

# **Preparedness and Response to COVID-19 :Experience of Asan Medical Center**

**Jiwon Jung**

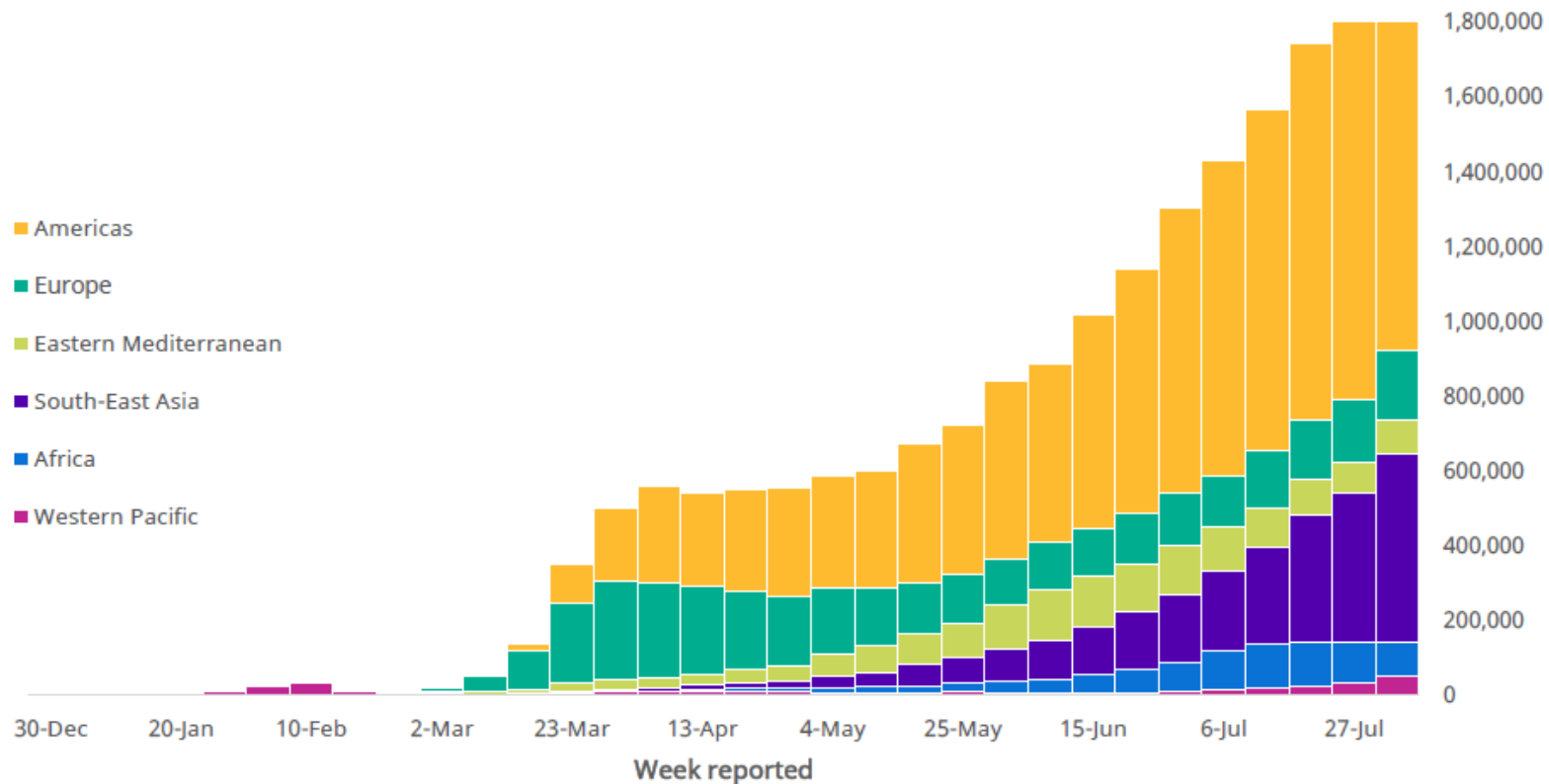
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**서울아산병원**  
Asan Medical Center

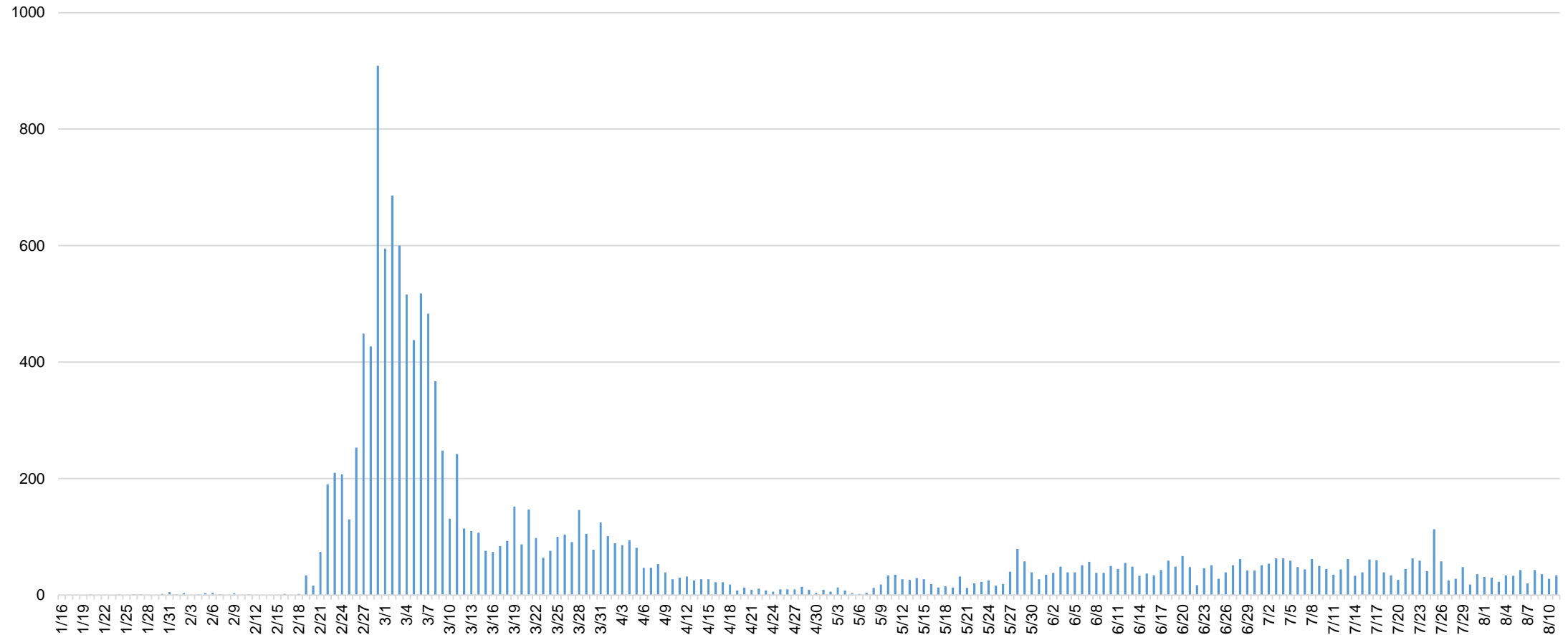
# Epidemic curve of the world

Figure 1: Number of COVID-19 cases reported by week by WHO region: data through the week ending 9 August



[https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200810-covid-19-sitrep-203.pdf?sfvrsn=aa050308\\_2](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200810-covid-19-sitrep-203.pdf?sfvrsn=aa050308_2)

# Epidemic curve of South Korea



# Asan Medical Center

- 2,700-bed, tertiary care center, Seoul, Korea
- Healthcare workers – 8,800
- Outpatient – 12,000 per day
- Inpatient- 300 per day

# AMC Response to COVID-19

## Screening of Patient

(1) Before visiting our hospital

- Delay appointment of outpatient clinic or admission of patients from high risk area or countries (e.g. China at Jan, Daegu City at Feb)

(2) At visiting our hospital

Questionnaire (epidemiologic link, symptom or sign of COVID-19)

(3) During hospitalization

Screening for pneumonia (GGO on chest CT)

Periodic PCR follow-up in high-risk patients (from Daegu City or other epidemiologic risks)



# Questionnaire for screening

Daily update

COVID-19 Questionnaire		Infection control office, Asan Medical Center 2020.07.16 22:00 ver.	
<p>★To prevent COVID-19, one designated guardian during the hospitalization period is required. Do not allow visitors to enter the ward except for one designated guardian★ ★Please provide accurate and honest answers. Those who answer dishonestly may be penalized in accordance with the national health regulations and law.★</p>			
Patient	Name	ID	Contact number
Guardian	Name	Relationship	Contact number
<p><b>Only High risk(★) Epidemiological Relevance Check for Outpatient &amp; Exam</b></p>			
<p>1. Epidemiological Correlation (Check All That Apply, "★" = "high-risk" category)</p>			
<p><input type="checkbox"/> ★ <b>Contact with COVID-19 confirmed patient</b> (Call 8112(8881122)) (3 weeks from the contact date, Children and adolescents under 19 yrs old are 4 weeks from the date of contact) (Received notifications from national institution after coming into contact with a patient confirmed of COVID-19 (SHS, public health center, etc.))</p>			
<p><input type="checkbox"/> ★ <b>Overseas visits within the last 2 weeks</b> (Country: _____) Duration(Y/M/D): ____/____/____ - ____/____/____ (Call 8112(8881122))</p>			
<p><input type="checkbox"/> Released from Quarantine after COVID-19 Confirmation, Quarantine Released Date(Y/M/D): ____/____/____ (Call 8112(8881122))</p>			
<p><input type="checkbox"/> Familial Relationship <input type="radio"/> Housemate is confirmed COVID-19 <input type="radio"/> Housemate have received notifications from the government regarding contact of confirmed COVID-19 <input type="radio"/> Housemate had overseas visits within the last 2 weeks</p>			
<p><input type="checkbox"/> Was present in an area that was visited by an COVID-19 patient [ _____ ]</p>			
<p><input type="checkbox"/> ★ Visited the following <b>High-Risk Mass Outbreak</b> (Check the Visited Date and place name) ※ Not applicable if 2 weeks have passed from the last visit</p>			
Location	Visited	Name of the place	Date
Seoul	<input type="checkbox"/>	Comas Interactive (Misung Building 6th Floor)	7/1~10
	<input type="checkbox"/>	Ace A Zone 7th VMP	7/1~12
	<input type="checkbox"/>	Hanwha Life Insurance Myeongdong District Group Sales Branch	7/6~11
Gyeonggi	<input type="checkbox"/>	Gwangmyeong Su Internal Medicine Clinic	7/3, 6~10
	<input type="checkbox"/>	Siheung Seoul Daehyo Rehabilitation Hospital	7/2~15
Daejeon	<input type="checkbox"/>	Tiul Aqua Fitness	7/2~7
<p><input type="checkbox"/> Visited the following places (Check the Visited Date and place name) ※ Not applicable if 2 weeks have passed from the last visit</p>			
Location	Visited	Name of the place	Date
Seoul	<input type="checkbox"/>	Ice Punch English Gwanak Language School	7/10, 13
	<input type="checkbox"/>	Boramae Medical Center (Excluding COVID-19 Screening Center)	7/2~12
	<input type="checkbox"/>	The Catholic University of Korea Seoul St. Mary Hospital (1st Floor General Surgery Outpatient Laboratory, 2nd Floor Organ Transplant Center)	7/10
Gyeonggi	<input type="checkbox"/>	Sarang Church	7/11~12
	<input type="checkbox"/>	Jarada Boy Art Academy Suwon Yeongtong Research Institute	7/10
	<input type="checkbox"/>	Mango Kids Café	7/10
	<input type="checkbox"/>	Water Castle	7/10
	<input type="checkbox"/>	Bitcoin Mining Company Mining City Briefing Session	7/10
	<input type="checkbox"/>	QooQoo Siheung Branch	7/10
	<input type="checkbox"/>	Howon Hospital(Excluding COVID-19 Screening Center)	7/8

Location	Visited	Name of the place	Date
Daejeon	<input type="checkbox"/>	It's Coin Noraebang (Karaoke)	7/8
	<input type="checkbox"/>	Tomato PC Bang	7/8
	<input type="checkbox"/>	Cass Square	6/30~7/8
	<input type="checkbox"/>	Happiness of Ten thousand Won Coal Briquette Grilled Dish	7/6~8
	<input type="checkbox"/>	Current Affairs Chinese Academy Daejeon Campus	7/8
Gwangju	<input type="checkbox"/>	Hanam Sacred Heart Hospital(Excluding COVID-19 Screening Center)	7/6~10
	<input type="checkbox"/>	Jeongmi Fish Market	7/9~10
	<input type="checkbox"/>	Ghonnam National University Hospital 3rd Building 4th Floor Oral Surgery Outpatient Clinic	7/8
	<input type="checkbox"/>	Green Tea Room	7/8~9
	<input type="checkbox"/>	Happy View Hospital(Excluding COVID-19 Screening Center)	7/1~10
Jeonbuk	<input type="checkbox"/>	Cinema Sauna	7/8~7/10
	<input type="checkbox"/>	Aroma Life Naundong Branch	7/13
Jeonbuk	<input type="checkbox"/>	Aroma Life Youngdong Branch	7/9~13
	<input type="checkbox"/>	Okcheon St. Mary's Hospital(Excluding COVID-19 Screening Center)	7/9

☐ None of the Above(Epidemiological Correlation)

## 2. Check All Symptoms That Apply(Symptoms that occurred or are getting worse within 2 weeks)

- \* Please put a check if there are symptoms within 2 weeks even if there are no current symptoms  
☐ Fever above 37.5°C (Took Fever Reducer Y or N, Date and Time of Last Intake: \_\_\_\_\_)  
 (If you have taken a fever reducer within 6 hours, you will be considered to have a fever even if you don't)
- ☐ Cough ☐ Muscle ache (Body Aches) ☐ Chill  
☐ Headache ☐ Smell or taste loss ☐ Sore Throat  
☐ New symptoms of nasal congestion (New symptom of nasal congestion or runny nose for Children's Hospital)  
☐ Difficulty Breathing ☐ Pneumonia ☐ None of the Above

## 3. Additional checklist(Only for inpatient and emergency patients)

- ☐ (Within 2 weeks) Confirmation regarding Nursing Facilities
- ☐ Admitted in Nursing Facilities or Received Day Care Center Service
  - ☐ Received Home-Visit Care Service from Care Worker (Excluding Home Healthcare)
  - ☐ Working as a Care Worker

(Facility name: \_\_\_\_\_), Duration(Y/M/D): \_\_\_\_/\_\_\_\_/\_\_\_\_ - \_\_\_\_/\_\_\_\_/\_\_\_\_

→ If applicable, follow up for SARS-CoV-2 will be done 3 days after admission [HD#4]

☐ None of the Above

★ If the information is different from what you have written, assigned hospital bed can be changed and admission procedure may be delayed.

Additional examination may be also required so please fill out the information correctly. ★

I confirm that the information provided above is accurate to best of my knowledge.

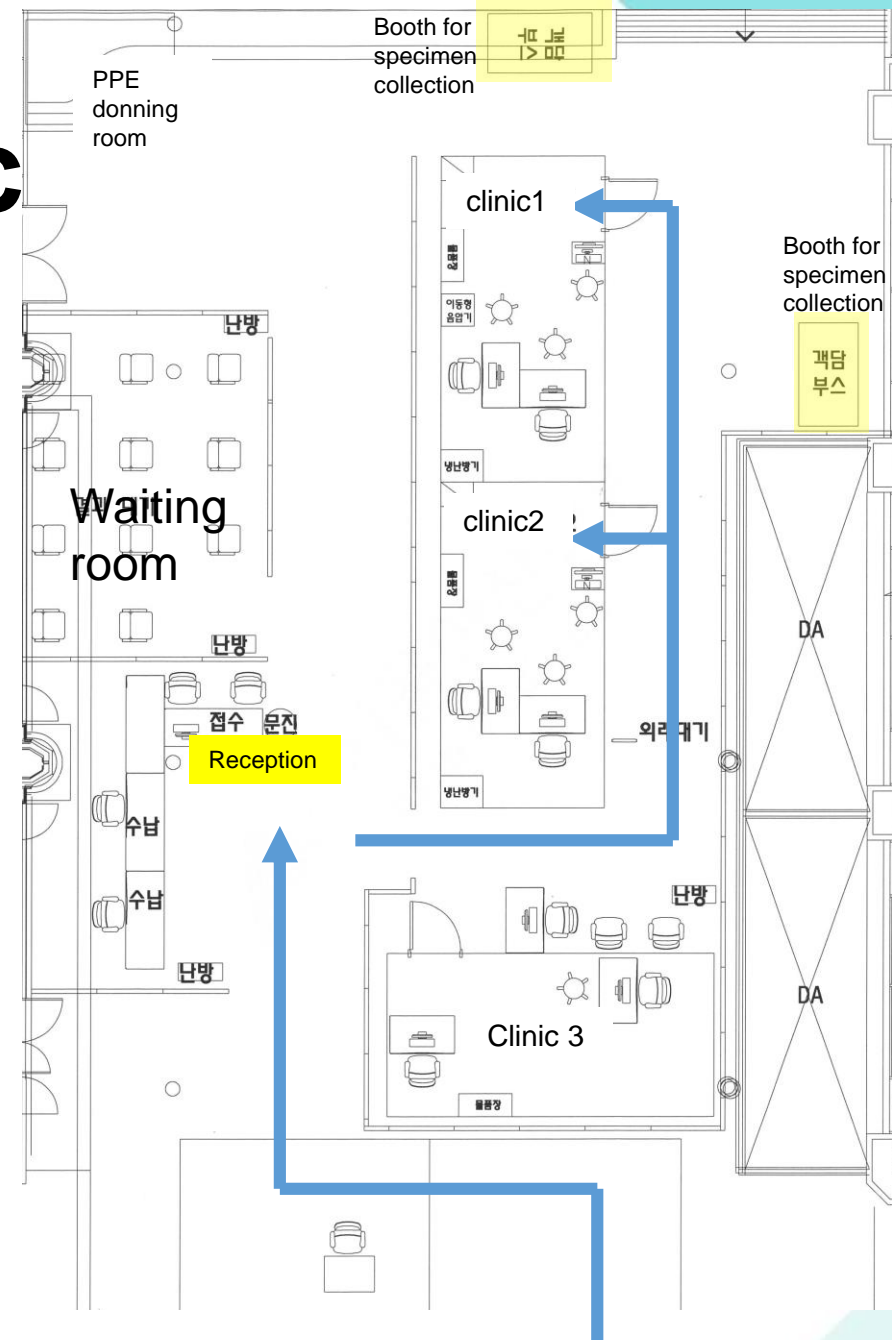
Date signed (Y/M/D): 2020 / \_\_\_\_ / \_\_\_\_

Print Name and Sign : (signature)

Medical Staff : (signature)

# Map of screening clinic

- Clinic 1: Patients planned for hospitalization with symptoms or epidemiologic link
- Clinic 2: Outpatients with epidemiologic link
- Clinic 3: Outpatients with symptoms

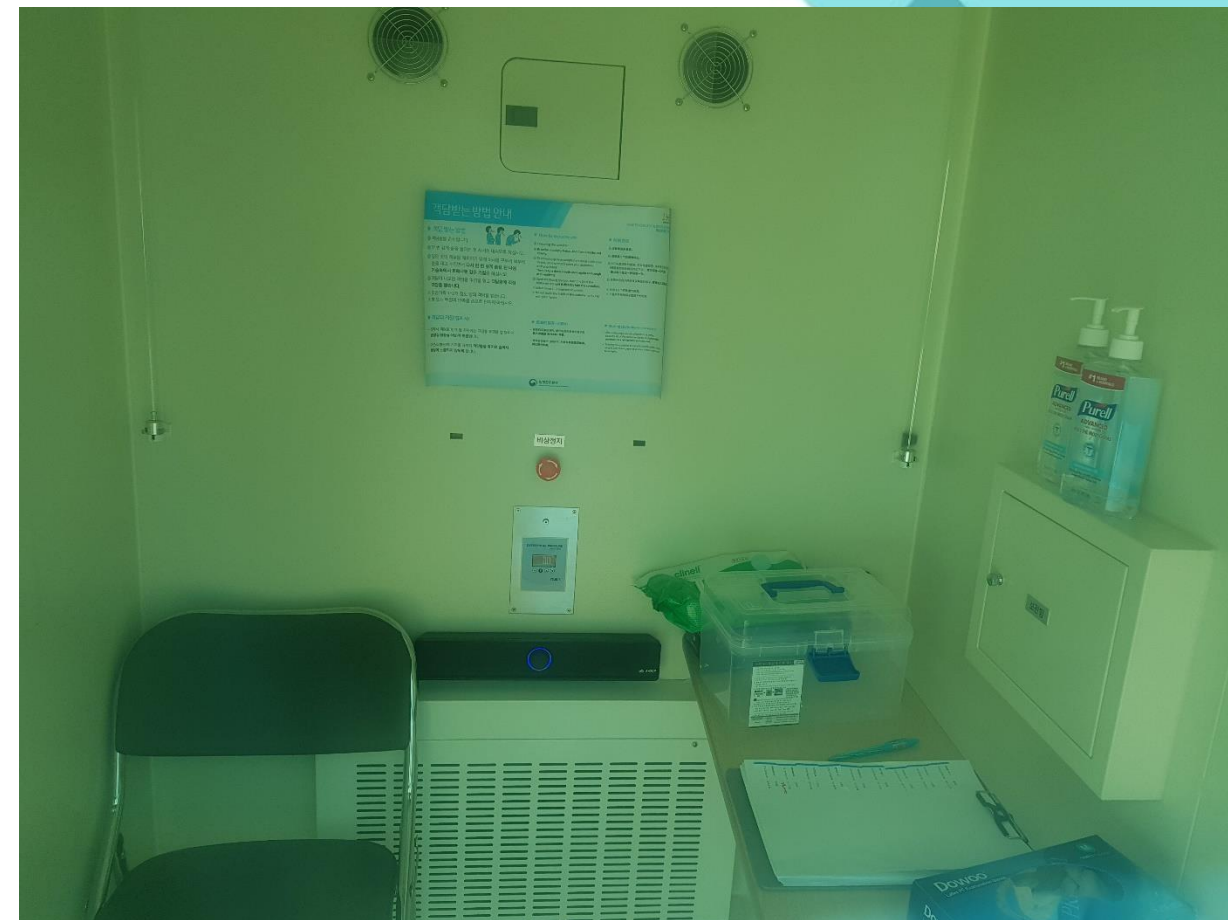






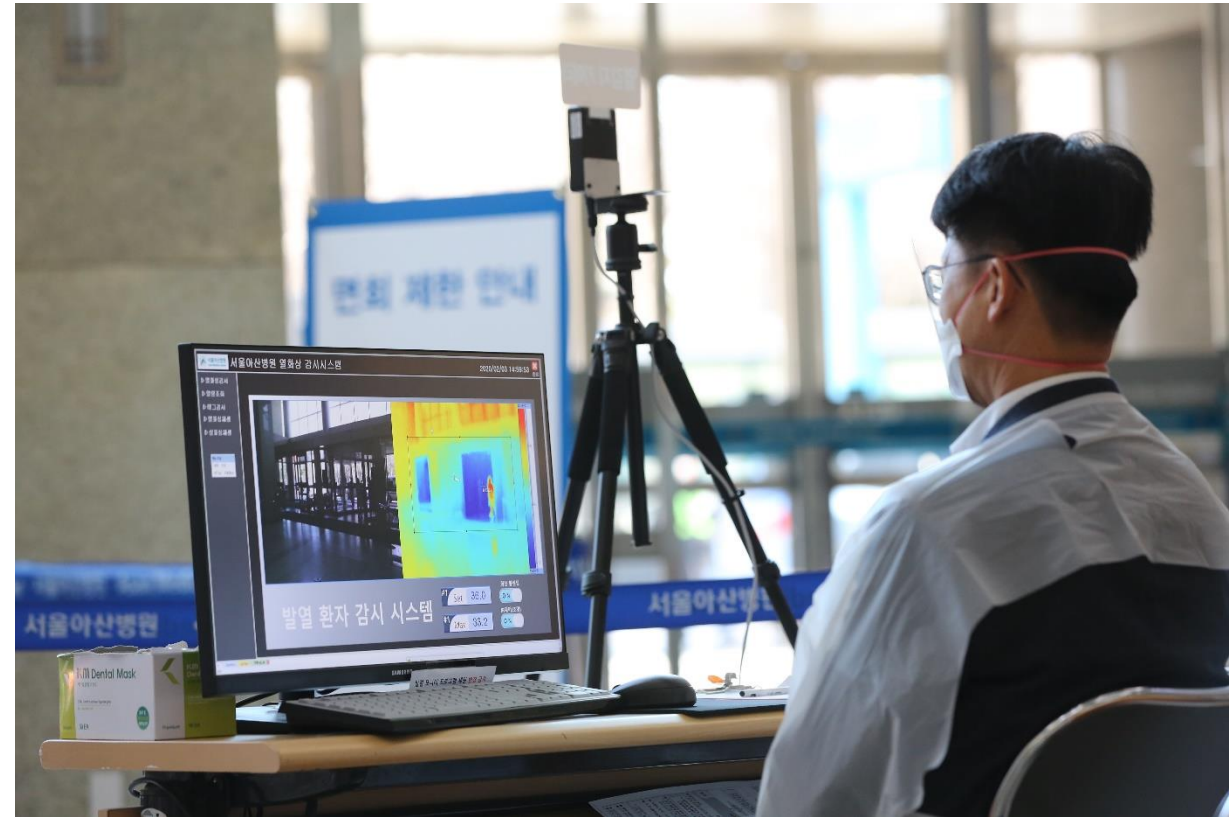
All rooms - negative-pressure





- Sample collection booth
- nasopharyngeal swab, sputum collection
  - UV
  - air change rate: 300/hour

# Monitoring of fever at entrance using infrared thermometers (20 Jan~)





# Restriction of visitors

- Restriction of parcel service
- Delaying students' clinical training, and volunteer staff
- Restriction of visit to wards and ICU
- Restriction of go-out of in-patient



# Universal masking

## 지금, 마스크 착용하고 계신가요?

Pt with COVID-19

코로나19 감염자



전파 위험 매우 높음

Healthy person

건강한 사람



전파 위험 있음



전파 위험 매우 낮음



**마스크 착용, 모두를 위한 배려입니다.**

## 지금, 마스크 착용하고 계신가요?

약속 1.

병원 내에서는 항상 마스크를 착용합니다.



약속 2.

입원 병실 안에서도 항상 마스크를 착용합니다. 식사 등의 이유로 마스크를 벗어야 하는 경우, 꼭 침상 커튼을 닫습니다.



약속 3.

통화 중에도 마스크를 항상 착용합니다.



약속 4.

코와 입을 모두 가리고 얼굴에 밀착시켜 착용합니다.



**마스크 착용, 모두를 위한 배려입니다.**

# Promotion of hand hygiene



# Respiratory ER

- Respiratory ER (1<sup>st</sup> floor): Symptoms (fever, respiratory symptoms or pneumonia) or epidemiologic link
  - universal PPE (gown, FFP2 equivalent mask, gloves, face shield)
- ER (6<sup>th</sup> floor)

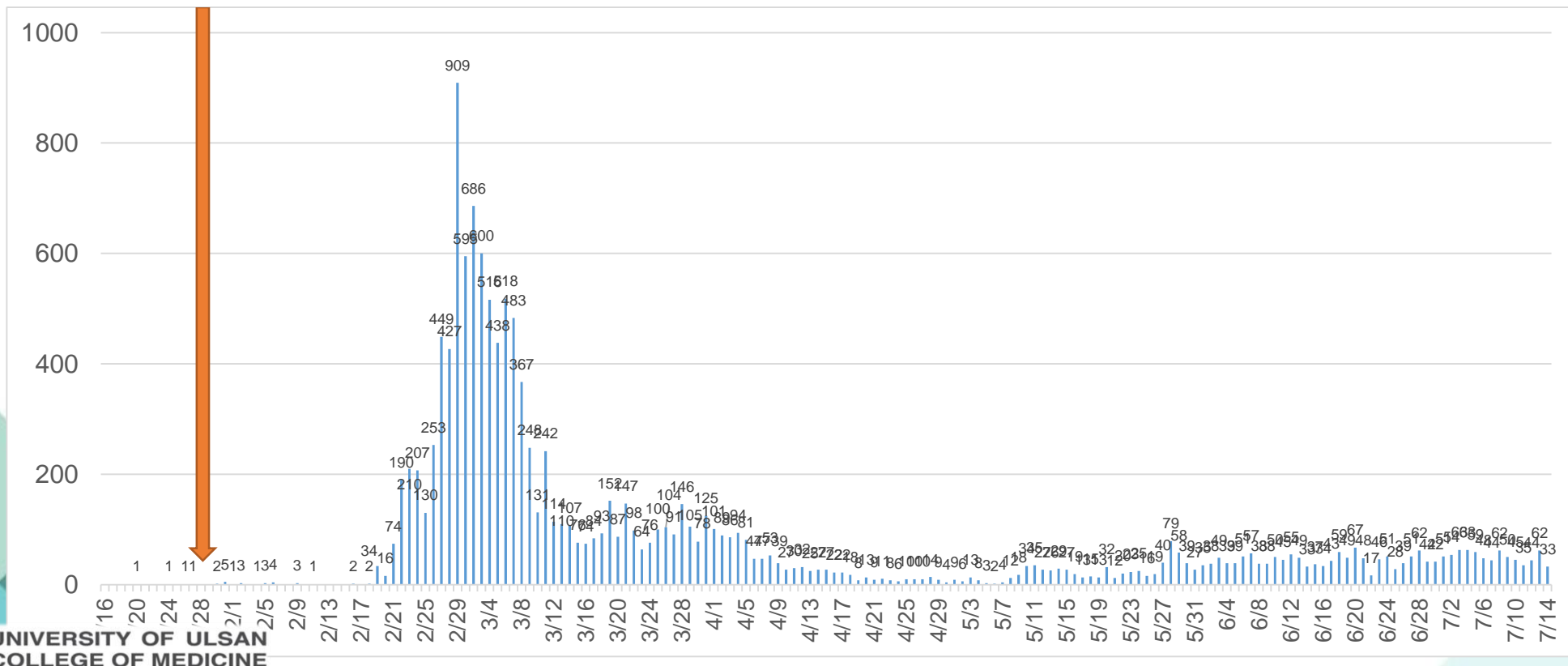


# Caution with aerosol generating procedures

- Nebulizer use: only after authorization by pulmonologist  
single room, proper PPE
- CPCR, bronchoscopy and other AGP (BiPAP, CPAP, high flow O2 therapy, T cannula suction, et al.) – single-room, proper PPE (gown, gloves, FFP2 equivalent mask, face shield or goggle)
- Bronchoscopy – universal PCR screening 1 day before bronchoscopy

# Early PCR set-up

- SARS-CoV-2 real-time PCR
- Start at Jan 29 (within 10 days after first case in Korea)



# Preoperative screening at AMC

- At other hospital at Daegu (Feb 2020)  
Just after living donor liver transplantation, donor was confirmed to have COVID-19  
→ Closed operating theater
- High risk: aerosol generating procedure including intubation, Positive-pressure room



- 1,128 patients with confirmed COVID-19 (perioperative)
- 30-day mortality: 24%
- Pulmonary complication: 51%

## Discussion

- **In the future, routine preoperative screening for SARS-CoV-2 might be possible with rapid tests that have low false positive rates**, but hospital-acquired infection would remain a challenge.
- Strategies are urgently required to minimise in-hospital SARS-CoV-2 transmission and mitigate the risk of postoperative pulmonary complications in SARS-CoV-2-infected patients whose surgery cannot be delayed.

Lancet. COVIDSurg Collaborative

# Preoperative screening at AMC

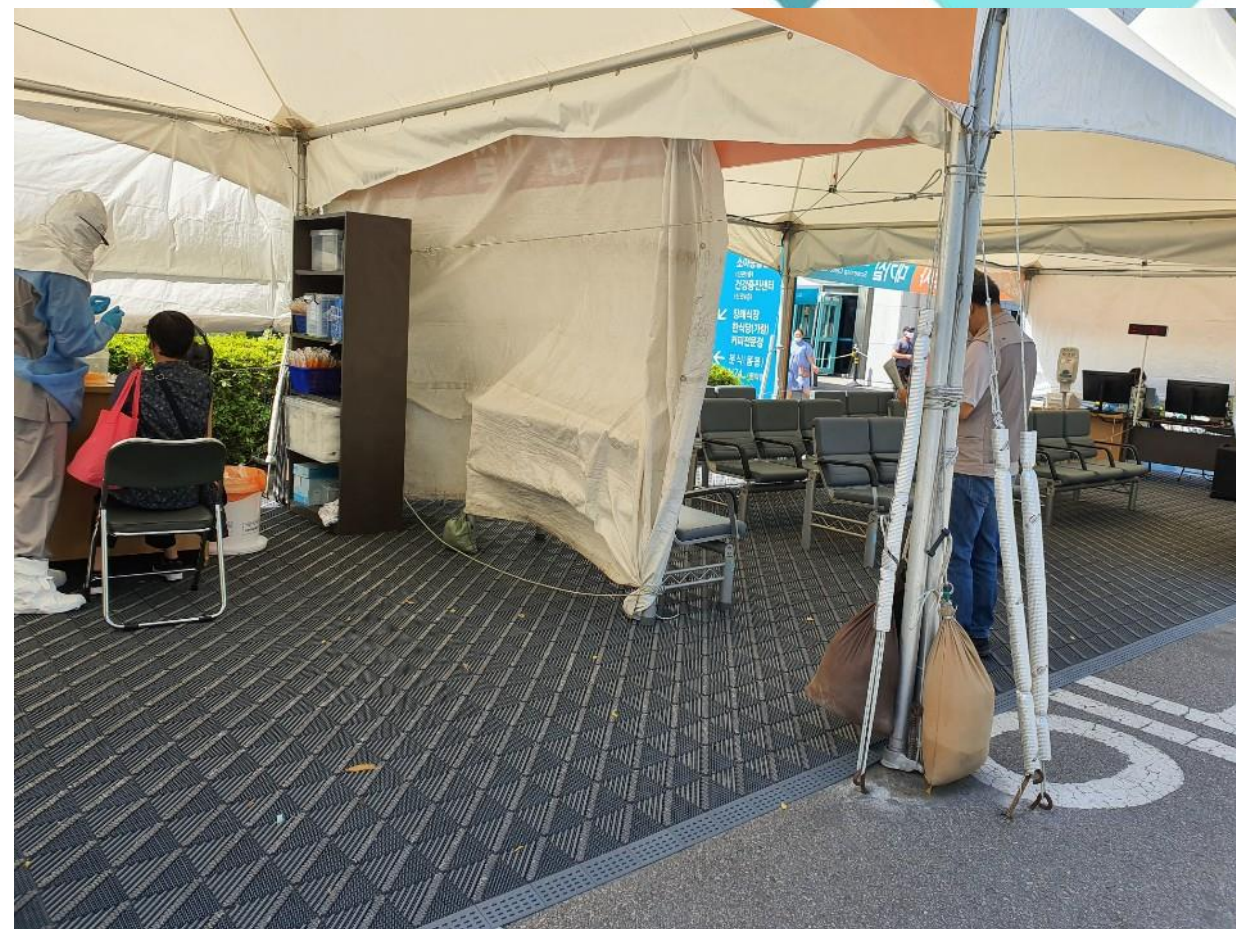
- Since Feb 24, PCR-based universal **preoperative** screening
- Since April 1, pooling (5 specimens)
- **Feb 24~ Apr 24**  
**positive rate 0% (0/9,099) (95% CI, 0.00-0.04%)**

**We deferred elective operation of patients with high epidemiologic risk (Daegu citizens...)**

# Universal screening at admission

- 4/29~ all patients
- Epidemiologic link or symptoms (+)
  - screening clinic, wait until getting negative PCR results
- Epidemiologic link and symptoms (-)
  - collect the specimen at walk-through screening centers  
admission without getting PCR results
- Apr 29~ Jun 10
- Positive rate – 0% (0/13,132) **(95% CI, 0.00-0.03%)**
  - ♣ Deferred hospitalization in patients with high epidemiologic risk







# Management of materials and medical equipment

- Global shortage of PPE especially masks
- Need for checking stocks, always!
- PPE
  - Gown (surgical gown, coverall)
  - Glove
  - Mask (N95, FFP2 equivalent level (KF94), surgical masks)
  - Goggle, face shield
- PAPR hood
- Isolation pod, negative pressure wheel chair
- Ventilator, High flow nasal cannula, ECMO



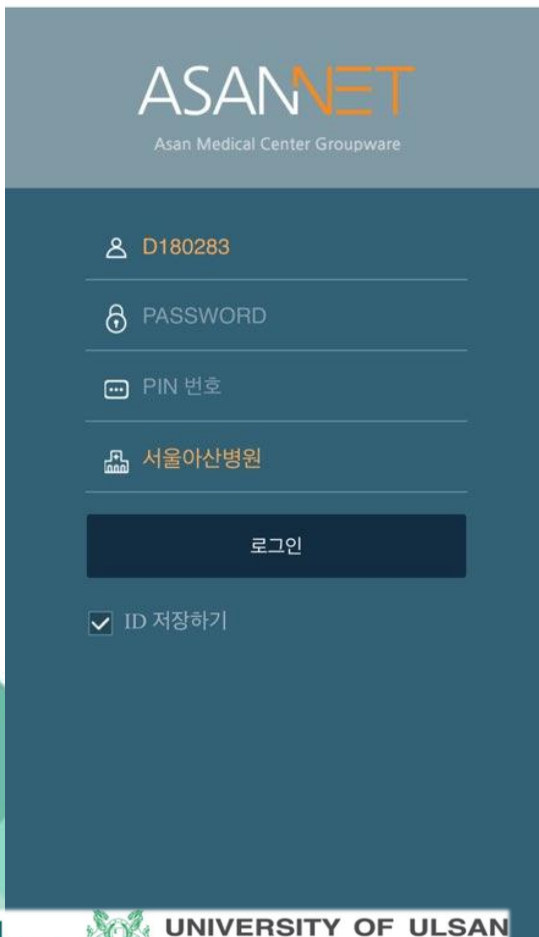
음압 이송 장비

# Healthcare workers and staff

- Restriction of visiting high risk places or cities/countries with high prevalence of COVID-19
  - Karaoke, theater, sauna, night club, pub...
- Restriction of gathering
- Any respiratory symptoms → SARS-CoV-2 PCR, restriction from working until symptom relieves
- Sharing informations, news, guidelines regarding COVID-19 in the front page of intranet

# Healthcare workers and staff

- Daily check symptoms and epidemiologic risk through App or Intranet

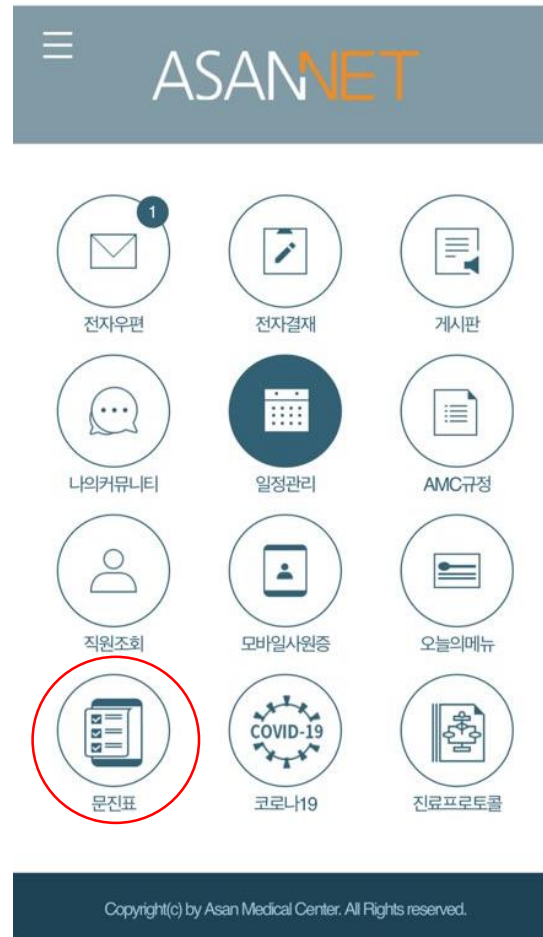


ASAN NET  
Asan Medical Center Groupware

로그인

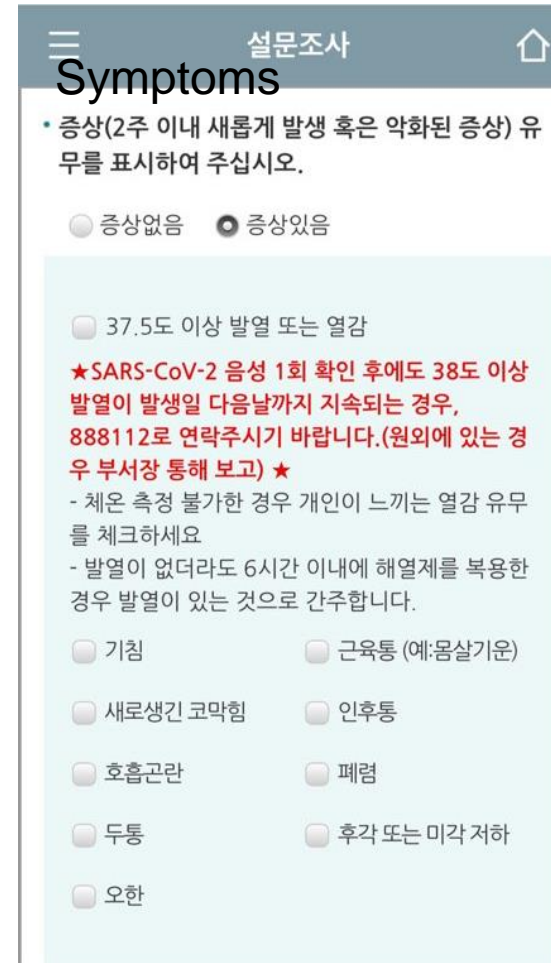
ID180283  
 PASSWORD  
 PIN 번호  
 서울아산병원

☒ ID 저장하기



ASAN NET

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설문조사  
Symptoms

증상(2주 이내 새롭게 발생 혹은 악화된 증상) 유무를 표시하여 주십시오.

☐ 증상없음 ☒ 증상있음

☐ 37.5도 이상 발열 또는 열감  
 ★SARS-CoV-2 음성 1회 확인 후에도 38도 이상 발열이 발생일 다음날까지 지속되는 경우, 888112로 연락주시기 바랍니다.(원외에 있는 경우 부서장 통해 보고) ★  
 - 체온 측정 불가능한 경우 개인이 느끼는 열감 유무를 체크하세요.  
 - 발열이 없더라도 6시간 이내에 해열제를 복용한 경우 발열이 있는 것으로 간주합니다.

☐ 기침 ☐ 근육통 (예:몸살기운)  
☐ 새로생긴 코막힘 ☐ 인후통  
☐ 호흡곤란 ☐ 폐렴  
☐ 두통 ☐ 후각 또는 미각 저하  
☐ 오한



설문조사  
High risk places

☐ ★(2주 이내) 고위험 집단발생장소 방문력

소재지		
서울	강남구	논현동 ★ 코마스인
	관악구	봉천동 ★ VMP(에)
	중구	- ★ 한화생명
경기	광명시	하안동 ★ 광명 수리
	시흥시	능곡동 ★ 시흥서울

☐ ★(2주 이내) 아래 장소 방문력

소재지		
서울	강남구	역삼동 이노션 월드와이드
	관악구	봉천동 아이스퍼지잉글
		신림동 도교술집 신림역
	노원구	부두막 코다차야 신림점
		상계동 오씨네 참쌀순대
	동작구	신대방동 보라매병원(선별)
	마포구	공덕동 버거킹 공덕역점
		방배1동 아름다운의원
	서초구	서초동 사계진미 숯불돈
	송파구	신천동 사랑의 교회
중구	신당동 태양의 집(음식)	
	신당동 한양중학교	
	면목동 세방사우나헬스	
	덕양구 화정시외버스터	
구로시	당정동 연강교토	



# Guardian in the wards

- In-patients always stay with their caregivers or guardians
- Screening for caregivers, guardians – needed
- Mobile questionnaire system (Jul 1th~ )
- Symptoms and visiting history of high risk places



보호자분의 핸드폰 번호 마지막 4자리를 입력해 주세요.  
(예 : 010-1234-5678인 경우 5678 입력)

①

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②

문진표 작성하기

# Setting up guidelines for management of patients with suspected COVID-19 or those with symptoms with or without pneumonia

**AMC 코로나19 환자 분류별 감염관리 방법 (임원예정자 및 재원환자용)**

2020.06.16 감염관리실

Level	분류 ※ 의학조사 결과에 따라 국가(감염관리본부) 기준에 따라 격리를 하는 대상은 일부 격리 해제 및 보호구 사용 등 관리방법이 다를 수 있음	4중 보호구 해제				입원 후 새로운 증상 발생				C. 재원기간 중 새로운 증상이 발생한 경우													
		A. 입원당일 선별검사 결과 확인 전 입원 시		B. 4중 보호구 해제 후		A. 입원당일 선별검사 결과 확인 전 입원 시		B. 4중 보호구 해제 후		1일실 해제여부		4중 보호구 해제		격리 해제		격리 해제		격리 해제		격리 해제		격리 해제	
		격리방법 (Level 2에서 3으로 격리 해제 후 4중 보호구 사용 가능)	Alert 격리방법 (의정 보호구)	아동/임사/사물/수술 가능여부	1인실 해제여부	4중 보호구 해제	격리방법 (Level 2에서 3으로 격리 해제 후 4중 보호구 사용 가능)	Alert 격리방법 (의정 보호구)	아동/임사/사물/수술 가능여부	1인실 해제여부	4중 보호구 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제	격리 해제
1	확진환자 (감염관리실에서 확인한 확진자 포함)																						
2	새로운 증상 발생 (신상변경 전)	SAR, 155계열 병원균 혹은 1인실				24시간 간격 2회	3일 이내 음성 확인 후 1인실 (의정 보호구 사용 가능)			155계열 병원균 혹은 1인실													
3	High risk 확진환자 (신상변경 전)	새로운 증상 발생 (신상변경 전) ※ 환자가 입원 후 48시간 이내 발생한 증상 ※ 환자가 입원 후 48시간 이내 발생한 증상 ※ 환자가 입원 후 48시간 이내 발생한 증상				24시간 간격 2회	3일 이내 음성 확인 후 1인실 (의정 보호구 사용 가능)			155계열 병원균 혹은 1인실													
4	새로운 증상 없음					1회 음성 확인 후 4중 보호구 해제 가능																	
5	새로운 증상 발생 (신상변경 전)	SAR, 155계열 병원균 혹은 1인실				24시간 간격 2회	3일 이내 음성 확인 후 1인실 (의정 보호구 사용 가능)			155계열 병원균 혹은 1인실													
6	Low risk 확진환자 (신상변경 전)	새로운 증상 발생 (신상변경 전) ※ 환자가 입원 후 48시간 이내 발생한 증상 ※ 환자가 입원 후 48시간 이내 발생한 증상 ※ 환자가 입원 후 48시간 이내 발생한 증상				24시간 간격 2회	3일 이내 음성 확인 후 1인실 (의정 보호구 사용 가능)			155계열 병원균 혹은 1인실													
7	새로운 증상 없음					1회 음성 확인 후 4중 보호구 해제 가능																	
8	역학적 연관성 있음 (C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8, C-9, C-10, C-11, C-12, C-13, C-14, C-15, C-16, C-17, C-18, C-19, C-20, C-21, C-22, C-23, C-24, C-25, C-26, C-27, C-28, C-29, C-30, C-31, C-32, C-33, C-34, C-35, C-36, C-37, C-38, C-39, C-40, C-41, C-42, C-43, C-44, C-45, C-46, C-47, C-48, C-49, C-50, C-51, C-52, C-53, C-54, C-55, C-56, C-57, C-58, C-59, C-60, C-61, C-62, C-63, C-64, C-65, C-66, C-67, C-68, C-69, C-70, C-71, C-72, C-73, C-74, C-75, C-76, C-77, C-78, C-79, C-80, C-81, C-82, C-83, C-84, C-85, C-86, C-87, C-88, C-89, C-90, C-91, C-92, C-93, C-94, C-95, C-96, C-97, C-98, C-99, C-100, C-101, C-102, C-103, C-104, C-105, C-106, C-107, C-108, C-109, C-110, C-111, C-112, C-113, C-114, C-115, C-116, C-117, C-118, C-119, C-120, C-121, C-122, C-123, C-124, C-125, C-126, C-127, C-128, C-129, C-130, C-131, C-132, C-133, C-134, C-135, C-136, C-137, C-138, C-139, C-140, C-141, C-142, C-143, C-144, C-145, C-146, C-147, C-148, C-149, C-150, C-151, C-152, C-153, C-154, C-155, C-156, 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# Setting up guidelines for management of patients with suspected COVID-19 or those with symptoms with or without pneumonia

- Classified by epidemiologic link, pneumonia, and symptoms  
→9 levels
- Isolation room designation (single room, negative-pressure room)
- PPE
- Number need to follow-up PCR
- Time of release isolation....





# Setting up guidelines for management or care of patients with confirmed COVID-19



- Proper PPE
  - Coverall
  - N95 mask +- PAPR
  - double gloves
  - goggle/face shield
  - Apron
  - boots



※ 구역 및 상황에 따른 세부적인 보호구는 [AMC 코로나바이러스감염증-19 대응 구역별 및 상황별 보호구] 참고

종류	Level D (N95) =Modified Level D (N95)	Modified (변형된) Level D (KF94)	Augmented (강화된) 4중 보호구	4중 보호구
사진	 고글생략			
Indication	Confirmed patients 진료, 검체채취, 세척/소독, 정소, 폐기물, 시신 처리	Highly suspected patients	Environmental cleaning	Patients with fever or pneumonia
Donning sequence	속장갑▶전신보호복▶속장갑 타이핑▶덧신▶N95▶후드▶겉장갑▶앞치마(필요시)▶안면보호구 ※에어로졸 발생처치 및 2시간 이상 확진환자 zone에 머무를 경우 PAPR 적용 (PAPR 적용 시에는 KF94 착용)	속장갑▶전신보호복▶속장갑 타이핑▶덧신▶N95▶후드▶겉장갑▶안면보호구 ※에어로졸 발생처치 및 2시간 이상 확진환자 zone에 머무를 경우 PAPR 적용	긴팔PP가운▶덧신▶N95▶SF후드▶페이스섀드▶청결장갑(고무장갑)	긴팔AP가운▶KF94▶고글▶청결장갑 ※구역에 따라 PP가운, N95, 페이스섀드 착용가능 (AMC 코로나19 대응 구역별 보호구 참고)
	앞치마▶덧신▶겉장갑▶안면보호구▶UNIVERSITY OF ULSAN COLLEGE OF MEDICINE▶N95▶속장갑▶장갑▶소독	덧신▶겉장갑▶안면보호구▶전신보호복▶KF94▶속장갑▶매 보호구 마다 클리넬로 손(장갑) 소독	장갑▶페이스섀드▶SF후드▶덧신▶긴팔PP가운▶N95	장갑▶고글▶긴팔AP가운▶KF94

# Setting up guidelines for management or care of patients with confirmed COVID-19

- Cleaning and disinfection of medical equipment
- Management of deceased patients

# Preparedness for nosocomial outbreak

Setting up negative-pressure Ward/ICU

- Zone 1 – Screening (6 rooms)
- Zone 2 – ICU (6 rooms)
- Zone 3 – general wards (16 rooms; 2 with anteroom)
- Designate PPE Donning/doffing area



Portable negative pressure generating machine



# Education

- Donning/doffing of PPE

Doctor, nurse, paramedic, cleaner, staff of facility department

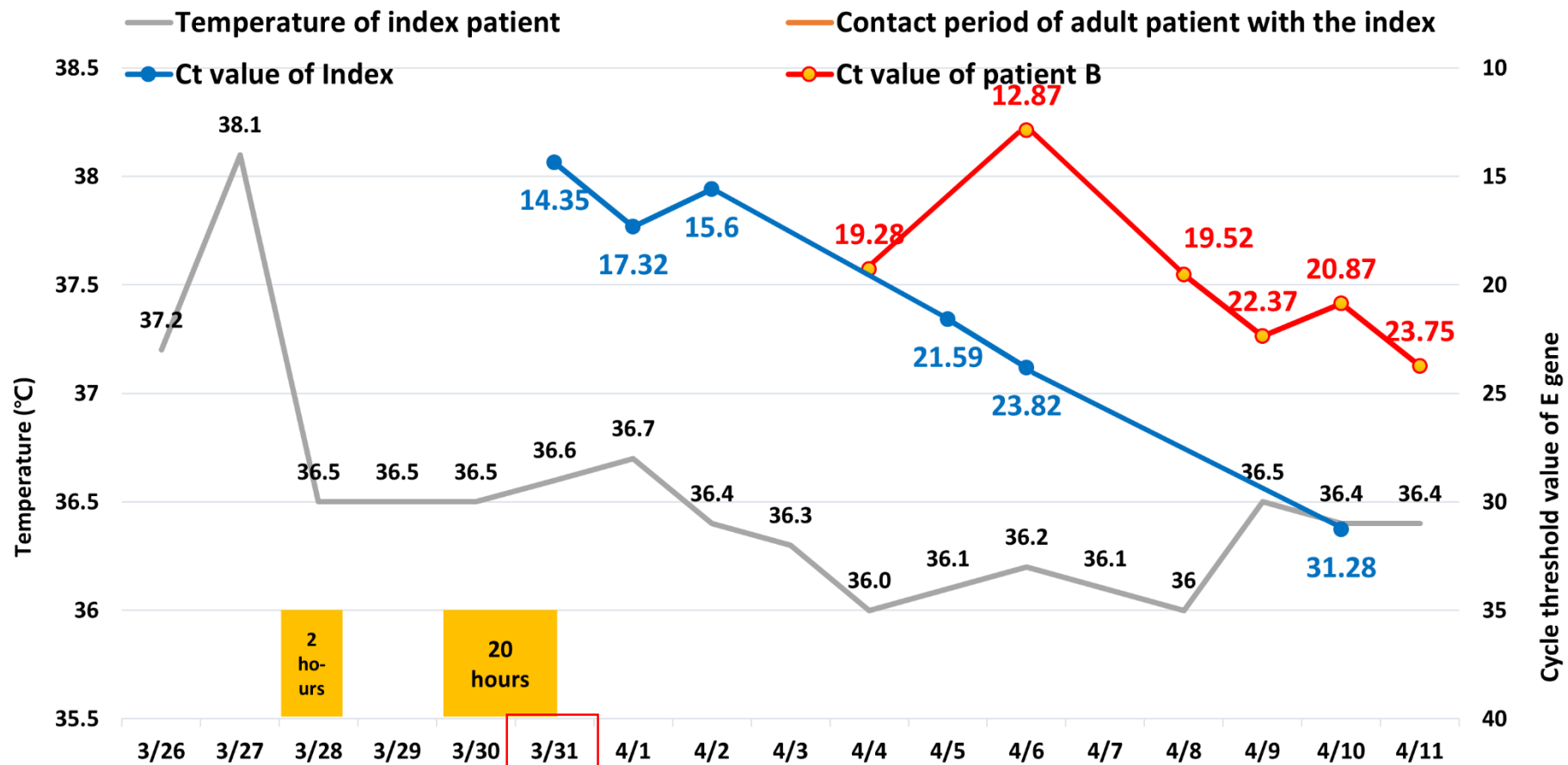




- From Feb to Aug
- 13 patients with COVID-19 were transferred from other hospital, or community health centers → 2 were died
- 12 patients were diagnosed with COVID-19 at our hospital
  - 1 medical student
  - 6 at ER
  - 2 at general ward
  - 1 at screening clinic
  - 2 was diagnosed at community health centers before or after outpatient clinic of our hospital

# Mar 31

- 9 year-old girl
- 3/25 visited to other hospital (Hospital A) due to headache  
→ intracerebral hemorrhage, intraventricular hemorrhage
- 3/26 Transfer to our pediatric ER
- She had no respiratory symptoms, no pneumonia on CXR
- During staying in ER, fever developed → Neg SARS-CoV-2 PCR



PCR from  
nasopharyngeal swab of  
Index: negative

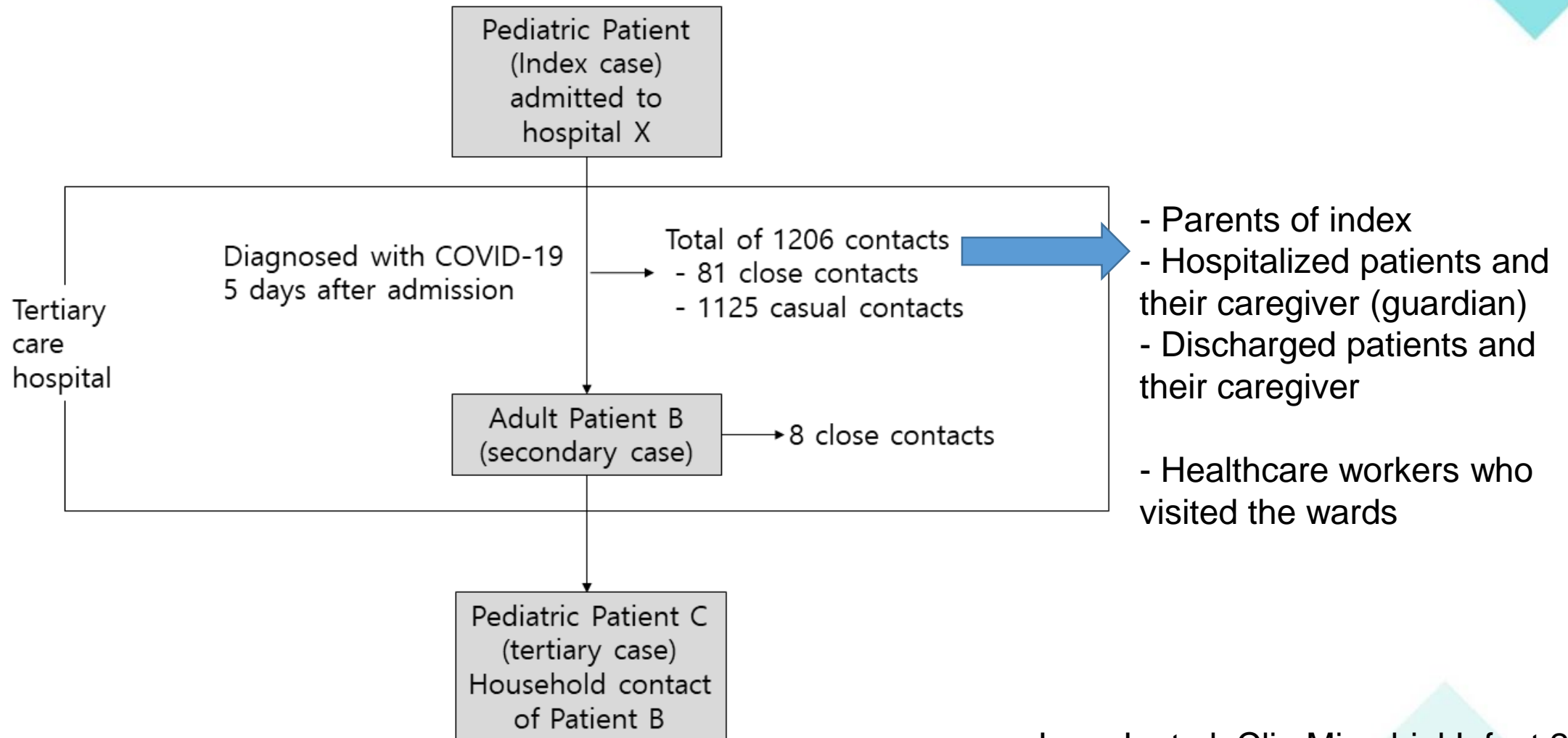
PCR from  
nasopharyngeal swab of  
index: positive  
(CT value of *E* gene: 14.35)

PCR from  
nasopharyngeal swab of  
patient B: positive  
(CT value of *E* gene: 19.28)

Media release of  
nosocomial outbreak at  
Hospital A

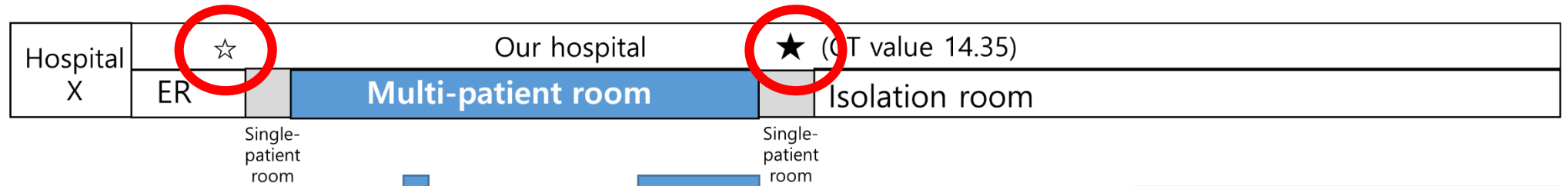
Jung J, et al. Clin Microbiol Infect 2020

# Contact tracing using closed circuit footage, interview





Index patient



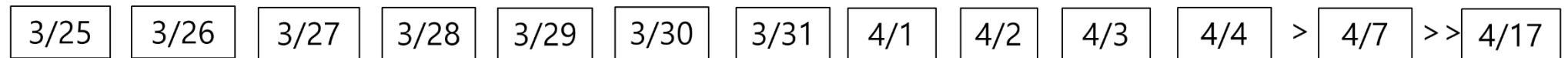
Patient B

Mother of infant who shared the multipatient room with index

Contact periods between patients A and B

Patient C  
(Patient B's daughter)

Contact periods between patients B and C



- ★ Positive result for SARS-CoV-2 PCR
- ☆ Negative result for SARS-CoV-2 PCR

- Considering the incubation period

Careful observation of development of symptom/sign of COVID-19

Immediate testing of SARS-CoV-2 PCR

During first 2 weeks after admission

# Need for Advancement

## Unmet need

(1) Fast contact tracing

CCTV tracing: time-consuming, labor-intensive

(2) Visitor tracing



***Thank you for your attention***