MJA
The Medical Journal of Australia

Supporting Information

Supplementary methods and results

This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.

Appendix to: Haustead D, Toh DJ, Reddi B, et al. Clinical course and care requirements during the 2020 COVID-19 epidemic in South Australia. *Med J Aust* 2019; doi: 10.5694/mja2.51047.

METHODS

Setting and model of care

South Australia is a state in the southern central part of Australia, with a population of approximately 1.75 million, of whom over 75% reside in the capital city, Adelaide.[1] The nearest major city is Melbourne, 650km away. Since the middle of March 2020 and continuing throughout the duration of this study, SA enacted social distancing measures and closed both domestic and international borders, physically isolating at the state level. Early in the pandemic, a statewide coronavirus disease 2019 (COVID-19) management pathway was developed, including a single centralised community and hospital service.[2]

In the community, there are nurse-run testing centres (44 centres, mixture of walk-in and drive-through), from which all samples for COVID-19 testing are processed by a single pathology service (SA Pathology). All non-hospitalised adults (18 years or older) who test positive are then triaged by phone by a team of general practitioners who co-ordinate their ongoing management in the community. All adult patients (except pregnant women about to give birth) with confirmed or suspected COVID-19 infections and requiring hospitalisation are admitted to the Royal Adelaide Hospital (RAH), regardless of where they initially presented in SA. The RAH is a tertiary hospital with 800 single rooms, all with bathrooms and a "pandemic mode" design feature that allows individual wards and areas of the emergency department (ED) to operate as relative negative pressure areas. As non-COVID-19 related services were moved to other hospitals in SA to increase the capacity for potential COVID-19 patients at the RAH, bed capacity exceeded demand throughout the study period.

All instances of patients who presented to the ED with fever of unknown cause or respiratory symptoms or epidemiological risk factors were treated as potential COVID-19 cases. Patients who fit any of these criteria were triaged outside the ED by a nurse in personal protective equipment (PPE) and were then managed in an isolated area of the ED by an emergency physician-led COVID-19 team. Emergency services provide pre-notification of arrival for all patients who met potential COVID-19 criteria. Patients with either suspected COVID-19 (defined by the Communicable Disease Network Australia [CDNA] guidelines: having either fever and respiratory symptoms, or epidemiological risk factors) or confirmed COVID-19 requiring admission were admitted to a dedicated COVID-19 unit consisting of general physicians and infectious disease and respiratory specialists.[3] For patients with confirmed or suspected COVID-19 but with an indication for admission unrelated to COVID-19, other specialists were consulted as required, but the patients were admitted under the care of the COVID-19 team. After discharge, the community team coordinated the care of patients not been deemed to be clear of COVID-19 infection.

Personal protective equipment and screening

All health care personnel in the same room as a patient with suspected COVID-19 wear surgical masks, goggles, or face shields, long-sleeved gowns, and gloves. When performing procedures that can generate aerosols or caring for critically unwell patients, a formally fit-tested N95 respirator is worn instead of a surgical mask. No PPE is worn when not in the same room as the patient. The patient is encouraged to wear a surgical mask as tolerated. Staff members without appropriate PPE exposed to patients with confirmed COVID-19 must self-isolate for two weeks before returning to work. All staff members and hospital visitors (no visitors are allowed for patients with potential COVID-19; one visitor for other patients) are asked COVID-19 screening questions on entering the hospital and are directed to a testing centre if appropriate.

Study population and data collection

The study was conducted between 30 January 2020, the date of the first positive severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) test in SA, until 26 April 2020. Clinical outcomes were monitored until 6 May 2020. Results were collected for all SARS-CoV-2 reverse transcriptase–polymerase chain reaction (RT-PCR) assay tests in SA. Specimens were predominately nasopharyngeal swabs, but included small numbers of specimens from sputum, faeces, and tracheal

aspirates. No salivary or serology tests were included. When an associated respiratory pathogen testing panel was also used, the results were also obtained. SARS-CoV-2-positivity was defined as having at least one laboratory-confirmed positive SARS-CoV-2 test in SA; a confirmed case was defined by a positive RT-PCR assay result. Repeat tests were performed for hospitalised patients shortly after initial test results became available if the clinical pre-test probability of COVID-19 was high.

Testing data (SARS-CoV-2 and other respiratory pathogens) were obtained from SA Pathology: patient demographic information, date and time of specimen collection, specimen type, testing location and test results. As some patients had several tests for SARS-CoV-2 during the study period, results are presented for total tests and for total persons tested. SA Pathology patient identification numbers were linked to SA hospital identification numbers for linkage of test results with clinical data for hospitalised patients.

Clinical data was collected from the enterprise electronic health record (Sunrise Clinical Manager; Allscripts). ED visit data were obtained for all patients who presented to the RAH ED with a positive SARS-CoV-2 test result or who met the criteria for potential COVID-19 infection. Inpatient data were collected for all patients admitted to the RAH with a positive SARS-CoV-2 test result or who met the criteria for suspected COVID-19. ICU data were recorded for all patients with confirmed COVID-19 admitted to the RAH ICU. We collected data on patient demographic information, arrival method, triage category, comorbid conditions, laboratory and radiology results and number of tests ordered per admission, other diagnoses during the course of infection, treatments (including high-flow oxygen, invasive mechanical ventilation, extra-corporeal membrane oxygenation, and kidney replacement therapy), and outcomes (including length of stay, discharge, re-admission, and death). All clinical outcomes are presented for patients who completed their hospital course by study end. One patient with COVID-19 remained in hospital (general ward) at the end of the study period, and their final outcome was unknown; all other data for this patient were included in the analysis. All investigations and management were performed at the discretion of the treating physician.

Children (under 18 years of age) were not treated at the RAH, and clinical outcomes only are presented for these patients.

Statistical analysis

Descriptive statistics were used to summarise data (medians with interquartile ranges or counts and percentages). For ED presentations and inpatient admissions, results are presented for SARS-CoV-2-positive patients and, for comparison and as a guide to resource use, patients with potential or suspected COVID-19 who tested negative. Given suspicions of prognostic differences for people over 65 years of age, data were collated for people aged 18–65 years and for those over 65. There were no missing data. Analyses were performed using R 3.5.2 (R Project for Statistical Computing; R Foundation).

REFERENCES

1. Australian Bureau of Statistics. Australian demographic statistics. Sep 2019. https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release (viewed May 2020)
2. Government of South Australia. COVID-19. Adelaide: Government of South Australia, 2020. https://www.covid-19.sa.gov.au (viewed May 2020).
3. Communicable Diseases Network Australia. Coronavirus Disease 2019 (COVID-19). Australia: The Department of Health, May 2020. https://www1.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-novel-coronavirus.htm (viewed May 2020)

Table 1. SARS-CoV-2 and other respiratory pathogen testing results, South Australia, 30 January – 26 April 2020

	SARS-CoV-2-positive	SARS-CoV-2-negative	Total
Patients	438 (0.8%)	52,445 (99.2%)	52,883
Tests	832 (1.4%)	57,470 (98.6%)	58,302
Age (years), median (IQR) [range]	54 (31–64) [1–94]	43 (28–60) [0–104]	44 (28–60) [0–104]
Sex			
Female	211 (48.1%)	30,380 (57.9%)	30,591 (57.9%)
Male	227 (51.9%)	22,065 (42.1%)	22,292 (42.1%)
Test location			
Community	148 (17.8%)	26,333 (45.8%)	26,481 (45.4%)
Hospital	684 (82.2%)	31,137 (54.2%)	31,821 (54.6%)
Other pathogens (positive/tested)			
Respiratory syncytial virus	0/438	333/52,560 (0.6%)	333/52,998 (0.6%)
Influenza A	7/438 (2%)	554/52,558 (1.1%)	561/52,996 (1.1%)
Influenza B	0/438	148/52,558 (0.3%)	148/52,996 (0.3%)
Human metapneumovirus	1/438 (0.2%)	164/52,560 (0.3%)	165/52,998 (0.3%)
Adenovirus	2/425 (0.5%)	595/51,295 (1.2%)	597/51,720 (1.2%)
Rhinovirus	6/253 (2%)	4927/22,371 (22.0%)	4933/22,624 (21.8%)
Parainfluenza 1	0/134	292/16,207 (1.8%)	292/16,341 (1.8%)
Parainfluenza 2	0/134	24/16,207 (0.2%)	24/16,341 (0.2%)
Parainfluenza 3	0/134	59/16,207 (0.4%)	59/16,341 (0.4%)
Mycoplasma pneumoniae	1/425 (0.2%)	362/51,296 (0.7%)	363/51,721 (0.7%)
Bordetella pertussis	0/331	130/46,393 (0.3%)	130/46,724 (0.3%)

IQR = interquartile range.

Table 2. Patients who presented to the Royal Adelaide Hospital emergency department with confirmed or potential SARS-CoV-2 infection

	SARS-CoV-2-positive			SARS-CoV-2-negative		
	18–65 years	**> 65 years**	**All**	**18–65 years**	**> 65 years**	**All**
Number of patients	83 (69%)	37 (32%)	120	1268 (57.5%)	939 (42.5%)	2207
Age (years), median (IQR) [range]	55 (38–60) [19–45]	72 (69.5–74.5) [66–86]	59 (46–68) [19–86]	44 (31–55%) [18–65]	80 (72–86%) [66–103]	60 (41–77%) [18–103]
Sex						
Female	39 (47%)	17 (46%)	56 (47%)	685 (54.0%)	431 (45.9%)	1116 (50.6%)
Male	44 (53%)	20 (54%)	64 (53%)	583 (46.0%)	508 (54.1%)	1091 (49.4%)
Positive test prior to arrival	70 (84%)	31 (84%)	101 (84%)	—	—	—
New diagnosis	13 (16%)	6 (16%)	19 (16%)	—	—	—
Arrival mode						
Emergency services	37 (45%)	24 (65%)	61 (51%)	645 (50.9%)	765 (81.5%)	1410 (63.9%)
Private vehicle	46 (55%)	13 (35%)	59 (49%)	623 (49.1%)	174 (18.5%)	797 (36.1%)
Length of stay (min), median (IQR) [range]	284 (232–413) [45–722]	300 (225–402) [148–824]	291 (231–410) [45–824]	289 (184–444) [4–4458]	365 (262–487) [2–1481]	326 (210–464) [2–4458]
Triage category						
ATS 1 (resuscitation)	1 (1%)	0	1 (0.8%)	36 (2.8%)	36 (3.8%)	72 (3.3%)
ATS 2 (emergency)	12 (14%)	2 (5%)	14 (12%)	336 (26.5%)	370 (39.4%)	706 (32.0%)
ATS 3 (urgent)	51 (61%)	29 (78%)	80 (67%)	616 (48.6%)	433 (46.1%)	1049 (47.5%)
ATS 4 (semi-urgent)	19 (23%)	6 (16%)	25 (21%)	261 (20.6%)	97 (10.3%)	358 (16.2%)
ATS 5 (non-urgent)	0	0	0	19 (1.5%)	3 (0.3%)	22 (1.0%)
Disposition from emergency department						
Inpatient COVID-19 team	59 (71%)	31 (84%)	90 (75%)	188 (14.8%)	231 (24.6%)	419 (19.0%)
Inpatient non-COVID-19 team	0 (0%)	1 (2.7%)	1 (0.8%)	413 (32.6%)	515 (54.8%)	928 (42.0%)
Intensive care unit	2 (2.4%)	1 (2.7%)	3 (2%)	48 (3.8%)	31 (3.3%)	79 (3.6%)
Emergency short stay unit	0	0	0	104 (8.2%)	53 (5.6%)	157 (7.1%)
Discharge	22 (26%)	4 (11%)	26 (22%)	494 (39.0%)	102 (10.9%)	596 (27.0%)
Died	0	0	0	0	3 (0.3%)	3 (0.1%)
Left before treatment complete	0	0	0	21 (1.7%)	4 (0.4%)	25 (1.1%)
Re-presentation by 28 days	7 (8%)	1 (3%)	8 (7%)	197 (15.5%)	112 (11.9%)	309 (14.0%)

ATS = Australasian Triage Scale; COVID 19 = coronavirus disease 2019; IQR = interquartile range.

Table 3. Demographic information and outcomes for all people with confirmed or suspected COVID-19 patients admitted to the inpatient COVID-19 unit, Royal Adelaide Hospital, 30 January – 26 April 2020

	SARS-CoV-2-positive			SARS-CoV-2-negative		
	18–65 years	**> 65 years**	**All**	**18–65 years**	**> 65 years**	**All**
Inpatients	84 (72%)	33 (28%)	117	188 (44.9%)	231 (55.1%)	419
Age (years), median (IQR) [range]	55 (45–60) [19–65]	72 (70–76) [66–86]	59 (50–69) [19–86]	51 (35–57) [18–65]	80 (73–86) [66–99]	68 (52–81) [18–99]
Sex						
Female	39 (46%)	14 (42%)	53 (45%)	91 (48.4%)	95 (41%)	186 (44%)
Male	45 (54%)	19 (58%)	64 (55%)	97 (51.6%)	136 (59%)	233 (56%)
Usual residence						
Own home	83 (99%)	29 (88%)	112 (96%)	166 (88.3%)	180 (78%)	346 (83%)
Low level supported care	0	1 (3%)	1 (0.9%)	7 (3.7%)	20 (8.7%)	27 (6.4%)
High level supported care	0	0	0	8 (4.3%)	31 (13%)	39 (9.3%)
Hotel	1 (1%)	3 (9%)	4 (3%)	1 (0.5%)	0	1 (0.2%)
Homeless	0	0	0	5 (2.7%)	0	5 (1%)
Prison	0	0	0	1 (0.5%)	0	1 (0.2%)
Length of stay (h), median (IQR) [range]	56 (22–168) [1–743]	182 (87–285) [1–994]	78 (26–208) [1–994]	54 (31–133) [1–690]	96 (48–158) [3–492]	79 (39–148) [1–690]
Investigations as inpatient (total orders)						
Blood pathology, median (IQR) [range]	7 (3–17) [0–148]	22 (14–41) [2–225]	11 (4–24) [0–225]	11 (7–19) [2–129]	16 (9–27) [2–162]	13 (8–24) [2–162]
Microbiology, median number (IQR) [range]	2 (0–5.75) [0–39]	3 (1–9.5) [0–30]	2 (0.5–6) [0–39]	4 (2–7) [0–40]	4 (2–6) [1–30]	4 (2–7) [0–40]
X-ray, median number (IQR) [range]	1 (0–1) [0–6]	1 (1–2) [0–10]	1 (0–2) [0–10]	1 (1–1) [0–11]	1 (1–2) [0–10]	1 (1–2) [0–11]
Computed tomography, median number (IQR) [range]	0 (0–0) [0–2]	0 (0–1) [0–3]	0 (0–1) [0–3]	0 (0–1) [0–4]	1 (0–1) [0–5]	0 (0–1) [0–5]
Other pathogens						
Respiratory syncytial virus	0	0	0	2	1	3
Human metapneumovirus	1	0	1	1	0	1

	SARS-CoV-2-positive			SARS-CoV-2-negative		
	18–65 years	**> 65 years**	**All**	**18–65 years**	**> 65 years**	**All**
Influenza A	2	0	2	3	1	4
Influenza B	0	0	0	1	0	1
Adenovirus	1	0	1	1	0	1
Rhinovirus	0	1	1	4	2	6
Mycoplasma pneumoniae	0	0	0	10	2	12
Bordetella pertussis	0	0	0	1	0	1
Disposition						
Discharge home	8 (10%)	1 (3%)	9 (8%)	65 (35%)	36 (16%)	101 (24%)
Discharge to community team	75 (89%)*	28 (85%)†	103 (88%)	5 (3%)	7 (3%)	12 (2.9%)
Transfer to other inpatient team	0	0	0	117 (62%)	184 (80%)	301 (72%)
Intensive care unit	7 (8%)	6 (18%)	13 (11%)	10 (5.3%)	5 (2%)	15 (4%)‡
Died	0	0	0	0	4 (2%)	4 (1%)
Current inpatient	0	1 (3%)	1 (0.8%)	0	0	0
Re-presentation by 28 days	6 (7%)	0	6 (5%)	9 (5%)	7 (3%)	16 (4%)

IQR = interquartile range.

* Includes six patients who went to the ICU before returning to the COVID-19 team.
† Includes three patients who went to the ICU before returning to the COVID-19 team
‡ All patients who went to the ICU were also transferred to another team.

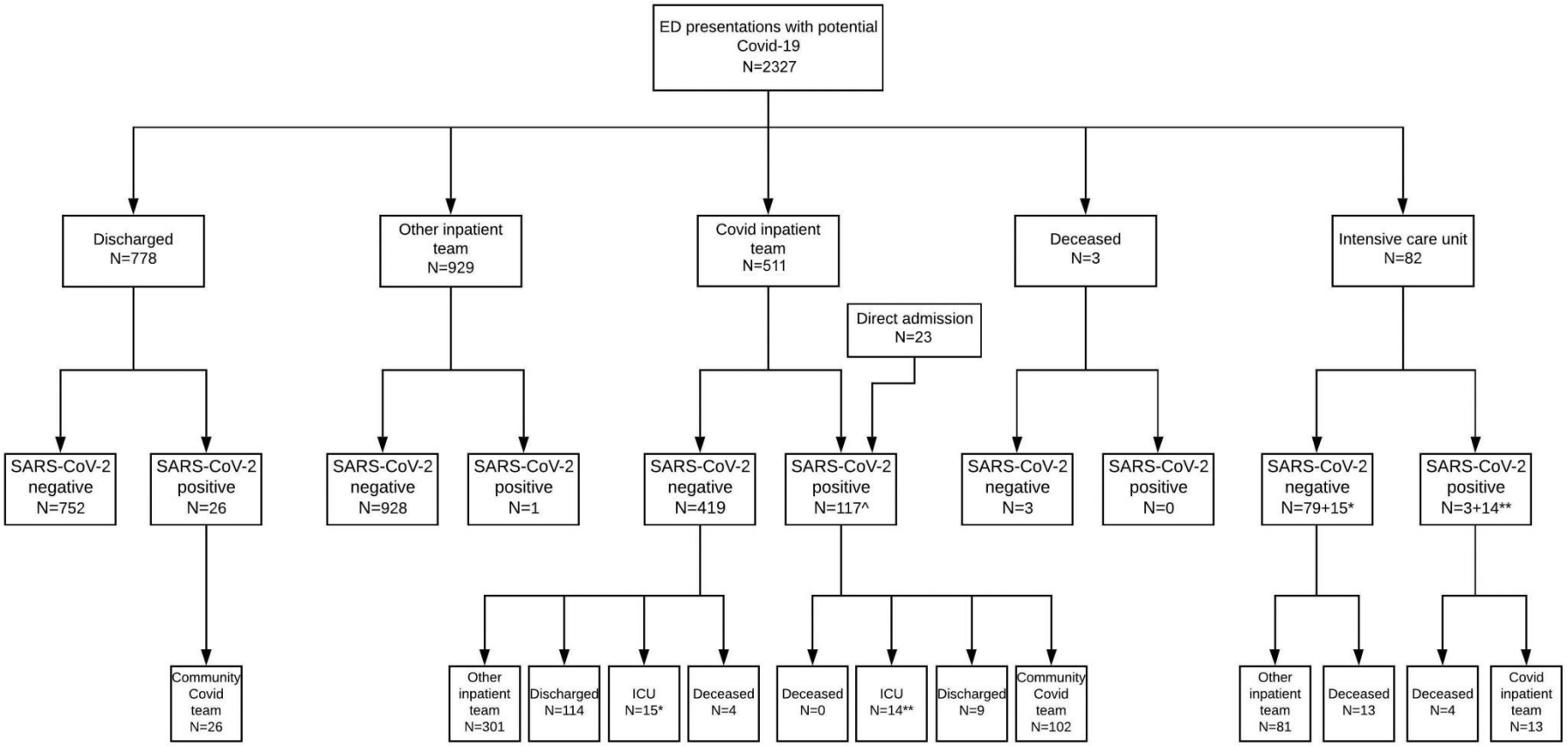
Table 4. Demographic characteristics, treatment and outcomes for people with confirmed COVID-19 admitted to intensive care at Royal Adelaide Hospital, 30 January – 26 April 2020

	18–65 years	> 65 years	All
Admitted patients (proportion of SARS-CoV-2-positive patients)	9 (3%)	8 (8%)	17 (3.8%)
Age (years), median (IQR) [range]	59 (47–63%) [26–65]	73 (69–76%) [68–77]	65 (56–73%) [26–77]
Sex			
Women	3 (33%)	1 (12%)	4 (24%)
Men	6 (67%)	7 (88%)	13 (76%)
Admission from emergency department	2 (22%)	1 (12%)	3 (18%)
Admission from ward	7 (78%)	7 (88%)	14 (82%)
Length of stay (days), median (IQR) [range]			
Before ICU	5.2 (1.0–6.1) [0.2–7.5]	2.4 (1.8–3.4) [0.2–6.2]	3.3 (1.6–6.0) [0.2–7.5]
In ICU	2.2 (1.6–4.4) [1.5–19.4]	17.3 (3.0–29.3) [2.5–36.8]	2.9 (1.8–18.4) [1.5–36.8]
After ICU	5.7 (4.2–8.2) [3.9–14.2]	5.1 (4.5–11.1) [4.3–15.4]	5.3 (4.3–8.2) [3.9–15.4]
Total	11.4 (9.2–15.8) [7.8–33.6]	28.5 (9.1–41.3%) [8.1–42.3]	11.9 (9.5–31.1) [7.8–42.3]
Treatment			
Nasal high flow	8 (89%)	7 (88%)	15 (88%)
Nasal high flow (days), median (IQR) [range]	1.5 (0.25–2.75) [0–5]	2 (0–3) [0–18]	2 (0–3) [0–18]
Non-invasive ventilation	0	0	0
Invasive mechanical ventilation	2 (22%)	6 (75%)	8 (47%)
Mechanical ventilation (days), median (IQR) [range]	10* [6–14]	11.5 (8–18) [3–27]	11.5 (7–15) [3–27]
Extracorporeal membrane oxygenation- no.	0	0	0
Renal replacement therapy	1 (11%)	3 (38%)	4 (24%)
Renal replacement therapy (days), median (IQR) [range]	2 [2–2]*	8 (3–26) [3–26]	5.5 (2.2–22) [2–26]
Tracheostomy	0	1 (12%)	1 (6%)
Disposition			
Discharged to hospital	8 (89%)	4 (50%)	12 (71%)
Discharged to ICU (current inpatient)	0	1 (12%)	1 (6%)
Died	1 (11%)	3 (38%)	4 (24%)

ICU= intensive care unit; IQR = interquartile range.

* No IQR, as there were only two patients in these groups.

Figure. Disposition of patients with potential COVID-19 who presented to the emergency department of the Royal Adelaide Hospital, 30 January – 26 April 2020



COVID-19 = coronavirus disease 2019; ED = emergency department; ICU= intensive care unit; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.
Patients who presented to the ED were considered to potentially have COVID-19 if they had fever of unknown cause, respiratory symptoms, or epidemiological risk factors. Patients who required admission to hospital and were classified as having confirmed or suspected COVID-19 on the basis of having either fever AND respiratory symptoms OR epidemiological risk factors were admitted under the care of a dedicated COVID-19 team or to the intensive care unit.

^ Includes one patient transferred from a non-COVID-19 inpatient team after testing positive for SARS-CoV-2 and two transferred from intensive care after being admitted directly from the ED.
* 15 SARS-CoV-2-negative patients admitted under the COVID-19 inpatient team required transfer to the ICU and are included in both counts.
** 14 SARS-CoV-2-positive patients admitted under the COVID-19 inpatient team required transfer to the ICU, 11 of whom returned to the COVID-19 inpatient team, as did two of three patients admitted to the ICU from the ED. These patients are counted in both ICU and COVID-19 inpatient team numbers.