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Impact of Spanish Public Health Measures on Emergency Visits and COVID-19 diagnosed cases during the pandemic in Madrid

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ABSTRACT

Introduction. Changes in Public Health recommendations may have changed the number of emergency visits and COVID-19 diagnosed cases in an Emergency Department in Madrid.

Material and methods. This retrospective case series study included all consecutive patients in a tertiary and urban ED in Madrid from 1st to 31st March. The sample was divided: Non-COVID-19, Non-investigated COVID-19, Possible COVID-19, Probable COVID-19, Confirmed COVID-19. Differences between public health periods were tested by ANOVA for each cohort, and by ANCOVA including the number of PCR tests (%) as covariate.

Results. A total of 7,163 (4,071 Non-COVID-19, 563 Non-investigated COVID-19, 870 Possible, 648 Probable and 1,011 Confirmed COVID-19) cases were included. Public Health measurements applied during each period showed a clear effect on the case proportion for the five cohorts.

Conclusion. The variability of case definitions and diagnostic test criteria may have impact on the number of emergency visits and COVID-19 diagnosed cases in Emergency Department.

Keywords: COVID_19; SARS-Cov_2; Emergency; epidemiology; Health Public; Spain.

Impacto de las medidas de Salud Pública españolas en las visitas a Urgencias y en los casos diagnosticados de COVID-19 durante la pandemia en Madrid

Introducción. Los cambios en las recomendaciones de Salud Pública pueden haber modificado la cantidad de visitas y los casos diagnosticados por COVID-19 en un servicio de urgencias de Madrid.

Material y métodos. Estudio retrospectivo de series de casos que incluyó a todos los pacientes atendidos de manera consecutiva en un servicio de urgencias terciario y urbano en Madrid, del 1 al 31 de marzo. La muestra se dividió: no COVID-19, COVID-19 no investigado, COVID-19 posible, COVID-19 probable, COVID-19 confirmado. Las diferencias entre los diferentes periodos establecidos por Salud Pública se evaluaron por el test de ANOVA para cada cohorte, incluyendo el número porcentual de test de PCR como covariable.

Resultados. Se incluyeron un total de 7.163 casos (4.071 no COVID-19, 563 COVID-19 no investigados, 870 posibles, 648 probables y 1.011 confirmados COVID-19). Las medidas de Salud Pública aplicadas durante cada período mostraron un claro efecto en la proporción de casos para las cinco cohortes.

Conclusión. La variabilidad de las definiciones de casos y los criterios de las pruebas de diagnóstico pueden tener un impacto en la cantidad de visitas a urgencias y en los casos diagnosticados de COVID-19 en el servicio de Urgencias.

Palabras clave: COVID_19; SARS-CoV-2; Urgencias; epidemiología; Salud pública; España.

INTRODUCTION

Since December 2019, when the first coronavirus disease-2019 (COVID-19) was reported in Wuhan (Hubei, China), the virus has spread worldwide, causing a global pandemic. This has become an international public health emergency [1]. Spain has been one of the most affected countries in the world being

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Madrid one of the regions with higher cases and mortality rates [2]. Diagnostic tests and public health interventions have shown to be effective actions to decrease the number of cases [3, 4].

Different case definitions and diagnostic test criteria have been used during the COVID-19 spread in Madrid [5]. From the first cluster of cases detected in China, case definition was initially based on epidemiological criteria. Subsequently, diagnostic tests were also allowed in those patients who had to be admitted for severe viral pneumonia. All tests required to be authorized by Public Health [5].

First case of COVID-19 infection in our center was diagnosed on February 28th (being the first in Madrid on February 24th). Several important dates must be highlighted [1]: i) March 5th, the emergency physicians were allowed to order tests without Public Health authorization in those patients admitted for severe viral pneumonia or met epidemiological criteria; ii) March 11th, Madrid was recognized as an area with community transmission, thereby previous epidemiological criteria were not needed for test request in our region; iii) March 14th, Spanish Government declared a State of Emergency and population confinement was implemented; iv) March 25th, there was an instruction to constrain tests only in patients with unclear COVID-19 diagnosis, but not in those with high clinical suspicion.

There is a lack of information about the impact of the different actions undertaken by Spanish Public Health on the number of emergency visits and the frequency of the confirmed COVID cases during the pandemic in Madrid. We aimed to describe the frequency of emergency visits and COVID-19 cases depending on the instructions about the confinement, case definitions and diagnostic test criteria undertaken by Spanish Public Health in an Emergency Department in Madrid during the SARS-CoV-2 pandemic.

METHODS

We present a retrospective case series study that included consecutive patients in the Emergency Department of The University Hospital Clínico San Carlos (HCSC) from 1st to 31st March. HCSC is an urban tertiary university hospital in Madrid with a 400,000 people referent area. The Emergency Department has a medical activity of 140,000 attentions per year. This center is sited in the center of the city where population density is approximately 5,000 inhabitants per km².

Sample was divided into five cohorts: i) Non-COVID-19, cases with non-COVID-19 pathologies; ii) Non-investigated COVID-19, cases with fever of unknown origin or respiratory symptoms, which SARS-CoV-2 etiology was not suspected; iii) Possible COVID-19, cases with minor symptoms related to COVID-19 but not tested; iv) Probable COVID-19, cases with clinical and radiological findings associated with COVID-19 but not tested or inconclusive test results; v) Confirmed COVID-19, cases with a positive test for SARS-CoV-2. The total number of PCR tests was also collected. Differences between public health periods were tested by ANOVA for each cohort, and by ANCOVA including the number of PCR tests (%) as covariate. Significant differences at $p < 0.05$. Analysis was carried out with PAST (v2.17) and R (3.6.1).

RESULTS

Figure 1 shows 7,163 cases: Non-COVID-19 (n=4,071), Non-investigated COVID-19 (n=563), Possible (n=870), Probable (n=648) and Confirmed COVID-19 cases (n=1,011). Public Health

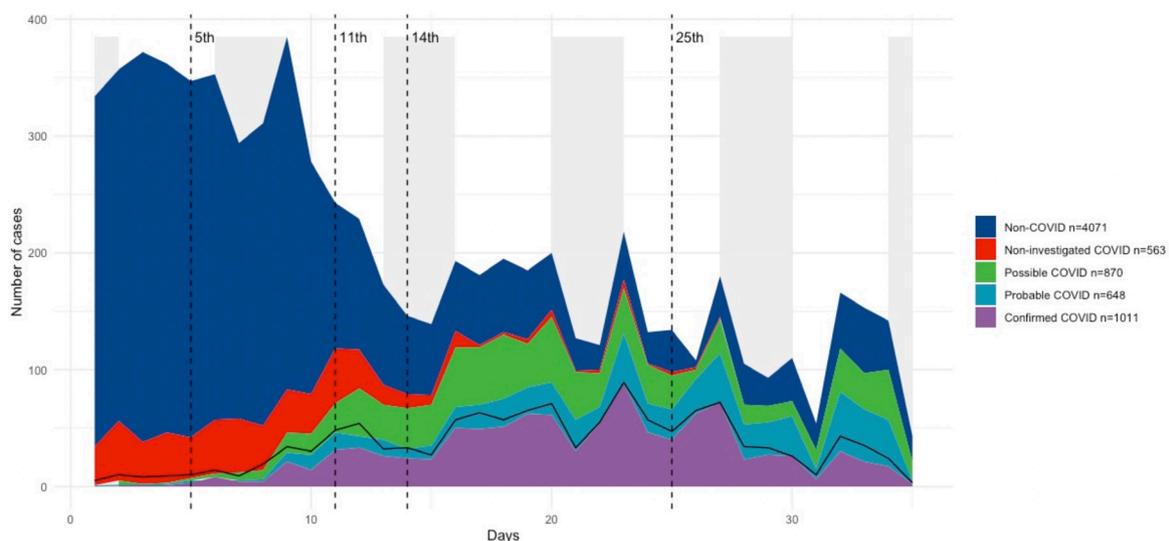


Figure 1 The number of visits attending in Emergency Department according to the probability of COVID diagnosis.

The shaded areas show the weekends. The black line represents the number of the diagnostic tests requested.

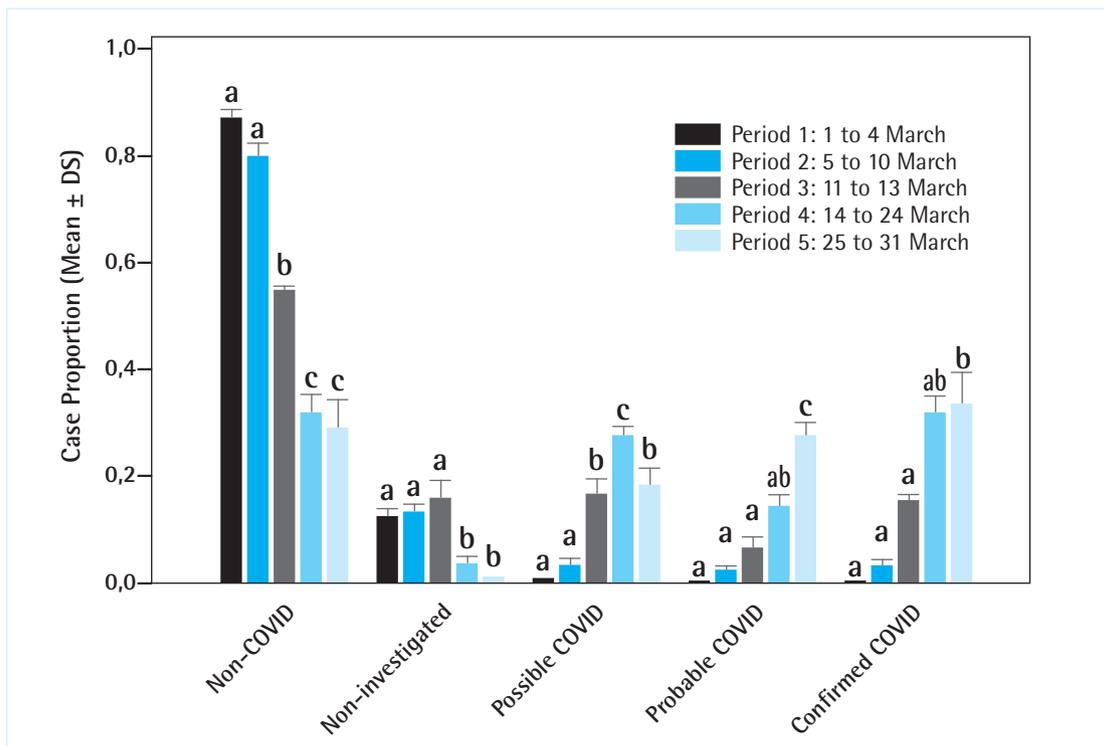


Figure 2 Patients proportion (mean± DS) for each COVID cohort and public health period (1 to 5).

Each cohort show a significance with a $p < 0.001$ (ANOVA). Different letters show significant differences between periods for each cohort at $p < 0.05$ after Tukey's post-hoc tests.

measurements applied during each period showed a clear effect on the case proportion for the five cohorts (figure 2). No effect of the PCR test was found as an interaction of this covariate with public health periods, though PCR test number was significantly different between these periods (ANCOVA, data not shown).

DISCUSSION

We highlight these important findings. First, a high number of patients with acute respiratory symptoms or fever of unknown origin were not investigated during the first two weeks because of the test request restrictions [5]. During this pre-test stage, the accurate diagnosis of SARS-CoV-2 infections was prevented and this may have had consequences on the viral transmission and the spread of the outbreak [6]. Second, the lockdown may cause a sharp decline in Non-COVID Emergency Department cases [7]. A significant reduction in Emergency Department visits related to Non-COVID conditions has been described over the first weeks of the pandemic. The hypothesis is that patients were avoiding going to hospitals because they feared getting infected with COVID-19 [8-10]. Finally, there was a high number of cases without a confirmed diagnosis due to SARS-CoV-2 test restrictions. This may be underestimating the current cases and deaths recognized in Spain due to the fact that only patients with microbiological diagnosis are included in the official statistics.

There are several limitations in our study. First, this was an observational study and causal relationships cannot be inferred. Second, this is a real-life cohort without intervention in which attending physicians followed the local protocol and the findings cannot extrapolate to other centers. Third, the sensibility and specificity of the PCR may differ from other studies and this fact may have modified the categorization of the patients. Finally, this study included only one center although this may be representative of what has happened in an urban and tertiary Emergency Department that offered health care to one of the nuclei of the pandemic in Madrid.

In conclusion, the variability of case definitions and diagnostic test criteria could have had a significant impact on the number of emergency visit and COVID-19 cases diagnosed in Emergency Department.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest

REFERENCES

1. World Health Organization. Coronavirus disease (COVID-19) outbreak. Second meeting of the Emergency Committee meeting [30th January 2020] Available at: <https://www.who.int>.
2. Equipo COVID-19. Red Nacional de Vigilancia Epidemiológica-Instituto Carlos III. Informe nº 29. Situación de COVID-19 en España a 14 de mayo de 2020. [Internet] Available at: <https://www.isciii.es/QueHacemos/Servicios/VigilanciaSaludPublicaRENAVE/EnfermedadesTrnsmisibles/Documents/INFORMES/Informes%20COVID-19/Informe%20n%C2%BA%2031.%20Situaci%C3%B3n%20de%20COVID-19%20en%20Espa%C3%B1a%20a%2014%20de%20mayo%20de%202020.pdf> [Access 17th May 2020]
3. Pan A, Liu L, Wang C, et al. Association of Public Health Interventions With the Epidemiology of the COVID-19 Outbreak in Wuhan, China. *JAMA*. 2020. In press. doi:10.1001/jama.2020.6130.
4. Eiros JM, López-Izquierdo R, Bouza E. Coronaviruses that are always present. *Emergencias*. 2020;32:160-1. PMID: 32395922
5. Centro de Coordinación de Alertas y Emergencias Sanitarias. Dirección General de Salud Pública, Calidad e Innovación: Procedimiento de actuación frente a casos de infección por el nuevo coronavirus (SARS-CoV-2). 12 de abril de 2020 (https://www.mscbs.gob.es/profesionales/saludpublica/ccayes/alertasactual/ncov-china/documentos/procedimiento_covid_19.pdf)
6. Tang YW, Schmitz JE, Persing DH, Stratton CW. The Laboratory 158 Diagnosis of COVID-19 Infection: Current Issues and Challenges. *J Clin Microbiol*. 2020. In press. doi:10.1128/JCM.00512-20.
7. Kraemer MUG, Yang CH, Gutierrez B, et al. The effect of human mobility and control measures on the COVID-19 epidemic in China. *Science* 2020. In press. doi:10.1126/science.abb4218.
8. Mantica G, Riccardi N, Terrone C, Gratarola A. Non-COVID-19 visits to emergency departments during the pandemic: the impact of fear. *Public Health*. 2020 May 7;183:40-1. DOI: 10.1016/j.puhe.2020.04.046
9. González Armengol J, Vázquez-Lima MJ. Emergency services and the fight against the SARS-CoV-2 pandemic. *Emergencias*. 2020;32:155-6. PMID: 32395920
10. Castro Delgado R, Arcos González P. Analyzing the health system's capacity to respond to epidemics: a key element in planning for emergencies. *Emergencias*. 2020;32:157-9. PMID: 32395921