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**BHABHA ATOMIC RESEARCH CENTRE**

अणुशक्तिनगर, मुंबई - 400 094

Anushaktinagar, Mumbai - 400 094



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 Dr Santosh Kumar  
 Dr Santoshi Prabhu  
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Cover Design by  
 Brother Jayesh Panchal

Dear Readers,

The Covid pandemic has put a huge burden on the healthcare system of every country including India and has exposed the inadequacies of our public and private healthcare system in terms of funding, infrastructure and manpower. Despite the challenges, the 'Covid warriors' have done their best in managing the medical crisis at great peril to their own safety. The Indian Medical Association National Covid Registry suggests that more than 1500 doctors have been infected with Covid and at least 400 doctors have succumbed to it, of which, 75% were above 50yrs of age.



As the pandemic stretched, the initial claps, lighting of lamps and showering of flowers were replaced by administrative disciplinary action, enquiries, police action and court cases. Patients and relatives often directed their ire towards the very same 'Covid warriors', who were working tirelessly to provide patient care, to express their dissatisfaction towards the healthcare.

'Patient satisfaction' is an enigmatic term which is generally considered as an indicator of quality of healthcare. Patient satisfaction is important as it may affect clinical outcomes, patient retention, medical malpractice lawsuits etc.

Quality of healthcare depends on the optimum use of medical expertise for best possible outcome with minimum morbidity. Over a period of time, delivery of healthcare has undergone significant changes with corporatisation and third party insurance. Availability of unlimited information from variety of sources on internet and increasing litigations have changed the traditional concept of a noble profession into a service industry. In general, patients expect from a doctor, punctuality, cordial behaviour, good communication, care and concern in addition to a good professional job. Satisfaction ratings are influenced by physician's personal attributes like friendliness, courtesy, politeness; and amenities like quality of food and cleanliness.

Patient satisfaction relies on patient's expectations and 'perception' of appropriate care. It assumes that patients can assess the technical skill and medical competence of their doctor. For instance, in a case of chronic bronchitis, patient may expect to receive antibiotics. But clinical research does not support giving antibiotics in all cases. Thus despite appropriateness of care, the quality of care is perceived as poor.

Patient satisfaction is too subjective a parameter to be used as a valid indicator of quality of healthcare. However, it cannot be completely discarded as it provides accurate information on the process of healthcare from the patients' eyes which cannot be replaced by any other performance indicator.

A handwritten signature in blue ink that reads "Shrividya".

Dr. Shrividya Chellam  
Chief Editor, Pulse

Dear Readers,

*The unprecedented Covid 19 pandemic has brought the world to a grinding halt since last year!*

*It has modified every aspect of life including daily routine, education, economy, transport, travel, entertainment, food security, sports, etc. Needless to say, it has led to a major disruption in the regular health care system. It has significantly impacted both, the way medical practices operate and clinicians practice medicine.*

*Conventional clinical practices related to patients, medical education activities, needed to be modified resulting in the cancellation of many activities such as grand rounds, departmental and multidisciplinary meetings, case presentations, etc.*

*But covid pandemic has resulted in enhancement in global connect with the medical fraternity like never before. Sharing information through webinars, exchange of experiences, treatment outcomes, etc. has resulted in better disease understanding and management. Video conferencing and virtual meets with eminent national and international faculties throughout this period have given confidence in patient management to clinicians even at smaller places.*

*Since the duration of post-Covid, 'New Normal' is uncertain, it has posed many challenges. This has also opened new alternatives for the health care delivery system. Telehealth to deliver medical services to patients is being used during the lockdown period to promote social distancing and disease containment, connecting with patients through telephones and smartphones is possible in a large number of cases.*

*Many patients are in constant touch with their clinicians through face-time, WhatsApp, etc. Even communication of lab reports via emails is being practiced regularly. Thus, mobile connectivity and teleconsultation have become a necessity for better patient connect, globally.*

*With the evolving guidelines for home monitoring of asymptomatic covid positive cases, the practice of telemedicine has proven to be very helpful.*

*Patients have experienced the ease of access to medical facility which eliminates transportation logistics, fear of virus exposure, and long waits in hospitals. Though, this practice cannot replace personal visits to the doctors for obvious reasons.*

*This experience of remote connection during the pandemic has resulted in an increased necessity for telemedicine services post-COVID-19 period.*

*Thus online patient web portals were once reserved for big corporate hospitals but are now essential as telehealth tools. However, these digital platforms must ensure patient information privacy and "Meaningful and gainful Use" of Electronic medical records.*

*In addition to this, point of care health delivery systems have been used during this pandemic for patient monitoring. Monitoring of heart rate, oxygen saturation, perfusion index is possible with small handheld devices. Home monitoring of blood pressure with digital apparatus and blood glucose monitoring has helped the clinicians to monitor vital parameters remotely.*





*Some international health care institutes have found the use of remote Micro-sampling and Dried Blood Collecting kits for few investigations. The feasibility of extending the same and capillary blood collection for common blood biochemistry needs to be explored in a larger population for future.*

*Covid pandemic has also endorsed the need for modification of medical curriculum which currently gives more stress on diagnostic and therapeutic approach. The existing medical curriculum does not impart sufficient training on how infectious diseases emerge and spread. Experience of this pandemic must be utilized to help the next generation of doctors better understand the role of preventive practices, biostatistics, epidemiology, data science, disease surveillance, viral genomics, non-pharmaceutical interventions, and contact tracing of various public health issues.*

*SARS in 2003 and the H1N1 influenza outbreak in 2009 have given us wake-up calls in past. All of us need to be prepared for such types of disruptions in the future. Embracing digital platforms for various sectors of life is going to be the future need. Effective management of pandemic like situations will require coordinated efforts and the involvement of society. Social Behavioural changes at the community level for infectious diseases, lifestyle modification for holistic wellbeing is going to be the key to a healthy community.*



*Dr Anjali R Kulkarni  
Head Medical Division*

# Impact of Lockdown Due to Covid-19 on Mental and Physical health, Academic and Career Prospects and Stress management

Ms. Shreya Ravikant Kate

Naperville Illinois, 60564, USA Email: shreyakate2003@gmail.com

## Introduction

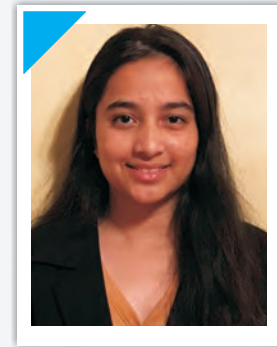
Over the past century humankind has encountered many devastating pandemics which have eradicated much of the world population. Now we have yet again come across the invisible enemy: Covid-19. Covid-19, initially seen to be an epidemic in China, was declared by the WHO a pandemic in March, and from there it has exponentially spread worldwide within days.

COVID-19 is a contagious disease which is spread through respiratory droplets from coughing, sneezing, or talking. Today, people have made it a common practice of hand-washing, social distancing; wearing masks and many countries have implemented mandatory stay-at-home orders, closing schools, local businesses and public places. This survey was conducted with the aim of the studying psychological impact of long-term lockdown implementation on mental and physical health, academic and career prospects and stress management in various geographical areas.

## Methodology

This qualitative experimental, observational study relied on primary data to study the cause-and-effect relationship of the lockdown on mental health. This methodology is less controlled and more interpretive, and used random sampling for unbiased results. An online survey via Google Forms was created and distributed through social media like WhatsApp, Instagram and Email to all the contacts of investigators from June 7<sup>th</sup>, 2020 to June 20<sup>th</sup> 2020. The questionnaire was spread across America, Canada, United Kingdom and India, with age ranged from 14-60 years. On receiving and clicking the link the participants got auto directed to the information about the study and informed consent.

The survey consisted of 8 multiple choice questions, 3 short response questions -to elaborate on the preceding choice-and a question that was measured on a 5-point scale.



Ms. Shreya Ravikant Kate

The survey multiple choice questions are as follows:

1. What was your initial reaction to the Covid-19 pandemic?
2. Is the lock down stressful for you?
3. Do you prefer working or studying online?
4. Has this disturbed your regular schedule?
5. Have you acquired a new talent or skill?
6. Do you miss sports or collaborative activities?
7. Did Covid-19 inhibit your daily exercise?
8. Do you interact more with your family?

## Results and Analysis

Total 200 people took the survey. Out of 200 respondents 59% were females, and 40.5% were male. 63.5% of the respondents were from India, 19% from Canada, 16% from America, and 1.5% from the United Kingdom. Out of 200 respondents 62% were above 35yrs of age, 26% were from ages 14-18, 10% were from the ages 19-25, and the remaining 2% were between the ages 26-35. The results obtained of the survey are as follows.

Initial reaction to the pandemic included worry in 54% of the responders, 22.5% were unbothered, 4.5% reacted in anger, 14 % were in fear and other reactions were noticed in 5% of responders (table 1).

**Table 1: Initial response to Covid-19 pandemic**

Question	Worried	Anger	Fear	Unbothered	Other
Initial re action to the Covid-19 pandemic	<b>54%</b>	<b>4.5%</b>	<b>14%</b>	<b>22.5%</b>	<b>5%</b>

**Table 2: Impact on psychological aspect**

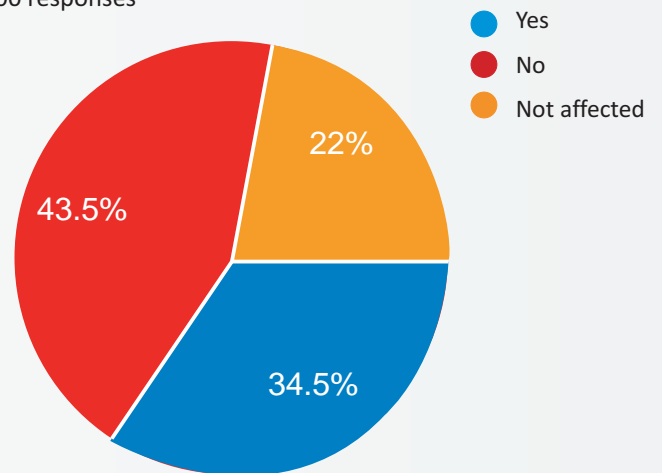
Question	Yes	No	Maybe
Is the lock down stressful for you?	<b>35%</b>	<b>39%</b>	<b>26%</b>
Has this disturbed your regular schedule?	<b>62.5%</b>	<b>30%</b>	<b>7.5%</b>
Do you miss sports or collaborative activities?	<b>81.9%</b>	<b>11.6%</b>	<b>6.5%</b>
Did Covid-19 inhibit your daily exercise?	<b>41%</b>	<b>47.5%</b>	<b>11.5%</b>

Mixed responses were obtained when impact of lock down on stress was asked. 35% of responders found it was stressful but 39% didn't. 62.5% of the responders found their regular scheduled to be disturbed but 30% didn't feel so. Sports or collaborative activities were mainly missed by 81.9% responders and only a few 11.5% didn't miss the same. Daily exercises were affected in 41% of responders but not in 47.5%. (table 2)

Mixed responses were obtained about career and academic prospects. When asked about working or studying online, this option was preferred by 34.5% of responders but not chosen by 43.5%. 22% were inconclusive about the same.

(figure 1)

**Do you prefer working or studying online ?**  
200 responses



**Fig. 1: Academic and career prospect**

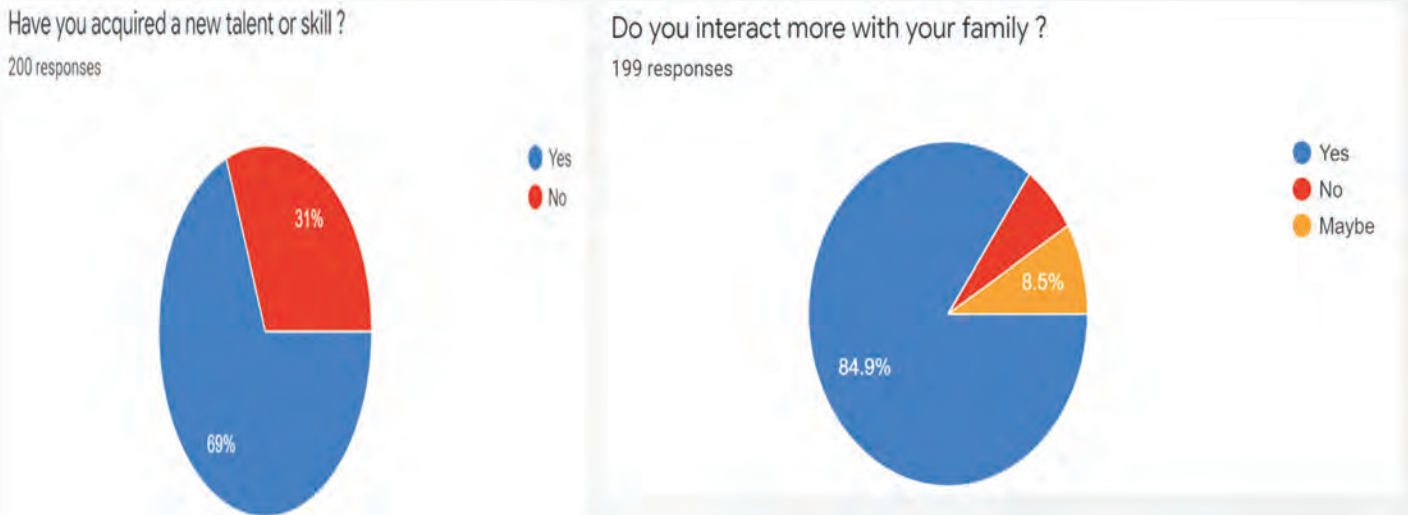


Fig. 2: Positive impacts of lockdown

Table 3: Stress management options

Activity	Responses
Yoga, Meditation	52
Exercises, walk	44
Spending time with family and friends	37
Music	22
TV, serials, Movies etc.	21
Reading	21
Baking	16
Gaming	6
Art and craft	10
Sleeping	6
Doing nothing	8
Regular work	8
Gardening	2
Spending time with pet	2
Prayer	4
Alcohol indulgence	1

Lock down period was useful for acquiring a new talent or skill in 69% of responders but not in 31%. 84.9% of responders felt they could interact more with their family in the lock down period but 6.5% didn't feel the same. 8.5% responders couldn't judge about this aspect. ( figure 2)

**Stress management options during lockdown**

Responders had multiple ways to relieve their stress. Yoga and meditation were preferred by maximum responders (n= 52). Similarly exercise and walking were too preferred

by 44 responders. Spending time with family and friends were seen opted in 37 responses. Music (n=22), Reading (n= 21), TV and online entertainment (n=21), Baking /cooking ( n=16), Art / craft activities( n=10), Gaming (n=6), sleeping (n=6), Doing Prayers (n=4), Gardening (n= 2), Spending time with pets (n= 2) and Alcohol indulgence( n=1) were other stress reliever quoted by responders. Doing nothing (n=10) and only continuing regular work (n=10) were too options selected by a few. (Table 3)



Table 4: New talent/ skill acquired

<b>Academic Enhancement (18.1%)</b>	<b>Professional Enhancement (11.8%)</b>	<b>Soft Skills (8.1%)</b>	<b>Arts (16.8%)</b>	<b>Self well being (9.3%)</b>	<b>Recreational (35.625%)</b>
Taking online courses	Modifying practice as a doctor	Patience	Learning new instruments	Meditation	Photography
Learning new languages	Acquiring new certifications	Multitasking	Dance	Regular Exercise	Cooking
	Learning new techniques to work from home	Staying focused	Sewing/ Embroidery		Gardening

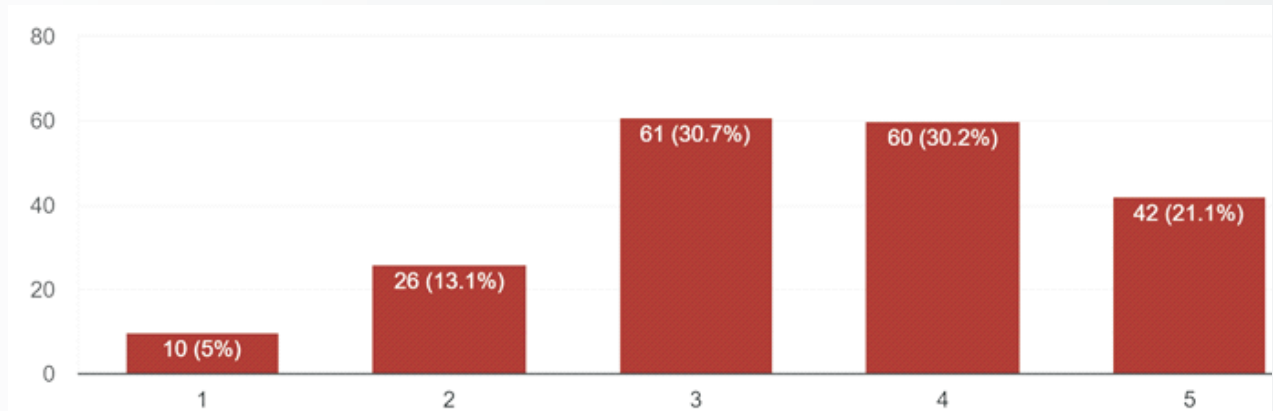


Fig. 2: Grading of time spent on social media

**New Skills/Talents acquired**

The respondents have adopted many unique talents.

For the purpose of ease, I have divided the responses under following heading Academic enhancement, Professional enhancement, Soft skills, Arts, Self well- being and Recreational. Recreational activities like photography, cooking, gardening was acquired by 35.6 % responders and was maximum. Academic enhancement like taking online courses, learning new languages were chosen by 18.1% responders. 16.8 % responders selected Art activity like learning new instrument, dancing and sewing/ embroidery.

Professionally new skills like learning to work online, obtaining new certificates and improving regular work pattern were endorsed by 11.8% responders. Keeping patient mind, ability to multitask things and staying focused were soft skills concentrated by 8.1% individuals. Practices to improve self well - being like meditation and exercising regularly were chosen by 9.3% responders.

(table 4)

Responders when asked to grade the time spent on social media to communicate with friends and family on scale of 1 to 5, maximum opted for 3 ( 30.7%) followed by 4 ( 30.2%),

As cities are gradually opening up, do you feel safe to go outside without the vaccine?

199 responses

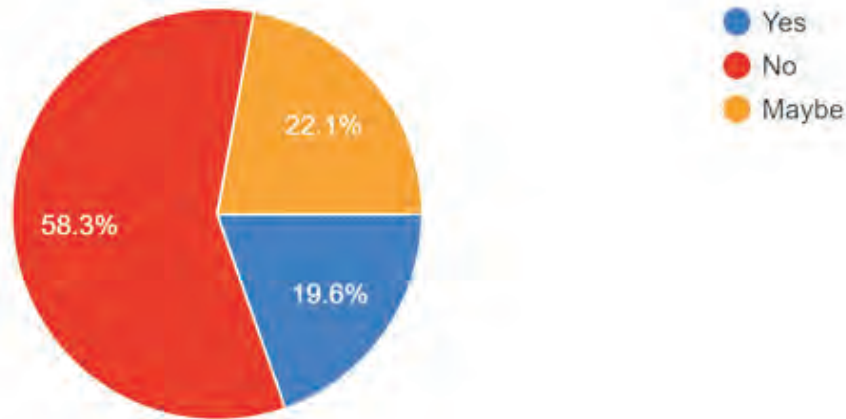


Fig. 4: Perceived safety of going out of house

then 5 (21.1%), 2 (13.1%), and 1 (5%). The scale denotes the increase in time spent on social media. Therefore, 1 means no activity on social media, 3 means no change, and 5 means double the usual time spent on social media. (Figure 3) Responders when asked about going out of house without an effective vaccine in Covid-19 pandemic, 58.3% felt unsafe and 22.1% were equivocal and 19.6% felt safe. (Figure 4)

### Discussion

After the implementation of the lockdown, the reduced access to friends and family or other social support systems, has caused psychological problems such as depression, anxiety and panic disorder. Moreover, other psychological impacts include: loneliness, lack of motivation, stress, financial strain and panic.

### Response or attitude

Study by Roy et al on the knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic, reported most of the respondents were concerned and indulged in to personal hygienic measures to avoid COVID-19 infection. Most of the participants in this study were educated - either graduate or post-graduate which could explain increased awareness towards the disease. Our study population included right from school students to working professional in all fields from various countries. Hence, in our study varied responses like 54% worried, 22.5% unbothered, 4.5% reacted in anger, 14 % were in fear and

other reactions were noticed in 5% of responders.

### Psychological impact

FEEL COVID surveys found that one-third of the respondents had a significant psychological impact. In our study, mixed responses were obtained when impact of lock down on stress was asked. 35% of responders found it was stressful but 39% didn't. 26% were unsure about the psychological impact of lock down. Mixed population from different countries and varied age group can explain the mixed response obtained in our study.

### Stress busters

Hiremath P et al in their study highlighted tips to overcome impact of lockdown on mental health which were suggested Meditation, yoga, exercise, family time, learning new hobby etc. Similarly in our survey we found that Yoga, meditation exercises were chosen as stress busters by maximum respondents. Spending time with family and friends, Music, Reading, TV and online entertainment, Baking /cooking, Art / craft activities were other stress reliever reported.

### Lifestyle changes

One Italian survey aimed to investigate the immediate impact of Covid-19 on eating habits and lifestyle changes. The perception of weight gain was observed in 48.6% of the population; 3.3% of smokers decided to quit smoking; a slight increased physical activity has been reported, especially for bodyweight training, in 38.3% of respondents. Similarly in our study 62.5% of the responders

found their regular schedule to be disturbed but 30% didn't feel so. Sports or collaborative activities were mainly missed by 81.9% responders and only a few 11.5% didn't miss the same. Daily exercises were affected in 41% of responders but not in 47.5%. These could be the reasons for disturbed schedule which affected respondents. People have increased interacting with friends and distant family through different platforms of social media and technology which has substituted face-to-face conversations. The lockdown has allowed people to spend more time with family and acquire nuanced skills/talents. Although, team sports have been cancelled, people are finding creative ways to get the subsequent amount of daily exercise. These include secular activities such as biking, jogging and daily walks. Although Covid-19 and the lockdown had brought a negative initial response, many people combatted that through developing new passions and pass times, keeping mental well-being a priority.

There are few limitations to our study results. First is the inherent design of the study like sampling technique being only restricted to people with internet access and having understanding of English; could also limit generalizability of the study. Secondly the study was conducted during a period of lockdown, which can have its own psychological impact and may have affected the responses obtained.

### Conclusion

Although initially people were worried and stressed, this pandemic has revolutionized our thoughts about pandemics. Not only did we find creative outlets to relieve stress and get subsequent exercise, but we have made a lot of progress in regulating a very transmissible virus.

We also realized the importance of community, valuable conversations and our routinely endeavors. It gives an appreciation for the many doctors, researchers and medical experts battling cure and vaccine for this pandemic.

The global population has become more aware of mental health, and the importance of routines which shape sleeping schedules and social interactions. As the number of cases decrease and the cities open up, people will still continue their new learned skill and talent, and spend time with family.

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# Covid 19- An Anaesthesiologist's Perspective

**Dr. Pritee Bhirud**

Department of Anaesthesia, BARC Hospital

The ongoing Covid 19 pandemic began in Huwei, China on 31<sup>st</sup> December 2019 and quickly swept the world in its incessant wave, redefining clinical practice as we knew it. The causative agent for this influenza illness is the SARS CoV2 virus which is a RNA virus affecting the respiratory system primarily along with the gastro intestinal system.<sup>[1]</sup>

Along with physicians, chest medicine specialists and intensivists, anesthesiologists too answered to the call of duty owing to their expertise in airway management and intubations for patients needing ventilatory care.

The operation theaters slowed down during the beginning of the lockdown in India, but the emergency surgeries kept their flow relentless and the anesthesiologists had to adapt themselves quickly to the new requirements of anesthesia and surgery in Covid times. New protocols were formulated rapidly keeping in mind patient and Health Care Worker (HCW) safety and at the same time, considering institutional limitations.<sup>[1]</sup>

Covid 19 being a respiratory virus the anaesthesia community soon recognized that they were at the forefront of risk for transmission of virus as well as disease exposure. The aerosol generating nature of anaesthesia procedures (in descending order of risk) such as tracheal intubation, NIV (Non-invasive ventilation), bag mask ventilation, disconnection of ventilator circuit, tracheal extubation , airway suctioning etc and the proximity to the patient, risk the anaesthesiologist to transmission of Covid19.<sup>[1]</sup> The numerous surfaces involved in patient care such as Anaesthesia workstation, multi parameter monitors, nerve stimulators, ultrasonography machine, etc provide surfaces for deposition of aerosols.

The virus can survive on surfaces for several days and with positive pressure ventilation can easily spread from OT to adjacent rooms and corridors. Negative pressure rooms are recommended to arrest the spread of virus but unfortunately not many institutions in India are equipped with these. The Centre for Disease Control and prevention(CDC) recommends a minimum of 30 minute interval between surgical procedures to prevent cross infection and even more of an interval, if the air changes per



**Dr. Pritee Bhirud**

minute in the OT are lesser. The OT should have a HEPA filter with 15 air changes per minute which removes 99% of virus particles upto the size of 0.3um and at the same time maintaining humidity and temperature of the OT.<sup>[2]</sup> BARC operation theatre provides 24 air exchanges per hour.

Preoperative preparation followed in BARC operation theatre:

The anesthesia trolley along with all equipment necessary for surgery is prepared before the patient is wheeled in the OT. The anaesthesia machine, drugs, airway intubation equipment and emergency drug trolley is equipped to prevent to and fro movement of personnel.

The Anaesthesia machine along with multiparameter monitor is covered with plastic drapes which are discarded at the end of surgery [Fig1] All patients undergoing anesthesia perform gargles with 1% betadine, sanitize their hands and wear a surgical face mask before coming to the OT.

Intubation for General Anaesthesia(GA) as per recommendations.<sup>[3]</sup>

Intubation is a high aerosol generating procedure and is done efficiently and briskly. Only the anesthesia team along with OT technician is present in the OT during the intubation and all wear PPE.

Patient is pre oxygenated for 5 min at 15lit/min O<sub>2</sub> before starting GA, with a Hudsons O<sub>2</sub> mask with rebreathing bag applied either under or over the surgical face mask.<sup>[4]</sup>

The ventilator in the anaesthesia machine needs protection from the expired gases of the patient and hence 3 HEPA





**Fig. 1: Anaesthesia workstation draped with plastic**



**Fig. 2: Anaesthesia expired gases sent to sodium hypochlorite solution**

filters are placed-1 at the patient end of the Y piece, 1 at the machine outlet and 1 at the inlet. To minimize the OT contamination from the expired gases from the anaesthesia machine, a corrugated tubing is now attached to the medical gas scavenging outlet which takes the extra gases to the bucket filled with sodium hypochlorite. Similar attachment takes the extra gases from the pneumoperitoneum during laparoscopy into hypochlorite chamber. [fig.2]

Bag mask ventilation is avoided as much as possible and patient is intubated with Rapid Sequence Intubation (RSI). In addition to hypnotic sedatives and opioids for inducing anaesthesia, rocuronium or succinylcholine in the dose of 1.2 mg/kg and 1 mg/kg, respectively, is used to provide adequate neuromuscular blockade for intubation in 60 s. IV lignocaine (preservative free) 1.5mg/kg is also used to suppress coughing and attenuate the intubation response.<sup>[5]</sup>

Intubation is done efficiently with a Macintosh / video laryngoscope and once the endotracheal tube(ETT) passes beyond the vocal cords the cuff is inflated before attaching the patient to the ventilator. The 'Intubation Box' which is a clear acrylic box / clear plastic sheet over patient's face is used to contain the aerosols during intubations. The second anaesthesiologist (other than the intubator) touches the anaesthesia workstation, vaporizers and set the ventilatory parameters. The use of videolaryngoscopes ensures adequate distancing from the patients airway during



**Fig. 3: Spinal anaesthesia with level 2 PPE**

intubation and also facilitates intubation in difficult airway scenarios.<sup>[6]</sup>

The laryngoscope is wrapped in the outer pair of gloves of the intubator and handed over for disinfection immediately.

There is minimal movement of personnel during the surgery and strict sanitization measures are practiced.

Extubation is conducted similarly under the clear acrylic box or plastic sheet, a closed suction system is used for oral suctioning to prevent contamination with the patients oral secretions.

The patient's mouth and nose are covered with a surgical face mask immediately after extubation.

Once the patient is shifted out of the OT, the team doffs the PPE.

Sedation and Total Intravenous Anaesthesia(TIVA)

The use of Hudson's mask during anaesthesia with 4-6 litres O<sub>2</sub> flow is superior to high flow of O<sub>2</sub> through nasal prongs, which increases aerosolization.<sup>[7]</sup>In addition the application of a surgical face mask over the O<sub>2</sub> mask reduces aerosolization further.

Regional anaesthesia is comparatively safer. Hence subarachnoid block (spinal anaesthesia), [Fig.3]

epidural anaesthesia or analgesia and peripheral nerve blocks [Fig.4] are preferred



**Fig. 4: Peripheral nerve block using ultrasound being given for hand surgery**



**Table 1: Anaesthesia for Emergency and Semi Emergency cases from Mid-March to August 2020 in BARC Hospital**

Type of Anaesthesia	Number of cases
Subarachnoid Block	70
Total Intravenous Anaesthesia	39
General Anaesthesia	17
Regional Nerve Block Upper Limb	8
Combined Spinal Epidural	5
Regional Nerve Block Lower Limb	3
Chronic Pain Procedures	3
Total	145

The use of regional anaesthesia does not eliminate the risk of transmission of Covid 19 and the use of PPE is recommended to prevent the chance of infection.

To conclude, this is not the first but definitely one of the worst pandemics faced by humankind, both in terms of infectivity and mortality. Implementation of infection control measures, triage and protocolized treatment modalities will definitely allow us to gain an upper hand over the virus.

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# Viral Use of Mouthwashes: A Covid-19 Perspective

Dr Hina Trivedi, Dr Manan Doshi, Dr Chandan Verma

Department of Dentistry, BARC Hospital

## Introduction

The emergence of Covid-19 pandemic poses an immense global health challenge. As dental care providers, we are faced with significant responsibilities both towards the dental team and our patients to limit exposure to the virus. Due to the characteristics of dental settings, the risk of cross infection between dental health care personnel (DHCP) and patients can be very high. Thus the aim of this article is to recommend evidence based infection control strategies and patient management protocols to provide optimum dental care and simultaneously prevent community transmission in dental settings.

The novel corona virus disease pandemic has emerged as a crippling community health crisis and is spreading exponentially across the globe. The first case being reported in Wuhan City, of China, in late December 2019,<sup>1</sup> to a global spread affecting 21,057,788 individuals with 756,719 deaths at the time of writing. Corona virus belongs to a family of single stranded RNA viruses known as Corona viridae that are zoonotic in nature and cause symptoms ranging from those similar to the common cold to more severe respiratory, enteric, hepatic, and neurological symptoms. WHO named the novel viral pneumonia as “Corona Virus Disease (COVID-19)” while the International Committee on Taxonomy of Viruses (ICTV) named this novel virus as “SARS-CoV-2”<sup>2</sup> Inside the human body, this virus is present abundantly in nasopharyngeal and salivary secretions of affected patients. The primary route of spread of COVID-19 is via respiratory droplet,<sup>3</sup> which makes dental professionals more vulnerable to it.

Dental setups invariably carry the risk of COVID-19 infection due to the specificity of its procedures (aerosol production), proximity to the oropharyngeal region, and frequent exposure to saliva.<sup>2</sup> Moreover, if adequate precautions are not taken, the dental office can potentially expose patients to cross-contamination. The nature of the dental setting puts both the dentist/dental team and the patient at a high risk of cross-infection. The purpose of this position statement is to establish a standard operating



Dr Hina Trivedi

protocol (SOP) for institution-based and private clinical practices.

## Clinical manifestation (Fig 1)

Most patients present with fever (88.7%), cough (57.6%), and dyspnea (45.6%), while some experience headache, sore throat, anosmia, fatigue, shortness of breath, and other atypical symptoms (muscle pain, confusion, diarrhoea, and vomiting).<sup>4</sup> Chest computed tomography of patients, revealed bilateral pneumonia, with ground-glass opacity and patchy shadows.<sup>4</sup> The undiagnosed cases may be more in number as most patients present with mild symptoms that closely resemble seasonal allergies and common flu.

## Oral manifestations (Fig 1)

A recent survey concluded that more than half of the patients suffered from recent loss of taste sensation

CLINICAL MANIFESTATIONS	ORAL MANIFESTATIONS
FEVER (88.7%)	DYSGEUSIA/ AMBLYGEUSIA (more than 50%)
DRY COUGH (57.6%)	RECENT LOSS OF TASTE (CDC)
DYSPNEA (45.6%)	ORAL NON SPECIFIC ULCERS
HEADACHE	OPPORTUNISTIC FUNGAL INFECTIONS
SORE THROAT	XEROSTOMIA
ANOSMIA	RECURRENT ORAL HERPES SIMPLEX 1
FATIGUE	GINGIVITIS
SHORTNESS OF BREATH	
<b>ATYPICAL SYMPTOMS- MUSCLE PAIN, CONFUSION, DIARRHOEA &amp; VOMITING</b>	
<b>CHEST CT- BILATERAL PNEUMONIA WITH ROUND GLASS OPACITY &amp; PATCHY SHADOWS</b>	
	** There is no conclusive evidence whether oral lesions associated with COVID19 are typical of direct viral invasion or occurring as a result of systemic deterioration or following adverse drug

Fig. 1: Manifestations



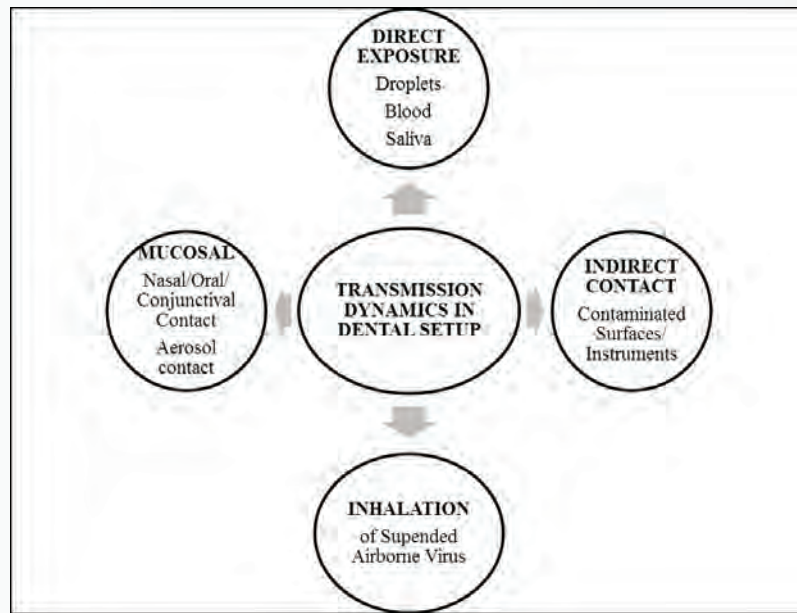


Fig. 2: Routes of Transmission

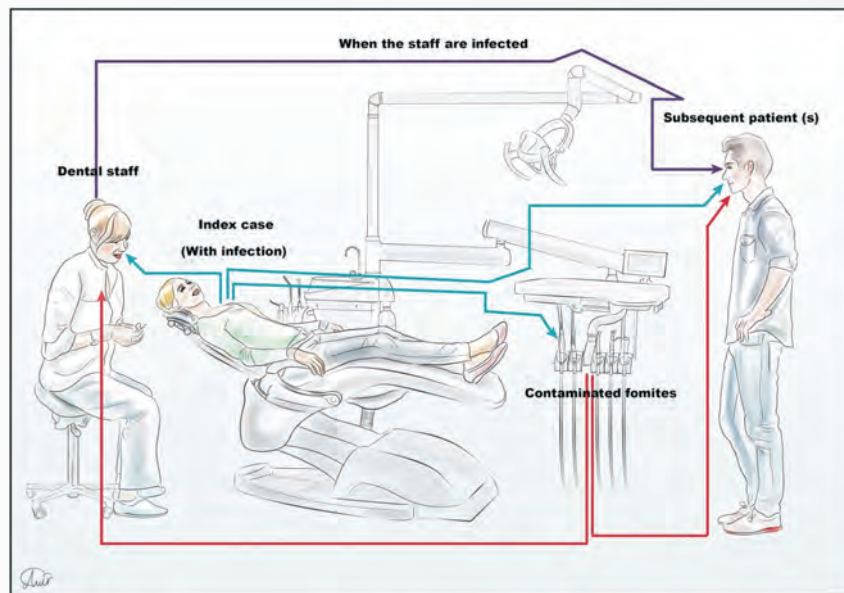


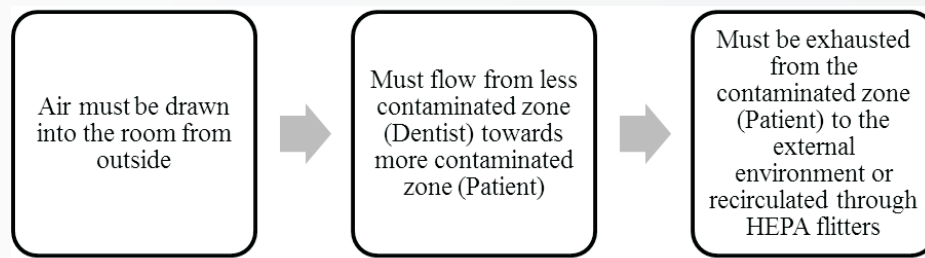
Fig. 3: Transmission within the Operatory

(ageusia/dysgeusia/amblygeusia)<sup>4</sup>. The Centers for Disease Control and Prevention (CDC) included ageusia/dysgeusia as an early symptom of COVID-19 (American Centers of Disease Control and Prevention, 2020b). Other oral manifestations reported so far include oral non-specific ulcerations (affecting both keratinized and non-keratinized epithelium), xerostomia, opportunistic fungal infections, recurrent oral herpes simplex virus-1 infection, fixed drug eruptions, and gingivitis. There is no conclusive evidence whether oral lesions associated with COVID-19 are typical of direct

viral invasion or occurring as a result of systemic deterioration or following adverse drug

#### Transmission dynamics in Dental Setup (Fig 2, Fig 3)

Due to close face-to-face contact with patients and frequent utilization of sharp devices, dental personnel are repeatedly exposed to respiratory tract secretions, blood, saliva, and other contaminated body fluids and are always at risk for COVID-19 infection<sup>5</sup>. Asymptomatic carriers of the infection are equally capable of transmitting the virus as symptomatic patients. 2019-nCoV transmission in dental settings occurs through four major routes.



**Fig. 4: Direction of Airflow**

## Challenges

- The most important concern in dental clinics is the transmission of COVID19 via droplets and aerosol because, despite all of the precautions taken, it is almost impossible to reduce droplet and aerosol production to zero during dental procedures and this can persist for about 3 hours.<sup>5</sup>
- Research has shown that coronaviruses can remain on metal, glass, and plastic surfaces for several days. Therefore, as surfaces in dental clinics serve as venues for droplets and aerosol mixed with patients' saliva and/ or blood, they can potentially spread infection.
- Coronaviruses can actively maintain their virulence at room temperature from 2 hours up to 9 days. Their activity at 50% humidity was significantly higher than 30%. Therefore, in the dental environment, it seems that keeping surfaces clean and dry will play a significant role in preventing COVID19 transmission.
- The asymptomatic incubation period for individuals infected with SARS-CoV-2 is variable but can be protracted. This makes it extremely difficult to identify those individuals that pose a risk.

## Recommendations for Providing Dental Care during COVID-19 Pandemic

### 1. Dental clinic modification

#### A. Reception/Waiting area<sup>6</sup>

- Display visual alerts at the entrance about respiratory hygiene, cough etiquette, social distancing and disposal of contaminated items in trash cans.
- Install glass or plastic barrier at the reception desk, preferably with a two-way speaker system.
- Ensure availability of sufficient three-layer masks

and sanitizers and paper tissue at the registration desk, as well as nearby hand hygiene stations.

- Distant waiting chairs, preferably a meter apart.
- All areas to be free of all fomite such as magazines, toys, TV remotes or similar articles.
- A bin with lid should be available at triage where patients can discard used paper tissues.

#### B. Operatory Area<sup>6</sup>

- Installation of high vacuum extra oral suction devices recommended.
- Maintain natural air circulation within the operatory, through frequent opening of windows and by using an exhaust blower to extract the room air into the atmosphere.
- The window air condition system/split AC should be frequently serviced, and filters cleaned. Commercially available electrostatic air conditioner filters can be used.
- Use of indoor portable air cleaning system equipped with HEPA filter and UV light may be used.
- In central AC buildings, on re-circulatory system, blocking off the return air vents in the patient area will temporarily stop air circulation provided AHU will have provision to receive adequate outdoor air supply. Allow fresh air into rooms by opening of windows or doors slightly.

#### C. Changing Room

- Dedicated area for donning and doffing of personal protective equipment (PPE).

#### D. Air Flow Circulation (Fig. 4)<sup>7</sup>

The air flow must be planned in a way to facilitate clearing of the contaminated aerosol within the dental operatory with adequate provision of ventilation to allow a minimum of 6 ACH (Air Changes per Hour). It is recommended to:

- Use a standalone HEPA 13 or HEPA 14 air filter in the dental operatory.
- Avoid air conditioners if they are not having in-built HEPA filters
- Use natural ventilation when available
- Introduce additional positive air flow from less contaminated to more contaminated zone by using pedestal or table top fans.
- Place exhaust fans to evacuate the contaminated air to the external environment.

**2. Dental Health Care Professional (DHCP) Guidelines<sup>6,7,8</sup>**

Standard Precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where health care is delivered. These practices are designed to both protect DHCP and prevent DHCP from spreading infections among patients.

- Hand hygiene.
- Use of personal protective equipment (e.g., gloves, masks, eyewear).
- Respiratory hygiene / cough etiquette.
- Sharps safety (engineering and work practice

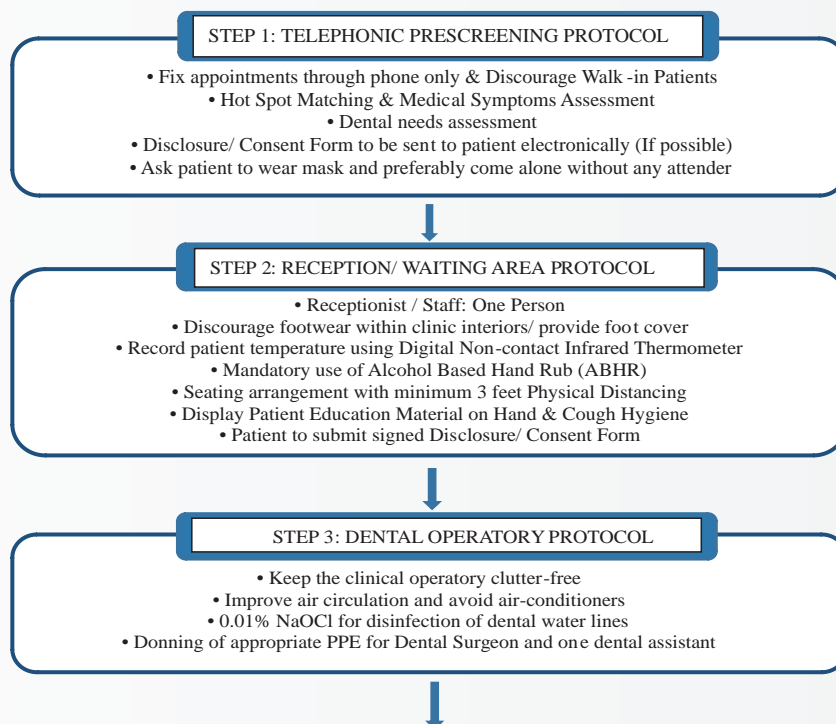
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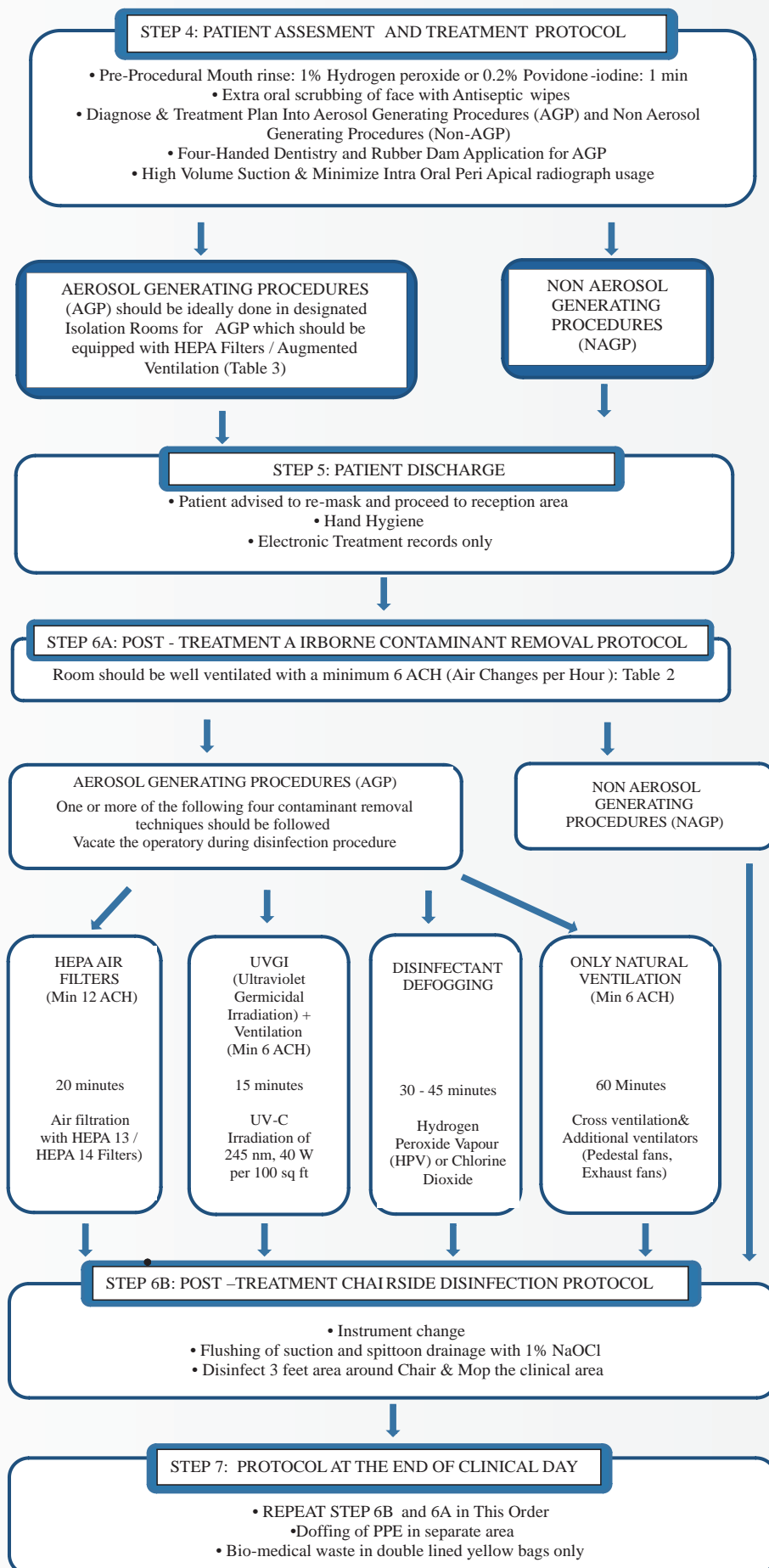
- Safe injection practices (i.e., aseptic technique for parenteral medications).
- Sterile instruments and devices.
- Clean and disinfected environmental surfaces.

The WHO guidelines on hand hygiene in healthcare (2009) suggest that hand hygiene is the single most important measure for the prevention of infection. Hand washing with soap and water is preferred when hands are visibly dirty or soiled with blood or other body fluids or after using the toilet. Use Alcohol-Based Hand Rubs (ABHR) is preferred when hands are not visibly soiled. Hand hygiene must be performed before patient examination or dental procedures, if gloves are torn or compromised during the procedure, after removing gloves or touching patients and after touching surroundings or equipment that are not disinfected.

Personal protective equipment (PPE) refers to wearable equipment that is designed to protect DHCP from exposure to or contact with infectious agents. The use of PPE, including protective eyewear, masks, gloves, caps, face shields, and protective outerwear, is strongly recommended

**3. Protocols for Dental Patient Management<sup>6,7,8</sup>**







DECISION (Questions to be ascertained on first interception- Physically/ Telephonically)			LEVEL OF EMERGENCY	DENTAL CONDITIONS	LEVEL OF INTERVENTION
Decision Point A	If lifesaving intervention required?	Yes- ES1 No- Move Down	ES-1-:  <b><u>EMERGENCY CARE</u></b>  Dental Conditions leading to impairment of basic functions like breathing/ swallowing	<ul style="list-style-type: none"> <li>• Uncontrolled Bleeding</li> <li>• Swelling Obstructing Airway</li> <li>• Severe Trauma Obstructing Airway</li> </ul>	Need Immediate Care and should be attended to immediately
Decision Point B	Is the pt currently in disabling pain/ infection?	Yes- ES2 No- Move down	ES-2-:  <b><u>URGENT CARE</u></b> <ul style="list-style-type: none"> <li>• Dental Conditions affecting normal functioning</li> <li>• Pain/ Infection</li> </ul>	<ul style="list-style-type: none"> <li>• Symptomatic Irreversible pulpitis</li> <li>• Symptomatic Periodontitis</li> <li>• Acute Abscess</li> <li>• Pericoronitis/ Third Molar Pain</li> <li>• Post Op Osteitis/ Dry Socket/Dressing Changes</li> <li>• Tooth fracture causing soft tissue trauma</li> <li>• Dental Trauma with Avulsion</li> </ul>	<ul style="list-style-type: none"> <li>• Pharmacological Management</li> <li>• If Pharmacological management doesn't provide relief</li> <li>• Pt then needs to be scheduled for EMERGENCY CARE</li> </ul>
Decision Point C	Can the condition remain stable for a period of time?	Yes- ES3	ES-3-:  <b><u>SCHEDULED/ ELECTIVE CARE</u></b>	<ul style="list-style-type: none"> <li>• Loss of restorations with no pain</li> <li>• Dental Trauma which is asymptomatic</li> <li>• Temporary Fillings in Endo Accessed Teeth with no pain</li> </ul>	Tele counselled and Scheduled when regular Dental Services are restored.

Fig 5 Patient Treatment Protocol

#### 4. Recommended disinfection and sterilization protocols for dental clinics treating patients during COVID-19 pandemic<sup>[9]</sup>

Area	Specifications
Waiting Area	<ul style="list-style-type: none"> <li>➤ Avoid sweeping with broom</li> <li>➤ Use wet mopping with warm water and detergent or hospital disinfectant (e.g., 1:50 dilution of 5.25% - 6.15% sodium hypochlorite)</li> <li>➤ High touch surfaces (e.g., door knobs, handles, and elevator buttons) must be cleaned more frequently with hospital-grade detergent/disinfectant</li> <li>➤ Toilets, wash basins, and sinks must be cleaned with detergent and disinfected with 1% sodium hypochlorite</li> </ul>
Triage Area Standard recommendation	<ul style="list-style-type: none"> <li>➤ Floor - Use wet mopping - multi bucket technique - water/detergent/low-level disinfectant such as 3% hydrogen peroxide, 1% sodium hypochlorite, or EPA-approved agents</li> <li>➤ High touch/clinical surfaces within 3 feet diameter of the dental chair that are difficult to clean must be covered using a physical barrier for every patient or disinfected between patients using a wipe (e.g. 0.5% to 0.1% sodium hypochlorite or 70% alcohol for sensitive surfaces)</li> <li>➤ Wet dust all noncritical/non-touch surfaces and horizontal surfaces with freshly prepared disinfectant solution once a day unless visibly soiled (e.g., 0.5% -1% sodium hypochlorite or 3% hydrogen peroxide)</li> <li>➤ Walls, window blinds, and frames must be cleaned and disinfected when visibly soiled or end of the day</li> <li>➤ Mop heads and cleaning cloths must be discarded in biomedical waste bins appropriate or decontaminated regularly by laundering (heat disinfection) with detergent and 1:1000 dilution of sodium hypochlorite and dried at 80°C. Must be changed frequently</li> <li>➤ The housekeeping staff must adorn the recommended PPE</li> </ul>

Aerosol Generating Area (additional recommendations)	<ul style="list-style-type: none"> <li>➤ Identify a closed room to perform Aerosol Generation Procedure if available</li> <li>➤ 1:100 dilution of 5.25% - 6.15%, i.e., 0.01% of sodium hypochlorite for DUWL</li> <li>➤ Air should be filtered with (HEPA 13 or 14) - if recirculated or otherwise exhausted to the outside effectively</li> <li>➤ Temporary use of a strategically placed portable, industrial-grade HEPA filter may expedite the removal of airborne contaminants:</li> <li>➤ UVGI 252 nm, duct irradiation, or upper-room air irradiation (30-40 W/100 square feet) can be used as an adjunct air cleaning measure, but it cannot replace HEPA filtration</li> <li>➤ Allow adequate time for sufficient ACH to remove 99% of airborne particles and to perform environmental disinfection of minimum 15 min after non- AGP and 30 min after AGP between patients.</li> <li>➤ Hydrogen peroxide vapor fumigation with 30% hydrogen peroxide can be performed</li> <li>➤ Extra oral suction</li> </ul>
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### 5. Digital dentistry<sup>10</sup>

The COVID-19 pandemic has led to the absolute requirement for strict and effective infection control protocols beyond those that already exist within the dental setting. One such step is towards digital dentistry. It is an umbrella term comprising of Intra oral scanners, CAD-CAM, 3D Printing & Milling. Digitalization eliminates a potent source of cross infection between dentists and the dental team i.e. intraoral impressions which are highly contaminated with saliva. Impressions are a critical component in fabrication of dental prosthesis which has to be transferred from dentists to the lab technicians posing a huge risk of cross infection at various levels. Not only does digitalization eliminate potent source of cross infection, it provides better accuracy, efficiency, and a high level of

predictability of the outcomes.

Thus, following the above recommendations will help in delivering appropriate dental healthcare to the patients while minimizing the risk of cross infection.

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## Surgery in Times of Covid-19

Dr. Jayesh Kalbhande, Dr. Vicky Kuldeep

Department of Surgery, BARC Hospital

Corona Virus Disease - 2019 (COVID-19) caused by SARS CoV-2, a strain of coronavirus, originated in animal markets of Wuhan, China. The disease mainly targets the respiratory system. Within a span of 3 months it enveloped the world and was declared a pandemic by World Health Organisation. United States of America, Brazil and India remain the worst affected. Being a new outbreak, its presentation, pathogenesis and communicability is still under scanner. Every minute, every hour we are learning new facts about the virus and the disease. Social distancing, wearing masks and hand hygiene are the most important tools against the disease. Although scientists are working towards developing an effective drug against the novel corona virus, at present, we are left with symptomatic supportive treatment only. All hopes are now attached to development of effective vaccine, as 5-6 vaccines are in phase-III trial world over.

COVID-19 has affected every single activity in human life, surgery being no different. Every surgical procedure warrants usage of minimum of 5-6 personnel protective equipment kits (PPE) which include a disposable gown, hood, mask, face shield, gloves and shoe covers. Although India has evolved as a major mass production house for PPE, still shortage prevails in majority of state run hospitals. PPE being a precious commodity, it is being utilised wisely mainly for corona wards. Hence, routine surgeries have been postponed although emergency procedures are still being carried out. However, overall number of surgical procedures have reduced significantly. After 5 months of fear of pandemic, the new normal is gradually being accepted. Patients are coming back to the hospitals asking for routine surgeries and many hospitals have started routine surgical procedures by adapting to the new normal.

At our hospital, emergency surgical procedures were carried out throughout these times. Acute surgical illness like acute abdomen (acute appendicitis, gastric perforation, bowel perforations etc), abscess, carbuncles, gangrene, obstructive ureteric calculi were conducted in



Dr. Jayesh Kalbhande

separate operation theatre with all required protective measures. Separate designated operating theatres, recovery area and intensive care unit were setup in order to avoid infection from suspected COVID 19 person to non-infected patients.

Laparoscopic procedures involves creation of pneumoperitoneum, which may lead to aerosolization of viruses causing increased risk of infection. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and The European Association for Endoscopic Surgeons (EAES) have recommended that since there is lack of sufficient evidence to confirm spread of SARS COV 2 through air insufflation during laparoscopic surgery, minimal invasive laparoscopic surgical procedures can be undertaken with adequate precautions like evacuation of pneumoperitoneum through filtration device, minimal use of energy sources, personal protective equipment for all theatre personnel regardless of COVID 19 status etc. The literature on this topic is growing day by day and over a period of time there will be more clarity on the subject and recommendations may change.

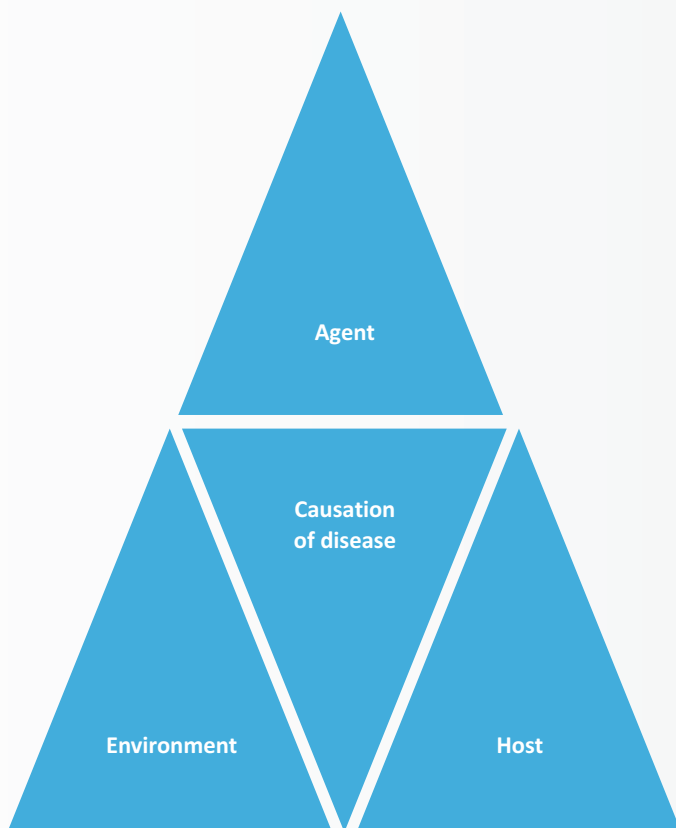
Endoscopic procedures such as colonoscopy, oesophago-gastro-duodeno-scopy are also aerosol generating procedures. Therefore, they need to be considered on par with surgical procedures in terms of capacity to spread COVID 19. The need for procedure and risk associated with it to cause spread of disease need to be duly considered before undertaking any endoscopic procedures.



However, there are many surgical procedures which fall in grey zone, where they are neither elective nor can be termed as emergency procedures. In these circumstances, medical need of procedure, availability and utilisation of resources in hospital need to be considered carefully. The risk to the individual due to the performance of the procedure during pandemic as well as risk of delaying the procedure need to be taken into account. In such circumstances, there is a need of shared decision making between health care provider and beneficiary based on overall risk and benefits of procedure.

Apart from surgical procedures, outpatient department (OPD) has also been compromised during the pandemic. OPD allows direct human contact and is an important way of transmission of disease from healthcare provider to an individual or vice versa.

In order to break the chain of transmission of disease, one needs to understand the epidemiological triangle of disease transmission (Fig 1). An epidemiological triangle is formed by infectious agent, susceptible host and a conducive environment for transmission of infectious agent to susceptible host. In order to reduce transmission of disease, each of the corner of this epidemiological triangle need to be addressed carefully.



**Fig. 1: Epidemiological Triangle**

SARS COV 2 virus is the causative agent of COVID-19 and is transmitted by droplets or fomites. Visitors to OPD need to be screened for fever and evaluated in a separate area as they can be a source of infection to others. Consultation area need to be well ventilated as closed room with less air exchanges increase chances of spreading of disease. Elderly, diabetic and patients with comorbidities are more susceptible to severe COVID 19 infection. Host related factors have significant role in chain of transmission of disease as they provide an opportunity to be a modifiable factor. It has been proposed that severity of COVID 19 infection may be proportional to insulin resistance. Strict control of diabetes, regular exercise, and reduction in obesity may not only reduce insulin resistance but also play a vital role in decreasing severity of infection in susceptible host.

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# Prevention of Spread of SARS-COV-2

**Dr. Pratibha Toal**

Head, Department of Anaesthesia,  
Convener, Infection Control Committee, BARC Hospital

The vaccine against the novel corona virus is still on its way. Hence public health responses should aim at breaking the chain of infection by focusing on mode of transmission. The nosocomial transmission of SARS-CoV occurs through aerosols and droplets. The person-to-person routes of transmission of SARS-CoV include direct transmissions such as cough, sneeze, droplet inhalation transmission, and contact transmission through fomites such as the contact with oral, nasal, and eye mucous membranes<sup>1</sup>

Overcrowding in emergency rooms, poor compliance with Infection Prevention and Control (IPC) measures e. g hand hygiene, social distancing, cough etiquettes, etc and contamination of the environment like spitting, contributes to viral spread. Performing aerosol generating procedures (e. g intubation, suction, bronchoscopy, cardiopulmonary resuscitation) or using a nebulizer on a SARS patient facilitates transmission in healthcare personnel<sup>1</sup>

Center for Disease Control(CDC), World health organization (WHO) and Ministry of Health and Family Welfare (MoHF) have published SARS-CoV IPC guidelines that have targeted health administrators, HCPs and public health units to implement IPC measures.

These guidelines include administrative control, engineering and environmental control and use of Personal Protective Equipment (PPE) which are being followed at BARC hospital and dispensaries. (1,2,3)

## Administrative control

- Screen and Triage everyone entering the healthcare facility for signs and symptoms of SARS-CoV.
- Suspected patients are to be segregated and examined in a separate room at the entry point.
- Recording their temperature and documenting presence of symptoms consistent with SARS-CoV.
- Providing face masks to patients.
- Early diagnosis and isolation of SARS-CoV patients is the key factor.



**Dr. Pratibha Toal**

- Cohorting or group zoning of suspected from positive SARS-CoV patients in a well-ventilated room is mandatory.
- Physical barriers and dedicated pathways to guide symptomatic patients through triage areas.
- Implementing Tele-health and Nurse-Directed Triage Protocols if possible.
- When scheduling appointments for routine medical care (e.g., annual physical, elective surgery), instructing patients to call ahead and discussing the need to reschedule their appointment if they have symptoms of SARS-CoV on the day they are scheduled to be seen.
- In the context of the SARS-CoV pandemic, every surgical procedure may entail risk for both healthcare workers and patients. As part of their routine clinical practice, healthcare workers should apply standard precautions and assess potential risks of exposure to infectious material. These precautions should include engineering controls that reduce exposure to infectious material, administrative controls and PPE use.
- Encouraging physical distancing of one meter or 6 feet.
- Restricting visitors from entering the hospital.

## Environmental controls

- It is recommended that all aerosol-generating procedures must be done in a well-ventilated or

negative-pressure isolation room. Contact and airborne precautions must be followed during the procedure. Environmental cleaning and disinfection procedures should be followed consistently and correctly.

- Routine cleaning and disinfection procedures with hospital-grade disinfectant of frequently touched surfaces or objects and patient-care areas in which aerosol generating procedures are performed.
- It is recommended that decontamination of transportation trollies/wheel chairs is done.
- Dedicated medical equipment should be used when caring for patients with suspected or confirmed SARS-CoV-2 infection.
- All non-dedicated, non-disposable medical equipment used for patient care should be cleaned and disinfected according to manufacturer's instructions and facility policies.
- Management of laundry, food service utensils, and medical waste should be performed in accordance with hospital policy.
- Laboratories should be equipped with biosafety practices and appropriate transport requirements as all laboratory specimens are potentially infectious.

#### **Engineering control**

- Physical separation is efficient in reducing transmission of respiratory virus in hospital settings.
- Spatial barriers or partitions to manage patients in triage areas and airflow management.
- Installing physical barriers using glass or plastic windows in the hospital reception area.
- Closed suctioning systems for airway suctioning in intubated patients is advocated for source control.

#### **Use of personal protective equipment**

- For contact and droplet precautions, PPE measures should include wearing a surgical/N95 mask, a gown, gloves, face shield, goggles and/or visors and shoe covers up on entering the patient's room as well as removal of PPE upon leaving. Adequate precautions during donning and doffing are recommended.
- Hand hygiene during donning and doffing is mandatory.

- In other areas of hospital, institutional protocol should be followed.

#### **Hand Hygiene**

- Healthcare personnel should perform hand hygiene before and after all patient contact, contact with potentially infectious material and before putting on and after removing PPE. Hand hygiene after removing PPE is particularly important to remove any pathogens that might have been transferred to bare hands during the removal process.
- Hand hygiene should be performed by using alcohol based hand sanitizer with 60-95% alcohol or washing hands with soap and water for at least 20 seconds if hands are visibly soiled.

#### **Corpse handling and management**

- Standard IPC precautions while handling dead bodies are recommended.
- A dedicated vehicle is recommended for transport.

#### **Why healthcare personnel get infected?**

- Failure to follow above guidelines increases the risk potential of contracting infection.
- Although healthcare personnel follow all safety guidelines at Covid facilities, they may lower their guard at non covid areas of hospital, common rooms, hospital cafeteria etc exposing themselves to infection.

With above safety precautions and the upcoming vaccine, the pandemic should be soon under control.

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# Viral Use of Mouthwashes: A Covid-19 Perspective

Dr. Himani Gupta, Dr. Vanashree Saple  
Department of Dentistry, BARC Hospital

## Introduction

The oral ecosystem shelters a diverse microbial community in the body, harboring over 700 species of allochthonous and pathogenic microbiota including bacteria, fungi and ubiquitous viruses. Although dental plaque research spans 120 years, the properties of virobiota and their behavior in multi species dental biofilms are still poorly fathomed.<sup>1</sup> One unique feature of viruses is their extreme form of 'r-selection'; producing thousands of worthless copies of themselves for each competent viral particle, that easily develop resistance to antiviral medication, and may escape vaccines or the immunological memory of previous infections. Also, viruses require a particular behaviour of the host in order to be transmitted to another individual, e.g. coughing that aids spread via droplet or aerosol.<sup>2</sup>

## The Covid-19 oral cavity conundrum

Recently, human to human transmission of Corona Virus Disease 2019 (Covid-19), by a novel lethal strain of Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2), caused a global pandemic burden with life threatening outcomes, not only in medically compromised persons but also in perfectly healthy young individuals with competent immune system. This zoonotic virus has a 'hit and run' approach causing a cascade of inflammatory reactions that can lead to mortal autoimmune damage, acute kidney injury, cardiac injury, liver dysfunction and grave complications as Severe Acute Respiratory Syndrome (SARS), sepsis and septic shock.<sup>3</sup> The oral cavity serves as a perfect portal for SARS-CoV-2 entry into the body making this pathway of viral colonization and infection highly critical for the onset of Covid-19. Epithelial cells in oral cavity mucosae, especially in the tongue mucosa, show a high expression of transmembrane protein Angiotensin Converting Enzyme 2 (ACE2) which is the primary receptor of this virus. Our current understanding of how viruses replicate and persist within the oral tissues is still in infancy. SARS-CoV-2 revealing its certain neurotropic and mucotropic abilities may potentially affect the functioning of salivary glands, taste/smell sensations and oral mucosa integrity, interfering with dynamic oral environment by



Dr. Himani Gupta

exerting influence on microbiota balance. In the first 10 days after the transmission, when the patient usually is highly contagious, the virus accumulates at the nasal, oral, and pharyngeal mucosa. Throat and sputum are abundant in viral particles, which peak 5–6 days after the onset of symptoms and decline thereafter.<sup>4</sup> Two major routes of transmission have been described, one through 'Flügge droplets' ( $> 5 \mu\text{m}$  in size), expelled when breathing, talking, sneezing, coughing, etc., which will immediately settle down on different surfaces and, from there, indirectly, the virus may be transmitted through contact by hand or contaminated objects if they contact the subject mucosae. Alternately, direct transmission may occur via 'Wells droplet nuclei' ( $\leq 5 \mu\text{m}$  in size), expelled by the above mentioned activities, since they remain suspended in air for significant periods of time, allowing them to be transmitted over distances  $> 1 \text{ m}$ , keeping the virus particle viable in aerosols for up to 3 hours.<sup>5</sup>

## Role of pre-procedural mouth rinses

The mouth is a docking area for bacteria and viruses from the nose, throat and respiratory tract, and the fluids in the mouth are grossly contaminated. Modern dentistry uses high-speed hand pieces, ultrasonic scalers, air polishing devices and abrasion units, thus generating dental aerosols with particles less than  $50 \mu\text{m}$  in diameter that is hazardous to the patient, dentist and the dental team. Any dental procedure that has the potential to aerosolize saliva will cause airborne contamination with organisms from some or all of these sources. The smaller particles of dental aerosol ( $0.5$  to  $10 \mu\text{m}$ ) have the potential to penetrate and



lodge in the smaller passages of the lungs and are thought to carry the greatest potential for transmitting infections such as tuberculosis, SARS, avian flu, herpetic infections and presently, Covid-19 from patients to health care workers and vice versa.<sup>6</sup>Therefore, it is critical that we develop additional layers of prevention to protect from the spread of infection inside the dental clinics. With no definitive treatment or vaccine available as yet for Covid-19, effective infection control measures are needed to limit the virus spread. Reducing the viral loads of SARS-CoV-2 in patients' saliva could be one such vista that can be explored. This can be achieved by use of a pre-procedural antimicrobial mouthrinses that are efficacious in reducing cross contamination and can be readily integrated into Covid-19 infection control measures in hospital and community settings.<sup>7</sup>By decreasing the viral load, the amount of virus expelled could be temporarily reduced and, therefore, the risk of transmission will be less.

In common with many viruses such as influenza and herpes simplex, coronaviruses are surrounded by a fatty layer, called a 'lipid envelope' into which the spike glycoproteins required for infection are inserted. It is widely known that interfering with the lipid envelope represents a virucidal strategy to target coronaviruses.<sup>8</sup> The below mentioned agents in commonly available mouth washes can be judiciously used to interrupt the chain of viral transmission. Povidone iodine has demonstrated virucidal activity against both enveloped and non-enveloped viruses including Ebola, Middle East respiratory syndrome (MERS) and SARS CoV-2, influenza viruses and is frequently recommended specifically in dental settings for control of SARS-CoV-2. Povidone iodine (7.5%), formulated as gargle/mouthwash but diluted 1:30 to a final concentration of 0.23%, within 15 sec. of exposure, has shown to rapidly inactivate SARS and MERS corona viruses, influenza virus A (H1N1), and rotavirus. Gargle and mouth wash of 1% and throat spray of 0.45% has shown to achieve  $\geq 99.99\%$  virucidal activity against SARS-CoV-2, corresponding to  $\geq 4 \log_{10}$  reduction of virus titre, within 30 seconds of contact.<sup>9</sup>This has been recommended by professional bodies such as Dental Council of India,<sup>10</sup> and Indian Dental Association<sup>11</sup>. These guidelines are followed at our dental units at hospital, Anand Bhavan and Kharghar dispensaries. However, its use may present some risks, including allergic reactions or thyroid dysfunction in long-term use.

Chlorhexidine (CHX) is a bisbiguanide antiseptic and

disinfectant, considered a gold standard with a widely demonstrated antimicrobial activity against gram-positive and gram-negative, anaerobic and aerobic bacteria, some viruses, and yeast. Due to its positive charge, it reacts with the negatively charged microbial surface, penetrating into the cell and causing leakage. CHX is often formulated with ethanol at lower concentrations, which may in part explain its virucidal impact. It is a more effective antimicrobial in vivo because it binds to clean oral surfaces and is released over time. Despite lower activity toward coronaviruses, a combination of CHX with alcohol may offer a useful strategy for reducing viral load over longer times. In an in vivo study, after rinsing with 10 ml of 0.2% CHX for 30 sec, using matrix-assisted laser desorption/ionization-time of flight mass spectrometry it was demonstrated that it remained in the oral cavity at micrograms per milliliter levels for 11 h and was even detected 24 h after application.<sup>12</sup> However, CHX presents side effects such as temporary loss of taste, staining of teeth, dryness and soreness of mucosa, and bitter taste.

Cetylpyridinium chloride (CPC), a member of the quaternary ammonium compound family, is an effective tensio-active agent. It is mono-cationic at oral pH that permits dual retention in the oral environment, as both surfactant chains and cationic charges may adsorb to intraoral surfaces, which are lipophilic and anionic. CPC acts primarily by penetrating the bacterial cell membrane, causing leakage of cell components, disruption of bacterial metabolism, inhibition of cell growth and finally cell death. CPC was recently shown to have activity against influenza both in vitro and in vivo, through direct attack on the viral envelope, with in vitro EC 50 being 5–20  $\mu\text{g}/\text{mL}$ .<sup>13</sup>

Hydrogen peroxide causes oxygen-free radical-induced disruption of lipid membranes. Studies, including a recent systematic review, report that corona virus 229E and other enveloped viruses are inactivated at concentrations around 0.5%.<sup>10</sup> 1%–3% concentration used in mouthwashes is adequate for use, while higher concentrations of hydrogen peroxide (>5%) will induce damage to both soft and hard tissues. Within the oral environment, hydrogen peroxide is rapidly inactivated due to the presence of host- and bacteria-derived catalase activity in saliva and other endogenous peroxidases. A consideration with this agent is that it can have potential pro-viral activities, although so far this was only seen in vitro.<sup>14</sup>

Other agents reported in literature include

hypertonic saline, 62–71% ethanol, 0.5% hydrogen peroxide, or 0.1% sodium hypochlorite within 1 min. Other biocidal agents, such as 0.05–0.2% benzalkonium chloride or 0.02% CHX digluconate, betacyclodextrin and citrox have also been suggested.<sup>12</sup>

Present research on inhibiting adherence with ACE 2 receptors, production of potent anti virals, passive immunization, interference with replication machinery etc. is on the forefront of our war against Covid-19. Investigators have developed a novel technology for a new class of antimicrobials called specifically targeted antimicrobial peptides or STAMPs, wherein the moiety provides specific binding to a selected pathogen and may facilitate the targeted delivery of the attached antimicrobial peptide such as defensins, cathelicidin, LL-37 etc. to the virus.<sup>15</sup>

### Conclusion

Assuming viral shedding is involved, the oral rinses that target the viral lipid envelope represent a potential method to remove/rinse or inactivate infective particles generated in the throat. The specific intracellular replication cycle for SARS-CoV-2 in humans is not yet known. Based on non-synchronized replication cycles that take <24 h, virus is likely to be secreted almost constantly. Oral agents will impact only on virus that is extracellular or actively budding. Therefore, the persistence of treatment will be important. How long mouthwash components retain an ability to interact with bio-membranes in the mouth is unclear, and more research is required. Therapeutic implications may focus upon controlling pathogenic SARS CoV -2 with specific drugs and strategies to boost immune responses, via various routes, at this stage of pandemic. However, there exists a paucity of robust clinical studies in this area that address in a randomized double-blind manner the impact of oral rinsing on objective measures, specifically neutralization of enveloped viruses, including coronaviruses. Nevertheless, use of pre-procedural rinses is definitely recommended prior to commencing any dental procedure.

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# Pearls of ENT Practice During Pandemic

Dr. Amol Hekare, Dr. Pallavi Bhandarkar

Department of ENT, BARC Hospital

The 2019 novel corona virus disease (COVID-19) was declared by the World Health Organisation as a pandemic in March 2020. After the pandemic of Spanish flu in 1917, the current health emergency is affecting the world after a century and despite all the biotechnological advances, the world seems unprepared for it.

Otolaryngologists (ENT specialists) are health care workers with a higher risk of being exposed to viral and other respiratory infections due to the nature of their work. During this pandemic time, there has been a sea of change in clinical practice due to the contagious nature of corona virus through aerosolization and surface contamination. The medical teams are working in tandem to fight against this enemy and have emerged stronger.

In the early days of this novel pandemic (March and early half of April) due to very little information available in medical literature, there were a lot of queries in the minds of doctors.

With widening experience and armed with more knowledge about the disease, we at our hospital made a few protocols whereby health service could be provided with due precautions and without compromise. Apart from providing ENT management, we also voluntarily took the task of educating the community about the pandemic and precautions, as being a public health emergency, this is ever so important. With the existing efficient computer based system of tracking each patient of CHSS, we could reach out to patient who already had appointment with ENT department in advance and offered telephonic consultation as well as counselling about the pandemic especially if it involved vulnerable population like elderly patients or patients on immunosuppressive therapy or with comorbidities.

## Practices followed in ENT out patient department at our hospital

- Use of N95 mask, face shields, head cap, hand gloves by all medical, nursing, supporting.
- Recommended distance maintained between doctor and patient while history taking and



Dr. Amol Hekare

examination with appropriate personal protection equipment (PPE).

- Proper social distancing between patients in waiting area with only one accompanying person.
- Dedicated examination room in OPD.
- Empowering patients with knowledge of pandemic and precautions to be taken to prevent infection spread.
- To perform aerosol generating procedures like flexible laryngoscopy only with recommended PPE and only when absolutely indicated.
- Suitable modifications in equipment like draping of microscope (fig. 1).

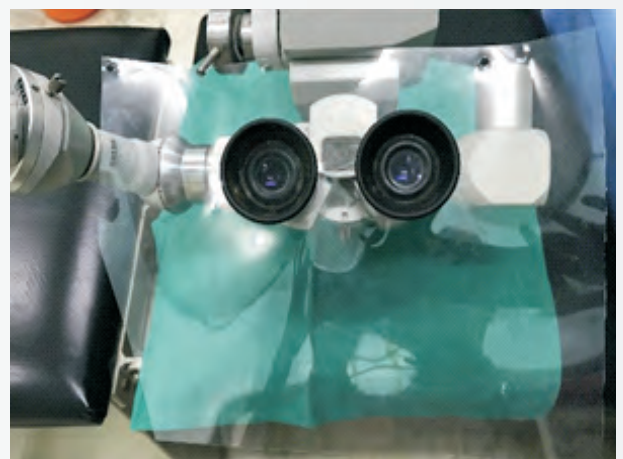


Fig. 1: Shield fixed to microscope





**Fig. 2: Exhaust fan installation and ventilation port made in minor operation theatre**

- Minimise procedure time without compromising the treatment to avoid exposure to infection
- Comparative negative pressure created in minor OT (by exhaust fan installation and additional ventilation window) (fig. 2)
- At regular time interval, surface cleaning with disinfectant.
- Staggered duty rotations of doctors and staff to avoid overcrowding.

During this pandemic the department of ENT treated 1101 OPD patients from 1<sup>st</sup> April to 18<sup>th</sup> August, out of which 35-40% were telephonic consultations, more in number during the period of lockdown. In the unlock phase, there has been a steady increase in foot falls. With all the above mentioned precautionary measures, we had no reported incident of COVID-19 cross infection in our OPD.

As per the guidelines issued by ICMR in the lockdown period, routine surgeries were postponed to avoid burdening of health care system and make it available for pandemic which was the need of the hour. Patients who could be managed by conservative management were initially offered medical line of treatment and only if not responding to medical line of management, surgical intervention was considered. For emergency

surgeries, following protocol guided by infection control committee of BARC hospital is being followed.

- Clinically, Severe Acute Respiratory Infection (SARI) like illness or any contact with COVID-19 patient is ruled out.
- COVID-19 testing of patient 48 - 72 hours prior to surgery is done wherever feasible depending on urgency of the procedure and/or High-Resolution Computerised Tomography (HRCT) chest if indicated preoperatively.
- In urgent cases, where COVID-19 testing is not feasible, surgery is performed with all due precautions.
- All doctors and ancillary staff present in operation theatre are in personal protective equipment.
- Procedure is performed by the more experienced doctor to minimise operative time.
- Operation theatres used for these procedures have HEPA filters of 0.3micron and 25 air exchanges/hour
- Number of staff in theatre are limited to essential minimum.
- Monitoring of patient is ensured in wards with continued protective precautions.
- Postoperative hospital stay is minimised.

We operated 7 emergency cases in operation theatre and 21 minor procedures were carried out during this pandemic time till mid-August. Cases included malignancy cases for biopsy /evaluation,foreignbody throat and neck abscesses.

Audiology and speech therapy unit which is an integral part of our department has essential dedicated sound treated chamber to carry out diagnostic work. During this pandemic, modifications were done in infrastructure to carry out safe treatment practices which has been challenging and time consuming. The changes included installation of ultraviolet tube for surface disinfection, modifications in AC ventilator system to create negative pressure environment, protective covers for transducer accessories to reduce patient cross infection along with appropriate sanitisation after each patient.

The unit has continued to offer essential urgent audiological and speech rehabilitation care with triaging of patients and telephonic consultations/counselling for hearing devices adjustment and maintenance.Children with special needs requiring speech and language intervention services are being provided support through counselling,home programme training and sharing of knowledge resources for continuing therapy training. Counselling for parents in handling the emotional and rehabilitation needs of their children during this challenging period has been undertaken. Apart from

routine clinical work,our audiologist volunteered her services to run BARC hospital helpline.

All the doctors from ENT department are also sharing the responsibility of fever ward set up in the hospital for the pandemic. It involves managing suspected and COVID-19 positive patients, counselling their relatives, contact tracing, shifting of critical patients etc.This being different from routine clinical work,was initially challenging but with team spirit, difficulties were overcome.With each patient, our experience and services are getting enhanced. During this time, the hospital administration and other health care workers have been very helpful and supportive.

Every time a life is lost to this infection, it is disheartening but every recovery is encouraging too. The fight needs to continue with zeal as long as needed. The happiness seen on the face of a recovered patient going home keeps us motivated to continue fighting in this war.

'One step at a time' describes the journey that all healthcare workers have undertaken with one common destination,'Control this pandemic'.

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# Mitigation of Challenges to Transfusion Services Amidst Covid -19 Pandemic in BARC Hospital Blood Bank

Dr. Prachi Gaddam, Dr. Susan Cherian,  
Dr. Raji Naidu, Dr. Uma Chaturvedi  
Department of Pathology, BARC Hospital

## Background

In the year 2020, the world was overwhelmed by a pandemic Covid-19 caused by a novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). This disease is highly infectious and primarily spread from person to person through small droplets from nose and mouth when a person with Covid-19 exhales or coughs. Fomites on surfaces also act as carriers of the virus. Hence, the pivot of prevention is to maintain social distance and disinfection<sup>1</sup>. One of the disruptions caused by this prevention strategy was that voluntary blood donation decreased substantially as healthy donors were apprehensive of visiting the healthcare facilities and getting infected<sup>2</sup>.

## Impact on transfusion services

In India, transfusion services had 4 potential challenges to address due to the impact of the pandemic, namely, blood/component shortage, donor-staff safety concerns, restrictions on consumable supply logistics and participating in clinical trials on use of convalescent plasma in Covid-19 patient<sup>2</sup>. Despite a reduction in elective surgeries in this period, the demand for blood components exceeded supply as many chronic medical conditions require transfusion.

## Response to pandemic by blood transfusion services

In an effort to allay the fears of donors, at the beginning of the lockdown period, BARC blood bank circulated an animation video about 'Blood donation during Covid-19' which could be accessed at <http://www.barc.gov.in/covid-19/index.html>. Information regarding safe blood donation and the importance of self-deferral if they were feeling unwell was emphasized in simple language. Additional safety measures taken in view of Covid-19 was shared with the donors to instill a sense of security in them and to motivate them to come forward to donate blood. In response to the video, we could screen about 120 donors



Dr. Prachi Gaddam

physically and many more telephonically and could take more than 70 donations during this pandemic period. Donors were called in a staggered manner to avoid crowding in the blood bank premises. No immediate or delayed adverse reactions were reported in these donors.

Safety of donors and staff involved in collection, screening and component preparation was addressed by adopting infection control measures to minimize the risk of Covid-19 infection. These included training staff on hand hygiene, use of personal protective equipment and environmental cleaning. This prevented absenteeism of crucial blood bank staff due to sickness and quarantine. The Standard Operating Procedure (SOP) manual of all blood bank operations was updated as per the revised guidelines issued by National Blood Transfusion Council (NBTC) in light of the pandemic<sup>3</sup>. More than 240 cross matches were performed including the ones for the patients in fever ward. About 125 components were issued to patients in our hospital of which 35 (28%) were given to Covid-19 suspect patients.

Supply of consumables used in preparation of blood components like blood bags, testing kits and immunehematology reagents was ensured amidst the lock-down trade restrictions by inventory checks and coordinating with supply chain partners.

If the efficacy of convalescent plasma therapy is established

as a therapeutic modality, blood bank will have a new challenge to make provision for the same in the future.

Thus donor recruitment through early awareness measures and stringent safety protocols facilitated uninterrupted transfusion services and ensured an adequate stock of blood components to meet entire transfusion requirements in the hospital. The support of the entire blood bank staff to adapt to the changed work environment and their commitment ensured that supply of blood components remained unaffected in this pandemic.

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# Clinical Manifestations and Symptoms in Covid-19

Dr. Rainuka Rana

Casualty Medical Officer, BARC Hospital

## Introduction

Corona Virus Disease-2019 (Covid-19), caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), has become an epidemiological threat worldwide and can affect every age group from infants to the elderly resulting in a wide spectrum of clinical manifestations. The outbreak of Covid 19 began in Wuhan, Hubei Province, China in December 2019 and was declared as an official pandemic on 11 March 2020 by World Health Organization (WHO). More than 28030286 cases and 908054 deaths have been reported till now (10/09/2020) spread over 210 countries with India being one of the worst-hit countries.

The incubation period of SARS-CoV-2 is 2-14 days and is transmitted through close contact of droplets or aerosol particles of symptomatic or asymptomatic patients, contaminated surfaces and through faeces with the mortality rate being around 2.3%. Risk factors include older



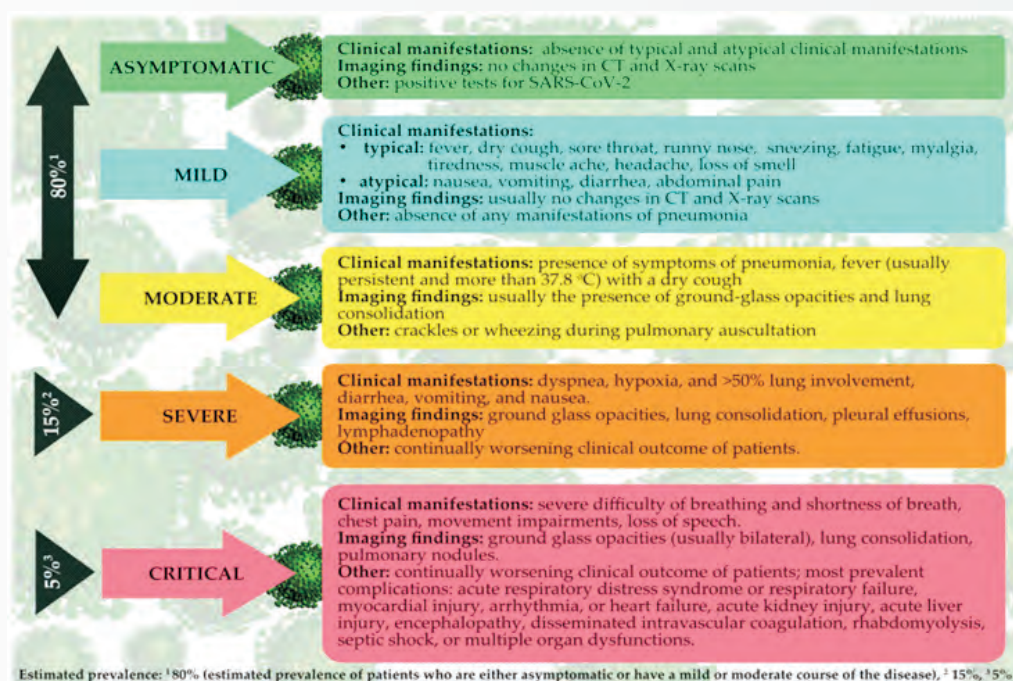
Dr. Rainuka Rana

age group (>65), hypertension, diabetes, obesity (BMI  $\geq$  30), COPD, serious heart conditions (eg. heart failure, coronary artery disease, cardiomyopathies), chronic kidney diseases and immunocompromised status.

A varied degree of severity ranging from mild or asymptomatic carriers to fatal cases is seen in Covid-19 [Figure 1]. Symptoms include fever, cough, shortness of

**Table 1: The severity of SARS-CoV-2 infection with typical characteristics.©**

Baj J, et al. J Clin Med. 2020. Jun 5;9(6):1753. doi: 10.3390/jcm9061753





breath, new loss of taste or smell, fatigue, headache, body ache, sore throat, runny nose, nausea, vomiting, diarrhoea to respiratory distress and the most common reason for fatality is Acute Respiratory Distress Syndrome (ARDS)

### Common general symptoms

The most prevalent and common symptoms are fever, cough, sore throat and myalgia. Other symptoms include headache, diarrhoea, nasal congestion, dizziness, abdominal pain, vomiting, chest pain, rhinorrhoea, or pharyngalgia. Most of the patients are symptomatic or with mild symptoms. More than 90% of the symptomatic patients presents with more than one symptom.

The most common cause of death seen is respiratory failure (46.91%), followed by septic shock (19.75%), multiple organ failure (16.05%), and cardiac arrest (8.64%). Rarer cause of death were due to acute coronary syndrome, malignant arrhythmia, or disseminated intravascular coagulation (DIC). Early onset shortness of breath, fever and underlying co-morbidities prove to be poor prognostic factors.

### Radiological findings

An early chest x-ray may be normal or may show ill-defined consolidation in lower lobes. Chest x-ray taken in later stages may show ARDS like pan-lobar involvement of lung parenchyma, multiple consolidations disrupting lung architecture requiring endotracheal support. CT scan is more sensitive than chest X-ray in highlighting these changes. Most common CT findings are bilateral patchy shadows and ground-glass opacities (GGO) with reticular and/or interlobular septal thickening or consolidation; multilobe involvement and focal lesions (patches, stripes, or nodules) centrilobular nodules, cystic change, pleural effusion, interstitial fibrosis, or lymphadenopathy.

### Reporting and Data System (CO-RADS)

Provides a standardized assessment score that simplifies CT reporting with a five-point scale of suspicion for pulmonary involvement of Covid-19. CORADS score 1-2 is suggestive of low suspicion, 3- intermediate and 4-5 is suggestive of high suspicion of Covid-19 infection.

### Laboratory findings

Normal or decreased white blood cell count (lymphocytopenia), or thrombocytopenia can be seen on a complete blood count. Higher levels of acute phase response proteins like C-reactive protein (CRP) and

ferritin, ESR, and inflammatory biomarkers such as Interleukin-6; IL-6, tumor necrosis factor alpha -TNF- $\alpha$  are also associated with an increased risk of Covid-19 infection. High levels of D-dimer and high-sensitivity cardiac troponin are also found to be a poor prognostic markers for cardiovascular outcomes in Covid-19 infection.

Other laboratory indicators are raised alanine aminotransferase (ALT) levels, lactate dehydrogenase (LDH) levels, creatine kinase levels; high pro-calcitonin levels and lower total serum proteins.

Two clinical scores namely sequential organ failure assessment (SOFA) score used in sepsis and confusion, urea, respiratory rate, blood pressure, and age  $\geq 65$  years (CURB-65) score used in the assessment of severity in patients with community acquired pneumonia are used for identifying low and high risk for poor prognosis and death in COVID-19 infection. Both clinical scores require laboratory testing.

The most common diagnostic test for virus sampling is the upper (nasopharyngeal/ oropharyngeal swabs or saliva) or lower respiratory tract (sputum or tracheal aspirate or broncho-alveolar lavage- BAL)- in severe cases

### Respiratory symptoms

Common acute respiratory symptom include acute onset dyspnea followed by cough- dry or with expectoration. Patients are also found to have upper respiratory symptoms with headaches, sore throat, chest congestion, rhinorrhoeas or influenza-like illness symptoms (e.g., fever, myalgias, fatigue).

Covid-19 spreads via airborne droplets and first enters the the upper respiratory tract. Replication begins there and symptoms such as high fever, sore throat, myalgia and fatigue may set in peaking at day 5 of infection on an average. Uptake in the upper respiratory tract is believed to be facilitated by the cleavage in S1-S2 regions of the viral protein. In the lower respiratory tract, Angiotensin Converting Enzyme II (ACEII) receptors act as a binding site for the viral capsid antigen and allow entry into alveoli cells. These ACEII receptors are absent in the upper respiratory tract but are also present in the gastrointestinal system, heart, kidneys and alveolar cells.

Covid-19 patients may be asymptomatic for a week from the time of infection and during this period, viral samples may be positive but the patient may be an asymptomatic carrier. While many clinical features of Covid-19 overlap



with those of other acute respiratory illnesses, several unique characteristics were identified. Patients with Covid-19 had a longer duration of symptoms, particularly fatigue, fever, and myalgias, were more likely to be admitted to the hospital and for a longer duration, were unlikely to have co-existent viral infections, and were more likely to develop ARDS.

The commonest form of acute severe hypoxemic respiratory failure is ARDS in patients who had a longer duration of symptoms. The mechanisms of lung injury and repair, and advances in supportive care, particularly ventilatory management gives us an idea on pathophysiology of ARDS, but still there is no definitive pharmacological therapy for this syndrome. The hospital mortality rate is high at 40%. The emerging therapies for Covid-19-induced ARDS are specific inflammatory pathway blockers, immuno-modulators, epithelial and channel function modulators, endothelial and vascular dysfunction therapies, anticoagulant drugs, and other therapies that aid resolution of ARDS.

### **Cardiovascular symptoms**

Common cardiovascular complications include acute myocardial injury (usually defined as an increase in cardiac troponin I levels), blood pressure abnormalities, arrhythmias, pericarditis, left ventricular dysfunctions, myocarditis, heart failure, cardiogenic shock in severe and critical cases.

The mechanism of acute myocardial injury caused by SARS-CoV-2 infection might be related to ACE2-mediated cardiomyocyte damage and apoptosis due to infiltration of inflammatory cells, cytokine storm, hypoxemia, acidosis, pulmonary hypertension, increased myocardial oxygen consumption and even mental stress. The drugs currently used during Covid-19 treatment might prolong the QT interval or can prove to be proarrhythmic and Covid-19-related hypoxia can prove to be a triggering factor for atrial fibrillation. Myocardial injury associated with SARS-CoV-2 infection impairs cardiac functions and induces ventricular tachyarrhythmias.

Elevation of D-dimer levels and higher levels of fibrin/fibrinogen degradation products are the most common laboratory findings. Others include altered coagulation profile, elevated levels of creatine kinase myocardial band (CK-MB), myohemoglobin, cardiac troponin I, and N-terminal pro-brain natriuretic peptide

and sometimes positive anti-phospholipid antibodies.

Co-existence of cardiac manifestations with respiratory impairments is common in Covid-19.

### **Gastrointestinal And Liver Symptoms**

Common gastrointestinal symptoms in Covid-19 patients include loose motions, nausea, vomiting, abdominal pain, abdominal distension, loss of appetite, dysgeusia etc. SARS-CoV-2 can be detected in the oesophagus, stomach, duodenum, rectum and in faecal samples.

The possible mechanism of SARS-CoV-2 infection is due to over expression of ACE2 receptors present in gastrointestinal epithelial cells. Covid-19 enters the mucous membranes and gets access to enterocyte via ACE2 receptors. After entry into the cell, RNA and proteins are produced with the help of ribosomes. Viral capsids, RNA and protein combine to form multiple copies of Covid-19. These viral particles exit the cell and lead to cytokine release (interleukin 2, 7, tumour necrosis factor [TNF]  $\alpha$ , macrophage and monocyte products). These cytokines mediate various effects on the gastrointestinal tract inducing the above symptoms.

Apart from the gastrointestinal manifestations, the infection might also affect liver and its function. Covid-19 patients show increased levels of ALT, AST, serum bilirubin and gamma-glutamyltransferase (GGT). The pathological mechanism of liver injury is not yet understood; however, the possible mechanisms include direct viral infection of hepatocytes, drug hepatotoxicity, binding to cholangiocytes via ACE2 receptors, or immune-related injuries. Several cytokines such as interleukin-1 (IL-1), IL-2, IL-33, IL-7, G-CSF, IL-36, tumour necrosis factor like cytokines- all contribute to maintaining the integrity and function of the GI tract and help to preserve intestinal epithelium after injury from mechanical stresses, infections or viruses. The levels of these cytokines are found to be elevated in Covid-19 patients presenting with GI and liver symptoms.

### **Olfactory and Gustatory Symptoms**

Sudden onset olfactory dysfunctions like- anosmia (most common), hyposmia and gustatory dysfunctions like dysgeusia and ageusia are also one of the common findings in Covid-19 patients. Most of Covid-19 patients without nasal obstruction or rhinorrhoea reported hyposmia or anosmia with or without headache. The loss of smell in Covid-19 patients might be associated with a milder

clinical course of the disease. A possible pathogenic mechanism for and olfactory and gustatory disorders can be due to wide expression of ACE2 receptors on epithelial cells of the oral mucosa though exact mechanism is still unknown.

### Neurological Manifestations

Neurologic manifestations are commonly described in Covid-19 patients, and these might involve the central nervous system such as dizziness and headache, peripheral nervous system such as impairments in taste and smell, and skeletal muscles. The most common symptoms include dizziness and headache. Others include skeletal muscle injury, gait disturbances, impaired consciousness, acute cerebrovascular disease, convulsions, polyneuritis, encephalopathy, Guillain–Barre syndrome.

The SARS-CoV-2 is highly pathogenic and is known to have neuroinvasive properties. The exact route by which SARS-CoV enters the CNS is still not reported. Evidence shows that SARS-CoV-2 may first invade peripheral nerve terminals, and then gain access to the CNS via a synapse-connected route. Hematogenous or lymphatic route mode of transmission is very unlikely in early stage of infection.

### Ocular and Cutaneous Findings

Retina, choroid and conjunctival epithelial cells have ACE2 receptors present in them. Covid-19 cases rarely demonstrates ocular manifestations. The most common seen are conjunctiva hyperaemia, chemosis, epiphora, and increased secretions that were indicative of acute conjunctivitis.

The common cutaneous involvement seen in Covid-19 was found to be maculopapularexanthema, papulovesicular rash, urticaria, painful acral red purple papules and petechiae. Most common sites for skin involvement are trunk, hands and feet and gets recovered within 10 days.

### Covid Management at Barc Hospital

A commendable initiative by our hospital was an early and clear demarcation of separate pathway for suspected Covid-19 cases. Triage process to identify the appropriate pathway for a patient starts at the casualty entrance. Any patient with symptoms suggestive of Covid-19, including but not limited to fever, cough and shortness of breath of new onset, is directed to the newly set up fever OPD at the casualty

entrance. The patients are assessed, screened and investigated there by a team of doctors and nurses. Approximately, around 20000 patients have been screened till now with positive cases of around 3000. The patients are screened in with temperature scanners, a thorough history taken, vitals assessed, blood investigations, radiologic investigations like chest Xray/HRCT chest and Covid-19 swabs. The patients of high-risk, with co-morbid conditions, and moderate to severe symptoms are directly admitted. Asymptomatic cases and patients with mild symptoms are then sent to designated nearby isolation centres. Covid-19 in adults and elderly, mostly presented with sore throat, anosmia, loss of taste, fever, cough, breathlessness, loose motions and generalised weakness. Covid-19 in children usually presented as an uncomplicated febrile upper airway infection or mild pneumonia or may be asymptomatic with good outcome.

### Conclusion

SARS-CoV-2 is rapidly transmissible and might affect nearly everyone, resulting in a wide spectrum of clinical manifestations. It does not only affect the respiratory tract but can widely affect the gastrointestinal, nervous, or cardiovascular system. Less typical manifestations include dermatologic, rheumatologic or ophthalmic manifestations. Even though the long-term complications are unknown, pneumonia, acute respiratory failure, acute respiratory distress syndrome, acute liver or kidney injury, cardiac complications, septic shock, or coagulopathy are described, so far, as being the most prevalent. Some of the clinical manifestations that are not typical might appear first. Thus, the understanding of Covid-19, its diagnosis, transmission routes, molecular mechanisms of infection, prevention, and treatment strategies are still rapidly evolving.

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# Covid-19 Pandemic: Obstetrician's Perspective

Dr. Minal Dhanvij, Dr. Nigamananda Mishra, Dr. Santoshi Prabhu,  
Dr. Vaishali Jadhav, Dr. Gayatri Savani

Department of Gynaecology and Obstetrics, BARC Hospital

Coronavirus has touched everyone's life, from changing habits to claiming millions of lives. To some extent all these are visible side effects. But what this novel virus has caused to our tiny live foetus is still a blind spot. More studies are required to discover the corona-foetus relationship as two lives are at stake, mother and neonate.

The corona virus derives its nomenclature from the Latin word 'corona' which means 'crown' or 'halo'. This is because the virion particle appears as a crown-like fringe, typically referred to as spike, on electron microscopy. It is a beta-coronavirus, single stranded, non-segmented, enveloped virus. Coronavirus causing the Covid -19 pandemic is SARS- CoV-2 (Severe Acute Respiratory Syndrome Corona Virus 2) which is named by the international committee on taxonomy of viruses. The disease symptomatology ranges from the common cold to severe fatal illness. Bats are the natural reservoirs for SARS-CoV-2 and civet cats or raccoon dogs are the intermediate sources. It is transmitted by fomites formed due to respiratory droplets from the infected person while sneezing and coughing. The person-to-person close contact is responsible for the spread of this pandemic. The possibility of faeco-oral transmission and airborne spread through inhalation of small particle aerosols is under evaluation. Common manifestations among hospitalized patients are fever (83-100%), cough (59-82%), myalgia (11-35%), headache (7-8%), diarrhoea (2-10%) and abnormalities on radiographic imaging of the chest (100%). Gender difference has been observed prominently in this pandemic, men have been more affected than women which could be due to differences in reporting, susceptibility, exposure, or recognition and diagnosis of infection.<sup>1</sup>

## Pregnancy and SARS-CoV-2 susceptibility

The susceptibility of pregnant women to SARS-CoV-2 can be explained by the changes that takes place in anatomical, reproductive, endocrine and immune systems of pregnant women which also increases the severity of the diseases. The anatomical structure of the respiratory system is



Dr. Minal Dhanvij

changed during pregnancy, and the virus transmitted by droplets and aerosols is more easily inhaled by pregnant women. The cardiovascular changes, increase in metabolic rate and oxygen consumption, decrease in functional residual capacity, and the mismatch between basic ventilation and perfusion, all these factors caused by pregnancy leads to the occurrence of hypoxic respiratory failure in women after infection with SARS-CoV-2. Also, the pulmonary vascular resistance increases, which may lead to pulmonary hypertension and heart failure. Physiological and mechanical changes in pregnancy increase susceptibility to infections in general, particularly when the cardiorespiratory system is affected and encourage rapid progression to respiratory failure. This is the reason for a worse prognosis of infection in pregnant women as compared to non-pregnant women. More importantly, angiotensin-converting enzyme (ACE)-2 which is the SARS-CoV-2 receptor, has been proven to be highly increased during pregnancy, which may contribute to the susceptibility to SARS-CoV-2. Furthermore, the pregnancy bias toward T-helper 2 (Th2) system dominance, which is protective to the foetus, leaves the mother vulnerable to viral infections, which are more effectively contained by the Th1 system. These unique challenges mandate an integrated approach to pregnancies affected by SARS-CoV-2<sup>2</sup>.

As we all are sailing through the high tide of this SARS-



CoV-2 pandemic, special attention is towards the mother and her neonate. The effects of Covid-19 virus in ongoing pregnancy can be analysed and categorised as early pregnancy effect and second and third trimester effects.

### **Early pregnancy and SARS-CoV-2**

There is no evidence to suggest an increased risk of miscarriage in a pregnant woman infected with coronavirus. SARS-CoV-2 entry into a cell involves the interaction of its spike protein with the cell's membrane-bound ACE2, which is cleaved by the transmembrane protease serine 2 (TMPRSS2). Blocking TMPRSS2 protease activity blocks ACE2-mediated entry of SARS-CoV-2, suggesting that co-expression of both genes is required for infection. ACE2 expression can be visualised during embryo development and hence expression of ACE2 and TMPRSS2 in these tissues raises the possibility for vertical transmission and indicates that further work is required to understand potential risks to implantation, placental and foetal health that require further study.<sup>3</sup>

### **Second and third trimester complications due to SARS-CoV-2**

Foetal complications of Covid-19 include miscarriage (2%), intrauterine growth restriction (IUGR; 10%), preterm birth (39%), oligohydramnios and intrauterine foetal demise. Fever, with a median temperature of 38.1-39.0°C, is the prevailing symptom in Covid-19. Pregnancy-related adverse events can occur during infection of patient such as premature labour or premature rupture of membrane.

The case report from Lausanne University Hospital stating miscarriage during the second trimester of pregnancy in a woman with symptomatic Covid-19 appears related to placental infection with SARS-CoV-2, supported by virological findings in the placenta. Contamination at the time of delivery, sampling, or laboratory evaluation was ruled out as all other swabs were negative for SARS-CoV-2. Foetus was morphologically normal so no other cause of foetal demise was identified. Whether SARS-CoV-2 crosses the placental barrier warrants further investigation. Additional study of pregnant women with Covid-19 is warranted to determine if SARS-CoV-2 can cause similar adverse outcomes.<sup>4</sup>

### **Effects of SARS-CoV-2 on maternal health**

The result of a systemic review and meta-analysis of 86 studies were included (2567 pregnancies) in the quantitative synthesis; other small case series and case

reports were used to extract rarely-reported events and outcome. Results have been tabulated in Table 1. This study also suggested that the risk of iatrogenic pre term birth and caesarean delivery was increased. The available evidence is reassuring, suggesting that maternal morbidity is similar to that of women of reproductive age. Vertical transmission of the virus probably occurs, albeit in a small proportion of cases.<sup>5</sup>

In the current situation, the obstetrics & gynaecology department of our hospital has played a vital role in managing patients. After the commencement of lockdown, our hospital has delivered 228 patients with 140 normal deliveries and 88 LSCS. Also during management, 17 (7.4%) patients came SARS-CoV-2 positive. After the primary management, these patients are transferred to the Covid-19 designated centre (panel hospital). And the counting is still on as patients are increasing day by day.

### **Vertical transmission and neonatal outcome of the SARS-CoV-2 positive mother**

Vertical transmission of SARS-CoV-2 is possible and appears to occur in a minority of cases of maternal Covid-19 infection in third trimester. Rates of infection are similar to other pathogens that cause congenital infections. However, given the paucity of early trimester data, no assessment can yet be made regarding rates of vertical transmission in early pregnancy as well as potential risk for consequent foetal morbidity and mortality.<sup>6</sup>

A case report from British American Hospital, Peru, of a 41-year-old with 33 weeks of gestation with a history of previous caesarean deliveries and diabetes mellitus presented with a 4-day history of malaise, low grade fever, and progressive shortness of breath, positive for Covid-19 and negative for Covid-19 serology. The patient developed respiratory failure requiring mechanical ventilation on day 5 of disease onset. The patient underwent a caesarean delivery, and neonatal isolation was implemented immediately after birth, without delayed cord clamping or skin-to-skin contact. The neonatal nasopharyngeal swab, 16 hours after delivery, was positive for SARS-CoV-2 real-time polymerase chain reaction (RT-PCR), and immunoglobulins IgM and IgG for SARS-CoV-2 were negative. Maternal IgM and IgG were positive on postpartum day 4 (day 9 after symptom onset)<sup>7</sup>.

A quantitative synthesis revealed that of 936 neonates from Covid-19 infected mothers, 27 neonates had SARS-CoV-2

**Table 1: Tabular form showing result of a systematic review and meta-analysis of 2567 pregnancies.**

<b>Demographics and Maternal health conditions</b>	<b>Percentage of SARS -CoV-2 pregnant women</b>
Black, Asian and Minor ethnic group	50.8%
Obesity	38.2%
Chronic Co-morbidities	32.5%
Symptoms Reported	
Fever	63.3%
Cough	71.4%
Dyspnoea	34.4%
Laboratory Findings	
CRP	54%
Lymphopenia	34.2%
Elevated Transaminase	16%
Third trimester women	73.9%
Delivered vaginally	48.3%
Caesarean Section	52.4%
Maternal Complications	
Maternal intensive care unit admission	7%
Intubation Required	3.4%
Maternal Mortality	~1%
Neonatal Complications	
Neonatal nasopharyngeal swab RT-PCR	1.4%
Preterm	21.8%

viral RNA positive nasopharyngeal swab, indicating a pooled proportion of 3.2% for vertical transmission. Notably, the pooled proportion of SARS-CoV-2 positivity in neonates by nasopharyngeal swab in studies from China was 2.0% (8/397) which was similar to pooled proportion of 2.7% (14/517) in studies from outside of China. SARS-CoV-2 viral RNA testing in neonatal cord blood was positive in 2.9% of samples, 7.7% of placental samples and 9.7% of faecal/rectal swabs. Neonatal serology was positive in 3.7% (based upon the presence of IgM)<sup>6</sup>

**Placenta and SARS-CoV-2**

A study from North-western University, Chicago, documented the result of sixteen placentas from patients with SARS-CoV-2. Compared to controls, third trimester placentas were more likely to show at least one feature of maternal vascular malperfusion (MVM), particularly abnormal or injured maternal vessels, and intervillous thrombi. Covid-19 placentas show increased prevalence of decidual arteriopathy and other features of MVM, a pattern of placental injury reflecting abnormalities in oxygenation within the intervillous space associated with adverse perinatal outcomes. These changes may reflect a systemic inflammatory or hyper-coagulable state influencing placental physiology. These findings provide mechanistic insight into the observed epidemiologic associations between Covid-19 in pregnancy and adverse perinatal outcomes. Collectively, these findings suggest that increased antenatal surveillance for women diagnosed with SARS-CoV-2 may be warranted.<sup>8</sup>

**Post-partum care for SARS-CoV-2 mother**

Breast milk is elixir of life for the new-born. Breast milk was tested for SARS-CoV-2 in 6 of the mothers reported by Chen et al; all specimens were negative. Until additional data are available, mothers who intend to breast feed and are well enough to express breast milk should be encouraged to

do so; breast feeding can be instituted after her consent.

A systematic review of forty nine studies included information on mode of delivery and infant infection status for 655 women and 666 neonates. In all, 28/666 (4%) tested positive postnatal. A quick review of the study is summarised in table no. 2.<sup>9</sup>

Thus the neonatal Covid-19 infection is uncommon, rarely symptomatic, and the rate of infection is no greater when the baby is born vaginally, breast fed or remains with the mother. Though the International Society for Research in Human Milk and lactation (ISRHML) is yet to conclude on the reliability of virus testing in human milk, the advantages of breast feeding far outweigh the presently known risks of SARS-COV-2 in the infants. Separation of the mother and baby raises issues of affordability and infrastructure logistic. Hence rooming-in of the baby with the mother reduces the burden on the family as well as the healthcare set-up. Breast feeding offers various benefits both to the mother and the new born including the presumption of the neonate receiving maternal antibodies against the virus. The mother can breast feed with strict adherence to hygienic measures. This saves on the practical issues associated with feeding of expressed breast milk. If the neonate gets affected with Covid-19, the incidence of which is reasonably less and having a mild course, monitoring can continue with the baby roomed in. Isolation of the neonate can be considered only if mother is severely ill to care for the baby or the infant per se needs intensive care.<sup>10</sup>

**Treatment for SARS-CoV-2 positive mother**

The general principles of caring for women in pregnancy and childbirth includes using aggressive infection control methods, non-administration of corticosteroids repeatedly, oxygen therapy, preventing fluid overload, using empirical antibiotics (due to the risk of secondary bacterial infection), co-infection testing of other infections, and having a high

**Table no 2. Percentage of the babies tested positive for SARS-CoV-2 in Different Scenarios (From a systematic review of 49 studies that included 666 neonates born to 655 SARS-CoV-2 positive mothers)**

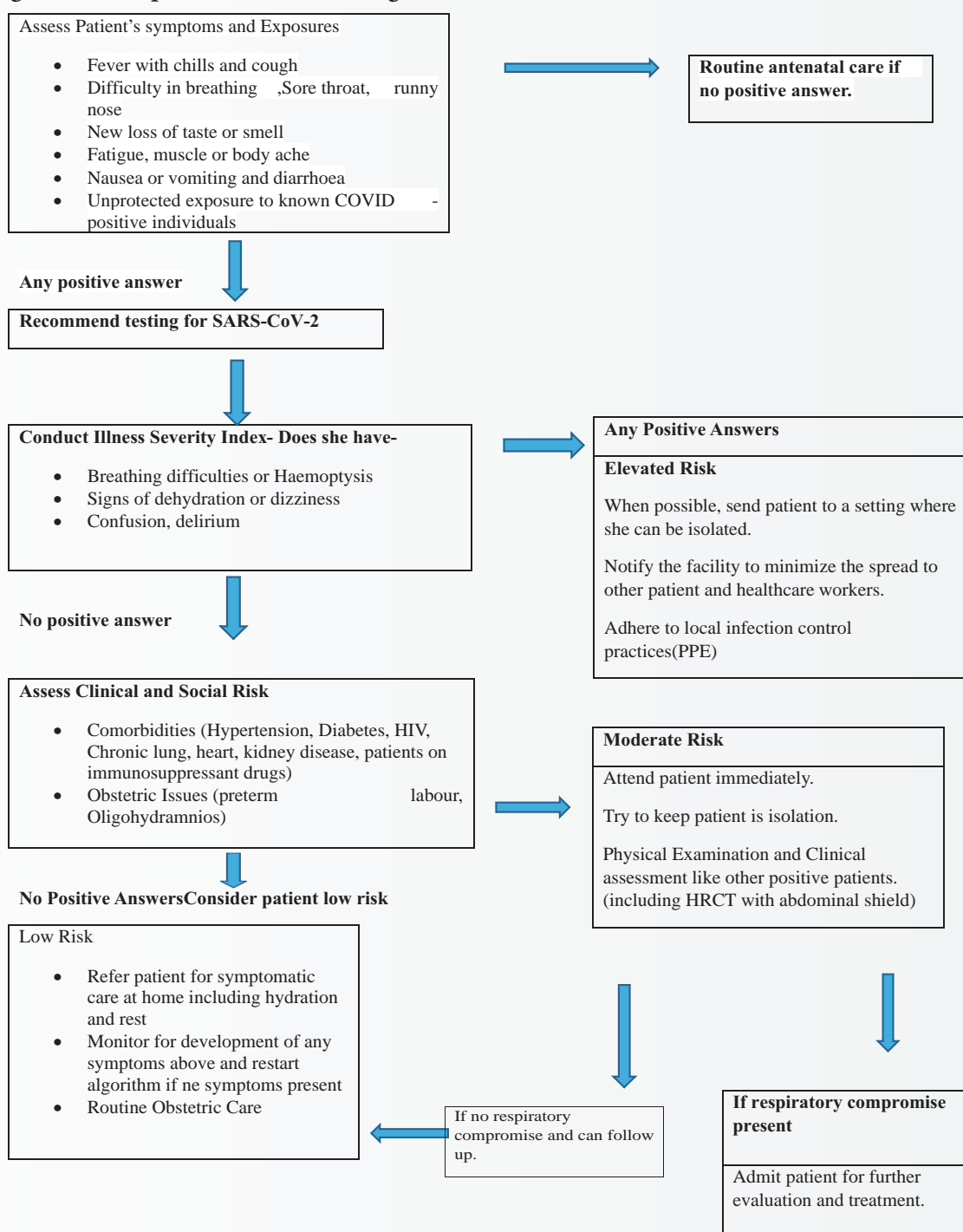
Different Scenarios	SARS-CoV-2 Positive Neonates
SARS-CoV-2 Positive Neonates (28/666)	4%
Vaginally born positive neonates	2.7%
Caesarean	5.3%
Breast fed babies	4.7%
Formula fed babies	5.3%

index of suspicion. Recent studies have identified remdesivir and chloroquine as strong candidate drugs for the treatment of Covid-19. Remdesivir is a novel, broad-acting antiviral nucleotide pro-drug that effectively inhibits replication of SARS-CoV-2. Its use appears to be safe in human pregnancies, and phase 3 trials evaluating efficacy in Covid-19 are currently underway in the United States. Although chloroquine and its metabolites cross the placenta, it may be safely used in all trimesters of pregnancy,

with no increased risk of adverse perinatal outcomes. However, it is worth noting that chloroquine is a drug with a large volume of distribution, and pharmacokinetic studies have shown significantly lower plasma drug concentrations in pregnancy, which suggests the need for a higher dose in Covid-19 (at least 500 mg twice daily).<sup>11</sup>

Management of pregnant patient with Covid-19 is like a jumbo roller-coaster ride.

(ACOG) has given the simplified version in an algorithmic form.





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# The Psychological Distress of Pandemics– A View Point

Dr. Saumitra Nemlekar,  
Dr. Aditi Chaudhari, Dr. Shobha Nair  
Department of Psychiatry, BARC Hospital

With the advent of the COVID-19 pandemic, there has been significant financial and social turmoil. This has led to a heavy burden and induced stress on individuals from all walks of life. These emotional reactions have now led to a pandemic of psychiatric illnesses.

The disease-illness divide is somewhat blurred. Defining distress and disease are difficult especially in the current atmosphere. Medical illnesses are easy to distinguish due to clear signs and symptoms. However, when it comes to distress, multiple factors modify the presentation. Let's have a look at the following case studies to understand this better.

- Mr. AB owns a local eatery. He has taken a large loan just prior to the pandemic to expand his eatery. Since the lockdown, he has had no income and equated monthly installments of his loan (EMI) are piling. He has to choose between his daughter's education and the loan. Mr. AB is now sad and worries a lot, unable to sleep at night and feels helpless.
- Mr. VK is an IT professional. He has just been recruited by a multinational company based in UK. To join this job, he has quit his old job and is currently jobless. Since the lockdown, he gets palpitations, is easily startled, irritable and unable to relax.

Both these cases have onset of symptoms after the pandemic. Lockdown has changed their routines, finances, mobility and social roles. An emotional reaction to this change should not be misunderstood as an illness. Distress presents with same symptoms as depression or anxiety. Therefore, classifying them as 'diseased' would be incorrect. To understand any psychiatric illness better, George Engel gave the concept of 'bio-psycho-social model for psychiatry' Development of illness arises through the interaction of the



Dr. Saumitra Nemlekar

following

1. Biological factors i.e. genetic predisposition.
2. Psychological factors like coping, personality; social factors like economic status, environment and roles along with responsibilities.

A 'contextual' look of each of the above is necessary. If not done, all of us may be 'medicalized' into a disorder. Under the current circumstances, the environmental and social changes are major contributors to distress.

Our mental health and the economic situation are interlinked. In addition to this, factors such as gender injustice, social exclusion and cultural conflicts are at play in the current pandemic. Studies have already linked poverty, low education and exploitative work to depression. It is therefore necessary to understand that an over-simplified biomedical view will not suffice. The lockdown & COVID-19 pandemic has been uniform for all, but its impact is unequal. Socio-economically able sections of the society may be able to withstand the upheaval, however those with hand-to-mouth existence are facing complete annihilation. The resultant distress cannot be equated by the use of 'standardized' measures and quantified by 'checklist diagnosticians'. Vital details will be lost in transition of such 'distress' to an 'International Classification of Disease (ICD) code'.

As a diverse multilingual - multicultural democracy, we need perceptions which reflect this diversity. Since democracy is 'of the people, by the people and for the people', the psychological relief & approach should also be directed with the same guidelines. Failure to understand the context and lack of focus on this multi-faceted problem, will result in poorer health and mental health indices. This will affect the underprivileged and the marginalized more, which constitute a large proportion of our population.

There is indeed a need for psychological help to those who are distressed. Using simple counselling therapy and behavioral techniques will greatly benefit them. Some people with severe stress may also require medications & specific psychotherapy. A few basic techniques to deal with distress are listed below.

- Organizing your day, scheduling activities.
- Adequate sleep for 7-8 hours as per circadian rhythm.
- Meditation and light exercises according to age.
- Communicating with family members.
- Avoiding unnecessary sources of stress e.g. rumour mongering, sensationalizing posts and news, too much use of social media.

However, unless the financial and social contributors of the distress are identified and addressed, use of counseling or medications may be a mere eyewash. Rather than an individual based approach, public health approach is

needed. As a country and as health-care professionals, we must understand that simple compassion and extending a helping hand will alleviate this 'distress'. Improving the social determinants can minimize the psychological impact of the pandemic.

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# Covid 19 and Eye

Dr. Divya Gupta

Department of Ophthalmology, BARC Hospital

## Introduction

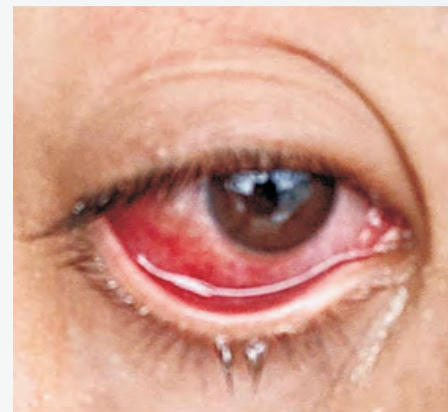
The Covid 19 pandemic and its varied manifestations need no introduction. There is growing evidence that human-to-human transmission occurs among close contacts. There are reports of healthcare professionals including ophthalmologists being infected all over the world, with a few fatalities too. One of the affected healthcare workers, who was part of the expert task force which visited Wuhan, has reflected on his experience of the disease. Despite of the protective suit and N95 respirator, he was infected by the virus with the first symptom being unilateral conjunctivitis, followed by development of fever a few hours later. Since his report, healthcare professionals in China have been urged to use eye protection when in close contact with patients. Given that these patients may present to the hospital with viral conjunctivitis, it is important for the emergency physicians and eyecare professionals to enquire about travel history and systemic flu-like symptoms.

A case keratoconjunctivitis as the primary manifestation of Covid-19 was first reported in North America (Courtesy: Canadian Ophthalmological Society, April 2020). The researchers noted that in March, a 29-year-old woman arrived at the Royal Alexandra Hospital's Eye Institute of Alberta with a severe case of conjunctivitis and minimal respiratory symptoms. The patient had various clinical findings such as sub-epithelial infiltrates, pseudodendrites, enlarged submandibular and cervical lymph nodes. Conjunctival swabs to test for chlamydia, gonorrhoea, and bacterial culture were sent and were negative. Valacyclovir was started assuming viral etiology. After undergoing

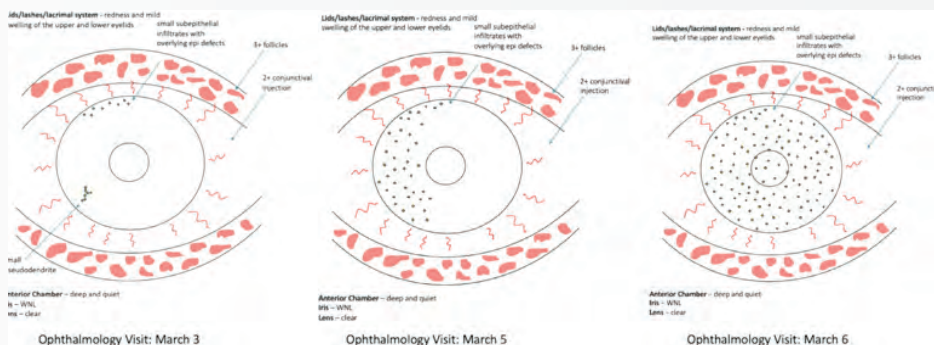


Dr. Divya Gupta

several days of treatment with little improvement, a Covid-19 test was ordered since the woman had recently returned home from Asia. The test came back positive.



**Fig. 1: External photograph of the right eye taken by the patient before the second visit (March 5th) to the eye clinic demonstrating marked conjunctival injection and watery discharge. Photograph provided by the patient (used with permission)**



**Fig. 2: Schematic representation of the slit-lamp examination findings over progressive clinic visits; note the increase in the corneal lesions over time**



### Importance of eye protection

Front-line health care and eye care providers, including family physicians, emergency physicians, ophthalmologists and optometrists, seeing patients presenting with a red eye, should enquire about travel history and infectious contact. Patients who have a red eye, respiratory symptoms such as cough and shortness of breath, and recently travelled to areas with known outbreaks are at higher risk of having Covid-19. Clinical interactions with any patients presenting with similar upper respiratory tract symptoms should routinely be done with mouth and eye protection as exposure to the patient's secretions is possible during the proximity of an eye examination.

Worldwide experience suggests that protocols should include pre-screening to reschedule nonurgent patients with symptoms or travel history in the last 14 days, avoiding micro-aerosolgenerating procedures such as non-contact tonometry, infection control protocols to reduce droplet transmission and usage of proper PPE. Contact tonometry such as applanation/ indentation procedures should also be avoided to prevent viral spread via tears. Patients can also be screened or managed through tele-ophthalmology if patients are able to send photographs of their eye to their eye care professional. Importantly, asymptomatic individuals can still pass on viral infection up to 48 hours before the onset of symptoms. Eye protection (goggles/ face shield) or facial protection (facemask) should be worn, and health care workers are advised against touching any mucosal membranes (eyes, nose or mouth). Ophthalmologists should take particular care when examining patients, because of both the proximity to patients' nose and mouth, and the potential exposure to tears which may contain the virus. All the above protocols are diligently followed at our hospital.

### Prevention strategies

Preventive measures are vital to limiting the spread of disease. In addition to physical distancing and practicing good hand hygiene, patients should employ behavioral changes that reduce the direct touching of the eyes and face like wearing glasses, sunglasses and refraining from wearing contact lenses or applying cosmetics.

### Pearls for Ophthalmologists

- Ophthalmologists should be aware that ocular shedding of Covid-19 virus via tears is a distinct possibility.
- Conjunctivitis or tearing can be the first presentation in

a patient with the Covid-19 infection. Patients may present with chemosis in advanced cases, or follicular conjunctivitis.

- The ocular examination should be performed while wearing gloves with the use of extension instruments to avoid direct contact with secretions. Patients who visit the ophthalmic clinics are often elderly with multiple comorbidities and hence it is important to screen the need for the visit and only see patients who need urgent care. Social distancing, as advocated in many countries, means being 6 feet away from others which is clearly impossible in the small confines of ophthalmic examination areas. One way to practice it is to have only one person in the room with the patient.
- It has been observed that physicians most at risk of becoming infected include ophthalmologists, otolaryngologists and anesthesiologists because of the proximity of the examiners to mucosal surfaces.
- When performing surgery under general anesthesia, it has been recommended that surgeons and other staff do not enter the room for 15 minutes after intubation or extubation.



**Fig. 3: A slit-lamp shield to protect the examiner at our set up**

**References**

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# Comparison Of Tools Used For Diagnosis Of Tuberculosis

Dr. Gurpreet Goraya, Dr. Kanchan Bantwal  
Deonar West Dispensary

## Introduction

Tuberculosis (TB) remains a disease of major global concern despite efforts to combat it.

The WHO estimates that about 3 million people who developed TB in 2012 were missed by national notification system. Various TB diagnosis tools use Direct Smear Microscopy with Ziehl-Neelsen (ZN) stain (DZM) as the acid-fast dye. It is the most commonly used WHO recommended diagnostic tool for TB in low and middle-income countries since it is cheap and easy to operate. However, the test has a low sensitivity with a detection limit of between 5000-10,000 bacilli/ml of sample. For patients with a low bacillary load as seen in HIV patients and infants, true positive cases are missed. Culture of mycobacterium on solid media has been considered the global standard for TB diagnosis. Unfortunately, the growth of TB bacilli requires a prolonged period.

We aimed to study the incidence of TB in patients of Deonar west dispensary along with the presence of investigative evidence in patients who were clinically diagnosed to have TB.

## Aim and Objectives

To study the incidence of pulmonary and extra pulmonary TB in Deonar west dispensary

To examine the pathological, radiological and microbiological evidence in patients with clinical diagnosis of TB.

## Methods

This is a retrospective observational cohort study conducted in Deonar west dispensary over a period of 5 years from 1<sup>st</sup> January 2013 till December 31<sup>st</sup> 2017. As per standard protocol, all adult patients who visited the dispensary were given a standard questionnaire. Patients with an affirmative answer to any of the following questions



Dr. Gurpreet Goraya

were referred to the TB clinic in dispensary.

## Questionnaire for clinical diagnosis of Tb

Persistent low grade fever more than 2 weeks

Weight loss

Persistent cough more than 2 weeks

Sudden swelling in the neck suggestive of lymphadenopathy

Breathlessness with fever suggestive of pleural effusion

On immunosuppressants like steroids.

Incomplete treatment of TB in the past

All patients referred to TB clinic underwent the following investigations:

X ray chest

Complete Blood Count(CBC),

Erythrocyte Sedimentation Rate(ESR)

Sputum microscopy

Polymerase Chain Reaction(PCR),

GeneXpert

Fine Needle Aspiration Cytology (FNAC),

Biopsy,

Adenosine Deaminase(ADA) levels as required.

## Observation and results

**Table 1: Demographics of the study population**

Age in years	Number of patients			Total(%)
	Female	Male	Total	
18-20	7	4	11	14
21-40	7	19	26	33
41-60	12	26	38	49
>60	1	2	3	4
Total	27	51	78	100

**Table 2: Incidence of pulmonary TB**

Pulmonary TB	No. of patients
Parenchymal involvement	39
Pleural effusion	19
Total	58

**Table 3: Incidence of extra pulmonary TB**

Extrapulmonary TB	No. of Patients
Abdominal TB	2
Mediastinal lymphadenopathy	2
TB lymphadenitis	13
Spine TB	1
TB meningoencephalitis	1
Erythema Nodosum	1
Total	20

**Table 4: Radiological findings in pulmonary TB patients**

X ray chest positive	X ray chest negative but HRCT positive	Total Pulmonary TB
52	6	58

**Table 5: Sputum AFB in Pulmonary TB**

Positive	Negative
8	50

**Table 6: Hemogram of patients**

Hemoglobin Range in gm%	No. of patients
4-8	3
8.1-12	53
12.1-16	22
Total	78



## Observation

Out of all the patients attending Deonar west dispensary, total 78 patients were referred to TB clinic during 5 years of study. 51 were male and 27 were female with most of them being in the 41-60 year age group.(Table 1) Out of the 78 patients, 58 were diagnosed to have pulmonary TB while 20 were found to have extra pulmonary TB.(Table 2)

Amongst the pulmonary TB patients, 52 had positive XR chest findings like consolidation and pleural effusion while 6 had normal XR chest.(Table 4) However, due to high clinical suspicion HRCT (High resolution CT) was done in all 6 of them which showed infiltrations suggestive of TB. Out of the total 58 pulmonary TB patients, 39 had parenchymal involvement while 19 had pleural effusion.(Table 2)

Extra pulmonary TB was diagnosed in 20 patients with maximum number of patients having TB lymphadenitis. Spine, meningeal and dermatological involvement were rarely observed.(Table 3) 8 patients out of 58 patients of pulmonary TB tested positive for sputum AFB (Table 5).

Haemogram of all 78 TB patients showed 3 patients to be severely anemic (4-8 gm%) while 53 patients had mild to moderate anemia. Raised ESR (60-90) was a consistent finding in almost all patients who got diagnosed with TB. (Table 6)

## Discussion

According to WHO, TB is vastly underdiagnosed as a direct result of current testing methods which requires weeks to deliver a definitive result, leading to patients being left untreated or placed on ineffective therapies. These patients may continue to spread TB to others in the community, increasing the disease burden. Culture of mycobacterium TB (MTB) in clinical specimens is substantially more sensitive than Direct Smear Microscopy. However, MTB culture takes a long time (10- 14 days for liquid culture and 3-4 weeks for solid culture), due to the long doubling time of MTB.

Direct smear microscopy with carbolfuchsin and fluorochrome such as auramine-rhodamine remains a mainstay in the detection of MTB in clinical specimens and is widely supported by the WHO.

Fluorescence microscopy improves the sensitivity of MTB detection. Previously, the light source necessary for fluorescence microscopy was not available for field use but

recent advances in light emitting diode (LED) technology have widened the applicability of fluorescent microscopy.

Advantages include longer lamp lifetime, reduced costs and non requirement of dark room

Mycobacteria Growth Indicator Tube (MGIT) can also be used as a rapid method for the detection of drug resistant strains of MTB directly from acid fast smear positive samples as well as from indirect drug susceptibility studies in 10-12 days.

Polymerase Chain Reaction (PCR) genetic test is based on multiplication not of the entire bacilli, as in culture, but of their genetic material i.e chromosomal DNA or ribosomal RNA, provided all ingredients are present in the reaction tube. This will only take place when the target genetic sequence to which the added primers can bind are found in the sample. Specificity of the test will thus depend on the use of correct primers, using sequences typical for MTB. Thus, from one target sequence, on one bacillus, the reaction can produce millions of copies and this yields a positive result. The main advantage of PCR-based techniques is their speed; only 1-2 days are needed. This is true for diagnosis of TB and for diagnosis of drug resistance (mainly rifampicin) and species identification. The main disadvantage of PCR-based tests is their high cost.

'GENEXPERT MTB/RIF' is a cartridge based test which detects MTB as well as rifampicin within 100 minutes.

Ligase Chain Reaction is a variant of PCR which is mainly used for respiratory samples and has a high overall specificity and sensitivity.

With the worldwide reemergence of multi drug resistant (MDR) and extensively drug resistant (XDR) strains, TB has become an even greater threat. According to the WHO global TB control report, there may be more than 500,000 cases of MDR TB worldwide. Current testing for drug resistance can take more than 4 weeks, leading to higher mortality and the further spread of MDR strains.

Our patients underwent blood, radiological and microbiological investigations as required.

## Conclusion

Incidence of TB was approximately 2.5 per 1000 population with around 80% being pulmonary TB and 20% extra pulmonary TB.

As sputum test for TB is unreliable due to low sensitivity of

test, additional diagnostic tests like XRay, HRCT, GenXpert, PCR, FNAC, Biopsy etc were needed to prevent missing out on TB patients.

#### References

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# Startling commonality between recommended community behaviour in pandemic and autism: musings of a psychiatrist

Dr. Shobha Nair

Head, Department of Psychiatry, BARC Hospital

Table 1: Characteristics of Autism

Deficits in reciprocal social interaction and communication
Repetitive, stereotyped behaviours and narrow repertoire of interests
Preference for solitary activities
Inflexible adherence to routines
Poor sharing, difficulty to put oneself in others' shoes or empathize
Emotional reactions may be inappropriate

As the Corona virus spreads due to close human contact, all measures suggested to contain spread indicate adopting autistic behaviours. We are all learning to be on the autism spectrum (Table 1)

Maintain distance whoever it may be, close or distant, friend or foe. Relationships don't matter anymore. All that matters is the task at hand. Brief, need based communication is the key. With masks on face, facial expressions don't matter. No need to have eye contact either. Don't share anything. Your belongings are yours. No one should touch them, use them. Learn to engage in solitary activities and not get bored. Do the same activities day after day. Social activities are fond memories. One can spend time, lost in those memories. Eat food at home day after day. Wear few comfortable clothes day after day. Variety is a



Dr. Shobha Nair

thing of the past. Obsessively place your things in its place to avoid contamination and engage in cleaning and washing.

Life is nothing but following a list of ritualistic behaviours. Pay attention to minute details like the door knob, the lift button, the public tap, the pen we use or the jewellery we wear. When you meet a person, rather than looking at him/her as a whole, focus on the mask worn, properly or not.

Show no empathy. Don't lend a helping hand. What if Corona strikes? Harbour excessive and irrational fears. Go about your life alone, though in the midst of a family, a community, a society. Have rigid, inflexible rules. Throw a tantrum or become aggressive if anyone, by chance, disturbs the rules. Laughter is suppressed, there's no reason to be joyous, grief is hidden, no one there to share.

Did nature prepare itself for this disaster by increasing the rates of autism? Is autism the human adaptation for the present and future?

## Covid-19 Pandemic Snapshots

**Dr. Pratibha Toal, Convenor, ICC along with Head Medical Division, addressing the medical officers about hospital Covid arrangements and protocols**



**Mr. Rahul Ramesh Shewale, Lok Sabha member from the Mumbai South Central constituency paid a visit to hospital to boost the morale of medical staff.**





Inside the fever ward where suspected Covid-19 patients are admitted; doctor, nursing staff and helper staff in personal protective equipment.



Hospital kitchen staff members, being a part of essential services, have been working relentlessly 24/7 to provide food for patients and hospital staff even during the lockdown period. (From left to right) Mr. S. L. Shinde, Mr. Mohd. Rahis, Mr. Manoj Razzak, Mr. Vijay Ingle, Mr. Rakesh Mahade, Mr. Ramesh Ghanekar, Mr. Ram Bahadur Thapa.



Above Team in the canteen



Hospital staff, on 22<sup>nd</sup> March 2020, expressed gratitude by clapping for all the frontline warriors during Covid-19 pandemic, as urged by the Honorable Prime Minister Shri Narendra Modi.



International Nurses Day was celebrated on 12<sup>th</sup> May in BARC hospital with precautions of masks and social distancing.



(From Left to right) Retired Sister incharge Annie Babu, Assistant Matron Molly Thomas, Assistant Matron Vijaya Dhekne, Matron Veronica Salve, ICU Sister incharge Shobhana Menon, Assistant. Matron Rashmi Parab.





## 'Wall of Happiness'

Head, Medical Division Dr. Anjali Kulkarni with Mr. Unmesh Chaskar, Mr. Shivdas Nambiar, Dr. Aditi Chaudhari, Mr. Prakash Tawde, Mr. Ramesh Sawant, Mr. Anil Chandla.



The Covid-19 pandemic has been an unprecedented humanitarian crisis. Health care personnel have led this battle from the forefront and have risen to the occasion, often at the risk of their own health and the health of their family members. The staff of Medical Division have been no different. In these troubling times, it is natural to feel desolate and disheartened. Keeping this in mind, the Wall of Happiness was conceptualized by Head, Medical Division,

Dr. Anjali Kulkarni to foster a sense of togetherness and joy. It has been on display at the foyer on the first floor since the World Humanitarian Day on 19<sup>th</sup> August 2020. The employees of the Medical Division and their children send in their contributions, which are exhibited every month. Readers are welcome to submit the same to Dr. Aditi Chaudhari Ext. #28112 or email at [draditi@barc.gov.in](mailto:draditi@barc.gov.in)



## Newer Servies



EINSTEIN VISION 3.0

BARC Hospital, Department of Obstetrics and Gynaecology has procured one of the best 3D laparoscopic systems available in the world i.e EINSTEIN VISION 3.0 by AESCULAP-B-BRAUN. It is the first 3D laparoscopic unit in DAE. This unit is imported from Germany and is one of the few premium laparoscopic systems in India. The system is installed in the main operation theatre of BARC hospital. EINSTEIN VISION 3.0 became fully functional from 10<sup>th</sup> Nov 2020 to serve the CHSS beneficiaries.

Head, Medical Division, Dr Anjali Kulkarni inaugurating the new EINSTEIN 3.0 along with the department of Obstetrics and Gynaecology and panel laparoscopic surgeon Dr. Prashant Bhamre.



## ACADEMIC ACHIEVEMENTS



1. **Dr. Pratibha Toal**, Head Anaesthesia Unit, BARC Hospital, won the first prize in the poster competition held by ISCCM (Indian Society of Critical Care Medicine) in October 2020 with the theme 'Critical Care at the Frontline with Patient Advocacy'.
2. BARC Hospital Pathology department was amongst the top 10 contributors for correct slide diagnosis for slide seminar held by Maharashtra Association of Pathologists and Microbiologists at MAPCON 2019.

### Paper presentations

1. Dr. Sruthi Mayura won the first prize for her paper presentation 'Appraisal of International Academy of Cytology Yokohama System for breast fine needle aspiration cytology with histopathological correlation- 3 years Retrospective Study' at MACYCON 2020 held at AIIMS Nagpur.
2. A paper on 'Histopathological spectrum of skin lesions- one year retrospective study' by Dr Prajakta Bapat, Dr Prachi Gaddam, Dr Raji Naidu, Dr Susan Cherian, Dr Uma Chaturvedi, was presented by Dr Prajakta Bapat at Mapcon 2019 Akola, 21<sup>st</sup> September 2019
3. A paper on 'Clinicopathological study of 6 cases of Idiopathic calcinosis cutis' by Dr Tejashwini Kotian, Dr Prachi Gaddam, Dr Raji Naidu, Dr Susan Cherian, Dr Uma Chaturvedi was presented by Dr Tejashwini Kotian at Annual CME in Pathology on JN Medical college Karnataka, 19<sup>th</sup>-22<sup>nd</sup> June 2019
4. A paper on 'Appraisal of International Academy of Cytology Yokohama System for breast fine needle aspiration cytology with histopathological correlation- 3 years Retrospective Study' by Dr Sruthi Mayura, Dr Prachi Gaddam, Dr Raji Naidu, Dr Susan Cherian, Dr Uma Chaturvedi was presented by Dr Sruthi Mayura at MACYCON 2020 at AIIMS NAGPUR on 9<sup>th</sup> February 2020
5. A paper on 'Papillary thyroid carcinoma arising in thyroglossal cyst and simultaneous multifocal papillary thyroid carcinoma in thyroid- unusual pre-operative diagnosis on cytology' by Dr Prajakta Bapat, Dr Prachi Gaddam, Dr Raji Naidu, Dr Susan Cherian, Dr Uma Chaturvedi was presented by Dr. Prajakta Bapat at MAYCON 2019 in LTMGH Sion Hospital on 2 & 3<sup>rd</sup> Feb 2019
6. A paper on 'The Bethesda classification of thyroid lesions and its clinical utility' by Dr Aashi Mehrotra, Dr Raji Naidu, Dr Uma Chaturvedi, Dr Susan Cherian, Dr Prachi Gaddam was presented by Dr. Aashi Mehrotra at MAYCON 2019 in LTMGH Sion Hospital on 2<sup>nd</sup> & 3<sup>rd</sup> Feb 2019



7. Dr Ashwini Bhagwanrao Munde, Dept. of Anaesthesia , presented her paper on ' intranasal dexmedetomidine for preoperative sedation in paediatric patients' by Dr Ashwini Munde, Dr Sheetal Chiplonkar, Dr. Pratibha Toal, in a meeting held by Indian society of Anesthesiologist Mumbai branch & Dr. G. S. Ambardekar anesthesia society on 26 th July 2019 at KEM hospital. She also had a podium presentation of the same topic on world Anesthesia day 2019 in a CME held by ISA at Sahara star Mumbai on 12th & 13th October 2019
8. A paper on 'Assessment of cytomorphological features in papillary lesions of breast with histological correlation 'by Dr Prachi Gaddam, Dr Raji Naidu, Dr Susan Cherian, Dr Uma Chaturvedi was presented by Dr. Prachi Gaddam at MAPCON 2018,in AFMC Pune on 8<sup>th</sup> and 9<sup>th</sup> September 2018

### **Publications**

1. Dr. Shrividya Chellam, Dr. Kajal Dalal, Dr. Pratibha Toal. A commentary on ' Global prevalence and reasons for case cancellation on the intended day of surgery :A systemic review and meta-analysis' Int. J. Surg.2020.<https://doi.org/10.1016/j.ijso.2020.08.006>.
2. Dr. Jayesh Kalbhande, Dr. Vicky Kuldeep. Abdominal Tuberculosis and value of CA 125 in diagnosis and completion of treatment- A Case Report. Journal of Medical Science And clinical Research. Volume 08 Issue 4 April 2020, 51 – 53
3. Dr. Jayesh Kalbhande, Dr. Vicky Kuldeep. Sternal Tuberculosis - A Case Report, Indian Journal of Applied Research, Volume 10, Issue 4, April 2020, 1-2
4. Dr. Jayesh Kalbhande, Dr. Vicky Kuldeep. Left para-duodenal hernia presenting as abdominal lump- A Case Report, Journal of Medical Science And clinical Research Volume 08 Issue 4 April 2020, 78-81
5. Dr. Jayesh Kalbhande, Dr. Vicky Kuldeep. Richters Incisional hernia presenting with strangulation - A case report - Indian Journal of Applied Research, Volume 10, Issue 4, April 2020, 35-36
6. Dr. Jayesh Kalbhande, Dr. Vicky Kuldeep. Use of Insulin in treatment of COVID-19: A proposal to explore feasibility, Journal of Medical Science And Clinical Research Volume 08 Issue 7 July 2020, 628 – 634

### **Publication - Book Chapter**

FNAC for Thyroid and Parathyroid Disorders, Uma P Chaturvedi, Raji T Naidu, Prachi R Gaddam, Preeti Dhingra, Surgical and medical management of diseases of the thyroid and parathyroid, Pleural Publications, Chapter 20, page 273-297.



## Candidates passing DNB exam in June 2020.



**Dr. Ashwini Munde**  
Dept. of Anaesthesia



**Dr. Soujanya Pathri**  
Dept. of Anaesthesia



**Dr. Samruddhi Patil**  
Dept. of Gynaecology & Obstetrics



**Dr. Akshita Patel**  
Dept. of Ophthalmology



**Dr. Praveen Shahi**  
Dept. of Ophthalmology



**Dr. Vicky Kuldeep**  
Dept. of Surgery



**Dr. Pratima Pimpalkar**  
Dept. of Surgery

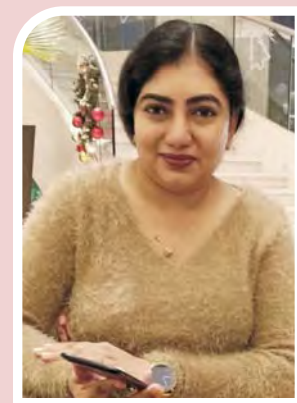
## EXTRACURRICULAR ACHIEVEMENTS



### Donor motivation:

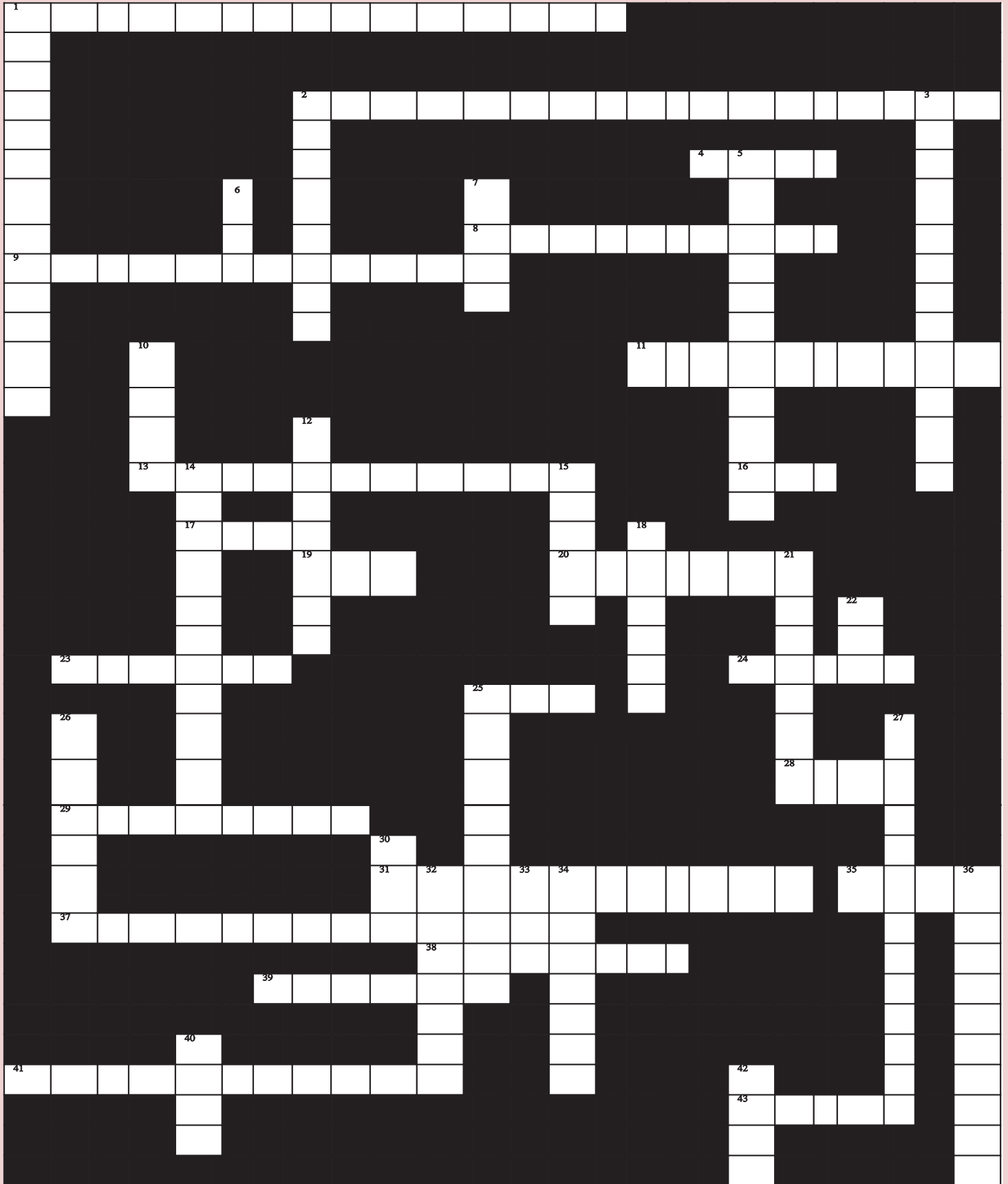
**Mr Shanker Shastry** completed his 100th blood donation on 28.6.19 in BARC hospital Blood bank. He has been donating regularly in various blood banks and blood donation camps and motivated several donors over the years.

**Dr. Neha Shah**, part time dispensary doctor in BARC was chosen to be a contestant on the hot seat opposite host Amitabh Bachchan in the well known general knowledge contest 'Kaun Banega Crorepati' and won a jackpot of Rs.1 crore.





# CROSSWORD



## CROSSWORD CLUES

### ACROSS

1. Vit D (15)
2. Disinfectant bleach solution ( 6, 12)
4. Newer oxygen therapy for Covid 19 (4, acronym)
8. Widely used anti viral for Covid 19 (10)
9. Target of covid vaccine (5, 7)
11. Restricted movement to prevent spread of infection(10)
13. Monoclonal antibody for immunosuppression (11)
16. Marker of activated immune system in Covid 19 (3, Acronym)
17. Pump to circulate blood through artificial lung (4, Acronym)
19. Antimalarial (3, Acronym)
20. Loss of smell (7)
23. A fibrin degradation product(6)
24. Covid 19 originated here(5)
25. National public health institute in USA (3, Acronym)
28. Severe lung injury (4, Acronym)
29. Post Covid lung sequelae (8)
31. Important preventive measure for Covid 19 (4,7)
35. Radiological investigation for Covid 19 (4, Acronym)
37. Long acting Steroid (13)
38. Lesions due to bleeding within skin (7)
39. Life threatening infection (6)
41. Acid resistant protease inhibitor in human urine (11)
43. Covid 19 reporting and data system for lung involvement in CT (5, Acronym)

### DOWN

1. Excessive immune response (8. 5)
2. The causative agent of Covid-19( 4, 3,1)
3. Liver enzyme (11)
5. Oral anti-viral drug(11)
6. A protein used as inflammatory marker (3, Acronym,)
7. Moderna and Pfizer vaccine type (4,Acronym,)
10. Set of tests for diagnosis of Covid-19 (4, Acronym)
12. Atleast 70% of this solution is a good disinfectant (7)
14. Antiviral oral medicine used against Swine flu virus (10)
15. Non invasive method of ventilation (5, Acronym)
18. Objects /material which can carry infection (6)
21. Loss of taste(7)
22. Cover worn by frontline workers to protect from infection (3,Acronym)
25. Cavelike sinus (9)
26. Live attenuated Covid 19 vaccine from UK
27. Vit C scientific name (8,4)
30. American Heart Association (3, Acronym)
32. Blood thinner(7)
33. End of Life decision (3, Acronym)
34. Anticoagulant (7)
36. Process of blood Clot (10)
40. Protective face cover (4)
42. Apex body in India for formulation and promotion of biomedical research (4, Acronym)

***\*Please email your answers to [pulse@barc.gov.in](mailto:pulse@barc.gov.in). Names and photographs of the first five entries with correct answers will be published in the next issue of 'Pulse'***

## Answers to Crossword, Pulse Vol. 21, March 2020.

<sup>1</sup> T	A	K	O	T	S	U	B	O	C	A	R	D	I	O	M	Y	O	P	A	<sup>2</sup> T	H	Y					
	P																				O			<sup>3</sup> T			
	I																				R			R			
	<sup>2</sup> C	O	X	S	A	<sup>4</sup> C	K	I	E					<sup>3</sup> L	O	R	D	O	S	I	S			E			
	O					O															I			N			
	E					O															O			D			
	C		<sup>5</sup> T			M			<sup>4</sup> L	Y	M	P	H				<sup>7</sup> N			N			E				
	T		E			B			E											I			L				
	O		N			S			U								<sup>5</sup> P	L	E	X	U	S	E				
	M		N						K											A			N				
	Y		<sup>6</sup> I	S	L	E	T	S	O	F	L	A	N	<sup>8</sup> G	E	R	H	A	N	<sup>9</sup> S			B				
			S						P					A						C		<sup>10</sup> S	E				
			E						E					L						O		U	R				
<sup>7</sup> P	R	O	L	A	P	S	E		N					<sup>8</sup> E	P	L	E	Y		T		L	G				
			B						I					A						O		P					
			O						A					Z					<sup>11</sup> E		M	H	<sup>12</sup> A				
			W											Z					B		A	O	M				
			<sup>13</sup> P											<sup>9</sup> T	R	I	S	M	U	S		N	P				
			A			<sup>14</sup> H			<sup>15</sup> D										S		<sup>10</sup> S	I	A	D	H		
<sup>11</sup> B	O	R	B	O	R	Y	G	M	I													M	O				
			A			S			X							<sup>16</sup> A						I	T				
			E			T			H							N						D	E				
			S			E			<sup>12</sup> A	M	Y	L	O	I	D	O	S	I	S			E	R				
			T			R			L							V							I				
			H			O			L						A				<sup>13</sup> M	Y	O	P	I	C			
			E			D			P														I				
			S		<sup>14</sup> E	E	G		I														N				
			I			S			<sup>15</sup> K	O	R	O	T	K	O	F	<sup>17</sup> F										
			A			I			E												O						
						S														<sup>16</sup> B	U	R	R	H	O	L	E

This time, there were no entries with all the correct answers as given above.

## OBITUARY



Veteran atomic scientist and former chairman of Atomic Energy Commission Padmashri **Dr. Sekhar Basu** succumbed to COVID-19 on Thursday, 24<sup>th</sup> September 2020 at a private hospital in Kolkata. He had pioneered the highly complex reactor for India's first nuclear powered submarine INS Arihant.



**Dr. Ketaki Pathak Paranjpe**, who was an anaesthesia alumna, BARC Hospital, succumbed to her fight against COVID-19 at a private hospital in Chiplun. She was a practicing anaesthesiologist and chronic pain specialist in Dervan.





**Chief Editor**

**Dr. Shrividya Chellam**

Dept. of Anaesthesia & MOIC Casualty Unit, BARC Hospital  
Anushaktinagar, Mumbai - 400 094.

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