To: (10)(2e) (10)(2e) [(10)(2e) @rivm.nl]; (10)(2e) (10)(2e) [(10)(2e) @rivm.nl]
Cc: (10)(2e) (10)(2e) [(10)(2e) @rivm.nl]; (10)(2e) (10)(2e) [(10)(2e) @rivm.nl]
From: (10)(2e) (10)(2e)
Sent: Wed 5/13/2020 2:12:30 PM
Subject: FW: TEST: COVID-19 Literacy
Received: Wed 5/13/2020 2:12:31 PM

Hoi (10)(2e)

Gaaf zeg!
Nog niet eerder gezegd, maar ik ben ook eens met de tekst in de header.

Paar dingen die me nog opvallen.

- Qua afbeelding, dit zijn gewoon stock foto's denk ik? Is er nog een die dichterbij 'literatuur' komt?
- Mogen de koppen van de stukjes wat groter? Omdat sommige stukjes zelf nog koppen gebruiken is het soms moeilijk onderscheid te maken
- Ook staat tussen sommige stukjes staat maar 1 enter, zou de afstand tussen de stukjes net iets groter kunnen, en gelijk?
- Is het ook mogelijk ook 'linkjes' te hebben vanuit de individuele stukjes, dus niet alleen op key messages en summaries?
- Ik vind de referenties erg dominant aanwezig. Kunnen de enters tussen de referenties in nog weg? / de tekst wellicht helemaal wat kleiner maken? (of had ik dat dan zo moeten aanleveren…?)

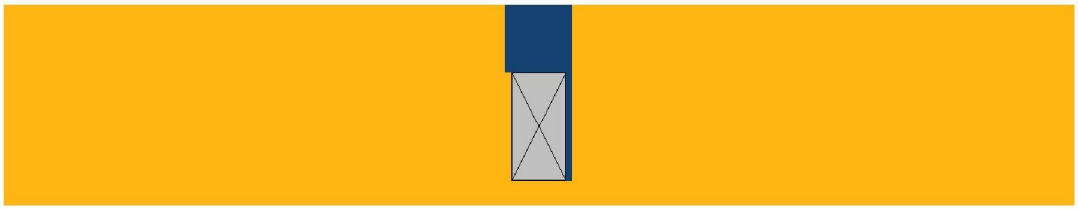
Zeg ook nee, waar het niet gaat, maar dit valt mij nog op!

Groet,

(10)(2e)

From: COVID-19 Literacy <(10)(2e)@nieuwsbrieven.rivm.nl>
Sent: woensdag 13 mei 2020 16:03
To: (10)(2e) (10)(2e) (10)(2e) <(10)(2e) @rivm.nl>
Subject: TEST: COVID-19 Literacy

Bekijk online



COVID-19 Literacy

13 mei 2020

Key messages from the literature on COVID-19

› A- or presymptomatic transmission

Introduction

This is the first edition of the COVID-literacy newsletter. In this newsletter, we will regularly present key messages from the literature on COVID-19. This newsletter contains important information about several cohorts and their outcomes, the capacity of the health system in regard to COVID-19, mental health and many more topics. The upcoming editions of these newsletters will feature updates and new topics alike.

Why?

Since March 2020, many of our colleagues at the Centre for Infectious Disease Control (Dutch: Centrum Infectieziektebestrijding – CIb) have been reviewing new literature on a wide range of subjects related to COVID-19 every week. These teams have developed living summaries for internal use, which serve as a foundational body of literature to support decision-makers (including the OMT), guideline developers, and researchers on COVID-19 within CIb. These summaries can also be used as a starting point for more specific literature searches.*

Looking to contribute?

If you would like to contribute to these literature teams, please let us know. We are always looking for new colleagues. Also, if you believe that a certain important topic is missing and that a new team should be set up, we are happy to look into this together. Please e-mail us at (10)(2e) @rivm.nl.

We hope you enjoy our summaries!

Best,

(10)(2e) (10)(2e), (10)(2e) (10)(2e), (10)(2e) (10)(2e), (10)(2e) (10)(2e) (10)(2e)

*The short summaries on topics related to COVID-19 presented in this weekly newsletter are based on quick searches in EPPImapper (http://eppi.ioe.ac.uk/COVID19_MAP/covid_map_v3.html), as well as manual searches by authors on specific topics. Two researchers ((10)(2e) (10)(2e), (10)(2e) (10)(2e)) shared tasks related to study selection. The synthesis of results differs per topic, as is shown by the authors of each summary.

It is currently urgently necessary to identify the most important evidence quickly. This led us to opt for this quick approach, despite its inherent risk of overlooking key evidence or making

misguided judgements. It takes our teams approximately two weeks to process and review studies after they are published. These living summaries will be updated by appending a *what's new section* featuring new information.

Key messages

Patients at higher risk for severe illness due to COVID-19 infection

- Identifying patient groups at higher risk for severe illness (ICU admission or death) is essential for devising group-focused public health policies.
- Data from 12 studies with clinical cohorts showed a wide variance in the prevalence of comorbidities due to methodological differences.
- Of the clinical COVID-19 patients, 3-30% were admitted to the ICU during hospitalisation and 0-28% died; 15-39% of patients admitted to the ICU died.
- Cardiovascular disease, hypertension and diabetes are more prevalent among patients with severe illness, whereas chronic lung diseases, cancer, chronic liver diseases and immunodeficiency are not.
- More cohort data are needed to determine which medical conditions result in an age-independent risk of complications.

Children and COVID-19

- SARS-CoV-2 infections are less prevalent among children. Children with an infection usually have milder symptoms and recover quicker than adults.
- The most common reported symptoms are cough, fever and sore throat.
- Reports of death among children due to COVID-19 are scarce.
- Reported case clusters focus mainly on adults. In most clusters that involved children, the index case was an adult.
- Limited data on transmission within schools show few secondary cases.
- More data are necessary to understand the epidemiology of COVID-19 among children worldwide.

The effect of COVID-19 on pregnancy and neonates

- We have assessed 23 pieces of literature reporting on the effect of SARS-CoV-2 infection in pregnant women and/or neonates.
- SARS-CoV-2 infections in pregnant women and neonates are not associated with worse outcomes than infections in the general population, and infections are usually mild or asymptomatic.
- There is currently no evidence to suggest that SARS-CoV-2 infection in pregnant women leads to more complications in pregnancy or delivery, and standard maternal and fetal monitoring should be maintained.
- There is no current evidence of vertical transmission of Covid-19 from mother to neonate, although this cannot be ruled out.
- Breastfeeding and nursing should be encouraged in neonates born to mothers with Covid-19, but caregivers should apply proper hand hygiene and consider wearing a surgical mask.
- Additional research is necessary in this field, especially on the effect of SARS-CoV-2 infection in early pregnancy, on the impact of comorbidities during pregnancy on SARS-CoV-2 infection outcomes, and on the presence of Covid-19 in extensive neonatal samples.

Capacity of health systems

The surge capacity of countries' (public) health systems is being challenged by the COVID-19 crisis, with key issues including:

- Lack of knowledge about the pathogen and the related disease, making it difficult to design and implement response measures in a timely fashion.
- Lack of protocols/guidance, equipment and health care structures (space) to avoid contamination among healthcare workers and nosocomial outbreaks.
- Shortages of test kits, staff, equipment and other resources.
- Due to the high level of anxiety among the population, increased demand for testing continues to overwhelm public health systems.

The included papers describe strategies to address these different challenges based on countries' experiences, case studies, and expert opinions and advice.

Contact tracing in relation to COVID-19

- The most frequently reported method for identifying and locating contacts was an interview to recover relevant information about contacts.
- In South Korea, this was complemented with various tracking measures, using patients' history of clinic visits, cell phone GPS location history, credit card transaction logs, and closed-circuit television. A smartphone-based, "self-assessment app," was also introduced as an additional tool to track symptoms of COVID-19. In China, multiple (mobile) applications were used with the aim of 1) stopping individuals with a potential infection from traveling, whilst allowing healthy people to travel freely and resume work, 2) notifying individuals of potential exposure to COVID-19 patients in public transportation, and 3) providing information on local case clusters.
- Studies reported a range of 1-44,730 confirmed index cases with a range of 23-2370 primary contacts. Overall, secondary attack rates ranged between 0.55-6.6%. Secondary attack rates ranged between 4.6-11.2% for household contacts and 0-0.9% for health care personnel and patients.

Mental health of healthcare workers

- Most studies report that COVID-19 has an impact on the mental health of healthcare workers, although some studies report no impact.
- Most of the included studies assess the mental health of healthcare workers in China.
- Most studies are cross-sectional, meaning they measure mental health at one point in time.
- Studies assessing the mental health of healthcare workers often do not provide information on underlying causes of reported changes in mental health.

One health and animal reservoirs

- Natural SARS-CoV-2 infections have been found in dogs, cats (and other felines) and mink, likely through contact with infected humans.
- Experimentally, cats, dogs, ferrets, non-human primates, fruit bats and hamsters have been shown to be susceptible to intranasal SARS-CoV-2 infection.
- Experimentally, cats, ferrets and hamsters have been shown to be able to transmit the virus to other cats, ferrets and hamsters.

A- or presymptomatic transmission

- A patient is generally contagious during the symptomatic phase. Patients with mild and severe symptoms are able to excrete the virus. However, there is direct evidence that the amount of virus detected in patients is highest around the time of starting symptoms.
- It is difficult in daily practice to indicate when symptoms exactly started.
- Modeling studies estimated the contribution of infections before the onset of symptoms at 10-60%.
- Several studies have been conducted on patient clusters, usually based on transmission within families in Asia. These studies show that a- or presymptomatic transmission 1-3 days before persons developed symptoms in absence of another possible source.
- In addition to these, few cross-sectional studies (with or without follow-up) showed a- or presymptomatic transmission.

Summaries

Patients at higher risk for severe illness due to COVID-19 infection

Research questions & methods

Which patients have a higher risk of getting a severe COVID-19 infection?

LitCovid/EPImapper were screened to identify multicentre studies on clinical COVID-19 cohorts that included ≥ 100 patients.

Results

Research and patient characteristics

Eight clinical cohorts (with 3-30% of the patients admitted to ICU at some stage) and 4 IC cohorts were found: from China (1-6), the USA (7, 8), and Europe (9-12), with the clinical cohorts comprising 100 (10)- 5700 (8)patients (median age 42-72 years) and the ICU comprising 124 (12)- 1591 (9)patients (median age 60-64 years). In all cohorts, most patients were male (52-82%). Due to the short observation periods (3.5-7 weeks) no conclusive data on discharge or

death could be obtained from all admitted patients.

Comorbidities

Of the COVID-19 patients, 24-94% had at least one comorbidity. The prevalence of comorbidities varied widely between studies due to differences in admission policies and lack of uniformly applied definitions. Age is associated with severe disease. Furthermore, the prevalence of cardiovascular disease, hypertension and diabetes was higher in ICU patients and deceased patients, compared to patients upon admission to hospital, whereas the prevalence of chronic lung diseases, cancer, chronic kidney and liver disease and immunodeficiency was not. Only 2 studies conducted a multivariate analysis with conflicting results that did not consistently identify which medical condition resulted in a complicated course of disease.

Conclusion

Elderly people (> 65 years) and people with cardiovascular disease, hypertension or diabetes have a higher risk of severe COVID-19 infection (ICU admission or death). However, due to methodological limitations, these findings on the age-independent contribution of these and other medical conditions to severe outcomes of disease need to be confirmed in male and female patients by more studies on clinical cohorts.

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Children and COVID-19

Research questions & methods

The main objectives of the literature search on Children and COVID-19 are gathering information on the clinical presentation and course of disease, the presence of asymptomatic infections, viral load, and the transmission of SARS-CoV-2 from and to children. Throughout, case reports have been left out.

Results

Children seem to represent 0.6-6.2% of all COVID-19 cases (1-7). When differentiating children between 0-9 and 10-19 years of age, the percentages are 0.7-2.8% and 1.0-5.2%, respectively. Iceland randomly tested 13,080 persons, of which 100 tested positive (0.8%) (8). None of the 848 children (< 9 years) included in this survey tested positive.

Clinical presentation and course of disease

In a Chinese study with 731 confirmed cases (< 18 years), 12.9% of persons were asymptomatic, 43.1% had acute respiratory tract infections, 41.0% developed pneumonia, 2.5% were severely ill and 3 children (0.4%) were critically ill (9). Another Chinese study with 171 children (<16 years) reported 15.8% asymptomatic cases, 19.3% with an acute respiratory tract infection, and 64.9% developing pneumonia (10). IC admission of children in the USA was

estimated at 0.6-2.0% of all confirmed cases (1).

In the publications so far, four teenagers and one infant have been reported to have died, (most likely) due to COVID-19 (1, 7, 9, 10). The corresponding case fatality rate is 0.1-0.2%.

However, it remains difficult to gauge the comparability of studies and countries, as test policies differ per country, ranging from testing every contact to testing cases who most likely have to be hospitalised.

Clustering and transmission

Within clusters, persons developed symptoms within a short space of time, whereas asymptomatic cases were also identified. In those situations, it is impossible to determine an index case. Only a few children have been reported as possible index case, with an adult being the index case in the vast majority of the reported clusters (11-14). Two studies published information on 19 index cases (10 students and 9 staff members) who had been in school when symptomatic (15, 16). In total, 947 persons in 18 schools were identified as contacts and followed. Two secondary cases were found: one primary-school student and one high-school student.

Conclusion

Children seem to be less affected than adults. They also appear to be of minor importance in the transmission of the virus. However, testing limitations and non-pharmaceutical measures could have influenced study results, such as limited data on transmission within schools, which were closed early in most countries. Moreover, at the beginning of the pandemic, travellers, who are mainly adults, played a large role in the spread of the virus.

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The effect of COVID-19 on pregnancy and neonates

Research questions

For this summary, we reviewed articles related to pregnancy, neonates, and Covid-19. Based on

collaboration with obstetricians and gynaecologists at the NVOG, key questions have been drawn up as a guide for assessing parameters:

1. Do SARS-CoV-2 infections in pregnant women lead to more pregnancy complications?

2. Which complications are more prevalent in pregnant women with SARS-CoV-2 infections than in non-pregnant women?

3. Do SARS-CoV-2 infections in pregnant women lead to more complications during delivery?

4. When should pregnant women with Covid-19 after (P)PROM be delivered?

5. What precautions do women with SARS-CoV-2 infections need to take in order to nurse their newborn while minimising the risk of transmission? What is the risk of transmission of the virus during nursing?

Methods

We conducted our search in both PubMmed and EMBASE to best isolate articles reporting on SARS-CoV-2 infections in pregnant women and neonates. Until May 8, 22 pieces of literature were identified (20 journal articles and 2 letters of correspondence). Results are divided into three groups: infections in pregnant women, outcomes of pregnancy and delivery, and infections in neonates.

Results

The current literature on SARS-CoV-2 infection and pregnancy is still largely underdeveloped, although accumulating. Studies consist of small sample sizes and are mostly retrospective, and parameters are inconsistent, which means that results cannot easily be generalised. With this in mind, current research suggests that SARS-CoV-2 infection in pregnant women and neonates is not associated with worse outcomes, and the disease in pregnant women is mild or asymptomatic. While comorbidities play a role in exacerbating SARS-CoV-2 infection in the general population, little is known about the role comorbidities play in infections in pregnant women. The rate of complications during pregnancy does not seem to be higher than in non-infected women, though preterm birth has been reported. SARS-CoV-2 infection in neonates has rarely been reported and vertical transmission is not expected based on current research. Early samples collected from neonates are lacking, though, and increased testing on amniotic fluid, cord blood, placenta, and breast milk would provide valuable information on the SARS-CoV-2 infection route and transmission, both vertical and horizontal. Data on antibody tests are rare and due to unreliable tests, interpreting outcomes is difficult. Finally, there is little evidence regarding the safety of breastfeeding by mothers with a SARS-CoV-2 infection. There is currently no evidence of vertical transmission during breastfeeding, and nursing should be encouraged, as long as protective measures are taken.

Conclusions

Based on these results, we can conclude that additional research is necessary in order to make any general remarks on the effect of SARS-CoV-2 infections on pregnancy. Because effects of SARS-CoV-2 infection on early pregnancy are unknown, pregnant women and their fetuses should be closely monitored. For mothers in their third trimester, care should be given as usual with regular maternal and fetal monitoring. The decision and method of delivery should be based on the clinical condition of pregnant women in consultation with multidisciplinary teams and patients. Mothers and fathers with Covid-19 should be encouraged to breastfeed and nurse their newborn, though they should apply proper hand hygiene and consider wearing a surgical mask during feeding. By following the advice of current research on Covid-19 and pregnancy and the harmonised guidelines of the LCI and NVOG, evidence-based decisions can be made and both pregnant women and neonates can be adequately protected from Covid-19.

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Capacity of health systems

Research questions & methods

- How to manage increasing surges and demand for health systems due to COVID-19?
  - What are the challenges and the potential solutions to these challenges?
- Exclusion Criteria:
  - Non-peer reviewed papers; papers not based on the COVID-19 experience; papers that are merely descriptive of the response without answering the research question.

Results: Strategies for handling the increased demand for health systems to respond to COVID-19

Supporting the rapid implementation of response measures

- Repurposing existing structures, plans and developments (e.g. for Influenza Pandemic).[1]
- Diminishing the speed of spread and the peak of the epidemic curve through rapid diagnosis and isolation of cases, with additional measures such as "social distancing."[1]

Maintaining hospital capacity

- Avoiding infections among healthcare workers on and nosocomial outbreaks by:
  - Using a combination of administrative approaches: establishing protocols for triaging and isolating patients suspected of having an infection in emergency departments;[1]engineering control,[1]special training of hospital staff,[1,3,9] and use of personal protective equipment (PPE).[1-3]
  - Tackling equipment shortages: fast-tracking public procurement.[4]
  - Supporting Infection Prevention and Control for healthcare institutions through technology: systems for monitoring medical staff.[5]
  - Dedicating spaces for COVID-19 management: separate areas for patients with different risks of infection,[3, 6, 7]even considering out-of-hospital settings for mild cases.[8]

- Enhancing emergency care through:
  - Effective ICU preparation and scheduling, including evaluation of ICU bed capacity, the ability to augment ICU-level bed space with alternative care sites,[1, 7, 9-11] mechanical ventilator stock and supply chains,[1] and the logistics of isolating and cohorting patients.[1]
  - Specific aspects of the decision-making process, including modelling yield scenarios for hospitalisation rates and ICU bed requirements;[12] creating a dynamic and fluid system;[7] establishing a team of experts to systematically make decisions and a centralised committee to review them.[13]
- Decreasing hospital admissions and healthcare-seeking behaviour using:
  - Online patient databases,[14] self-checking tools;[15-17] and online hospitals.[18]
  - Triage at primary care facilities,[19, 20] home testing,[19-21] or other specific locations.

Increasing diagnostic capacity by

- Rapidly expanding diagnostic tests to all symptomatic patients, and ultimately to patients who have mild symptoms consistent with COVID-19.[1]

Increasing human resources capacity

- Deploying staff from within or outside of medical centres to dedicated COVID-19 departments;[3, 9, 22, 23] appropriate training and supervision[3, 9] segregation of teams and workflow to minimise the simultaneous loss of workforce;[2, 3, 22] honest, clear, and empathic leadership;[3] good work-rest cycle;[3] discouraging staff from taking holidays;[3] establishing of good morale and well-being to counter absenteeism.[3, 22, 23]
- Funding for the recruitment of more healthcare workers.[4]

Conclusion

From these studies, we can conclude that:

1. Hospitals require a quick influx of staff, units, and equipment in order to manage increases in COVID-19 cases. Resources should be reconfigured and prioritized based on real-time data on capacity and patient requirements.
2. Hospitals should create filter zones for COVID and non-COVID areas to prevent contamination, and healthcare and testing should be provided outside hospital settings as much as possible, ideally at primary care facilities, home, or other facilities.
3. Critical challenges still include a lack of staff, equipment and resources in hot spots; to solve these problems, a whole-society approach and global solidarity are needed.

Most of the results are based on expert opinion and/or small case studies within specific contexts (one hospital) and areas (one county). More representative studies are needed to support the generalisation of findings.

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Contact tracing in relation to COVID-19

Research questions & methods

Our research questions were: 1) How is Contact Tracing (CT) performed in countries worldwide?; 2) What are the reported results of Contact Tracing (CT) in terms of number and type of contacts reached and the secondary attack rate among different contacts?; and 3) What digital applications or other technical innovations for Contact Tracing (CT) are used to enhance CT?

Inclusion criteria were that a study should describe 1) contact tracing (CT) and 2) empirical data.

Results

See main findings above.

Conclusion

Due to the limited number of studies describing contact tracing (CT) and the heterogeneity of these studies, no conclusions can be reached as of yet.

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Mental Health

Research questions & methods

How is the mental health of healthcare workers affected by COVID-19?

Results

Thirteen studies were included in this summary

The results of the papers vary, showing that COVID-19 has no or hardly any effect on mental health to severe effects on mental health. The specific aspects of mental health that the studies focused on differed: depression, anxiety, distress, insomnia, burn-out, mental health disturbance and so on. A variety of measurement instruments was used to assess the mental health of healthcare workers. Most of the included studies assessed the mental health of Chinese healthcare workers.

Nurses, females, healthcare workers with direct contact with COVID-19 patients, and healthcare workers who worked in Wuhan (compared to other regions) reported more severe mental health problems. Living in rural areas, having an organic disease, having children, fear, and weekly working hours also affected healthcare workers' mental health status.

Conclusion

The mental health of healthcare workers is affected by COVID-19, but the effects vary. More longitudinal studies are needed and more studies outside of China are needed to draw conclusions.

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One Health and Animal Reservoirs

Research questions & methods

Which animal species are susceptible to SARS-CoV-2 and do these animals develop symptoms?

Is animal-to-animal spread of SARS-CoV-2 possible and by which route(s)?

Is human-to-animal spread of SARS-CoV-2 possible and by which route(s)?

Is animal-to-human spread of SARS-CoV-2 possible and by which route(s)?

Results

In addition to humans, natural SARS-CoV-2 infection has been found in a number of animals worldwide, including dogs, cats, other felines, and farmed mink. It is believed these animals contracted the virus through contact with humans infected with SARS-CoV-2. Some animals showed mild symptoms. In a preprint from Wuhan, among a sample of 102 cats, antibodies against SARS-CoV-2 were found in 15%. Another preprint describes a community of students in France with two confirmed COVID-19 cases, in which none of the cats and dogs were found to be SARS-CoV-2 positive.

Experimental infections with intranasally inoculated SARS-CoV-2 have been performed with cats, dogs, ferrets, fruit bats, hamsters, non-human primates, pigs, chicken, and ducks. Pigs, chicken, and ducks were found not to be susceptible to SARS-CoV-2. Virus replication was found in the other species mentioned here, mainly in the upper respiratory tract, but also in the lungs and intestine. Recorded clinical signs were mild to absent. For cats, dogs, fruit bats, ferrets, and hamsters, intraspecies transmission of the virus was investigated. Dogs and fruit bats were unable to transmit the virus under experimental conditions. Ferrets, cats, dogs, and hamsters were found capable of intraspecies transmission of the virus to direct contacts. In ferrets, transmission through indirect contact (airborne) was also investigated and proven.

Conclusion

Several animal species are susceptible to SARS-CoV-2 infection, including pet species such as cats and dogs. Transmission from humans to animals is likely in the described cases of natural infection, but it is unclear how efficient this spread is. Animal-to-animal spread has been proven experimentally for ferrets, cats, dogs, and hamsters.

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A- or presymptomatic transmission

People infected with SARS-CoV-2 can develop a wide spectrum of symptoms, from nonspecific respiratory symptoms to symptoms of gastroenteritis. Current epidemiologic, virologic, and modeling reports support the possibility of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission from persons who are presymptomatic (SARS-CoV-2 detected before symptom onset) or asymptomatic (SARS-CoV-2 detected but symptoms never develop). To what extent asymptomatic or presymptomatic persons can contribute to ongoing transmission is unclear but important to explore. Important questions related to this were: From which stage are these persons contagious? What is the role of asymptomatic or presymptomatic persons in the transmission?

Results

- A patient is generally contagious during the symptomatic phase. Patients with mild and severe symptoms are able to excrete the virus (Zhang et al 2020). However, there is direct

evidence (He et al. 2020, Kim et al. 2020, Zou et al. 2020) that the amount of virus detected in patients is highest around the time of starting symptoms.

- It is difficult in daily practice to indicate when symptoms exactly started.
- Modeling studies estimated the contribution of infections before the onset of symptoms at 10-60% (Ferreti et al. 2020, Ganyani et al. 2020, He et al. 2020).
- Several studies (Luo et al. 2020, Hu et al. 2020, Pan et al. 2020, Tong et al. 2020, Yu et al. 2020, Huang et al. 2020, Qian et al 2020, Zhou et al, 2020, Wycliffe Wei et al, 2020, Rothe et al. 2020) have been conducted on patient clusters, usually based on transmission within families in Asia. These studies show that a- or presymptomatic transmission 1-3 days before persons developed symptoms in absence of another possible source.
- In addition to these, few cross-sectional studies (with or without follow-up) showed a- or presymptomatic transmission, for instance a study by Kimball et al. 2020 in a nursing home in America where nearly half (n = 13) of the 23 positively tested subjects were asymptomatic at the time of the positive PCR test result. Ten of these eventually developed symptoms and 3 remained asymptomatic over the entire study period. There was no difference in Ct value between the asymptomatic and symptomatic persons, indicating no difference in contagiousness.

Limitations of the studies

- It is not always clear whether persons were entirely asymptomatic before the onset of symptoms or had possibly mild symptoms
- Possible transmission routes were not always mentioned
- Conditions of study settings were not always clearly defined
- For cluster studies, it seems plausible that transmission took place within the described cluster. However, phylogenetic analyses could have been provided additional information on transmission and clustering
- Most studies took place in China on the basis of self-reported data (reliability)
- The marker of contagiousness was in most studies based on positive PCR test results, without ct-values or cultured virus

Conclusions

Transmission can occur 1-3 days before the onset of symptoms and a/presymptomatic transmission may play a role in the overall transmission. Based on current evidence, information of the ECDC and guidelines of several Western countries, the possibility of presymptomatic transmission of 1-3 days before the onset of symptoms should be included in our policy, especially for procedures as contact tracing.

Findings and conclusions have been approved by the members of the OMT and are published on the website: https://lci.rivm.nl/covid-19/bijlage/onderbouwing-a-pre-vroegsymptomatische-transmissie.

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