

# Results of the COVID-19 Survey. Impact on Cardiovascular Care in the ARGEN-IAM-ST National Infarction Registry

## *Resultados de la Encuesta COVID-19. Impacto en la atención cardiovascular del Registro Nacional de Infarto ARGEN IAM-ST*

HERALDO D'IMPERIO, JUAN GAGLIARDI, RODRIGO ZONI, ANDRIÁN CHARASK, YANINA CASTILLO COSTA, MARÍA PÍA MARTURANO, WALTER QUIROGA, STELLA MACÍN

### ABSTRACT

**Background:** The pandemic declared by WHO for the SARS-CoV-2 virus prepared the Argentine health system for the care of COVID-19 cases, but in this scenario the impact on prevalent diseases, such as cardiovascular diseases, is unknown.

**Methods:** A cross-sectional survey was conducted in the centers participating in the ARGEN-IAM-ST registry, to investigate the institutional organization, outpatient care, hospitalization in critical care areas and the situation of health care workers.

**Results:** A total of 80 centers were surveyed; 55% were public institutions and 97% had critical care areas. Ninety-one percent of the institutions created a crisis committee due to the pandemic and 65% took measures for outpatient care due to social distancing. In 89% of the centers hospitalizations due to cardiovascular diseases declined by 57% (SD  $\pm$  18) and in 24% of the centers health care workers became infected with SARS-CoV-2.

**Conclusion:** A high percentage of centers participating in the ARGEN-IAM-ST continuous registry created crisis committees to reorganize the delivery of health care services; almost two thirds of them took measures for outpatient follow-up and there was a significant decline in bed occupancy for patients with cardiovascular diseases.

**Key words:** Coronavirus Infections - COVID-19 - Surveys and Questionnaires - Myocardial Infarction - Registries

### RESUMEN

**Introducción:** La pandemia declarada por la OMS por el virus SARS CoV2 llevó al sistema de salud argentino a prepararse para la atención de casos de COVID-19, pero se desconoce el impacto en este escenario sobre patologías prevalentes, como las cardiovasculares.

**Material y métodos:** Se realizó una encuesta transversal en los centros que participan del registro ARGEN-IAM-ST, que se desarrolló para indagar sobre la organización institucional, la atención ambulatoria, la internación en cuidados críticos y el personal de la salud.

**Resultados:** Se encuestaron 80 centros; el 55% eran de dependencias públicas y el 97% con servicio de cuidados críticos. El 91% de las instituciones formó un comité de crisis por la pandemia. El 65% de los centros tomó medidas de atención ambulatoria por el distanciamiento social.

Para el 89% se redujeron los ingresos por patologías cardiovasculares, y la magnitud de la caída tuvo una media de 57% (DE  $\pm$  18). En 24% de los centros se registró personal de la salud contagiados con SARS-Cov2.

**Conclusión:** Un elevado porcentaje de centros que participan del registro continuo ARGEN-IAM-ST crearon comités de crisis para reorganizar la atención; casi dos tercios de ellos tomaron medidas para seguimiento ambulatorio y se registró una importante caída de la ocupación de camas de pacientes cardiovasculares.

**Palabras clave:** Infecciones por Coronavirus - COVID-19 - Encuestas y cuestionarios - Infarto del miocardio - Sistemas de registros

### INTRODUCTION

By the end of 2019, an outbreak began, with epicenter in China, caused by an RNA virus of the coronavirus family. On February 11, 2020, the World Health Organization (WHO) called the disease COVID-19 and this coronavirus was named SARS-CoV-2 by the Inter-

national Committee on Virus Taxonomy (ICVT).

Because of the exponential increase in the number of cases and the rapid expansion to neighboring countries and then to Europe and the Americas, WHO described the situation as a pandemic on March 11, 2020.

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Address for reprints: Dr. Heraldodimperio, Azcuénaga 980 (1115). Ciudad Autónoma de Buenos Aires, Argentina - e-mail:heraldodimperio@gmail.com

Investigators of the ARGEN-IAM-ST registry

On March 3, 2020, Argentina confirmed the first imported case, which led to the adoption of isolation measures given the growing number of infections worldwide, and on March 19, 2020, declared social, preventive, and mandatory lockdown (Decree 297/2020).

According to initial estimations, 40% to 70% of the world's population could become infected during the pandemic. The recent experiences of countries such as Italy, Spain, and the United States, among others, were consistent in that the rate of infection caused saturation of the health care systems, jeopardizing the adequate coverage of the cases and raising concerns about the management of the remaining prevalent diseases. (1, 2)

This particular situation gave rise to the hypothesis of collateral damage of the COVID-19 pandemic, with uncertain results.

In Argentina, the impact of this collateral damage on the universe of cardiovascular diseases during the pandemic is also unknown.

For this reason, an evaluation of how the institutions participating in the ARGEN-IAM-ST registry on myocardial infarction have organized outpatient and inpatient care of cardiovascular diseases during the lockdown could provide information on the current situation.

## METHODS

The ARGEN-IAM-ST Registry (3) is a cooperative initiative between the Argentine Society of Cardiology (SAC) and the Argentine Federation of Cardiology (FAC), active since 2015 (ClinicalTrials.gov NCT2458885). The aim of this continuous registry is to survey cases of ST-segment elevation acute myocardial infarction (AMI). Public and private institutions with different levels of complexity and which treat cardiovascular diseases participate in this registry.

A cross-sectional telephone survey was conducted among the heads or physicians in charge of the cardiology departments or critical care units of the centers participating in the ARGEN-IAM-ST registry.

The survey was developed with closed questions and certain domains with the following structure: the first part collects data on the size and structural capabilities of the institutions; the second section deals with the organization and outpatient clinic to adapt to the national strategy of social distancing; the third part asks questions about admissions to critical care units and the strategies established for the treatment of myocardial infarction; and the final question is about infections with SARS-CoV-2 among the institution's health care workers, as it is one of the most sensitive issues in this pandemic (the complete questionnaire is included in the supplementary material).

## Statistical analysis

Qualitative variables are presented as frequency tables and percentages with their corresponding confidence intervals. Quantitative variables are expressed as mean  $\pm$  standard deviation (SD), or median and interquartile range (IQR 25-75), according to their distribution.

Discrete variables were analyzed using contingency tables and continuous variables with the t test or the Kruskal-Wallis test, as applicable. A p value <0.05 was considered

statistically significant. The analysis was performed using Stata/SE v13.0 software package.

## Ethical considerations

The ARGEN-IAM ST study protocol was approved by the Argentine Society of Cardiology Ethics Committee and the Ethics Committee of each Institution.

## RESULTS

A total of 80 centers were surveyed with participation of all the provinces (Table 1). Fifty-five percent are public hospitals and 97 % have critical care areas. Of these, 67 % have a coronary care unit (CCU) and 58 % of the centers also have a cardiology residency program. In 12 centers (23 %) the number of beds in the CCU has been reduced due to the reorganization of resources in critical areas. Sixty-three percent of the institutions have catheterization laboratory and 10% of these centers have dedicated one lab exclusively for COVID-19 patients (Table 1).

A central crisis committee for the pandemic was organized in 91% of the centers and only 10% of the cardiology departments also created an internal crisis committee to deal with specific issues of the area.

In 65% of the centers, measures were taken to provide outpatient care: 43% used some kind of teleconsultation tool, such as telephone calls (63%), telemedicine (23%) and consultations via applications offered by private health care insurance companies (14%). In

**Table 1.** Number of centers per provinces surveyed

Provinces	Centers surveyed
Buenos Aires	19
Autonomous City of Buenos Aires	16
Catamarca	2
Chaco	1
Chubut	3
Córdoba	4
Corrientes	2
Entre Ríos	1
Formosa	2
Jujuy	2
La Pampa	1
La Rioja	2
Mendoza	2
Misiones	3
Neuquén	1
Río Negro	4
Salta	2
San Juan	1
San Luis	1
Santa Cruz	1
Santa Fe	3
Santiago del Estero	2
Tierra del Fuego	2
Tucumán	3
23 provinces	80 centers

addition, 23% complemented this type of care with electronic prescriptions.

In the domain of hospital admissions, 89% of the centers reduced the admission of patients with cardiovascular diseases to critical care units; 10% indicated that the number of admissions was the same and 1% reported more hospitalizations.

The mean reduction in critical care admissions was 57% (SD  $\pm$  18): 62% (SD  $\pm$  18) in public institutions and 52% (SD  $\pm$  17) in private centers;  $p = 0.02$ .

Thirty percent of survey respondents had planned a strategy for AMI management: two-thirds prioritized fibrinolysis while primary percutaneous coronary intervention (PCI) was adopted in one-third of the centers. As for the questions on whether reperfusion with fibrinolysis or PCI in AMI patients had increased, at the time of the survey all the respondents reported no changes.

Nineteen centers (24%) reported infection with SARS-Cov2 among the health care workers, but 4 of them indicated that the infections had occurred outside the health care setting (due to travel, contact outside the institution, etc.) (Table 2).

## DISCUSSION

The Argentine health care system has been forced to implement measures to avoid an exponential curve of SARS-CoV-2 infections, and on the other hand, the general population is in a situation of lockdown and fear of becoming infected. Both factors have generated a new social situation where priorities are reassigned by both components trying to find a delicate balance between what is necessary and what is dispensable.

In countries where the rate of infection was exponential, the health care systems were significantly collapsed to deal with COVID-19 cases, and consequently, with high-prevalent conditions such as AMI.

This phenomenon - a consequence of the pandemic - warned the scientific societies. Several reports were published about the low number of occupied beds with diseases such as myocardial infarction, which inevitably leads to the question of what happens to these patients without the usual care. (4)

To provide a context for the results of the ARGEN-IAM-ST COVID-19 survey, we must mention the progress of infections and deaths in Argentina during the study period, which began on April 21, 2020, when 122 infections and 6 deaths were recorded, and ended on May 11 with 244 infections and 9 deaths (Figure 1). More than two thirds of the cases occurred in the Metropolitan Area of Buenos Aires (AMBA), and the provinces of Catamarca and Formosa had no recorded infections according to reports from the Argentine Ministry of Health. During this period, the health authorities and the expert panels considered that the peak of infections had not yet occurred because of the premature confinement, and there are different opinions on when it could happen.

This survey conducted among the participating

centers of the ARGEN-IAM-ST registry is not intended to be representative of the country or of the surveyed centers regions. It is rather a possible approach to the drop of bed occupancy rates for prevalent diseases, especially in critical care units, a situation that has strongly attracted the attention of the medical community using the available tools of the registry. As cardiovascular diseases are highly prevalent and are the main cause of mortality in Argentina as in most countries, their possible lack of treatment is of particular concern.

Firstly, almost all the institutions implemented crisis committees in response to the health emergency, and two thirds developed strategies for monitoring outpatients to avoid crowding in the waiting rooms, according to the resources and realities of each sector and region. Here, we must take into account the speed with which these strategies had to be implemented, since outpatient care was stopped by national decree, and the accompanying measures and infrastructure created obstacles for reorganization. The use of resources such as teleconsultation, which could be carried out mostly by telephone, and electronic prescriptions in almost one out of four centers that used teleconsultation, is noteworthy; these measures coincide with the global trend to adopt this type of resources. (5)

Secondly, the decrease in the number of patients admitted with cardiovascular diseases (without considering scheduled procedures), in almost 90% of the centers surveyed, reaches a mean of 57% (SD  $\pm$  18), irrespective of a statistical difference of 10 points between public and private centers, which suggests a drop of more than 50% in the bed occupancy for these diseases. In studies carried out in other countries, usual bed occupancy rates in critical care units is between 80-90%; above these values, quality of care decreases, and below these figures, patients do not receive the adequate care required for their complexity. However, the bed occupancy recorded in these studies does not refer exclusively to cardiovascular disease, but to total bed occupancy. (6-8)

The survey reveals a situation in a certain period, where early lockdown avoided an initial exponential curve of infections and allowed the Argentine health system to be prepared with sufficient bed capacity for an expected increase in the demand due to COVID-19. On the other hand, this scenario has led to a new dynamic of follow-up for outpatients, with few general emergency room consultations which, together with low bed occupancy, may have important consequences in the universe of cardiovascular diseases. In addition, the collateral damage of COVID-19 and its consequences also present challenges for their proper quantification.

Eighty-nine percent of the centers surveyed have reported a decrease in admissions for cardiovascular causes; however, they have not reported a perceived decrease in the rate of use of the various reperfusion

Table 2. Results of the survey

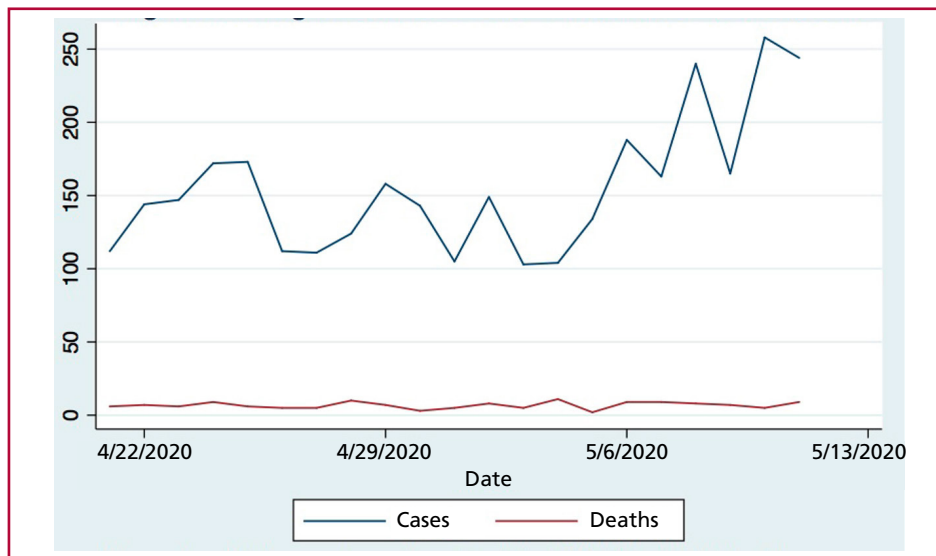
N°	Summary of questions	N° of answers	Percentage
1	Type of institution		
	-Public	44	55
	-Private	36	45
2	Number of beds in the institution, median (IQR 25-75%)*	152 (100-220)	
3	Institution with critical care area		
	-Yes	78	97
	-No	2	3
4	-CCU**	52	67
	-ICU	26	33
5	Number of beds in the critical care area, median (IQR 25-75%)	18 (13-32)	
6	Number of beds in CCU, median (IQR 25-75%)	10 (6-14)	
7	Cath lab		
	-Yes	50	63
	-No	30	37
8	Has a cath lab room assigned to treat COVID-19		
	-Yes	5	10
	-No	45	90
	-Don't know	0	
9	CCU has had to reduce beds		
	-Yes	12	23
	-No	40	67
10	CCU staff joined ICU*** staff to work together in the treatment of COVID-19 patients		
	-Yes	1	2
	-No	79	98
11	Cardiology residency program		
	-Yes	46	58
	-No	34	42
12	An institutional crisis committee was created		
	-Yes	73	91
	-No	7	8
	-Don't know	0	
13	The department of cardiology has its own crisis committee		
	-Yes	8	10
	-No	72	90
	-Don't know	0	
14	The department of cardiology took measures for outpatient follow-up		
	-Yes	48	65
	-No	32	35
	-Don't know	0	
15	Use of teleconsultation tools		
	-Yes	35	44
	-No	45	56
	-Don't know	0	

(continue)

(continuation)

N°	Summary of questions	N° of answers	Percentage
16	If the answer to question 15 was yes -By telephone calls -By specific platforms for teleconsultation -WhatsApp (for video calls) -Skype -Zoom -Hangouts -FaceTime -Other (describe): platforms provided by prepaid medical insurance companies	22 8 0 0 0 0 0 0 5	63 23       14
17	Electronic prescriptions -Yes -No -Don't know	18 62 0	23 67  
18	Scheduled medical visits for high-risk patients -Yes -No -Don't know	35 45  	44 56  
19	If the answer to question 18 was yes: -Percentage (of those who answered), median (IQR 25-75%) -Don't know	10 (7-15) 44	 55
20	Decline in hospitalization of patients with cardiovascular diseases in critical care areas -Yes, has declined -No, is the same -No, has increased -Don't know	71 8 1 0	 89 10 1
21	Estimated percent of decline, mean****(SD)	56 ( ± 18)	
22	The center is operating for -Referrals -Emergency visits -Others (Can choose several options)	80 80  	100 100  
23	Some strategy has been established for the management of AMI during the peak of the pandemic -Yes -No -Don't know If the answer is yes: -Priority of: -Greater use of thrombolytic therapy -Greater use of percutaneous coronary intervention	24 56  15 9	30 70  62 28
24	Nowadays, reperfusion of STEMI with PCI: -Has increased -Has decreased -Is the same -Don't know	0 0 80 0	  100  
25	Nowadays, reperfusion of STEMI with thrombolysis: -Has increased -Has decreased -Is the same -Don't know	0 0 80 0	  100  
26	The health care workers have become infected with SARS-CoV-2 -Yes -No -Don't know	19 61 0	24 76  

\*IQR: Interquartile range. \*\*CCU: Coronary care unit. \*\*\*ICU: Intensive Care Unit. \*\*\*\*SD: Standard deviation. AMI: Acute myocardial infarction. STEMI: ST-segment elevation acute myocardial infarction.



**Fig. 1.** Progression of COVID-19 during the survey

Number of cases and deaths reported by the Argentine Ministry of Health

strategies for patients consulting for AMI. This observation opens the possibility that many patients with cardiovascular diseases that may require hospitalization do not seek medical care.

Regarding the health care workers who were infected, the survey only asked if there were any employees infected in the institution, but did not further investigate the number of cases, whether they were doctors or nurses, or the number of COVID-19 patients treated; therefore, it is not reasonable to compare this survey with reports from other countries. Even so, almost a quarter of the centers reported infections among health care personnel, and could be thus taken into account to strengthen prevention measures, since this is a point of concern for the Argentine Ministry of Health which reported 16.7% of infections among health care workers. (9, 10)

Based on the results of this survey, it is possible to add information in a defined context to support the perception of the medical community and to intensify efforts for adequate coverage of the general population.

Undoubtedly, the entire society is learning on the go about the scourge of this unprecedented pandemic. The Ministry of Health and the cardiovascular scientific societies in Argentina have echoed the significant problem of bed occupancy and have transmitted specific messages in the media to encourage consultation and avoid potentially devastating complications.

## CONCLUSION

A high percentage of centers participating in the ARGENT-IAM-ST continuous registry in the context of lockdown have created crisis committees to reorganize the health care delivery. Almost two thirds of them have taken measures for outpatient follow-up and there has been a significant decline in bed occupancy for patients with cardiovascular diseases in critical care units.

## Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material)

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## Appendix

### List of the ARGEN IAM-ST participating centers that answered the COVID-19 survey

Hospital General de Agudos Dr. Cosme Argerich	Hospital Ramón Carrillo
Clínica Pasteur de Neuquén	Hospital Regional Río Gallegos
Sanatorio Pasteur de Catamarca	Hospital Distrital Eduardo Neira
Instituto de Cardiología JF Cabral	Hospital Herrera Motta de Chilecito
Clínica Bazterrica	Hospital General de Agudos Dr. E. Tornú
Clínica Santa Isabel	Hospital Interzonal General de Agudos San Martín de La Plata
Hospital de Alta Complejidad en Red El Cruce, Dr. Néstor Kirchner	Hospital Privado De La Villa
Hospital Teodoro J. Schestakow	Hospital Centro de Salud Zenón Santillán
Centro Modelo de Cardiología de Tucumán	Hospital Lamadrid de Monteros
Hospital Escuela de Agudos Dr. Ramón Madariaga	Hospital Luisa Cravena de Gandulfo
Instituto Modelo de Cardiología Privado de Córdoba	Hospital de San Bernardo
Hospital General de Agudos Juan A. Fernández	Hospital Centeno
Hospital de Clínicas José de San Martín	Hospital Melchora Figueroa de Cornejo
Sanatorio Los Lapachos	Instituto de Cardiología de Santiago del Estero
Hospital Pablo Soria	Clínica Yunes
Hospital SAMIC Iguazú	Clínica Del Valle
Hospital Samic Oberá	Hospital Subzonal Dr. Andrés R. Isola
Sanatorio Güemes	Sanatorio de la Ciudad
Sanatorio de la Trinidad Mitre	Hospital Ramón Carrillo de Río Negro
Hospital José María Cullen	Hospital Privado Regional
Hospital Provincial Universitario del Centenario	Sanatorio Juan XXIII
Hospital Clemente Álvarez	Sanatorio San Carlos
Sanatorio Allende Cerro	Hospital Central de Formosa
Hospital San Juan de Dios de La Plata	Hospital de Alta Complejidad de Formosa
Hospital Interzonal General de Agudos	Clínica Modelo de Morón
Dr. Alberto Balestrini	Hospital Interzonal General de Agudos Rossi
Clínica Monte Grande	Hospital Italiano de La Plata
Hospital Regional de Ushuaia	Instituto Médico Sagrado Corazón
Sanatorio Fuegoño de Diagnóstico y Tratamiento	Sanatorio Los Arcos
Hospital Italiano de Córdoba	Hospital Británico de Buenos Aires
Hospital Córdoba	Hospital General de Agudos Dr. Teodoro Álvarez
Hospital Escuela Gral. San Martín	Hospital General de Agudos Dr. Zubizarreta
Hospital San Martín	Hospital Central de San Isidro
Instituto Cardiovascular del Nordeste	Hospital Iriarte de Quilmes
Hospital Regional Diego Paroissien de Mendoza	Hospital Zonal General de Agudos Dr. Arturo Oñativia
Sanatorio de la Trinidad Quilmes	Clínica IMA
Sanatorio de la Trinidad Palermo	Hospital Dr. Raúl F. Larcade
Hospital Dr. Guillermo Rawson de San Juan	Hospital San Juan Bautista
Hospital General de Agudos Bernardino Rivadavia	Hospital Zonal General de Agudos Narciso López de Lanús
Hospital Alemán	Hospital Privado de la Comunidad de Mar del Plata
Hospital San José de Pergamino	

## Survey

Date:

Province:

### Type of institution and structure

- 1- Type of institution: public/private/mixed
- 2- Number of beds in the institution:
- 3- The institution has critical care unit areas: YES/NO
- 4- If the previous question was answered yes: Does the institution have a coronary care unit or intensive care unit? CCU/ICU
- 5- Total number of beds in critical care area (ICU plus CCU):
- 6- For CCU, number of beds:
- 7- Does the institution have cath lab? YES/NO
- 8- If the institution has cath lab: is there a room dedicated for COVID-19 patients requiring angiography or percutaneous coronary intervention? YES/NO/DON'T KNOW
- 9- Has the number of CCU beds or those allocated for patients with coronary artery disease declined due to the reorganization? YES/NO
- 10- Has the CCU staff joined the ICU staff for the care and management of patients (or has it remained as a separate unit)? YES/NO
- 11- Does the center have a cardiology residency program? YES/NO

### Organization due to the pandemic and outpatient clinic

- 12- Has the institution created a crisis committee due to the pandemic? YES/NO/DON'T KNOW
- 13- Has the department of cardiology created its own crisis committee in the context of the pandemic? YES/NO/DON'T KNOW
- 14- Did the department of cardiology take measures for outpatient follow-up to avoid medical visits? YES/NO/DON'T KNOW
- 15- Has the department of cardiology used tools for teleconsultation? YES/NO/DON'T KNOW
16. If the answer to the previous question is yes: Which? (please tick as applicable)
  - \*Telephone calls
  - \* Specific platforms for teleconsultation
  - \* WhatsApp (for video calls)
  - \* Skype
  - \* Zoom
  - \* Hangout
  - \* FaceTime
  - Other (please describe): .....
- 17- Has the department of cardiology implemented the use of electronic prescriptions? YES/NO/DON'T KNOW
- 18- Are high-risk patients appointed for scheduled medical visits? YES/NO/DON'T KNOW
- 19- If the answer to the previous question is yes, in your opinion, what percentage of high-risk patients had scheduled visits in the outpatient clinic? Percentage/DON'T KNOW

### Hospitalization and critical care

- 20- In your opinion, has the number of hospitalizations of patients with cardiovascular diseases in critical care areas declined since the beginning of the lockdown? YES/NO/DON'T KNOW  
(This question is intended to inquire about emergency admissions due to myocardial infarction, heart failure, arrhythmias, only related to cardiology)
- 21- If the answer to the previous question is yes, in your opinion, what is your estimated percent drop in admissions? PERCENTAGE/DON'T KNOW
- 22- Due to the pandemic, the cardiovascular area in your institution is operating for (please tick ALL applicable answers):
  - \* Referrals
  - \* Emergency room visits
  - + Others (please, explain).....
- 23- Has any strategy been established for the management of acute MI during the peak of the pandemic? YES/NO/DON'T KNOW. If the answer is yes, thrombolysis or PCI?
- 24- In your center, reperfusion of STEMI patients with PCI has currently: INCREASED/DECREASED/IS THE SAME/DON'T KNOW.
- 25- In your center, reperfusion of STEMI patients with thrombolysis has currently: INCREASED/DECREASED/IS THE SAME/DON'T KNOW.

### This question is only referred to the healthcare staff of the institution:

- 26- Have the healthcare workers become infected with SARS-CoV-2? YES/NO/DON'T KNOW