Type of manuscript: ***Original Article***

Literature Review in Forensic Practitioner and COVID-19

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Abstract

In the present scenario where everyday new facts of the SARS-CoV2 virus arises, a glimpse on the existing guidelines and the role of the forensic practitioner in COVID-19 cases has been studied. In our study we found that extensive studies have been done on the droplet mode of transmission and prevention of the disease. A comparative glimpse at the guidelines showed the importance of isolation and prevention practices. Using the National guidelines, International guidelines on the disposal of body and autopsy practises a study was done. It was observed that the basis of all guidelines was infection prevention and isolation techniques. Use of disinfectants after contact has been the basis in guidelines.

Keywords: *Forensic Practitioner; COVID-19; autopsy; disinfection; national guidelines; international guidelines*

Introduction

The term Forensic Practitioner has been defined in Forensic Science Regulator as a person who collects, discovers and analyses scientific evidence from crime scene to court [1].

World Health organisation has given the official name of the disease Corona Virus Disease abbreviated as COVID-19 [2]. Royal College of Pathology in its COVID-19 guidelines has advised if death is believed to be due to confirmed case of COVID-19 infection , a post mortem is not needed and medical certification of cause of death can be given. Inclusion of autopsy workers has been included in their Yellow manual with effect from 2003 [3].

In 1965, history of Corona Virus began. Tyrell and Bynoe studied the organisms isolated from patients of human embryonic tracheal culture and found it to be infectious agent as when they introduced it into human volunteers, they were infected with common cold. 229E, B814, OC 43 were discovered in sixties with Surface (S), Membrane (M) and envelope (E) protein [4].

This was accepted as a new genus of virus, CORONA. Named so because in electron micrograph of its negatively stained appearance, the surface projections gave it a crown like appearance [4]. Corona virus develop in the cytoplasm of infected cells, budding into cytoplasmic vesicles from the endoplasmic reticulum. They are extruded from cells within the same time frame and cell is destroyed. They are capable of genetic mutation if two viruses infect a cell at the same time [4]. The virus has been named SARS-CoV2 by the institute of taxonomy after the genotype was isolated by China [2].

Methodology

We reviewed and did a literature search on the guidelines on the internet about the role of forensic practitioner in COVID-19. Our keywords were forensic, autopsy, COVID-19, biosafety level. After collecting guidelines of various health agencies and reliable associations we were able to draw a comparative glance at the guidelines issued by the authorities to have a clear picture on the role on forensic practitioner in COVID-19. We were finally able to finalise on the following guidelines: Royal College of Pathology.

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New briefing on COVID-19, CDC-COVID19 and health care departments and professionals, WHO Status update COVID-19, WHO infection Prevention control guidelines, Institute of Forensic Medicine Malaysia, precautions for handling and disposal of dead bodies, Hong Kong, COVID 19 GUIDELINES India, AIIMS New Delhi COVID -19 Guidelines.

Results

In the literature we found the basic concept of droplet transmission [2]. It is spread of infectious agents from infected source caused by dissemination of droplets. As in the guidelines, during coughing, sneezing and talking, transmission occurs when at a distance of less than one meter they are propelled. They are then deposited on the conjunctiva, eyes, mouth, nose, throat. Maximum volume travel short distance, less than 1 meter and do not remain suspended in the air. Airborne transmission is when the droplet nuclei remain infectious when suspended I the air for a long time. They are obligate and preferential type of airborne transmission. Community transmission is increasing test through sentinel samples. Local transmission is where source of infection is within the location reporting [2].

Universal precautions were introduced by Centre of Disease Control in 1985. In 1996 the CDC guideline for isolation, precaution sin hospital combined Universal precautions and body substance isolation into what is known as Standard Precautions. Irrespective of the disease state, the precautions which are applied are known as Standard Precautions. It includes hand hygiene and Personal protective equipment. Hand hygiene includes hand wash, hand rub or wash with anti-septic and surgical hand wash. Additional precautions are used in specific circumstances. Personal protective equipment are used to protect the health care workers from getting infected [5,6].

A comparative study of the various guidelines weas done. It was found that all guidelines emphasized on the principles of infection prevention and control practices. They emphasised on the use of the hand hygiene, universal precautions and appropriate waste disposal [5,6,7,8,9,10]. The guidelines were in union on the decision avoiding of embalming the body [6,8,9,10]. The confirmed cases of the COVID-19 were not to be sent for autopsy [3]. Infection prevention practices were emphasised repeatedly for health care workers, people involved in transferring the body, relatives of the deceased, mortuary staff [3,6,7,8,9,10,11]. Use of body bag was advised by all to reduce contact with body fluids [6,7,8,9,10]. Disinfectants to be used wherever the body was in contact [6,7,8,9,10]. Use of safety cabinets and negative pressure in autopsy rooms has been advised [6,7]. Use of airborne infection isolation room has also been advised [7]. Air exchange of 6 per hour and differential pressure with exhaust and closed door has been advised [6,7]. Use of such instruments which reduce aerosol generation like round ended scissors, PM 40, hand shears, oscillating saw with vacuum shrouds is advised [6,7,8,9]. Mortuary and dissection comparison is tabulated in table 1. Disposal of waste as per the national guidelines [6,7].One dissector at a time and one cavity dissection at one time has been stated in mostly all guidelines [3]. Respecting the religious sentiments of the deceased and with the use of standard precautions body can be either cremated or buried after handing over to relatives [8,9].

The difference in the guidelines were as under- while some said that autopsy could be done on probable cases of COVID-19 [9], others advise that is preferable to avoid autopsy in such cases [6,8]. Transfer of the body from ward to mortuary was advised in some [9], others said that if autopsy is not warranted, body can be handed over to the relatives [8]. Body bag was advised by all the guidelines [6,7,8,9,10]. A single layer[6,7] of impermeable body bag to double layer[9] is recommended. Some guidelines have said that a layer of white sheet outside the body [9] and then a double layer of body bag [9] can be used. Variation in the concentration of sodium hypochlorite from 0.5-3 % has been advised[6,7,8,9,10]. Table 2 enlists the differences in body bag and waste disposal. Few guidelines mention use of ethyl alcohol or disinfectants approved by their authorities [7] Use of airborne infection isolation room, safety cabinets has also been advised [6,7] and avoid water splash or spray. Specimen collection has been emphasised especially the upper respiratory tract swab and lower respiratory tract swabs. Clinical specimen and formalin fixed tissue specimen to be sent for histopathology analysis[7]. Two sample collection from the same site has been advised to test for the virus and other respiratory pathogens[7]. Unfixed organs held firm on the table and sliced with a sponge Added protection when dissecting lungs[3,8] and washing intestine under water [6]. Body can be handed over to relatives after

autopsy [6,7,8,9,10]. Sometimes, body is refrigerated before handing it over to relatives[9]. The relatives if they wish to see the body, are under supervision[9] and practise infection prevention guidelines. Ash can be collected after the cremation [8].

Discussion

The basis of the guidelines is the current knowledge of droplet transmission and travel related cases. Biosafety level 2-3 is recommend by the guidelines[3,6]. The infective aerosol, infected body fluid, nonintact skin, existing co-morbidities of the deceased and the health care workers form the basis of the guidelines [6,7]. The minimising of aerosol generation is emphasised by the use of instruments and guiding principles of not re-capping the needles and syringes and disposal in puncture proof container [6,7,8,9,10]. Removal of intravenous catheter and central lines or ports at the ward and disinfecting the surfaces is to reduce the chance of infection with the fomites [8]. Packing of the body in layers of adsorbents and body bag with disinfectant application in outer layer emphasise on the same principle[9]. Preventing aerosol in the dissection room by using negative pressure rooms, closing doors and appropriate instruments has been underlined by all guidelines[6,7,8,9,10]. One dissector at a time in one cavity is the underlying principle [3]. Tasking role before conducting the autopsy has been highlighted [9]. Emphasis on specimen collection has been duly laid [6,7]. Handing over the body to the relatives post autopsy respecting their religious sentiments should be done [6,7]. Disinfection and chemicat pre-treatment of the liquids before disposal was emphasised in all [6,7,8,9,10].

Administrative emphasis on containment approach and empowering officers to take such measures to facilitate emergency management and Government policies in managing the outbreak is resonant in all guidelines.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: taken from IEC committee in Mar 2020

Table Number 1: Differences in Mortuary and Dissection

Legend

COVID-19: Corona Virus Disease 2019

NIFM,Malaysia: National Institute of Forensic Medicine, Malayasia

MoHFW: Ministry of Health and Family Welfare

CDC: Centre of disease Control and Prevention

WHO: World Health Organisation Infection Prevention and Control during Health Care for Probable or confirmed cases MERS-CoV

Table Number 1:

Guidelines Features	NIFM, Malaysia	MoHFW	CDC	WHO
Autopsy in confirmed cases	Not needed	---	--	Not needed
Autopsy in probable cases	Done	To be avoided	Jurisdictional decision	To be avoided
Mortuary room	Respective mortuary	Negative pressure	Airborne infection isolation rooms Biosafety cabinets	Negative pressure Exhaust fans Dress in/out Autopsy room

Cont... **Table Number 1:**

Number of people conducting autopsy	3-4. role assigned before conducting the autopsy.	Minimum number of people.	Minimum number of people.	Minimum number of people.
Instruments	Prevent aerosol production	Round ended scissors PM 40	Hand shears/Oscillating saw with vacuum shrouds	Avoid use of power saw, splashes
Body cavity	one person at a time	One cavity at atime	--	One person at a time
Organ dissection	Respiratory tract specimen. Blood specimen	Unfixed organs held firm on the table. Sliced with a sponge Added protection when dissecting lungs	1. Upper respiratory tract swab 2. Lower respiratory tract swab 3.Formalin fixed autopsy tissue 4. Clinical specimens	1. Remove tissue with absorbent material 2. Washing of intestines 3. Lung : additional respiratory protection

Table Number 2

Guidelines Features	**NIFM, Malaysia**	**MoHFW**	**CDC**	**WHO**
Body bag	Body bag 1. White cotton 2. 02 Body bag Disinfect	Body bag: 1. Leak proof plastic bag 2. Mortuary sheet/bed sheet 3. Disinfect	Body bag	Single layer
Environmental cleaning	0.5% sodium hypochlorite Autopsy room: BSL 2	1% sodium hypochlorite Contact time: 30 mins Air dry	EPA approved products	1% sodium hypochlorite Contact time: 10 mins Ethyl alcohol
Linen	Disinfect	Standard precautions Biohazard bag -> yellow	Biohazard bag- disinfect	Linen
Disposal of sharps	Puncture proof container			

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