

# Fuzzy model for evaluation of predicting factors for Sars-Cov-2 infection severity

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The Sars-Cov-2 virus has been a challenge due to its pandemic potential, reflecting its transmissibility power that is perceptible through the high transmissibility and mortality rate [1]. Operational limitations related to the displacement of serious cases to Manaus, where the high and medium complexity assistance is concentrated in the State of Amazonas, contribute to the increase in the hospital occupancy rate during the epidemic peaks of Covid-19 [2]. In order to minimize this scenario, a tool that assists in the prediction of severity, through variables of the Health Information Systems (SIS), will contribute to the optimization of patient management. The study is a prospective cohort using secondary data. The SIS used are SIVEP-Gripe, which notifies serious cases, and e-SUS, which notifies mild cases. This work proposes to develop of a fuzzy model to assess and predict the severity in cases of Covid-19 in Amazonas, in the period from 2020 to 2022, based on the Hsu-Chen model. The indicators come from the linkage between the mentioned SIS, through the analysis of 23 predictive factors, which are characterized by comorbidities, signs, and symptoms [3]. It seeks to structure the nebulosity of human thought, by means of subjective metrics based on personal experiences translated into gradations of importance degree to a given subject. The human uncertainly thought is present in several resolutive processes that do not depend on the level of work performed and occurs due to the lack of an adequate amount of experience that allows a broad understanding of the systems, lack of engagement in the work environment and due to the subjectivity inherent to the work. perception of the external world [4]. The steps of this model involve: opinions of 12 experts

(health professionals who work in the line of confronting the pandemic), the classification of the importance degree (linguistic terms) to the severity, predictors (linguistic variables) contained in the intersection between the mentioned banks (Figure 1).

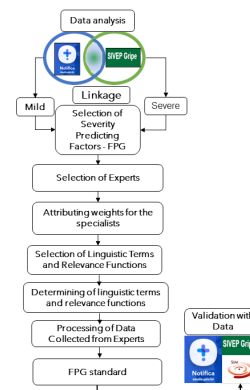


Figure 1. Fuzzy Model Steps.

An instrument was built on the REDCap platform to capture the experts' perception through an online questionnaire. Finally, it is expected that the model fuzzy can be an evaluation tool the describe severity predictors among cases of Covid-19, evaluating clinical and demographic factors available in the SIS, in the view of health professionals who work on the front line of coping with the disease.

## References

- [1] BARRETO, M. L., DE BARROS A. J. D., CARVALHO M. S., CODEÇO C. T., HALLAL P. R. C., MEDRONHO R. DE A. E. What is urgent and necessary to inform policies to deal with the Covid-19 pandemic in Brazil?. Vol. 23, Revista Brasileira de Epidemiologia; 2020.
- [2] SOUZA NORONHA K. V. M., GUEDES G. R., TURRA C. M., ANDRADE M. V., BOTEGA L., NOGUEIRA D. ET AL. The COVID-19 Pandemic in Brazil: Analysis of supply and demand of hospital and ICU beds and mechanical ventilators under different scenarios. Cad Saúde Publica 2020.
- [3] NIQUINI, R. P., LANA, R. M., PACHECO, A. G., CRUZ O. G., COELHO, F. C., CARVALHO, L. M. SRAG por COVID-19 no Brasil: descrição e comparação de características demográficas e comorbidades com SRAG por influenza e com a população geral. Cad Saúde Pública 2020.
- [4] GRECCO, C. H. S. Avaliação Da Resiliência Em Organizações Que Lidam Com Tecnologias Perigosas: O Caso, da Expedição de Radiofármacos. COPPE/PEP/UFRJ, 2012.