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REVIEW

Impact of the COVID-19 pandemic on the Forensic Medical Services in Madrid (Spain)[☆]



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Abstract The Community of Madrid has been the Community hardest hit by the COVID-19 pandemic. The recent star up of the Madrid's Institute of Legal Medicine and Forensic Sciences, has forced to manage this situation, with its precarious structure, through the establishment of Accords and operational guidelines, which have prevented the collapse of its functioning. These measures, also promoted by the different Services, but in particular, those adopted by the Pathology Service, have contributed to avoid this situation. In this sense, special measures had to be adopted for the treatment of corpses in Madrid Community, with the opening of temporary deposits, which would face the high number of deaths. A comparative study of the number of deaths, according to forensic medical etiology, has been carried out from 2019 with the year 2020, in the period between March 9 to April 20 of this year.

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PALABRAS CLAVE

COVID-19;
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Servicio;
Patología

Afectación de la pandemia por COVID-19 en los Servicios Médico-Forenses de Madrid (España)

Resumen La Comunidad de Madrid ha sido la comunidad más castigada por la pandemia por la COVID-19. La reciente puesta en funcionamiento del Instituto de Medicina Legal y Ciencias Forenses de la Comunidad de Madrid ha obligado a que con su precaria estructura gestionara esta situación, mediante el establecimiento de acuerdos e instrucciones que han impedido que este se colapsara. Especialmente las medidas adoptadas por el Servicio de Patología han impedido este colapso y disponer de personal necesario para hacer frente a las contingencias que pudieran producirse. Se han tenido que adoptar medidas especiales para el tratamiento de

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cadáveres en la Comunidad de Madrid, con la apertura de depósitos temporales, que hicieran frente al elevado número de fallecidos. Se ha realizado un estudio comparativo del número de fallecidos, según etiología médico-legal, entre los años 2019 y 2020 en el periodo comprendido entre el 9 de marzo y el 20 de abril.

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Introduction

By means of Decree 37/2006, of 4 May, the Government Council of the Community of Madrid¹ created the Legal Medicine Institute of the Community of Madrid, and it passed its Regulations once State functions and services had been transferred to the Community of Madrid by RD 1429/2002, of 27 December, and 600/2002, of 1 July. Decree 50/2015 of 21 May, of the Government Council,² modified the said regulations regarding the structure of certain Services and Departments.

The mandatory approval of the JL (Jobs List) of the Madrid Community Legal Medicine and Forensic Sciences Institute (*Instituto de Medicina Legal y Ciencias Forenses de la Comunidad de Madrid*) (hereinunder IMLCFCM), published in the Board of Justice, the Interior and Victims³ Order 123/2019, of 27 September, was the necessary preparatory step so that Order 12/2020, of 21 January⁴ could be published in edition number 36 of the BOCM (the Official Bulletin of the Community of Madrid), establishing that the Institute of the IMLCFCM would commence working on 1 February of this year.

The swearing in ceremony of the Manager and Assistant Manager on 2 February, together with the designation of the functions of the General Secretary, were the first steps in completing the structure described in Decree 50/2015. The announcement of a specific selection process for several specific Department Head jobs on the 15.10.2019, and the Resolution of the same, by publication of the names of the appointees in the BOE dated 22 January, and the subsequent swearing in ceremonies, completed the first level of organisational responsibility within the IMLCFCM.

To complete the organisational framework of the IMLCFCM, the announcement of the Department Head positions was made in the Resolution of 2 October 2019 by the General Management of Human Resources and Connections with the Administration of Justice (*Dirección General de Recursos Humanos y Relaciones con la Administración de Justicia*) (DGRHRAJ) of the Board of Justice, the Interior and Victims of the Community of Madrid. To date, and given the suspension of job vacancies for occupation, it has not been possible to complete this second level of the structure.

Action by the Legal Medicine and Forensic Sciences Institute of the Community of Madrid in the medical emergency

On 11 March 2020 the World Health Organisation raised the public health emergency due to COVID-19 to the level of

international pandemic, and by means of RD 463/2020, of 14 March,⁵ the state of emergency was declared to manage the medical emergency caused by COVID-19.

Within this scenario, the Community of Madrid is the Spanish Autonomous Region that has been the most affected, with rates of infection, hospital admission (including to ICU) and deaths higher than those of any other Autonomous Community.

The medical health emergency occurred at a time when the structure of the IMLCFCM was still incomplete, and it was composed solely of its Managers, Assistant Managers and Department Heads. It also included a General Secretary, without any initially planned financial support. The formation of the Board of Directors was also suspended, as it was not possible to create it with elected members, as the regulations demand. This was combined with the impossibility of formally creating the different Services and Departments, as the necessary previous step to starting work, according to the said structure.

From this starting point, the IMLCFCM Management established a series of measures to respond to the emergency situation, as Madrid was the Autonomous Community with the highest number of recorded cases. It was therefore necessary to urgently implement measures to prevent services from collapsing, especially those in connection with duty rosters and keeping the Pathology Department operational, adapting it to current circumstances.

The measures that were implemented included communications, agreements, intra- and inter-institutional instructions and recommendations in connection with the working of the IMLCFCM. Other measures were associated with the pandemic situation, and they were based on the need to respond to different situations created by a pandemic that was changing from day to day.

Three basic areas of action can be distinguished in the decisions taken by the IMLCFCM in connection with the COVID-19 pandemic:

- 1 Agreements, communications, recommendations and instruction for IMLCFCM personnel:
 - Protocol for action in cases of infection by the new coronavirus, issued on 13 February 2020. This establishes the measures to be implemented in connection with processing corpses, and it was created with the help of the National Institute of Toxicology and Forensic Sciences, and revised by the Emergency Coordination and Medical Emergencies Centre.
 - Reorganisation of the working of the Medical-Forensic Clinical Department, cancelling all planned visits after 11

March and solely attending to those arising from emergencies, without the possibility of delay.

- Recommendations to prevent Clinical and Duty forensic doctors from becoming infected by COVID-19 coronavirus, in connection with live subjects (10.03.20).
 - Instructions on the best practices when removing a corpse (10.03.20) and centralising forensic autopsies with a suspicion of COVID-19 in the Pathology Department of the IMLCFCM.
 - Forensic Laboratory working norms in connection with the management of samples to be analysed for emergency toxicological and biochemical purposes (11.03.20).
 - Instruction establishing the minimum services in the IMLCFCM (13.03.20).
 - Agreement modifying the duty roster in the IMLCFCM that affects Area II (the periphery of the Community), with the creation of 7 territorial sectors and the introduction of 24h. duty shifts throughout the Community of Madrid, with authorisation by the DGRHRAJ and informing the President of the Supreme Court of Madrid (TSJM) (19.03.20).
 - Recommendations for the working of the Local Offices and Head Office of the Medical-Forensic Clinic (Contingency Plan of the IMLCFCM due to COVID-19; 23.03.20).
 - Modification of the norms relating to the toxicological and biochemical studies to be undertaken by the Forensic Laboratory Department (25.03.20).
 - Agreement for the modification and reinforcement of the verification process of medical death certificates to adapt them to the existing regulations in Area I, more specifically the City of Madrid (26.03.20), which include the Forensic Doctor of the Civil Registry and the duty forensic doctor for Fast-Track Trials, due to the large number of death certificates to be endorsed.
 - Recommendations for medical-forensic action due to the state of emergency caused by COVID-19 and to fill out death reports (06.04.20).
 - The preparation of medical-forensic death report models according to LO 7/1992 (06.04.20).
 - Instruction for the reinforcement of the Procedural Official in Madrid (Area I) (14.04.20) with the duty forensic doctor for Fast-Track Trials.
 - Communications on the management of samples in the Laboratory Department (13.04.20).
 - Gathering statistical data on possible cases of COVID-19 in Area II.
- 2 Intra-institutional management:
- Taking control of compliance with working hours and processing requests for vacations, leave and permits using the computerised timekeeping control application “*Fichajes y Vacaciones*” (FIVA).
 - Control of leave and exemptions for certain medical-forensic activities as a result of the COVID-19 pandemic.
 - Regulation of substitutions and approval of intrasectorial agreements in administrative areas as a result of the Sectorialisation of Area II and the implementation of a 24h duty roster.
 - Interruption of the electoral process convened by the Resolution of 31 January 2020, of the DGRHRAJ, convening and regulating the election process for 3 forensic doctors as members of the Board of Directors of the IMLCFCM.

- Management of the certification of the 24h. duty roster in Area II established by the Agreement of 19 March.
 - Management of the means of transport necessary for the transport of the forensic doctor in the 24h duty roster established by the Agreement of 19 March.
 - Management of material resources, from requesting them until they are delivered to the different offices, specifically: personal protective equipment (gloves, masks, disposable coats, protective glasses, impermeable aprons, protective overtrousers), protective screens and disinfectant gels. This includes obtaining tests for fast detection for use in the Forensic Laboratory.
- 3 Inter-institutional management:
- Agreements with the Epidemiological Monitoring Network of the Community of Madrid, SUMMA and SAMUR, which in the last two cases have the aim of encouraging the issuing of medical death certificates in cases of natural death associated with or potentially associated with COVID-19.
 - The preparation of a model death certificate to be used by SAMUR with the guarantee of the IML Management.
 - Inclusion in the COVID-19 Monitoring Commission under the President of the TSJM and composed of the Head Prosecutor of Madrid, the Senior Judges of Madrid, the Provincial Coordinator Secretary of Madrid, the General Director of the DGRHRAJ, Government Secretary of the TSJM and the Communications Office of the TSJM.
 - Transfer of the agreements, recommendations and instructions issued by the IMLCFCM to the DGRHRAJ, TSJM and their dependent Dean’s offices.

Many of the above measures associated with the state of emergency caused by the COVID-19 pandemic and initially adopted by Management and one of the measures agreed by the Heads of Service of the IMLCFCM have the aim of preventing the collapse in capacity of the medical-forensic institutional response, while also protecting the forensic doctors included in the IMLCFCM.

An example of the measures to protect the collapse of capacity was the said Agreement for the reinforcement and modification of the verification process and medical death certificates to adapt them to meet the existing regulations in Area I (Madrid city), passed on 26 March.

Only in Area I (Madrid) the gradual increase in pressure due to the number of incidents deriving from the deaths associated with COVID-19 made it necessary to manage, together with other institutions, the existence and destination of up to 51 corpses per day. This was reflected in the enormous increase in the number of death certificates issued, as will be described below.

The daily obligation for medical-forensic endorsement of the medical certificates examined due to judicial mandate made it possible to monitor their number. As a result of this, a specific Agreement was reached on the verification process. In the city of Madrid it was usual to endorse approximately 90–100 death certificates at this time of year, but this clearly and gradually increased after 23 March, when more than 324 certificates were issued. A maximum number of 391 certificates were issued in the first week of April, with a subsequent sustained evolution until 10 April, when fewer than 300 certificates were issued again (Fig. 1). Since then and to date, double the number of death certificates are

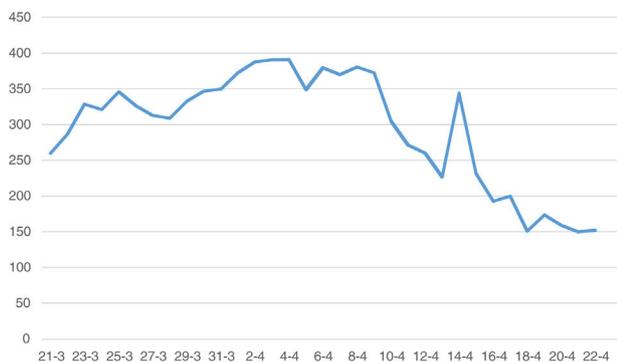


Figure 1 Number of medical death certificates endorsed by forensic doctors and supplied by undertakers. Source: prepared by us.

still being verified and endorsed than was the case before the COVID-19 pandemic was declared.

Management of the Pathology Department of the Legal Medicine and Forensic Sciences Institute of the Community of Madrid

The functions assigned to the Forensic Pathology Department of the IMLCFCM include performing autopsies in cases of violent death or with a suspicion of criminality, together with the identification of corpses.

This Department is operational during 24 h a day every day of the year. Although the posts of Head of Anthropology, Histopathology and Necropsies have yet to be filled, there are 15 specialist technicians in autopsies, 3 social workers, 3 photographers and the secretarial staff of the general bodies of the Legal Department.

Because of the situation resulting from the state of emergency due to COVID-19, modifications had to be made in this Department to prevent collapse occasioned by the large number of deaths. On the other hand, it was also necessary to manage the available personnel to prevent risk for them, while ensuring that sufficient staff were available to cover possible contingencies caused by temporary disability (TD), exemptions due to age or chronic disease, or the need to care for family members. These factors were covered by the declaration of medical emergency (Royal Decree 463/2020, of 14 March, which declared the state of emergency for management of the medical crisis caused by COVID-19).

The following measures among others were implemented for the above reason:

- 36 corpses were transferred from the cold storage rooms of the Pathology Department to the temporary morgues which had been created. The Emergency Military Unit (*Unidad Militar de Emergencias*) (UME) helped to do this, with the aim that sufficient morgue storage space would be available for the foreseen mass arrival of corpses at the Department. This transfer was managed by the Deputy Board of Justice. It took place with due medical guarantees (in a double body bag, disinfected and in a coffin).
- Disinfection of the Forensic Pathology Department and Forensic Laboratory by the UME.

- Distribution of staff resources to protect personnel against unnecessary risks:

- Two shifts of technicians working morning and afternoon.
 - Keeping personnel in isolation to cover contingencies. This applied to autopsy technicians as well as secretarial staff, with a reserve of staff to cover contingencies.
- Keeping the Department Head in daily contact with forensic doctors on duty, for the functions of advice and gathering data from duty shifts in the city of Madrid and its suburbs.
 - Daily monitoring of cases of COVID-19 which were admitted to the Forensic Pathology Department.
 - Organising, maintaining and coordinating the stock of protective equipment for Pathology Department personnel, supplying the said material every day to workers.
 - Coordinating and supplying, together with the Deputy Manager, the necessary protective equipment for all of the forensic doctors in the Community of Madrid.
 - Establishing new shifts for specialist autopsy technicians to prevent, on the one hand, that teams were reduced by the contingencies that arose and, on the other hand, to prevent the exposure of a high number of workers. For this purpose the 3 teams that were usually established were reduced to 2 teams that were strengthened so that they could cover TD and exemptions due to any other cause, by restricting the attendance of team members in rotation. This management made it possible to keep a sufficient number of technicians operational, thereby covering the service properly.

These measures had the purpose of avoiding two basic problems:

- Collapse of the Pathology Department due to lack of the necessary human and material resources to be able to cover the personnel contingencies that may have arisen and did in fact occur (30% of specialist autopsy technicians on sick leave, and 40% of secretarial staff in a situation of TD or exempted from working).
- Preventing the risk of unnecessary exposure of the said personnel and meeting the recommendations of the Medical Authority in the emergency and lockdown phase.

Procedure for processing corpses during the alarm phase due to COVID-19 in the Community of Madrid

Due to the medical emergency it was urgently necessary for temporary morgues to be created to hold the large number of dead bodies in the Community of Madrid (almost 30% of all the deaths declared in Spain as a whole). A crisis group was therefore organised and met, composed of the DGRHRAJ (represented by the Director of the IMLCFCM), the Board of Health (represented by the General Manager of Post-Mortem Medicine), the General Infrastructure Manager of the Board of Justice and Infrastructures, the General Board for Civil Defence (represented by the General Manager of Security and the Community of Madrid Fire Service) and the Ministry of Defence (represented by a UME official) and representatives of the undertakers working in Madrid.

This meeting established:

- The computer program to register and classify the entry and exit of corpses into and from the temporary morgues.
- The personnel in charge of controlling entry and exit, preventing the attendance of volunteers for obvious reasons.
- Security control in the premises.

Because of the existing regulations governing the handling of corpses by undertakers, it was necessary to modify the Regulation of Post-Mortem Medical Policing, which states that only undertakers may transfer dead bodies. This was broadened to include members of the UME and the Fire Service of the Community of Madrid, so that they could help in the said transfers.

This arrangement also established the criterion by which undertakers took charge of transport of those who had died at home to the temporary morgues, together with any judicial actions in cases of reported death. The transfer of all other corpses (from hospitals in the Community) was carried out through requests made to the UME, which coordinated these transfers.

The transfer of 36 duly identified and numbered corpses from the Pathology Department took place within this arrangement.

The criterion was established that all corpses had to enter the temporary morgues with the following documentation and in the following conditions:

- Death certificate or
- Report of death
- Disinfected in a sealed coffin and double shroud.

Finally 3 temporary morgues had to be prepared:

- Hortaleza Ice Rink, with capacity for 440 corpses.
- The future IMLCFM building in Valdebebas, with space for 240 corpses.
- Majadahonda Ice Rink, with capacity for 162 corpses.

Currently and on the date of this paper, only the future building of the IMLCFM is open and operational.

Comparative study of deaths during the medical emergency

During the period from 9 March to 20 April the number of deaths in the Community of Madrid increased due to COVID-19, and this is shown by the statistics of the bodies which record these deaths.

Data from the same period this year and in 2019 were used to evaluate the said increase, making a comparison that permits us to describe the impact of the disease on the population of Madrid. Data supplied by the National Epidemiology Centre of the Carlos III Health Institute (*Instituto de Salud Carlos III*) (ISCIII) were used for the period in 2019, more specifically the recorded data on daily deaths due to all causes, obtained from the General Civil and Notaries Registry of the Ministry of Justice, distributed among all of the autonomous communities and including the 52 provincial capitals, through the daily Mortality Monitoring System (MoMo).⁶ This includes deaths due to all causes recorded in 3929 computerised civil registries, representing 92% of the

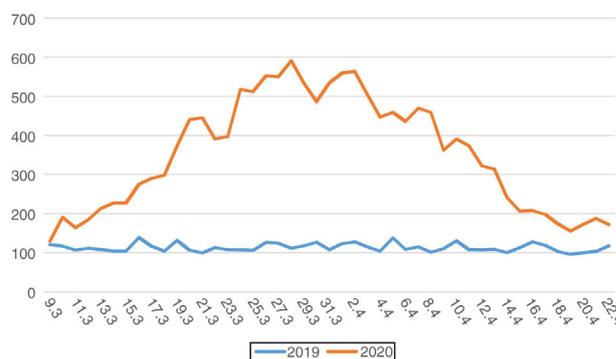


Figure 2 Comparative study of the curve showing deaths due to all causes during the same period (9 March to 22 April) in 2019 and 2020 in the Community of Madrid. Source: Prepared by us based on Daily Mortality Monitoring (MoMo) data.

Table 1 Number of violent deaths with a medical-legal aetiology corresponding to the months of March and April in the years 2019 and 2020 in the Department of Forensic Pathology of the Legal Medicine and Forensic Sciences Institute of the Community of Madrid.

Date		Medical-legal aetiology		
		Accidental	Suicide	Homicide
2019	March	30	24	3
	April	38	15	2
2020	9–31 March	13	23	2
	1–22 April	7	10	1

Spanish population. Fig. 2 shows that the curve increased from the start of the month of March and peaked on 28 March, with 591 deaths. After this the curve began to gradually decrease.

152 corpses entered the Pathology Department during this period, of which 96 corresponded to natural deaths (63.1%), which is a datum that is similar to previous periods (66.20%). 15 of these deaths were certified, which amounts to 15.62%, a clearly higher percentage than in other periods. 58 of the total number of natural deaths were found to have the ‘‘suspicion’’ of COVID-19», representing 60.4% of all natural deaths.

On the other hand 55 admissions corresponded to violent deaths, plus one with an indeterminate cause. The comparison between this period and the corresponding one in 2019 (Table 1) in terms of medical-legal aetiology shows that this remained the same, although accidental deaths clearly fall. This means that in relative terms the percentage of deaths due to suicide increases.

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