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COVID-19: Role of Epidemiologist in Public Health Emergency, India

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ABSTRACT

COVID-2019 disease is also known as 2019-nCoV acute respiratory disease, Novel corona virus in December 2019 and has infected more than Twenty million people with over Eighty Thousand people who died of the pandemic till 25 August 2020. The World Health Organization (WHO) has declared the corona virus outbreak (2019-20) as a public health emergency of international concern (PHEIC) on 30th January 2020 and a pandemic on 11th March 2020. Viruses can be prevented by adopting proper personal and respiratory system hygiene and maintaining a distance from society timely. Although doctors and nurses may be the front line and visible image of health care workers. In the ongoing fight against the virus, there are other health workers behind the scenes, such as Epidemiologists control the epidemic day and night Data and data are the focus of disease prevention and control. The epidemiologist/surveillance officer/doctor conducting the epidemiological investigation should close the case inquiry forms for all Covid-19 cases that meet the standard / surveillance case definition.

Keywords: COVID-19, Epidemiologist, Outbreak.

INTRODUCTION

COVID2019 disease is also known as 2019-nCoV acute respiratory disease, Novel corona virus pneumonia, Wuhan pneumonia. In December 2019, the first case of corona virus disease 2019 (COVID-19) was reported in Wuhan, China, during an outbreak of viral pneumonia. An initially it was regional epidemic and now expanded to a global pandemic affecting at least 309 countries with significant morbidity and mortality.

Infectious diseases refer to diseases with medical symptoms and signs caused by growing pathogenic biological agents or infections in individuals/hosts/organisms, and are also called infectious diseases or infectious diseases. [(1)]

The virus was identified as COVID-19 (new corona virus), called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), an enveloped single-stranded RNA virus that has the same characteristics as SARS-COV-1 Similar phylogeny. [(2)]

The World Health Organization (WHO) has declared the corona virus outbreak (2019-20) as a public health emergency of international concern (PHEIC) on 30th January 2020 and a pandemic on 11th March 2020. [(3)] The WHO has also prepared guidelines to fight corona virus by introducing eight pillars of support:

1. Country level coordination, planning and monitoring
2. Risk communication and community engagement
3. Surveillance, rapid response teams and case investigations
4. Points of entry

5. National laboratories
6. Infection prevention and control
7. Case management
8. Operational support and logistics

Although many details of the emergence of the virus (such as its origin and ability to spread between humans) are still unknown, it seems that human-to-human transmission is causing more and more cases. In view of the outbreak of severe acute respiratory syndrome corona virus (SARSCoV) in 2002 and the outbreak of Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012, 2019-nCoV is the third occurrence of humans in the past two decades Coronavirus. This puts global public health institutions on high alert

In India total 29,67,844 Cases of COVID-19 have been reported, including 56,202 Deaths as of 2nd August 2020. [(4)]

Public health supervision, field investigation, analysis, research, evaluation and contact. From disease surveillance to field evaluation and policy formulation, [(5)] Epidemiologists usually revolve round collecting scientific and fitness records from the field, lookup or historic data, evaluation of gathered data, and presentation of findings. The findings can be used to advance public fitness initiatives or find out how illnesses originate, spread, and can be treated. Although people are living longer and many illnesses are no longer harming humanity as they used to, epidemiologists are nonetheless important. Epidemiologists play a crucial function in outbreak control. [(6)]

China responded quickly by informing the World Health Organization (WHO) of the outbreak and sharing sequence information with the international community after discovery of the causative agent. The WHO responded rapidly by coordinating diagnostics development; issuing guidance on patient monitoring, specimen collection, and treatment; and providing up-to date information on the outbreak. Several countries in the region as well as the United States are screening travellers from Wuhan for fever, aiming to detect 2019-nCoV cases before the virus spreads further.

History of COVID-19

2019, Chinese authorities had notified W.H.O of several cases of pneumonia of unknown etiology. The outbreak was reported in a seafood wholesale market in Wuhan, China in December last year, and 66% of employees showed symptoms.

On January 20, Washington State in the Northwest Pacific confirmed the first known case of COVID-19, and the person returned from Wuhan on January 15. [(7)]

The novel coronavirus was declared a public health emergency on January 30, and was named COVID-19 on February 11, 2020. [(8)]

Kerala, India reported its first case of COVID-19 infection. On January 27, 2020, a 20-year-old woman went to the emergency department of Thrissur General Hospital in Kerala. She had a history of dry cough and sore throat one day. There is no history of fever, rhinitis or shortness of breath. She revealed that due to the COVID-19 outbreak there, she returned to Kerala from Wuhan, China on January 23, 2020. [(9)]

In the first COVID-19 case reported in Rajasthan on March 2, 2020, a 69-year-old Italian tourist among 23 tourists from Italy tested positive for COVID-19. [(10)]

In Rajasthan on August 22, 2020 had a total of 67,954 cases with 933 deaths and 51,698 discharged. [(11)]

Symptoms of COVID-19

The first people infected with COVID-19 are related to animal and seafood markets. This fact indicates that animals initially transmitted the virus to humans. However, people with newer diagnoses have no relationship or contact with the market, thus confirming that people can spread the virus to each other. There is currently little information about the virus. In the past, respiratory diseases caused by

coronaviruses (such as SARS and MERS) have been spread through close contact.
Common symptoms include

1. Fever
2. Breathlessness
3. Cough
4. It may take 2–14 days for a person to notice symptoms after infection
5. Expectoration
6. Myalgia
7. Loss of smell (anosmia) or loss of taste (ageusia)

The Director-General also pointed out that the risk of serious complications increases with age. According to WHO. Severity grades the percentage of people with COVID-19 is mild disease, from which a person can recover more than 80% of serious diseases, causing breathing difficulties and pneumonia. About 14% of serious diseases, including septic shock, respiratory failure and More than one diseased organ about 5% fatal disease 2%. **(12)**

According to M.O.H.F.W. In India, the most common sign and symptoms of COVID-19. Positive patients experience fever, Body-ache, fatigue, weakness, a dry cough and some patients have a history of pain, nasal congestion, diarrhea, sore throat, or runny nose. These symptoms are usually moderate and started regularly. Some people become infected, but they do not have any symptoms and do not feel bad. Most people (about 80%) recover without any special treatment. About 1 in 6 people who develop COVID-19 will become seriously ill and have trouble breathing. Older people and those with underlying health problems, such as high diabetes, heart problems or blood pressure, are more likely to develop serious illnesses. People with a fever, cough, and shortness of breath should seek medical attention. **(13)**

Corona Virus Spread Following Ways:

Coughing and sneezing without covering the mouth can disperse droplets into the air. Touching or shaking hands with a person who has the virus can pass the virus between individuals. Making contact with a surface or object that has the virus and then touching the eyes, nose or mouth. Some animal coronaviruses, such as feline coronavirus, may spread through contact with faces. However, it is unclear whether this also applies to human corona viruses. The National Institutes of Health (NIH) suggest that several groups of people have the highest risk of developing complications due to COVID-19. These groups include: People aged 65 years or older, Young children, Women who are pregnant Coronaviruses will infect most people at some time during their lifetime. Coronaviruses can mutate effectively, which makes them so contagious. To prevent transmission, people should stay at home and rest while symptoms are active. They should also avoid close contact with other people. Covering the mouth and nose with a tissue or handkerchief while coughing or sneezing can also help prevent transmission. It is important to dispose of any tissues after use and maintain hygiene around the home. **(14)**

Epidemiology of COVID-19

Data provided by the WHO Health Emergency Dashboard report 22,536,278 confirmed cases of COVID-19, including 789,197 deaths (as of 6:48 pm CEST, 21 August 2020).

Table-1 the number of cases of COVID – 19 outbreak according to WHO situation reports on August 11, 2020.

S. No.	Country	Cases
1	America	12,028,928
2	Europe	3,909,981
3	South-East Asia	3,383,904
4	Eastern Mediterranean	1,790,071
5	Africa	984,140
6	Western Pacific	438,513

The latest epidemiological information about this epidemic can be found in the following sources:

- WHO's new coronavirus (COVID-19) dashboard.
- The Coronavirus Global Cases COVID-19 site of the Johns Hopkins University Center for Systems Science and Engineering, which uses publicly

available resources to track the spread of the epidemic.

Current evidence for COVID-19 suggests that the causing virus (SARS-CoV-2) has a zoonotic source closely related to the SARS-like coronavirus from bats. It is an encapsulated beta RNA coronavirus related to the severe acute respiratory syndrome virus (SARS) and the virus has been shown to use angiotensin converting enzyme receptor 2 (ACE2) to enter cells. People infected with the new coronavirus are the main source of infection. Direct human transmission occurs through close contact, mainly through airway droplets, which are released when an infected person coughs, sneezes or talks. These droplets also can land on surfaces where the virus remains alive. Infection can also occur when a person touches an infected surface and then touches the eyes, nose, or mouth. The median incubation period is 5.1 days (range 2-14 days). The exact time a person with COVID-19 is contagious is uncertain. According to the current evidence, the infectious period begins 2 days before symptoms appear and lasts up to 8 days. The extent and role of preclinical / asymptomatic infections in transmission remains under investigation. [(15)]

In December 2019, many cases of pneumonia were reported that occurred in Wuhan City and source searches pointed to the Huanan Seafood Market. The first case of the COVID-19 epidemic was detected with unexplained pneumonia on December 12, 2019, and 27 cases of viral pneumonia, seven of which were severe, were officially announced on December 31, 2019. Etiological studies were performed on patients. who were admitted to hospital because of similar viral histories of these patients increased the likelihood of infection from animals to humans. On January 22, 2020, the new CoV was considered to be derived from wild bats and belongs to Group 2 coronavirus containing the coronavirus associated with severe acute respiratory syndrome (SARS-CoV). Although COVID-19 and SARS-CoV belong to the same subgroup beta corona virus, the similarity at the genome level is only 70%, and the new group shows genetic differences compared to SARS-CoV. took place during the Spring Festival in China, which is the most famous traditional festival in China, with nearly 3 billion people traveling across the country. These conditions have created favorable conditions for the transmission of this highly contagious disease and serious difficulties in epidemic prevention and control. [(16)]

Table 2: State/UT wise list of COVID confirmed cases. (As on 22.08.2020 at 01:53 PM). [(5)]

S.No.	State	Cases	Deaths
1	Delhi	158604	4270
2	Haryana	52164	585
3	Rajasthan	68566	938
4	Kerala	54182	204
5	Maharashtra	657450	22013
6	Gujarat	84311	2867
7	Uttar Pradesh	177239	2797
8	Madhya Pradesh	50640	1185
9	Bihar	117671	588
10	Goa	13484	135

Role of Epidemiologist in Disease Outbreak

Epidemiology is art of science in which we study distribution (frequency and pattern) and determinants of health related events in populations and the use of this study in the prevention and control of health problems. At the time of outbreak of any health related problems, Epidemiologists are actively engaged, and use epidemiological method to find out the cause of outbreak.

Once an understanding has been reached that an assessment should be carried out before or generally at the same time as emergency operations, the role of the epidemiologist is collection of useful data from a field, analyses and summaries complex epidemiological data for making various policies to control and prevent health problems. Epidemiologists are front line health worker in every pandemic situation. Epidemiologists give active participation in public health policy making.

Responsibilities for Epidemiologist

- ✧ Identify health problems in an affected community

- ✧ Find out origin and a mode of the transmission of disease.
- ✧ Obtained data from disease survey ,clinical study ,Interview study
- ✧ Analyse complex epidemiological data and find out conclusions.
- ✧ Creates a plan of action for stop health crises in population
- ✧ Create reports detailing various component of disease.
- ✧ Presenting epidemiological data for policy making.
- ✧ Communicates with policy makers on public health.
- ✧ Manage multiple roles in a project at once.
- ✧ Create various public health awareness programs and supervise them.
- ✧ Conducting various studies to gain more information regarding health problems.

Epidemiologist Following Step for Disease Outbreak

Epidemiologist is a backbone of investigation of a disease outbreak. The main objective of investigation a disease outbreak is-

1. Define the outbreak in the term of time place and person.
2. Line list responsible factors for origin of disease.
3. Find out cause, source, and various modes of transmission of a disease.
4. Make recommendation to prevent disease recurrence.

In investigation main aim is find out the correct cause of morbidity and mortality in specified population and implement its appropriate disease control to reduce and prevent mortality.

According CDC Applied Epidemiologists approach the investigation of a disease outbreak using the following 12 steps:

Step1.Prepare for field work

Preparing for the field work is totally depended on epidemiologists. He can decide to conduct a field investigation before conforming increase in cases or after conforming increase in cases. Most of time epidemiologists discover that increase of number of a particular disease in a specified population then they decide to go in a field.

According to CDC field preparation can be divided into 2 categories.

1. Scientific issue
2. Management and operational issue.

Step 2. Establish the existence of an outbreak

This is 2nd step of outbreak investigation. in this step epidemiologist compare disease frequency with available data of the corresponding period of past 2-3 years. The applied epidemiologist must compare local and regional disease patterns and prevalence prior to the increased cluster of cases at the outbreak site. The applied epidemiologist asks: Is this a real outbreak? After assessing the evidence, the answer is either "yes" or "no." If "yes," then they move to step 3.

Step 3. Verify the diagnosis

This step is closely linked with existence of disease. To verify the diagnosis epidemiologist can use this three investigation method.

1. Medical Investigation
2. Laboratory investigation
3. Epidemiological investigation

With the help of clinician, disaster response team, laboratory testing result, survey findings epidemiologist scientifically collect all evidence to prove disease outbreak in a population.

Epidemiologist will look into epidemiological and environmental aspect of outbreak. Basic aim is identify the source of problem.

Step 4. Define and identify cases

It is a standard criterion for deciding that an individual should be classified as having the health condition of interest.

The applied epidemiologist, again, working with team members and local public health officials set about trying to

identify all individuals who "fit" the case definition.
Epidemiologist conduct descriptive epidemiologic studies the disease outbreak in terms of person, time and place.

Step 5: Find cases systematically and record information; Epidemiologist design an epidemiological case sheet to collect relevant information like(name, age ,sex ,occupation, social class, travel history, sign and symptoms of illness ,personal contact at home, work, school, and other place. special events .former medical history and many more.
Demographic data, clinical information, and risk factor information along with other pertinent data. These data are, then, assembled in a way that helps describe the disease cluster and how it moved through the specific population.

Step 6- perform descriptive epidemiology: Collecting and identify basic information of the person with disease in this steps epidemiologist define outbreak in time, place, and person. This steps help epidemiologist to find out following things;
Compressive characteristic of the outbreak.
Identify population at risk for the disease.
Provide basic clues about etiology and mode of transmission.

Step 7. Develop hypotheses
The applied epidemiologist uses the knowledge and expertise in hypothesis generation to posit a working hypothesis for the disease outbreak given the available data from Steps 2 thru 5.

Step 8. Evaluate hypotheses epidemiologically
At this step, the applied epidemiologist uses available data (mainly from Step 5) to statistically evaluate the working hypothesis (calculating and evaluating rates, discussed above) along with evaluating the tentative data and conclusions with other public health personnel on-site to establish face validity.

Step 9. Refine hypotheses and carry out additional studies
Additional data are still coming in to the applied epidemiologist from the impacted community. This additional data are further evaluated to determine if the "new" data and the related conclusions comport with the earlier conclusions in Step 7. If not, the working hypothesis would need to be refined.

Step 10 Compare and reconcile with lab and environmental studies
The epidemiologist playing major role. Epidemiology can suggest vehicles and guide appropriate public health actions, while laboratory evidence can confirm findings.

Step11 Implement control and prevention measures
Once the working hypothesis has been confirmed, the applied epidemiologist, again working with local public health personnel, develop and deploy appropriate disease control measures. These basic disease control measures were previously discussed in the response at Lecture 3, Item 11 (above). The disease control measures must be implemented and assessed to confirm effectiveness in arresting the disease.

Step 12. Communicate findings
For the applied epidemiologist, "the investigation is not complete until the results are disseminated to the appropriate parties" (Gerstman, 2003, p. 363). The applied epidemiologist must deliver an oral report to local officials summarizing the above steps; this oral briefing should be in "plaiblanguage" and present the main findings of the outbreak investigation. A scientific report must, also, be prepared to document the initial activities, interim actions, final actions taken, and any recommendation for local public health officials to consider following the outbreak investigation (CDC, 2006).

Disease Surveillance

The important information in disease surveillance are - who many gets the disease, how many get the disease, where did they get the disease, why did they get the disease, and what needs to be done as public health response.

The components of the surveillance activity are:

(a) Collection of data
(b) Compilation of data
(c) Analysis and interpretation
(d) Follow-up action
(e) Feedback.

The epidemiologist ensures proper data collection, which is one of the stages of disease surveillance. Other steps include reporting, data collection, data analysis, evaluation, and action.

The collected samples are sent to COVID-19 laboratories for analysis, then tested, and then efforts are made to isolate the patient if positive.

Disease monitoring is the continuous scrutiny of occurrences of health events that allow for timely response in its control and serves as an effective way to control disease. Disease surveillance also means looking out for new and emerging diseases and an example is "Mad Cow disease" in the 1980s". [(17)]

Disease surveillance has been recognized as an effective disease prevention and control strategy, in particular for diseases that are prone to epidemics. Disease surveillance is the first link in the response to emerging infections such as COVID-19. Disease surveillance includes an epidemiologist, a public health laboratory, and a healthcare system that includes 4 core components: namely collection, analysis, dissemination and response. [(18)]

Field Investigation

Surveillance provides the information needed to operate. After the observation, the epidemiologist conducts an investigation. Field studies are the means by which data is pushed into action, the primary function of epidemiologists who conduct research in others to identify disease causes and risk factors. This may be the identification of the patient's travel history, the treatment plan to date, and the identification of contacts with the patient. It is invaluable to understand community values and the vocabulary they used to identify health and disease. [(19)] Fields experience from previous outbreaks helps the epidemiologist recognize the data that is most critical in identifying threats and planning and evaluating strategies for a specific situation. Field studies help to understand the prevalence of diseases, especially new diseases, and are often carried out in response to serious public health problems. [(20)]

Communicating

As health communicators, we can help by delivering reliable information to the public accurately and in a timely manner, so that people can make decisions based on facts instead of rumors. Part of the reason is to be aware of any inaccurate information that peoples may share on social media or elsewhere. We can also be careful not to exaggerate the facts, but instead focus on helping people understand their personal health risks and what measures should be taken to control the spread of diseases.

- Who is at the greatest health risk?
- When does this information apply to them?
- What actions can they take?

Public health information epidemiologists and other public health professionals have played an active role in disseminating public health information provided by surveillance and health information to public health care providers and decision makers. [(21)] This is important because effective communication is a means for epidemiologists to influence policy, and there is an increasing need for epidemiologists to influence the public when designing, interpreting and reporting their work. Communication about increased

exposure prompts outbreak investigation. (22)

Contact-Tracing

1. Contact identification

For all cases that meet the criteria/surveillance cases, contact identification is an important part of the epidemiological investigation Definition of Covid-19. These cases are classified as suspicious, probable and confirmed.

The epidemiologist conducting the epidemiological study should complete the case inquiry forms for all Covid-19 cases that meet the standard / surveillance case definition. After completing the inquiry form, the epidemiologist should systematically identify potential contacts. Contact identification therefore starts with the case. The contacts are identified by asking for activities related to the case and activities and roles of those around the case (living / deceased) from the onset of the disease. Although some information may be obtained from the patient, much of it will come from those close to the patient. IN In some cases, the patient will die or has already been admitted to a restricted isolation unit. It is an epidemiologist's visit to the patient's home is mandatory. The following information you should get:

All persons who lived with the case (alive / deceased) in the same household from the onset of the disease. All persons who visited the patient (alive / deceased) at home or in a medical facility from the onset of the disease.

All places and people visited by the patient from the beginning of the disease, e.g. hospitals, clinics, traditional healer, temple, relatives, etc.

All these places and people should be visited and contacts identified. During the home visit, the contact identification / follow-up teams should inquire about who may have been exposed patient (alive / dead) but not identified and listed as a contact for the above process. They should be given priority high-risk contact categories, people who in the last 14 days.

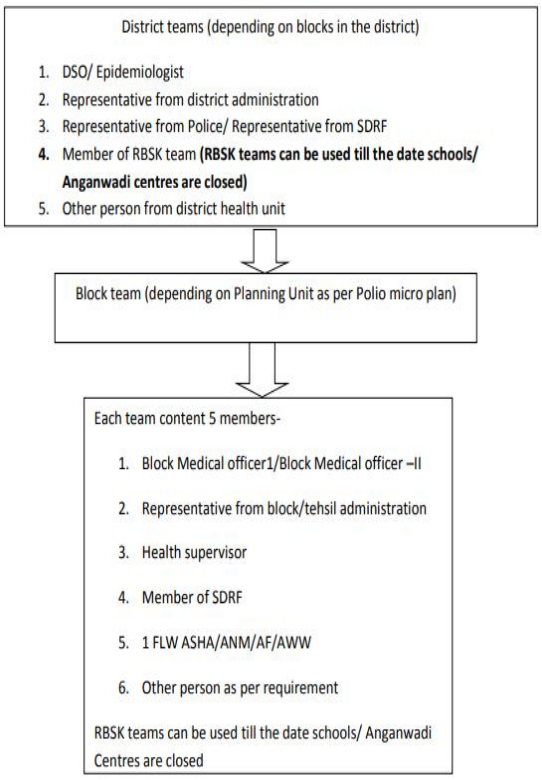
2. Contact listing

All persons considered having significant exposure (belonging to the categories described above) should be listed as contacts, using the contact form. Efforts should be made to physically identify and inform each contact listed their contact status, what those means, the activities that will follow, and the importance of early care if they develop symptoms. Contacts should also be provided with preventive information to reduce the risk of human exposure near them.

Stay home and limit close contact with other people. Avoid crowded places, socializing, and using public transport. Report any suspicious signs and symptoms such as fever, cold, cough, and difficulty breathing immediately (please tell phone numbers for the contact team, supervisor or Covid-19 hot line / call center)

3. Contact follow-up

The epidemiologist / supervisor / contact tracing physician should assemble a competent team involving local supervision and FLW (ASHA, AWW, ANM & Supervisors) to track all contacts listed. An effective contact tracing system depends on trust with the community, which in turn favors the optimum cooperation. Communities should ensure they are collaborating with tracking teams and allowing targeting symptomatic contacts with designated isolates. Involvement of relevant community members (especially local leader) in tracking contacts is crucial in cultivating good relationships, trust and confidence. Local supervision i FLWs (ASHA, AWW, ANM and supervisors) should be involved as early as possible in the response. Local surveillance staff and FLW are closely supervised by trained epidemiologists.



CONCLUSION

Fighting outbreaks like the new coronavirus requires teamwork between different health professionals and other sectors. Epidemiologists play a pivotal role in the event of outbreaks, especially new ones. This is because they are on the front line, identifying likely cases and contacts for those cases, using available data to determine the best policy, and determining the impact of these policies. This is done using data that is essential in the fight against epidemics. With this data, epidemiologists act as a basis for health professionals in the event of an outbreak, collaborating with other sectors.

While the impact of very low levels of toxic pollutants on large populations is unknown, action needs to be taken now to protect future public health. The threats of groundwater contamination require a serious preventive policy. According to a number of assessments, the significant risk of groundwater contamination is not prevented by current remediation practices. It should be considered that if exposure becomes general and nearly uniform due to groundwater contamination, current epidemiological techniques may not be able to identify any related health effects.

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