

Role of Pan-Tilt Camera in Tele-interaction During Surgery at the Time of COVID-19 Crisis

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How to cite this article:

Shijina Koliyath, Ravi Kumar Chittoria, Barath Kumar Singh. P/Role of Pan-Tilt Camera in Tele-interaction During Surgery at the Time of COVID-19 Crisis/New Indian J Surg. 2023;14(1):9-12.

Abstract

Telemedicine plays an important role in imparting healthcare facilities worldwide in special situations like the COVID-19 crisis. Use of technology in healthcare has come a long way. Special cameras for surveillance and interaction have been used in fields of industries, offices, home based and national security systems etc. Here we describe our experience regarding the use of Pan-Tilt camera in tele-interaction during surgical procedures during the time of corona pandemic.

Keywords: Pan-Tilt (Pan-Tilt) Camera; Telesurgery; COVID-19 crisis.

INTRODUCTION

COVID-19 pandemic has been ravaging its influence and spreading all over the world in a rapid pace since its advent in December 2019 in Wuhan in China.¹ Lots of people all over the world have been affected including healthcare workers, many of whom have lost their life to the disease. Corona virus disease is spread by droplet infection

and risk of spread of the infection in a hospital setting from patient to healthcare worker, from healthcare worker to another healthcare worker is high, especially when there is lack of personal protective equipment to healthcare workers worldwide. Social distancing has become a norm during the time of this corona crisis. Tele-interactions have become more and more popular with regards to consultations and imparting medical education. Thus, Telemedicine and tele-consultation has become an important aspect of healthcare worker patient interaction during corona pandemic. In this study we describe our experience regarding use of PT (Pan-Tilt) camera for live interaction between trainee surgeon and consultant during surgical procedure in the operating room.

MATERIALS AND METHODS

This study was conducted in a tertiary care center in the department of plastic surgery during April-May 2020 at the time of COVID-19 pandemic after the departmental committee ethical approval.

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Received on 31-12-2022

Accepted on 25-01-2023

Informed consent was taken from the participants, both healthcare workers and the patients. Pan-Tilt camera was installed in the operation theatre and smart phone devices were configured and application was downloaded. Once the device is set and camera installed, the senior consultant interacted with the trainee surgeon during a surgical procedure to provide needful advice and to tele-monitor the procedure, thus maintaining social distancing norms and unnecessary exposure to corona virus. (Fig. 1, 2).



Fig. 1: Pan-Tilt Camera

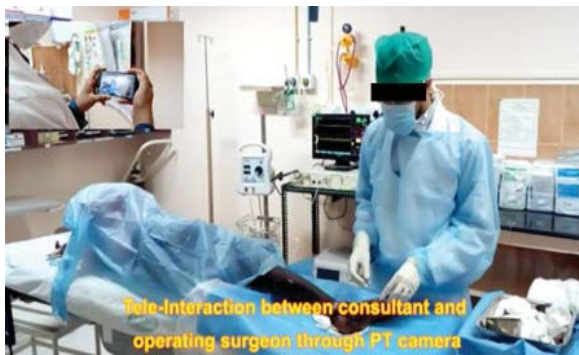


Fig. 2: Tele-interaction between consultant and operating Surgeon.



Fig. 3: Tele-Interaction and Telemonitoring of Surgery by consultant from remote location.

The consultant interacted with the operating surgeon in real time and monitored the surgery and provided useful inputs at that point of time through tele-medicine. (Fig. 3.)

Table 1: Feedback Proforma

Question	Consultant	Trainee Surgeon
1. Were you satisfied with the audio quality of the teleinteraction?	-	-
2. Were you satisfied with the video quality of teleinteraction?	-	-
3. Were you satisfied with the consultant-trainee interaction regarding clearing of doubts and tele-monitoring of surgery?	-	-
4. Do you find this initiative cost-effective and reducing unnecessary Operating room visits?	-	-
5. Do you find it useful in practicing social distancing at the time of COVID-19 Pandemic?	-	-
6. Would you recommend it to be used by other practitioners/healthcare institutes?	-	-

The consultant was always available in case his physical assistance was required during the surgery. Feedbacks were taken from the consultant and the trainee surgeon at the end of interaction. (Table 1)

The steps of setting up the camera is given in the quick start guide provided with the device, the salient steps include:

1. Power On: Plug the power cable into the camera, and then plug the power adapter into an outlet.
2. Camera setup: a) Create an user account-download and install EZVIZ app.b) Add camera to EZVIZ. c) Enable the Image Encryption. d) Angle Adjustment.
3. SD Card Management
4. Mounting of the camera on wall or ceiling.

The details of each step with pictorial representation are provided with the user manual.

RESULTS

At the end of the study it was found that both the consultant surgeon and trainee surgeon gave positive feedback regarding the use of PT camera for tele-interaction during surgery. The application helped in maintaining social distancing and utilising telemedicine for patient care at the time of corona pandemic.

DISCUSSION

COVID-19 (Corona Virus Disease-2019) pandemic is spreading rapidly worldwide since its advent in December 2019. Human coronaviruses (HCoVs) represent a major group of coronaviruses (CoVs) associated with multiple respiratory diseases of varying severity, including common cold, pneumonia and bronchitis.² Measures like maintaining social distancing, wearing masks, staying at home, avoiding social gatherings etc. have been implemented worldwide, many countries have declared lockdown for days allowing only emergency medical services and other essential services to function. Disease in healthcare workers is also on the rise owing to interaction with affected patients. Unnecessary hospital visits are being avoided. Patient monitoring and interaction has taken a new form owing to telemedicine services. Hospitals and healthcare workers are striving day by day to provide medical services to corona as well as non-corona patients taking precautions to not spread the disease from patient to healthcare workers and vice-versa. At this difficult times technology has helped in imparting medical education and training as well. All around the globe telemedicine lectures and seminars are being conducted in the form of webinars and other live interactions using applications like zoom, google meet etc. Technology in its varied forms is also being utilised for imparting medical education during surgical procedures to trainee surgeons as well.

WHO defines telemedicine as "The delivery of healthcare services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities."³ There are various telemedicine applications which

can be classified into 4 basic types, according to the mode of communication (video, audio, text based, according to timing of information transmitted (Real time video/audio/text interaction), according to purpose of consultation (diagnosis, treatment, health education, counseling for non-emergency consultation and immediate assistance or first aid for emergency consultation) and according to individuals involved (doctor to patient, doctor to care giver, doctor to doctor, healthcare worker to doctor).⁴

Pan tilt camera facility with smart phone device application can be used for various telemedicine applications. It is easy to set-up, user friendly, can be accessed from anywhere and of utmost importance at time of pandemics such as corona for maintaining practices of social distancing. The PT camera application is available freely in google play store/Apple store for all smartphones. Multiple users can install it for tele-monitoring and tele-interaction.

PT camera can connect using any available Wi-Fi network or mobile data (3G/4G) network. Once PT camera is configured in a specific network, then tele-interaction is possible from anywhere, inside or outside the hospital.

The PT camera has the following features and specifications Resolution 720p or 1080p, Lens-4mm@F2.2, view angle 90 degree (diagonal) Pan and Tilt (Pan angle upto 340 degree, tilt angle upto 120 degree), Smart motion Tracking, Privacy mode, 2.4GHz Wi-Fi only, Night Vision(upto 33ft/10m), Two-way talk 16ft/5m Mic Pickup, Intelligent Linkage with alarm sensors via EZVIZ app, MicroSD Slot for Local Storage (upto 128GB). The operating conditions are temperature between 14degree Fahrenheit to 113 degree Fahrenheit. Dimensions 87.7X87.7x112.7mm, weight of 256gram. The camera costs around 11,300 Indian Rupees.

Once the application is installed and camera access is obtained, the camera can be accessed from anywhere from any distance provided internet connectivity is present. Many smart phone devices can be connected to a single camera.

These cameras have been traditionally used for CCTV surveillance for industrial and home based use. Their use in telemedicine has opened up new avenues. Some of the limitations include its availability and cost factor.

CONCLUSION

The use of PT camera for tele-interaction between consultant and trainee surgeon has been found useful especially in imparting medical education and patient care while upholding social distancing and avoiding unnecessary hospital visits. The limitations of the study include that it is a single institute study without any statistical analysis; further randomised controlled studies are required to further substantiate the results.

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