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COVID-19, Australia: Epidemiology Report 11:

Reporting week ending 23:59 AEST 12 April 2020

COVID-19 National Incident Room Surveillance Team

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COVID-19, Australia: Epidemiology Report 11: Reporting week ending 23:59 AEST 12 April 2020

COVID-19 National Incident Room Surveillance Team

Notified cases of COVID-19 and associated deaths reported to the National Notifiable Diseases Surveillance System (NNDSS) to 12 April 2020.

An error occurred in the composition of Figure 4 (Age distribution of all cases, hospitalised cases, and deaths with median, interquartile range, and range) as originally published, which incorrectly depicted a median age at death of 84.5 years. This has now been amended with a revised figure showing the current median age at death of 78.5 years.

Summary

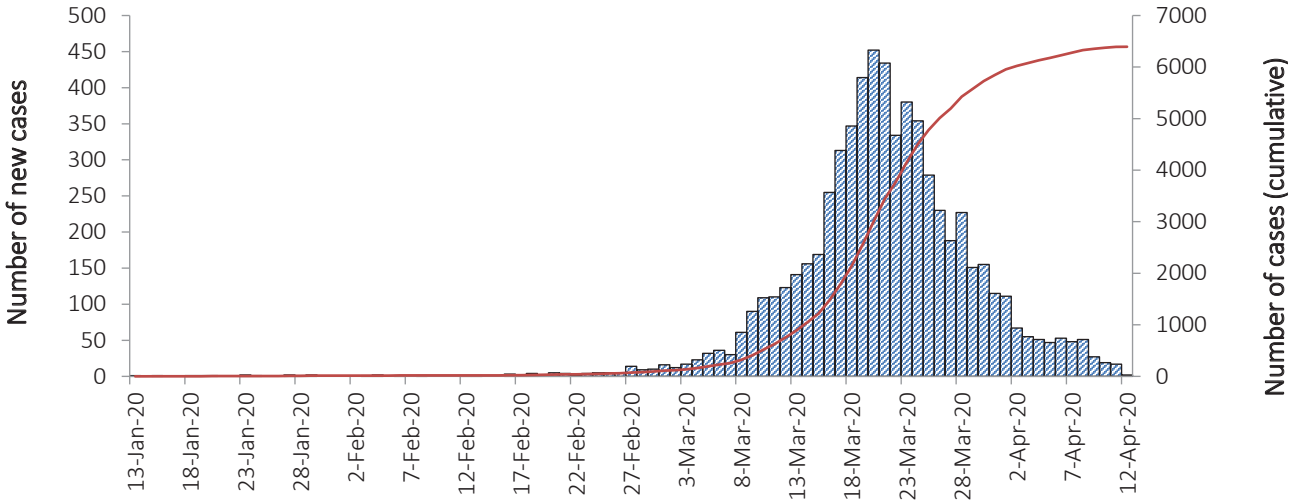
The reduction in international travel, domestic movement, social distancing measures and public health action have likely slowed the spread of the disease (Figure 1).

Confirmed cases in Australia notified up to 12 April 2020[i]	
Notifications	6,394
Deaths	46

Notifications in Australia remain predominantly among people with recent overseas travel, with some locally-acquired cases being detected. Most locally-acquired cases are able to be linked back to a confirmed case, with a small portion unable to be epidemiologically linked. The distribution of overseas-acquired cases to locally acquired cases varies by jurisdiction.

Internationally, cases continue to increase. The rates of increase have started to slow in several regions, although it is too soon to tell whether this trend will be sustained. The epidemiology differs from country to country depending not only on the disease, but also on differences in case detection, testing and implemented public health measures.

Keywords: SARS-CoV-2; novel coronavirus; 2019-nCoV; coronavirus disease 2019; COVID-19; acute respiratory disease; case definition; epidemiology; Australia



i Data caveats: Based on data extracted from the National Notifiable Diseases Surveillance System (NNDSS) on 14 April 2020. Due to the dynamic nature of the NNDSS, data in this extract are subject to retrospective revision and may vary from data reported in published NNDSS reports and reports of notification data by states and territories.

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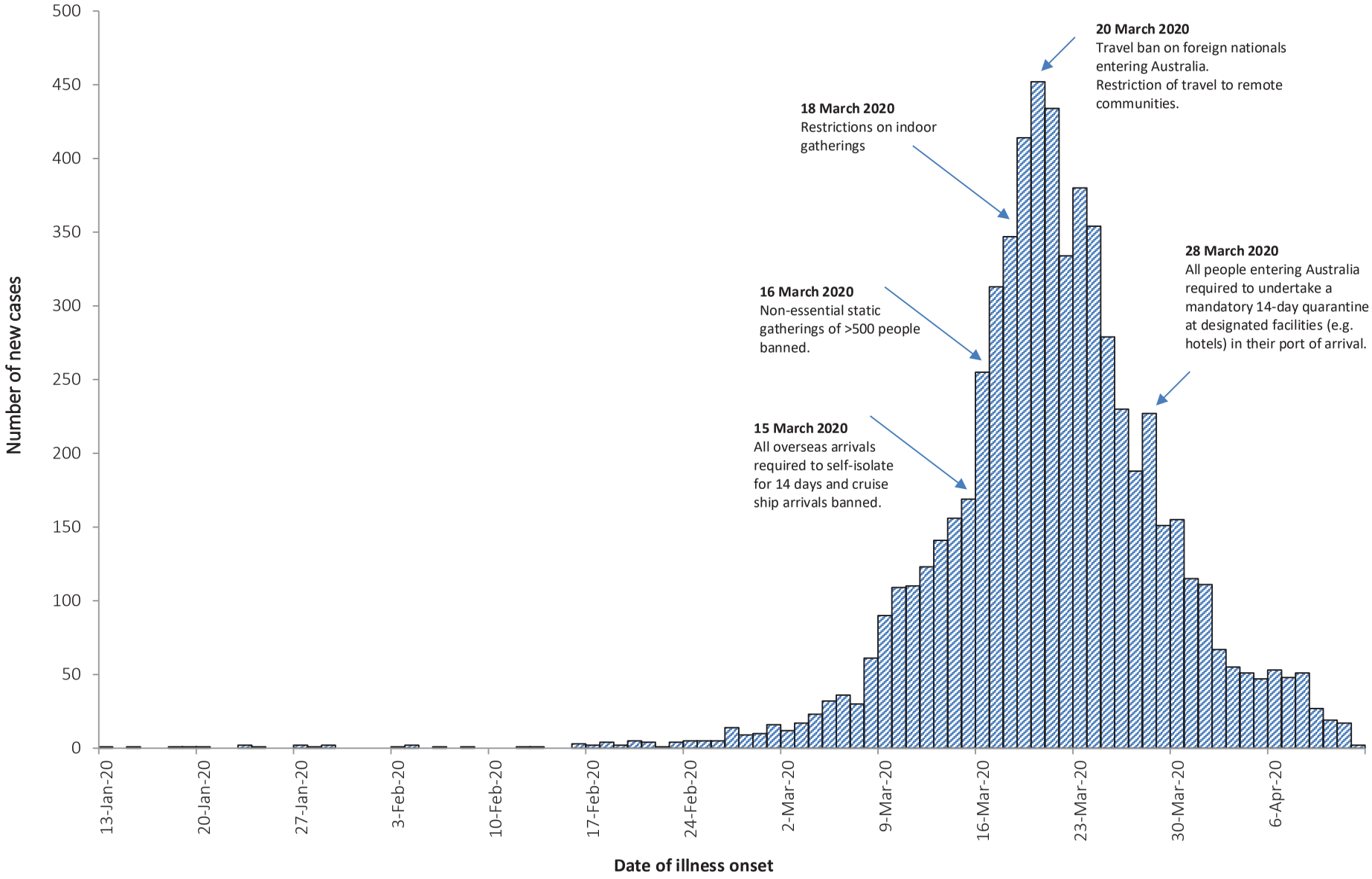
Figure 1: COVID-19 notifications in Australia by date of onset, from 13 January to 12 April 2020,[a] with timing of key public health measures



a Due to reporting delays, interpret the latest days' new cases with caution.

Australian cases: descriptive epidemiology

National trends

- Over the past week, 589 cases of COVID-19 were notified to the NNDSS, bringing the total number of confirmed cases notified in Australia to 6,394 (up to 23:59 AEST 12 April 2020). This is a 65% decrease in weekly new cases compared to the previous reporting period (n = 1,646);
- The median time between onset of symptoms and laboratory testing was 3 days (interquartile range: 1–6 days); and
- Forty-four cases (0.7%) have been reported in Aboriginal and Torres Strait Islander persons since the start of the outbreak. These cases were reported across several jurisdictions, with the majority reported in areas classified as 'major cities of Australia' based on the case's usual place of residence. Across all Australian cases, completeness of the Indigenous status field was approximately 78%; 22% of cases had a reported value of 'not stated' or had no information provided.

Geographical distribution

- Cases of COVID-19 continue to be reported at varying rates in all jurisdictions (Table 1);
- New South Wales had the highest rate of COVID-19 notifications (35.4 per 100,000) and the Northern Territory had the lowest (11.0 per 100,000);
- The majority of new cases continue to be reported in New South Wales and Victoria over this past week. No cases were reported from the Northern Territory during this reporting period; and
- Most cases over the past fortnight were reported to reside in major metropolitan areas, with a small number of cases residing outside these areas (Figure 2 and Figure 3).

Age and gender distribution

- Cases of COVID-19 were reported across all age groups. The median age of all COVID-19 cases was 47 years (interquartile range: 29–62 years) (Figure 4);
- The number of cases was highest in the 20–29 years age group;
- The highest rate of disease was among those in the 60–69 years age group, followed closely by the 70 – 79 years age group (Figure 5);
- Children make up a very small proportion of cases nationally with 1% aged less than 10 years and 3% aged 10 – 19 years; and
- Notifications by gender were approximately equal, although there was some variation across age groups.

Source of infection

- To date, most of the reported COVID-19 cases in Australia acquired their infection overseas;
- Of cases with a reported place of acquisition, 65% had a recent international travel history and 33% were considered to have been locally acquired (Figure 6):
    - The majority of overseas-acquired cases reported a travel history to the European Region, the Americas Region or on board cruise ships (Figure 7);
    - Of the locally-acquired cases, most were considered to be contacts of a confirmed case, with a very small proportion of cases not able to be epidemiologically linked to a confirmed case; and
    - Cases where a place of acquisition has not been reported (1.3%) are currently under public health investigation.

Table 1: Notifications and rates of COVID-19 and diagnostic tests performed, Australia, by jurisdiction

Jurisdiction	Number of new cases this reporting period (00:00 AEST 6 April to 23:59 AEST 12 April 2020)	Total cases (to 23:59 AEST 12 April 2020)	Rate (per 100,000 population)	Cumulative number of tests performed (proportion of tests positive %)
NSW	208	2,867	35.4	141,777 (2.0%)
Vic	150	1,317	20.0	67,000 (2.0%)
Qld	69	1,000	19.6	72,313 (1.4%)
WA	57	501	19.1	23,118 (2.2%)
SA	22	431	24.6	36,449 (1.2%)
Tas	71	147	27.5	3,770 (3.9%)
NT	0	27	11.0	3,355 (0.8%)
ACT	12	104	24.4	6,159 (1.7%)
Australia	589	6,394	25.2	353,941 (1.8%)

Cluster and outbreak investigations

Investigations are taking place in states and territories in relation to a number of clusters and outbreaks of COVID-19. To date the largest outbreaks have been associated with cruise ships, with some other large domestic clusters associated with healthcare facilities and private functions, such as weddings.

Cruise ships account for a substantial proportion of cases of COVID-19 in Australia. Of cases with a reported place of acquisition, 17% (n = 950) were acquired at sea on a cruise ship. This is a 5% increase in COVID-19 cases acquired on a cruise ship since the last reporting period. There have been 17 deaths among cases acquired on cruise ships in Australia.

As reported by states and territories on 11 April 2020, there were 21 known clusters or outbreaks of COVID-19 occurring in healthcare settings and approximately 481 cases in healthcare workers, with no such cases occurring in the Northern Territory. Where jurisdictions reported source of infection, 79% (244/307) of healthcare workers acquired their infection outside of the healthcare settings, such as from travel overseas or a household contact.

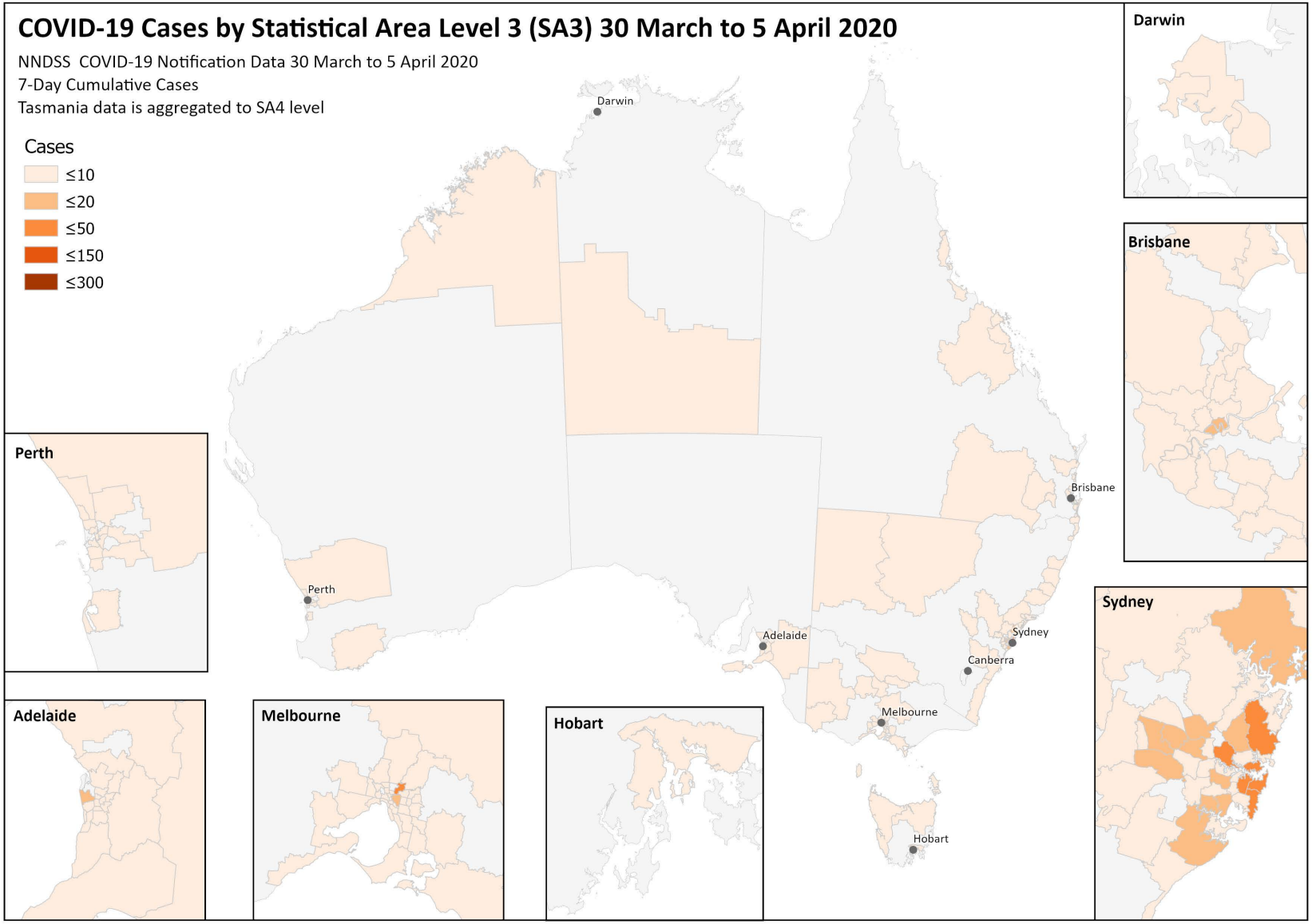
Cluster:

- The term 'cluster' in relation to COVID-19 refers to two or more cases that are epidemiologically related in time, place or person where a common source (such as an event or within a community) of infection is suspected but not yet established.

Outbreak:

- The term 'outbreak' in relation to COVID-19 refers to two or more cases among a specific group of people and/or over a specific period of time where illness is associated with a common source (such as an event or within a community).

Figure 2: Confirmed cases of COVID-19, Australia, by location of usual residence and statistical area level 3,a 7 day heat map as at 5 April 2020



a Represents the usual location of residence of a case, which does not necessarily mean that this is the place where they acquired their infection or were diagnosed. Overseas residents who do not have a usual place of residence in Australia are not shown.

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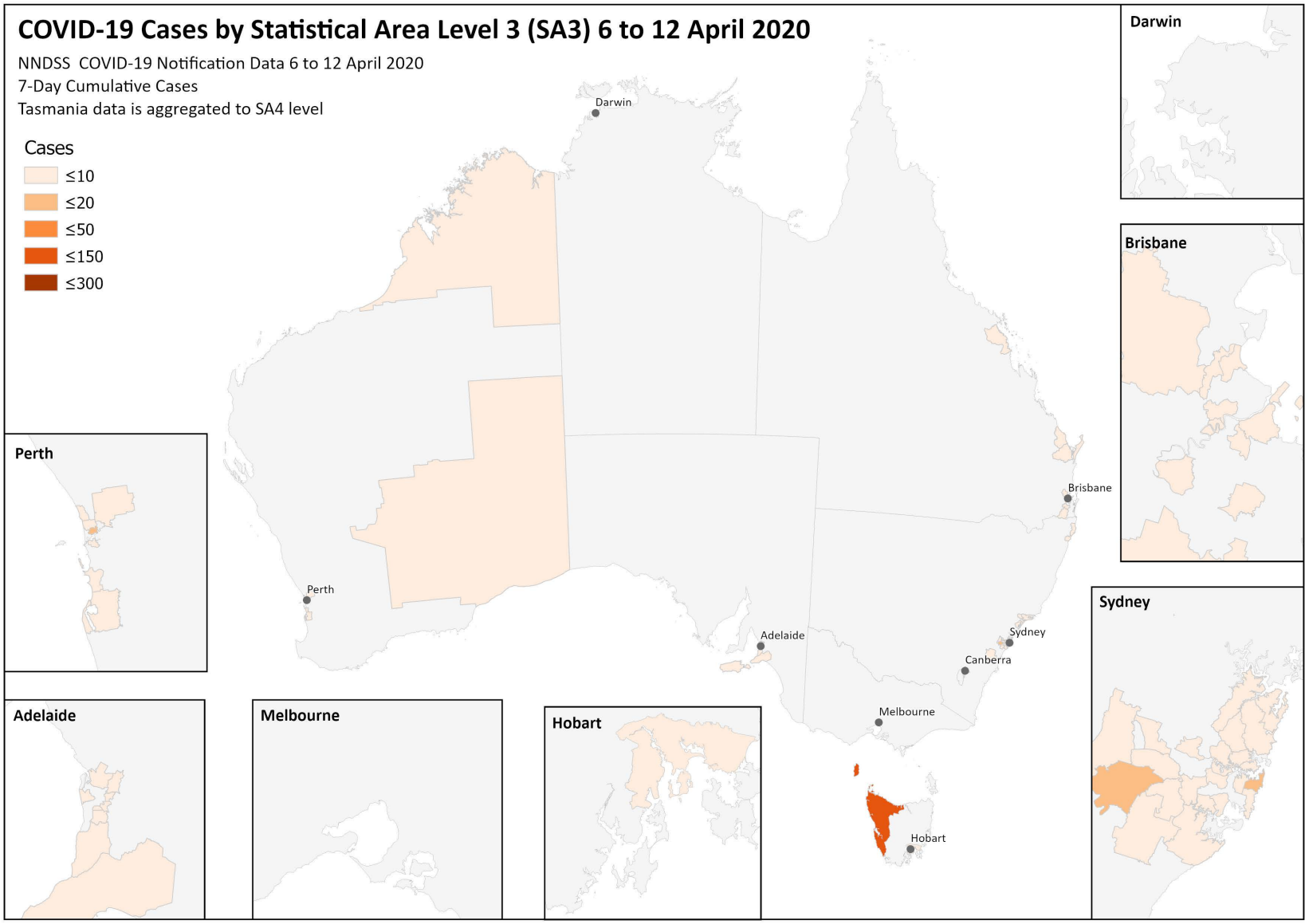
Figure 3: Confirmed cases of COVID-19, Australia, by location of usual residence and statistical area level 3,a 7 day heat map as at 12 April 2020



a Represents the usual location of residence of a case, which does not necessarily mean that this is the place where they acquired their infection or were diagnosed. Overseas residents who do not have a usual place of residence in Australia are not shown

Figure 4: Age distribution of all cases, hospitalised cases, and deaths with median, interquartile range, and range.

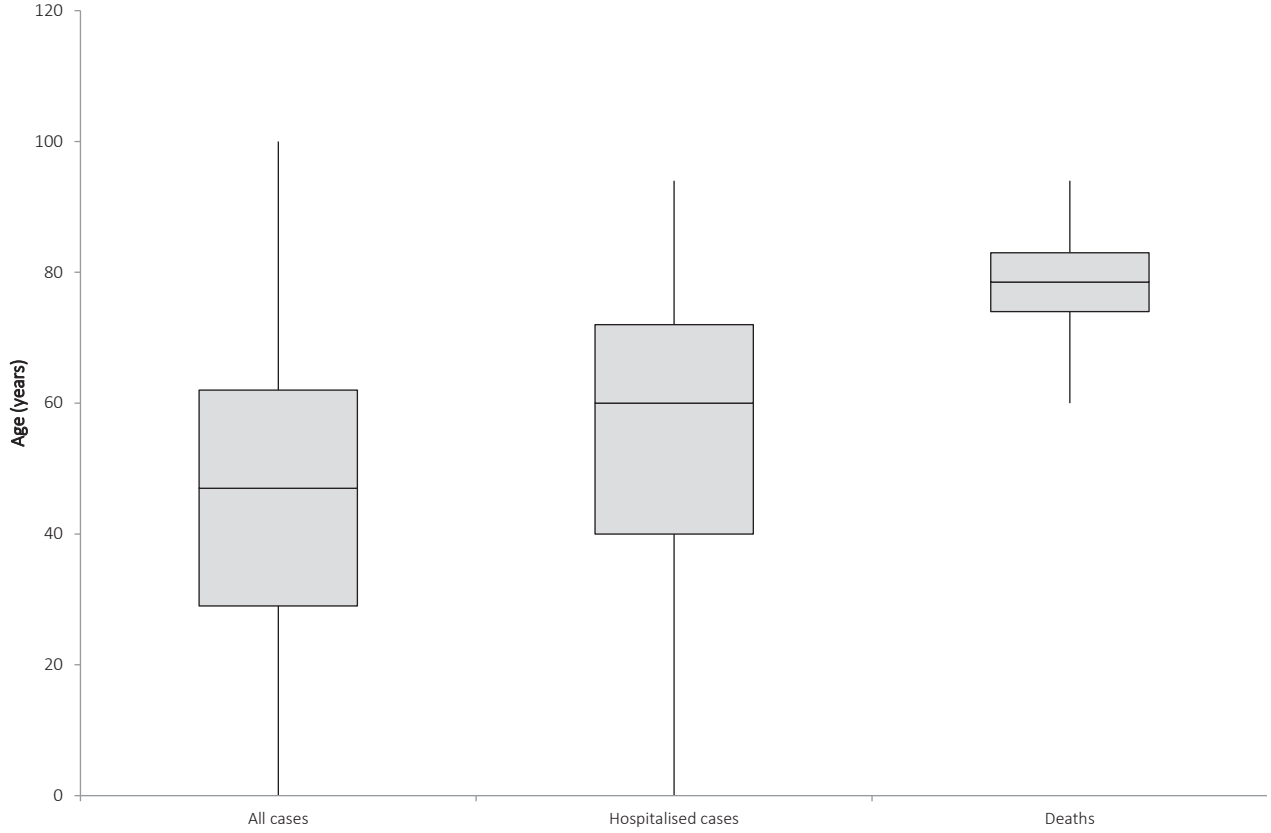


Figure 5: COVID-19 notification rates per 100,000, Australia, by age group and gender

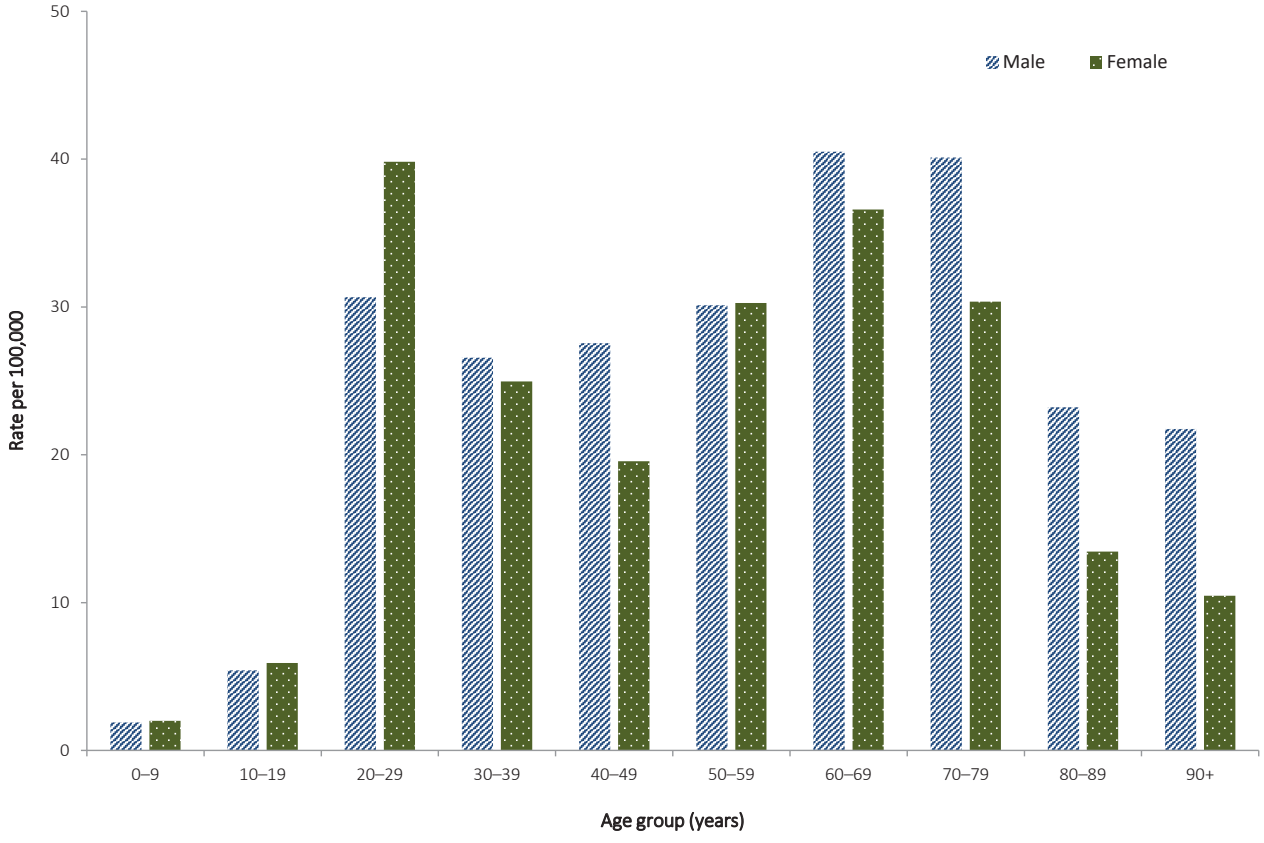


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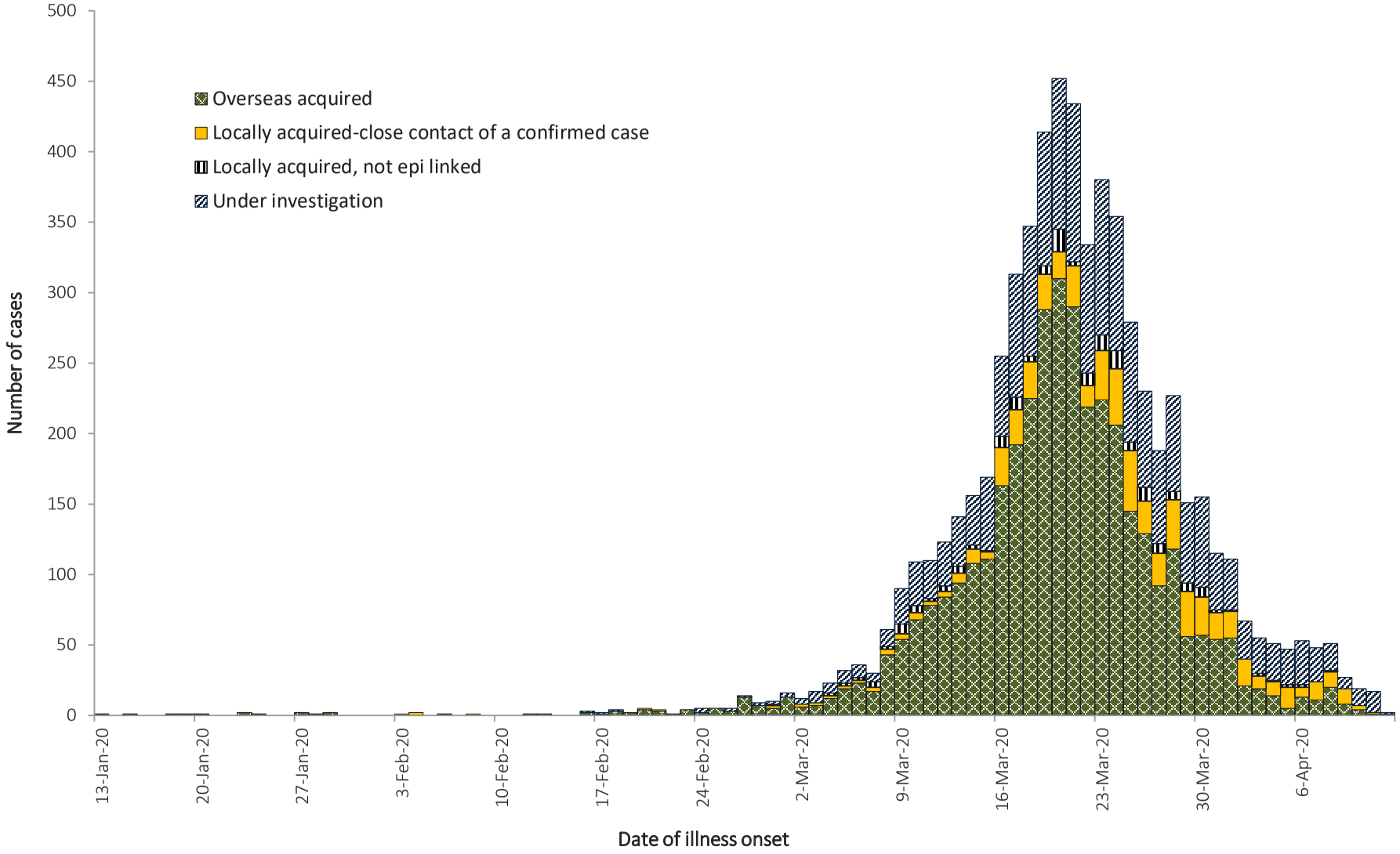
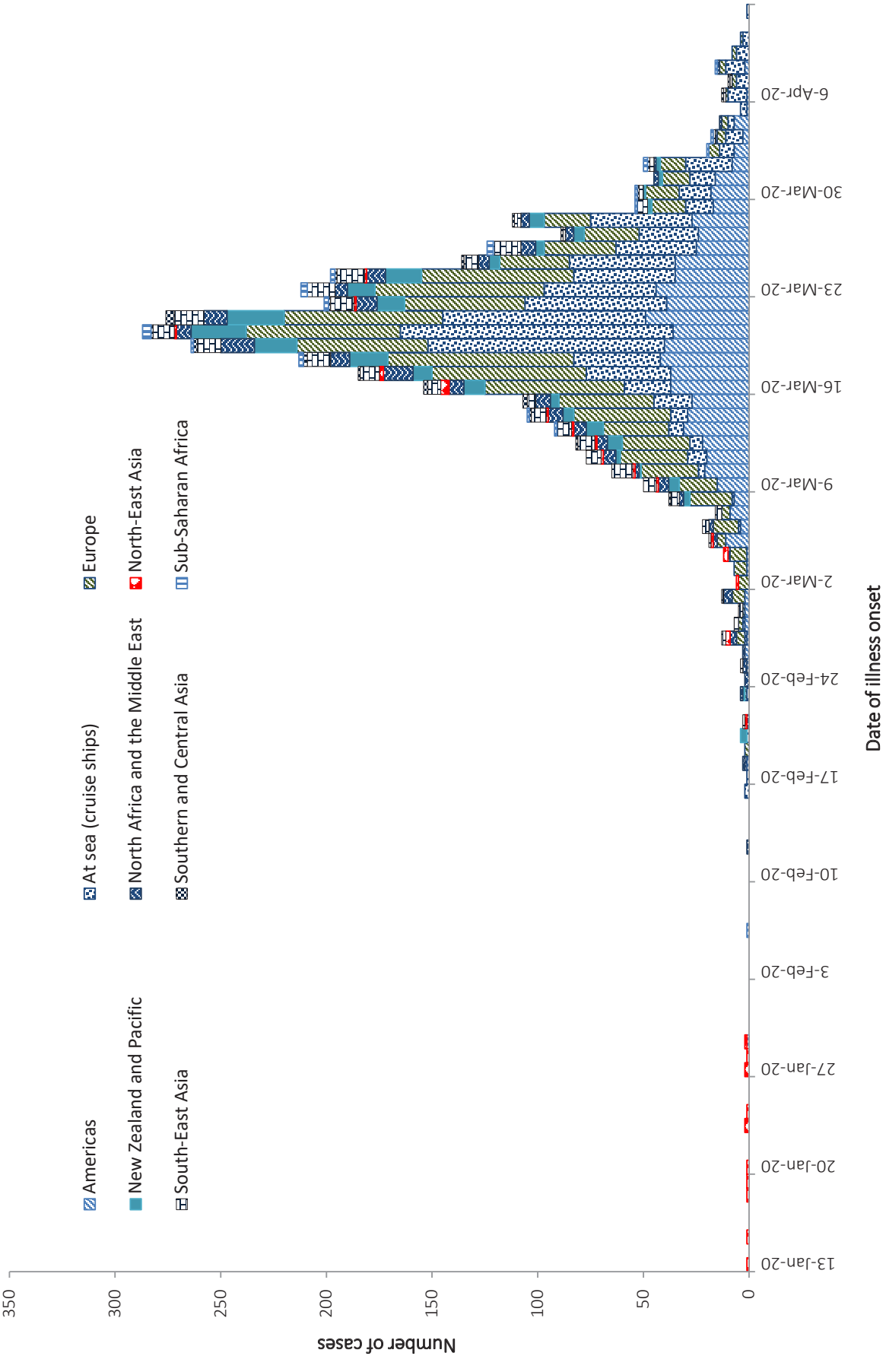
Figure 6: Number of COVID-19 cases by place of acquisition over time, Australia (n = 6,394)[a]



a Note that this graph is from NNDSS where there is a data completeness lag compared to more current proportions presented in text.

Figure 7: Confirmed cases of overseas-acquired COVID-19 infections (n = 3,541)



Symptom profile

- Of the symptoms reported, cough (70%) was the most common (Figure 8);
- Forty-eight percent of cases reported fever, 40% reported sore throat, and 36% reported headache. Only 4% or fewer of all cases reported either pneumonia or acute respiratory disease (ARD); and
- In addition, loss of taste was reported from 438 cases and loss of smell from 443 cases. These conditions were reported in at least 8% of cases, noting that this is currently not a standard field in NNDSS, and is likely to under-represent those presenting with these symptoms.

Severity

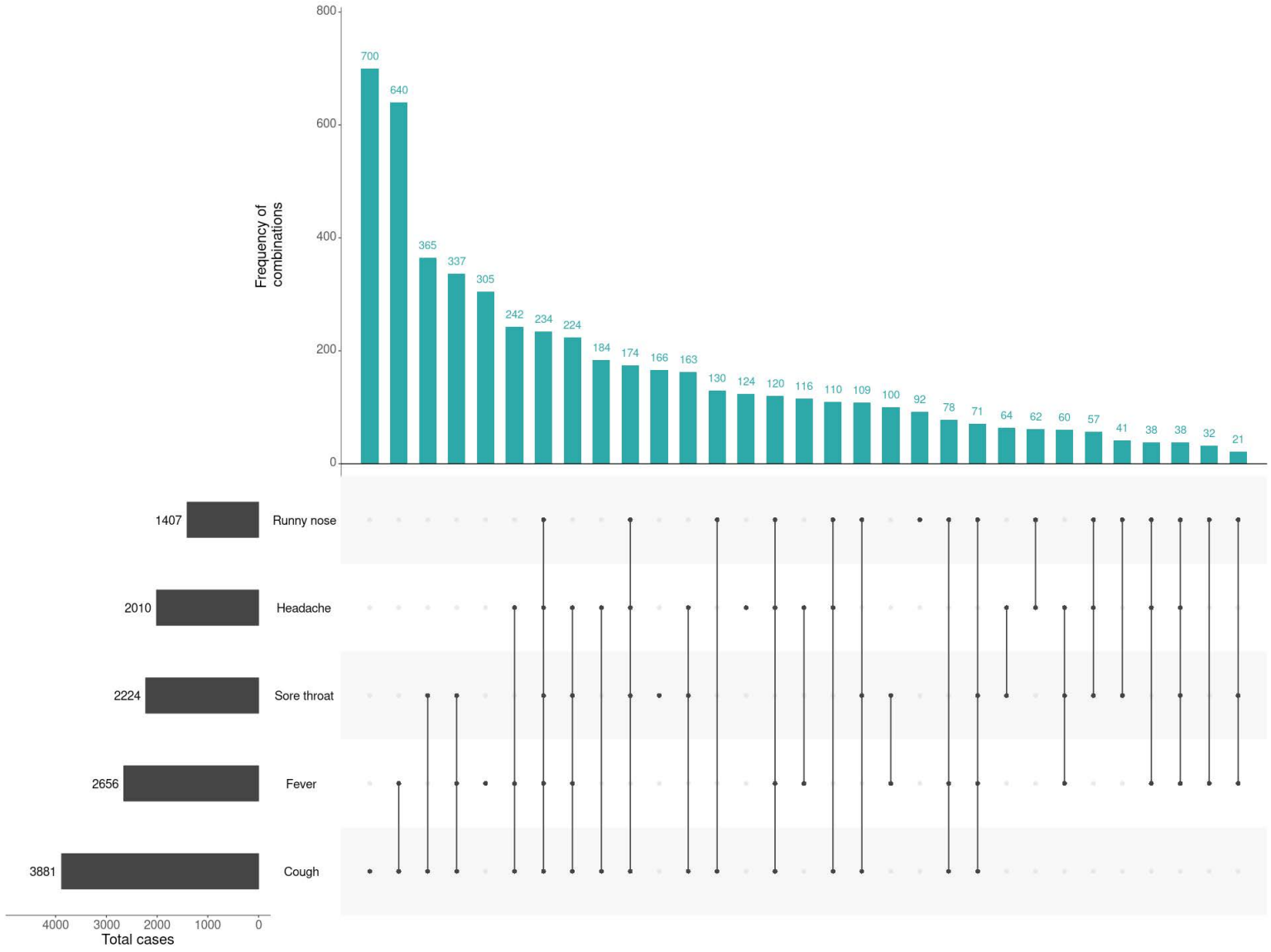
- Of total cases of COVID-19 (n = 6,394) notified, 12% (n = 752) were admitted to hospital:
    - The median age of hospitalised cases was 60 years (interquartile range: 40–72 years), with the highest proportion of hospitalised cases in the 60–69 years and 70–79 years age groups;
    - The most commonly reported comorbid conditions among hospitalised cases were cardiac disease and diabetes (each 20%);
- Of the hospitalised COVID-19 cases, 17% (n = 127) were admitted to an intensive care unit (ICU), with 36 cases requiring ventilation;
- Forty-six COVID-19 deaths were confirmed in Australia up to 12 April 2020:
    - The median age of cases who died was 78.5 years (interquartile range: 74–83 years);
    - 28 of the cases were male and 18 were female; and
    - The most commonly reported comorbid conditions among COVID-19 deaths were diabetes (33%), chronic respiratory disease (30%) and cardiac disease (30%).

Public health response

Since COVID-19 first emerged internationally, Australia has implemented public health measures in response to the disease's epidemiology, both overseas and in Australia. These measures are focused on restrictions on domestic and international travel and public gatherings; priorities for testing and quarantining of suspected cases and close contacts; guidance on effective social distancing; and the protection of vulnerable populations such as those in residential care facilities and remote Aboriginal and Torres Strait Islander communities. Key aspects of Australia's evolving public health response are summarised in Table 2.

During the current reporting period, the Australian Health Protection Principal Committee (AHPPC) has issued advice to inform the national public health response to the pandemic including: treatment and prophylaxis of COVID-19, healthcare worker use of PPE, home isolation, organ donation and transplant, rapid point of care tests, and updated quarantine arrangements for noncruise maritime and air crew.

Figure 8: Variation in combinations of COVID-19 symptoms in confirmed cases, Australiaa



a This figure shows the variation in combinations of symptoms observed in reported cases (n = 5,547) for the five most frequently observed symptoms (cough, fever, sore throat, headache, runny nose). The horizontal bars on the left show the frequency of symptom occurrence in any combination with other symptoms. The circles and lines indicate particular combinations of symptoms observed in individual patients. The vertical green bars indicate the frequency of occurrence of the corresponding combination of symptoms

Table 2: Timeline of key COVID-19 related events, including Australian public health response activities, from 1 March 2020 to 12 April 2020.

Date	Event / response activity
9 April 2020	Air crew on international flights will be required to self-isolate at their place of residence (or hotel if not in their local city) between flights or for 14 days, whichever is shorter.[2]
30 March 2020	Special provisions be applied to vulnerable people in the workplace and application of additional regional social distancing measures to combat COVID-19.[3]
29 March 2020	Both indoor and outdoor public gatherings limited to two persons only.
28 March 2020	All people entering Australia required to undertake a mandatory 14-day quarantine at designated facilities (e.g. hotels) in their port of arrival.
26 March 2020	Restricted movement into certain remote areas to protect community members from COVID-19.
25 March 2020	• School-based immunisation programs, with the exception of the delivery of meningococcal ACWY vaccine, are paused; and • Australian citizens and Australian permanent residents are restricted from travelling overseas.
24 March 2020	• Temporary suspension of all non-urgent elective procedures in both the public and private sector; • Progressive scale up of social distancing measures with stronger measures in relation to non-essential gatherings, and considerations of further more intense options; and • Aged care providers limit visits to a maximum of two visitors at one time per day.
21 March 2020	Qld, WA, NT and SA close borders to non-essential travellers.
20 March 2020	• Travel ban on foreign nationals entering Australia; • Restriction of travel to remote communities; and • Tasmania closes borders to non-essential travellers.
18 March 2020	• DFAT raises travel advice for all overseas destinations to Level 4 'Do Not Travel'; • Continuation of a 14-day quarantine requirement for all returning travellers; and • Restrictions on indoor gatherings.
16 March 2020	Non-essential static gatherings of > 500 people banned.
15 March 2020	All overseas arrivals required to self-isolate for 14 days and cruise ship arrivals banned.
8 March 2020	Restrictions on COVID-19 contacts and travellers from listed higher risk countries.
5 March 2020	Restrictions on travel from Republic of Korea.
1 March 2020	Restrictions on travel from Islamic Republic of Iran.

International situation[4]

- As at 23:59 AEST 12 April 2020, the number of confirmed COVID-19 cases reported to the World Health Organization (WHO) was 1,696,588 globally;
- The number of new cases reported globally increased by 50% since last week. This has declined from a 79% increase in the previous week. However, it is too soon to tell whether this trend will be sustained;
- COVID-19 was reported across a total of 213 countries, territories and areas;
- The reported epidemiology varies by country with different trajectories of outbreaks after their first 100 cases. Figure 9 highlights that for a number of countries outside of mainland China which have reported more than 100 cases, their rates of increase continue to be high, particularly USA, Spain and Italy, although at a slower rate than the previous week. For Singapore and Japan, there continues to be a slow but steady rate of increase in their number of new cases, while the Republic of Korea and Hong Kong are reporting very few new cases each day. Reported case numbers will be influenced by rates of testing, case definition, and case detection as well as overall health system capacity;
- Globally, 105,952 deaths have been reported. The risk of death is reported to increase with age;
- The case fatality rate is reported as approximately 6%. This is highly likely to be an overestimate due to variable levels of underascertainment of cases, especially those with mild infections and presence of a comorbid condition such as diabetes, cardiovascular disease and chronic respiratory disease; and
- Of all deaths reported globally, over half have been from Italy (18%), USA (17%) and Spain (15%). For several other countries or regions including Japan and Republic of Korea, there continues to be a slow increase in their number of deaths, with both countries reporting few new deaths each day, which is consistent with their broader epidemic case trends (Figure 10).

Background

The current estimates on epidemiological parameters including severity, transmissibility and incubation period are uncertain. Estimates are likely to change as more information becomes available.

Transmission

- Human-to-human transmission of SARS-CoV-2 is via droplets and fomites from an infected person to a close contact;[5]
- A virological analysis of nine hospitalised cases found active virus replication in upper respiratory tract tissues, with pharyngeal virus shedding during the first week of symptoms. However, current evidence does not support airborne or faecal-oral spread as major factors in transmission;
- A study in China showed an association between household contacts and travel with a confirmed COVID-19 case and an increased risk of infection;[6] and
- A recent study suggests that children do not play a key role in household transmission and are unlikely to be the primary source of household infections.[7]

Incubation period

- Estimates of median incubation period, based on seven published studies, are 5 to 6 days (ranging from 0 to 14 days). Patients with long incubation periods do occasionally occur, however they are likely to be 'outliers' who should be studied further but are unlikely to represent a change in epidemiology of the virus.[8,9]

Figure 9: Number of COVID-19 cases (logarithmic scale) by selected country or region and days since passing 100 cases, up to 12 April 2020

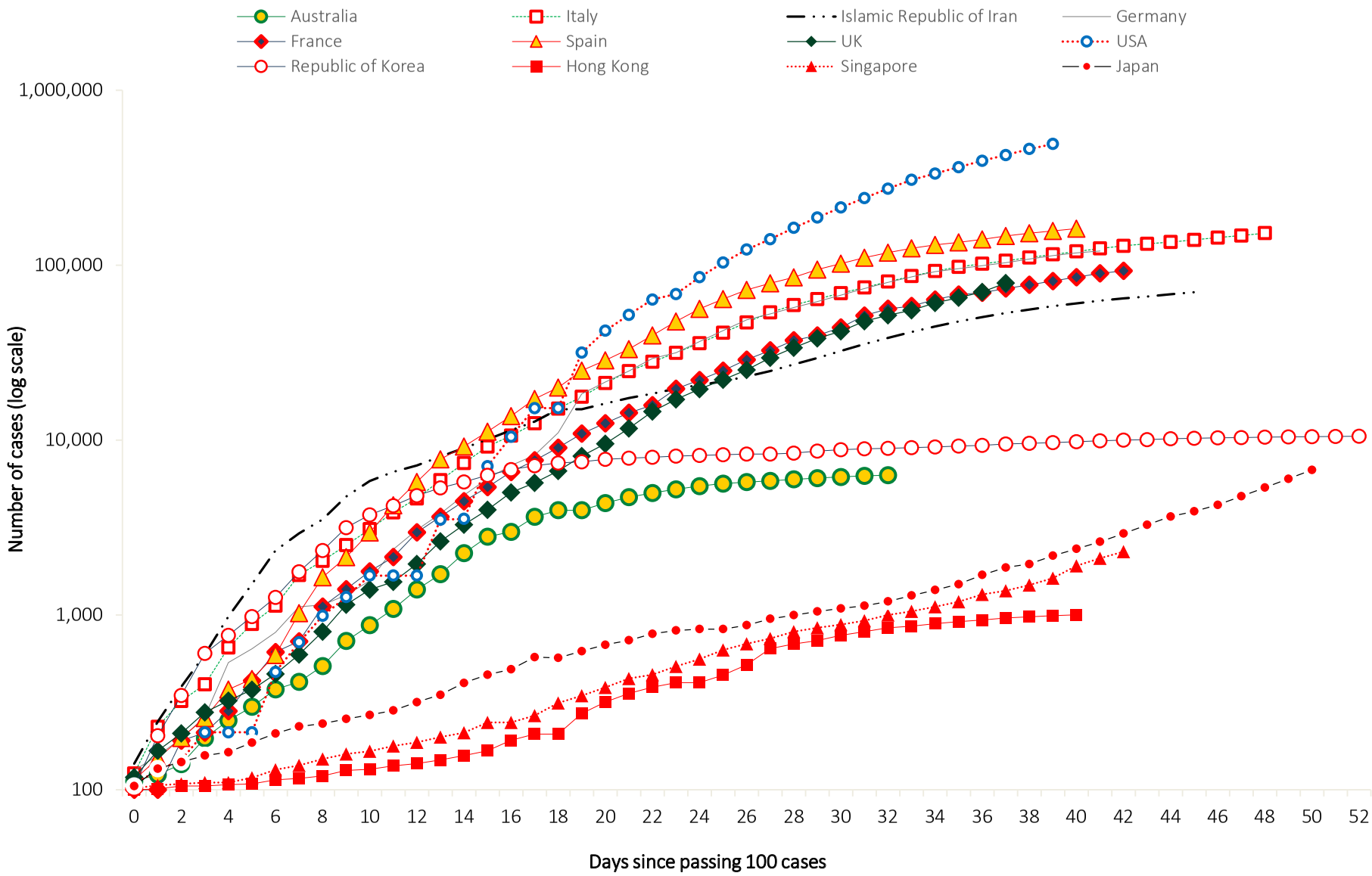


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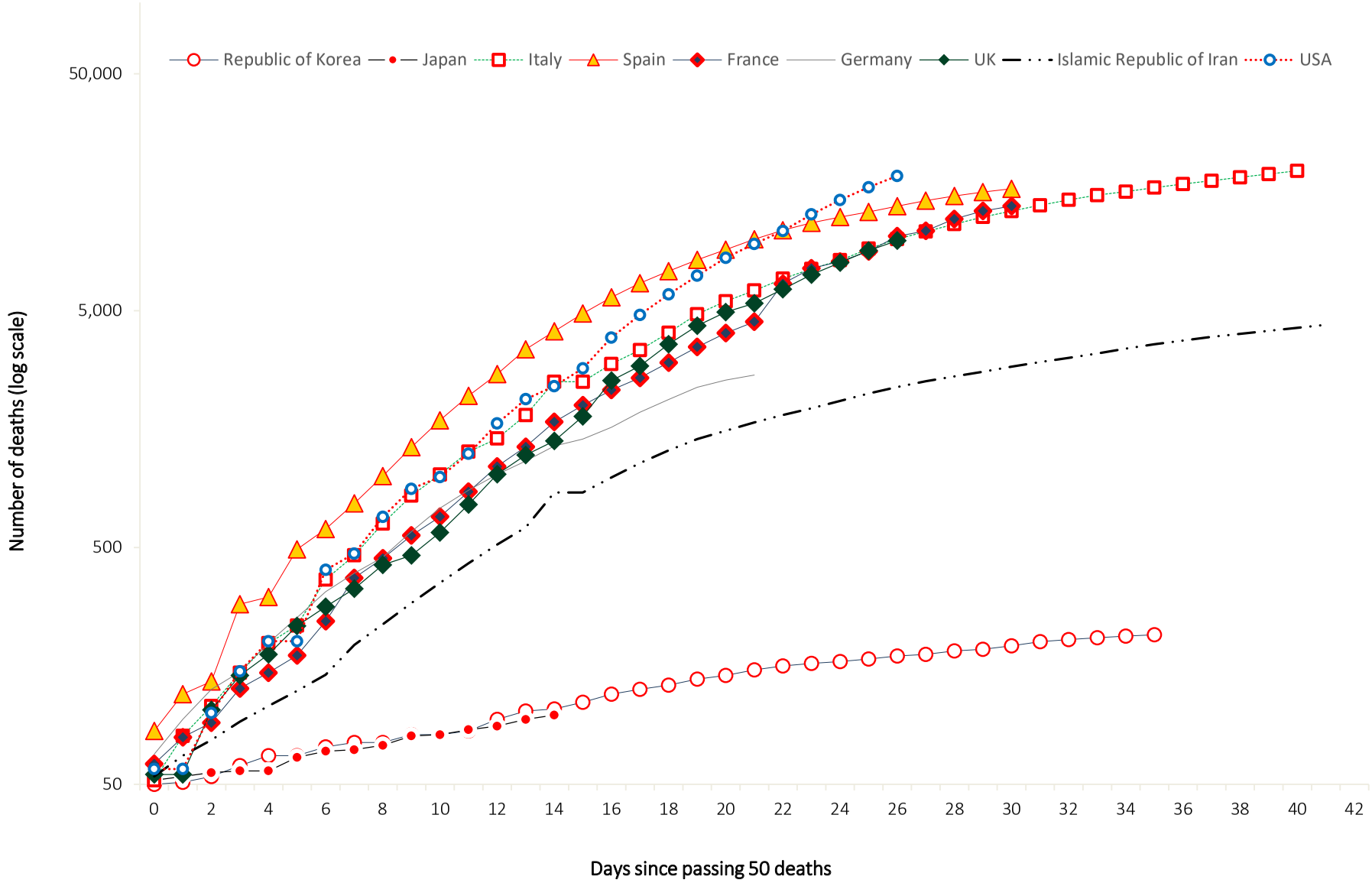
Figure 10: Number of COVID-19 deaths (logarithmic scale) by selected country and days since passing 50 deaths, up to 12 April 2020



Molecular epidemiology

- Since December 2019, the virus has diversified into multiple lineages as it has spread globally with some degree of geographical clustering;
- The whole genome sequences currently available from Australian cases are mostly in returned travellers from China, the Islamic Republic of Iran, Europe and the USA, and thereby reflect this global diversity; and
- Recent work describes an emerging clade linked to the epidemic in the Islamic Republic of Iran.[10]

Clinical features

- COVID-19 presents as mild illness in the majority of cases with cough and fever being the most commonly reported symptoms. Severe or fatal outcomes are more likely to occur in the elderly or those with comorbid conditions;[5,11]
- Some COVID-19 patients show neurological signs such as headache, nausea and vomiting. There is evidence that SARS-CoV-2 viruses are not always confined to the respiratory tract and may invade the central nervous system inducing neurological symptoms. As such, it is possible that invasion of the central nervous system is partially responsible for the acute respiratory failure of COVID-19 patients;[12]
- There is some evidence to suggest that impairment or loss of the sense of smell (hyposmia/anosmia) or taste (hypoguesia/aguesia) is associated with COVID-19.[13,14] This is supported by research finding a biological mechanism for the SARS-CoV-2 virus to cause olfactory dysfunction;[15,16]
- Examination of cases and their close contacts in China found a positive association between age and time from symptom onset to recovery. The study also found an association between clinical severity and time from symptom onset to time to recovery. Compared to people with mild disease, those with moderate and severe disease were associated with a 19% and 58% increase in time to recovery, respectively;[6]
- Several studies have identified cardiovascular implications resulting from COVID-19. Vascular inflammation has been observed in a number of cases and may be a potential mechanism for myocardial injury which can result in cardiac dysfunction and arrhythmias; and
- Recently published literature outside of Wuhan found that approximately 10% of all cases developed gastrointestinal symptoms associated with COVID-19 infection either on admission or during hospitalisation.[17,18] This number is higher than the 3% previously reported in Wuhan.

Treatment

- Current clinical management of COVID-19 cases focuses on early recognition, isolation, appropriate infection control measures and provision of supportive care.[19] Whilst there is no specific antiviral treatment currently recommended for patients with suspected or confirmed SARS-CoV-2 infection, multiple clinical trials are underway to evaluate a number of therapeutic agents, including remdesivir, lopinavir/ritonavir, and chloroquine.[20]

Data considerations

Data were extracted from the NNDSS on 14 April 2020, by diagnosis date. Due to the dynamic nature of the NNDSS, data in this extract are subject to retrospective revision and may vary from data reported in published NNDSS reports and reports of notification data by states and territories.

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Appendix A: Frequently asked questions

Q: Can I request access to the COVID-19 data behind your CDI weekly reports?

A: National notification data on COVID-19 confirmed cases is collated in the National Notifiable Disease Surveillance System (NNDSS) based on notifications made to state and territory health authorities under the provisions of their relevant public health legislation.

Normally, requests for the release of data from the NNDSS requires agreement from states and territories via the Communicable Diseases Network Australia, and, depending on the sensitivity of the data sought and proposed, ethics approval may also be required.

Due to the COVID-19 response, unfortunately, specific requests for NNDSS data have been put on hold. We are currently looking into options to be able to respond to data requests in the near future.

We will continue to publish regular summaries and analyses of the NNDSS dataset and recommend the following resources be referred to in the meantime:

- NNDSS summary tables: http://www9.health.gov.au/cda/source/cda-index.cfm
- Daily case summary of cases: https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/coronavirus-covid-19-current-situation-and-case-numbers
- Communicable Diseases Intelligence COVID-19 weekly epidemiology report: https://www1.health.gov.au/internet/main/publishing.nsf/Content/novel_coronavirus_2019_ncov_weekly_epidemiology_reports_australia_2020.htm
- State and territory public health websites.

Q: Can I request access to data at post-code level of confirmed cases?

A: Data at this level cannot be released without ethics approval and permission would need to be sought from all states and territories via the Communicable Diseases Network Australia. As noted above, specific requests for NNDSS data are currently on hold.

A GIS/mapping analysis of cases will be included in each *Communicable Diseases Intelligence* COVID-19 weekly epidemiology report. In order to protect privacy of confirmed cases, data in this map will be presented at SA3 level.

Q. Where can I find more detailed data on COVID-19 cases?

A: We are currently looking into ways to provide more in-depth epidemiological analyses of COVID-19 cases, with regard to transmission and severity, including hospitalisation. These analyses will continue to be built upon in future iterations of the weekly *Communicable Diseases Intelligence* report.