



# Pharmacological Prophylaxis and Personal Protective Equipment (PPE) Practices in Gynecological Cancer Surgery During COVID-19 Pandemic

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## Abstract

**Purpose** In the absence of vaccine, proper use of personal protective equipment (PPE) is the most important strategy to protect healthcare workers against COVID-19 infection. The recommendations on pharmacological prophylaxis against COVID-19 infection are controversial. The aim of current study was to assess PPE practices during surgery on COVID-19 negative gynecological cancer patients and use of pharmacologic prophylaxis by clinicians practicing gynecologic oncology.

**Methods** We disbursed a survey questionnaire through various social media platforms among clinicians practicing gynecologic oncology. The survey consisted of 37 questions divided into five subgroups evaluating demographic details, use of pharmacological prophylaxis against COVID-19, preoperative COVID-19 screening protocol, details on PPE usage and associated discomfort, if any.

**Results** Two hundred twenty oncologists from 13 countries responded to the survey. Pharmacological prophylaxis was being used by 85 (38.6%) respondents; most common agent was hydroxychloroquin (HCQ) by 24.5% respondents. Routine preoperative screening for COVID-19 was performed by 214 (97.3%) respondents. Some degree of discomfort during surgery due to PPE use was reported by 170 (77.3%) respondents, which was moderate to severe in 73 (33.2%) respondents. Most common difficulties associated with face mask/shield were problems in communication (69.5%) and breathing (58.1%). Eye protection was associated with poor visibility, fogging and headache. Unusual fatigue attributed to PPE use was experienced by 143(65%) respondents.

**Conclusion** Use of pharmacological prophylaxis against COVID-19 is controversial and the same is reflected in our survey. Most respondents adhered to PPE use despite experiencing some physical discomfort.

**Keywords** Personal protective equipment · COVID-19 · Pharmacological prophylaxis · Healthcare workers · Discomfort

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## Background

Since the onset of COVID-19 infection in November 2019, it has become a major healthcare problem. According to world health organization (WHO) reports as on November 18, 2020, 55,064,128 individuals were infected with COVID-19 and 1,328,015 had died due to the disease [1]. COVID-19 infection has impacted treatment of non-COVID health conditions including cancer care. However, definitive cancer directed treatment cannot be delayed during COVID-19 pandemic as it will adversely affect the oncological outcomes. The optimal care of patient with cancer including surgery should continue to mitigate the negative impact of delay in treatment. The results from various studies evaluating outcome of patients for

gynecological cancer undergoing surgery during COVID-19 pandemic have not shown adverse outcomes [2, 3].

Healthcare providers are at increased risk of acquiring COVID-19 infection [4]. Increased risk of COVID-19 infection among operating room personnel is attributed to various factors including exposure to aerosol generated during intubation, prolonged close contact with infected individual during surgery, inhalation of smoke generated by energy devices and exposure to body fluids [5, 6]. Protection of healthcare workers (HCW) from COVID-19 is not only important for them but also crucial for the healthcare system. Adequate and persistent use of PPE by HCWs is essential to protect them against COVID-19 infection.

Patterns of PPE usage vary among HCWs depending upon the institutional policy, availability, knowledge and attitude toward PPE, and discomfort associated with its use. The adverse effects of PPE usage are aggravated not only by duration and complexity of surgery but also presence of preexisting co-morbidities like asthma, allergy, COPD, contact dermatitis and use of power glasses.

The guidelines on use of pharmacological prophylaxis against COVID-19 for HCWs are inconsistent and controversial. Indian Council of Medical Research (ICMR) recommends the use of hydroxychloroquin (HCQ) for asymptomatic HCW involved in the care of suspected or confirmed cases of COVID-19 [7]. The ICMR recommendations are based on very weak evidence and have been criticized [8, 9].

Therefore, we conducted an online survey to study the use of pharmacological prophylaxis and PPE practices and among clinicians practicing gynecological oncology during current pandemic.

## Methods

The study was conducted through electronic questionnaire-based survey using Google forms [10]. The questionnaire was created by the authors (AM, PS) of the study. The questionnaire constituted 37 questions divided into five subgroups to address demographic details, use of pharmacological prophylaxis against COVID-19, institutional COVID-19 screening protocol for patient prior to surgery, details of PPE usage and associated discomfort, if any. Invitation to participate in survey was sent to practicing gynecologic oncologists through electronic media (personal e-mail, Whatsapp and twitter). All participants consented to participate in survey. The survey was active from August 21 to September 20, 2020. One reminder was sent on day 20. The data were analyzed using Microsoft office excel 2007.

## Results

A total of 220 clinicians practicing gynecologic oncology from 13 countries participated in the survey. Table 1 shows demographic details of participants. One hundred ninety-six (89.1%) responders were from India and 24 (10.9%) from other countries. Most common age group was 35–45 years (95 respondents, 43.2%). One hundred ten (50%) respondents were senior faculty with > 8-year clinical experience, 58 (26.4%) were junior faculty (< 8-year experience) and 52 (23.6%) were residents, trainees or fellows. One hundred thirty-six (61.8%) respondents were gynecologic oncologists, 51 (23.2%) were surgical oncologists and 33 (15%) were gynecologist practicing oncology. Ninety-eight (44.5%) respondents were working at government institute, 97 (44.1%) at private institute and 25 (11.4%) at NGO/trust hospitals or nursing homes.

### Pharmacologic Prophylaxis Methods Against COVID-19

Eighty-five (38.6%) respondents were taking pharmacologic prophylaxis for COVID-19 infection while 136 (61.8%) were not using any prophylaxis. Most commonly used drug for prophylaxis was HCQ used by 54 (24.5%) respondents. Other prophylactic methods used were ayurvedic preparations by 5 (2.3%), BCG vaccine by 4 (1.8%), homeopathic drugs by 3 (1.4%) and combinations by 18 (8.2%) respondents. Figure 1 shows the distribution of pharmacological prophylaxis methods used against COVID-19 infection. Out of 32 respondents above the age of 55 years, 14 (43.8%) were using pharmacological prophylaxis while 71 respondents out of 188 (37.8%) under 55 years were taking pharmacological prophylaxis.

### Preoperative COVID-19 Screening Protocol for Patients

Two hundred fourteen (97.3%) respondents were screening patients for COVID-19 prior to surgery. One hundred fifty-eight (71.8%) were screening prior to both major and minor surgery and 46 (20.9%) were screening prior to only major surgery.

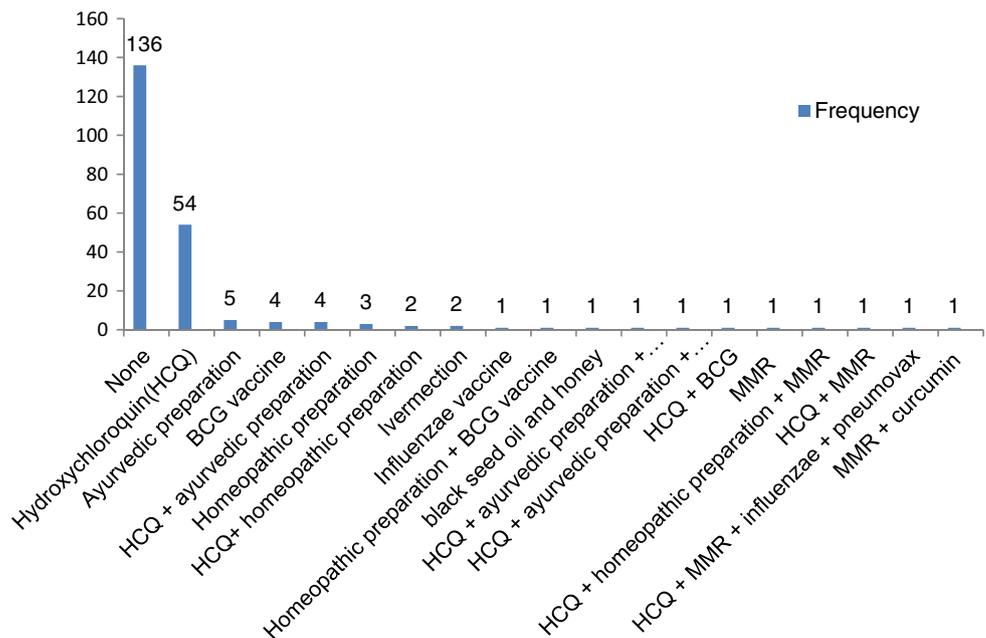
Reverse transcriptase polymerase chain reaction (RT-PCR) on nasal/throat swab was the most commonly used screening test practiced by 147 (66.8%) respondents. Other tests used for COVID-19 screening were high-resolution CT scan (HRCT) of thorax, rapid antigen test and antibody test. Table 2 shows details of preoperative COVID-19 screening protocol.

**Table 1** Demographic details of participants

Variable	Response	Number (n)	Percentage %
Country of practice	India	196	89.1
	Outside India*	24	10.9
Age group	25–35 years	58	26.3
	> 35–45 years	95	43.2
	> 45–55 years	35	15.9
	> 55 years	32	14.5
	Senior faculty	110	50.0
Job position	Junior faculty	58	26.4
	Resident/trainee/fellow	52	23.6
	Gynecologic oncologists	136	61.8
Specialty	Surgical oncologists	51	23.2
	Gynecologists	33	15.0
	Government institute/hospital	98	44.5
Type of institute	Private institute/hospital	97	44.1
	NGO/trust hospital, nursing homes, others	25	11.4
	Type of patients being treated	Both COVID and non-COVID patient	139
Only non-COVID patient		81	36.8
Average gynecological cancer surgery/week	< 2	75	34.1
	2–5	93	42.3
	6–10	46	20.9
	11–15	06	2.7

\*America, Bangladesh, Brazil, Burundi, Barbados, Columbia, England, Italy, Nepal, Spain, Uganda, UK

**Fig. 1** Pharmacologic prophylaxis methods against COVID-19



**Details of PPE Usage**

One hundred thirty-nine (63.2%) respondents were using disposable gowns during surgery. One hundred sixty-three

(74.1%) respondents were using N95 masks with/without 3 ply masks during surgery. Seventeen (7.7%) individuals were using masks with valves.

**Table 2** Preoperative COVID-19 screening protocol

Variable	Response	Number (n)	Percentage %
Preoperative screening for COVID-19	Prior to both major and minor surgery	158	71.8
	Only prior to major surgery	46	20.9
	Only for patient with suspicion of COVID-19 infection	9	04.1
	Only for patient belonging to high-risk area	1	00.4
	None	06	02.7
Test used to perform COVID-19 screening	RTPCR on nasal/throat swab	147	66.8
	RTPCR on nasal/throat swab and HRCT thorax	35	15.9
	RTPCR on nasal/throat swab or rapid antigen	15	6.8
	HRCT thorax alone	4	1.8
	HRCT thorax and rapid antigen	4	1.8
	Rapid antigen alone	4	1.8
	Antigen + Antibody-based tests	5	2.3
	None	6	2.7

For eye protection 155 (70.4%) respondents were using face shields or goggles or both and 50 (22.9%) were using power glasses alone. One hundred sixty-eight (76.3%) respondents were using double gloves routinely prior to pandemic and continued the same practice while 19 (8.6%) respondents reported a change from single glove to double glove during COVID-19 pandemic. One hundred ninety-four (88.2%) agreed with their institutional PPE policy and 26 (11.8%) did not agree with the same.

Twenty-five (11.4%) respondents had preexisting health conditions such as headache and contact dermatitis. Eighty-three (37.7%) individuals were using power glasses or loupes routinely prior to pandemic. Table 3 shows details of PPE usage.

### Discomfort Associated with PPE Use

Table 4 [SI] shows discomfort associated with PPE use. Figure 2 shows the level of stress while operating and discomfort after donning PPE. One hundred forty-three (65%) respondents experienced more than usual fatigue which was attributable to PPE usage. Sixty-seven (30.5%) respondents felt a need to take a break during surgery due to discomfort related to PPE use. Seventy-eight (35.5%) were comfortable only for 1–2 hours after donning the PPE. One hundred seventy-one (77.7%) respondents were unable to enjoy operating like they were before pandemic.

Figure 3(a)[SI] shows the distribution of difficulty faced with the use of face masks. Most common discomfort experienced with use of face mask was difficulty in communication reported in 153(69.5%) respondents followed by breathing problems in 128(58.1%). One hundred seventeen (53.2%) respondents found N95 mask more comfortable compared to respirator mask.

One hundred ninety-eight respondents (90%) reported discomfort like poor visibility and fogging, headache and skin irritation with the use of eye protection. Figure 3(b) [SI] shows the distribution of difficulty faced with the use of eye protection. The most common difficulty faced was fogging experienced by 178 (80.9%) respondents. Eighty-four (38.2%) respondents found goggles more comfortable compared to face shield. One hundred forty-four (65.5%) respondents were not satisfied with the visibility after wearing eye protection.

Majority of the respondents did not find any change in the intra-operative complication rates while operating during pandemic. One hundred fifty (68.2%) respondents reported a change in route of surgery during COVID-19 pandemic. Where both open and minimally invasive surgeries were feasible, 55 (25%) respondents favored minimal invasive surgery over open and 95 (43.2%) favored open surgery.

Two hundred ten (95.5%) respondents reported a reduction in the extent of interaction with colleagues due to pandemic. To cope up with the stress and discomfort caused by use of PPE during COVID-19 pandemic, people used various methods like walking, yoga, workout, music and meditations. Seventy-five (34.1%) respondents felt that they are less complaint toward the use of PPE with time.

### Discussion

It was encouraging to receive responses from oncologists from 13 countries. Participants belonged to all level of clinical experience.

Use of pharmacological prophylaxis against COVID-19 by healthcare providers is highly debatable [11–13] and the

**Table 3** Details of PPE usage

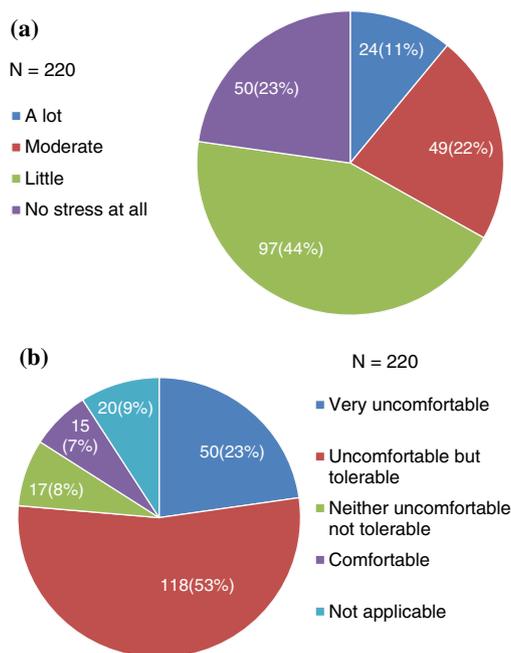
Variable	Response	Number (n)	Percentage %
Type of surgical gown used	Disposable	139	63.2
	Reusable	81	36.8
Mask routinely being used	Respirator mask	36	16.4
	N95 + 3ply mask	97	44.1
	N95 mask	66	30.0
	3ply mask	21	09.5
Using masks with valves	Yes	17	07.7
	No	190	86.4
	Not applicable	13	05.9
Eye protection routinely used	Face shield	90	40.9
	Goggles	30	13.6
	Both	35	15.9
	Regular power glasses	50	22.7
	None	15	06.8
Details of glove use	Always been using double glove	168	76.4
	Changed from single to double glove	19	08.6
	No still using single glove	32	14.5
	Others	1	00.5
PPE policy	N95/eye protection/double gloves	147	66.8
	Respirator mask/eye protection/double gloves	36	16.4
	N95/eye protection/single glove	17	07.7
	3ply mask/eye protection/single glove	7	03.2
	Others	13	05.9
Do you agree with PPE policy	Yes	194	88.2
	No	26	11.8
Prior conditions, i.e., headache, contact dermatitis	Yes	25	11.4
	No	195	88.6
Using power glasses/loupes routinely	Yes	83	37.7
	No	137	62.3

same is reflected in our survey that showed only 38.6% respondents were using any pharmacological prophylaxis. Although ICMR recommends use of HCQ prophylaxis for HCW, the evidence to support this recommendation is weak and most studies do not support this recommendation [8, 9]. In a hospital-based case control study from India, two-dose ivermectin prophylaxis within 72 h was associated 73% reduction in COVID-19 infection among healthcare workers for the following one month [14]. Due to the absence of evidence supporting the use of BCG vaccine in COVID-19 prophylaxis, WHO recommends against the use of BCG vaccine [12].

American society of anesthesiologist (ASA) and anesthesia patient safety foundation (APSF) recommend mandatory preoperative COVID-19 screening with nucleic acid amplification testing (including PCR tests) prior to a elective surgery [15]. HRCT thorax does not increase the

sensitivity of COVID-19 testing in RTPCR negative patients and hence is not recommended [16]. In a study of preoperative testing strategy done at Tata Memorial Centre Mumbai, 262 cancer patients asymptomatic for COVID-19 were screened preoperatively by RTPCR on nasopharyngeal and oro-pharyngeal swab. Twenty-one out of 262 were positive for COVID-19. Out of 241 negative patients, 237 (98.3%) underwent surgery. None of the patient had symptomatic COVID-19 disease in the postoperative period. Therefore, the authors concluded that the strategy of preoperative COVID-19 by oral and nasal swab RTPCR was beneficial [17]. Our survey also showed that maximum respondents practiced preoperative COVID-19 testing before major surgery and test most commonly performed for screening was RTPCR on nasal and oral swab.

Ministry of health and family welfare of India recommends triple-layer medical mask, face shield (wherever



**Fig. 2** a Level of stress while operating during COVID-19 pandemic, b Discomfort after donning PPE

feasible) and sterile latex gloves for the operating room personnel for non-COVID hospitals and non-COVID treatment areas of a hospital which has a COVID block. N95 mask is required only when the patient is a resident of containment zone [18]. American college of surgeons (ACS) recommend only surgical mask while handling a patient not suspected for COVID-19. But due to potential risk of screening test being false negative maximum respondents reported use of N95/respirator masks, eye protection and double gloves [19, 20].

Use of PPE by HCWs is associated with PPE-related adverse effects. The presence of preexisting health issues like asthma, headache, migraine, contact dermatitis, claustrophobia and use of power glasses may aggravate the discomfort caused by PPE use [21]. Prolonged use of PPE has been associated with adverse physical effects such as difficulty in breathing, communication, headache, dizziness and impaired vision. Fatigue, dehydration and hyperthermia are other side effects reported with use of PPE [22]. In a study by Carlos et al., evaluating the impact of PPE on surgical performance during COVID-19 pandemic showed two-third (66%) expressed a decrease in overall comfort, a significant majority (82%) an increase in surgical fatigue and 54% reported problems in communication [23]. In a cross-sectional study by Jonathan et al., 81% healthcare workers reported PPE-associated headaches which affected their level of work performance [21]. In a survey of 129 HCWs conducted by Yuan et al., 94.6% healthcare

professionals reported adverse reactions [24]. Respondents reported difference in the level of discomfort reported by different types of PPEs. In our study, more than 95% respondents reported symptoms like difficulty in breathing, communication, dryness of mouth, claustrophobia, headache, due to the use of face masks. Fogging, headache and poor visibility was reported with use of eye protection equipments. Use of eye protection was found incompatible with the loupes and glasses in 14% individuals, which added to the discomfort. Multiple symptoms were seen in individuals.

Minimal invasive surgery can be performed during pandemic with extra precautions. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGE) and European Society of Gynecologic Endoscopy (ESGE) provide recommendations for the use of laparoscopy during pandemic [25]. To reduce aerosol transmission, use of closed circuit flow to maintain pneumo-peritoneum and use of suction device for releasing the gas through filtered port are recommended. Sudden loss of unfiltered gas and spillage of body fluids should be prevented during colpotomy and extraction of uterus through vagina. In our study, half of the respondent reported the use of extra precautions while performing MIS.

To conclude, the current study provides a snapshot of the pharmacologic substance used by healthcare works for COVID-19 prophylaxis. Very few studies have evaluated the impact of PPE usage on the physical and mental health of the individual. Our study highlights the problems faced by the gynecologic onco-surgeon while operating with PPE in COVID-19 pandemic. The limitations of this study are that the results of the survey may be subject to response bias. Secondly, the survey was made broadly available through social media, and hence there is no denominator to establish a response rate of survey.

Use of pharmacological prophylaxis against COVID-19 is controversial and the same is reflected in our survey. Most respondents adhered to PPE use despite experiencing some physical discomfort.

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### Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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