



INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation

Journal Home Page: www.pharmascope.org/ijrps

Emerging respiratory virus: COVID-19-Basic concepts and its impact on immunisation of vaccine preventable diseases

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Article History:

Received on: 06 Sep 2020

Revised on: 25 Oct 2020

Accepted on: 25 Nov 2020

Keywords:

Immunisation,
vaccine preventable
diseases,
COVID-19

ABSTRACT

In Dec 2019, pneumonia cluster in China caused by a previously unknown virus, now called Novel Coronavirus 2019, occurred, causing respiratory as well as gastrointestinal symptoms. The respiratory symptoms usually include common cold; pneumonia causing generally mild disease. There are, however, several examples of severe disease-causing coronaviruses that include severe acute respiratory syndrome (SARS)-Cov first identified in China in 2003; and Middle East Respiratory Syndrome (MERS) Cov, first identified in Saudi Arabia in 2012. In 2019 the n-COV was first detected in China. At present, there are many cases in China and along with it, this has spread to other countries as well. The article aims at giving general information about the novel coronavirus and its impact on vaccine preventable diseases. Currently, there is a big outbreak in India and other countries as well. By ensuring early immunisation, protecting people and groups of persons, reducing the susceptibility of a vaccine preventable disease (VPD) outbreak not only saves lives but also requires less resources and helps to reduce the health care burden. Immunizations are important resources for health care that protect people vulnerable to VPD. Countries may therefore contribute to the maintenance of immunisation programmes by using methods that adopt the do-no-harm principle and limit the transmission of COVID-19 when conducting immunisation activities.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v11iSPL1.4378>

Production and Hosted by

Pharmascope.org

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INTRODUCTION

In Dec 2019, pneumonia cluster in China caused by a previously unknown virus, now called Novel Coronavirus 2019, occurred. Coronavirus belongs to broad group of viruses that consist of a nucleus

of genetic material which is surrounded by a crown-like envelope with protein spikes and hence named "corona". This virus causes respiratory as well as gastrointestinal symptoms. The respiratory symptoms usually include common cold; pneumonia causing generally mild disease. There are, however, several examples of severe disease-causing coronaviruses that include severe acute respiratory syndrome (SARS)-Cov (first identified in China in 2003); and Middle East Respiratory Syndrome (MERS) Cov, (first identified in Saudi Arabia in 2012). The n-COV was first detected in China in the year 2019. It was initially identified with some cluster of subjects in direct contact with the infected person; who consumed seafood and live animal market in Wuhan which then spread to other people including their family members as well as health-care workers. At present, the outbreak is emerged

greatly in India and other countries as well. By providing early immunisation, protecting individuals and group of people, reducing the susceptibility of an outbreak of VPD, not only saves a life but also requires less resources and helps reduce the burden on health care. Immunizations are essential health care services that protect individuals who are susceptible to VPD. Thus contributing to the maintenance of immunization programs, countries can use strategies that follow the concept of do-no-harm and restrict COVID-19 transmission when carrying out immunization activities. These programs should also be utilized as an opportunity to spread messages to promote behaviours that minimise the risk of COVID-19 transmission, recognise its characteristics as well as to provide the necessary support for symptoms (WHO, 2020).

The virus is thought to be originated from a variety of animals to humans called spillover, including a variety of factors. For, e.g., MERS-COV is originated from camel to humans while the SARS-COV from civil cats. The source of n-Cov-2019, however, is not yet known. The exact dynamics of coronavirus transmission have yet to be determined. They usually spread via droplets while a person coughs or sneezes or comes into contact with things that are contaminated with the virus.

This novel virus has a spectrum of symptoms ranging from mild to severe. Fever or respiratory symptoms can occur, such as cough, shortness of breath, while pneumonia, kidney failure, and death can occur in serious cases. The mortality rate is increasing day-by-day. The diagnosis of this virus can be made with the help of PCR which identifies the virus based on its particular genetic composition. There is no specific treatment other than supportive care. However, the treatment & vaccines against this virus are under development.

High-risk groups, including elderly people, people with existing heart, lung or kidney disease, diabetes, or people who are on chemotherapy/on cancer medication and pregnant women are more vulnerable to the disease.

Suspects of the disease are those who have an acute respiratory illness, travel history to an area where local transmission of the disease has been reported, being in contact with a subject with a known case of COVID-19 in the last 14 days before the onset of symptoms.

Contact cases occur when one stays in the same house or same close environment (workplace or classroom) of a COVID-19 patient without proper hygiene, having less than 1 m distance with a symptomatic person who later tested positive. Contact

cases also include a person who is taking direct care of a patient. The infection can be transferred within 14 days when the symptoms were mild or not developed.

The global health systems are strained by the COVID-19 pandemic. Previous outbreaks have evidenced increased mortality which is known to increase the incidence of vaccine-preventable as well as other treatable diseases subjected to an increased burden on the health care system. During the 2014-2015 outbreak of Ebola; measles, malaria, HIV / AIDS and tuberculosis lead to an increased number of deaths than those of Ebola deaths due to health system failures (Elston *et al.*, 2017; Parpia *et al.*, 2016).

Balwani *et al.*, in a rare Guillain-Barre Syndrome (GBS) case report, has recognized its dual (infective as well as non-infective) aetiologies, preceded by acute gastrointestinal or respiratory infections (Balwani *et al.*, 2018). This was associated with hepatitis C virus-positive hemodialysis (HD)-dependent patient. Similarly, one should keep in mind the differential diagnosis before reaching the final diagnosis. Early diagnosis also helps with the timely initiation of treatment, which is essential for the treatment of COVID-19 as well.

Immunization is a key component of health services and must protect children and pregnant mothers from Vaccine Preventable Diseases (VPDs).

Current situation and guidance

India is currently undergoing an extended lockdown phase; however, as per the MHA Order of 15 April 2020 (WHO, 2020), all health services are considered essential and need to be operational across the country.

Based on the current situation of COVID-19, District/ Sub-Division / Municipal Corporation / Ward, any other appropriate administrative unit is categorised as Red, Orange zones with active COVID-19 cases and Green zones with no active COVID-19 cases and the list is revised weekly or earlier.

Immunization services in different areas

In line with the area categorization, immunisation services have been classified under two headings

1. Immunization in the containment and buffer zone
2. Immunization beyond the buffer zone and the green zone

Three main concepts, irrespective of the region, may very well be enforced by providing immunisation services for various areas. It is important to maintain social distancing, hand washing and respiratory

preventive steps. The birth dose vaccination will begin at health facilities irrespective of the areas.

The list of areas in a district under the 'Containment Zone' and 'Buffer Zone' is updated regularly. Any area leaving a 'containment/buffer zone' would start the immunisation act based on facilities and outreach. A Modified Outreach Session has been developed for the Areas Beyond Buffer Zone and Green Zone. One outreach session will be planned for <500 population. A staggered approach could be advocated for each session so as to avoid crowding, which includes no more than 5 persons at a session site. Village session is divided into two sessions to reduce crowding. Additional session can be conducted by Hired Vaccinator.

Multiple sessions need to be planned in each urban area and MAS to coordinate limited mobilization and staggered access to UHSND services at each session. Private sector engagement strategies to be explored as appropriate for awareness creation and identification of missed children.

Beneficiary Mobilization: ASHA should mobilize the beneficiaries/family of the session by phone at least one day before. Any child, caregiver and/or pregnant woman suffering from flu like symptoms (fever, cough or shortness of breath) should be advised not to come to the session site.

Session Site

An ANM should emphasize standard hygiene practices and should wash hands with soap and water for at least 20 seconds before the start of the session and sanitize hands with an alcohol based sanitizer. Staff must be trained on screening of beneficiary for flu like symptoms. Equipment such as weighing scales, thermometers, infant metres, stadiometers, etc., should be properly sanitised immediately after use with prescribed disinfectants. During tests (pregnancy, Urstix, etc.) involving body fluids, necessary measures for the prevention of infections should be taken.

Provide key preventive messages related to COVID19, (hand washing technique, nutrition of pregnant women, breastfeeding). Caregivers can make IEC material available for caregivers in the waiting area. Site should be sanitized properly after the session. All vaccination data to be entered in the HMIS and RCH portal as usual. Gloves and masks should be properly disposed off as per the guideline of COVID-19.

WHO COVID-19 Essential Supplies Forecasting Tool (ESFT) is designed to help governments, partners and other stakeholders estimate potential requirements for essential supplies to respond to the cur-

rent COVID-19 pandemic. Although it gives users with an estimation of the number of cases, this calculator is not an epidemiological calculator. It is intended to be complementary to the Health Workforce tools (Adaptt and the Workforce Estimator). Both tools use the same base clinical attack rate ranges and classify health workforce using ILO ISCO codes, but their outputs are intentionally different due to their primary focus.

Countries should identify essential programs that should be emphasized in their efforts to maintain continuity of service delivery. Well-organized and well-prepared health systems help to provide equal access to medical care in emergency situations. There is a possibility of interruption to routine immunization activities due to COVID-19 related health system pressures and decreased vaccination demand. Disruption of immunization programs, particularly for short periods, may lead to an increase in the number of vulnerable individuals and increase the risk of outbreak-prone vaccine preventable diseases such as measles (Suk *et al.*, 2016). Newborn vaccination (e.g. BCG, OPV, Hepatitis B) should remain a priority and vaccines should be provided in accordance with the national immunisation schedule. Preventing respiratory diseases and hospitalisation through pneumococcal, influenza, and pertussis vaccination would improve the availability of respiratory, medical, and health care equipment to assist COVID patients.

School-based vaccination programmes can only occur if infection prevention and control measures are taken to avoid an increased risk of COVID-19 transmission between students, school staff and health workers. School-based programmes are an essential way to distribute vaccines to children and adolescents against multiple vaccines, such as tetanus booster doses and diphtheria, HPV vaccines, measles-rubella vaccines, and typhoid vaccines. But if mass vaccination camps are temporarily suspended, school-based action strategies should be avoided and alternative ways to reach those school-born children with appropriate vaccines should be sought (WHO, 2020).

Parents may be notified that although it is imperative to provide timely vaccinations, guidance from national and local governments on preventive measures for COVID-19, including social distancing, is also needed. This means that vaccination services may be temporarily interrupted. In such cases, it will be important to advise parents to look for immunisation programs for children immediately once vaccination services recommence to catch missed doses (WHO, 2020).

Surveillance systems should continue to make sure for the early detection and management of VPDs, at least for diseases with global monitoring instructions and eradication objectives: polio, measles, neonatal tetanus and rubella in countries with regional elimination objectives. Countries should also give priority to monitoring epidemic-potential VPDs: influenza, meningococcal disease, yellow fever, typhoid, cholera and diphtheria (WHO, 1999). Other VPDs should continue to be monitored as much as possible.

Guiding Principles

1. VPD surveillance should be maintained and strengthened to ensure that VPD cases are early detected and handled and to contribute to COVID-19 tracking, where feasible (WHO, 2020).
2. When COVID-19 adversely impacts the provision of immunization programs, countries may need to adopt post-COVID-19 catch-up vaccination policies and plan for a gradual recovery. Catch up implementation will include methods for recognizing and tracking individuals who missed vaccines, recognizing immunity deficiencies and restoring community demand.
3. Dynamics of COVID-19 in a country or area must be constantly controlled by the national authorities. In the provision of advice on enhancement, adaptation, suspension, or reconfiguring of immunization programs, National Immunization Technical advisory groups (NITAGs) play a major role.
4. Immunization is an important system of health which should be given priority to prevent and sustain the continuity of communicable diseases during the COVID-19 pandemic where practicable (WHO, 2020).
5. Vaccination with influenza is recommended where possible for health staff, older adults and pregnant women (WHO, 2012).
6. Mass vaccination programs should be halted indefinitely on the basis of existing understandings of the COVID-19 virus transmission and the physical distancing guidelines. Countries routinely track and determine the need for postponing mass immunization campaigns.
7. Outbreak response major immunization programs will require a detailed case-by-case risk/benefit study contrasting the probability of delayed reaction to immediate responses,

both in relation to morbidity and death of the VPD and the possible impact of further COVID-19 virus transmission.

Many easy steps can be taken to safeguard vaccine workers and custodians against exposure to COVID-19, like restricting the number of people who visit immunization and holding persistent sessions. Planning to prevent overcrowded waiting rooms could involve

1. The management of vaccine appointment schedules
2. Bundling of immunization programs with other important preventive health programs to reduce the frequency of visits and exposure to the supporters to the health centre
3. The use, if possible, of outdoor space and physical distance at a health centre
4. Establish immunization sessions for older people and ones having medical states exclusively

Immunization programs and waiting areas must be isolated from curative services, wherever possible. (i.e. distinct times of the day or separate spaces depending on the facility).

Prevention

Since prevention is always better than cure, this virus can be prevented. Standard hygiene measures which include covering the mouth and nose while coughing or sneezing, avoiding close contact (1 metre or 3 feet) with those who are ill, the use of masks and personal protective equipment (PPE) especially in healthcare settings, washing hands regularly with soap and water or alcohol-based hand rub often for at least 20 sec, avoiding unnecessary contact with animals should be strictly followed. Better to stay home, but if any symptoms like fever, cough or difficulty in breathing, one should seek medical help immediately.

In order to minimise the risk of transmission, persons with suspected or confirmed COVID-19 should be isolated and treated. The act of seeking immunisation may increase the spread of infection to others. WHO recommends postponing vaccination for 14 days after symptom resolution. Improving immunisation services and generating demand for care should be a priority, says the WHO. If routine services have continued during the pandemic, the delivery of services may have been sub-optimal, or patients may not have been able or willing to access services, it says (World Health Organization, 2020;

WHO, 2020). During the suspension of immunisation activities, the strategic preparation of vaccination catch-up activities should begin and not wait for them to be resumed. Analysis of vaccine lists, default listings and monitoring of newborns should be updated on a regular basis during suspension or reduction of immunisation activities and should be used to prepare for recovery (WHO, 2020).

Following the pandemic of COVID-19, any improvement in the functioning of immunisation programmes must be clearly communicated to health workers and society. Currently, electronic media in the form of television, mobiles, and computers are completely amalgamated into the fabric of life (Gaidhane *et al.*, 2018). People have unprecedented access to new media and use them in expected and unexpected ways. The use of social media in awareness and prevention of the present pandemic also plays a vital role.

Where current schemes of surveillance VPD cannot operate in the usual manner, essential roles, such as the acute flaccid paralysis monitoring, the polio environmental monitoring, the monitoring of outbreaks and the shipping of emergency specimens and the confirmation of priority VPD in the laboratory should be established and preserved. In order to reduce the risk of exposure to COVID-19, active monitoring of VPDs, such as polio, may continue in a limited number of priority hospitals as long as the supervisory officer wears appropriate personal protective equipment (PPE). If this is not possible, active monitoring should be carried out as remotely as possible (e.g. via the internet, telephone) (World Health Organization and Global Polio Eradication Initiative, 2020).

Health workers should be trained to develop anti-infection and control skills and also to enhance their ability to communicate key messages during COVID-19 to caregivers and communities about vaccination as a priority health service, the risks of VPDs and the benefits of vaccination.

Community involvement should involve local leaders in the planning of catch-up activities in order to support their role in advocating vaccination programmes, to inform the services to be resumed and to stress the importance of vaccination and recovery of missed vaccinations. It will be important for countries to track potential obstacles to vaccination among the public and disadvantaged groups to direct tailor-made strategies for catch-up activities.

Most of the VPD labs are now interested in studying the virus that triggers COVID-19. If COVID-19 becomes a priority for laboratory testing, VPD samples should only be tested if there is an assurance

that the test capacity of COVID-19 is not compromised due to limited availability of reagents and limited international transport capacity.

Countries are expected to maintain a reasonable level of VPD testing capability, albeit theoretically at a reduced rate of VPD testing. If laboratory tests are not possible, samples should be properly stored for confirmation if laboratory capacity permits. Countries should ensure and monitor adequate storage capacity at the provincial and central level on a regular basis. Laboratory test algorithms may need to be adapted to meet the laboratory confirmation requirement. Specifically, for possible outbreaks of measles, new clusters may be confirmed by testing five to ten suspected cases of measles. Where practicable, robust VPD surveillance systems should be combined with COVID-19 surveillance systems, using common resources for laboratory capability, data management systems, specimen transport and reporting, and alignment with COVID-19 laboratory surveillance for the selection, transport and analysis of specimens.

Community-based surveillance (CBS) is strongly opposed because it requires in-person visits as well as awareness of the population. However, while polio (CBS) is underway, people performing such surveillance will also be advised to identify instances of acute flaccid paralysis and suspected outbreaks and to call on patients and urge them to go to the nearest hospital, if appropriate, CBS for neonatal tetanus. WHO does not support CBS to any VPDs.

Global production of vaccines is being disrupted, with delays in shipments of vaccines to countries. The procurement of vaccinations at the national level will be guaranteed for at least three months in order to avoid future shortages of supply. If this is not possible, the availability of vaccines at the sub-national level should be ensured for three months, where storage capacity is available. Otherwise, consideration of the shipment of vaccines at the sub-national level is recommended more frequently, e.g. on a monthly basis or depending on the previous stock level.

CONCLUSIONS

Since other preventable diseases, such as influenza and measles, may circulate in a country along with COVID-19, all health care workers should receive vaccines on a national schedule. Measles rubella verification activities may continue with the outbreak of COVID-19, but the capacity of the country to respond to COVID-19 should be adapted or otherwise postponed.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

Funding Support

The authors declare that they have no funding support for this study.

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