Emergency department adult presentations from the COVID-19 hotel quarantine program in Victoria, Australia: A retrospective cohort study of admissions and presenting complaints

Robert MELVIN D, Gerard M O'REILLY D, Andrew UNDERHILL, Larissa STOKES, Sophie TANT and Alison LOOK

Emergency and Trauma Centre, Alfred Health, Melbourne, Victoria, Australia

Abstract

Objective: The present study aims to describe presentations to the designated ED from the Victorian COVID-19 hotel quarantine program.

Methods: A retrospective cohort study was conducted between 7 December 2020 and 6 June 2021 at The Alfred Emergency and Trauma Centre, a major adult quaternary referral teaching hospital. Participants included adult patients (>18 years old) who were quarantining as part of Victoria’s COVID-19 quarantine program. The primary outcome was discharge destination from the ED (admission to hospital vs discharge from ED).

Results: Notably, 164 patients presented to The Alfred Emergency and Trauma Centre during the study period. The mean (SD) age was 50.9, with most patients being male (n = 96 [58.5%]). Most patients were referred from a quarantine hotel (n = 83 [50%]). Thirty-four percent (n = 56) of ED presentations were admitted to hospital (31.5% to a ward, 2.5% to intensive care unit). Forty-six percent (n = 75) were discharged to the complex care hotel to be looked after by Alfred Health, with only 16% (n = 26) being discharged to a standard quarantine hotel. The most common presenting complaint categories were: cardiovascular (n = 33 [20%]), miscellaneous (n = 25 [25%]), gastrointestinal (n = 19 [11.5%]) and mental health (n = 18 [11%]).

Conclusion: The study demonstrates that the number of ED presentations from quarantine was low (<1 presentation/day). COVID Quarantine Victoria and Alfred Health put significant resources into the program to allow most returned international travellers to be safely cared for within a hotel and thus reduce the burden on the public hospital system.

Key words: COVID-19 < infectious disease, emergency medicine, emergency treatment < emergency medicine, transportation of patient < emergency medicine.

Introduction

The initial outbreak of SARS-CoV-2 virus (COVID-19) in Victoria resulted in over 900 confirmed cases in the state by the end of March 2020. This led the Victorian government to implement National Cabinet’s decision that all international arrivals be required to quarantine in a designated facility for 14 days. The COVID-19 Hotel Quarantine Inquiry subsequently found that this program was hindered by numerous issues, and in the wake of breaches of containment in the hotel quarantine program, there was a second wave of infections.

In late November 2020, the Victorian government established a redesigned COVID-19 quarantine program and a dedicated agency to oversee it named ‘COVID-19 Quarantine Victoria’ (CQV). Working with this agency, Alfred Health was contracted to provide oversight and clinical management for two hotels. The ‘health hotel’ (HH) was for
people with confirmed COVID-19 and suspected COVID-19 (sCOVID) patients, and the ‘complex care hotel’ (CC) for COVID-19-negative patients with complex medical/social needs. Most people returning from overseas did not require either of these two hotels and stayed in a standard quarantine hotel (QH), which was overseen by CQV.

Alfred Health Hotel Support Services (HSS) was the program established to manage the CC, HH and nursing team at the airport. At Melbourne’s Tullamarine airport, arriving international travellers were assessed by a team of doctors and nurses. If they were deemed not suitable to immediately enter hotel quarantine (e.g. acutely unwell at airport and/or unable to self-care in a hotel room), then transfer to the designated ED was arranged. In the HH and CC hotels, Alfred Health HSS implemented a dedicated team of doctors, nurses, allied health, mental health clinicians, and pharmacists who were exclusively contracted to work onsite at the hotels. An Alfred ED physician was on-call to provide telephone support for both the hotel clinical staff and The Alfred ED staff regarding hotel patients.

In the event of deterioration at any hotel quarantine facility or at a maritime port, transfer to a designated ED was established. This was most commonly The Alfred Emergency and Trauma Centre (E&TC) as this health service was involved in the quarantine program. Other EDs involved during the study period included: The Royal Melbourne Hospital (RMH); The Royal Women’s Hospital (RWH) and The Royal Children’s Hospital (RCH).

To date, there has only been one published account of an Australian hotel quarantine program during the COVID-19 pandemic, by Dinh et al., and little is known about the numbers and types of presentations to the ED in Victoria during this unprecedented period.

The aim of the present study was to gain an understanding of the nature of transfers from the Victorian quarantine program to The Alfred E&TC by determining the incidence, referral source, clinical features, COVID-19 test result and ED disposition destination among ED presentations.

Methods

Design

This was a retrospective cohort study of ED presentations referred from: any quarantine hotel (QH, CC or HH); the airport; or a maritime port to The Alfred E&TC between 7 December 2020 and 6 June 2021 (6 months). Quarantine hotels were governed by CQV and consisted of a number of standard QH, one HH, and one CC.

Ethics approval

Ethics approval was obtained from the Alfred Health Human Research and Ethics Committee 428/21 on 21 July 2021.

Setting

The present study was undertaken at a major adult quaternary referral teaching hospital and trauma centre (The Alfred E&TC), which receives over 65,000 emergency visits annually. All patients from any of the quarantine facilities (QH, CC, HH, airport or a maritime port) were already placed under a Public Health Determination Notice, which was amended to allow temporary leave to visit the E&TC to receive medical care.

Inclusion criteria

All adult patients (>18 years of age) attending The Alfred E&TC during this 6-month period were included in the study. Patients were identified using a keyword search from the ED triage nursing notes. The following search items were included: hotel, HQ, Quar, Quarantine, QH, boat, airport or overseas.

In addition to this search criteria, a separate search of hospital transfers was conducted from the CQV database. This was then cross-referenced against the Alfred Health search allowing the identification of any additional presentations and the removal of duplicates.

Exclusion criteria

The present study did not assess the impact on the other Victorian EDs from the quarantine program.

Outcome measures

The primary outcome was disposition destination from the ED (admission to hospital vs discharge from ED). Secondary outcomes included: type of QH on discharge and type of admission (i.e., ward vs intensive care unit [ICU]).

Exposure variables that were collected included: age, sex, Australian Triage Scale (ATS) category assigned, presenting complaint, facility prior to the ED (QH, HH, CC, airport or maritime port) and working diagnosis on discharge.

Data collection and analysis

These variables were formulated into a Microsoft Excel spreadsheet. Researchers then performed individual chart reviews to determine the following information: location prior to the ED arrival; discharge destination from the ED; primary complaint (single, most prominent complaint chosen) and working diagnosis on discharge from ED.

Where there was more than one presenting complaint, a determination was made as to which was the primary complaint, and a consensus reached between two clinician researchers. For classification, the New Zealand national chief presenting complaints terms were used. This is an ED-specific Emergency Care Data Standard that is relevant to the Australasian setting and utilises the SNOMED reference sets.

For the ‘Working Diagnosis on Discharge from ED’ category, the Australian Emergency Care Diagnosis Groups were used from the Australian Independent Hospital Pricing Authority 2019. This is similar to the ICD10 categorisation but is more specific to the ED diagnosis groups in the Australian setting. The working ED diagnosis was determined by ED physicians who were one of the investigators.
For descriptive statistics, symmetrical numerical data were summarised using mean (SD), skewed numerical data and ordinal data were summarised using median (IQR) and categorical data were summarised using frequency (%). The measure of association used to compare numerical data across two groups was the difference in means (95% CI) or medians, as appropriate. The measure of association used to compare categorical variables was the odds ratio (OR) (95% CI). For inferential statistics, symmetrical numerical data were analysed using Student’s t-test, skewed numerical data and ordinal data were analysed using the Wilcoxon rank-sum test and categorical data were analysed using the \( \chi^2 \) and Fisher’s exact tests where frequencies were small. A P-value of <0.05 were considered statistically significant.

Results

**Total number of arrivals from quarantine program to Alfred E&TC**

During the 6-month study period, more than 16 000 international travellers arrived at Melbourne Airport and entered the CQV program, of whom 164 (1.0%) presented to The Alfred E&TC.

Figure 1 describes the incidence of ED presentations by month. Due to a COVID-19 outbreak at a QH in February 2021, international flights to Melbourne were paused from 13 February to 8 April 2021. Except for the month of March, there was no apparent change (i.e., increase or decrease) in the incidence of ED presentations over the study period.

Table 1 summarises the patient characteristics. The mean (SD) age was 50.9 (17.5), with most patients being male (\( n = 96 \) [58.5%]). Most patients were referred from a QH (\( n = 83 \) [50.6%]).

Of the 164 ED presentations, 34 (20.7%) were transferred directly from the airport due to concerns by the airport clinical team about symptoms or about their ability to cope in the hotel environment (e.g. falls risk/dementia). There were 36 (22.0%) ED presentations from the CC Hotel, where COVID-19-negative returned travellers were looked after. From the HH, two of the eight presentations were known to be COVID-19-positive and had subsequently deteriorated and needed hospitalisation. The other six patients were sCOVID, which is why they were in the HH but did not test positive during their ED admission. From a maritime port, there were three patients, all crewmen on boats entering Australia who were subject to the same quarantine restrictions. Of these three men, two of them sustained fractures to limbs requiring admission to hospital.

Table 2 summarises the patient features on presentation to the ED. The commonest triage category \(^8\) was ATS3 (\( n = 88 \) [53.7%]). The most common presenting complaint categories were: cardiovascular (CVS) (\( n = 33 \) [20.1%]), miscellaneous (\( n = 25 \) [15.2%]), gastrointestinal (GI) (\( n = 19 \) [11.6%]), and mental health (\( n = 18 \) [11%]). There was a broad range of primary presenting complaints, with 13 of the 13 NZED categories being covered (Obstetrics & Gynaecology and Environmental had zero presentations).

Table 3 summarises the outcomes following the ED presentation and shows the number of positive COVID-19 patients seen in the ED from the quarantine program. Of the 164 patients, two (1.2%) were known to be COVID-19 positive prior to arrival at The Alfred E&TC and had been transferred from the HH into hospital. Of these two patients, one was admitted to ICU with the other being admitted to the COVID-19 ward. The third COVID-19 positive patient tested positive on a swab taken in the ED.

Table 3 shows 56 (34.1%) ED presentations from the quarantine program were admitted to hospital (52 [31.7%] to a ward, four [2.4%] to ICU). Of the four ICU admissions: one each for COVID-19; diabetes ketoacidosis; severe hyponatraemia; and a neck mass causing stridor. The patient with COVID-19 admitted to ICU had had a previous lobectomy and asthma, with mild respiratory failure but did not require mechanical ventilation.

There were a broad range of working diagnoses (Table 3), with Circulatory being the largest group (\( n = 27 \) [16.5%]). The second commonest diagnoses (\( n = 25 \) [15.2%]) was the ‘Mental, behavioural and neurodevelopment’ group, which covered both alcohol and drug related conditions, psychoses, and suicidal ideation. There were zero diagnoses in the male genitourinary, obstetric, perinatal or blood and immunology groupings.

Table 4 compares the patients by the primary outcome of ED disposition destination (admission vs discharge). There was no association between admission status versus age, sex or triage category.

The odds of being admitted were significantly less for those coming from QH (OR 0.2 [95% CI 0.1–0.6], \( P = 0.001 \)) when compared to those referred from the airport/
Compared to those with a CVS presenting complaint, the odds of admission were significantly greater for those with a GI (OR 6.2 [95% CI 1.7–23.0], P = 0.006) or respiratory (Resp) (OR 5.6 [95% CI 1.4–21.9], P = 0.013) presenting complaint.

Discussion

This is the first study to review ED presentations from the Victorian hotel quarantine program and their discharge destination from ED. Nearly half of the ED presentations (45.7%) were discharged from ED to the CC hotel to complete their quarantine period. The present study established that while the hotel quarantine program cared for 189 confirmed COVID-19 patients from December 2020 to June 2021, only two adult patients with COVID-19 required admission to an acute hospital. Despite the quarantine program being set up because of the COVID-19 pandemic, there were very few ED presentations because of COVID-19, with a wide range of presenting complaints and associated working diagnoses.

The low ED presentation rate may be explained by the involvement of Alfred Health clinicians, nursing staff, allied health, pharmacists and mental health clinicians present within the CC and HH, as well as nursing staff situated at the airport to assess arrivals. There were also clinicians available at the QH. We postulate that having health professionals embedded in the hotels may have been a significant factor associated with the low ED presentation rate, and thus confirm the value of this staffing model. By having an Emergency Physician involved in the hotel program via telephone, to assist with assessing transfers and the discharge destination from the hospital, this may also have kept the ED presentation rate lower.

Of the ED presentations, 56 (34.1%) were admitted to either a ward or ICU. This compares to the median inpatient admission rate at The Alfred E&TC of 24.0% for 2021. Of the transfers arriving directly from the airport, 50.0% were admitted to the ward with the remaining going to CC hotel (and one patient to home quarantine). This supports the notion that the airport team were accurate at determining which returning travellers needed extra support during their quarantine period (either in hospital or at CC). The benefits of

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having a health service involved in such a program were further highlighted by the significantly higher odds of a patient from a standard QH being discharged from ED rather than admitted. These standard QHs had less health resourcing but cared for more residents overall. All patients were transferred to, and from, hospital by Ambulance Victoria with paramedics in full PPE regardless of their COVID-19 status (as all patients were considered high risk for developing COVID-19 while in quarantine).

While acknowledging the differences in the systems used in both Victoria and New South Wales, and the phase of the pandemic, it seems that the model used in Victoria has resulted in far fewer ED presentations than in the 4-month period in 2020 that Dinh et al.3 studied (542 vs 164 ED presentations). As well as the onsite hotel staffing model differences, another reason for this may be the involvement of a dedicated mental health clinician based at the CC hotel 7-days/week, with availability of telehealth consultations at all QHs. There was also an allocated psychiatrist to the Alfred Health HSS program to assist with assessments.

During the 6-month study period, 11.0% of the presentations had a primary complaint involving mental health, with 15.2% having a working diagnosis on discharge assigned to the mental, behavioural and neurodevelopment group. This is similar to the New South Wales experience (where 19.0% were assigned to the mental health diagnosis group) and with similar issues around anxiety or a situational crisis and/or suicidal ideation. The lower number of mental health presentations to The Alfred E&TC may also be partly explained by acute mental health issues at QH being sent to RMH (but all CC or HH residents were only referred to The Alfred E&TC).

Improvements were implemented during the program such as the default discharge destination from The Alfred E&TC was to the CC hotel, no matter where the resident had arrived from initially. Also, all patients remained in ED until their COVID-19 swab result was available, after one patient tested positive after they had been discharged to the CC hotel from a swab taken in ED. There were six patients who re-presented to the ED during their quarantine period, two of which were potentially preventable on review and should have been admitted to the hospital on their first presentation.

During the study period, the quarantine program was almost exclusively catering to returned international

| TABLE 3. ED outcomes |
|----------------------|
| Characteristic       | Number       |
|----------------------|--------------|
| Positive COVID-19 PCR test (known or in ED) | 3 (1.8%) |
| Negative COVID-19 PCR test in ED (or not swabbed) | 161 (98.1%) |
| Discharge destination |              |
| Complex care hotel   | 75 (45.7%)   |
| Health hotel         | 4 (2.4%)     |
| Home                 | 2 (1.2%)     |
| ICU                  | 4 (2.4%)     |
| Maritime port        | 1 (0.6%)     |
| Quarantine hotel     | 26 (15.9%)   |
| Ward                 | 52 (31.7%)   |
| Emergency care diagnosis groups | |
| E01 Nervous system and neurological | 5 (3.0%) |
| E02 Eye              | 4 (2.4%)     |
| E03 Ear, nose, mouth and throat | 3 (1.8%) |
| E04 Respiratory      | 3 (1.8%)     |
| E05 Circulatory      | 27 (16.5%)   |
| E06 Digestive        | 6 (3.7%)     |
| E07 Liver, gall bladder, bile duct and pancreas | 3 (1.8%) |
| E08 Musculoskeletal  | 14 (8.5%)    |
| E09 Skin, subcutaneous and breast tissue | 3 (1.8%) |
| E10 Endocrine, nutritional and metabolic | 5 (3.0%) |
| E11 Kidney and urinary tract | 9 (5.5%) |
| E12 Male genitourinary | 0 (0.0%) |
| E13 Gynaecology      | 1 (0.6%)     |
| E14 Obstetrics       | 0 (0.0%)     |
| E15 Perinatal        | 0 (0.0%)     |
| E16 Blood and immunology | 0 (0.0%) |
| E17 Neoplasms        | 3 (1.8%)     |
| E18 Infectious diseases | 18 (11.0%) |
| E19 Mental, behavioural and neurodevelopment | 25 (15.2%) |
| E20 Injuries and other externally caused morbidity | 18 (11.0%) |
| E50 General symptoms without diagnosis | 16 (9.8%) |
| E60 Other factors influencing health status | 1 (0.6%) |

ICU, intensive care unit; PCR, polymerase chain reaction.

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travellers, which contrasts significantly with the second half of 2021 during which the cohort was mainly comprised of local community COVID-19 cases with some refugee repatriation flights. Future studies are planned to review this cohort in a similar fashion.

Study limitations
The search criteria used to identify cases seen at The Alfred E&TC may have missed some presentations, as it was reliant on the terms being used in the triage documentation. We aimed to mitigate this by comparing this list with a generated list of transfers obtained from CQV. The present study only analysed presentations to the designated ED.

Conclusion
The present study is the first of its kind to assess the ED presentations from the Victorian COVID-19 hotel quarantine program to the designated ED. It demonstrates that the number of ED presentations from quarantine was low, and most patients were discharged to the CC hotel.

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Competing interests
GMOR is a section editor for Emergency Medicine Australasia and co-author of this article. He was excluded from the peer-review process and all editorial decisions related to the acceptance and publication of this article. Peer-review was handled independently by members of the Editorial Board to minimise bias.

Data availability statement
The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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