be very unlikely, as there would need to be an enormous amount of spores in the air, with the likely relatively short period of exposure (compared to the prolonged time they would have spent breathing the air in a specific room / ward).

JH noted that it could not be confirmed whether the Cryptococcal infection affecting [redacted] was a hospital acquired infection or not. He explained that patients can be exposed to this infection a long time before it manifests itself as an overt infection, as it may sit dormant, and only when the immune system can no longer cope, it will reactivate. JH confirmed that the more he looked at [redacted] case, and based on his research and findings, his view was that [redacted] may well have had the infection in [redacted] system prior for some time (i.e. a latent infection, rather than an acutely acquired infection).

JH said that although Cryptococcus was an unusual infection, there had been 5 cases in Scotland that year (2018). Four cases came from within the NHS Greater Glasgow and Clyde (GGC) area and one from a nearby Health Board. Three of the cases were from different places in [redacted] itself, and in at least 2 of them, it was believed to have been acquired while in the community. The fourth case in NHSGGC [redacted] was also believed to have been community acquired. All five cases were in 'at risk' patient groups. In the last 10 years, NHSGGC has seen 15 cases, from patients who came from [redacted].

JH noted that the QEUH is the biggest hospital in Scotland, and therefore more likely to see patients with unusual infections and patients with illnesses like [redacted] (lymphomas) which are sadly, one of the most 'at risk'. It was noted, however, that there were no other cases (in the ward [redacted] was in), of Cryptococcus – either with haemato-onclology patients, but also no patients that had undergone renal transplantation (also 'at risk') - with some 140 transplants per annum.

[redacted] remained concerned about pigeon faeces in the Plant Room, and the fact that this was where the ventilation systems for the hospital were located. JH confirmed that the Expert Cryptococcus Group had looked carefully at this, and reiterated that they could find no evidence that supported the hypothesis that spores of *Cryptococcus neoformans* (from postulated aerosolised pigeon faeces in the Plant Room air) had been able to get from the Plant Room air (if present) into the ventilation system of that Plant Room (during shut down and filter change), and hence to susceptible patients by this route.

[Post meeting note: JH has confirmed that when the ventilation system is operational (i.e. when the AHU is on), the part of the AHU from the fan onwards (about half way down the unit) is all under positive pressure: i.e. air within the AHU can leak out, but air cannot leak in. Next, the air goes through the fine filter (final filter), prior to entering the duct work, which takes the filtered air to the rooms and wards that it serves. It is also important to realise, that from the fine (final filter) in the AHU, to the ward/room, that the duct work is also all under positive pressure, therefore, as above, filtered air can leak out of the duct, but unfiltered air cannot leak into the duct.

In summary, this means that both outside air (via the air intakes) and any ingress of Plant Room air gaining access prior to the fan in the AHU (as this part of AHU is under negative pressure so air can leak in) will both be met by the same final filter. Air, after passing the final filter and entering the duct work, is under positive pressure, so that air will always leak out, not in, and therefore this gives the protection of preventing ingress of unfiltered air into all of that duct work.]

h. [redacted] death certificate

BA asked AH why Cryptococcus was not named as a contributory factor on [redacted] death certificate; [redacted]. BA asked why no post mortem had taken place.

[redacted]

[redacted]

[redacted]

BA and SA asked about the side effects of the drugs [redacted] was on, and whether that could have affected [redacted] treatment. AH confirmed that many patients receive the same or similar medications as [redacted] had, as a significant number of patients who have lymphoma will suffer from infections, and [redacted] sadly did not respond to treatment for [redacted] illness.

BA noted that she felt the Cryptococcus did have an impact on [redacted], and that it "knocked [redacted] for six". AH noted that [redacted] was frail, and had continual fevers that had an impact on [redacted], before [redacted] Cryptococcus infection. [redacted].

[redacted].

SD confirmed he echoed what AH had said, [redacted] for the patient, their family and for the clinical and nursing staff where this had been the patient's wish. SD also felt that so much of what clinicians do is not black and white, and although evidence based, the relationships between patients, families and clinicians are fundamental. It was clear AH and [redacted] family had a strong relationship.

i. Press releases

The family described how awful it had been for them to read press releases, which led to distrust in the Health Board. [redacted] described a complaint [redacted] had made about this at the time, but felt "fobbed off" by the response. [redacted] said that when [redacted] travelled home from [redacted] funeral, he put the national news on the television, and realised they were talking about [redacted]. The timing and content of what was described in the media was very upsetting. [redacted] felt that media statements should be approved by families before being issued.

JB acknowledged how awful this must have been for the family, and apologised. JB described that meetings like this were always the preferred option, and that it can be challenging at times when the media and other outside bodies are pressing for information, especially as the Board

is bound by patient confidentiality. For that reason, the Communications Team do not link directly with patients and their family, but the point the family was making was acknowledged. JB confirmed that the Health Board are much more cautious now, and wanted to learn for where improvements could be made.

j. SCI

It was acknowledged that the family have questions about the SCI report, and a commitment was made to aim to respond to these in writing within a fortnight.

4. Conclusion

BA confirmed that she felt [redacted] care was as good as it could be, and reiterated that the issue was with the Health Board, and being assured that the hospital was a safe place. SA noted that as well as the concerns discussed, it was also about the family's grief, as she felt that the Health Board did not care about that. SA's comments were acknowledged, and the NHSGGC team indicated they were sorry. SD agreed that confidence in the hospital was essential, and as a clinician who worked in the QEUH, he wanted patients to come to hospital if they needed to, and that he personally would take his own immediate family there if they required hospital treatment. SD recognised this was not just about words, but action, and acknowledged how important it was for staff within the hospital to feel confident in it.

The family accepted that they may never know where [redacted] Cryptococcus infection came from, but found it difficult when categorical statements were made about where it did not come from.

SD noted that he had found the meeting valuable, and he hoped that was the family's view. SD and JB noted that there was full recognition of what the family had been through, and it was important to act on learning. A further meeting was offered, if the family felt they would find this helpful, once they had received the response to their SCI questions.

Meeting ended 15:48.

Greater Glasgow and Clyde NHS Board

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Private and Confidential
Ms Beth Armstrong
Via email: beth.armstrong[redacted]

Date: 13 October 2020

Enquiries to: Jennifer Haynes
Direct Line: [redacted]
E-mail: Jennifer.Haynes[redacted]

Dear Ms Armstrong

I am writing to you following our meeting on 30 September 2020, whereby you and your family shared with us some specific questions about the Significant Clinical Incident (SCI) investigation report into your [redacted] death, which we committed to replying to in writing. Thank you for affording us the opportunity to respond to your family's concerns about the SCI report. Whilst my colleagues and I felt the meeting we had was helpful and meaningful, it was very clear how let you down you feel with regards to our communication with you, including the SCI report. For that, I am deeply sorry, and I truly hope that this response will go some way to restoring your faith and confidence in us.

I have tried within this response to answer your questions compassionately, whilst balancing the need to offer you clear explanations. If the clinical and factual nature of my response in any way comes across as cold or insensitive, then I sincerely apologise, as I do not underestimate the grief and distress caused to you and the rest of your family, and I truly regret all that you have been through.

General Questions

1. Why was the SCI investigation commissioned?

The fact that your [redacted] tested positive for Cryptococcus whilst [redacted] was in hospital was, in itself, not something that was of significant clinical concern to [redacted] doctors, as it is sadly very common for patients as ill and as immuno-suppressed as [redacted] was to contract unusual infections. However, as you are aware, at around the same time, we had a second inpatient who also tested positive for Cryptococcus. For this reason, an Incident Management Team (IMT) was convened, which is a team of experts (including infection prevention and control doctors and nurses, clinical staff and estates and facilities colleagues) to consider what the source of the infections may be.

It was agreed through the IMT that both your [redacted] and the other Cryptococcus patient case (which was for Paediatrics, as it related to a child) should undergo SCI investigations. An SCI investigation is an established process that is commissioned by Senior Management in the event of any unplanned or unexpected serious clinical incident. For your [redacted] case, it was suggested and agreed at an IMT meeting that this should be a combined SCI investigation, led by Paediatrics, with input from the Adult Team for completeness. This was because of the possible link between the two patient cases. Unfortunately, there were delays in commissioning the Paediatric SCI investigation, and the decision was taken to progress the SCI process for your [redacted] case, to ensure no further delay.

2. Delay in commissioning and finalising the SCI investigation report

I hope the response to your previous question has addressed your concern about the delay in commissioning the SCI investigation.

With regards to why the SCI took a year to be written, and what the guidelines are around this, I can confirm that SCI investigations should be completed within 3 months. We therefore failed, by some margin, to achieve that in your [redacted] case, for which I sincerely apologise, particularly given how much angst you felt awaiting explanations about what happened to [redacted]. As I have described, there was a delay in commissioning the SCI investigation, which was related to the Paediatric case, in identifying appropriately qualified personnel independent of the care provided, due to the small internal pool of suitable staff. Thereafter, although the investigation was undertaken and the report had been drafted, it took much longer than it should have to finalise it. Although this was down to a desire to make sure the report was as thorough and robust as it could be, I fully accept that the timescales were unacceptable. I realise this explanation will be particularly dissatisfying for you, given your subsequent comments about accuracy, which I will address later in this letter.

3. Mistakes, omissions and lack of detail in the report
It is clear from both the questions you have submitted in writing, and from our discussion at the meeting, how disappointing the SCI report was to you and your family. After all you have been through, I am deeply sorry that this caused you further distress, and, as confirmed in our meeting, we will add this letter as an addendum to the SCI report, so it is clear what your concerns are, and how we have responded.

Section 2 - The review process

4. Name and roles of members of the review team
I am aware that it is clearly written on the template of the SCI report that Section 2 should include the name and roles of the members of the review team, yet only roles were given in your [redacted] SCI report. I can therefore completely understand your frustration at this apparent omission.

Our policy on SCI investigations states that final reports should be anonymised, so that individual staff members are not named. This is largely to do with the fact that SCI investigations are not about apportioning blame, but instead are supposed to be a learning tool, to identify the root causes which led to an incident occurring, and any actions identified for improvement, which would help minimise the risk of a similar situation happening again. It appears that an old template was used for your [redacted] SCI report, which stated that names should be included.

Whist the above is our policy, clearly there is a need to be pragmatic and human, and in your [redacted] case, I can see that it is important for you to know who was involved with the SCI investigation. For that reason, I can confirm that the colleagues who were part of your [redacted] SCI investigation team were:

- Myra Campbell, Clinical Services Manager
- Ian MacDonald, Consultant Haematologist
- Teresa Inkster, Consultant Microbiologist
- Lynne Pritchard, Lead Nurse in Infection Prevention and Control
- Steven Jones, Lead Clinical Risk Coordinator

We have gone through our email communications from you, and whilst we could not see a request asking for the names of those involved with the SCI, if we have accidentally missed or misunderstood something, I am very sorry, as this was a simple question to answer, and I therefore very much regret that it has caused you added concern, which was avoidable.

5. No recollection of being informed about the SCI investigation
In a letter to you from me, sent via email on 10 May 2019 at 08:49, I said:

One of the main active pieces of work currently underway is a Significant Clinical Incident (SCI) investigation into your [redacted] care.

The letter went on to explain what an SCI investigation entails, and to confirm that you would receive a copy of the final report when it was completed.

Section 3 - Incident background & detailed description of events

6. Location of
I am sorry that the SCI report noted that the . Although the , I realise that if this is what the SCI report had meant to say, it should have been explicit, and I acknowledge your point that this comes across as a lack of care in writing the report.

7. Wrong date on bone marrow biopsy
I can see your case notes clearly state that had a bone marrow biopsy on 2018, so I sincerely apologise for the error in the report, which read that this took place in 2017. Again, I acknowledge that mistakes like this have undermined your confidence in the SCI report.

8. Intermittent confusion
Your received a CT scan of head on 2018, and an MRI scan on 2018. These scans were to help exclude spread of lymphoma to brain, and to see if any other cause could be identified for confusion. It is usual practice that if a CT scan comes back without any concerns, then an MRI would be carried out.

Dr Hart has confirmed that your confusion did sadly fluctuate, along a typical delirium pattern, with minimal confusion in the morning, worsening throughout the day, and then particularly severe at night. Doctors' rounds tend to be in the morning, so nursing and family reports are very helpful to give a clear picture, and I realise it must have been so difficult for you to see your like this.

Taking everything into consideration, your doctors felt that confusion was due to lymphoma, and possibly the effects of the steroids was taking. This is unfortunately not an unusual occurrence for patients who suffer from the same type of illness as your . leg weakness was thought to be part of overall frailty and deterioration at that stage, which meant that spent most of time in bed, which would have unfortunately compounded the weakening in legs.

9. When and why were these scans carried out?
I hope I have managed to clearly explain this to you in response to Question 8.

10. Why was your tested for Cryptococcus?
Your had bloods taken, cultures were grown from this and the results then went to the microbiology labs for identification processes. This is standard treatment for blood culture samples. Once the organism which grew was identified, this triggered the decision to do specific blood tests for Cryptococcus.

11. You were verbally told that despite negative blood cultures, Cryptococcus can hide in the body for up to a year. Could this affect the disease progression?
The incubation period for Cryptococcus is unfortunately unknown. There is evidence that the organism can lie dormant in the body before reactivating. Dr Hart has confirmed that he does not think Cryptococcus would have altered disease progression, as it was the lymphoma that sadly predisposed to Cryptococcus.

12. Antifungals
The antifungals commenced to treat your Cryptococcal infection were Ambisome (November 2018), and then Flucytosine was added in on November 2018. These were started on the Microbiology Team's advice, which is common practice. The Flucytosine and Ambisome combination were continued for your until December 2018, and thereafter received Fluconazole. Whilst I realise you are worried, please be assured that clinicians do not think

these medications had any specific side effects that had a significant effect on your [redacted]. Of note, Ambisome is particularly well tolerated for a patient's overall condition in terms of side effects. A dose was missed of Gemcitabine, as when patients have inter-current infections, their clinicians will often do this. Your [redacted] chemotherapy was recommenced on [redacted] 2018. During this time, there sadly continued to be an ongoing deterioration in your [redacted] overall condition. [redacted] clinicians do not feel this was specifically due to [redacted] infection and its treatment, although this will have been part of it, but primarily to do with [redacted] disease progression.

13. Negative blood cultures

As you know, we discussed in the meeting we had with you the difference between a latent infection (lies inactive or dormant in a patient) and an acute infection (a 'live' infection, where symptoms are present). We unfortunately do not know with certainty whether your [redacted] Cryptococcal infection was latent or acute, but we do know [redacted] blood cultures were initially positive, then became negative, which suggests that a significant part of the infection had been treated through the aforementioned antifungal medications.

14. Staphylococcus epidermis

Staphylococcus epidermis is a common organism that lives on all of our skin. It is a common contaminant, was not present in your [redacted] blood and is often not clinically significant. As a precaution, your [redacted] was started on [redacted], on [redacted] 2018.

15. It is our observation that [redacted] deterioration began when [redacted] contracted Cryptococcus

I acknowledge that this is your perception, and I can understand that with all that you have learned about Cryptococcus, why you would find this so distressing. Very sadly, your [redacted] clinical deterioration began when [redacted] was admitted to hospital [redacted]. Dr Hart has confirmed that there were never any sustained periods of improvement during [redacted] time in hospital, and [redacted] began at the end of December 2018. Whilst I realise why you feel the way you do about [redacted] Cryptococcus infection, as discussed at the meeting we had, Dr Hart does not feel that Cryptococcus played a part in your [redacted] decline, which was very sadly continuous, barring a few fluctuations, which is what the clinical team often see, as this is common for patients with illnesses and treatments like your [redacted].

<u>Section 4 - Key Issues identified and lessons learned</u>

16. Antifungal medication and the temporary stop to [redacted] chemotherapy

Although you have referenced the cost of a medication, I would seek to assure you that this is not a consideration for individual clinicians when they are deciding what medicines would benefit a patient. [redacted] clinicians had very much hoped that your [redacted] would respond when [redacted] chemotherapy was restarted, as there had been an initial improvement in [redacted] pyrexia (fevers) with the medications [redacted]. As described above, although I cannot begin to imagine how difficult this journey has been for you, [redacted] clinicians do not feel that [redacted] Cryptococcus infection was clinically significant for [redacted]. In saying this, please do not think that I underestimate your strength of feeling or what you are stating.

As you know from our meeting, the aim was to get your [redacted] well enough to go home. [redacted] prognosis was sadly always going to be, at best, a few months, and the chances of this were unfortunately low (around 30% as an estimate, albeit there is little robust evidence for relapsed [redacted] lymphoma).

When your [redacted] chemotherapy restarted on [redacted] 2018, there was no meaningful response seen, and similarly, when the high dose of steroids were used from [redacted] 2019, although [redacted] fever improved, your [redacted] marker of tumour progression still rapidly rose. The disease tragically proved to be refractory to the chemotherapy and steroids.

17. We are unclear that negative blood cultures are conclusive evidence that the infection was no longer present

I have hopefully addressed this point for you in response to Question 13.

18. Our observation is that the deterioration began much earlier in late [redacted]
I have hopefully addressed this point for you in response to Question 15.

19. Language around whether infection contributed to deterioration
As you know, this is an issue we discussed at our meeting, and Dr Hart shared a timeline with you, which I have enclosed with this letter. [redacted], and this was also the conclusion reached by the SCI investigation team based on their review of your [redacted] case, including [redacted] medical records. I am sorry you found the language vague, and I hope that both Dr Hart's explanation and the confirmation of the information above has helped detail the thinking and conclusions reached by the experts involved.

Appendix I - Cause Effect Model

20. Ventilation and pigeons
I can completely understand why you would wish for this issue to have been addressed within the SCI report, given the attention and worry this matter has generated. I am therefore genuinely sorry the SCI report did not go into the level of detail you either wished or expected, and for the additional distress this caused you and your family.

Although ventilation systems within the hospital have received negative publicity, I can confirm that despite extensive review, no link has been found between ventilation and infections in the Queen Elizabeth University Hospital (QEUH). As you know, we discussed this issue in detail at our meeting and Dr John Hood, the Consultant Microbiologist who has led the Cryptococcal Enquiry Group confirmed that whilst the Plant Room hypothesis (whereby air from the Plant Room, postulated to contain aerosolised spores of *Cryptococcus neoformans*, from the postulated presence of pigeon guano, could have possibly accessed the patients via the Air Handling Units) was investigated, it was confirmed that when the Air Handling Units final filer is removed, air is blown out at force back into the Plant Room, rather than sucked into the Air Handling Unit duct.

Although I realise it will remain very upsetting for you, I do hope you found the information that was relayed at that meeting helpful in better understanding this issue, the complexity involved, and why we unfortunately may never know definitively the answers you are seeking. You were very understanding of that at the meeting, which I know we all appreciated, given the ordeal you have been through.

As you will know, there is an independent Public Inquiry underway, looking at infection issues in the QEUH. We will engage with that process fully, and provide the Independent Public Inquiry Team with everything they need, in the hope that this process will offer answers.

21. Air quality tests
As discussed at the meeting, I fully take on board your comments about other areas of the hospital, but as Dr Hood explained, radiology areas were the areas least likely to have Cryptococcus in the air, and that for it to have been acquired in a public area (such as corridors, lifts and so on) would be very unlikely, as there would need to be an enormous amount of spores in the air, with the likely relatively short period of exposure (compared to the prolonged time [redacted] would have spent breathing the air in a specific room / ward).

In terms of your question about not moving your [redacted] to another area of the ward or in the hospital, whilst I can understand your thinking, by that stage, the Cryptococcus infection was already confirmed, and there would therefore not have been a benefit in moving [redacted], particularly as [redacted] was in the ward most appropriate for [redacted] needs, with access to the relevant clinical specialists. For that reason, it may have posed a greater risk to have moved [redacted] to another ward within the hospital. There was also no evidence at that stage, nor now, that the Cryptococcus had come from the hospital environment.

22. The following sections have been left blank in the SCI report:

- **Latent / Organisational Factors**
- **Latent / External Factors**
- **General Factors**

This refers to the Accident Causation Model, which is a technical tool for establishing any contributory factors, errors, systemic problems and gaps that may indicate root cause. The boxes are all headed, but not all will apply in every case. As they did not apply in your [redacted] case, they should have been marked as N/A rather than left blank. I therefore apologise that this led to dubiety for you and your family.

In conclusion, I truly hope that the answers I have given you and your family within this letter have thoroughly addressed the concerns you had about the SCI report, and once again, I am very sorry that the SCI report was so disappointing to you. I know that nothing we do can take away all that has happened, but both within this letter and at our meeting, I was very keen to demonstrate to you how deeply important what happened to your [redacted] is to us, and that we want to do whatever we can to support you. If, therefore, once you have reflected on the content of this letter, you would like a further meeting to clarify any points that may remain, we would be happy to arrange this, and you are welcome to contact Jennifer Haynes (whose contact details are at the top of this letter) if you would find this useful.

Yours sincerely,

[redacted]

Jonathan Best
Chief Operating Officer – Acute Services
NHS Greater Glasgow and Clyde

From: [redacted]
To:
Cc:
Subject: Re: IMT tomorrow
Date: 22 August 2019 13:19:54

Hi Linda, I confirm I'll chair the meeting and look forward to getting the papers. I'll try to speak to Iain tonight
E

Sent from my iPad

On 22 Aug 2019, at 10:30, de Caestecker, Linda [redacted] wrote:

> Iain and Emilia
> We need a public health Consultant to chair the 6A IMT tomorrow morning. The last meeting went badly due to difficult behaviours as people are anxious and uncertain. Iain has a major input to the meeting so it's hard for him also to chair. I have a meeting on Drugs Deaths as part of the Renfrewshire Commission.
>
> Emilia, can you help either to chair or go to the Drugs meeting for me and feed back.
>
> What are both your views on the best option?
>
> Sent from my BlackBerry 10 smartphone on the EE network.

University Hospitals Bristol NHS
NHS Foundation Trust

Root Cause Analysis (RCA) Investigation Report

PRIVATE AND CONFIDENTIAL

Delete all guidance notes in purple (replace with relevant text)

Incident Investigation: **(version):**	*Replace this text with the level of investigation, e.g: Local Divisional Investigation, Level 1 Concise Root Cause Analysis investigation, Level 2 Comprehensive Root Cause Analysis Investigation, Serious Incident Panel review, Independent Investigation. Include version of document*
Serious Incident (SI) number and grade (if applicable)	*Replace this text with the SI reference number (known as the STEIS number), which can be obtained from your divisional patient safety team or the patient safety team in Trust Headquarters. Enter the grade of SI (0, 1, 2)*
Incident Date:	*Replace this text with the date the incident happened. If this is not known, then state unknown.*
Incident Number:	*Replace this text with the local incident number generated when the incident was reported "on line", sometimes referred as the "U" number.*
Author(s) and Job Titles	*Replace this text with the names and job titles of the authors*
Investigation Report Date	*Replace this text with the date the incident was reported via the Ulysses Safeguard System.*

Contents

Executive Summary

Brief description of incident:

Give a brief description of what happened and what the outcome was.
Lorem ipsum lorem ipsum

Incident date:	*Replace this text with the date the incident happened. If this is not known, then state unknown.*
Incident type:	*Replace this text with one of the following: Patient Safety (e.g. an incident that lead to harm to one or more patients associated with the delivery of their care); Health and Safety (e.g. an incident or accident that caused harm to staff, visitors, others, or patients but not associated with their care); Information Governance (e.g. an incident involving a breach of confidentiality or a loss of patient or staff information); safeguarding*
Healthcare Specialty:	*e.g. vascular surgery*
Actual effect on patient and/or service:	*e.g. death; serious staff injury; ward closure; reputational damage. See appendix 1 for level of harm to patient*
Level of investigation conducted:	*Replace this text with the level of investigation, e.g: Local Divisional Investigation, Level 1 Concise Root Cause Analysis investigation, Level 2 Comprehensive Root Cause Analysis Investigation, Serious Incident Panel review, Independent Investigation. Include version of document*
Involvement and support of the patient and/or relatives:	*Yes/no*
Care and service delivery problems:	*Summarise from later section*
Contributory factors:	*Summarise from later section*
Root causes	*Summarise from later section*
Lessons learned	*Summarise from later section*
Recommendations	*Summarise from later section*
Arrangements for sharing learning	*Summarise from later section*

Main Report

Incident Description:

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Specialty: *[e.g. vascular surgery]*

Effect on Patient and/or Service: *[e.g. death; serious staff injury; ward closure; reputational damage. See appendix 1 for level of harm to patient]*

Actual harm caused to patient: *[e.g. Near Miss, Negligible, Minor (minimal harm requiring extra observations and / or minor treatment), Moderate (short term harm requiring further treatment), Major (permanent or long term harm), Death. See appendix 1]*

Background and context

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Terms of reference

Purpose

This investigation was commissioned by [add name] with reference to the University Hospitals Bristol NHS Foundation Trust (UHBFT) Policy for the Management of Incidents (and Serious Incident Policy) 2013 to identify the root causes and key learning from this case.

This report will be approved and administered in accordance with UHBFT Policy.

Research carried out in the NHS has shown that systems failures may be the root cause of safety incidents. RCA investigations are not intended to investigate individual performance or disciplinary issues. Should any such issues emerge during an RCA investigation they will be subject to a separate HR process and will not be considered in the RCA report" The Incident Decision Tree will be used as a tool to determine culpability.

Objectives

1. To establish the facts i.e. **what** happened, to **whom**, **when, where**, **how** and **why** (*root causes*)
2. To establish whether failings occurred in care or treatment
3. To establish how recurrence may be reduced or eliminated
4. To formulate *recommendations and an action plan*
5. To provide a *report and* record of the investigation process & outcome
6. To provide a means of *sharing learning* from the incident

Investigation type, process and methods used *[delete yes or no as appropriate]*:

Review of health records	Yes / No	Brainstorming	Yes / No
Chronology/timeline	Yes / No	Barrier analysis	Yes / No
Incident review meeting(s)	Yes / No	Statements from staff	Yes / No
Interviews with all those involved	Yes / No	Re-enactment	Yes / No
Fishbone analysis	Yes / No	Five "whys"	Yes / No
Independent expert opinion	Yes / No	Incident decision tree	Yes / No
Post mortem report	Yes / No	Other (please specify)	Yes / No

Involvement of other organisations *[delete if not applicable]*:

Investigation timescales/schedule
[Detail here the timescale covered by the investigation]

Level of investigation

Replace this text with the level of investigation, e.g: Local Divisional Investigation, Level 1 Concise Root Cause Analysis investigation, Level 2 Comprehensive Root Cause Analysis Investigation, Serious Incident Panel review, Independent Investigation. Include version of document

Involvement and support of patient and relatives

[Detail here dates of meetings / correspondence with family]

Specific considerations requested by the family:

If the patient or family identify questions that are outside the scope and terms of reference of the investigation these should be referenced here and acknowledged and responded to under the Complaints Policy and processes.

Involvement and support provided for staff involved

Staff can be significantly affected when things go wrong and become a "second victim", particularly when the outcome for the patient is permanent severe harm or death. Detail here the level of support for staff involved [e.g .individual and / or team debrief, support from line manager for individual or team, support from supervisor / mentor / occupational health / professional body / union.

FINDINGS

Chronology of Events

This section should clearly identify who did what and when and should give the reader a clear understanding of what happened and the order of these events [add extra rows as required]

Date / Time	Source(s)	Information	Notes / Comments (analysis)

Detection of Incident

Identify here how and when staff became aware that an incident had happened and when the Trust was informed about this. In some cases, staff awareness will be immediate. In other cases the team may find out sometime after the event. The report should clearly differentiate between what is believed to have happened and what is known to have happened. It may not be possible to establish causation. The cause of death of a patient for example, may not be possible to determine, unless there is a clear Coroner's verdict as to causation. If an inquest has yet to be held, then this should be stated. If no error has been detected, then this should be stated here.

Notable practice

This section should highlight practice which goes beyond expected standards of care and Trust policies and procedures. It should recognise very high standards of care, innovative practice, and situations where staff have worked under difficult circumstances.

Care and service delivery problems

A care delivery problem is a problem that arises in the process of care, usually actions or omissions by staff. For example a failure to use trust pressure ulcer risk assessment procedures.

The brief definition is that care delivery problems are staff not doing what is expected of them, whilst a service delivery problem is the Trust not doing what is expected of it as an organisation.

A service delivery problem refers to acts or omissions that are identified during the analysis of the incident, which are not associated with the direct provision of care. For example the lack of availability of a 24-hour doppler service

Potential Contributory factors

These reflect the circumstances present at the time of the incident, but are not necessarily causal.

	Potential Contributory Factor	Score*
Patient Factors	*Consider: Clinical condition, Disability, Physical Factors, Social Factors, Mental/Psychological Factors, Interpersonal relationships*	
Individual Factors	*Consider: Physical issues, Psychological Issues, Social and / or Domestic issues, Personality Issues, Bogus Healthcare worker, Cognitive factors e.g. Preoccupation / narrowed focus, Expectation / Confirmation bias, distraction*	
Team and Social Factors	*Consider: Role Congruence, Leadership, Support and cultural factors*	
Education and Training	*Consider: Competence, Supervision, Availability / accessibility Appropriateness of training*	
Equipment and Resource Factors	*Consider: Equipment Displays, Equipment Integrity e.g. poor working order, Availability/Positioning, Usability*	
Work and Environmental.	*Consider: Administrative factors, Design of physical environment, Staffing, Work load and hours of work, Time*	
Task Factors	*Consider: Guidelines, Policies and Procedures, Decision making aids, Procedural or Task Design*	
Communication	*Consider the effectiveness of Verbal, non-verbal and written communication*	
Organisational & Strategic	*Consider: Organisational structure and priorities, externally imported risks e.g. locums, unexpected adverse impact of external guidance, Safety culture*	

* *Each is scored on from 0-3 for their relative impact on the root cause of this incident: +: Positive good practice or mitigating action; 0: Contextual but not an influencing or causal factor to this incident; 1: Possibly may have been an influencing factor to this incident; 2: Had an influencing factor to this incident; 3: Causal Factor that led directly to this incident.*

Influencing factors

An influencing factor is something that influenced the occurrence of, or outcome of an incident. Generally speaking the incident may have occurred in any event, and the removal of the influence may not prevent incident recurrence but will generally improve the safety of the care system

Causal Factors

A causal factor is something that led directly to an incident. Removal of these factors will either prevent, or reduce the chances of a similar type of incident from happening in similar circumstances in the future. Causative factors tend to be more closely related to the incident being analysed

Root causes

The Root Cause or Causes emerge from the Contributory Factors. For each of the contributory factors identified, consider whether the incident would still have happened if the contributory factor had not have occurred. If the answer is that the incident still could have happened then this is unlikely to be the root cause. If, however, the answer is that the incident would not have happened then the contributory factor is likely to be the root cause or one of the root causes.

Lessons learned

Lessons learned should be listed here.

This section should identify separately any lessons learned which were not felt to have had a direct impact on the outcome of events. These should be listed under a separated section entitled Supplementary Learning.

It is appropriate to include Lessons Learned which note challenges involved with particular patient groups or clinical situations.

CONCLUSIONS

Recommendations

At an RCA meeting a range of potential solutions to the problems emerging from the serious incident may have been identified. Before these solutions are suggested as recommendations, the following checks should be made

- *ask again whether the solution being suggested would have stopped or contributed to stopping the incident in question;*
- *consider the implications of the solution – could it cause more problems then it solves;*
- *is the financial cost of the solution prohibitive;*
- *will the solution be acceptable to staff and patients.*

Even if the recommendation does not meet each of these 'tests', you may still wish for it to be included in the report for consideration. For example, in the case of a recommendation which would prove costly, it should be decided within the division where the cost will be incurred whether this cost is prohibitive and whether the residual risk of not implementing the recommendation should be added to their risk register.

Recommendations should be clear, specific and measurable.

Any issue identified as a care delivery problem, service delivery problem or a contributory factor should be considered as a potential subject for a recommendation.

Arrangements for Shared Learning

This RCA will be shared with all stakeholders.

Distribution List

List all those to whom the report is distributed

Appendix 1: Guidance for scoring patient harm

Table 1	Consequence score (severity levels) and examples of descriptors				
	1	2	3	4	5
Domains	**Negligible**	**Minor**	**Moderate**	**Major**	**Catastrophic**
'Safety' **Impact on the safety of patients, staff or public (physical/psychological harm)**	Minimal injury requiring no/minimal intervention or treatment. No time off work	Minor injury or illness, requiring minor intervention Requiring time off work for >3 days Increase in length of hospital stay by 1-3 days	Moderate injury requiring professional intervention Requiring time off work for 4-14 days Increase in length of hospital stay by 4-15 days RIDDOR/agency reportable incident An event which impacts on a small number of patients	Major injury leading to long-term incapacity/disability Requiring time off work for >14 days Increase in length of hospital stay by >15 days Mismanagement of patient care with long-term effects	Incident leading to death Multiple permanent injuries or irreversible health effects An event which impacts on a large number of patients

Post investigation risk rating of incident:

On completing investigation, revisit the initial risk rating assigned to the incident(if appropriate) in the Ulysses Safeguard system (add 'x' to matrix below)

Final Risk Rating Matrix					
Severity	Likelihood of Recurrence				
	1 Rare	2 Unlikely	3 Possible	4 Likely	5 Almost Certain
5. Catastrophic	5	10	15	20	25
4. Major	4	8	12	16	20
3. Moderate	3	6	9	12	15
2. Minor	2	4	6	8	10
1. Negligible	1	2	3	4	5

	Total	**Final Risk Level**
	1-3	Low Risk
	4-6	Moderate Risk
	8-12	High Risk
	15-25	Highest Risk

Likelihood Score Guidance:

Likelihood score	1	2	3	4	5
Descriptor	Rare	Unlikely	Possible	Likely	Almost certain
Frequency	Not expected to occur for years	Expected to occur at least annually	Expected to occur at least monthly	Expected to occur at least weekly	Expected to occur at least daily

Appendix 2: Duty of Candour

		Delete Yes or No as appropriate	By whom	Date	Documented in health record? *Delete Yes or No as appropriate*	Achieved within 10 working days Yes / No
Initial discussion with patient. or family within 10 working days of incident being identified	Has the patient been informed face to face of this incident?	**Yes / No**			**Yes / No**	
	Has the family been informed face to face of the incident?	**Yes / No**			**Yes / No**	
	Has the patient or family been provided with an appropriate apology?	**Yes / No**			**Yes / No**	
	Have they been offered written confirmation of the initial discussion regarding this incident?	**Yes / No**			**Yes / No**	
	If yes, did they accept the offer of written confirmation of the initial discussion?	**Yes / No**			**Yes / No**	
	Has the patient/family been asked whether they wanted any specific question(s) answered as part of the investigation? List any specific questions in section below.	**Yes / No**			**Yes / No**	
	Have they been offered a copy of the incident investigation outcome?	**Yes / No**			**Yes / No**	
	Did they accept the offer to receive a copy of the incident investigation outcome?	**Yes / No**			**Yes / No**	
	If yes to above: Was this within 10 working days of completion of investigation outcome?	**Yes / No**			**Yes / No**	**Yes / No**
	If yes, has the patient/family been offered a face to face meeting to discuss the outcome of the investigation?	**Yes / No**				**Yes / No**
	Did they accept the offer of a face to face meeting?	**Yes / No**	*If yes, please state details below*			
	Date of meeting / With whom					

This section of the report must contain details of all contacts prior to the completion of the RCA investigation. Where contact has not been made the report must detail the attempts made at contact or the rationale for not doing this. This section must state if and how the patients, carers/family or others affected by the incident have been involved in the investigation.

This section must describe what information and support has been given following the incident.

There are four key tasks which must be completed within 10 days (unless this is not possible or they are declined) to meet our Duty of Candour:

Notify the relevant person that the incident has occurred or is suspected to have occurred
Provide all the facts known at this point
Include an appropriate apology
Offer written notification/confirmation of all of the above points

As a minimum, therefore, the following information must be included in the report:

The date the appropriate person was notified that the incident has occurred or is suspected to have occurred
The date this person was provided with all the facts known at this point (i.e. when they were offered an explanation of what happened)
The date an apology was made verbally and/or sent in writing (e.g letter of condolence)
The date an offer was made to confirm what happened in writing
Who undertook each of these tasks
The rationale for not completing any of these tasks (if appropriate)
The dates that any unsuccessful attempts were made to undertake these four key tasks and who did this

The RCA Lead Author should conclude this section by explicitly stating whether they are assured that the Trust has adhered to its Duty of Candour (as outlined on the Being Open Policy)

If there are any further actions needed to ensure compliance these should be listed as recommendations in the appropriate section of the report

Appendix 3: Action Plan

Root CAUSE / contributory factor	Action required to address root cause	Individual responsible for completing action	Date set for completing action	Governance group responsible for monitoring action	Evidence of completion^ of action (link to completed audits / PDSA cycles)
N/A	PDF RCA and attach to electronic incident report	RCA author	Following executive sign off of RCA.		

^ or explanation of change in situation which has required the action in response to the issue to be reviewed

Approval of RCA and Action Plan

	Signature (Electronic accepted)	Date	Name and Designation
RCA Lead Author:			
RCA sign off by Senior Manager* as correct and accurate account of events			
Contributor(s): *(No signature necessary)*			
Action Plan Owner: *(Overall responsibility for action plan completion)*			
Governance Group** Monitoring Action Plan			

** Incidents risk rated 9-12: Divisional Patient Safety Manager; Cross divisional incidents risk rated 9-12: Divisional Patient Safety Managers; Serious incidents and incidents risk rated 15+: Executive Director Sponsor; Never Events: Medical Director or Chief Nurse; For serious incident panels: Chief Executive. ** Incidents risk rated 9-12: Divisional Governance Group; Cross divisional incidents risk rated 9+: Patient Safety Group; Incidents risk rated 15+ and Grade 1 serious incident: Divisional Governance Group; Grade 2 serious incidents / Never Events/ serious incident panels: Patient Safety Group*

From: [redacted]
To:
Subject: FW: Ward 4B
Date: 01 October 2024 14:05:02

Example 2

Dr Christine Peters
Consultant Microbiologist
QEUH/RHC
NHSGGC

From: Peters, Christine **On Behalf Of** Ic Doctor, South
Sent: Thursday, November 30, 2017 11:48 AM
To: Devine, Sandra [redacted]; Barmanroy, Jackie [redacted]; Campbell, Myra [redacted]uk>; McColgan, Melanie [redacted]; Walsh, Tom [redacted]; Jones, Brian [redacted]
Cc: Green, Rachel (NHSmail) [redacted]; Ic Doctor, South [redacted]
Subject: RE: Ward 4B

Thank you Sandra, it is helpful for me to understand what conversations are taking place.

My advice as ICD is that we need to meet to discuss control measures and patient placement. I agree that it is essential to have clinicians there and if you have already put in place steps to organize a meeting I will attend as ICD on tomorrow. In doing so I request that I am sent information prior to the meeting regarding what work has taken place on the ward and paperwork of agreed patient placements with HPS etc as you indicated has occurred.

Regards,

Christine

Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
Ex [redacted]
Mobile: [redacted]

From: Devine, Sandra
Sent: 30 November 2017 11:39
To: Peters, Christine; Barmanroy, Jackie; Campbell, Myra; McColgan, Melanie; Walsh, Tom; Jones, Brian
Cc: Green, Rachel (NHSmail); Ic Doctor, South
Subject: RE: Ward 4B

Hi Christine
Melanie is not available today and both Brian and I have spoken to Myra and suggested that the clinical service should decide how they would like to take this forward. I have said to Myra that I am happy to attend a meeting today or tomorrow (am) and I'm waiting for her to get back to me. I think it's essential that clinical staff from the unit are in attendance and obviously Myra is best placed to organise this. Perhaps Melanie will take a view as to whether or not she should be there and I guess this would mean we could not meet until tomorrow. Can I ask who is the ICD on duty tomorrow? As requested I have cc in the South Glasgow doctors generic e mail box.
Sandra

Sandra Devine
Associate Nurse Director
Infection Prevention & Control
[redacted]

From: Peters, Christine
Sent: 30 November 2017 11:31
To: Barmanroy, Jackie; Devine, Sandra
Cc: Green, Rachel (NHSmail)
Subject: RE: Ward 4B

Dear Jackie and Sandra,

Based on my assessment of risk on the ward and the need to have an HAISCRIBE signed off, I will call a meeting to discuss current and future work on the ward to include Melanie, Myra, David Brattey and Haematology clinician.

Will Calum be able to facilitate this ?

Regards,

Christine

Dr Christine Peters
Consultant Microbiologist
Queen Elizabeth University Hospital,
GGC
Ex [redacted]
Mobile: [redacted]

From: Barmanroy, Jackie
Sent: 30 November 2017 10:56
To: Peters, Christine; Devine, Sandra
Subject: Ward 4B

Good morning,

Thank you for the phone call this morning Christine. I have listened to your concerns and discussed with Sandra.
IPCT are happy to attend any meeting and walk round at the request of the haem-onc service.

Regards,

Jackie.

Jackie Barmanroy
Senior Nurse Infection Control
New Office Accomodation Block
Queen Elizabeth University Hospital
Tel: [redacted].

From: Leanne Hamilton (NHS Healthcare Improvement Scotland) on behalf of Susan Lovatt (NHS Healthcare Improvement Scotland)
Sent: 10 September 2024 12:56
To: Leanne Hamilton (NHS Healthcare Improvement Scotland)
Subject: FW: Queen Elizabeth University Hospital Glasgow
Attachments: 20200121 NHS GGC close letter 1.0.pdf

From: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: Tuesday, January 21, 2020 11:07 AM
To: Ian.Smith[redacted]
Cc: LOVATT, Susan (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

Ian

Letter for GGC attached for information
Leanne

From: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND)
Sent: 20 January 2020 09:26
To: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Cc: LOVATT, Susan (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

Thanks Ian – out of the office today but we'll get a letter out to GGC tomorrow
Leanne

From: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: 17 January 2020 13:39
To: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Cc: LOVATT, Susan (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

Hi, I think this looks fine, I would suggest we can close

Ian Smith
Head of Quality of Care
Quality Assurance Directorate
Healthcare Improvement Scotland
Tel: [redacted]
Mobile: [redacted]
Email: [redacted]

From: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: 16 January 2020 07:35
To: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Cc: LOVATT, Susan (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

Hi Ian

We have received a response from NHS GGC re the ventilation issue – the concerns were:

- the ventilation in the infectious diseases unit, ward 5C and 5D is not suitable for the type of patients cared for in these wards
- there is no specialised ventilation systems in ward 5C and 5D and this puts immunocompromised patients at risk
- the mechanical supply ventilation in ward 5C and 5D is not adequate as it fails to maintain a positive pressure in order to prevent the ingress of less clean air.

We asked them:

1. Are you aware of the concerns and if so how have you responded?
2. How are you assured that the ventilation system within the infectious diseases unit (Ward 5C and 5D) is adequate and that appropriate pressure is maintained?
3. Have there been any identified patient care issues as a consequence of poor ventilation within ward 5C/5D within the last 12 months, and how have these been responded to?

They cover letter provides a response to each of these questions. It confirms they were made aware of such concerns in December 2018 and outlines how they responded with the 2 reports provided as evidence of the work undertaken. They state they are satisfied air pressure in the rooms has been maintained (though they don't say how they are assured of this/how this is monitored on an ongoing basis). They also note patients with possible or confirmed highly infectious disease are only admitted with the agreement of an Infectious Diseases Consultant, in line with national guidance, to the negative pressure isolation rooms in the Medical High Dependency Unity. Therefore high risk patients in this category are not admitted to Wards 5C or 5D.

Grateful for thoughts on where we go next. You'll remember we agreed (after you spoke to Ann/Robbie) not to put this one round the RTC given the nature of the concerns and all the work going on in QEUH around this, but still to follow the RTC process methodology.

Thanks Ian
Leanne

From: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: 06 January 2020 15:00
To: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

Yes, happy for letter to go

Ian Smith
Head of Quality of Care
Quality Assurance Directorate
Healthcare Improvement Scotland
Tel: [redacted]
Mobile: [redacted]
Email: [redacted]

From: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: 06 January 2020 14:52
To: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

I did wonder about including this question. I can rephrase as suggested. You think it's good to go apart from that?

From: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: 06 January 2020 14:50
To: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

1. Have there been any reports of hospital acquired infections within ward 5C and ward 5D within the last 12 months, and how have these been responded to?
Hi, need to be careful about the above para, not all infections are caused by the ventilation system. Might be better to say any identified patient care issues as a consequence of poor ventilation

Ian Smith
Head of Quality of Care
Quality Assurance Directorate
Healthcare Improvement Scotland
Tel: [redacted]
Mobile: [redacted]
Email: [redacted]

From: HAMILTON, Leanne (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: 06 January 2020 14:43
To: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: RE: Queen Elizabeth University Hospital Glasgow

Ian

Draft letter for GGC attached. Can you have a look please?
Thanks
Leanne

From: Respondingtoconcerns (NHS HEALTHCARE IMPROVEMENT SCOTLAND)
Sent: 06 January 2020 11:46
To: SMITH, Ian (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: FW: Queen Elizabeth University Hospital Glasgow

Email below as requested.

From: Ihcregulation (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Sent: 06 January 2020 09:45
To: Respondingtoconcerns (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: FW: Queen Elizabeth University Hospital Glasgow

Hi both

Please find below a email from a staff member at Queen Elizabeth University Hospital, Glasgow.

Thanks
Natalie

From: [redacted]
Sent: 29 December 2019 15:19
To: Ihcregulation (NHS HEALTHCARE IMPROVEMENT SCOTLAND) [redacted]
Subject: Queen Elizabeth University Hospital Glasgow

Hello,

I am a nurse working in the Queen Elizabeth University Hospital in Glasgow.

There is many ongoing concerns about infection control at this hospital.

One issue that has not been addressed is regarding the infectious diseases unit, ward 5C and 5D.

I feel the ventilation is not suitable for the type of patients cared for in these wards. There is nothing unique about this ward being an infectious diseases 'unit'.

On a daily basis there is patients with compromised immunity. From cancer patients from the Beatson, to patients with advanced HIV.

I believe there is a risk of infection due to the ventilation in these wards. I believe there should be enhanced ventilation in these wards due to there always being immunocompromised patients in these wards since the building opened in 2015.

Please can you investigate this as a matter of urgency, I believe there is an ongoing risk to patients lives.

I believe from some reading that the Department of Health (The Health Act 2006), advises that for the prevention and control of healthcare associated infections, NHS bodies must plan and implement how they can prevent and control healthcare-associated infections. I believe that managers of the Queen Elizabeth University Hospital Glasgow are failing to provide a clean environment and where the risk of healthcare- associated infections is kept as low as possible. I fear that there is no specialised ventilation systems in ward 5C and 5D and this puts immunocompromised patients at risk.

I believe that the mechanical supply ventilation in ward 5C and 5D are not adequate as it fails to maintain a positive pressure in order to prevent the ingress of less clean air.

Please investigate this as a matter of urgency.

I believe there should be a historical investigation to determine how many patients have contracied hospital aquired infections within ward 5C and ward 5D, and there should be an investigation to determine for any patients who have passed away in these wards since the opening of the building, if these hospital aquired infections played a part in their deaths.

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Jane Grant
Chief Executive
NHS Greater Glasgow and Clyde

Gyle Square Office
Date: 21 January 2020
Enquiries to: leanne.hamilton[redacted]

Dear Ms Grant

NHS GGC, QEUH, Infectious Diseases Unit

Thank you for your correspondence of 15 January 2020, in which you provided information in relation to the potential concerns about the ventilation within Ward 5 and Ward 6 at the Queen Elizabeth University Hospital.

On review of the information provided, it is clear that there has been concerted action taken to address the concerns, which were originally raised in December 2018 and we note the two reports provided as evidence of the work undertaken. We note you are satisfied that air pressure in the rooms has been maintained.

We also acknowledge that patients with possible or confirmed highly infectious disease are only admitted with the agreement of an Infectious Diseases Consultant, in line with national guidance, to the negative pressure isolation rooms in the Medical High Dependency Unity. Therefore high risk patients in this category are not admitted to Wards 5C or 5D.

We are therefore satisfied that no further assessment of this matter is required by Healthcare Improvement Scotland at this time. We will notify the complainant of our decision.

I would like to take this opportunity to thank you for your support with this matter.

Yours sincerely

I would like to take this opportunity to thank you for your support with this matter.

Yours sincerely

[redacted]
Leanne Hamilton
Senior Reviewer (job share)

[redacted]
Sue Lovatt
Senior Reviewer (job share)

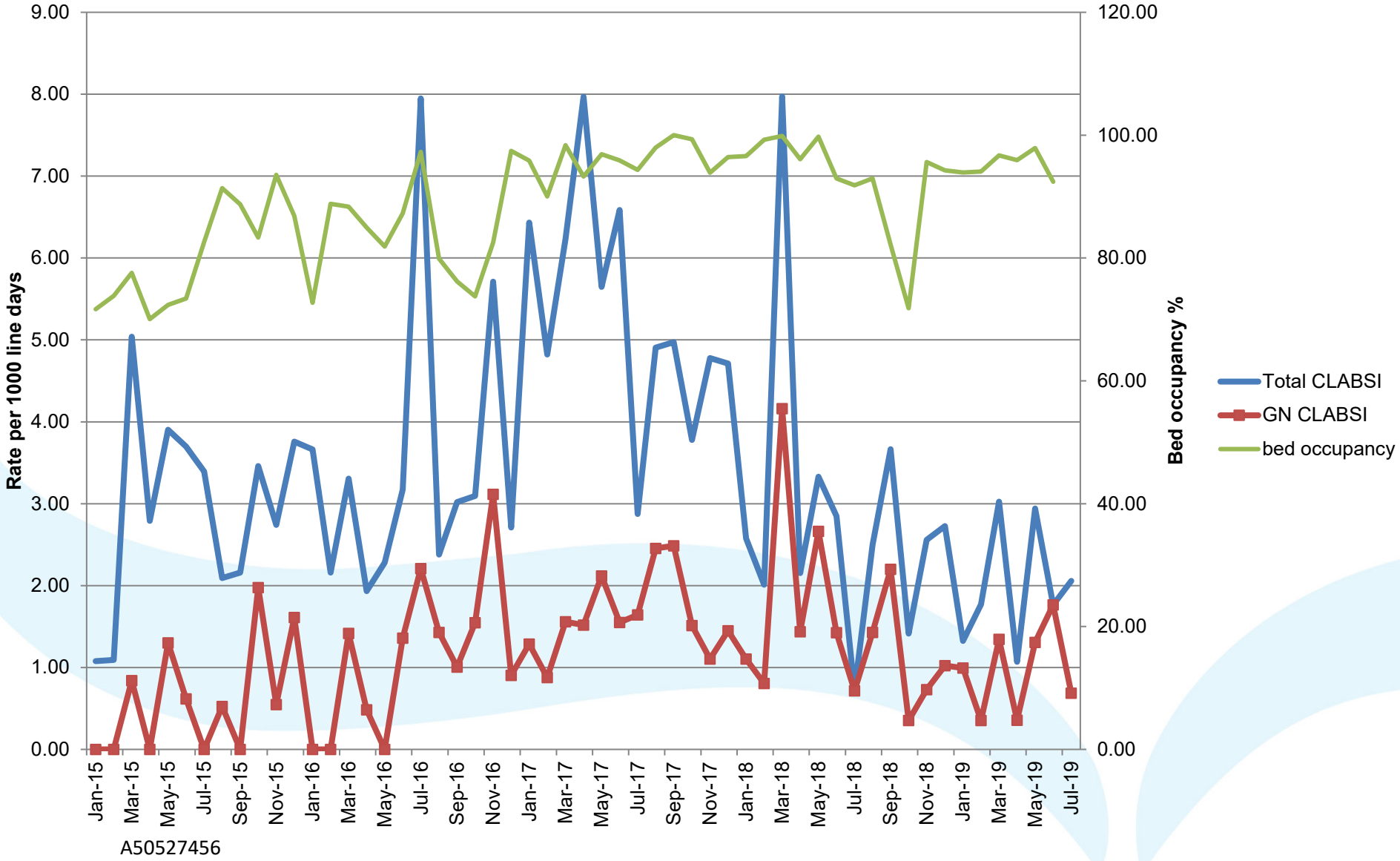
NHS SCOTLAND

Paediatric Haemato-oncolgy RHC

Summary of Data

September 2019

CLABSI rate total and gram negative only. Bed occupancy on secondry axis



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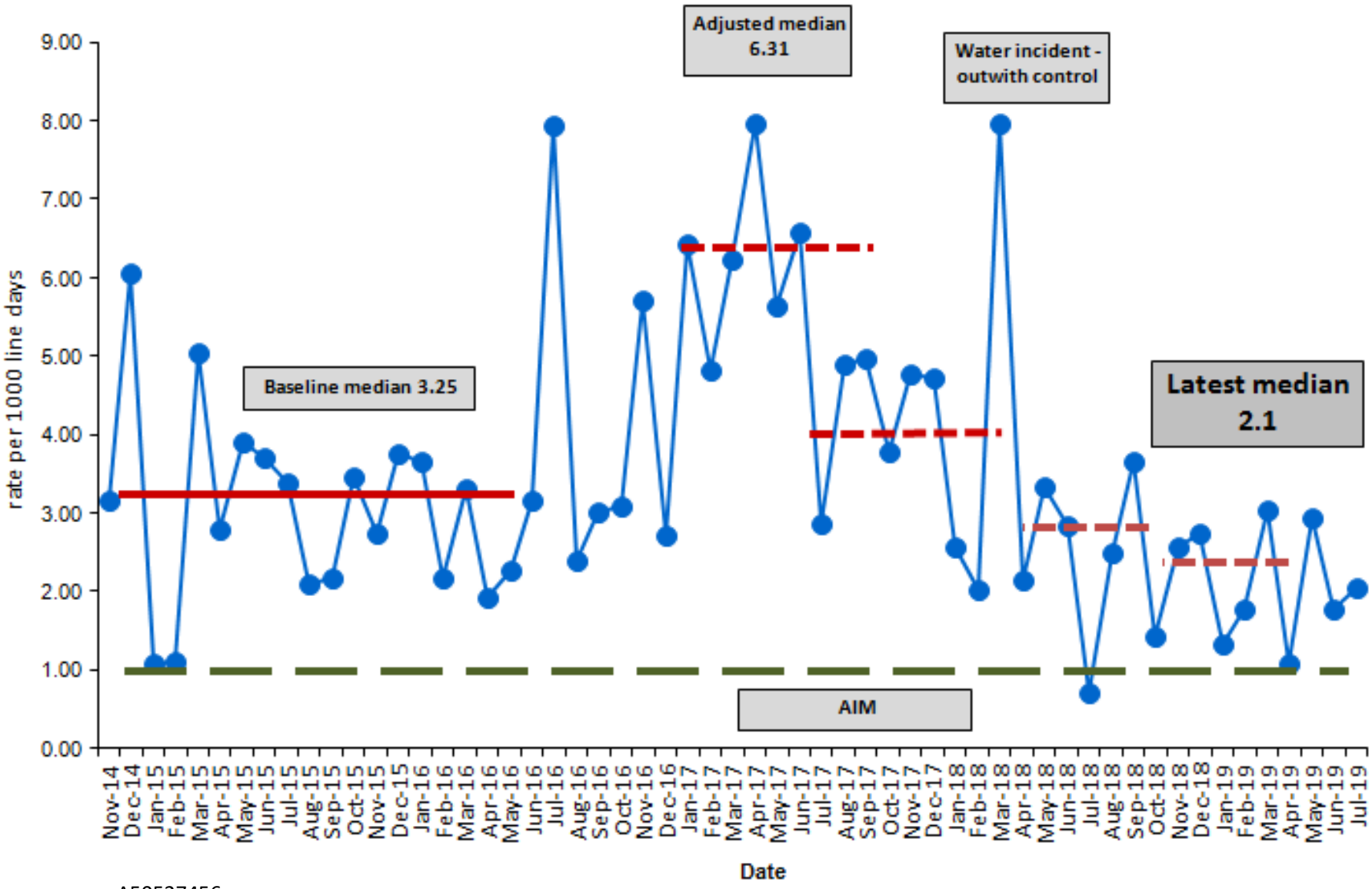
Rate of central line associated blood stream infections (CLABSI) per 1000 central line days

(Updated to 31 July 2019)



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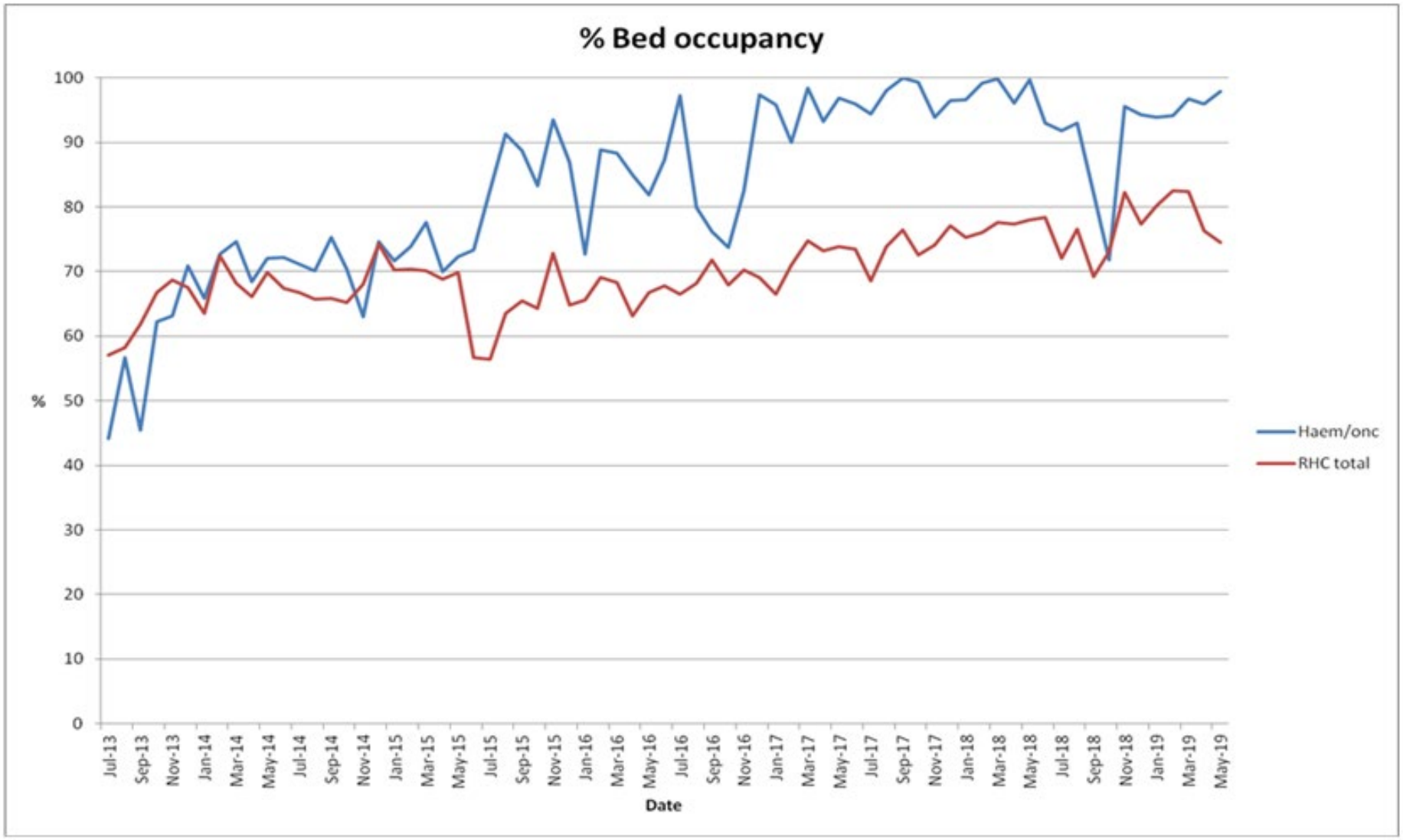
% Bed occupancy
100
90
80
70
60
50
40
30
20
10
0
%
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Jul-14
Sep-14
Nov-14
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Mar-15
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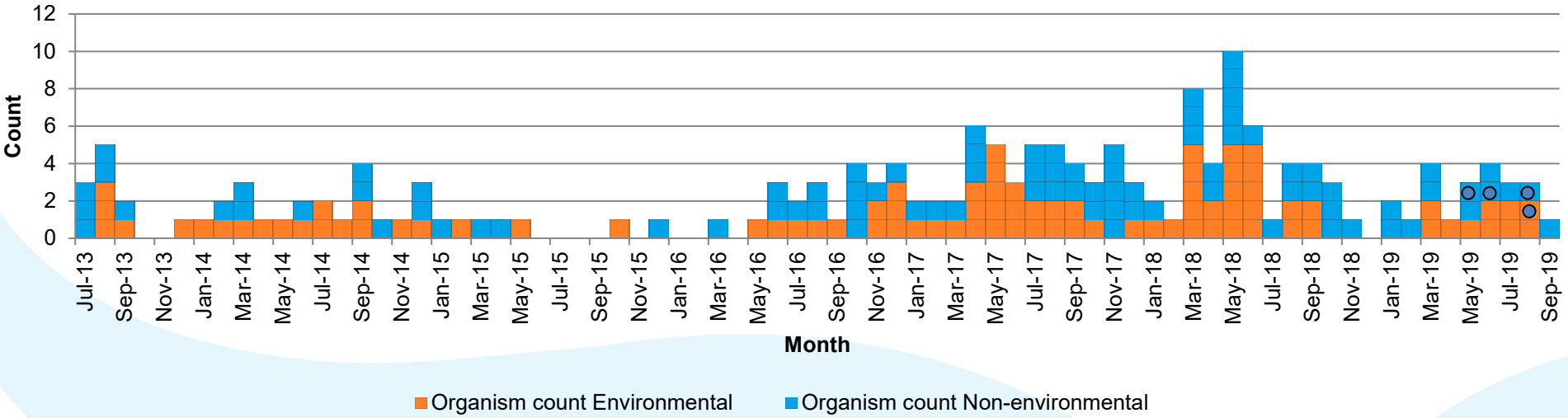
May-18
Jul-18
Sep-18
Nov-18
Jan-19
Mar-19
May-19
Date
Haem/onc
RHC total

Epi Curve data

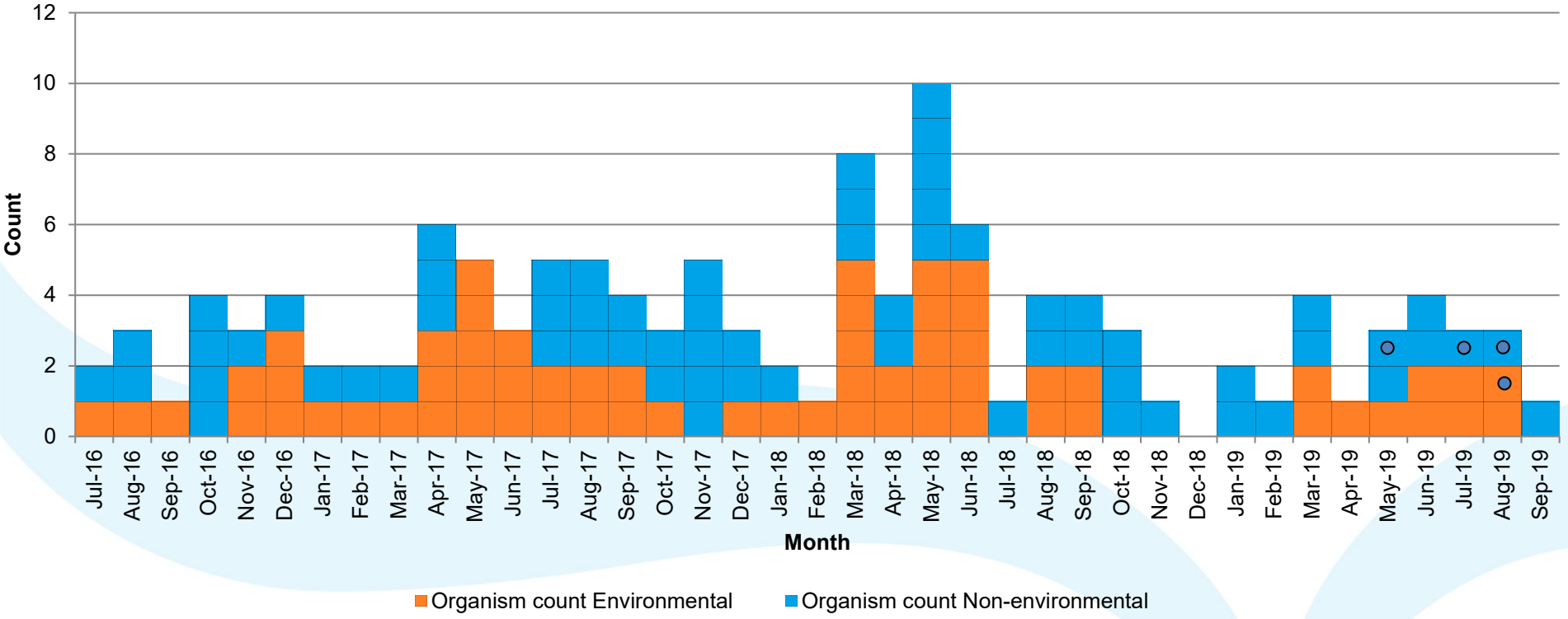
Epi curve of selected gram negative isolates from blood cultures processed at QEUH lab from paediatric haemotology/oncology patients



1 count per patient per species in 14 day period

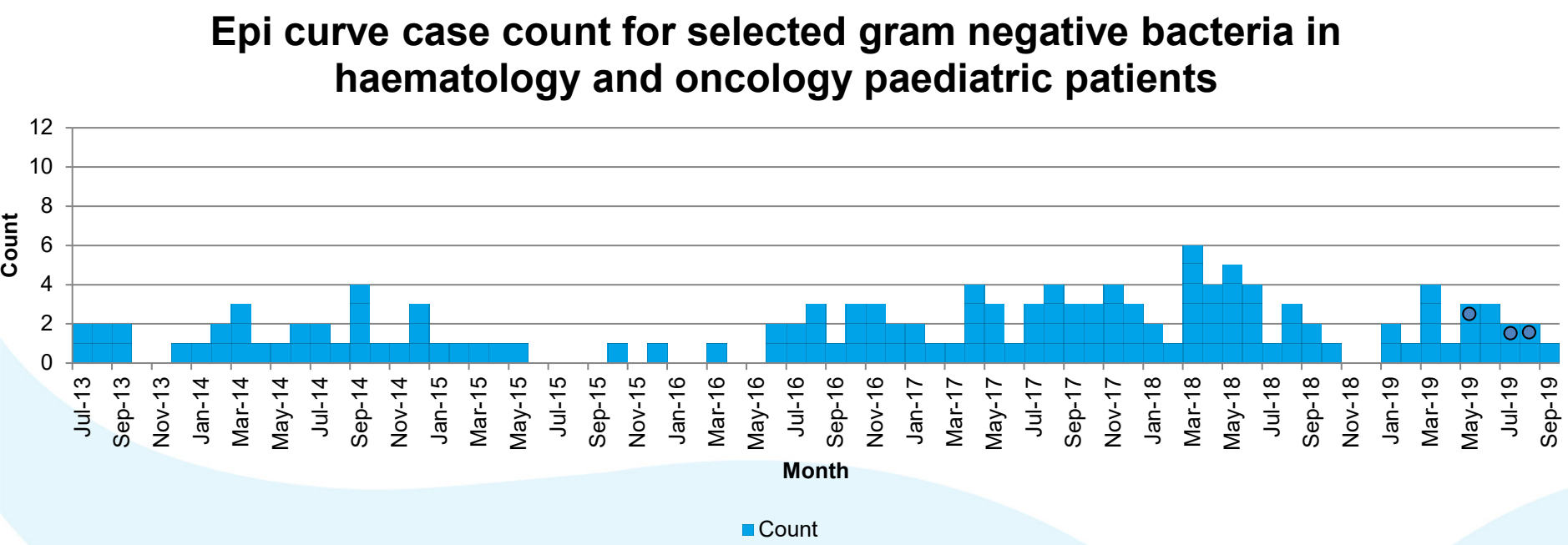
Epi Curve data

Epi curve of selected gram negative isolates from blood cultures processed at QEUH lab from paediatric haemotology/oncology patients



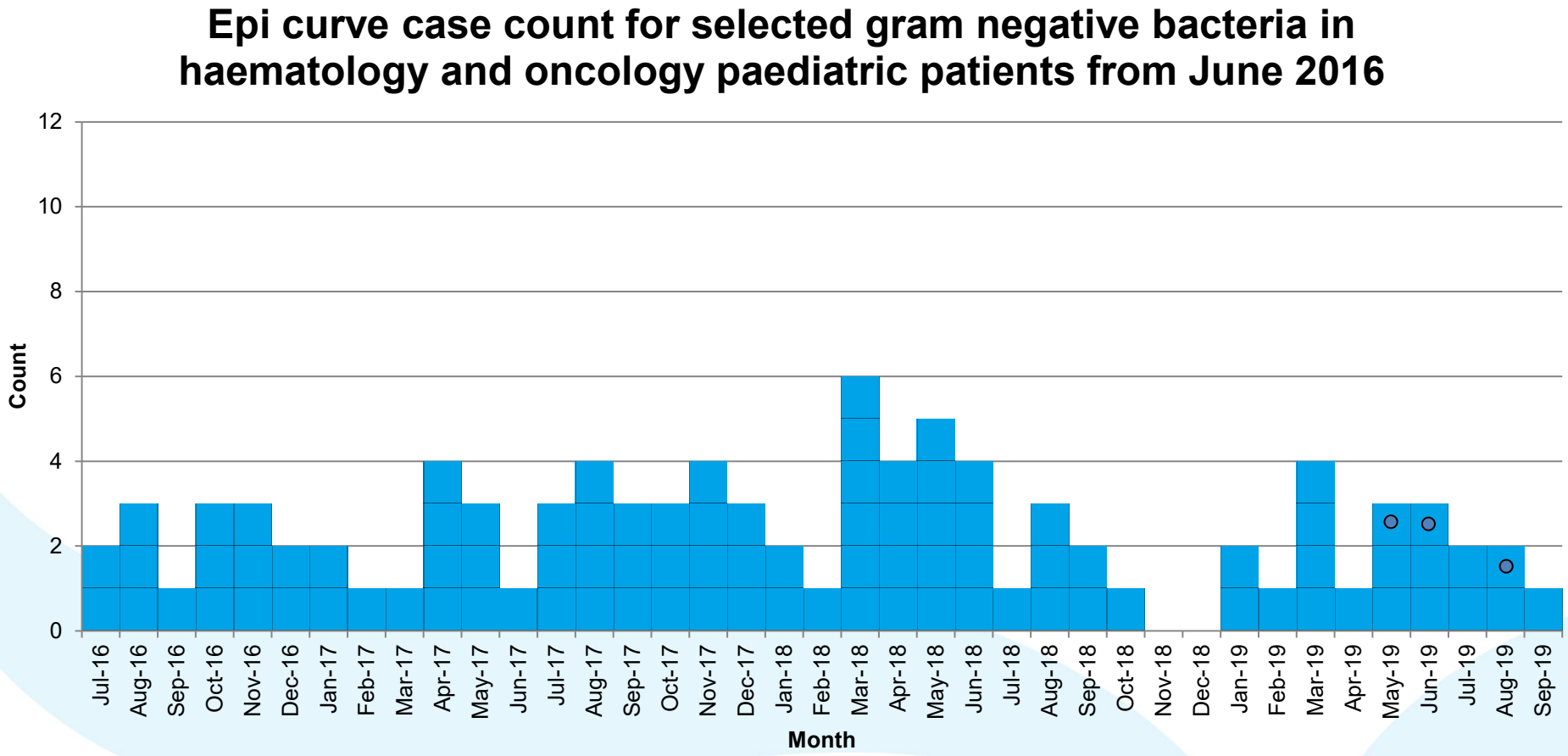
1 count per patient per species in 14 day period

Epi Curve data



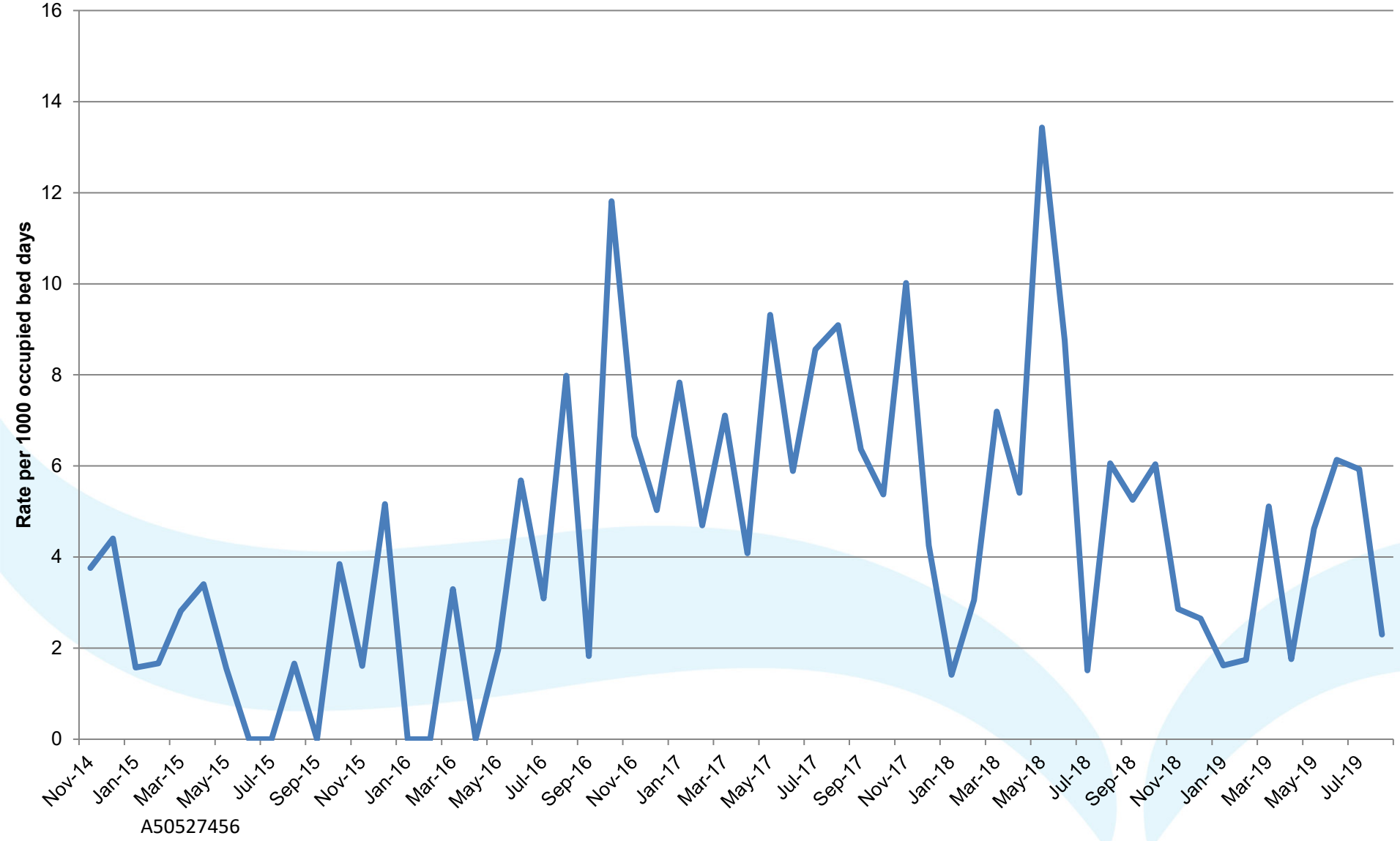
1 count per patient in 14 day period

Epi Curve data



1 count per patient in 14 day period

Crude rate of all gram negative blood cultures from RHSC Scheillion, RHSC DCU, and RHC ward 2A/B, Ward 6A



A50527456

Counts by organism

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20 *
Klebsiella pneumonia	3	4	1	7	12	3	-
Enterobacter cloacae	2	2	-	1	12	9	2
Stenotrophomonas	2	1	1	4	10	5	1
Pseudomonas aerugenosa	2	1	-	1	5	2	-
Klebsiella oxytoca	2	-	2	3	2	1	-
Acinetobacter spp	-	2	-	4	3	-	-
Elizabethkingia spp	2	1	-	4	1	-	1
Chryseobacterium spp	1	1	-	2	1	1	1
Pseudomonas putida	1	-	1	2	2	2	-
Serratia marcescens	2	1	1	1	-	1	1
Citrobacter spp	-	-	-	2	1	2	-
Pantoea species	1	1	-	1	1	-	1
Burkholderia cepacia	-	2	-	1	1	-	-
Rhizobium radiobacter	2	-	-	1	-	-	-
Aeromonas hydrophila	1	-	1	-	-	-	1
Enterobacter hormaechie	-	-	-	-	1	1	-
Cupriavidus pauculus	-	-	-	-	2	-	-

From: T Wafer
To: teresa.inkster[redacted]
Cc: MCLAUGHLAN, Edward (NHS NATIONAL SERVICES SCOTLAND); alan.gallacher[redacted]; STORRAR, Ian (NHS NATIONAL SERVICES SCOTLAND); Powrie Ian (NHS GREATER GLASGOW & CLYDE); Connelly Karen (NHS GREATER GLASGOW & CLYDE); Kennedy Iain (NHS GREATER GLASGOW & CLYDE); Kane Maryanne (NHS GREATER GLASGOW & CLYDE); Purdon Colin (NHS GREATER GLASGOW & CLYDE); Mcneil Elaine (NHS GREATER GLASGOW & CLYDE); RANKIN, Annette (NHS NATIONAL SERVICES SCOTLAND); Wilson, Andy; John.Hood[redacted]; MAREK, Aleksandra (NHS GREATER GLASGOW & CLYDE); Facilities Meeting Hub; Siebelt Christine (NHS GREATER GLASGOW & CLYDE); denniskelly[redacted]; Tom Makin; Tim Wafer; Leiper, Jim; Allyson.Hirst[redacted]; Dodd Susan (NHS GREATER GLASGOW & CLYDE)
Subject: Re: filter failures
Date: 28 September 2018 15:58:43

Good afternoon

Have had lengthy discussion with Teresa and have some suggestions that we will follow through at next weeks meeting.

We have seen POU failure issues before, but upon detailed examination have determined that the contamination came via the outlet point and not through the filter.

All that being said we need to identify quick and accurate testing methodology which we can utilise on-site and will investigate over week-end .... something out of the food industry perhaps.

It would be good to get a failed filter and have it independently inspected. Thinking of electron microscopy of each side of the filter element. Can organise through our laboratory services if required.

Perhaps we need to consider a different filter design to mitigate potential for external contamination.

There will be plenty to discuss.

Cheers
Tim

Sent from my iPhone
Tim Wafer
Authorising Engineer - Water Hygiene
The Water Solutions Group
Email: [redacted]
Web: watersolutionsgroup.org.uk

On 28 Sep 2018, at 15:19, Inkster, Teresa [redacted] wrote:

> Dear all
> I have just received the fungal culture results. These indicate 3 further filter failures which is very concerning as this is now 4 out of 30 failures in ward 2A/B. We need an urgent review of these filters and need to discuss with PALL. Lab contamination is possible but perhaps would be more widespread. Patients have just moved into 6A with filters recently placed. We need to discuss at the water meeting on Tuesday the need for a regular testing programme . There have been no patients recently with fungal infections and patients are on antifungal prophylaxis due to the cladding work risks. Given the extent of the contamination in our system we need an expert opinion as to whether these filters are clogging up and whether we should be changing them sooner .
> Locations are ; dirty utility tap, Ensuite tap in room 5,ensuite shower in room 5
> Kind regards
> Teresa
> Dr Teresa Inkster

Lead Infection Control Doctor NHSGGC
Training Programe Director, Medical Microbiology
Dept of Microbiology
Queen Elizabeth University Hospital
Glasgow
[redacted]

From: Powrie, Ian
Sent: 12 July 2018 08:42
To: Hirst, Allyson
Subject: FW: [BlockedURL][ExternaltoGGC]Additional Information in respect of Chlorine dioxide used on water systems within Renal Environments.
Attachments: Activated carbon and chlorine dioxide and by-product removal copy.pdf

---

From: Tim Wafer [redacted]
Sent: 11 July 2018 10:56
To: Powrie, Ian
Cc: Wafer Tim
Subject: [BlockedURL][ExternaltoGGC]Additional Information in respect of Chlorine dioxide used on water systems within Renal Environments.

Hi

Following our recent conversation i can confirm that Constant dosing of Chlorine dioxide is widely used within the treatment of Cold water Supplies within the Healthcare environment.

Renal treatments area are always subject to review and covered under a stand-alone risk assessment which is normally completed by ourselves.

Within many of our client sites that utilise Chlorine dioxide they ensure compliance with renal requirements by employing both PRE renal plant and POST treatment monitoring. There are tight set-points with a set of operating parameters based on the monitor outputs. Indeed, some have insulated a warning beacon to alert the Renal Unit in the event of a deviance from normal control parameters.

Examples of such sites are: -

The Leeds Teaching Hospitals NHS Trust
City Hospitals Sunderland NHS Foundation Trust
United Lincolnshire Hospitals NHS Trust
Mid Yorkshire Hospitals NHS Trust
Sheffield Teaching Hospitals NHS Trust
Leicester Hospitals NHS Trust

As part of this project we will be liaising with the Renal team to discuss specific criteria and bring together the necessary risk assessment and standard operational procedures documentation.

Regards

T Wafer FRSPH; MIHEEM
Technical & Compliance Director
Authorising Engineer - Water & Chlorine dioxide

The Water Solutions Group
5 Arena Park
Scarcroft
Leeds
LS17 9BF

Tel: [redacted]

Email: [redacted]

Web: BLOCKEDwatersolutionsgroup[.]org[.]ukBLOCKED

Bundle of documents for Oral hearings commencing from 19 August 2024 in relation to the Queen Elizabeth University Hospital and the Royal Hospital for Children, Glasgow

Bundle 27 – Miscellaneous Documents

Volume 13

A50527456