

Evidence of gender differences in the diagnosis and management of coronavirus disease 2019 patients: an analysis of electronic health records using natural language processing and machine learning

J. Ancochea Bermúdez; Jose L. Izquierdo Alonso; I. H. Hernández Medrano; A. Porrás Chavarino; M. Serrano Olmedo; S. Lumbreras Sancho; C. del Río Bermúdez; S. Marchesseau; I. Salcedo Ramos; I. Zubizarreta; Y. González Fernández; Joan B. Soriano Ortiz

Abstract-

Background:

The impact of sex and gender in the incidence and severity of COVID-19 remains controversial. Here, we aim to describe the characteristics of COVID-19 patients at disease onset, with special focus on the diagnosis and management of female patients with COVID-19.

Methods:

We explored the unstructured free text in the electronic health records (EHRs) within the SESCAM Healthcare Network (Castilla La-Mancha, Spain). The study sample comprised the entire population with available EHRs (1,446,452 patients) from January 1st to May 1st, 2020. We extracted patients' clinical information upon diagnosis, progression, and outcome for all COVID-19 cases.

Results:

A total of 4,780 patients with a confirmed diagnosis of COVID-19 were identified. Of these, 2,443 (51%) were female, who were on average 1.5 years younger than male patients (61.7±19.4 vs. 63.3±18.3, $p=0.0025$). There were more female COVID-19 cases in the 15-59 year -old interval, with the greatest sex ratio (SR; 95% CI) observed in the 30-39 year-old age range (1.69; 1.35-2.11). Upon diagnosis, headache, anosmia, and ageusia were significantly more frequent in females than males. Imaging by chest X-ray or blood tests were performed less frequently in females (65.5% vs. 78.3% and 49.5% vs. 63.7%, respectively), all $p<0.001$. Regarding hospital resource use, females showed less frequency of hospitalization (44.3% vs. 62.0%) and ICU admission (2.8% vs. 6.3%) than males, all $p<0.001$.

Conclusion:

Our results indicate important sex-dependent differences in the diagnosis, clinical manifestation, and treatment of patients with COVID-19. These results warrant further research to identify and close the gender gap in the ongoing pandemic.

Index Terms- artificial Intelligence; sex differences; COVID-19; Natural Language Processing; SARS-CoV-2.

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the

paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to *Journal of Women's Health*, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

*Ancochea, J.; Izquierdo, Jose L.; Medrano, I. H.; Porras, A.; Serrano, M.; Lumbreras, S.; del Río-Bermúdez, C.; Marchesseau, S.; Salcedo, I.; Zubizarreta, I.; González, Y.; Soriano, Joan B. "Evidence of gender differences in the diagnosis and management of coronavirus disease 2019 patients: an analysis of electronic health records using natural language processing and machine learning", *Journal of Women's Health*, vol.30, no.3, pp.393-404, March, 2021.*