

Systematic Review (COVID Surveillance Systems)

COVID 2019 Asymptomatic Infections Across the World- Can It Be a Time Bomb for Future Pandemic Recurrence? A Systematic Review of Surveillance Strategies

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Background: Covid 2019 Infection can be considered a disease typically following Ice berg Phenomenon, where actual large no of submerged cases are inside and can become threat to human beings as immunity development to SARS –CoV-2 cannot be forever. Studies across the World have suggested that out of many important research questions- the problem of asymptomatic and pre-symptomatic virus shedding is one of the most gray area in management of COVID 2019 pandemic across the world. Objective: Unrecognized threat of Incubatory carriers as well as asymptomatic cases becoming a re-infection pool to Global Community can be very dangerous for whole world. So a strategy for further Management of asymptomatic and pre-symptomatic CORONA +ve cases needs urgent appraisal, if we have to prevent future recurrence of COVID 2019 Pandemic. That why a systematic research is crucial in this regard, as attempted by authors in this article.

Material and Methods: As per PRISMA (2020) guidelines protocol, search of various kinds of studies in any form ;using five key search words: 'Asymptomatic', "Pre-symptomatic" "COVID 2019 Infection Surveillance, Pandemic, Recurrence " was done in all health related websites of Google, PubMed, EMBASE, MEDLINE, Global Health, , Biomed Central, Web of Science, Cochrane Library, world library World Cat, from 1st January, 2020 to 25th April 2020 for systematic review, followed by Meta-Analysis.

Results: Out of wide variety of 46 studies available in literature related to this topic, 19 were found to be eligible for issues synthesis, from which 2 crucial themes of Surveillance of Symptomatics and Asymptomatic & Pre-symptomatics emerged. The symptomatics surveillance was good in the form of Isolation and Quarantine across the World; but the real problem was of asymptomatic post discharge surveillance, which was only in nascent stage in many countries across the world including developing countries such as India.

Conclusion: Lack of asymptomatic post discharge surveillance may cause a real havoc in future, if governments chalk out no strategy across the World, leading to possible recurrence of COVID 2019 Pandemic. However authors suggest more future research studies, before we can say it very definitively that it will certainly happen.

Keywords: Asymptomatic; "Presymptomatic" "COVID 2019 Infection Surveillance; Pandemic; Recurrence

Introduction

According to WHO(2020) COVID 2019 outbreak is the sixth public health international emergency [1]. According to WHO(2020) situation reports; [1,2] the incubation period for COVID-19 is on an average is 5-6 days, but can reach upto 14 days), so 3 types of Covid 2019 transmissions are possible: Symptomatic transmission- where a symptomatic COVID-19 case is a case who has developed signs and symptoms compatible with COVID-19 virus infection. Pre-symptomatic transmission: During this period, some infected persons can be contagious. Therefore, transmission from a pre-symptomatic case can occur before symptom onset. Asymptomatic transmission: where an asymptomatic laboratory-confirmed case is

a person infected with COVID-19 who does not develop symptoms. Asymptomatic transmission refers to transmission of the virus from a person, who does not develop symptoms.

The COVID 2019 infection spreads mainly through respiratory droplets expelled by coughing. COVID-2019 is also transmitted via droplets and fomites during close unprotected contact between an infector and infectee. As per WHO Report(2020)[3] airborne spread till now has not been reported for COVID-19 and it is not a major driver of transmission based on available evidence. But it can occur if aerosol-generating procedures are conducted such as in ICU. The risk of catching COVID-19 from asymptomatics currently is low. Most people across the globe infected with COVID-19 virus have mild

disease and recover [3].

One of the most important question in the present times is that of asymptomatic and presymptomatic virus shedding in SARS-CoV-2 transmission, in view of rising such cases in whole world. Studies reveal that Asymptomatic and presymptomatic virus shedding can be a big challenge to this infection control [4,5]. Moreover, patients with mild and unspecific symptoms are also difficult to identify and quarantine. The absence of fever in SARS-CoV-2 infection (12.1%) has been found to be more frequent than in SARS-CoV (1%) and Middle East respiratory syndrome coronavirus (MERS-CoV; 2%) infection as per various studies in Literature [4-10] and Studies [4-12] show people without symptoms can infect others.

According to WHO also around 60% of people in world with coronavirus showed mild or no symptoms [1-3]. Nearly 60% infected with coronavirus may be unaware they have the disease, according to number of papers studying the outbreak. That's why scientists are calling for urgent measures – from closing all schools to banning public gatherings – to stop mild and asymptomatic cases fuelling the pandemic [8].

The studies [4-12] on influenza viruses and community-acquired human corona viruses, reveals that the viral loads in asymptomatic carriers are relatively low, so for SARS-CoV-2, the risk may also remain low if we look on the positive side. But the urgent needs is for identifying a cohort of asymptomatic carriers and following their viral loads, clinical presentations and antibody titers. This type of studies can tell us that how many subjects had symptoms in a later phase, whether virus shedding from the subjects is robust, and how often they might transmit SARS-CoV-2 to others [13,14].

If we see the scenario of a developing Country like Govt of India from its ICMR body admits in his information given to Media and Newspapers that around 69% Corona Positive cases belong to asymptomatic category. The new revelation of asymptomatic or mildly symptomatic infection in India has triggered concerns. [z2 [13,14]. Another problem which still remains worrisome is that corona prevalence is doubling every 10 days in developing countries such as India from 20th April 2020, as less no of tests have been performed as compared to average dense population of 455/km in 130 Crore People of India. So Unrecognized threat of Incubatory carriers as well as asymptomatic cases becoming a real reinfection pool to Global Community can be very dangerous for whole world including India.

In addition to active case finding and testing, it is critical to enhance surveillance activities to detect and monitor if there is COVID-19 transmission in the community. WHO has given surveillance recommendations according to four transmission scenario (countries with no cases, sporadic cases, clusters of cases, and community transmission) and recommends that countries consider using existing hospital-based severe acute respiratory infection (SARI) and primary care influenza like illness (ILI) sites, or whichever syndromic respiratory disease systems may already be in place [15]. In light of this, the effectiveness of using fever detection as the surveillance method needs urgent review

Therefore surveillance of asymptomatics after Recovery is important, as the epidemiological and clinical data can increase our

knowledge of COVID-19 Pandemic management in future as later on the surveillance objectives can shift from containing the epidemic to mitigating its medical and societal impact. So there is great need for further studies on the surveillance of asymptomatic COVID-19 infections to guide epidemic control effort. That's why surveillance evaluation studies carry its own Importance. Therefore a strategy for further surveillance of asymptomatic and presymptomatic CORONA +ve cases needs urgent appraisal, if we have to prevent future recurrence of COVID 2019 Pandemic. That why a Systematic Research is crucial in this regard, as attempted by authors in this article.

Material and Methods

As per latest PRISMA (2020) [27 items Checklist & Flow diagram] guidelines [16], search of various kinds of studies in any form ;using five key search words: 'Asymptomatic', "Presymptomatic" "COVID 2019 Infection management", "Pandemic", "Recurrence" was done in all health related websites of Google, PubMed, EMBASE, MEDLINE, Global Health, , Biomed Central, Web of Science, Cochrane Library, world library World Cat, from 1 January, 2020 to 25th April 2020 for systematic review.

The systematic review strategy

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) is an evidence-based minimum set of 27 items and Flow diagram guidelines [16] which helps authors to report a wide array of systematic reviews and meta-analyses that assess the benefits and harms of a health care intervention and this was considered in this systematic review. The systematic review was carried out in following way; First check list of all items to be considered were incorporated in article and then PRISMA flow diagram was followed and main issues were extracted from all studies as per key search words & following Inclusion & Exclusion Criteria. Inclusion criteria: All types of Surveillance strategies for COVID 2019 for both Symptomatic and Asymptomatic were considered Exclusion Criteria: Any study not related to Surveillance of COVID 2019 was excluded (Figure 1).

Results

Synthesis of Issues for Surveillance from key studies(n=19) in systematic review out of total studies (N=41) (Table 1).

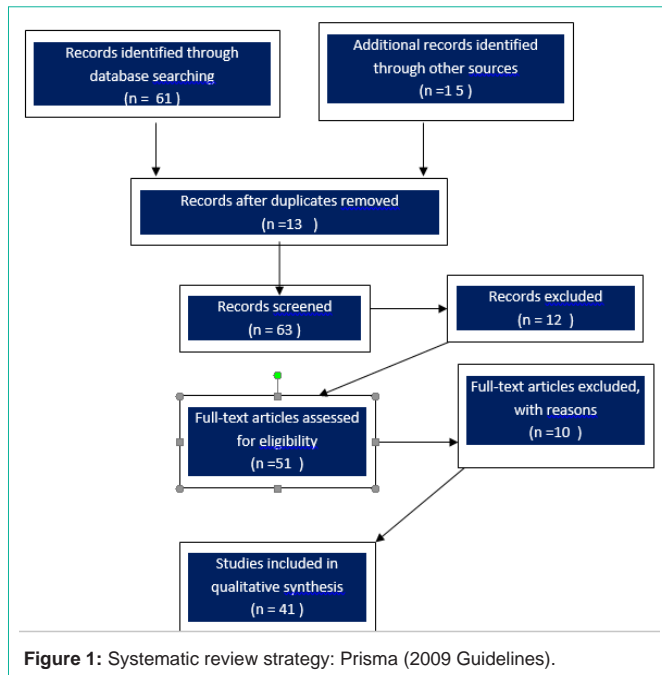
The themes which were identified from systematic review of all studies were:

Existing global surveillance systems for symptomatics

Our systematic review from studies reveal that there are many models of Surveillance systems for symptomatics, from which many countries were able to control Corona Epidemic in their respective country. These models are as follows:

Country specific surveillance systems

French system of surveillance: The active surveillance of close contacts of confirmed COVID-19 cases and the implementation of control measures, including home quarantine for those evaluated at moderate/high risk of exposure, decreased the risk of human-to-human transmission originating from imported cases and subsequently delay propagation of the virus in the general population. The rapid and collaborative management of the first imported COVID-19 cases in France highlighted the fact that the



French healthcare system was adequately prepared to respond to such emerging diseases threats. However, this surveillance system was extremely time-consuming and required considerable manpower.

US- CDC Surveillance System(Serosurveys): For surveillance of COVID-19, and its virus, CDC used multiple surveillance systems in collaboration with state, local, territorial, and academic partners to monitor COVID-19 disease in the United States. COVID-19 surveillance was done using a combination of data sources from existing influenza and viral respiratory disease surveillance, syndromic surveillance, case reporting, commercial lab reporting, the healthcare safety system, ongoing research platforms, and other new systems designed to answer specific questions [31]. The agency adapted a number of surveillance systems used to record the toll of seasonal flu in the United States to get a near-real-time picture of SARS-CoV-2’s march across the country.

Weekly 2019 surveillance

This report, based on the model of its longtime influenza report, FluView. Public health, commercial and clinical laboratories tested for SARS-CoV-2 and reports their results.

COVID view

This is a weekly surveillance summary of U.S. COVID-19 activity. The report summarizes and interprets key indicators including information related to COVID-19 outpatient visits, emergency department visits, hospitalizations and deaths, as well as laboratory data.

WHO Surveillance System: For all countries to understand the epidemiology and trends of COVID-19, Who has suggested following surveillance strategies for Symptomatics [28,29]

Case-based reporting : Reporting every case of COVID19

- Case-based reporting form

- Data dictionary for case-based reporting form
- Aggregated reporting: reporting global cases count of COVID19
- Aggregated weekly reporting form

Case-based reporting: WHO has requested that national authorities must report probable and confirmed cases of COVID-19 infection within 48 hours of identification, by providing the minimum data set outlined in the “Revised case reporting form for 2019 Novel Coronavirus of confirmed and probable cases” through the National Focal Point and the Regional Contact Point for International Health Regulations at the appropriate WHO regional office.

Aggregated reporting: All Member States of WHO are requested to provide the following minimum set of aggregate counts, once weekly.

Member state self-reporting platform: The designated national authority is asked to provide data directly to the self-reporting platform, which will be publicly available without editing or filtering by WHO.

Global Influenza Surveillance and Response System (GISRS): According to WHO (2020 report Existing respiratory disease surveillance systems and associated networks, such as the Global Influenza Surveillance and Response System (GISRS), can play an important role in monitoring the spread of COVID-19 and will be relied on if comprehensive active case finding is challenging in countries with community transmission. To detect a positivity rate of at least 2%, a sampling strategy should be developed that results in a minimum of 50 specimens per week for COVID-19 testing.

Local Surveillance strategies of Countries e.g. India: IDSP: According to GOI, MOHFW report in order to establish In country/ community surveillance through the Integrated Disease Surveillance Programme network(IDSP) of Corona +ve cases: a)SSU/DSU receives line list / emails of Passengers under observation, coming from 2019-nCoV affected countries from APHO, Office of Emergency Medical Relief, MEA or CSU and information collected in Format A & B. b) Health Status of these passengers to be shared with CSU in Format C as per SoPs. c)Passengers who have history of close contact will be followed by IDSP officials on daily basis. d) Close contacts of the suspect case – Information be shared as per interim guidelines in the format. Format C to be sent positively every day to idsp-npo@nic.in by 12:00 pm including ‘Nil’ report.

Existing global surveillance systems for asymptomatics: Most studies reveal that mild and asymptomatic cases can help authorities to plan for future responses to Covid-19 activity. By knowing a high percentage of people in a community who are likely infected- it can help after the virus moved through during its first wave of infections, the response to a reappearance later can be tailored to protect only high-risk people, for instance. This can allow healthcare system to prepare for any further spread of the epidemic.

CDC in US has modified existing surveillance systems, many used to track influenza and other respiratory viruses annually, to track COVID-19 e.g. Outpatient Influenza-Like Illness Network (ILINet) and National Syndromic Surveillance Program (NSSP), At

Table 1: Synthesis of Issues for Surveillance from key studies (n=19) in systematic review out of total studies (N=41).

Sr. No.	Name of author of study with reference citation	Country of Study	Year of study	Study methodology-study design, sample size etc.	Evidence from studies	Implications of studies	Issues synthesized from studies
1	Yan Bai, Lingsheng Yao, Tao Wei, et al [07]	China	2020	RESEARCH LETTER (n=2)	All symptomatic patients had multifocal ground-glass opacities on chest CT, and 1 also had subsegmental areas of consolidation and fibrosis. All the symptomatic patients had increased C-reactive protein levels and reduced lymphocyte counts	Transmission of the novel coronavirus from an asymptomatic carrier with normal chest computed tomography (CT)	Mechanism by which asymptomatic carriers acquire and transmit the coronavirus requires further study.
2	Yu Han, Hailan Yang[17]	China	2020	RESEARCH ARTICLE (n=10)	SARS-CoV-2 possesses powerful pathogenicity as well as transmissibility and holds many mysteries, such as whether the virus can be transmitted by asymptomatic patients	selected available cases of COVID-19 in China to better understand the transmission and diagnosis in asymptomatics and mothers to their infants.	Patients with negative swabs may also be diagnosed with COVID-19.
3	Rothe C [18]	Germany	2020	Editorial (n=1)	Case of 2019-nCoV infection acquired outside Asia in which transmission occurred during the incubation period in the index patient.	This case of 2019-nCoV infection was diagnosed in Germany and transmitted outside Asia.	Infection appeared to be transmitted during the incubation period of the index patient, in whom the illness was brief and nonspecific.
4	Mizumoto K, Kagaya Katsushi, Zarebski Alexander, Chowell Gerardo et al [19]	Japan	2020	(n=3711)statistical modelling Derived the delay-adjusted asymptomatic proportion of infections, along with the infections' timeline.	Estimated the proportion of asymptomatic cases among individuals who tested positive for SARS-CoV-2 along with the times of infection of confirmed cases on board the Diamond Princess cruise ship	The estimated asymptomatic proportion was 17.9% (95% credible interval (CrI): 15.5–20.2%).	Model reveals the delay in symptom onset and also for right censoring, which can occur due to the time lag between a patient's examination and sample collection and the development of illness. Most infections occurred before the quarantine start.
5	Verity R, Okell, LC Dorigatti I, Winskill, P Whittaker C, Imai,N et al. [20]	China	2020	(n=1334 cases) individual-case data for patients who died from COVID-19 in Hubei, mainland China cases outside of mainland China	Estimated the case fatality ratio from individual line-list data identified outside of mainland China.	The world is currently experiencing the early stages of a global pandemic.	Although China succeeded in containing the disease spread for 2 months, such containment is unlikely to be achievable in most countries.
6	Chan, Jasper Fuk-Woo et al. [21]	China	2020	RESEARCH ARTICLE- FAMILY CLUSTER STUDY	person-to-person transmission of this novel coronavirus in hospital and family settings, and the reports of infected travellers in other geographical regions.	It is still crucial to isolate patients and trace and quarantine contacts as early as possible because asymptomatic infection appears possible	Educate the public on both food and personal hygiene, and alert health-care workers on compliance to infection control to prevent super-spreading events.
7	Carl Heneghan, Jon Brassey, Tom Jefferson [22]	UK	2020	LitCovid. 21 Reports Analysis. (a subset of Pubmed), medRxiv, Trip, Scholar and Google.	Between 5% - 80% of people testing positive for SARS-CoV-2 may be asymptomatic	children and young adults can be asymptomatic and some asymptomatic cases will become symptomatic over the next week --pre-symptomatics	Symptom-based screening will miss lot of cases,
8	Hu Z, Song C, Xu C, et al. [23].	China	2020	Clinical characteristics of 24 cases with asymptomatic infection screened from close contacts	a typical asymptomatic transmission to the cohabiting family members, which even caused severe COVID-19 pneumonia.	The communicable period can be considered 3 weeks and the communicated patients could develop severe illness.	Emphasized importance of close contact tracing and longitudinally surveillance via virus nucleic acid tests. Further isolation recommendation and continuous nucleic acid tests may also be recommended to the patients discharged.
9	Laur SA, et al. [5]	Germany	2020	Pooled analysis of confirmed COVID-19 cases reported	Analysis 4 January 2020 and 24 February 2020.News reports and press releases from 50 provinces, regions, and countries outside Wuhan, Hubei province, China.	Study supports current proposals for the length of quarantine or active monitoring of persons potentially exposed to SARS-CoV-2.	Longer monitoring periods are justified in extreme cases.

10	Zunyou Wu, Jennifer McGoogan [24]	China	2020	View Point (n=72314)	Found 889 asymptomatic cases (1%; diagnosis by positive viral nucleic acid test result were lacking typical symptoms including fever, dry cough, and fatigue).1	Proactive investment in public health infrastructure and capacity is crucial to effectively respond to epidemics like COVID-19, and it is	It is critical to continue to improve international surveillance, cooperation, coordination, and communication and be even better prepared to respond to future new public health threats.
11	Hiroshi Nishiura T, et al. [25]	Japan	2020	Letter to the Editor	In general, asymptomatic infections cannot be recognized if they are not confirmed by RT-PCR or other laboratory testing, and symptomatic cases may not be detected if they do not seek medical attention	limited sensitivity of RT-PCR does not affect the estimate of asymptomatic ratio, because the sensitivity is cancelled out from the right-hand side of equation.	Estimates to assess prevalence of asymptomatic viral shedding are important
12	Chi-cheh-laii, et al. [26]	China	2020	Review Article	COVID-19 can present as an asymptomatic carrier state.	Adults represent the population with the highest infection rate; however, neonates, children, and elderly patients can also be infected by SARS-CoV-2.	In addition, nosocomial infection of hospitalized patients and healthcare workers, and viral transmission from asymptomatic carriers are possible.
13	Sibyll BS, et al. [27]	Germany	2020	Outbreak Analysis; With Strengthened surveillance of COVID-19 cases. to identify imported cases early and to prevent secondary transmission in the community or among healthcare workers (HCW).	Investigations carried out among contacts immediately upon illness onset and a follow-up procedure initiated according to the evaluated level of infection risk.	The surveillance system as well as the control measures were adapted from those implemented during past emerging infections that occurred after 2003 (severe acute respiratory syndrome (SARS), MERS, influenza A(H1N1)pdm09, Ebolavirus disease).	If the transmission of SARS-CoV-2 occur during the asymptomatic phase, it cannot be excluded that secondary transmission events initiated from the three confirmed cases remained undetected during the investigations.
14	Yuanyuan X, et al. [17] [28]	China	2020	Rapid Communication(n=2)	Post discharge surveillance & +ve Virus detection in medical Staff. The current standard for diagnosing COVID19, the RT-PCR-based method, has a high accuracy of 97%	Potential infectivity of recovered cases was unclear. Implemented consecutive virus surveillance among medical staff recovered from COVID-19 at hospital , After hospitalised treatment, a possibility of small proportion of clinically recovered patients carrying a small amount of virus	Surveillance aimed to investigate their potential infectivity after discharge. And post-discharge surveillance is suggested.
15	Sohrabi C, et al. [18] [29]	UK	2020	Review	human-to-human transmission possibility during the asymptomatic incubation period of COVID-19,of 2-10days	Need for rigorous surveillance and on-going monitoring to accurately track and potentially predict its future host adaptation, evolution, transmissibility, and pathogenicity.	Further investment required to establish robust methods to contain future outbreaks of communicable disease
16	Lin CU, et al. [18] [30]	Taiwan	2020	prospective active surveillance system with Information Technology Services	Early identification of undiagnosed cases	whether the infection was undiagnosed at the time of admission or acquired after admission) can facilitate prompt action to minimize nosocomial spread,	prospective active surveillance system can protect staff and patients
17	Garg S, Kim L, Whitaker M, et al. [31]	US	2020	Weekly report	COVID-NET was implemented to produce robust, weekly, age-stratified COVID-19-associated hospitalization rates.	Ongoing monitoring of hospitalization rates -----critical to understanding the evolving epidemiology of COVID-19 in the United States.	Monitoring and Surveillance to guides planning and prioritization of health care resources for COVID 2019
18	Ye, Feng et al [32]	China	2020	Full Length article	Asymptomatic carriers during the incubation period can be a potential infection source of COVID-19.	Person-to-person transmission documented	Asymptomatic carriers should be a focus for disease prevention.
19	WHO documents [1,3,33-36]	Geneva	2020	Report of Surveillance strategies apart from Case-based reporting, Aggregated Reporting to WHO	Surveillance guidelines existing in country must be utilized for COVID surveillance	GISRS Surveillance SeroSurveillance Weekly Surveillance Covid View	Various Surveillance Models Can be utilized for followup of Asymptomatics

this point in the outbreak, all laboratories have performed primary diagnostic functions; therefore, the percentage of specimens testing positive across laboratory types can be used to monitor trends in COVID-19 activity.

Future Global Surveillance systems for Asymptomatics: This is practically is nascent stage across the world for asymptomatics. Most countries lack surveillance Models such as that of US namely Outpatient Influenza-Like Illness Network (ILINet) and National Syndromic Surveillance Program (NSSP), but National Polio Surveillance Programmes & Other Communicable and NCDs Surveillance systems are existing in developed and developing countries across the world have still not been used for surveillance of Asymptomatics

Discussion

Symptomatic transmission refers to transmission from a person while they are experiencing symptoms. Preliminary data suggests that people may be more contagious around the time of symptom onset as compared to later on in the disease. In a small number of case reports and studies, pre-symptomatic transmission has been documented through contact tracing efforts and enhanced investigation of clusters of confirmed cases [12-17] This is supported by data suggesting that some people can test positive for COVID-19 from 1-3 days before they develop symptoms [6,16]. Thus, it is possible that people infected with COVID-19 could transmit the virus before significant symptoms develop [1-3,33-36].

It is important to recognize that pre-symptomatic transmission still requires the virus to be spread via infectious droplets or through touching contaminated surfaces. There are few reports of laboratory-confirmed cases who are truly asymptomatic, and to date, there has been no documented asymptomatic transmission. This does not exclude the possibility that it may occur. Asymptomatic cases have been reported as part of contact tracing efforts in some countries [1-3,33-36].

COVID-19 infection so can range from asymptomatic and mild illness to severe illness. Most of the patients have an uncomplicated illness, mild to moderate pneumonia. China CDC has published data on COVID-19 which showed 80.9% cases were mild [37]. New evidence has emerged from China indicating that the large majority of coronavirus infections do not result in symptoms [38]. There are many variations across individuals in the clinical manifestations of COVID19 and we should pay attention to how to prevent people from being infected by asymptomatic patients and patients who were in their incubation period. The large number of patients infected with the virus who show few or no symptoms estimated to be as high as 80% complicates fighting the disease, forcing health care workers worldwide to shift their focus from containing the disease to mitigation [39].

There is clear evidence of asymptomatic infection with COVID-19. Estimates of the proportion of laboratory-confirmed cases who are asymptomatic may vary by age group, study setting and study methodology ranging from 1.2% (China), 6.4% (Italy), 12.9% (pediatric cases in China), 13.0% (long-term care facility in Washington State), and 17.9% (modelled estimate based on data from the Diamond Princess cruise ship). The extent to which screening is

undertaken in group exposures and for contacts of cases, as well the duration of follow-up to ensure asymptomatic individuals do not subsequently develop symptoms will also influence the proportion of cases who are asymptomatic. There is some limited evidence of transmission from people who are asymptomatic and never develop symptoms, and more evidence of transmission from people who are in their incubation period [40].

Globally, too, there is enough evidence that suggests that people who never develop symptoms can transmit the virus. Studies from around the world published in the past weeks reveal the spread by “invisible sources” as a fresh challenge in the fight against Covid-19. This makes it much harder to trace and isolate everyone with the disease before they start transmitting it to others. Public health experts say these invisible sources of contagion must be fact [13-14].

Persons with co-morbidities should be shielded from close contact with mobile members of the family,” he said. Earlier the WHO had said that pre-symptomatic or asymptomatic transmission of the new coronavirus was “relatively rare”. However, new studies from Japan, Italy, South Korea and Washington state — have suggested that silent spreaders can be just as dangerous to a community [13-14]. Although for most people COVID-19 causes only mild illness, it can make some people very ill. More rarely, the disease can be fatal. Older people, and those with preexisting medical conditions (such as high blood pressure, heart problems, or diabetes) appear to be more vulnerable. Public health efforts are targeted at both interrupting further transmission and monitoring the spread of COVID-19. As reports of asymptomatic cases increase, the need for reliable serology testing is becoming more urgent. There are a number of groups working on this and developments are being monitored [20].

Researchers also suspect that there is an undetected pool of people who have mild or no symptoms. That is because an increasing number of infected people have not travelled to epidemic hotspots, or come into contact with people with confirmed cases of COVID-19. This is different from unreported cases, those that are missed because authorities are not carrying out enough tests or people in the early stages of the virus who are not yet showing symptoms. A new study suggests there were 37,400 people with the virus in Wuhan who authorities did not know about, and who had mild or no symptoms but could still be contagious [7].

In Iceland, which says it has tested a higher proportion of inhabitants than any other country, about half those who tested positive for COVID-19 have no symptoms. Separately, the South China Morning Post reports that the number of “silent carriers” – people who are infected by the new coronavirus but show delayed or no symptoms – could be as high as one-third of those who test positive [4,7]. Now researchers are trying to determine whether people infected with COVID-19 but that show no symptoms can infect others. Preliminary findings seem to suggest they can. Study of Yuanyuan Xing, et al (2020) [28] from China reveals that after fulfilling the Chinese current criteria for discharge, it took few days for the immune system to completely eliminate the residual viruses in the body. During this period, the virus may rebound and test positive, but the patients were asymptomatic and chest CT showed no deterioration. If the patients’ immunity decreases, there is a risk of a relapse.

The new revelation of asymptomatic or mildly symptomatic infection in developing countries such as India has also generated Urgent concerns with ICMR body. While ICMR officials do not recommend mass testing in India, given the size and scale of the country, experts familiar with the development said the door-to-door surveillance model is being examined. "It's not easy to test everyone. But the model of door-to-door surveillance used for polio can be replicated here. The fact that India continues to be polio free indicates the robustness of the.

In case of Covid-19, the possibility of monitoring people aged 50 years and more is being considered. "The silent spreaders are unknowingly infecting others. There is a need to strictly monitor the 50 plus population, which has the majority of positive cases," added this person. Any such exercise will take a long time and be expensive. Door-to-door surveillance will prove to be "costly and unachievable" in a country like India [37-40].

According to many WHO(2020) reports [1,3,33-36] that Countries that routinely conduct primary care or hospital-based sentinel surveillance for ILI, ARI, SARI, or pneumonia should continue to collect respiratory specimens using existing case definitions, through sentinel or syndromic networks. Laboratories should continue testing routine sentinel site samples, as well as non-sentinel samples for influenza, with the addition of testing for COVID-19. Until we know more about the temporal patterns of transmission, all countries are encouraged to conduct year-round surveillance for COVID-19. It is recommended to use the WHO's case definition for ILI and SARI for COVID-19 surveillance. It is probable that some COVID-19 infections may be missed due to the requirement of fever as a criterion. This is acceptable since we are monitoring for general trends and not estimating the burden of illness, and it is likely that fever will enrich the viral yield.

Following Strategies can be utilized for strengthening of asymptomatic Surveillance [33-36,39-45]:

GISRS surveillance: Influenza and COVID-19 are both respiratory viruses with similar clinical presentations GISRS is a well-established network of more than 150 national public health laboratories in 125 countries which is monitoring the epidemiology and virologic evolution of influenza disease and viruses. Till 25th March, 2020 approximately 85% of more than 220 national public health laboratories currently testing for COVID-19 globally are laboratories closely associated with GISRS. Utilizing the GISRS system can be an efficient and cost-effective approach to enhancing COVID-19 surveillance.

- Developed countries(e.g. US)
- Outpatient Influenza-Like Illness Network (ILINet) and National Syndromic Surveillance Program (NSSP)
- National Polio Surveillance Programmes
- Developing Countries (e.g. India)
- NPSP based surveillance system
- AADHAR BASED IDSP Surveillance
- Door to Door Surveillance by Primary Health care Workers

- Sentinel Surveillance at CHC/Block level

National surveillance systems should initially aim at rapidly detecting cases and assessing community transmission. As the epidemic progresses, surveillance should monitor the intensity, geographical spread and the impact of the epidemic on the population and healthcare systems and assess the effectiveness of measures in place. In circumstances with capacity shortages and strict implementation of social distancing measures, surveillance should focus on severe acute respiratory infections, sentinel surveillance in outpatient clinics or collection of data through telephone helplines. A strategic approach based on early and rigorous application of these measures will help reduce the burden and pressure on the healthcare system, and in particular on hospitals, and will allow more time for the testing of therapeutics and vaccine development [1-3,20, 33-36].

According to many WHO (2020) Reports [1-3, 33-36] the ultimate objectives of the any global surveillance should be to [1]. Monitor trends in COVID-19 disease at national and global levels [2]. Rapidly detect new cases in countries where the virus is not circulating, and monitor cases in countries where the virus has started to circulate [3]. Provide epidemiological information to conduct risk assessments at the national, regional and global level [4]. Provide epidemiological information to guide preparedness and response measures. Such surveillance strategies needs replication with regard to asymptomatics also, if we have to prevent future recurrence of COVID 2019 Global Pandemic.

In china it is now followed that the Designated hospitals should make plans for patients' return visits and re-testing for the next two to four weeks following their discharge, t sputum samples are more reliable and should be the first choice for re-testing. A high-powered committee headed by Chinese Premier Li Keqiang, which was leading the efforts to contain the virus since January has also called for intensified detection and prompt response to asymptomatic case meaning people infected with coronavirus, but showed no symptoms. Screening of asymptomatic infections should be stepped up, targeting close contacts of confirmed patients, people involved in cluster outbreaks, those exposed to Covid-19 and travellers from areas with high risks of infections, it said. The regulation required nationwide hospitals and disease control departments to take prompt actions once asymptomatic carriers are detected. Once verified, asymptomatic carriers will be put under concentrated medical observation for 14 days and can only.

India's Discharge Policy of nCoV Cases also needs reconsideration. If the laboratory results for nCoV are negative, the discharge of such patients will be governed by his provisional/confirmed diagnosis and it is up to the treating physician to take a decision. The case shall still be monitored for 14 days after their last contact with a confirmed 2019-nCoV case. The case shall be discharged only after evidence of chest radiographic clearance and viral clearance in respiratory samples after two specimens test negative for nCoV within a period of 24 hours

India's top medical research body is grappling with the problem posed by "silent spreaders" and examining the feasibility of starting 'door-to-door' surveillance to monitor and test older people at high risk who dont have symptoms [13-14]. While ICMR officials do not

recommend mass testing in India, given the size and scale of the country, experts familiar with the development said the door-to-door surveillance model is being examined.

Salivary Surveillance can also be a new Option Because saliva can be provided by patients without any invasive procedures, the use of saliva specimens will reduce the risk of nosocomial transmission of 2019-nCoV and is ideal for situations in which nasopharyngeal specimen collection may be contraindicated. As per study in literature, Saliva can be a promising noninvasive specimen for diagnosis, monitoring, and infection control in patients with 2019-nCoV infection [46].

Our systematic review therefore finally reveals from evidence of all studies that Asymptomatic carriers during the incubation period can be a potential infection source of COVID-19. As Person-to-person transmission has been documented; asymptomatic carriers should be a focus for disease prevention So it gets almost clear from studies in literature- COVID-19 can be transmitted by asymptomatic carriers during the incubation period [17--33].

Our systematic review from all available studies [17-46] therefore finally reveals that both developed & developing countries such as India lacks a Proper Post Discharge Surveillance system of Asymptomatic Corona + ve cases , which can be detrimental in the form of future recurrence of Epidemic in countries like India where Population density is high and virus explosive Hot spot areas such as Dharavi Slum of Mumbai & Slums of Delhi can be a dangerous recurrent areas in future.

Conclusion

Lack of asymptomatic post discharge surveillance can be devastating for future, if governments chalk out no Proper-surveillance strategy across the World, leading to possible recurrence of COVID 2019 Pandemic. However authors suggest more research studies in future on urgent basis, before we can say it very definitively.

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