

Report Title	Nosocomial Infection (Hospital Acquired COVID-19) wave 2		
Sponsoring Executive	Dr David Carruthers, Medical Director		
Report Author	Dr Chizo Agwu, Trust Mortality lead/Deputy Medical Director Julie Booth Lead Nurse Infection Prevention and Control.		
Meeting	Trust Board	Date	7 th October 2021

1. Suggested discussion points <i>[two or three issues you consider the Trust Board should focus on]</i>
<p>In this paper we focus on hospital acquired COVID-19 infections (Nosocomial infection) in wave 2; rates of infection, patient demographics and risk factors for poor outcome are reviewed. In wave two, 11.2% of all cases of COVID were hospital acquired (definite and probable categories). Mortality in this group was 21.5%. It is not possible to say whether the deaths were caused by COVID or health issues related to their original admission.</p> <p>Comparisons are made with wave 1 SWBH data as well as national data for wave 1 which show rates of upto 25% for hospital acquired COVID and published mortality rates of between 27 and 40% for nosocomial disease.</p> <p>The steps put in place to limit the risk of nosocomial infection are reported here also. Actions taken to limit outbreaks and any lessons learnt as the pandemic progressed are highlighted. This is important as we prepare for potential further waves in COVID infection, as well as managing current infection rates, to minimise risk to patients and staff.</p>

2. Alignment to our Vision <i>[indicate with an 'X' which Strategic Objective this paper supports]</i>						
<table border="1" style="width: 100%;"> <tr> <th style="width: 33%;">Our Patients</th> <th style="width: 33%;">Our People</th> <th style="width: 33%;">Our Population</th> </tr> <tr> <td>To be good or outstanding in everything that we do</td> <td>To cultivate and sustain happy, productive and engaged staff</td> <td>To work seamlessly with our partners to improve lives</td> </tr> </table>	Our Patients	Our People	Our Population	To be good or outstanding in everything that we do	To cultivate and sustain happy, productive and engaged staff	To work seamlessly with our partners to improve lives
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3. Previous consideration <i>[where has this paper been previously discussed?]</i>
Q+S Committee August 2021

4. Recommendation(s)
The Quality and Safety Committee is asked to:
a. NOTE rates of Nosocomial infection by hospital site and impact on various groups
b. DISCUSS potential factors that affected rates of nosocomial infection
c. DISCUSS management of outbreaks and lessons learnt

5. Impact <i>[indicate with an 'X' which governance initiatives this matter relates to and where shown elaborate]</i>					
Trust Risk Register	x	Multiple Covid related risks			
Board Assurance Framework					
Equality Impact Assessment	Is this required?	Y	N	x	If 'Y' date completed
Quality Impact Assessment	Is this required?	Y	N	x	If 'Y' date completed

SANDWELL AND WEST BIRMINGHAM HOSPITALS NHS TRUST

Report to the Public Trust Board: 7th October 2021

Nosocomial Infection (Hospital Acquired COVID-19) - wave 2

1. Introduction

1.1 Reducing acquisition of COVID infection in a hospital setting involves multiple factors and steps to be taken to minimise the risk. Community rates, non-COVID admissions, PCR testing, PPE usage, social distancing and the ward environments all play a role. The presence of asymptomatic carriage in patients and availability of ward space to isolate patients have a big impact.

1.2 The COVID pandemic started in UK in March 2020. Here we report our in patient data. There have been 2 waves;

1.2.1 Wave 1 is defined as occurring between March 2020-May 2020

- 1009 patients who were COVID-19 Positive in SWBH, of which 31.8% died

1.2.2 Wave 2 is defined as September 2020-April 2021.

- 4,744 patients were COVID-19 positive in SWBH, 16.1% (767) died.

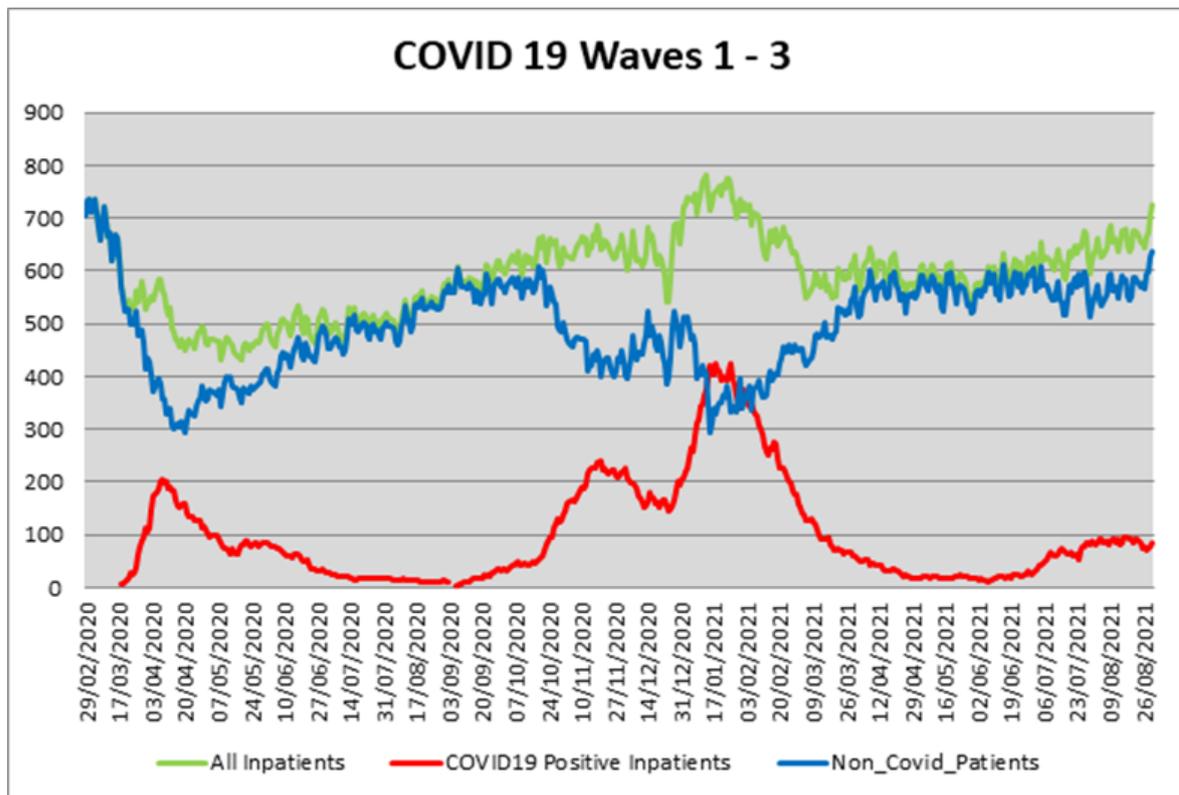
1.3 In this paper we focus on **hospital acquired COVID-19 infections (Nosocomial infection) in wave 2**; rates of infection, factors implicated in the rates and actions taken to limit and reduce rates and any lessons learnt as the pandemic progressed.

1.3.1 It should be noted that there was a high community prevalence rate and a National increase in COVID-19 cases during this period of time. The Trust had a high number of cases, with high acuity which impacted on the bed capacity across the organisation.

1.3.2 The number of non-COVID acute admissions remained high as well in wave 2 in comparison to wave 1. (Graph 1)

1.3.3 Additional bed capacity was opened and routine surgical work halted for a period of time to create additional bed capacity, staffing availability and for patient safety reasons

1.4 From this review we will consider the changes put in place to minimise the risk of Hospital Acquire COVID and identify important learning points for future care. We also consider how future changes in our estate and infection control processes will further mitigate the risk.



Graph 1 – rates of staff infection alongside number of hospital cases with COVID-19

2 Definitions:

2.1 Standard definitions for Hospital Acquired COVID were produced and are referred to throughout this report: (Table 1)

- **Community acquired infection:** a positive specimen date 0-2 days after hospital admission
- **Indeterminate Acquired infection:** a positive specimen date 3-7 days after hospital admission
- **Hospital-Onset Probable Healthcare Associated (HoPHA)–** a positive specimen date 8-14 days after hospital admission
- **Hospital-Onset Definite Healthcare Associated) (HoDHA) –** a positive specimen date 15 or more days after hospital admission

	Community		Indeterminate					Probable (HoPHA)					Definite (HoDHA)		
Day of admission	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15 +

Table 1 – definitions of COVID infection by day of admission

2.2 Hospital Acquired COVID Data for wave 2

2.2.1 11.2% of all COVID cases were HACq during wave 2

- 6.7% of all COVID 19 cases (319/4744 pts) had Hospital-Onset Probable COVID (HoPHA) infection.
- 4.5% of all COVID 19 cases (215/4744 pts) had Hospital-Onset Definite COVID (HoDHA) infection.

2.2.2 21.5% of those patients with HACq died during wave 2

- 22.8% (73 of 319 patients) with HoPHA died
- 19.5% (42 of 215 patients) with HoDHA died

It is not possible to say whether the death of cases that were either HACq or community acquired was directly COVID related or due to another healthcare issue.

2.2.3 14.9% (115 of 767 patients) of all those that died in the 2nd wave had either HoPHA or HoDHA. (see table 2)

Acquired	No. Covid-19 cases (%total cases)	No. Covid-19 Deaths (% mortality in each group)	COVID-19 deaths in each group as % of total deaths
Community	3738 (79%)	544 (14.5%)	71.0%
Indeterminate	472 (10%)	108 (22.8%)	14.1%
Probable Hospital Onset	319 (6.7%)	73 (22.8%)	9.5%
Definite Hospital Onset	215 (4.5%)	42 (19.5%)	5.4%
Grand Total	4744	767 (16.2%)	

Table 2- COVID cases by source of infection

2.3 Comparison with a cohort of patients from wave 1 data from SWBH:

- 2.3.1** HACq COVID (HoPHA + HoDHA) from wave 1 was 97 out of 999 COVID cases (9.7%). (11.2% in wave 2)
- 2.3.2** Mortality from HACq COVID in wave 1 was 43% (42/97 cases) (21.5% in wave 2)
- 2.3.3** 42 out of 293 deaths (14%) from wave 1 were from HoPHA + HoDHA (14.9% in wave 2)

2.4 Summary of Nosocomial COVID data:

- 2.4.1** The total number of HACq cases in wave 2 was greater than wave 1 while the % of deaths in each wave that were HACq were the same. However the mortality of HACq cases in wave 2 was less than that in wave 1. This is on the background of a higher peak number of in-patient cases in wave 2 (440) v wave 1 (200), but also with a significantly higher number of non-COVID patients in wave 2 requiring hospital care. (graph 1)

2.4.2 Annex 1 shows comparative data from the literature, though direct comparison is difficult, SWBH experience is similar to that reported elsewhere for wave 1, though data for wave 2 is less available.

- infection rates of 20-25% for hospital acquired COVID and mortality rates between 27 and 40% have been reported, with SWBH data comparing favourably to these data sets

2.4.3 The demographics of the patient population is important to consider both from a perspective of community and HACq COVID cases to understand any differences seen in mortality between the groups as shown in table 2. We know that age and the presence of multiple comorbidities are important determinants of outcome of COVID from our previous outcome reviews.

3 Patient Demographics for wave 2

3.1. Age, Gender and ethnicity

- **A greater number of male patients died** in community, indeterminant and probable HACq disease, but the reverse was seen in the gender ratio for definite HACq disease, but numbers are small for this group (Tables 3 and 4).
- Patients aged >65 made up 52.8% of all COVID-19 admissions and 82.7% of all deaths.
- **Mean age of patients was greater** when comparing HACq (HoPHA + HoDHA) v Community/indeterminant disease for both surviving and deceased patients.
- For each group based on place of COVID acquisition, **those patients who died were older than survivors** for each group. Difference was greatest for the HoDHA group (81 years v 73 years for deceased v survivors)
- There was **no clear trend in ethnicity** patterns between deceased and survivors for all places of COVID acquisition. The % of patients with HoPHA and HoDHA was greatest for white patients, perhaps reflecting their older age group. However the high number of patients where ethnicity is not known makes detailed analysis difficult.

Survivors	Total cases	Gender	Age (yrs)	Ethnicity total no(%)				
				M/F	M/F	Asian	Black	Mixed
Community	3194	1678/1516	58/59	775(24)	293(9)	125(4)	979(31)	954(30)
Indeterminant	289	137/152	67/70	43(15)	18(6)	12(4)	140(48)	81(28)
Probable	246	120/126	73/77	22(9)	14(6)	12(5)	129(52)	69(28)
Definite	172	85/87	70/76	14(8)	6(3)	14(8)	102(59)	37(22)

Table 3: COVID wave 2 surviving patients based on place of COVID acquisition

Deceased	Total	Gender	Age (yrs)	Ethnicity total no (%)				
				M/F	M/F	Asian	Black	Mixed
Community	544	303/241	75/78	117(22)	49(9)	29 (5)	192(35)	158(29)
Indeterminant	108	62/46	74/83	11(10)	6(6)	5(5)	59(55)	27(25)
Probable	73	44/29	78/80	4(5)	3(4)	4(5)	34(47)	28(38)
Definite	42	18/24	81/82	2(5)	2(5)	0(0)	26(62)	12(29)

Table 4: COVID wave 2 deceased patients based on place of COVID acquisition

3.4. Deprivation index: The majority of patients admitted and subsequently dying of COVID-19 were from the lowest socio-economic class.

- 68.4% (3249/4744) of all patients admitted were from the lowest 2 deprivation index deciles. They also made up 71.9% of all deaths and 71.4% (30/42) of all deaths in those with HoDHA.

3.5 Co-morbidities

The Charlson comorbidity Index (measure of comorbidity and risk of death – scores mild: 1-2, moderate: 3-4, severe: >5) **was higher in those with Hospital Acquired disease (HoPHA + HoDHA)** than those with community disease for both survivor and deceased patients. In addition, the index was higher in those who died compared with survivors where ever infection was acquired (table 5+6).

	Survivor	Deceased
Community/Indeterminant	4.4	6.2
Hosp Acq (HoPHA + HoDHA)	5.8	7.2

Table 5: Charlson Comorbidity index score based on place and outcome of COVID

	Total COVID deaths	HoDHA deaths
Hypertension	553/767 (72%)	30/42 (71.4%)
Diabetes	369/767 (48%)	19/42 (45%)
Chronic kidney disease	253/767 (32.9%)	12/42 (28.5%)

Table 6: Common comorbidities in those cases who died in community and HoDHA COVID

Immunosuppressed:

- Only 9 patients with either leukaemia/lymphoma or solid tumours were admitted with COVID-19 infection, none of whom died.
- HIV: Of the 16 patients with HIV and HoDHA, 2 died.
- Learning Disability: 2.2% of those that died of COVID-19 had learning disability. None died of HoDHA

3.6 Summary: Overall the profile of patients that died of nosocomial infection was similar to the profile of those that died of community acquired infections with the following exceptions.

- The older population was more at risk of acquiring and dying from nosocomial disease.
- Patients aged >65yrs, those from low socioeconomic class and a higher Charlson co-morbidity index appeared to have the highest risk of death for both nosocomial and community acquired disease.
- Co-morbidities with high mortality rates include those with hypertension, CKD and diabetes
- Rates of nosocomial infection amongst immunosuppressed patients were low suggesting that all the preventative measures to shield this group of patients worked.

4 Processes to reduce the risk of Nosocomial infection

4.1 Nosocomial infection may be as a single case or part of an outbreak and in the next section we consider the approach in SWBH to minimise the risk of Nosocomial infection, in response to local circumstances and national IPC guidance.

4.2 The approach to **management of outbreaks** and processes to minimise the risks of Nosocomial infection are outlined in the sections that follow.

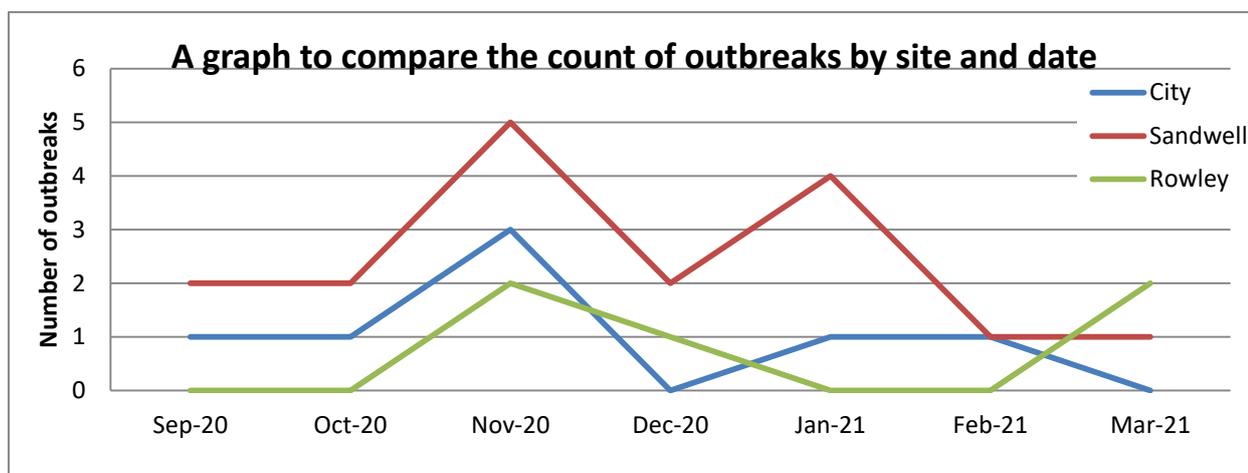
4.2.1 Definition:

An Outbreak is said to have occurred when two or more test-confirmed or clinically suspected cases of COVID-19 among individuals (for example patients, health care workers, other hospital staff and regular visitors, for example volunteers and chaplains) associated with a specific setting (for example bay, ward or shared space), where at least one case (if a patient) has been identified as having illness onset after 8 days of admission to hospital.

4.2.2 SWBH position

- Graph 2 represents the total number of outbreaks that occurred between September 2020 and March 2021. It is worth comparing with the total number of COVID cases illustrated by graph 1, showing the total case number at SWBH of COVID cases.
- Tables 7 and 8 represent the total number by site and table 9 the total number by ward area.
- The data demonstrates the higher number of outbreaks that we experienced at the Sandwell Hospital site. November was a particularly difficult month with a total of 10 outbreaks; this meant increased workload for all the sites as wards are closed when

there are outbreaks and contacts have to also be isolated/cohorted as there is an increased risk that they will become positive.



Graph 2– outbreaks by site/date

Site	Number of outbreaks
City	7
Sandwell	17
Rowley	5
Total	29

Table 7 – number of outbreaks per site

4.3 Tables 8 and 9 show the number of patients per site and ward affected by either community acquired or hospital acquired COVID-19 illness

- 50.2% (108/215) of all patients with HoDHA and 58.3% (186/319) of HoPHA occurred at Sandwell Site
- 19.5% (42/215) all HoDHA and (82/215) 38.1% of all HoPHA occurred at City hospital

Site/Ward	Community		Indeterminate		HoPHA		HoDHA		Total Covid	Total Covid Deaths
	Number of pts with Covid-19	Number of Covid-Deaths	Covid-19 cases	Covid-Deaths	Covid-19	Covid-19 Deaths	covid	Covid-19 Deaths		
City	1979	283	157	40	82	19	42	12	2260	354
Leasowes	5	3	1	1	1	1	3	2	10	7
Rowley	8	0	26	0	47	1	59	4	140	5
Sandwell	1746	258	281	66	186	51	108	23	2321	398
Grand	3738	544	472	108	319	73	215	42	4744	767

Total										
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Table 8 number of patients with COVID and Nosocomial COVID by hospital site

	Probable Hospital Onset		Definite Hospital Onset	
Site/Ward	Covid-19	Covid-19 Deaths	Covid-19	Covid-19 Deaths
Eliza Tinsley	26	0	33	4
McCarthy	14	0	20	0
Lyndon 2	30	9	13	1
Newton 3	27	7	15	2
Newton 4	22	6	37	10
Priory 5	34	12	16	3

Table 9 – number of cases of Nosocomial infection by ward area

4.4 Wards with highest number of patients with Definite Nosocomial infection are shown in Table 9. Newton 4 had the highest number of patients with definite Nosocomial (HoDHA) infection and related deaths, however this data needs to be interpreted with caution as deteriorating patients may be moved to other environments for their care needs and therefore the mortality related data is unclear.

Although Newton 4 which is acute Stroke ward had similar number of patients affected with nosocomial infection as Eliza Tinley which is community site, it had significantly more deaths (16 vs 4). This is more likely due to the acuity of the patients and associated co-morbidities or transfers back to other ward areas for care.

Annex 2: gives the important details of how outbreaks were managed at SWBH in line with National recommendations and local initiatives in response to infection rates

5. Key learning points and actions

We must consider the important factors related to testing, PPE, cleaning and importantly the environment that we have learnt over the last 18 months to minimise the risk of further Nosocomial infection at SWBH. The following table summarises the key learning points and actions for the future. Environmental issues will be assisted by our move to MMUH in 2022 where there is improved ventilation and an increased number of side rooms and bays with greater bed space.

Key Learning findings	What We Have Done
PPE compliance – there has been some variability in compliance, this has been influenced by how rapidly the guidance was changing	Posters at entrances to all clinical areas Information easily available on the connect page Hot spot audit development – ward measured compliance

	<p>Hand/space/messaging</p> <p>Review and improvement donning and doffing areas</p> <p>Peer challenge</p> <p>Peer review</p> <p>IPC team support to the ward areas</p>
FFP3 – fit testing and guidance	<p>Fit testing clinics extended</p> <p>Use of half face mask respirators to avoid refit testing with new masks</p>
Ventilation – Research shows that a room with fresh air can reduce the risk of infection by 70%	<p>Introduced leaving the windows open for short bursts of 10-15 minutes.</p> <p>Trialling of HEPA filters</p> <p>Ventilation risk assessment and the use of HEPA filters in outbreak situations</p> <p>Increase in the requirement for staff to wear FFP3</p>
Lack of Social Distancing during break times	<p>Risk assessment and identification of numbers allowed in the break rooms</p> <p>Staggered break times</p> <p>Social distancing measures in place in the canteen</p> <p>Extra space provided for staff</p> <p>Consistent messaging to staff</p>
Lack of consistency with cleaning methods	<p>Reintroduction of the ‘I am clean’ stickers</p> <p>Increased audit of near patient reusable equipment</p> <p>Bed space cleaning protocol developed and disseminated</p> <p>Agency staff for increased touch point cleaning</p> <p>Deep clean of COVID positive bed spaces</p> <p>Decant of wards to enable HPV cleans</p> <p>Sign off of deep cleans by senior Ward service officer/senior nurse</p>
Car sharing – unclear guidance	<p>Updated guidance in collaboration with HR available online</p>
Governance – improvements required	<p>Contact tracing improved</p> <p>Summary reports re outbreaks improved</p> <p>Triangulation of outbreak/HOCI and deaths</p>
Staff Screening	<p>Staff who are on outbreak areas are required to have a surveillance PCR test.</p> <p>Lateral flow testing</p>

6. The Trust Board is asked to:

- a. **Note rates** of Nosocomial infection by hospital site and impact on various groups
- b. **Discuss** potential factors that affected rates of nosocomial infection
- c. **Discuss** management of outbreaks and lessons learnt

Dr Chizo Agwu

Deputy Medical Director

Julie Booth

Lead Nurse Infection Prevention and Control

28th September 2021

Annex 1 – some comparative Nosocomial and general COVID data from the literature

- **COVID mortality:**
 - National comparative data from a variety of sources: ISARIC national study over a different time period to described for wave 1, had 29% mortality on the wards within 28 days of admission and 36% mortality in critical care
 - Other studies looking at March and early April 2020 data shows a 30 – 35% mortality which reduces to 10-15% later on it the pandemic (wave 1).

- **COVID HACq rates:**
 - Estimates are of 20-25% of hospital cases being acquired in hospital (Feb – July 2020)
 - As number of admitted cases increases, so does % of HACq infection
 - Other study showed HoDHA at 8.8%, with 18.3 % if HoPHA included
 - FOI request from 126 trusts (81 replied) estimated that of all non-COVID admissions, there was a 27% rate of HACq COVID infection

- **HAcq COVID mortality**
 - In April 2020, 10 trusts data showed that 12.5% were HACq COVID and overall mortality was 27.2%. Lower mortality in HACq COVID group, but longer convalescence
 - 3 acute trusts with 11% Nosocomial infection rate making up 18.5% of total COVID deaths, with no significant difference in mortality between HACq and Community Acq infection
 - 3 Trusts in Wales had a 38-42% mortality rate for HACq COVID, but 31-35% for Community Acq infection. The Nosocomial cases were frailer, older and had multiple comorbidities.

Annex 2

Managing the Outbreaks

- All outbreaks are reported on to the NHSE/I outbreak data capture system. There is a requirement to report all outbreaks of COVID as a serious incident. This is completed by the ward teams.
- Once an outbreak is declared there is a meeting called with internal and external stakeholders, this includes PHE and NHSE/I. During this meeting the numbers of patients affected is discussed, whether there are probable or definite hospital acquired COVID cases. There is also a review of the streaming pathway to ensure the patients were streamed to the correct area, the streaming pathway is under constant review via tactical and changes made that align with National and Local data and guidance. There is then a plan developed for each outbreak area and the required closure times noted and the length of time for isolation for the contacts. All areas complete a daily COVID hotspot audit to assess compliance with PPE, hand hygiene and cleaning. This is to act as a prompt as well as a way of identify areas for improvement.
- Capacity/IPC meeting daily

PPE

- Personal protection equipment is last in the hierarchy of controls, with the ideal being the removal of the risk. Due to the nature of the virus it is not possible to remove this risk and there needs to be other controls in place, PPE being one of them. The Trusts PPE guidance is based on the National NHSE/I recommendations and COVID status of the patient and the task being undertaken.

Key Issues and Actions

- In January 2021 it was noted that there were greater numbers of COVID positive patients and staff. Also compounding this situation was the poor ventilation at the Sandwell site and this is reflective in the number of outbreaks we were seeing at this time. It is now recognised that airborne transmission is a key mode of spread.
- Upgrade in PPE requirements: Following a risk assessment and senior executive decision, the Trust implemented an upgrade to IPC National guidelines in PPE requirements. This was on the basis of the high rates on asymptomatic COVID infection in our Non-COVID areas as well as the frequency of outbreaks that were occurring as a consequence of this. This meant that all patient interaction whether the patient was positive or negative required the staff member to wear a face fitted mask, FFP3. This offers a higher level of protection to smaller droplet particles including aerosols. This

had a positive impact and we saw the number of staff positive stabilise at a time of increasing community and Trust infection.

- Patients were also required to wear masks, initially when out of bed to ensure the 2m rule and to increase hand hygiene to reduce the risk of transmission. In cases where this was difficult for some patients, It was recorded on Unity as part of the nurse rounding requirements indicating if a mask was offered.

Compliance with PPE

To improve compliance in PPE which was being influenced by how rapidly the guidance was changing, the Trust implemented the following

- Posters at entrances to all clinical areas
- Information easily available on the connect page
- Hot spot audit development – ward measured compliance
- Hand/space/messaging
- Review and improvement donning and doffing areas
- Peer challenge
- Peer review
- IPC team support to the ward areas
- Fit testing clinics extended
- Staff were issued with silicon half face mask respirators (single user, multi-use)

Swabbing Pathway

- The Trust follows the National recommendation for swabbing, day 0 (day of admission), day 3 and day 7. There was not a requirement to swab patients unless they were symptomatic or are a discharge to a Nursing Home or Rowley or if they have been previously positive within 90 days.
- Compliance to Swabbing pathway: A lack of compliance with the swabbing pathway has an impact on outbreaks as we do not identify cases quickly therefore the risk of transmission is increased. There have been outbreaks associated with the lack of compliance to the swabbing pathway. This is addressed with the ward area at the time and the learning disseminated via Tactical for Groups to be stringent with the swabbing regime.
- In order to address this and make improvements a daily swabbing compliance list is circulated to enable clinical areas to review the data and confirm that they know which patients require swabbing. An electronic flagging system to identify patients that require swabbing is under review.

Appropriate Streaming of patients and availability of COVID-19 tests

- Point of care testing (POCT) LIAT was only introduced in early February 2021. Up until this point we used urgent PCR and standard PCR tests. The turnaround times for these urgent swabs was and still is an average of 6-8 hours, quicker if the swab is taken at City site as transport required from Sandwell Hospital Site. There were issues with the identification of urgent swabs which built in delays for results to be returned. A solution to this was the introduction of the purple bag system for urgent swabs, but at times there were issues with supply of these bags and the wards had to revert back to using the previous system.
- Routine swab results undertaken at RWT central laboratories were taking an average of 48-72 hours to be returned, this again impacted on the management of outbreaks and contacts of COVID positive cases. This turnaround time has now reduced and results are back within an average time of 24 hours.
- These delays had impact on streaming as patients with atypical symptoms were not always identified as COVID +ve in a timely manner and so contributed to some outbreaks.
- The POCT has enabled appropriate streaming into the bed base however there is still a 31% deficit between the POCT and the admissions that occur on a daily basis. There are actions being taken to address this with the Black Country Pathology services. There can be at times a backlog of tests pending as the volume of swabs exceeds the pending swabs.
- It has been agreed that a further two POCT machines will be allocated to the Trust to be placed in the emergency departments.

Lilac or Contact wards

- Due to the high number of outbreaks and positive patients a decision was made to create a contact ward area, this was identified as a 'lilac ward'. Premise for this ward area was to cohort all the contacts together and then move the positive patients to the red areas. This enabled a better segregated of patients into separate streams, also reduced the impact of bed closures and the risk of outbreaks. However, at the peak of the 2nd wave, the Lilac ward stream was closed due to issues with patient flow and capacity, due to the high number of COVID and non-COVID admissions. This was later re-opened and renamed contact wards. It will be important in future peaks to keep contact wards open as it appeared to lead to reduction in outbreaks.

Ventilation

- City Hospital and Sandwell Hospital are both aged buildings and because of this there is a lack of mechanical ventilation at both sites. However each site has their unique issues with regards to containment and control in outbreak situations with regards to ventilation.
- City is a Nightingale style ward layout and has high ceilings; this will help with dispersal of particles. Sandwell consists of bays of 5-6 beds with low ceilings and windows that only open a small amount due to health and safety restrictions.
- There was a high level of compliance with the hot spot audits and despite good IPC practices there was still evidence of ongoing transmission. As it is now recognised airborne transmission is a likely mode of spread and the lack of natural and mechanical ventilation at the Sandwell Hospital site impacted on the numbers of outbreaks that occurred. It can be concluded that the poor ventilation and the inability to dilute and disperse the virus was a significant issue in the risk of outbreaks.
- To address this issue there are HEPA filtration units (which use UVC light within a HEPA filtration unit to capture and inactivate viruses and bacteria) placed in one of the hot spot areas, N4. There was a reduction in the number of cases post this being introduced, however at the time the numbers were decreasing and there were a number of other measures put in place to ensure we managed the outbreaks effectively e.g. daily hand hygiene audits, cleaning checklists, PPE compliance checks, increased spacing between beds.
- There is further work required for ventilation and how we manage the risk. Consideration is being given to the high risk areas and the high risk clinical task. E.g. oral surgery and respiratory.
- We reduced beds in bays from 6 to 4 in P5 due to the number of outbreaks and this showed a decrease in the numbers of cases and outbreaks

Contact tracing

- Contact tracing is undertaken by the IPC nursing team as per the PHE guidelines – all time there is not a solution to this and the manual process will continue. In the future ICNET (software IPC solution) will address some of these issues

Ward Cleaning

To ensure consistency in ward cleaning, the Trust introduced the following measures

- Reintroduction of the 'I am clean' stickers
- Increased audit of near patient reusable equipment
- Bed space cleaning protocol developed and disseminated
- Agency staff for increased touch point cleaning
- Deep clean of COVID positive bed spaces
- Decant of wards to enable HPV cleans
- Sign off of deep cleans by senior Ward service officer/Senior nurse

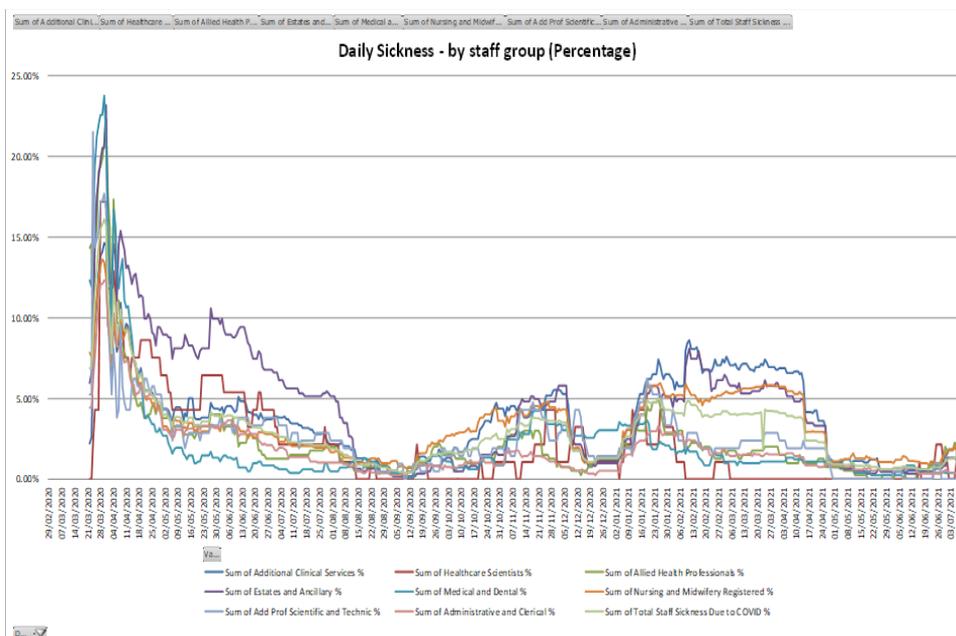
Staff Sickness

- It was also noted that we had an increased in COVID related staff sickness, and based on the high prevalence in the community, a risk based assessment was made to place staff in a FFP3 mask when carrying out direct patient care.
 - Staff working on outbreak areas was required to have a surveillance PCR test.
 - Surveillance Lateral flow testing and later LAMP testing was introduced for all staff to undertake so that asymptomatic staff will be identified in a timely manner and made to isolate.
 - Guidance on Car sharing and need to wear masks and be socially distant on shuttle busses were produced

To improve social distancing in staff /break rooms

- Risk assessment was done and appropriate numbers allowed in the break rooms was identified
- Staggered break times were introduced
- Social distancing measures in place in the canteen

Graph 3 illustrates shows that at the peaks of the pandemic were also the peaks of staff sickness.



Graph 3 – peaks of staff sickness for each wave

Despite the actions that were implemented and continue to be in place there is still a concern about ongoing transmission in healthcare settings. Standard infection control precautions and transmission based infection control precautions are the fundamentals in ensuring that patients and staff are safe. There is a level of personal accountability that needs to be driven home with the emphasis on protecting yourself to protect others. This is achieved by consistency in approach, confirm and challenge and most importantly supporting staff to make the right choice by education and training.