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Analysis of COVID-19 Quarantine Results with Adjusted Criteria for Flights from a High-Risk

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Abstract

The purpose of this report was to present the epidemiologic characteristics of Kazakhstan COVID-19 inflow cases in Korea. The Incheon Airport National Quarantine Station saw an increase in the number of imported cases from Kazakhstan and adjusted the COVID-19 diagnostic test standards for passengers from Kazakhstan. The standards for fever changed from 37.5℃ to 37.3℃. As a result, between July 1st and July 10th, 2020, out of 419 passengers from Kazakhstan, 119 passengers were tested with COVID-19 at the quarantine stage, and 28 passengers were confirmed.

The results included 90 cases that were not tested at the quarantine level with conventional COVID-19 test criteria. Using conventional criteria, only 49 cases were classified as Patients Under Investigation (PUI). By adjusting the criteria for COVID-19, the Incheon Airport National Quarantine Station confirmed 15 out of 28 (53.8%) cases at the quarantine stage.

In addition, as a result of analyzing the tympanic temperature at the time of arrival for 61 confirmed cases, including 33 cases that were confirmed after passing through the quarantine stage, 7 cases (11.5%) had body temperatures above 37.5℃ and 17 cases had body temperatures above 37.3℃ (27.8%). The number of confirmed cases was 29 (47.5%) if we included asymptomatic companions of PUIs or persons with body temperatures above 37.3℃.

Keywords: COVID-19, Incheon Airport, Quarantine, Patient under investigation (PUI)

Introduction

Stemming the inflow of coronavirus disease 2019 (COVID-19) from abroad through airport-based screening is an important component of efforts to curb the spread of the disease. The Incheon Airport National Quarantine Station has proactively responded to the pandemic with strengthened screening and quarantine measures for arrivals from Europe, the United States, and Middle Eastern countries since the first case in South Korea was reported on January 20, 2020.

According to an analysis of COVID-19 cases confirmed at the screening clinics of the Incheon Airport National Quarantine Station, most of the imported cases in March and April 2020 were linked to Korean nationals residing overseas, mainly in the United States and Europe. However, the distribution of cases shifted to Middle Eastern workers in May and June 2020, which led to the heightened enforcement of screening/quarantine measures at their places of business in cooperation with major government ministries.

However, amid the recent upsurge in the number of confirmed cases in certain Asian countries, we analyzed the screening results for air travelers from Kazakhstan, who showed

a higher positive test rate than those from other Southwest and Central Asian countries. Herein, we report the results of an analysis of COVID-19 screening for inbound travelers from Kazakhstan from July 1 through July 10, 2020.

Result

The screening clinics of the Incheon Airport National Quarantine Station confirmed six COVID-19 cases on June 22, five on June 24, and 10 on June 29 among passengers of flights from Almaty, Kazakhstan. Based on the epidemiological report on the confirmed cases detailing the current presence/absence of symptoms, the specific symptoms that were involved (fever, respiratory symptoms, etc.), and body temperature, the COVID-19 test requirement criteria for travelers from Kazakhstan were adjusted on July 1.

In this report, we analyzed the screening measures and confirmed cases since the adjustment of the COVID-19 test criteria for direct flights from Kazakhstan from July 1 through July 10. During the period, there were three flights inbound from Kazakhstan (on July 3, 5, and 6), all of which departed from Almaty. The number of passenger seats on each flight was 166.

Symptoms reported on health declaration forms among inbound travelers from Kazakhstan

We reviewed the completed health declaration forms, as a number of passengers on flights from Kazakhstan were found to have a fever upon a temperature check on arrival although they had not reported fever as a symptom. Among Korean nationals, 16 people (14.2%) reported they had symptoms within the last 21 days (3 weeks), whereas only three of the foreign nationals (0.1%) reported symptoms. In particular, among those who did not report any symptoms, two Korean nationals and 26 foreign nationals were identified as having a fever through thermal camera screening and a temperature check, indicating that the foreign nationals tended not to report symptoms on the health declaration form even when symptoms were present. Data on the symptoms reported on the health declaration forms are presented by nationality in Table 1.

Cases subject to diagnostic testing according to the COVID-19 test requirement criteria on flights from Kazakhstan

Due to the multiple instances of inbound travelers from Kazakhstan not reporting symptoms despite the presence of a measurable fever on arrival, the Incheon Airport National Quarantine Station lowered the standard of fever from 37.5°C or higher to 37.3°C or higher for travelers from Kazakhstan. This decision was made in consideration of the fact that flights from Kazakhstan arrive in the morning and the body temperature, which is affected by circadian rhythms, drops during red-

Table 1. Health Declaration Forms (HDFs) Report Status by Nationality

Unit: No. (%)

Nationality	Korean		Foreigner	
	Reported symptoms	Did not report symptoms	Reported symptoms	Did not report symptoms
Report status	16 (14.2)	97 (85.8)	3 (1.0)	303 (99.0)
Total	113		306	

Table 2. The Standards of COVID-19 PUIs and the Standards of COVID-19 Tests from Kazakhstan Flights

Standards of COVID-19 PUIs		Standards of COVID19 test from Kazakhstan flights
Non-contact thermometer measurement		Eardrum thermometer measurement
1. Fever (over 37.5℃)	⇨	1. Fever (over 37.3℃)
2. Symptoms (respiratory, non-respiratory)		2. Symptoms (respiratory, non-respiratory)
		3. Co-Inbound travelers of the patient with fever
		4. Co-Inbound travelers of the respiratory/non-respiratory symptomatic patient

Table 3. The Number of Inbound Travelers and COVID-19 Tests from Kazakhstan Flights

Unit: No., %

Date	No. of Inbound travelers			No. of Incheon Airport COVID-19 tests	Test ratio compared to Inbound travelers
	Total	Koreans	Foreigners (Kazakhstan)		
July 3, 2020	118	38	80 (66)	36	30.5
July 5, 2020	144	32	112 (100)	51	35.4
July 6, 2020	157	43	114 (100)	32	20.4
Total	**419**	**113**	**306 (266)**	**119**	**28.8**

eye flights. Instead of a contactless thermometer, a tympanic membrane thermometer was used to measure the core body temperature [2,3].

Furthermore, considering the characteristic of COVID-19 that it easily spreads among multiple individuals who are in close contact for extended periods of time, such as family members and acquaintances [4], COVID-19 tests were also administered to asymptomatic family members or travel companions of a person with a fever (37.3°C or higher) or symptoms (respiratory or non-respiratory). Table 2 compares the previous and current COVID-19 test criteria for air travelers from Kazakhstan.

During the period of analysis, the number of inbound travelers on the three flights from Kazakhstan increased gradually, from 118 on July 3 (38 Korean nationals and 80 foreign nationals) to 144 on July 5 (32 Korean nationals and 112 foreign nationals) and 157 on July 6 (43 Korean nationals and 114 foreign nationals). In particular, the number of Kazakh nationals on the respective flights was 66, 100, and 100, indicating that most of the passengers were Kazakh.

After the adjustment of the diagnostic test requirement criteria by the Incheon Airport National Quarantine Station, the number of incoming travelers who were subject to a COVID-19 test increased, compared to when the traditional criteria for persons suspected of COVID-19 (patients under investigation [PUIs] exhibiting a body temperature of 37.5°C or over or other symptoms of COVID-19) were used.1 Therefore, the mean proportion of total passengers who received COVID-19 tests among the total passengers was 28.8%, higher than the average ratio from April to July (4.37%; 3.65% when transit passengers were included). The number of inbound travelers from Kazakhstan and the number of those tested for COVID-19 are presented in Table 3.

Table 4. The Number of COVID-19 Tests According to the Standards

(Confirmed cases) Unit: No.

Date	No. of Incheon Airport COVID-19 tests	Conventional COVID-19 PUIs	Standard adjustment	
			Temperature 37.3~37.4℃	Co-Inbound travelers of symptomatic patients
July 3, 2020	36 (12)	15 (6)	8 (3)	13 (3)
July 5, 2020	51 (9)	22 (4)	14 (3)	15 (2)
July 6, 2020	32 (7)	10 (3)	9 (2)	13 (2)
Total	**119 (28)**	**49 (13)**	**31 (8)**	**59 (7)**

Cases tested and confirmed during the airport screening process according to COVID-19 test requirements for flights from Kazakhstan

Table 4 compares the number of people who were tested for COVID-19 during the airport screening process among all passengers on flights from Kazakhstan. When the traditional diagnostic test criteria were applied, the number of people classified as PUIs was 15 on July 3, 22 on July 5, and 10 on July 6, accounting for 14.5% of the total passengers. However, the adjusted criteria additionally required diagnostic testing for 21 people on July 3, 29 on July 5, and 22 on July 6, which brought

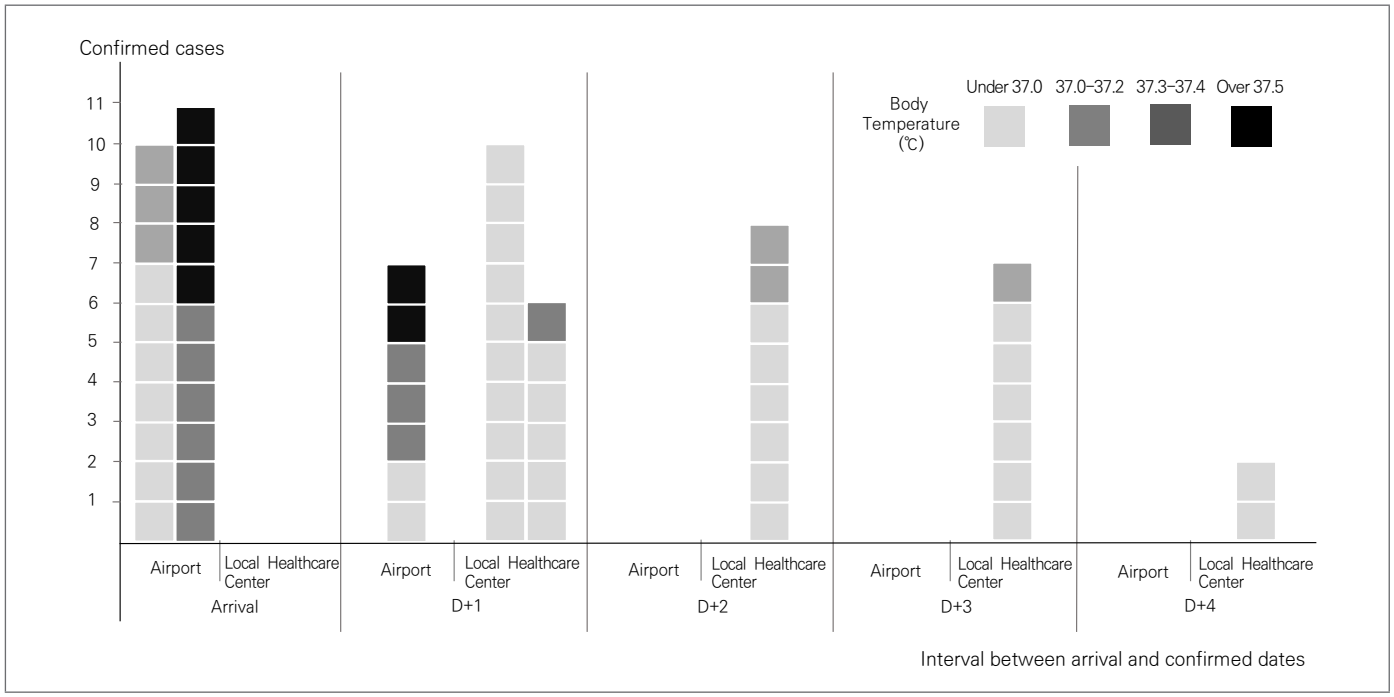

Figure 1. The Distribution of Body Temperature in COVID-19 Patients with the Interval of Arrival and Confirmed Dates

the total number of passengers tested for COVID-19 to 36 on July 3, 51 on July 5, and 32 on July 6.

Twenty-eight patients were finally confirmed to have COVID-19 by diagnostic testing conducted at the screening clinics of the Incheon Airport National Quarantine Station. Thirteen of the confirmed patients (46.4%) had been classified as PUIs according to the initial criteria. The remaining 15 patients had been required to undergo testing after adjustment of the test criteria: eight people (28.6%) had a body temperature of 37.3–37.4°C and seven asymptomatic people (25.0%) were in travel groups containing a symptomatic individual.

Body temperature on arrival and duration from the date of entry to confirmation of COVID-19 among confirmed cases

Figure 1 shows the distribution of body temperature on arrival and the interval from the time of entry to the confirmation of COVID-19 at a screening clinic during the airport screening process or at a local healthcare center among those who entered the country on these three flights.

For the cases tested during the airport screening process, the infection was confirmed on the day of entry or the day after arrival; for cases tested at local healthcare centers, there were no confirmed cases on the day of entry, and there was 1–4 days of delay until confirmation. This discrepancy seems to have been due to differences in the timing of tests determined by local governments, as the COVID-19 response guidelines require overseas entrants to be tested within 3 days of arrival.

Seven of the 61 confirmed patients (11.5%) were individuals who had been classified as PUIs according to the traditional criterion of a body temperature of 37.5°C or over, all of whom tested positive at the Incheon Airport screening clinic. Seventeen patients (27.9%) were additionally tested according to the new criterion of a body temperature of 37. 3°C or over3) and 12 patients were additionally tested because they were traveling together with symptomatic individuals, which brought the total number of people tested according to the new criteria to 29 (47.5%). The latter 12 people were all asymptomatic, with a body temperature less than 37.3°C, and were confirmed during airport screening. Therefore, it was confirmed that if the rate of reporting of symptoms on health declaration forms is low in a pandemic situation, adjusting the standards regarding the definition of a fever and other epidemiological characteristics for travelers from high-risk countries alone can be an effective measure during airport screening to prevent the spread of a disease.

Conclusions

The Incheon Airport National Quarantine Station has implemented enhanced COVID-19 screening procedures since January 2, 2020. In response to the pandemic, it has been striving to prevent the inflow of COVID-19 from overseas and has responded adaptively by analyzing the epidemiological characteristics and risk profile of inbound travelers. This report has confirmed that in a pandemic situation, a history of travel to high-risk countries and nationality, rather than the presence of symptoms, could be a crucial factor in the screening process and adjusting diagnostic test criteria (fever and the classification of accompanying travelers given the risk of intrafamilial transmission of COVID-19) could be an effective measure to tackle the pandemic. The Incheon Airport National Quarantine Station will continue to monitor outbreaks overseas and the epidemiological characteristics of incoming travelers to actively respond to imported cases of the disease.

① What was previously known?

Since the outbreak of COVID-19 was first reported at the end of December 2019, a steady influx of imported cases has been identified. Thus, the Incheon Airport National Quarantine Station has implemented enhanced screening/quarantine measures.

② What is newly added?

It was confirmed that the proportion of foreign nationals who reported symptoms on the health declaration form was low. Under the circumstances, it was found that adjusting the diagnostic test requirement criteria regarding fever and travel companions was effective for preventing the inflow of COVID-19 from abroad.

③ Implications?

COVID-19 response measures taken during the airport screening process are affected by the status of the outbreak in other countries and international relations. It is advised to strengthen screening measures appropriately by regularly monitoring the international status of the COVID-19 pandemic.

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