

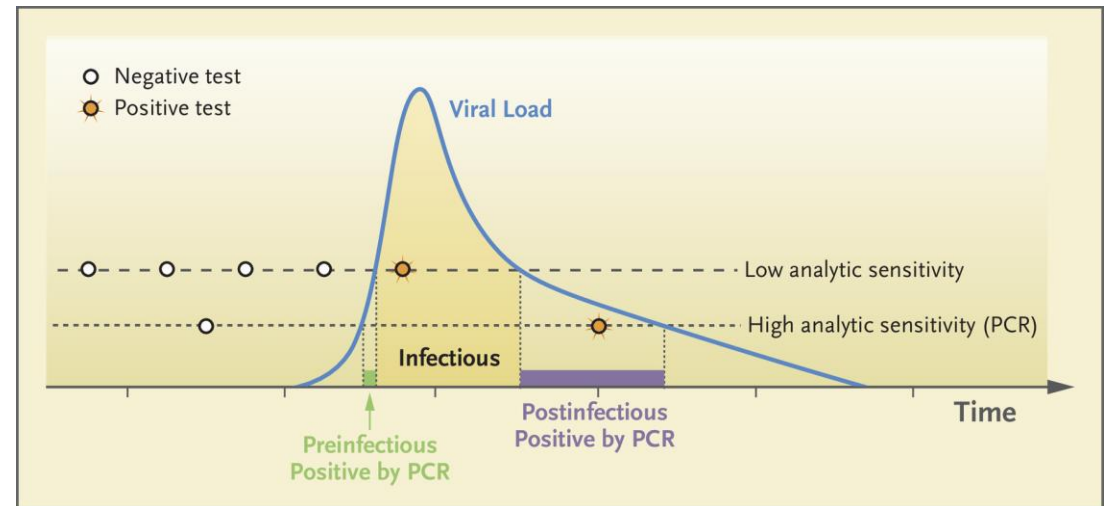
Leveraging of SARS-CoV-2 PCR cycle threshold values (Ct) to forecast COVID-19 trends

Nicolas Yin. Sigi Van Den Wijngaert. Leila Mekkaoui. Charlotte Michel. Giulia Zorzi. Dieter Van Cauteren. Marie Hallin. Delphine Martiny. Olivier Vandenberg

LHUB-ULB – department of Microbiology

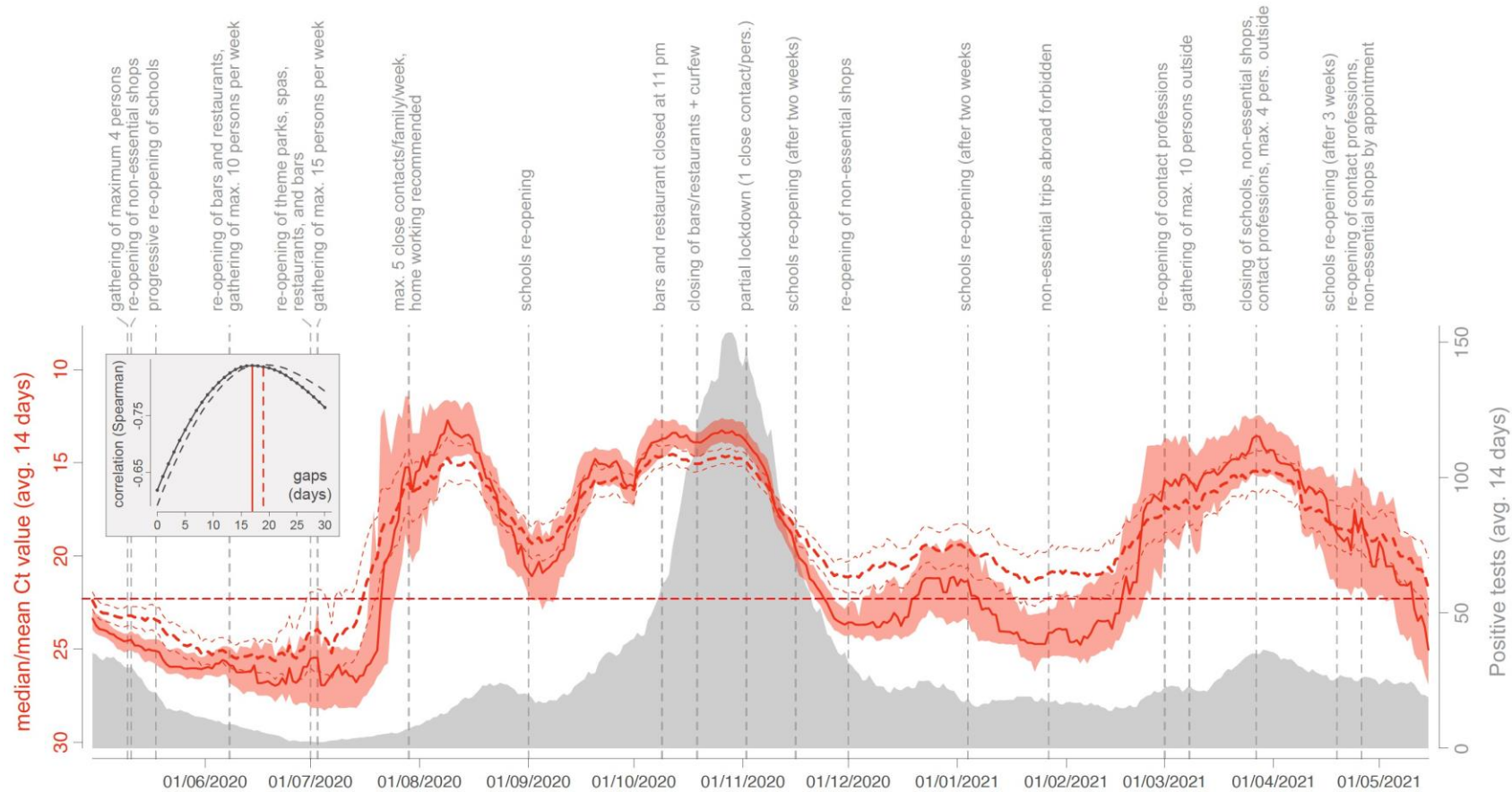
Introduction

- Ct values can be used to assess the infectiousness at the individual level. but:
 - Depends on the quality of the sample
 - Depends on the timing of the sampling
 - Depends on the instrument
 - Depends on the target



Rethinking Covid-19 Test Sensitivity — A Strategy for Containment
Michael J. Mina and al.

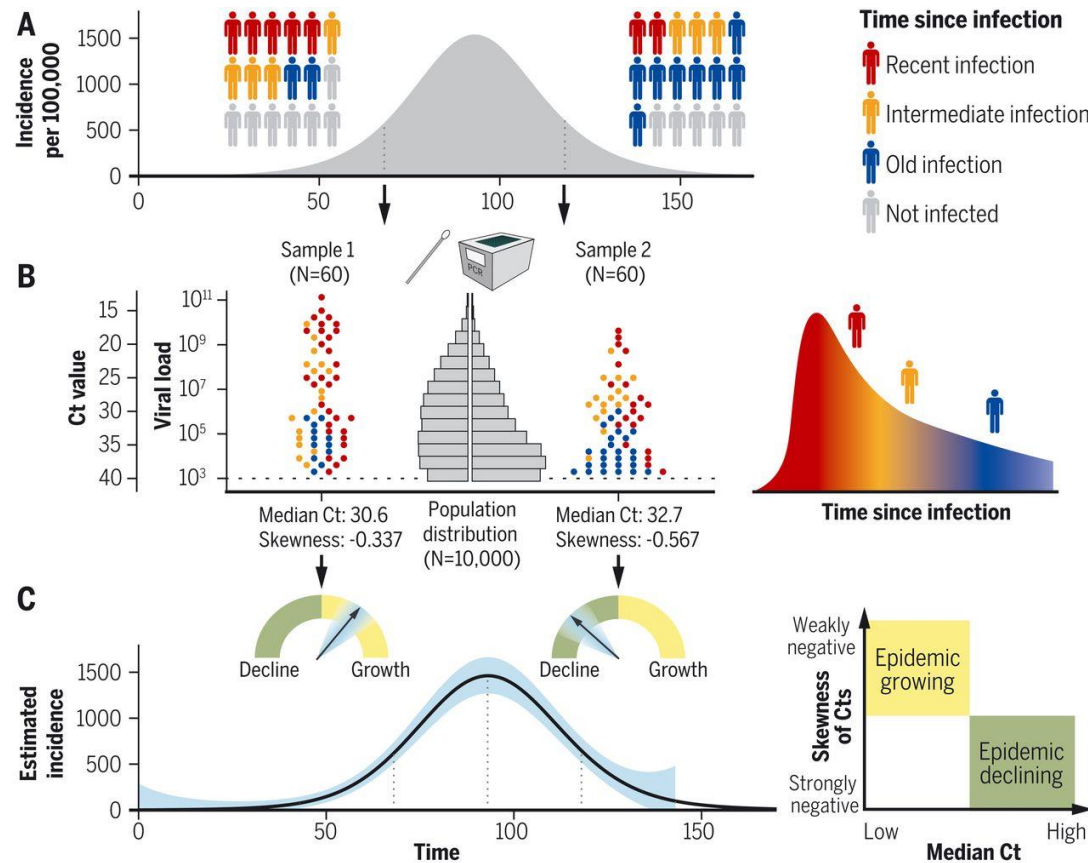
Correlation between the Ct and the epidemic



Leveraging of SARS-CoV-2 PCR cycle thresholds values (Ct) to forecast COVID-19 trends

N. Yin. S. Dellicour. V. Daubie. N. Franco. M. Wautier. C. Faes. D. Van Cauteren. L. Nymark. N. Hens. M. Gilbert. M. Hallin and O. Vandenberg

How to explain this correlation



- For a same number of positive tests. the proportion of recently infected people is bigger in the growing phase
- Furthermore. the recently infected people are known to be more infectious

Estimating epidemiologic dynamics from cross-sectional viral load distributions
JAMES A. HAY. LEE KENNEDY-SHAFFER. SANJAT KANJILAL. NIALL J. LENNON. STACEY B. GABRIELMARC LIPSITCH AND MICHAEL J. MINA

Use of semi-quantitative results

- Since December 2020. the Belgian Risk assessment group recommends the use of a semi-quantitative reporting
- The goal is to help with infectiousness assessment

The proposal for reporting and the associated evaluation of contagiousness is as follows:

Semi-quantitative reporting of RT-PCR values in four categories:

- very strongly positive: $\geq 10^7$ RNA copies/mL
'the patient is contagious'
- strongly positive: $\geq 10^5$ - $<10^7$ RNA copies/mL
'the patient is probably contagious'
- positive: $\geq 10^3$ - $<10^5$ RNA copies/mL
'the patient is potentially contagious, unless there is clinical and/or serological evidence of an old, cleared infection'
- weakly positive: $< 10^3$ RNA copies/mL
'the patient is probably not or no longer contagious if there is also clinical and/or serological evidence of an old, cleared infection'.

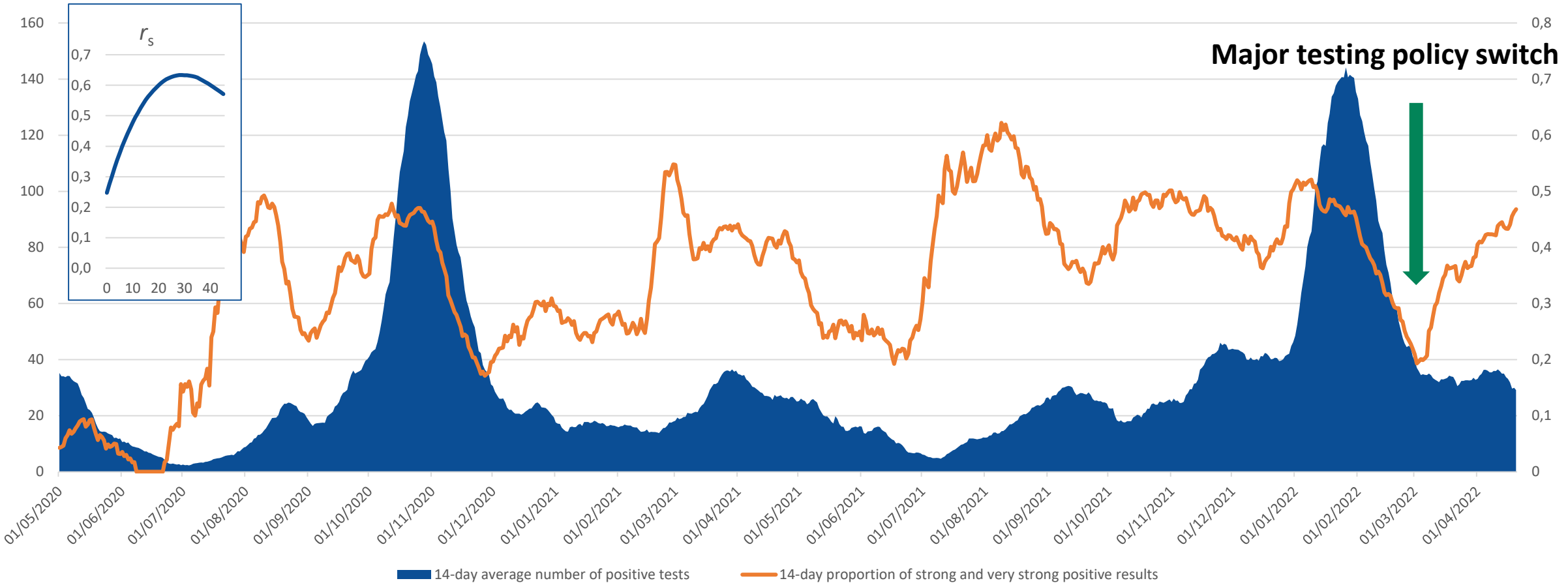
Inter-instrument Ct comparability

Instrument	10 ⁷ copies/ml	10 ⁵ copies/ml	10 ³ copies/ml
Altona RealStar®	16.6	24.2	31.7
Abbott <i>m</i> 2000	6.5	12.7	19
Abbott Alinity	16.7	23.3	29.9
Roche Cobas® Liat®	14.4	20.1	25.9

Methods

- Analysis of results collected from April 2020 to April 2022 → attribution of a semi-quantitative evaluation based on Ct values
- Use of 14-day averages to minimize day-to-day and holiday related variations
- Correlation between % of “strong” and “very strong” positive results and N of positive tests from 0-45 days later using Spearman's r_s rank correlation

Correlation between % of “strong positive” results and number of positive tests



Conclusions

- Using the SARS-CoV-2 PCR Ct values can add a useful dimension to follow epidemic' dynamic (likely true for all respiratory transmitted viruses)
- Categorizing positive results allows an easier follow-up and the gathering of comparable data between labs and instruments
- Such strategy could be used at a regional level through a laboratory network
- The model is however influenced by the testing policy and can be only followed if it remains stable

Acknowledgment

LHUB-ULB team and especially the microbiology department for their amazing work for more than 2 years into pandemic

