SHORT REPORT

Characteristics of patients with COVID-19 hospitalised in South Australia during the first wave of the pandemic

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Abstract

Objective: To describe the first wave of hospitalisations of patients testing positive for COVID-19 in South Australia.
Methods: Pathology test results for COVID-19 between January and June 2020 were matched against state-wide ED and inpatient data sets.
Results: The impact of the first wave of COVID-19 on South Australian hospitals was 440 unique patients with COVID-19; median ED, hospital and ICU lengths of stay of 4.7 h, 9.8 days and 4.1 days, respectively; and a crude mortality rate of 0.23 deaths per 100 000 population (four deaths).
Conclusion: The study sheds light on the characteristics of patients with COVID-19 hospitalised in South Australia.

Key words: *COVID-19, disease outbreaks, emergency service, hospital.*

Introduction

Many health jurisdictions require quantification of the impact of COVID-19 on hospitals at a state level, particularly the impact on hospital EDs and inpatient wards which need to maintain capacity.[1] In the present study, we describe the first wave of hospitalisations of patients testing positive for COVID-19 in South Australia by assessing clinician-assigned primary diagnoses assigned in the ED and on hospital admission.

Methods

COVID-19 pathology test results were matched against state-wide hospitalisation data to provide insight into the impact of the virus on South Australian hospitals and characteristics of hospitalised patients with COVID-19.

The data spanned from 1 January 2020 to 12 June 2020, and covered all 14 public metropolitan and major country hospitals for ED episodes, an additional six private and smaller country South Australian sites for inpatient episodes which had no ED presentations and state-wide results related to testing for COVID-19. Data extracts were linked using a unique patient ID.

When assessing hospitalisations of patients with COVID-19, we considered all ED presentations and admissions between 1 January 2020 and 12 June 2020 for patients who tested positive for COVID-19. This is a defensible matching period to include patients who may have presented to the ED with a related symptom before being confirmed positive (COVID-19 monitoring in Australia has occurred since 22 January 2020 with the first confirmed case in late January 2020[2]).

An exemption from ethical review for this analysis was granted by the SA Department for Health and Wellbeing Human Research Ethics Committee (ref: REC/20/SAH/35).

Results

Up to 12 June 2020, there were 102 424 COVID-19 tests from 93 744 unique patients. The number of positive test results was 830, representing a positive test ratio of 0.81% of tests undertaken.

These positive tests were from 440 unique patients, and of these, 86 presented to the ED at a major South Australian public hospital between 1 January and 12 June 2020 and 66 of these were admitted to hospital. There were an additional 53 patients admitted at the major metropolitan hospitals without going through the ED, resulting in 119 admitted patients. Several patients had multiple ED presentations and admissions during this time, such that the 86 ED patients corresponded to 111 relevant ED presentations and the 119 admitted patients corresponded to 206 associated inpatient episodes.

Over a third of 111 ED presentations with COVID-19 arrived by ambulance and only 4% were triaged into the least urgent triage category. Median ED length of stay (LOS) for the 111 ED presentations was 4.7 h (interquartile range [IQR] 2.9–6.7 h), with a maximum stay of 18 h. The median inpatient LOS for the 206 inpatient episodes with

TABLE 1. *Primary diagnoses assigned to ED and inpatient episodes for patients with COVID-19*

Principal diagnosis	COVID ED presentations	COVID inpatient episodes	COVID ICU episodes
A09.9 Gastroenteritis and colitis of unspecified origin		4	3
A41.8, A41.9 Sepsis; septicaemia	1	4	2
B34.2 Coronavirus infection	52	10	
B34.9 Viral infection	6		
B97.2 Coronavirus as cause classified to other chapters	2		
B97.8 Other viral agents as cause classified to other chapters	1		
E23.7 Disorder of pituitary gland	1		
G40.4 Other generalised epilepsy and epileptic syndromes	1		
G40.6 Grand mal seizures	1	2	
G43.0, G43.9 Migraine	1	1	
I26.9 Pulmonary embolism	1	1	
J00 Acute nasopharyngitis (common cold)		2	
J02.8 Acute pharyngitis due to other specified organisms		5	
J02.9 Acute pharyngitis, unspecified		5	
J06.9 Acute upper respiratory infection	4	2	
J10.0 Influenza with pneumonia, seasonal influenza virus identified		1	1
J10.8 Influenza with other manifestations, seasonal influenza virus identified	1		
J12.8 Other viral pneumonia		8	5
J12.9 Viral pneumonia	3	2	
J15.9 Bacterial pneumonia		1	
J18.1 Lobar pneumonia	2		
J22 Unspecified acute lower respiratory infection		1	
J34.8 Other specified disorders of nose and nasal sinuses		2	
J39.8 Other specified diseases of upper respiratory tract		1	
J96.0 Acute respiratory failure		1	
J96.9 Respiratory failure	1	3	2
J98.8 Other specified respiratory disorders	1	1	
K29.1 Other acute gastritis	1		
K59.0 Constipation	1		
K85.2 Alcohol-induced acute pancreatitis	1		
K92.2 Gastrointestinal haemorrhage	1		
M62.5 Muscle wasting and atrophy		1	
M79.1 Myalgia		2	
N17.9 Acute renal failure	1	1	
N39.0 Urinary tract infection		1	
R05 Cough	1	25	
R06.0 Dyspnoea; orthopnoea; shortness of breath	1	9	1
R07.1 Chest pain on breathing	2		

(*Continues*)

TABLE 1. *Continued*

Principal diagnosis	COVID ED presentations	COVID inpatient episodes	COVID ICU episodes
R07.3 Other chest pain		1	
R11 Nausea and vomiting	1	3	
R20.2 Paraesthesia of skin		1	
R20.8 Other and unspecified disturbances of skin sensation	2		
R31 Unspecified haematuria		1	
R42 Dizziness and giddiness	1		
R43.0 Anosmia		1	
R47.1 Dysarthria and anarthria	1		
R50.8 Other specified fever		1	
R50.9 Fever; hyperpyrexia; pyrexia		15	1
R51 Headache	2	8	
R53 Malaise and fatigue		4	
R55 Syncope and collapse	1		
R63.0 Anorexia; loss of appetite		1	
S05.9 Injury of eye and orbit	1		
S06.0 Concussion	2		
T81.0 Haemorrhage and haematoma complicating a procedure		1	
Z01.7 Laboratory examination	1		
Z03.8 Observation for other suspected diseases and conditions		1	
Z13.8 Special screening examination for other disorders	1		
Z51.9 Medical care		65	
Z71.1 Person with feared complaint in whom no diagnosis is made; 'worried well'		1	
No diagnosis	10	6	1
Total	**111**	**206**	**16**

COVID-19 was 9.8 days (IQR 3.4–13.1 days) with the longest stay being 60 days, and for the 16 ICU episodes, median LOS was 4.1 days (IQR 2.1–14.1 days) with the longest stay being 37 days. Overall, inpatient LOS for patients with COVID-19 amounted to 2026 admitted patient days, including 140 patient days in intensive care and four deaths (representing a crude mortality rate of 0.23 deaths per 100 000 population[3]).

Primary diagnoses assigned to hospital episodes for patients with COVID-19 are presented in Table 1. Almost a third of inpatient episodes (65 of 206 episodes or 32%) were assigned a diagnosis of Z51.9

'Medical care', and the high prevalence of respiratory illnesses, cough and fever mirrored the World Health Organization's case definitions for coronavirus surveillance.[4] The most prevalent diagnosis for inpatient stays incorporating an ICU admission was J12.8 'Viral pneumonia', while the most prevalent ED diagnosis for patients with COVID-19 was B34.2 'Coronavirus infection, unspecified site' (47% of cases).

Figure 1 summarises counts and sex (coloured bars drawn to scale), age (box-whisker plots) and prevalent diagnoses for patients with COVID-19 in South Australia. We observe that the admitted patient cohort is larger than the cohort of

ED presentations (patients were admitted without going through the ED); there are slightly more males in each cohort; and age generally increases with care needs except for the admitted patient cohort.

Discussion

The present study sheds light on characteristics of patients with COVID-19 hospitalised in South Australia. There is new knowledge regarding primary diagnoses assigned in hospital for patients who tested positive for COVID-19. The most prevalent diagnosis (47%) in ED for patients with COVID-19 was
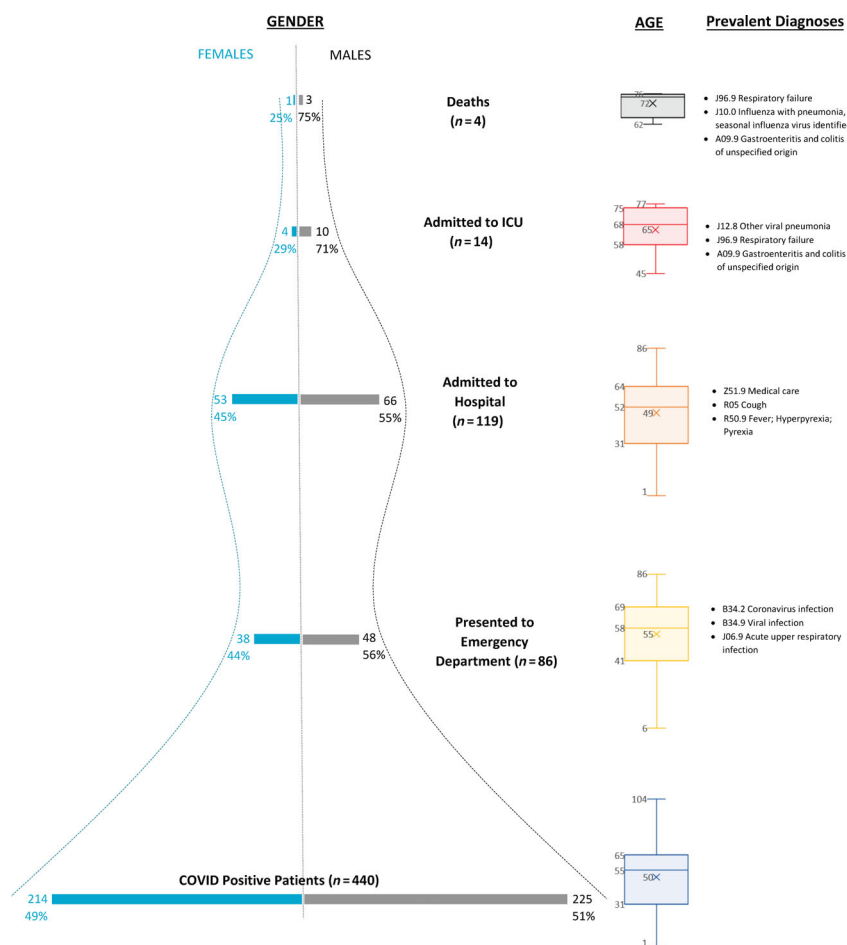
Figure 1. *Age and sex breakdown of patients with COVID-19 during the first wave of the pandemic in South Australia.*

Limitations

When matching pathology tests to hospital visits, we adopted a criterion of matching all ED presentations and inpatient admissions between January and June 2020 from patients who tested positive for COVID-19. It is possible that some hospitalisations are unrelated to the virus.

Conclusion

Linking state-wide ED, inpatient and pathology data can quantify hospital impacts and support health jurisdictions in their preparedness and planning in response to the novel coronavirus. The authors have commenced the next step in response planning by developing syndromic surveillance models that detect outbreaks to assist further with response preparedness and day-to-day hospital capacity management and operations.[13]

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Competing interests

None declared.

Data availability statement

Data analysed in this study is unable to be shared due to legislative and review committee requirements. The original data are available from SA Health and SA Pathology subject to appropriate governance and ethical approvals.

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B34.2 'Coronavirus infection, unspecified site', a code that does not appear in the study data set before February 2020. Initial advice[5] by the US Centers for Disease Control and Prevention (CDC) for coronavirus coding stated that this diagnosis code was generally not appropriate for COVID-19, because the cases had until then been respiratory in nature, so the site of any infection on a patient would not be 'unspecified'. However, it is noted that patients with COVID-19 have been reported to present with non-respiratory symptoms[6,7] such as muscle aches and pains (myalgia) and loss of sense of smell (anosmia) as seen in our study. Ocular symptoms of COVID-19 have also been reported where the ocular surface was suggested as a portal to the respiratory system.[8] In our study, the earliest presentation with ED notes occurred on 14 January 2020, and related to an eye complaint (nursing assessment: 'bilat eye pain. Both eyes look red'). Updated International Classification of Disease (ICD) coding guidelines[9] make reference to a new diagnosis code established by the World Health Organization for COVID-19 ('U07.1'), which is likely to be implemented in the next ICD update.[10] Use of this code is growing and its inclusion in syndromic surveillance and future epidemiological studies is acknowledged.[11] Further advice regarding the classification of COVID-19 cases in Australian hospitals has been issued by the Independent Hospital Pricing Authority.[12]

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