UNDERSTANDING THE COVID-19 TEST PERFORMANCE UNDER THE *IVDR*

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Example: IVD Test with 85% Sensitivity and 99% Specificity

	Person infected	Person NOT infected	
Positive Test Result	170	8	178
Negative Test Result	30	792	822
	200	800	1000

In this article, an example of a rapid test to detect COVID-19 infections is presented. The tradeoff between test performance, speed, and cost is discussed and an outlook towards future regulation in the EU is given.

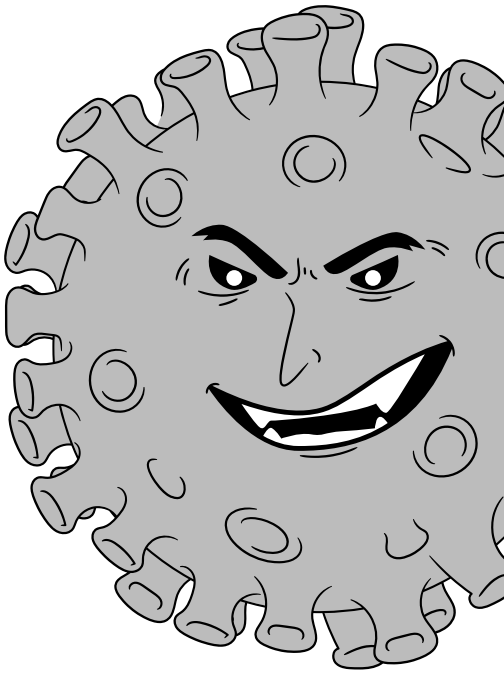
These days, healthcare professionals in "ad-hoc" COVID Test Centers start to use Rapid IVD (In Vitro Diagnostic) Tests to detect infections. Here is an example: 1000 persons are tested per day, while the prevalence of COVID-19 is set to a representative value of 20%. The Rapid COVID diagnostic test's performance characteristic used in this sample is expected to be as follows:

- 85% sensitivity (=ability to identify the presence of a target marker) and
- 99% specificity (=ability to recognize the absence of a target marker).

A single test result may be provided as fast as within 20 minutes.

Sensitivity: Ability to identify the “positives”

In this example every day a group of 1000 persons is tested. On average 178 persons per day are receiving a positive test result out of which 170 are “true positives”, and 8 are “false negatives”.
The other 822 persons a day will get a negative test result, including 792 which are “true negatives”, and 30 which are “false negatives”.



This means, under the assumptions in the example above:

- The triage of individuals using a Rapid Test in both non-infected and infected persons is accurate in 96.2% of all cases.
- The probability of a test result to be correct is 95.5% for “positives” and 96.4% for “negatives”.
- About 1 out of 7 positive samples is not detected by the Rapid Test!
- 30 infected persons will not get treated appropriately, while 8 persons NOT infected will get treated unnecessarily.

Which consequences the false results will have, depends on the circumstances.

Imagine the Rapid Test being used to admit visitors to a nursing home, or to allow passengers to enter a long-haul aircraft… One should not rely on the result of the rapid test of every manufacturer. Some manufacturers have started placing devices on the market without considering the state-of-the-art expectations when claiming compliance to the essential European requirements.

Performance characteristics of IVDs for a specific parameter, such as COVID-19, may vary quite a bit and are dependent – among other – on sampling methods, test methods, and test brands.
There are better performing tests than the rapid test described above, especially some tests based on PCR technology (polymerase chain reaction) providing very accurate results.
However, better performance comes hand in hand with higher costs and longer test duration. Such tests also require trained staff for sample taking and is dependent on the availability of the test, of laboratories with installed analyzers and trained technicians to process the samples.

Cheap – fast – high-performance: you can't have it all at once!

Current European legislation on In Vitro Diagnostic Medical Devices (IVDD), the Directive 98/79/EC [1], requires manufacturers to ensure that their devices achieve the claimed performances when used as intended by the manufacturer, in particular in terms of sensitivity and specificity.

Many IVD Tests are made available on the market after self-declaration and subsequent CE marking by manufacturers.

The new European Regulation on In Vitro Diagnostic Medical Devices, (EU) 2017/746 "IVDR" [2], which will apply from May 2022, will raise the bar in many aspects, e.g. by:

- defining economic operator obligations,
- changing the classification rules [3],
- requiring manufacturers to draw up and keep up to date technical documentation for their devices, and
- extending the involvement of notified bodies in conformity assessments.

The IVDR reinforces requirements on performance evaluation. Manufacturers will have to establish a Performance Evaluation Procedure, and report on the following topics in the Performance Evaluation Report:

- Scientific Validity,
- Analytical Performance, and
- Clinical Performance.

Manufacturers are further obliged to establish a Post-Market Surveillance Procedure, including Post-Market Performance Follow-up (PMPF): The usage and performance of devices shall actively be monitored throughout the lifecycle of the devices, and actions taken when necessary.

Particularly, manufacturers will have to continuously evaluate the performance of their devices, to confirm their safety and performance and to ensure the continued acceptability of the clinical evidence.

If you or your team need any assistance concerning the EU IVDR, please contact us to speak to our experienced consultants on info@quniquegroup.com or visit our website on www.quniquegroup.com

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References:

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