The burden of hospital-acquired COVID-19: the Welsh and international experience

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Introduction

During the first wave of the SARS-CoV-2 pandemic, the rate of hospital-acquired (nosocomial) COVID-19 across hospitals in the UK peaked at 15.8% of patients admitted with COVID-19.[1] However, little is known about the outcome of these individuals. To address this, we determined inpatient mortality associated with nosocomial COVID-19 in Wales during the first wave[2] and systematically reviewed the international literature.[3] Together, these studies expose the burden of nosocomial COVID-19 and support enhanced infection control and targeted public health measures.

Materials and methods

We first conducted a national service evaluation to determine the outcomes of 2,508 adults with molecularly confirmed SARS-CoV-2 admitted across 18 major hospitals in Wales, representing over 60% of those hospitalised between 1 March and 1 July 2020.

To understand the global burden of mortality associated with hospital-acquired (nosocomial) COVID-19 infection, we systematically reviewed the international pre-print and peer-reviewed literature from 1 January 2020 to 9 February 2021, without language restriction, for studies reporting outcomes of nosocomial and community-acquired COVID-19 (PROSPERO registration: CRD42021249023). We applied a random-effects meta-analysis to estimate the 1) relative risk of death and 2) intensive care admission, classifying studies by patient cohort characteristics and nosocomial case definition.

Results and discussion

Within our national service evaluation, inpatient mortality for nosocomial infection ranged from 38% to 42%, consistently greater than in participants with community-acquired infection (31%–35%) across a range of case definitions. Those with hospital-acquired infections were older and frailer than those infected within the community. Nosocomial COVID-19 diagnosis was made a median of 30 days following admission (IQR 21–63 days), suggesting a window for prophylactic or postexposure interventions, alongside enhanced infection control measures. These findings directly contributed to changes in clinical practice such as the recommendation to offer vaccinations for inpatients in Wales admitted during the second wave.[4]

21 studies were included in the primary meta-analysis, describing 1,513 probable or definite nosocomial COVID-19, and 6,738 community-acquired cases based on 8,251 admissions across eight countries during the first wave. The risk of mortality was 1.3 times greater in patients with nosocomial infection, compared with community-acquired (95% CI: 1.005–1.683). Rates of intensive care admission were similar between groups (RR 0.74, 95% CI: 0.50–1.08). Immunosuppressed individuals with nosocomial COVID-19 were twice as likely to die in hospital as those admitted with community-acquired infection (RR 2.14, 95% CI: 1.76–2.61).

Conclusion

Adults who acquire SARS-CoV-2 while already hospitalised are at greater risk of mortality compared with patients admitted following community-acquired infection. We highlight a window of opportunity for primary or booster vaccination is likely to exist following admission. Our meta-analysis exposes individuals with malignancy or who had undergone transplantation to be particularly vulnerable to mortality associated with nosocomial COVID-19. Importantly, immunosuppressed individuals commonly fail to respond to vaccination,[5–7] indicating the threat of nosocomial COVID-19 remains is likely to remain in these groups. With the continued widespread circulation of highly infectious novel variants increasingly capable of evading existing therapeutics, these findings inform public health and infection control policy. ■

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