

# 1 to 1, 11,111 Covid sample testing; Decoding the testing matrix!



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## ABSTRACT

Almost 100 yrs. after the 1918 Spanish Flu Pandemic, world is witnessing "Covid-19", another Pandemic of similar scale. Interesting, parallels are being drawn between these two pandemics –occurring a century apart; on their scale of spread, potential impact, global scare and attention, containment measures and even people are framing similar projections on possible course of the pandemic. While world was equally unprepared on many terms to safeguard itself from such a pandemic from SARS Cov-2 Virus, one scenario quite distinct from the previous pandemic scenario, is the current status of laboratories with advanced tools. Ground breaking genomic technologies such as NAAT (Nucleic acid Amplification technologies) or PCR (Polymerase Chain Reaction), which currently exist can be positioned as crucial weapons strategically for both community level operations and patient level care. We have the opportunity for cross learning from the experiences of the laboratories involved in Covid testing while informing our peers across policy, diagnostic and research domains, exciting the newcomers to join forces and educating all our associates who can be involved in supportive roles and the large numbers of innovators / supporters who can offer to improvise and strengthen on our current solutions.

**Key words:** Covid-19; Diagnostic testing; RNA PCR; RNA extraction; Covid warriors

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## INTRODUCTION

Almost 100 yrs. after the 1918 Spanish Flu Pandemic, world is witnessing "Covid-19", another Pandemic of similar scale. Interesting, parallels are being drawn between these two pandemics –occurring a century apart; on their scale of spread, potential impact, global scare and attention, containment measures and even people are framing similar projections on possible course of the pandemic.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a novel coronavirus /COVID-19 outbreak was declared as a global public health emergency by the World Health Organization (WHO) and then as pandemic,<sup>1</sup> As per the information available in public domain, the virus seemed to have emerged in the population in Wuhan, China from the local wholesale seafood market in late December 2019.<sup>2,3</sup>

While world was equally unprepared on many terms to safeguard itself from such a pandemic from SARS Cov-2 Virus, one scenario quite distinct from the previous pandemic scenario, is the current status of laboratories with advanced tools. Ground breaking genomic technologies such as NAAT (Nucleic acid Amplification technologies) or PCR (Polymerase Chain Reaction), which currently exist can be positioned as crucial weapons strategically for both community level operations and patient level care.

As per the latest updates from WHO, having over 15 million confirmed Covid patients and more than half million deaths across 215 counties within 200 days after announcement of Pandemic.<sup>4</sup> It's pretty much universally accepted fact that SARS Cov-2 virus is here to stay continuing to test the resilience of humanity at large and more specifically the actions of professionals involved in the specific tasks across

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several settings of communities, laboratories, hospitals and legislative/administrative offices. Although India seems to have acted early with its lockdown measures, having found to have more than 1.2 million Covid patients notified and further counting, it's a matter of concern not to find the curve flattening.

Among the early movers into action were the ones directly and indirectly involved in ensuring all the suspected Covid patients are tested properly, appropriately, timely and seamlessly. Against the backdrop clamor of multiple guidelines and testing algorithms, concerns of inadequate testing, intrinsic challenges in the testing processes and the need for rolling out long drawn testing policies, there is a need to widely share our experiences on real time basis. We have the opportunity for cross learning from the experiences of the laboratories involved in Covid testing while informing our peers across policy, diagnostic and research domains, exciting the newcomers to join forces and educating all our associates who can be involved in supportive roles and the large numbers of innovators / supporters who can offer to improvise and strengthen on our current solutions.

Thyrocare Technologies is one of the ICMR approved private laboratories, that joined forces early on, in the efforts to scale up of the diagnostic capacity in India. Having processed more than 1,00,000 tests within 100 days of start of Covid testing operations. We have been gone through a significant learning curve technically, administratively and also having coordinated with the government authorities. While having a fair share of successes and challenges alike we had to be constantly on our toes making the necessary iterations to our day to day activities both on the core laboratory tasks and the coordination aspects. While pooling resources and streamlining workflows towards efficiency are common industry practices in responding for any emergencies of scale, establishing platforms for seamless sharing of experiences and timely management of knowledge gaps will also be equally important tools is to fight back such biological emergencies, since a lot is yet to be unraveled.

## **GEARING UP FOR COVID TESTING / PREREQUISITES FOR COVID TESTING LAB**

Until mid-March 2020, when NIV Pune was the only Lab to undertake the Covid testing in India, and other Govt Labs under the VRDL network and CSIR labs were getting ready for Covid testing services, the additional testing capacities was decided to be secured through the Private sector providers and a lot has happened subsequently, very quickly with private sector kit-suppliers, kit-manufacturers, PPE manufacturers

and Testing Laboratories, all swung into action all at once to match to the imminent gaps clearly evident by mid-March.

### **Finding the sync**

Needs are clearly visible but, as it is a common case with public health emergencies, government agencies, which have the aerial view and national, supranational level insights, will be at the fore front of leading the response, guiding the individual entities small and big in the health ecosystem. It is for ensuring a rational, collective and best possible response one driven with the focus of optimal utilization of the resources. When the request for Expression of Interests was floated by MoHFW through ICMR, we were one among the handful of labs that submitted application detailing the aspects of self-assessment and our preparedness. While happy for being one of the first private labs in India to get ICMR approval for starting Covid testing, responsibilities also followed. The application to ICMR was a quickly doable process sharing details of self-assessment and reporting the lab's capabilities in terms of equipments like Biosafety Cabinets, automated extraction system, RT PCR instruments, existing quality accreditation like NABL, ISO and CAP along with availability of human expertise like Lab technicians, molecular analysts and Microbiologists.

### **Leadership and administrative support**

Full endorsement from management is especially important considering the roller-caster ride of working in such high stakes' emergency situations for country, where servicing risks and revenue expectations don't necessarily follow linear trajectories.

### **Setting of the laboratory for Covid**

Building on the existing lab space, negative pressure lab area was identified for the initial sample processing as a precaution for human safety especially with the plan to be ready as a high throughput Covid lab. Workflows (SOPs) for sample reception and processing, Nucleic acid extraction, PCR work and reporting were developed along with the updated Biosafety work policy and appropriately revised HR policies in the context of Covid work. Existing biomedical waste management processes was depended upon with the necessary Covid specific precautions. With eight lab personnel were allocated for handling the initial steps in the NPR with in the BSC's as primary safety barrier, eight personals were reserved for our 800-1000 capacity automated extraction system and for the PCR runs, well skilled personnel were made available even from beyond our existing lab roster. PCR data was decided to be read by the lab in-charge and reporting processes was distributed among the six team members of lab as per the priority of the report. Eight to ten were exclusively tasked with data entry and coordination responsibilities.

### Expertise and financial bandwidth

Being one of the largest clinical laboratories in India and having the in house expertise and networks for coordinating wide range of operations in the field including the logistics of sample collection and transportation has been an inherent asset.

## INSTITUTIONALIZING THE COVID-TESTING

### Starting the first run

Setting up the work space and equipment took one week, including the sensitization activities for the 20-member strong lab team identified exclusively for Covid testing. We were prepared to cater a daily work load of up to 1000 samples processing with the possibility of ongoing shifts, round the clock depending on the day's pending work.

After receiving the control kits list from ICMR/NIV and subsequent sharing back the 10 positive and 10 negative results to the regionally linked laboratory at Kasturba Hospital, Mumbai was the starting point. Once our results were found to be in concurrence and we are authorized to release the test reports with the conditions of reporting negatives directly to the patients and positives to specific municipal corporations. We officially started the Lab on 25<sup>th</sup> March 2020.

Meanwhile a much wider team across several departments quickly worked to set up the Covid call center, arrange the team of field collection personnel "Swab Technicians" and to directly reach out to Covid suspects in their communities, customized Covid Vans were arranged for safe collection and seamless transport of swab samples. Care was taken to ensure the screening criteria shared by ICMR be followed for collection of samples from the field and while pricing the test could be set by our lab much lower the Rs.4500/- limit capped by Govt. This was reduced to Rs. 2800/- later. Parallel, beyond the lab premises, IT platforms & LIMS were customized for Covid response, dedicated purchase and logistics teams were in place to ensure seamless support for uninterrupted testing services to match the scale up plans.

### Preparing for scale up

Within a week of starting the Covid testing, although we were delighted to know the good sample mobilization efforts, the lab capacity was challenged by the ready availability of the PCR testing kits that have to be imported from overseas. Although the availability of ICMR approved PCR kits was promising, sticking to the established protocols from the Altona, Thermo and Siemen's kit was decided keeping in mind the need for undertaking validations for each and every kit additionally as per the instructions and protocol from the respective

manufactures. This could be a challenge for the lab personal to following multiple protocols; but at that time, it was need of an hour due to lockdown to depend on multiple vendors than single. While we were assured of the streamlined supply of an alternative kit, assessing the needs for scaling up the capacities, additional extraction systems and human resources has to be indented for within two weeks of start of operations on greater scale.

Thanks for the timely logistical support of equipment reinforcement from vendors who could install additional 500 sample processing platform within 3 weeks (20<sup>th</sup> April 2020). Leveraging on the lab personnel from the other departments, could be secured internally to further strengthen our Lab team by additional 12 personnel to serve the increased work load though reassigning the roles and recomposing of teams. By such internal arrangements, testing procedures were streamlined to be running around the clock (24\*7). During these Covid times any additional hiring was not a feasible option. Fine tuning of the sample collection algorithms as per the latest guidelines has been an ongoing feature to incorporate the most updated guidance and especially reporting to be as per the updated SRFs from ICMR along with timely reporting to Municipal corporations and states in their specific line list and other formats.

Although the sample processing efforts be seamlessly organized to double up the capacity, ensuring proper coordination between us and the officials from ICMR, State officials, Municipal corporations, networking hospitals, has been a demanding exercise, which unless properly streamlined and up to date, could threaten to consume the same time ideally needed for the core Lab processes. This has been the case in our scenario to some extent and we fortunately managed to survive this crisis without any compromise.

## INDISPENSABLE STARS IN THE COVID TESTING GALAXY

### ICMR for its leadership

While ICMR HQ has been the nodal coordination agency for Government of India (GoI) for policy and over all guidance on several aspects, National Institute of Virology a National level reference laboratory in India, has been the backbone for laboratory-based efforts across all stakeholders. Right from prompt issue of technical guidance documents, validating the kits of private sector to the detection of corona virus supporting the newly started regional laboratories in servicing for the regional Covid reference needs. NIV has been inspirational on several fronts for its technical leadership and multitasking and timely updating list of available kits and resources along with sensitivity and specificity of each.

### Govt agencies for coordination

Police approving the essential service passes for the lab personnel, municipal corporation officials conducting the multiple stakeholder coordination meetings and state officials managing the information flow on almost real time basis are just a few of the overall mammoth coordination efforts happening outside to the efforts inside the lab united by the common Covid containment objective. However, what gets publicly recognizable as policy actions and through public broadcasting seems to be at minuscule levels compared to the enormous coordination that government agencies do on the ground.

### Private sector for its commitment and expertise

Affirmative decisions by lab's management team on the risky but socially needed financial commitments for Covid testing is appreciable since timely start of services contributed to the collective efforts of the society. Such financial decisions could probably be difficult from small to medium sized labs, which might fall short of the much critical administrative resources needed to secure both the streams of samples and kits when the supply chains, in the severely disrupted environments. Hard work and commendable logistical support from the teams to arrange the necessary kits and consumables and equipments during the lockdown period complemented the ongoing uninterrupted testing requirements at lab level.

### Covid warriors for their facilitation

Working in the face of uncertainty and personal risk, every action small or big, facilitated by several Covid warriors across the vital functions of policing, essential supplies movement, transportation of people, operations at hospital, labs and movements of the health workers into the community are truly commendable. We are what we continue to be as on date thanks of the daring and sincere efforts of Covid warriors.

## KEY ATTRIBUTES TO SUCCESS IN COVID TESTING

Swiftness in adapting to and upgrading for the dynamic requirements, Open-mindedness to work as team beyond the functional and institutional boundaries, keenness to innovate within the readily available skills set and resources and the much needed boldness to take move forward while sorting the paths as we go along have been the invisible but crucial key attributes for successful operations of the Covid testing laboratory during the current circumstances.

## REAL TEST FOR OUTCOMES LIES IN COORDINATION

As much as we tend to be immersed in on proper functioning of equipment, persona and test runs,

equally critical is the smooth coordination with various stakeholders around us. Coordination with govt agencies like ICMR for approval, police department for man/material movements, local government agencies and healthcare providers for referral of Covid sample collection are the aspects which have to fall in place for the samples to enter the lab. Coordination with suppliers and logistic teams across several fronts for kits, consumables has to happen in tandem for testing to continue uninterrupted. Similarly reporting and coordination should be ensured to be in sync using the most updated reporting forms, while promptly and patiently addressing the numerous queries and complaints that arise from the partners, even though many times for reasons beyond our control and our scope as a lab person.

While coordination among various departments internally and externally keeps happening, closely watching and most updated management team, proves to be lifesaving to deal with the government agencies escalating their concerns and pointing the lacunae's in our coordination works. With restricted access to people and information the media could even quote any complexities out of context. There were scenarios of even the need for issuing clarifications to the show cause notice issued to the lab manager, a smaller aspect in reality but with the real possibility of disturbing the peace of mind while at work and with the situation going out of lab limits and getting blown away, out of proportion.

## NUANCES OF WORKING AT BENCH

Several procedures undertaken at our lab for Covid testing processes is highlighted below.

### Sample collection training

Staffs who were working for collection of samples for H1N1 were involved as Swab collection Technicians(S-Techs). Conducted refresher training for the identified staff on understanding the mandatory filling requirements of ICMR's Specimen Requisition Form (SRF), triple layered packing procedure for proper transportation of samples, use of PPEs and practices for self-safety. While the trainings were happening in person initially, once the lockdown restrictions came into effect, we continued our trainings over video conferencing platforms for S-Techs. What's App and internal Apps were used for coordination of the movements of S-Techs based on appointments taken online for public or via phone for institutional partners or for Govt. facilities.

### Sample reception and processing

Dedicated gate was identified for entry of samples separately from the gate for people movement. Teams

of 6 people were allocated for handling the pre-analytical procedure. Which includes accessioning of samples; checking ambiguity in samples and SRF (sample requisition form), sample leakage etc. Trained security guards on use of PPE for themselves and also gave the responsibility of safe handling and disinfecting the vehicle and cold storage boxes from outside; being used for movement of Covid samples. Made SOP according to ICMR guidelines for discard policy. According to this all negative samples; viral transport medium (VTM) can be discarded after one week. Previous policy stated that positive samples need to send at national virology institutes for repository. But looking at huge numbers it has been directed to discard after one month due to space constraint. Genetic material or extracted RNA should be stored for 2 years under  $-20/-80$  degrees. Its part and parcel of laboratory to identify Space and team for archiving.

During sample processing utmost care was taken to overcome carry over or cross contamination issues along with an environmental contamination. NPR fumigation, BSC cleaning and UV exposure, infection control, viral exposure plans were kept ready as mandate documentation and strict adherence to policies were monitored on daily basis. Engineering controls of NPRs are checked after specific time intervals for air pressure changes and other important aspects.

#### RNA extraction

Two teams (2 shifts); kept on tasks for RNA extraction with one automated system initially. Subsequently capacity was increased with addition of three equipment's for automated RNA extraction. Additions were made, also with the caution to avoid dependency on single vendor and potential work flow disruptions from any unforeseen shortage of consumables, kits and reagents.

#### Master Mix preparation and addition

Liquid handler/ robotic arm System for RNA addition made ready for addition miniature proportion of RNA and Master-mix of reaction depending upon the consumables used during extraction elution step. Thou automated well experienced team managed for this.

#### PCR runs

Saved the templates for the cycling conditions, results interpretation is done by using software's available along with particular thermal cyclers by checking Cycle Threshold values, fluorescent, and proper sigmoid curves etc.

#### Reading and confirming the results

Results were checked along with Quality control; Negative/Positive and No template control in each run. Based on QC components; validity of run can be decided.

#### Result interpretation and reporting

Arrangements of training from application specialist on behalf of the supplier of RT PCR in addition to the in-house training for PhDs, who were selected based on their sound technical knowledge of RT PCR and result interpretation. Results were uploaded to LIS (Laboratory Information System), which was already integrated for Covid needs with final upload only after three confirmatory steps from user.

#### Innovative considerations

Supporting kit manufacturer for validations for RT PCR. Also quick efforts in functional mobile vans and booths for sample collection.

#### Covid specific staff welfare / logistics support

As per the requirements of the lab personnel depending on the work processes, transportation for staff, regular safe and healthy meals and even accommodation support close by was facilitated by the Lab management as a special consideration in view of the lockdown related restrictions.

## 1, 11,111 SAMPLE PROCESSING: REFLECTIONS FROM 100 DAYS

Graphical representation on weekly basis of number of samples tested vs number of positives. Daily basis trend monitoring is essential benchmark in testing. Needs to understand sources of samples giving a greater number of positives. Uniform trend has been observed at our center. This confirm the uniformity in processing and quality reports (Figure 1).

Bifurcation of Govt. and private patients and monitoring positive rate amongst both of them is routine procedure. Information about each district or Municipality needs to be forwarded immediately and ICMR portal entries are mandate before that. This provides lucidity on positivity rate in patients hospitalized in public/private Hospitals and home collections. As shown in Figure. 2.

Monitoring above all criteria's is important to show some similarities across the categories, but there could be something to be inferred otherwise also since Govt. added other high-risk groups and actually found a good number of positives. Also, simply attributing reasons for the collection of the samples category wise will highlight some circumstances which will be unique to the categories. For example, the samples from hospital settings can be more varied from type of hospital.

Age wise and gender wise analysis of data: Age wise; categorized as below 18, 18-50 and others above 50.

Percentwise load of each category with positive result is as shown in Figure 3.

It has been marked that 54% of the samples received from age group 19 to 50. In children's it was 4 % whereas above 50 years it was 28%. Positivity percentage of each group was 13 %, 1% and 8% respectively.

In gender wise data it has been seen that more than 50% of the samples were received from males (53%) with 14% of positives; as shown in Figure 4.

## CHALLENGING ASPECTS

Initially faced few challenges as there were stringent guidelines from ICMR became restrictions for Scale up of testing. Also, variation in the functioning of the municipal corporations leading to avoidable coordination related issue like need for valuable time to be kept for responding to queries. Restricted access to PPE / high fraction of the cost of PPE for S Techs for collection of samples.

### Handling errors and root cause analysis

One at a time in early days; when patients were not traceable as giving fake addresses and faulty phone numbers and Municipal corporations unable to track the patients. All sorts of queries revert back to laboratory. To overcome this we have generated OTP system to track actual phone numbers, identification proof made compulsory to track local address of patient.

## GUARDING FROM BOUNCERS

We had fair share of challenges including the troubles at platforms, sleepless nights handling the resources and even a memo from the govt. agency, all as part of package while working under uncertain conditions. To be better prepared and rather minimize the unpleasant surprises, there are certain aspects which can be recollected and reinforced looking back.

Selection of the most appropriate technical options and framing SOPs (and multiple protocols for alternate assays/ platforms if required) to provide the correct results with in the best possible TAT is most crucial, even if this translates into not accepting samples for few days. Gauging the work load and utilization rates of lab capacities across sub tasks should be happening on real time basis. Work load estimation should be in sync with indenting for additional kits, consumables and equipment's in the most prudent manner to avoid frequent over-capacity work days, since samples processing delays even by a day are highly undesirable in such scenarios.

Personnel across core lab and reporting sections need to be extra careful to ensure prompt fulfillment of mandatory reporting requirements. For example, when sharing data over online reporting platforms, it should be made sure the other party also gets the same format as what was uploaded. Let's remember, bugs can trouble us over IT platforms too not just in clinical samples at hand. Further, we need to be mindful of possible changes in the reporting formats. Data management process should be capturing all relevant information to serve the changing reporting needs and to be helpful to sort out any unforeseen troubles for the samples already processed, when needed or asked for by authorities.

Considering the sensitivity and the multitasking scenario of government officials involved in coordination, one needs to be clear and double sure on every word that is shared across all communication and coordination platforms including less common in-person meetings and the much more frequent WhatsApp updates, online meetings, emails, telephone calls and others communications happening almost over extended hours. Leaving any scope for misunderstanding or distortion of the messages can only be rectified at the cost of the valuable lab bench working time.

Although might not be apparent at the outset, instead of lab personnel handling all needs, lab management should be informed and convinced on the need to deploy some of their best minds to handle the communications and coordination between various agencies. In fact, a team should be set up to work closely with in and beyond the lab premises, one that is periodically updated on the proceedings and challenges inside the lab as well. Having a senior lead personnel, fully informed and readily available for coordination meetings or trouble shooting communications with the government could be a useful arrangement for Lab personnel to be undisturbed and focused on lab processes.

Lab work should be most up to date and be prepared for any sudden surprise scrutiny visits from govt agencies, as we encountered at our lab from Municipal officials. Any small inadvertent actions can be construed as unjustifiable mistakes resulting in serious questions and even embarrassment for the lab as a whole. Such unwanted scenarios should better be avoided by having a daily check list of critical aspects, followed up weekly checks and via Covid specific review meetings on the performance. Whenever any deviation found, log entries to be made along with prompt communication to other coordination agencies as required. Regular exercises to be in place to clear any backlogs with in the lab, disposal of leftover samples, genetic materials and rejected samples etc. Also, cleanliness, fumigation, proper UV exposure to BSCs is

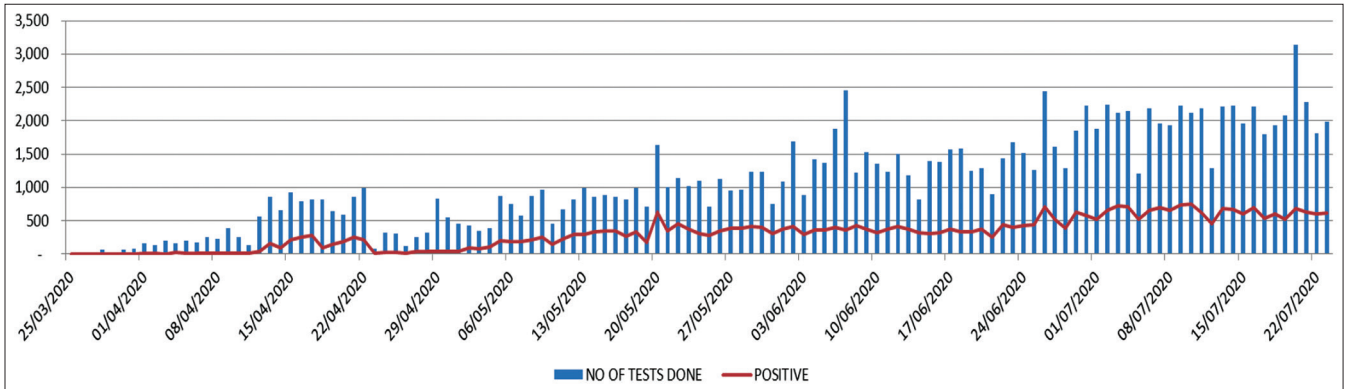


Figure 1: Graphical representation of number of samples and positivity rate

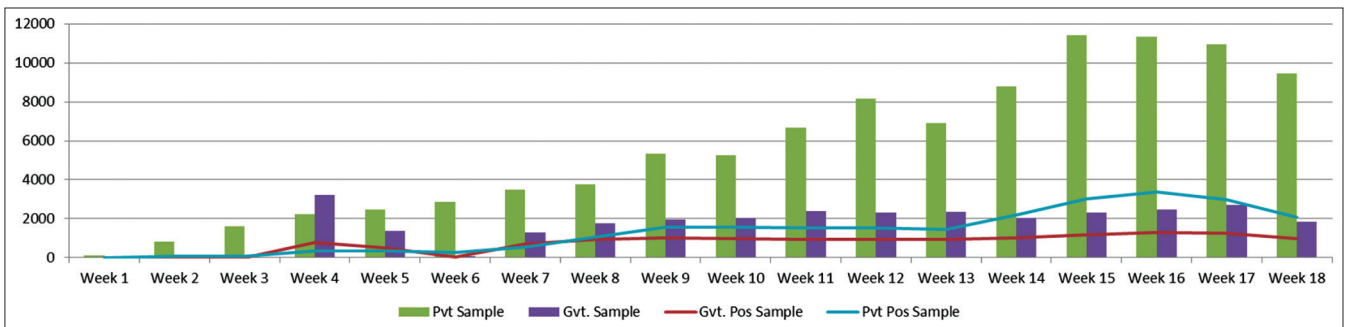


Figure 2: Graphical representation of Govt. samples and private samples along with positivity

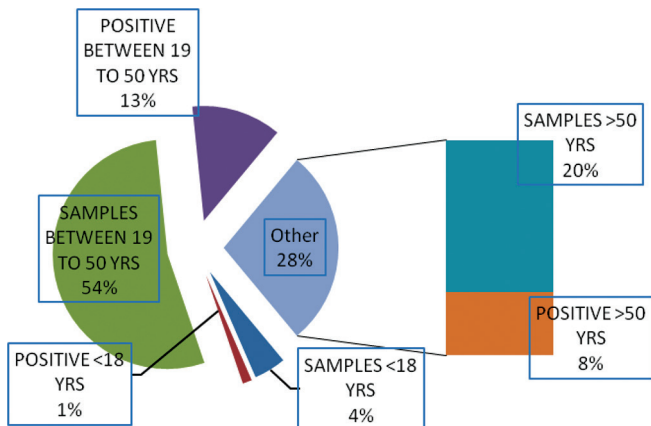


Figure 3: Segregation of age wise data

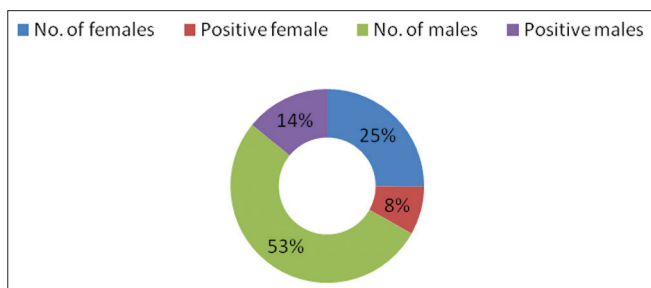


Figure 4: Segregation of gender wise data along with positive percentage

crucial check points on daily basis. Performance of Quality indicator should be monitored neatly and documented for accurate reporting.

### Inter laboratory comparison

ICMR has given area wise tie with nearest VRDL for Inter laboratory Comparison. This exercise was on monthly basis and later on converted into quarterly basis. Maintaining 100% concordance with this exercise is mandate. This brings confidence at laboratory performance level.

### Appreciations and criticism

Testing of people for Covid -19 picks up amid a slew of new cases; an alarming new trend has cropped up. Several incidents of contrasting swab test results shown by government and private labs or private & other private lab have been reported, putting the individuals involved and their kin through huge mental trauma. With two conflicting tests over a span of 24 hours, at this point it is unclear whether their dear ones are afflicted by coronavirus or not. Addressing such queries satisfactorily was distressing. Sometimes patients, clinicians understood the factors involved in such controversial results but sometimes it was difficult to guide people in right way. Later on, many media articles published and with the help of references this procedure became smooth.

Appreciation from few patients and clinicians was encouraging in this stressful condition. Also received token of appreciation in Dharavi pattern published report.

## GOING FORWARD GAINING FROM COVID

### Preparedness for molecular work

Covid crisis is certain to give a further boost to the Molecular platforms and where ever possible and platforms available, labs should be prepared to handle the molecular diagnostics to its fullest potential. Being at right place to be able to serve the need of the hour would of-course can't be of any less emphasis and one has to continue to strive for the best possible responses both professionally, technically and for some circumstances even for assuring the people in reach. Having different solutions ready would be handy in case of any supply chain disruptions.

### Quick adaptability and scalability

Lab processes and mindsets in general have to be much more adaptable for taking up the tasks with shorter notices and in less certain environments. Lab systems, personnel training plans and resource arrangement mechanisms have to be much more inclined for quicker adaption as per the emerging needs than ready to follow, well laid down protocols and following job responsibilities. Opportunity available through molecular platforms for rapid scale up has to be better optimized by securing the other necessary components in time and strategically.

### Managerial efficiency

Capability to efficiently manage human resources within Lab, across pre-set functional areas or knowledge domains and the ability to seamlessly work across platforms / assays would be a real test while responding to such unexpected needs that can only be expected more often in the future. Being mindful of the future needs, one has to be having a mental roadmaps or even formal policies to be able to manage the work flows and testing requirements across the potential spectrum of testing possibilities. Potential test menus and linked standardized work flows can be set in place and updated periodically although not working on regular basis. Such an extended menu of tests, should be able to be revived at any point of time quickly.

### Handling coordination

Coordination abilities will become an essential part of skillset of lab managers and other supporting (data) management personnel. Understanding the crucial role most appropriate communication with Govt. agencies and coordinating under the high-pressure scenarios such as outbreaks will become a necessity while offering the lab services for such scenarios. Similarly maintaining a quickly responsive supplier, logistics, sample collection networks and working arrangements will be crucial than ever before to able to leverage upon them during uncertain circumstances.

### Securing motivation

Spirit of the people matters the most to work in crisis and everyone has to a role to play to their best of abilities in a mutually supportive work place ecosystem. Carefully nurtured collaborative work environments, accommodative HR practices and prior sensitization / training programs on aspects of biosafety, quality practices and logistical support can help all the lab personnel be motivated to give their best, which becomes an absolute necessity in such special scenarios.

### Role clarity and delegation

While maintaining the much-needed flexibility and accommodative framework, prior planning should be in place to give role clarity in the earliest possible manner to let fellow team members fulfill the special situation based realigned deliverables. Prior discussions and briefing on expectations in case of the unexpected requirements would help the team be better prepared to deliver than expecting them to come on board fully and automatically when required.

### Futuristic outlook

Several functions in the labs, like planning test services, inventory forecasting, indenting equipment and supplies, recruitment and in house training of team members and lab designing all needs to be planned hereafter through a futuristic lens beyond serving the needs as per the plans. This could be of a good technical comfort to lab personnel and financial clarity to the management.

### Preparing for new normal

Going forward, as it has probably already sunk into all of our minds by now; we have to prepare for working in a much-altered world operating at a new normal. This means our day to day logistics, skills set, workplace practices and social approaches are going to be different than what we were used to and one has to realign their role, functioning and expectations with in the practical realms of this new world.

The WHO has developed interim guidance documents for laboratory diagnosis,<sup>5,6</sup> home care for patients with suspected Covid patients,<sup>7,8</sup> Also greatly contributed for clinical management, infection prevention and control in healthcare settings,<sup>9</sup> risk communication and community engagement, and global surveillance for human infection with COVID-19.<sup>10</sup> WHO has also developed an online course to provide general introduction to emerging respiratory viruses, including COVID-19, meant for people at large as well as healthcare workers.<sup>11</sup> WHO has also prepared a disease commodity package that includes an essential list of biomedical equipment, medicines and supplies necessary to care for patients with COVID-19.<sup>12</sup>



While we work in our lab settings, we need to wholeheartedly acknowledge the Covid patients have been through the scare themselves, Covid warriors who have been working so closely to convert the risk towards safety and the public in general who are conducting themselves in a responsible manner to safeguard one-selves and others at the same time. While we hope and wish collective strength of humanity to trump over human suffering from the ongoing Covid Pandemic, we at the lab front should understand our role, adapt to our settings and serve the needs in the best possible ways.

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