Public Health Wales Briefing:

Nosocomial COVID-19 in Wales: Lessons learned from hospital outbreaks, September 2020 - April 2021

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1. Background

The resurgence of COVID-19 cases in Autumn 2020 brought with it significant challenges for healthcare settings in Wales. The second wave, which ran between September 2020 – March 2021, saw a higher, more sustained peak in case numbers than that experienced in the first wave. In healthcare settings, this resulted in a number of complications. Unlike in the first wave, where elective hospital activity was severely reduced, the second wave occurred at a time when hospitals were seeking to provide more comprehensive care. Changes to testing protocols in the second wave, including the introduction of asymptomatic screening of patients, influenced patient flow. Furthermore, a high proportion of staff sickness or absence due to positive COVID-19 screens added additional pressures. The dominance in the wider population of COVID-19 variants with evidence of increased transmissibility, when compared to previous dominant lineages, added additional risk to hospitals. This risk included asymptomatic carriage amongst staff at a time when vaccine coverage amongst NHS staff was far from comprehensive. Critical care wards also saw a continued pressure on their services, with a high proportion of patients admitted to these services throughout the second wave testing positive for COVID-19.

In general, there was a 2-3 week lag between the peak in community-onset infections and subsequent hospital admissions, observed across all Welsh health boards. A sharp rise in healthcare-onset cases swiftly followed admissions of community-onset cases[1]. This pattern and linkage back to case rates in community settings was also noted in a previous briefing document from Public health Wales that focused on nosocomial transmission in the first wave of the pandemic[2]. In Wales, healthcare-onset cases peaked in the week ending 13th December 2020. A national lockdown was implemented on 19th December 2020, after which a stepped decrease in weekly healthcare-onset cases was observed to the week ending 4th April 2021 (Figure 1). Hospital onset cases remained low between April – July 2021, despite rises in cases the community linked to new variants of concern and the relaxation of lockdown restrictions. At the time of writing, increases in COVID-19 hospital admissions have been observed and emergences of new healthcare-onset clusters have been identified in a small number of hospitals across Wales[3]. Where these occur they can involve large numbers of patients and staff and be severely disruptive to hospital activity.

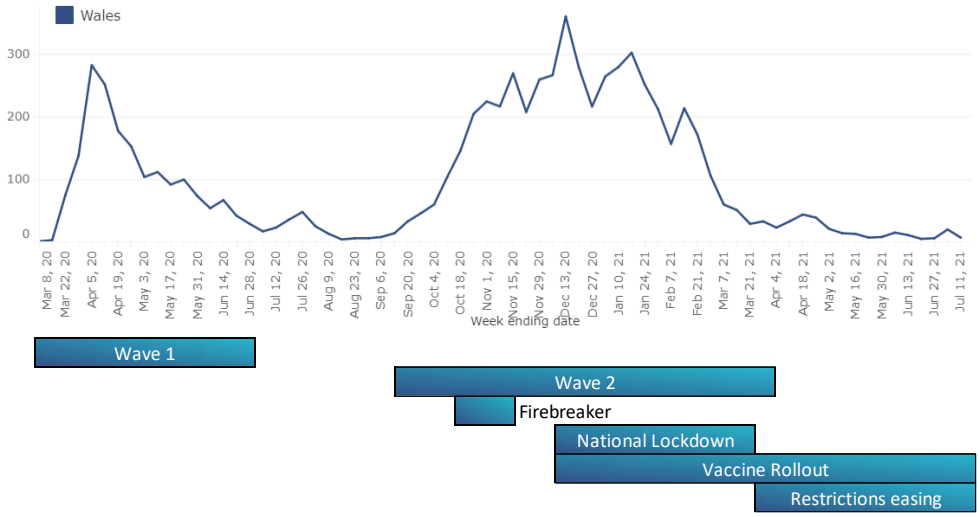

Figure 1: Weekly counts of probable and definite healthcare-onset confirmed COVID-19 cases, and key events in Welsh COVID-19 response, Wales, March 2020 – July 2021

This report outlines some of the lessons learned from the investigations of COVID-19 outbreaks in secondary care settings in Wales during the second wave. It is essential that this knowledge is retained and acted upon as we move towards living with COVID-19.

2. Key themes identified

2.1: Asymptomatic patients

- Introduction of COVID-19 into hospitals through asymptomatic carriage has been a major challenge and is likely to continue to be so, as vaccination coverage increases and disease presentation changes with more patients with few, mild or no symptoms.
- During the second wave, it was frequently observed that patients who were COVID-19 negative on admission subsequently tested positive early in their admission.
- Some outbreaks of COVID-19 in community hospitals were linked to previous admissions to district general sites. IPC investigations identified asymptomatic patients who were COVID-19 negative prior to transfer sometimes became symptomatic and/or tested positive shortly after admission to the community site. It is thought that these patients may have been incubating COVID-19 at time of transfer.
- Routine screening of asymptomatic patients who did not meet other testing criteria outlined in Welsh Government guidance identified cases that may not otherwise have been picked up or identified them earlier, thus reducing their potential to transmit to others.
- Whole genome sequencing (WGS) data showed that in many situations, there had been multiple introductions of COVID-19 to ward settings, as shown by the presence of multiple sequences amongst a cluster of epidemiologically-linked patients.

Recommendations

  - It is essential that healthcare organisations have robust admission screening procedures in place, utilising the range of test types now available, and covering all routes onto hospital sites; ED, AMU, paediatric, maternity, elective, and medical transfer both to sites within health board and between health boards and health trusts in England.
  - Healthcare organisations should ensure frontline staff are fully trained in the techniques required for correctly undertaking the tests and informed of any changes to testing protocols.
  - A single negative test is insufficient to rule out COVID-19 infection and healthcare organisations should take a cautionary approach in placement of these patients.
  - Healthcare organisations should follow Welsh Government testing guidance and act swiftly to isolate and test patients who develop symptoms.

2.2: Patient placement

- The first wave provided evidence to suggest high levels of patient movement between and within wards increased the likelihood of transmission events, increased the burden of contact tracing, and made it difficult to determine where transmission may have occurred. This issue persisted into the second wave. WGS allowed transmission to be tracked from patient movement within wards, between wards, between hospitals and in post-discharge patients tested in the community or on re-admission.
- Triaged wards based on admission type (elective vs. emergency) and microbiological and exposure history (i.e. COVID-19 negative, contact or COVID-19 positive) went some way to reduce patient movement and mitigate between-ward transmission opportunities.
- Pressure on hospitals meant that patient triage pathways could not always be maintained because of capacity issues, or operational need that did not necessarily comply with best IPC practice (i.e. continued admissions to wards where bays are restricted due to outbreaks, splitting wards to hold 'exposed and 'unexposed' patients, or mixing of contact bubbles). This could have provided opportunity for transmission of COVID-19.
- Certain medical interventions, such as dialysis or aerosol generating procedures, may be limited to particular areas. This creates an operational challenge when bed occupancy is high, and can cause slippage in IPC protocols or patient triage pathways.
- Certain specialities remain at higher risk of COVID-19 outbreaks due to the characteristics of the patients themselves. Mental health and Care of the Elderly patients pose difficulties in terms of understanding and complying with infection prevention practices, maintaining social distancing as well as presenting atypically (i.e. symptoms other than cough, pyrexia or anosmia/ageusia). This issue was initially identified in the first wave of the pandemic but many sites saw continued challenges with outbreaks in these areas during the second wave.

Recommendations

  - Healthcare organisations should have in place clear patient pathways which minimise patient movement, based on clinical need.
  - Hospitals should utilise the spaces available in overflow facilities, including field hospitals and community hospitals, when large outbreaks of COVID-19 increase pressure on bed occupancy in acute sites.
  - Patients should only be moved when there is clinical justification to do so. Where patient movement is essential, testing should be carried out and results available prior to movement wherever possible. This message should be communicated to all staff, especially those working out of hours where IPC staff cover may be limited.
  - Keeping accurate records of patient movements within the ward and hospital in an easily accessible format is essential to support contact tracing and epidemiological investigation of transmission chains.
  - Ward staffing numbers must reflect the added pressures of caring for patients walking with purpose or other challenging behaviours.

2.3: Staff

- High levels of staff sickness and use of bank/agency staff were noted as key factors in complacency in IPC practices in clinical settings, which was reflected in low IPC audit scores. These audits included hand hygiene, PPE, and environmental audits.
- Unprecedented staff absence and increased admissions led to higher patient to staff ratio. This compromised to ability of staff to maintain high standards of IPC practice.
- There has been a high uptake of the COVID-19 vaccination amongst NHS staff in Wales, which will hopefully reduce transmission opportunities on-site. However, there were anecdotal reports of falls in IPC practices after vaccination, due a false sense of security following immunisation.
- Welsh Government guidance recommended individuals with COVID-19 symptoms self-isolate and book a COVID-19 PCR test[5]. However, guidance available online at the time focused on common COVID-19 symptoms (i.e. cough, pyrexia, anosmia/ageusia)[6,7]. This may not have been sensitive enough to identify milder symptoms, such as fatigue, headache or myalgia. As such, staff may have been working whilst infectious.
- Prior to the roll-out of LFD testing, the identification of asymptomatic staff was normally prompted by an outbreak in inpatients. This made it difficult to pinpoint the directionality of transmission (i.e. patient to staff, or staff to patient).
- Staff data is still difficult to gather in a consistent and timely manner. When COVID-19 rates in the community are high, the risk of importation of from the community is also high. As such, cluster investigations should include staff data wherever possible. However, inconsistent practices in information sharing make this data difficult to come by, especially for peripatetic staff, who may move between different ward settings and pose a risk of transmission across a site. In some cases, this meant that staff data could not be included in outbreak investigations, so a full picture of the outbreak was not achieved.

Recommendations

- Encourage all staff, including bank/agency, to undertake regular IPC training/refresher courses to minimise slippage in times of high patient pressures.
- Reinforce a culture of being COVID-risk aware, even after the vaccination. This includes following IPC protocols, education regarding milder symptoms and reducing footfall on wards, to mitigate opportunity for transmission of COIVD-19, as well other infectious diseases.
- Communicate protocols for IPC activity in both clinical and non-clinical areas in hospitals, so measures to minimise transmission between staff in clinical settings are not undermined by bad practice in staff break rooms/canteens. Regular checks by IPC, senior staff and managers should be encouraged to support compliance.
- Extend staff symptom checking procedure to include milder symptoms indicative of COVID-19 infection. At the time of writing, the UK Health Security Agency had expanded guidance to include milder symptoms such as, myalgia, fatigue, headache, sore throat, runny nose, diarrhoea, nausea or vomiting[8]. However, Welsh Government guidance still focuses on cough, pyrexia, anosmia/ageusia. Disparity between guidance could lead to confusion.
- Encourage compliance with twice weekly lateral flow testing and reporting of results to identify asymptomatic staff cases.

- Clinical areas and teams should keep a record of all staff working areas covered on each shift to support contact tracing and outbreak investigation efforts. More needs to be done to encourage peripatetic staff to engage with contact tracing measures.
- Utilise resources in Track, Trace and Protect to assist in backward contact tracing of healthcare workers.

2.4: Hospital infrastructure factors

- Hospitals in Wales generally do not have the infrastructure to deal with highly transmissible respiratory infections. The structure, design and function of patient-facing facilities make application of IPC measures difficult.
- High admission numbers over the winter, and continued pressures due to increasing hospital activity and outbreak management, meant that it was frequently not possible to reach the 3.6m bed spacing recommended by Welsh Government.
- There is a high ratio of beds to shared facilities. This is most commonly seen in the availability of bathrooms/lavatories, with very few beds having en-suite facilities.
- Many clinical areas do not have mechanical ventilation or sufficient air pressure changes. As such, the ventilation on wards is inadequate and may have contributed to the transmission of COVID-19 across patient areas.
- Issues with infrastructure of hospitals in Wales extended beyond patient-facing areas and into staff areas. Many sites in Wales have inadequate space for staff changing/break facilities, meaning social distancing was impossible in some situations, increasing the risk of transmission amongst a group that would have exposure to both community and healthcare settings.
- Likewise, office space is limited, contributing to COVID-19 outbreaks amongst non-patient facing teams who could not work from home (e.g. medical records, hospital switchboard, catering, etc.).

Recommendations

- Ensure momentum is maintained in the long-term improvements of hospital estate in Wales. Actively engage IPC teams in the design and refurbishment of facilities.
- Invest in alternative measures that mitigate the risks imposed by limited space, such as PVC screens.
- Understanding the specialities at risk of COVID-19 transmission may help with infrastructure planning. Patient acuity should reflect the available estate. Specialities more at risk of outbreaks should have additional mitigations, where possible, that optimise IPC measures and reduce transmission opportunity.
- Ensure housekeeping staffing reflects infrastructure limitations, so high-touch points are cleaned frequently.
- Utilise natural ventilation as much as possible. Recognise this may incur the need for additional short-term measures to mitigate the risks of open windows in patient settings (e.g. safety bars on windows, additional blankets for patients).
- Maintaining a culture of COVID-risk awareness amongst staff and consider staggering shift and break times to allow for social distancing in shared staff facilities.

- Encourage staff to work from home where possible when rates of infection in the community are high or when a specific risk is identified (i.e. staff member is a household contact of a confirmed case). Investing in information technology infrastructure (i.e. mobile phones, laptops, virtual private network software, etc.) would allow those whose work is primarily desk-based to work from home when necessary.

2.5: Application of genomics data in epidemiological investigations

- In the second wave of the pandemic, there was more widespread use of WGS of positive COVID-19 samples via the Pathogen Genomics Unit, Cardiff. Genomics data was used alongside other epidemiological data to inform transmission hypotheses.
- Genomics data has been used to show the successes of IPC and operational measures in containment of outbreaks and limitation of onward transmission of COVID-19 during a time of unprecedented pressure on the health service.
- Analysis found that the diversity of sequences in inpatients generally followed trends in the diversity of community samples. Samples collected in the community became more frequently sequenced between September 2020 - March 2021.
- Genomics data supported the previously suggested hypothesis that COVID-19 does not respect the standard transmission boundaries normally applied to control the spread of other infectious diseases. Genomics analysis identified that patients nursed on the same ward but without direct contact (i.e. in different bays or isolation rooms) had identical sequences, despite application of IPC restrictions to affected bays. This may be suggestive of transmission via secondary pathways, such as staff, equipment or environment.
- The proportion of positive samples from staff sent to the Pathogen Genomics Unit was lower than that of positive patient samples. The laboratory where the initial PCR sample was processed will have contributed to the likelihood of the sample being sent to the Pathogen Genomics Unit for sequencing.

Recommendations

- Continue to work closely with the Pathogen Genomics Unit to increase understanding of the diversity of the COVID-19 genome and how this may affect transmissibility and severity of disease.
- Utilise the genomics data to support epidemiological hypotheses in outbreak investigations to understand common transmission pathways and hotspots for infection.
- Encourage staff to access testing services which will send positive samples to the Pathogen Genomics Unit for phylogenetic sequencing, so the role of staff in outbreaks can be properly assessed.

3. Conclusions

The second wave of the COVID-19 pandemic had a substantial impact on healthcare services in Wales. The key themes identified in this report add to the evidence gathered in previously released work from Public Health Wales[1,2]. The intensity of the second wave of the pandemic and the drive to continue to provide comprehensive care, including elective services, meant that not all lessons identified at the end of wave one were actioned successfully. There is still evidence of unnecessary patient movement linked to outbreaks in wave two. Hospital infrastructure continues to be a challenge in terms of infection control amongst both patients and staff. Furthermore, clinical and operational teams in healthcare settings need to engage with data from community settings, using these as an early-warning system to act proactively against increases in COVID-19 infection rates, as opposed to reactively responding once nosocomial cases have been identified.

However, despite new challenges, this report does find that some lessons from the first wave of the pandemic were actioned in the second wave. In general, there was a greater appreciation of the role of asymptomatic patient cases or those presenting atypically in transmission of COVID-19. This influenced the testing protocols in hospitals on both a national and local level. There was also an increased understanding of the role staff played in transmission. Staff were encouraged not to work between COVID and non-COVID areas where possible, and measures such as daily symptom checks and the arrival of Lateral Flow Device testing allowed staff who were presenting atypically or asymptomatically to be identified before exposure to the patient-facing environment. These actions will have supported the mitigation and management of COVID-19 in healthcare settings, and should be considered as approaches that may need to be stepped up again in the event of a new variant causing concern or if there is seasonal waves of COVID-19.

4. References

1. Public Health Wales Briefing: An overview of community and hospital onset COVID-19 cases in Wales during the second wave (September 2020 to April 2021), PHW (2021)
2. Public Health Wales Briefing: Nosocomial COVID-19 in Wales - Lessons learned from hospital Outbreaks, PHW (2020)
3. PHW Rapid COVID-19 virology dashboard, Accessed 27th September 2021 (https://public.tableau.com/app/profile/public.health.wales.health.protection/viz/RapidCOVID-19virology-Public/Headlinesummary)
4. Framework for COVID-19 testing for Hospital patients in Wales, March 2021, Welsh Government (2021)
5. COVID-19: Self-isolation Guidance, Welsh Government (Accessed 27th September 2021, last updated 20th August 2021) https://gov.wales/self-isolation
6. COVID-19: Check your symptoms to see if you need coronavirus medical help, Welsh Government (Accessed 27th September 2021) https://gov.wales/check-your-symptoms-see-if-you-need-coronavirus-medical-help
7. Main symptoms of coronavirus (COVID-19), NHS (Accessed 27th September 2021, last reviewed 16th September 2021) https://www.nhs.uk/conditions/coronavirus-covid-19/symptoms/main-symptoms/
8. People with symptoms of a respiratory infection including COVID-19 - GOV.UK (www.gov.uk)