00342 UNCERTAINTY IN EPIDEMIOLOGICAL CURVES DETECTED THROUGH A BAYESIAN ANALYSIS OF COVID-19 LABORATORY TEST RESULTS IN QUITO-ECUADOR

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Background Sensibility (Sn) and specificity (Sp) are the most important laboratory test parameters. Sn measures the probability to obtain positive result when you are positive and Sp is defined as the probability to obtain negative result when you are negative. However, the epidemiologically useful information is the probability of being positive/negative when your test was positive/negative. To show the difference between these probabilities and to show their consequences, we proposed a Bayesian analysis approach that consider the rising prevalence in the time.

Methods The study includes a dataset of 11701 samples tested for SARS-COV-2 using with AllplexTM 2019-nCov Assay (Sn: 95%, Sp: 98%) qPCR approach (19/03/2020 to 07/07/2020) this data was mapped (figure 1), and a dataset of 7952 samples tested for SARS-COV-2 IgG using INNOVITA® 2019-nCoV (Sn: 93%, 95.6%) lateral flow immunoassay approach (18/04/2020 to 22/05/2020). All samples were tested at Zurita & Zurita Laboratorios-quito under patient request. We estimated the mean proportion of positives cases in the qPCR dataset using descriptive statistics. To estimate the rising prevalence we applied a bayesian regression customized model using the qPCR dataset. This result was used to calculate the probability to be positive when the test is positive applying the equation: P(are+|test+)=((P(test+|are+) P(are+)))/(P(test+)), where is the sensibility reported by the manufacturer, and the P(test+)=((Sn*P(are+))+((1-Sp)*P(are-))).

Results The mean proportion of positives cases was and increases to after the most social restrictions were dismissed. The estimated mean of posterior distribution slope using our Bayesian regression customized model was 0.0016, from this value we estimate the rising prevalence. This approach showed an overestimation of positive cases by frequentist statistics in qPCR (figure 2a) as well as IgG data (figure 2b). Moreover, the overestimation was more evident when the prevalence in the population was lower.

Conclusions A high sensitive (P(test+|are+)), does not mean that the probability of being positive given you test is positive P(are+|test+) is high, the P(are+|test+) implies Sp and local prevalence P(are+). It is necessary to apply this knowledge to adjust epidemiological curves in the pandemic management.

Conflict of interest None

Number of positive cases (PCR) in Quito,Ecuador
People SARS-COV-2 tested by day: a (qPCR), b (IgG)

a)

b)