

# Epidemiological characteristics of 39 confirmed patients in Taiwan and Public and hospital responses to COVID-19 (#46677)

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First submission

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# Epidemiological characteristics of 39 confirmed patients in Taiwan and Public and hospital responses to COVID-19

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In December 2019, a novel coronavirus SARS-CoV-2 has widespread and coronavirus disease 19 (COVID-19) is an emerging health threat worldwide. Huge impact of COVID-19 were observed in medical, economic, social, and political aspects. The optimal strategies combating COVID-19 have not been fully established yet and vary in different countries. Until the end of February, 2020, 2150 patients received diagnostic testing for COVID-19 and 39 confirmed cases were detected in Taiwan, a relatively lower rate of infection in Asia. We summarized the epidemiological characteristics of infected patients and 1 patient expired. 17 (43.6%) were infected in the family or ward while the role of family clusters was emphasized. We also shared the public and hospital responses to COVID-19, including patient route control, outdoor clinics, restriction of hospital visits, regulation of facemask, and ward and staff modifications. These strategies may reduce the spread of COVID-19.

1

2 **Epidemiological Characteristics of 39 Confirmed**  
3 **Patients in Taiwan and Public and Hospital Responses**  
4 **to COVID-19**

5

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23

24

25 **Abstract**

26 **Background:**

27 In December 2019, a novel coronavirus SARS-CoV-2 has widespread and  
28 coronavirus disease 19 (COVID-19) is an emerging health threat  
29 worldwide. Huge impacts of COVID-19 were observed in medical,  
30 economic, social, and political aspects. The optimal strategies combating  
31 COVID-19 have not been fully established yet and vary in different  
32 countries.

33

34 **Methods:**

35 As the end of February, 2020, 2150 patients received diagnostic testing for  
36 COVID-19 and 39 confirmed cases were detected in Taiwan, a relatively  
37 lower rate of infection in Asia. We summarized the epidemiological  
38 characteristics of infected patients and the public and hospital responses to  
39 COVID-19.

40

41 **Results:**

42 39 patients were confirmed with COVID-19 and 1 patient expired. 17  
43 (43.6%) were infected in the family or ward while the role of family clusters  
44 was emphasized. We also shared the public and hospital responses to  
45 COVID-19, including patient route control, outdoor clinics, restriction of  
46 hospital visits, regulation of facemask, and ward and staff modifications.  
47 These strategies may reduce the spread of COVID-19.

48

49 **Conclusion:**

50 The emerging COVID-19 is an important health threat worldwide. Lower  
51 infected cases were reported in Taiwan and these strategies may  
52 contribute to prevent and control disease spread.

53

## 54 Introduction

55 Novel coronavirus (2019-nCoV, SARS-CoV-2) infection has emerged in  
56 Wuhan, China since December 2019, which has rapidly spread across the  
57 world.(Gates 2020; Zhu et al. 2020) In February 2020, **World** Health  
58 Organization (WHO) **has** renamed this epidemic disease coronavirus  
59 disease (COVID-19) as a severe acute respiratory syndrome. **COVID-19 has**  
60 **rapidly increased and spread worldwide.**((WHO) 2020; del Rio & Malani  
61 **2020)** As of **29st** February, there were 85403 confirmed cases of COVID-  
62 19 in 49 countries, with 2924 fatalities.((WHO) 2020; Dong et al.) **The**  
63 **emerging health threat of COVID-19 raised global attention.**(Day 2020)

64

65 Several studies have **conducted** to investigate the virology, transmission,  
66 risk factors, and protection against COVID-19.(Chen et al. ; Guan et al. 2020;  
67 Huang et al. 2020; Wang et al. 2020b; Wu & McGoogan 2020; Yang et al.)  
68 COVID-19 presented with human to human transmission, majorly with  
69 respiratory droplet and direct contact transmission from clusters of infected  
70 family members, friends, colleagues or medical health workers. However,  
71 even asymptomatic patient could also be the source of infection. COVID-19  
72 has dramatically increased in transmission compared to Severe Acute  
73 Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome  
74 (MERS), although a lower case fatality rates **were** observed. Gender  
75 composition of patients, male patients >65% and female patients >35%,  
76 median age was 47 - 56 years old. Approximately 23.7% of COVID-19 adult  
77 patients have at least one of coexisting underlying chronic illnesses such as:  
78 cardiovascular disease, diabetes mellitus, hypertension, or chronic  
79 obstructive lung disease. Most common symptoms have reported fever  
80 (43.8% on admission and 88.7% during hospitalization), dry cough (67.8%),



81 dyspnoea, myalgia, headache and diarrhea (3.8%), runny nose, sore throat,  
82 nasal obstruction, fatigue. However, the entire picture of COVID-19 has not  
83 been fully elucidated and the optimal infectious control measurements have  
84 not been established.(Razai et al. 2020)

85

86 COVID-19 is most prevalent in Asia and has been increasing dramatically  
87 in many countries.((WHO) 2020) Compared with other countries, Taiwan had  
88 a relatively lower rates of infected cases. The first case was diagnosed on  
89 21 January 2020, and there were 39 confirmed cases until 29 February 2020.  
90 Some of them were imported cases and some were family clusters. We  
91 conducted this study to summarize the epidemiological characteristics of the  
92 39 cases. Furthermore, advances in technology and infectious control  
93 measurements may also contribute to reduction of disease spread.(Chen et  
94 al. ; Wang et al. 2020a) We also share some public and hospital responses  
95 to COVID-19.

96

97

98

99

## 100 **Materials & Methods**

### 101 *1.Data sources*

102 Taiwan Centers for Disease Control (TCDC) has conducted many  
103 policies to combat COVID-19.(Centers for Disease Control 2020) The  
104 epidemiological data of confirmed cases were released in the public mass  
105 media. The identifiable data was encrypted, but the clinical presentations

106 and epidemiological relationship were reported. We summarized the public  
107 data to **demonstrated** the clinical characteristics of the 39 cases.

108

## 109 ***2. Diagnosis of COVID-19***

110 COVID-19 is a communicable disease in Taiwan which means all  
111 suspected cases are required to be reported to TCDC. Clinical diagnostic  
112 criteria of COVID-19 include history of travel or residence in the endemic  
113 areas, contact with confirmed cases, contact with cases with fever or  
114 respiratory symptoms, radiological image characteristics of pneumonia,  
115 clinical manifestations of fever or respiratory tract symptoms. The  
116 unconfirmed cases, who met the criteria of the suspected cases, will need to  
117 be identified with nucleic acid detection from the sputum, throat swab, lower  
118 respiratory tract secretion, or blood samples collected from patients. The  
119 polymerase chain reaction for 2019-nCoV and other viruses were  
120 performed.(Cui et al. 2019; Lin et al. 2020; Lu et al. 2020b; The 2020) The  
121 suspected cases will be isolated in negative pressure isolation rooms or  
122 single bed rooms until second negative tests.

123

## 124 ***3. Treatment of COVID-19***

125 Since there is no specific treatment for COVID-19, the main treatment  
126 is supportive care and oxygen support.((WHO) 2020; Centers for Disease  
127 Control 2020) For suspected or confirmed cases, **patients will be cared** in  
128 isolated rooms and receive supportive treatment to ensure electrolyte  
129 balance, closely monitor vital signs and oxygen saturation, monitor blood  
130 routine test and arterial blood gas analysis if necessary. Chest imaging and

131 other images were arranged. Intravenous **antibiotic** and oseltamivir were  
132 also administered empirically.

133

#### 134 *4. Public and hospital responses*

135 Public anxiety is common in facing a novel and unknown infection. (The  
136 2020) TCDC executed several policies while individual **hospital was**  
137 authorized to **perform their own infective control measurements**. We  
138 investigated some important health polices and hospital responses **and**  
139 **demonstrated some photographs**.

140

141

## 142 **Results**

### 143 *1. Epidemiological characteristics of confirmed cases*

144 We summarized the cumulative cases in some Asian countries since  
145 Middle February (**Figure 1**). The epidemiological characteristics of 39  
146 confirmed cases in Taiwan were summarized in **Table 1**. 16 (41.0%) were  
147 males and 23 (59.0%) were females. **Approximate** half (21, 53.8%) of **them**  
148 were aged **among 41 to 60**. 19 cases (48.7%) had history of travelling from  
149 overseas or residence or visited the city in China. 15 (38.5%) of confirmed  
150 cases had direct contact transmission from clusters of infected family  
151 members. One patient (2.6%) expired. Additionally, TCDC had aggressively  
152 tracked the travel, occupation, contact and cluster histories of confirmed  
153 cases. The relationship of the 39 cases were plotted and released to the  
154 public to clearly understand the epidemic situations (**Figure 2**).

155

### 156 *2. Public and hospital responses to COVID-19*

#### 157 *2.1. Home quarantine and patient route control*

158 Hospitals have designated separate entrances and exits for patients and  
159 **publics** to prevent hospital-acquired infections of COVID-19. The suspected  
160 cases will be separated from the emergency and outpatient procedures  
161 throughout the duration of the visit to hospital. When scheduling  
162 appointments on-line, the announcement of Tracking and Management  
163 Mechanism for People under Infection Risk will appear, as **Figure 3**. If  
164 patients have any travel history of endemic areas or respiratory infections,  
165 they will be guided to outdoor special clinic for COVID-19, as **Figure 4**.

166 For suspected cases, they will be guided to outdoor triage and admitted  
167 to isolation room. **Diagnostic tests will be performed in negative pressure**  
168 **rooms or single bed room.** At the hospital entrances, hand hygiene,  
169 facemask, and COVID-19 related posters were posted. Patients and visitors  
170 have to wash their hands with alcohol hand gel before entering to hospital.  
171 All these infectious control measurements contribute to reducing hospital  
172 acquired infections.

173

## 174 *2.2. Restriction of hospital visits*

175 Hospital visits are common in Eastern culture, but hospital acquired  
176 infections are common. In consideration of decreasing hospital-acquired  
177 transmission, **we restricted** hospital visits to prevent outbreak or getting  
178 infection of COVID-19. Instead of face-to-face hospital visits, family and  
179 friends are recommended to use video call to contact with patients. The  
180 entrances of ward are controlled by electromagnetic doors with access  
181 cards. Patients are not allowed to move around the hospital where the areas  
182 are not granted. No more than two visitors will be allowed to enter hospitals  
183 to visit the same patient at the same time. Visitors will be restricting from  
184 entering the hospital with recent travel history, as **Figure 5**. In case an

185 infection is confirmed, the visitor registration provides clues for tracking  
186 infectious source, contacts, and quarantine.

187

### 188 *2.3. Regulation of facemask and other personal protective equipment*

189 Wearing medical face mask from COVID-19 is a basic protection to  
190 prevent transmission from human to human. In order to prevent public over  
191 purchases and hoarding masks due to psychological factors, **government**  
192 **take actions to retrieve the mask factories, and all facemasks are allotted.**

193 Taiwan government has issued medical face masks to all local hospitals and  
194 clinics, to prevent face mask shortages. **Moreover, government has provided**

195 **medical face masks for susceptible populations, such as patients with**  
196 **cancer, haemodialysis, chemotherapy and radiotherapy to reduced**  
197 **nosocomial infection or hospital-acquired infection.** Government also issued

198 medical face masks to children, to reduced community transmission.

199 Taiwanese residents will have to present the national health insurance card  
200 to purchase medical face mask from local pharmacies and primary health  
201 unit. The policy will allow each residence to purchase two masks in a week  
202 and prohibit repeat purchases. In large crowding and close gathering areas,  
203 Taiwanese tends to wear face mask as a habit in their daily lives, to optimize  
204 protecting themselves and others.

205

### 206 *2.4. Ward and staff modifications*

207 For suspected cases or confirmed cases, they will admit to isolation room  
208 to ensure one patient in a room. In order to minimize infections of healthcare  
209 providers, nursing staffs has adherence in group scheduling to divide into  
210 two groups, to work in fixed shifting, separated in meal breaks. Job rotation

211 and ward rotation are prohibited to reduce chances of transmission and  
212 hospital-acquired transmission.

213

214

## 215 **Discussion**

216

217 The emerging COVID-19 is an important health threat worldwide and  
218 Taiwan has relatively lower rate of increase. Approximate half of 39  
219 confirmed cases were imported and 38.5% were infected by their family. The  
220 role of family clusters was reemphasized. Aggressive tracking and  
221 epidemiological surveillance contributed to clarifying infectious source and  
222 reduce disease spread. Furthermore, the hospital responses with these  
223 infectious control measurements may reduce the transmission of COVID-19.

224

225 As the end of February 2020, 2150 patients received diagnostic testing  
226 for COVID-19 in Taiwan. Among them, 39 (1.8%) patients were positive for  
227 SARS-CoV-2. The criteria of PCR testing varied according to the endemic  
228 situations.(Centers for Disease Control 2020) According to the study of  
229 China CDC, the majority of infected people were aged 30-79 years (87%). In  
230 the 39 confirmed cases in Taiwan, 35 (90%) were aged 30-79 years. The  
231 case fatality rate was 2.3% (1023 of 44672 confirmed cases) in China and  
232 we had 1 of 39 expired case (2.56%).(Wu & McGoogan 2020) Oversea travel  
233 history was observed in approximate half patients (19/39, 48.7%) but the  
234 high risk of community infection should not be ignored. Family and ward  
235 cluster is an important route of transmission and 5 families with 22 people  
236 were identified in the 39 reported cases. High contagiousness of SARS-CoV-

237 2 results in difficulties in preventing disease spread. Moreover, 81% infected  
238 patients had mild symptoms and were easily neglected and delayed  
239 diagnosed.(Bai et al. 2020; Rothe et al. 2020) **However, they were**  
240 **contagious and would cause disease spread.** Aggressive tracking and  
241 identifying infectious sources may contribute to early quarantine, block down  
242 transmission, and early diagnosis of patients with mild symptoms.

243

244 Although the route of transmission of SARS-CoV-2 has not been fully  
245 clarified, the main route of transmission was droplet and contact  
246 transmission.(Li et al. 2020; Lu et al. 2020a; Xu et al. 2020) Wearing  
247 facemask and washing hands are essential and effective in preventing  
248 infectious disease.(Leung et al. ; MacIntyre & Chughtai 2015) However,  
249 public panic is common when an **emerging disease becomes endemic.**(Bao  
250 et al. 2020; Medley & Vassall 2017) Public panic will cause unnecessary  
251 stockpile but shortage of mask will increase the risk of disease transmission.  
252 The mask policy by TCDC is an executable and effective strategy to combat  
253 an emerging disease. **Furthermore, hospital is a risky place for infectious**  
254 **disease. Our hospital responses with restriction of visits and different routes**  
255 **of patients with outdoor clinics may also reduce the risk of COVID-19**  
256 **transmission.**

257

258 Advances in technology also contribute to improvements in infection  
259 control. Big data analytics, new technology, and proactive testing have been  
260 applied in this war against COVID-19.(Wang et al. 2020a) A real-time,  
261 interactive internet dashboard has also been conducted to provide timely  
262 information for general public and healthcare providers.(Dong et al.) These  
263 strategies are believed to be beneficial in preventing and controlling disease

264 spread. We summarized some additional hospital responses and provided  
265 some authentic photographs for healthcare providers' reference.

266

267 Our study had some limitations. First, COVID-19 is a communicable  
268 disease and universal screening is not available at present. Patients with  
269 mild symptoms may be under-estimated. Second, the virology, transmission,  
270 incubation period, and contagious period of SARS-CoV-2 are not fully  
271 understood, the effective strategies against COVID-19 remain largely  
272 unclear. More studies are required to investigate the effectiveness of  
273 individual infectious control measurement.

274

275

276

277

## 278 **Conclusions**

279 The emerging COVID-19 is an important global issue. The 39 confirmed  
280 cases in Taiwan had similar age distribution as previous studies. The role of  
281 family and ward clusters was emphasized. The public and hospital  
282 responses with patient route control and outdoor clinics, restriction of  
283 hospital visits, regulation of facemask, and ward and staff modifications may  
284 contribute to reducing transmission of COVID-19.

285

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288

## 289 **Acknowledgements**

290 We thank Centers for Disease Control, Taiwan and everyone's efforts to  
291 combat COVID-19.



292

293

294

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**Table 1** (on next page)

Epidemiological characteristics of 39 confirmed cases

1

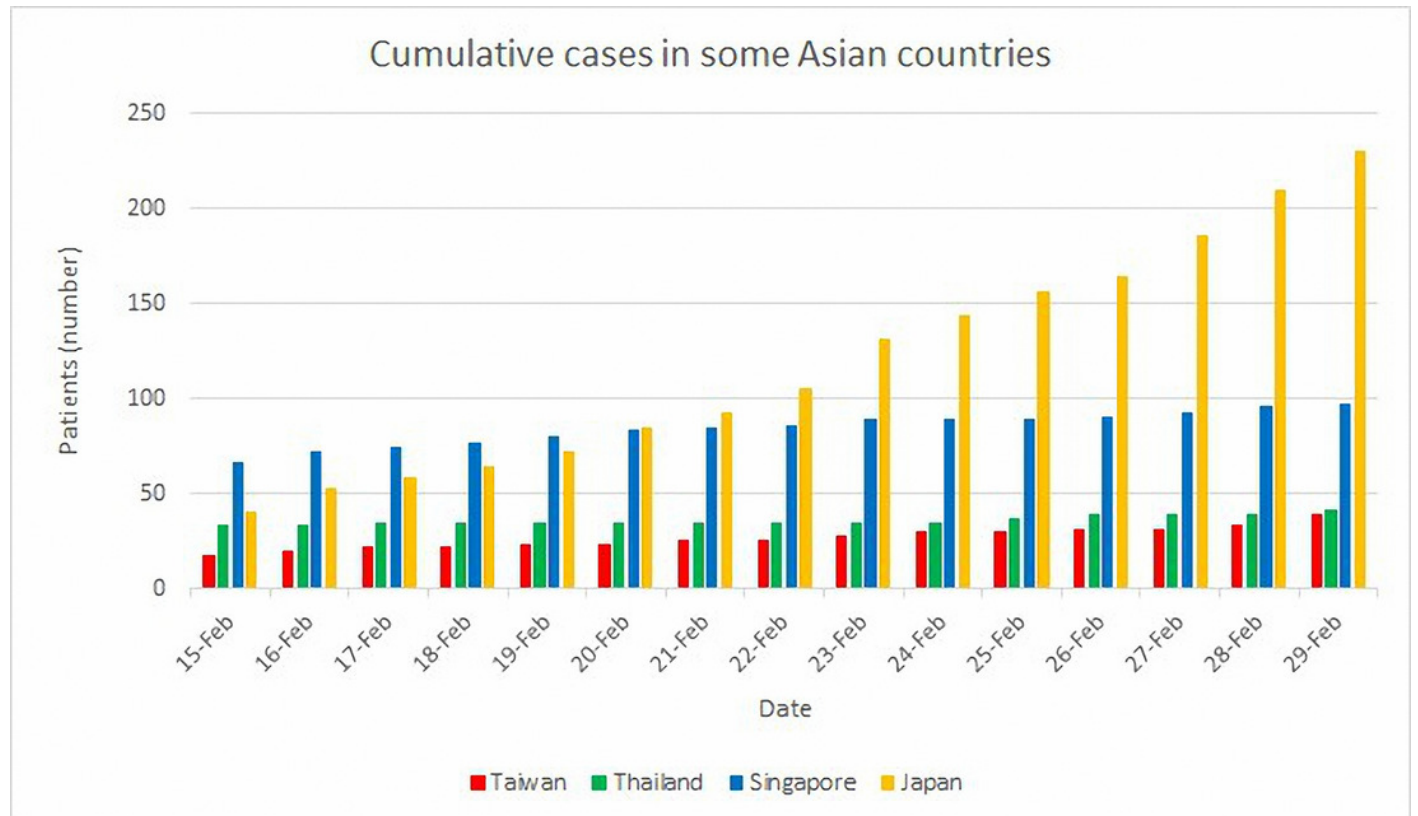
Clinical characteristics		No.	Percentage (%)
Total		39	100
Gender	male	21	53.8
	Female	18	46.2
Age (years old)	11~20	2	5.1
	21~30	4	10.3
	31~40	4	10.3
	41~50	10	25.6
	51~60	11	28.2
	61~70	3	7.7
	71~80	3	7.7
	>81	2	5.1
Travel history	none	20	51.3
	Yes	19	48.7
Family cluster infection	none	21	53.8
	Yes	17	43.6
	unknown source	1	2.6

2

3

# Figure 1

Figure 1. Cumulative cases of COVID-19 in some Asian countries since Middle February.

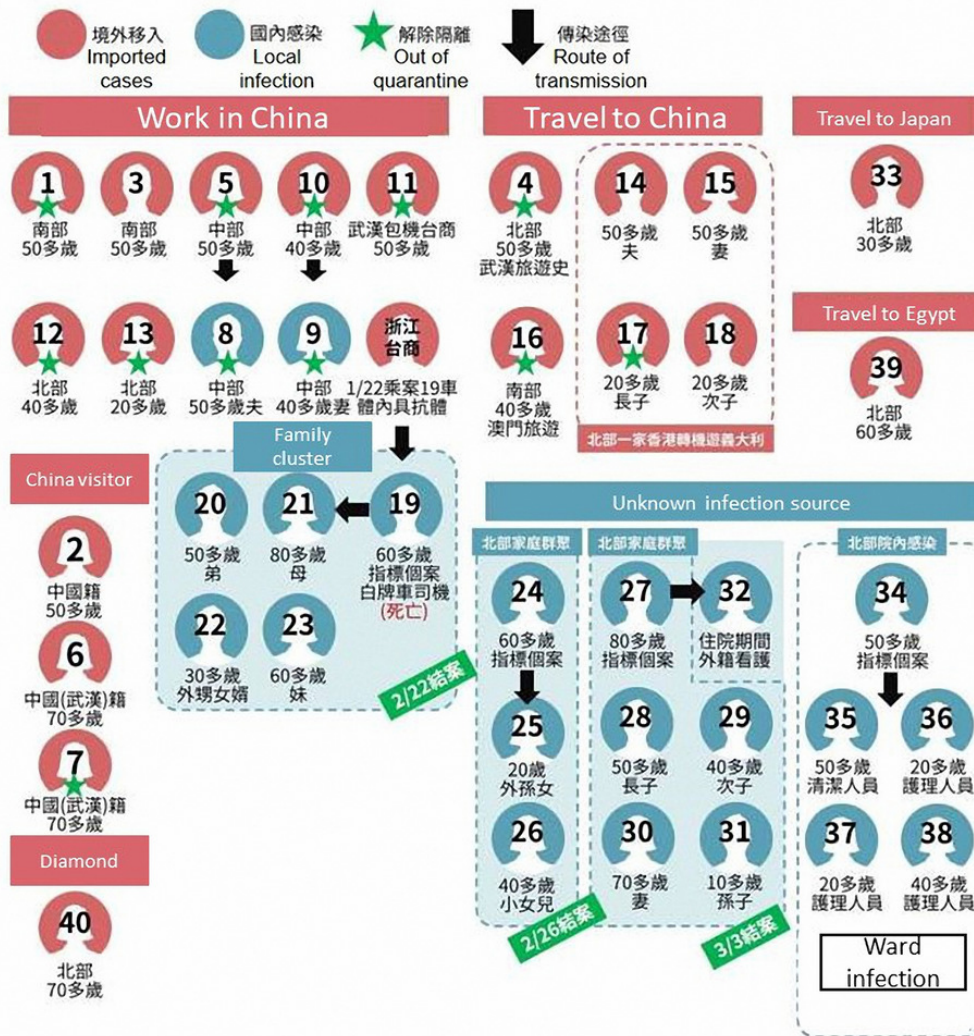


## Figure 2

Figure 2. The relationship and route of transmission of 39 confirmed cases in Taiwan.

# 國內確診個案關係圖

2020/03/03 製表  
中央流行疫情指揮中心



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\*Dotted lines: family cluster or ward cluster; pink color: imported cases; blue color: local infection; green star: out of quarantine; black arrow: route of transmission

## Figure 3

Figure 3. The pop-up window before internet registration to remind triage with travel history or respiratory symptoms.

具感染風險民眾追蹤管理機制 資料更新日期 2020/2/5

介入措施	居家隔離	居家檢疫	自主健康管理
對象	確定病例之接觸者	具中港澳旅遊史者	對象1：申請赴港澳旅遊者。 對象2：通報個案但已檢除危險性且符合解除隔離條件者。
負責單位	地方衛生主管機關	地方政府民政局/里長或里幹事	衛生主管機關
方式	居家隔離14天 主動監測1天2次	居家檢疫14天 主動監測1天1~2次	自主健康管理14天
配合事項	<ul style="list-style-type: none"> <li>衛生主管機關開立「居家隔離通知書」。</li> <li>衛生主管機關每日追蹤2次健康狀況。</li> <li>隔離期間留在家中(或指定地點)不外出，亦不得出遠或出國，不得搭乘大眾運輸工具。</li> <li>有症狀者由衛生主管機關安排就醫。</li> <li>如未配合中央流行疫情指揮中心防治措施，將依傳染病防治法裁罰，必要時進行強制安置。</li> </ul>	<ul style="list-style-type: none"> <li>主管機關開立「旅客入境健康聲明暨居家檢疫通知書」，配戴口罩返家檢疫。</li> <li>里長或里幹事進行健康關懷14天，每日撥打電話詢問健康狀況並記錄「健康關懷記錄表」。</li> <li>檢疫期間留在家中(或指定地點)不外出，亦不得出遠或出國，不得搭乘大眾運輸工具。</li> <li>有症狀者將送指定醫療機構採檢送驗，衛生主管機關加入主動監測。</li> <li>如未配合中央流行疫情指揮中心防治措施，將依傳染病防治法裁罰，必要時進行強制安置。</li> </ul>	<ul style="list-style-type: none"> <li>自主健康管理期間盡量避免外出，如需外出應全程配戴外科口罩；落實呼吸道衛生及咳嗽禮節每日早/晚各量體溫一次；期間如出現不適症狀，請立即撥打防疫專線1922就醫。</li> </ul>
法令依據	傳染病防治法第48條	傳染病防治法第58條	傳染病防治法第36條



## Figure 4

Figure 4. The outdoor clinics for patients with travel history or respiratory symptoms.



## Figure 5

Figure 5. Visitor restriction and visitor registration.

