

Time Consumable SARS Cov-2 Testing With RT-PCR in Indonesia: A Survey Study

Ade Heryana^{1*} Erlina Puspitaloka Mahadewi¹

¹*Department of Public Health, Faculty of Health Sciences Universitas Esa Unggul*
Corresponding author: heryana@esaunggul.ac.id

ABSTRACT

The requirement of Severe Acute Respiratory Syndrome Corona Virus-2 (SARS CoV-2) testing particularly with Polymerase Chain Reaction (RT-PCR) technology grow-up in line with the enhancement of Covid-19 pandemic. RT-PCR made a pivotal role in SARS-CoV-2 testing, although it is not suitable for high density people and scarcity of resources like Indonesia. This study aims to investigating and capturing the patient's complaint related to the backward of RT-PCR i.e. time consumable compare to point-of-care (POC) test.

Method: A cross-sectional online survey study had been executed to 174 Indonesia participants in August 2020. The 112 participants involved in this study after exclusion criteria and data cleaning. We investigated the patient's experience of SARS-CoV-2 testing from registration, specimen sampling, and receive the results. Collected data were analyzed with proportion descriptive analytics to capturing the time-related attribute of testing.

Result: Participants in this study were 43.2% less than 31 years old, 43.9% examined at government hospitals, and 73.5% stay in Greater Jakarta. A 50% of participants stated satisfied to the whole RT-PCR from registration to results, 51.5% satisfy to registration process, and 57.6% satisfy to the specimen sampling process. Even though a half of participants had satisficing experience in RT-PCR, time-related service attributes under performance i.e. registration service time exceed to 5 minutes (30%), swab sampling 1-3 minutes (49.2%), and registration to result received exceed to 3 days (47%). Based on study result, this paper discusses particularly on the lack of time-related services attributes that impact to lack of epidemiological value. RT-PCR had proofed as time consumable SARS-CoV-2 testing with RT-PCR technology. Most of long time contributed by idle time between pre-analytic to analytic and post-analytic. In this study SARS-CoV-2 testing with RT-PCR had proofed as time consumable Covid-19 testing. Most of long time contributed by idle time between pre-analytic to analytic and post-analytic. It should perform study to deeply investigate the idle time between processes.

Keywords: *RT-PCR, Covid-19, Patient experience, Quality management*

1. INTRODUCTION

Weekly analysis held by Indonesia Task Force for Covid-19 (ITF Covid-19) Handling at 1st week September 2020 stated the Covid-19 cases significantly increasing 32.9% for three weeks consecutively. Seventy districts and cities stated in red zone or area with high risk covid-19 infection from 514 or about 14% [1]. The spreading of SARS-Cov-2 infection in Indonesia showed significance increasing from period of initial case until September 2020. Real-time report obtained from worldometers.info, Indonesia at rank 23 from all of countries in the world with 214.746 cases at 12 September 2020. Meanwhile Indonesia had just 9.559 tests for 1 million peoples or at rank 163 from all of countries [2]. ITF Covid-19 daily report on 12 September 2020 stated 1.5 million people tested by PCR method and 2.6 million test cumulatively [3]. It's counted 18.800 people average test every day from 1-12 September 2020.

Real-Time Polymerase Chain Reaction (RT-PCR) and Computerized Tomography (CT) scan today are well established Covid-19 diagnostics even though they are expensive and off course it's not suitable for the area with scarcity of resources. The only way to reduce the Covid-19 epidemics when effective vaccine and

treatments were not established is applying nano-biosensors to identify infected peoples and then regulate the isolation from healthy individuals [4].

RT-PCR still has the some drawback including probability of false negative, the requirement of additional diagnostics such as CT scan, imbalance between demand and supply of PCR reagents and kits, less found in remote area, will not identify the asymptomatic patients who recovered the infection, the requirement of biosafety conditions, and the need for the expensive thermocycler and professional staff to perform the assay and interpret results [5]–[8]. However, RT-PCR cheaper, easier, widely used, and has a short TAT compare to deoxyribonucleic acid (DNA) sequencing technology. Therefore RT-PCR have played key roles in controlling the SARS-CoV-2 further spreading [9] include in Indonesia. Indonesia had 301 health facilities that delivering the RT-PCR test including governmental institution and private services [3]. Greater Jakarta with high rate of Covid-19 cases and high density people and resources-limited actually is not suitable to arrange testing with RT-PCR. However RT-PCR is still the main intervention to detect Covid-19 infected people. However, public initiative and services didn't restrict to TAT attribute only. TAT is the part of public health

surveillance which pay-attention to a whole process including case detection and result reporting. Covid-19 testing should prioritize accessibility, frequency, and sample-to-answer time [10]. This study aims to investigate the patient’s complaint related to time consumable SARS-CoV-2 testing with RT-PCR technology. Previous work on investigate Covid-19 testing patient’s satisfaction is very limited. Several study particularly examined the impact of Covid-19 pandemic to healthcare patient’s satisfaction. This study aims to investigating and capturing the patient’s complaint related to the backward of RT-PCR i.e. time consumable compare to point-of-care (POC) test.

2. METHOD

A cross-sectional online survey study had been executed to 174 Indonesian participants in August 2020. We adjust participants with inclusion criteria involve once nasopharyngeal swab specimen sampling, and had received the result exceed 1 day

since registration process either negative or positive. Data cleaning applied to investigate missing and redundancy data. The 112 participants involved in this study after applied inclusion criteria and data cleaning. We investigated the patient’s experience of SARS-CoV-2 testing from registration, specimen sampling, and receive the results. Collected data were analyzed with proportion descriptive analytics to capturing the time-related attribute of testing.

3. RESULTS

3.1. Perception by Characteristics

Based on collected data, participants who stated time consumable RT-PCR most a half less than 31 years old, tested at government hospital, and most stayed at Greater Jakarta (table 1)

Table 1 Time Consumable Perception by Participants Characteristics (n=112)

Characteristics	Indicators	Frequency	Percent
Age	> 50 years	3	2.7
	41-50 years	20	17.9
	31-40 years	42	37.5
	< 31 years	47	42.0
Health services	Government hospital	48	42.9
	Private hospital	22	19.6
	Primary health service	18	16.1
	District clinical laboratory	8	7.1
	Private clinical laboratory	4	3.6
	Others	12	10.7
Living stay	Greater Jakarta	80	71.4
	Out of Greater Jakarta	32	28.6

Table 2 Perception to Registration Process (n=112)

Characteristics	Indicators	Frequency	Percent
Information access	Most easy	41	36.6
	Easy	64	57.1
	Pretty difficult	5	4.5
	Difficult	2	1.2
Access to location	Most easy	49	43.8
	Easy	60	53.6
	Pretty difficult	3	2.7
	Difficult	0	0.0
Covid-19 protocol properly	Most agree	48	42.9
	Agree	55	49.1
	Pretty disagree	7	6.3
	Disagree	2	1.8
Rapidity & Alacrity	Very fast & spry	31	27.7
	Fast & spry	60	53.6
	Pretty slow	19	17.0
	Very slow	2	1.8
Flow process information	Very clear	26	23.2
	Clear	54	48.2
	Pretty clear	26	23.2
	Unclear (not applied)	6	5.4
Waiting room comfort	Very comfort	9	8.0
	Comfort	44	39.3
	Pretty comfort	41	36.6
	Uncomfortable	18	16.1
Queue discipline	Very fair (first in first out)	37	33.0

Characteristics	Indicators	Frequency	Percent
	Fair	21	18.8
	Pretty fair	51	45.5
	Unfair	3	2.7
Time consume	> 5 minutes	34	30.4
	3-5 minutes	34	30.4
	1-3 minutes	36	32.1
	< 1 minutes	8	7.1
Satisfaction	Very satisfy	18	16.1
	Satisfy	58	51.8
	Pretty satisfy	36	32.1
	Unsatisfied	0	0.0

Table 3 Perception to Swab Sampling Process (n=112)

Characteristics	Indicators	Frequency	Percent
Distance from registration counter	Far	10	8.9
	Middle	39	34.8
	Close	63	56.3
Queue discipline	Very fair (first in first out)	28	25.0
	Fair	55	49.1
	Pretty fair	25	22.3
	Unfair	4	3.6
Waiting room comfort & safety	Very comfort & safety	7	6.3
	Comfort & safety	48	42.9
	Pretty comfort & safety	40	35.7
	Uncomfortable & unsafe	17	15.2
Flow process information	Very clear	23	20.5
	Clear	61	54.5
	Pretty clear	23	20.5
	Unclear (not applied)	5	4.5
Flow process information	Very clear	26	23.2
	Clear	54	48.2
	Pretty clear	26	23.2
	Unclear (not applied)	6	5.4
Pain perception	Very pain	4	3.0
	Pain	32	28.6
	Pretty pain	47	42.0
	Painless	29	25.9
Time consume	> 5 minutes	3	2.7
	3-5 minutes	23	20.5
	1-3 minutes	55	49.1
	< 1 minutes	31	27.7
Satisfaction	Very satisfy	12	10.7
	Satisfy	67	59.8
	Pretty satisfy	28	25.0
	Unsatisfied	5	4.5

Table 4. Perception to All Process (n=112)

Characteristics	Indicators	Frequency	Percent
Satisfaction	Very satisfy	10	8.9
	Satisfy	60	53.6
	Pretty satisfy	36	32.1
	Unsatisfied	6	5.4

3.2. Perception to registration process

From 112 participants, 41% stated the waiting room pretty comfort, 45.5% stated pretty unfair when waiting in line, 60% stated need exceed to 3 minutes for registration process (table 2).

3.3. Perception to swab sampling process

From 112 participants, 42% stated pretty pain when

swab sampling, and 49.1% stated need 1-3 minutes for swab sampling process (table 3).

3.4. Perception to All Process

Even though most of participants need over 1 day to receive results, 54% stated satisfy for the RT-PCR services (table 4)

4. DISCUSSION

Participants who stated long RT-PCR service time mostly had tested in government hospital and at Greater Jakarta. This means that RT-PCR test demand concentrate to public health services according to Covid-19 policy. The increasing Covid-19 cases in Greater Jakarta led to longer service time. Result of RT-PCR test focused to people with high risk (>45 years) that led to longer service time to people less than 31 years.

Several health services applied Covid-19 protocol that separate patients with people who held RT-PCR. Most of all health services arrange RT-PCR at out of building (field, parking, park) that led to the uncomfortable for waiting the registration process. Health worker adjusted priority queue with people with high risk as first class patients. As a result, most of participant percept unfair waiting line for registration process.

Specimen for RT-PCR swab from nasopharyngeal and parhygeal tissue. This procedure led to the uncomfortable sampling even painfull for several person. However, this service attribute along to our observation had no effect to long service time. Moreover, most of participants stated this process need less time.

In the early stages of pandemics, precise and accurate diagnosis had significance contribution to control the transmission of diseases. In order to diagnosis SARS, the time consumable and sophisticated laboratory with trained personal are to be required [4]. In this study 28/58 (48.3%) participants stated time spending from registration to receiving results exceed to 3 days in government hospital. We suggest the root causal of this condition is the idle time of waiting in line the specimen before turn-around time.

Testing time of real-time RT-PCR is 1.5 – 3 hours [7]. United Kingdom National Health Service (NHS) laboratory reported average TAT of Covid-19 PCR testing is 14 hours, and 90% under 24 hours on June 2020. TAT is time interval between the specimens received in the laboratory reception to the time of report dispatched with verification [11].

Qualitative study held by [12] suggest that RT-PCR test at Off-Site Covid-19 Testing Centres (OSCTC) need variability sample processing and TAT from days to weeks. Indeed, OSCTs needed to retest patients to support contact tracing if there is significance delay cases. Daily telemedicine visits with patients until they receive result is one of way outs to solve the time consumable problem. If the result is negative, the additional 48 hrs follow-up should arrange to make sure a false negative.

The delay time of RT-PCR would make matter worse to Covid-19 pandemics. Surveillance model simulation study suggests that delay in reporting Covid-19 decrease the epidemiological impact of surveillance-driven isolation. Delay reporting will decrease reproductive number (R) only about 60% if surveillance held daily. When surveillance every 14 days, it will decrease R about 10-15% only [10].

5. CONCLUSION

In this study SARS-CoV-2 testing with RT-PCR had proofed as time consumable Covid-19 testing. Most of long time contributed by idle time between pre-analytic to analytic and post-analytic. Perception of long service time related to age, health facilities, and area. It should perform study to deeply investigate the idle time between processes.

REFERENCES

- [1] Satgas Penanganan Covid-19 BNPB, "ANALISIS DATA COVID-19 INDONESIA UPDATE PER 06 SEPTEMBER 2020," Jakarta, 2020.
- [2] Worldometer, "Coronavirus Cases," *Worldometer*, 2020. <https://www.worldometers.info/coronavirus/> (accessed Jul. 31, 2020).
- [3] Gugus Tugas Percepatan Penanganan COVID-19, "Infografis COVID-19 (12 September 2020)," *Berita Terkini Covid-19*, 2020. <https://covid19.go.id/p/berita/infografis-covid-19-12-september-2020> (accessed Sep. 13, 2020).
- [4] M. Ezhilan, I. Suresh, and N. Nesakumar, "SARS-CoV, MERS-CoV and SARS-CoV-2: A Diagnostic Challenge," *Meas. J. Int. Meas. Confed.*, vol. 168, no. August 2020, p. 108335, 2021, doi: 10.1016/j.measurement.2020.108335.
- [5] H. Moulahoum, F. Ghorbanizamani, F. Zihnioglu, K. Turhan, and S. Timur, "How should diagnostic kits development adapt quickly in COVID 19-like pandemic models? Pros and cons of sensory platforms used in COVID-19 sensing," *Talanta*, vol. 222, no. July 2020, p. 121534, 2021, doi: 10.1016/j.talanta.2020.121534.
- [6] E. Sheikhzadeh, S. Eissa, A. Ismail, and M. Zourob, "Diagnostic techniques for COVID-19 and new developments," *Talanta*, vol. 220, no. May, p. 121392, 2020, doi: 10.1016/j.talanta.2020.121392.
- [7] Y. Xu, M. Cheng, X. Chen, and J. Zhu, "Current approach in laboratory testing for SARS-CoV-2," *Int. J. Infect. Dis.*, 2020, doi: 10.1016/j.ijid.2020.08.041.
- [8] J. M. Abduljalil, "Laboratory diagnosis of SARS-CoV-2: available approaches and limitations," *New Microbes New Infect.*, vol. 36, no. June, p. 100713, 2020, doi: 10.1016/j.nmni.2020.100713.
- [9] J. W. Ai, Y. Zhang, H. C. Zhang, T. Xu, and W. H. Zhang, "Era of molecular diagnosis for pathogen identification of unexplained pneumonia, lessons to be learned," *Emerg. Microbes Infect.*, vol. 9, no. 1, pp. 597–600, 2020, doi: 10.1080/22221751.2020.1738905.
- [10] D. B. Larremore *et al.*, "Test sensitivity is secondary to frequency and turnaround time for COVID-19 surveillance," *medRxiv*, p.

- 2020.06.22.20136309, 2020, doi:
10.1101/2020.06.22.20136309.
- [11] NHS United Kingdom, "Pillar 1 NHS labs Covid-19 testing turnaround time data The current average Covid-19 testing turnaround time in the NHS pathol."
<https://webcache.googleusercontent.com/search?q=cache:2URQJw23YvAJ:https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/07/nhs-labs-covid-19-testing-turnaround-time-data.pdf+&cd=1&hl=en&ct=clnk&gl=id> (accessed Sep. 08, 2020).
- [12] C. Brammer *et al.*, "Qualitative review of early experiences of off-site COVID-19 testing centers and associated considerations," *Healthcare*, vol. 8, no. 3, p. 100449, 2020, doi: 10.1016/j.hjdsi.2020.100449.