A Review of Viral Shedding in Resolved and Convalescent COVID-19 Patients

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Abstract
As of August 06, 2020, 18.9 million cases of SARS-CoV-2 and more than 711,000 deaths have been reported. As per available data, 80% of the patients experience mild disease, 20% need hospital admission, and about 5% require intensive care. To date, several modes of transmission such as droplet, contact, airborne, blood borne, and fomite have been described as plausible. Several studies have demonstrated shedding of the virus from patients after being free from symptoms, i.e. prolonged virus shedding. While few studies demonstrated virus shedding in convalescent patients, i.e. those testing negative for presence of virus on nasopharyngeal and/or oropharyngeal swabs, yet virus shedding was reported from other sources. Maximum duration of conversion time reported among the included studies was 60 days, while the least duration was 3 days. Viral shedding from sources other than nasopharynx and oropharynx, like stools, urine, saliva, semen, and tears, was reported. More number of studies described virus shedding from gastrointestinal tract (mainly in stools), while least a number of cases tested positive for the virus in tears. Prolonged viral shedding is important to consider while discontinuing isolation procedures and/or discharging SARS-CoV-2 patients. The risk of transmission varies in magnitude and depends on the infectivity of the shed virus in biological samples and the patient population involved. Clinical decision-making should be governed by clinical scenario, guidelines, detectable viral load, source of detectable virus, infectivity, and patient-related factors.

Keywords Prolonged shedding · Virus shedding · Convalescent patients · Transmission

Introduction
As of August 06, 2020, 18.9 million cases of SARS-CoV-2 and more than 711,000 deaths have been reported. As per available data, 80% of the patients experience mild disease, 20% need hospital admission, and about 5% require intensive care [1]. To date, several modes of transmission such as droplet, contact, airborne, blood borne, and fomite have been described as plausible [2]. Asymptomatic carrier transmission of the virus has been demonstrated in several studies, highlighting the importance of identifying the sources of transmission and breaking the chain [3–5]. Viable SARS-CoV-2 has been detected in several biological samples such as faeces, urine, and blood. These biological specimens are of key interest as they can serve as sources of transmission and as targets for breaking the transmission chain [6–8]. With the emergence of new data, guidelines and clinical practice are constantly evolving in an effort to mitigate the disease burden of this global health crisis. In this study, we aim to study the sources of viral shedding that have been reported to date and compare the duration of shedding from different sources and their relation to clinical recovery. We also aim to highlight the importance of viral shedding in clinical decision-making about discontinuation of isolation procedures.

Methodology
Search Method and Strategy
We conducted a literature search during the months of June and July 2020 for articles on the various modes through which the virus may be shed from the affected host and may lead to
transmission of COVID-19 infection. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used for selection of studies [9]. Primary databases that were used for the search are WHO, PubMed, and Google Scholar. The search strategy used the following keywords: shedding, convalescent, prolonged, coronavirus, COVID-19, and their combination.

**Data Screening and Eligibility**

The final review articles fulfilled the following criteria:

1. Reported duration of viral shedding and its source in patients with resolved clinical symptoms but testing positive for SARS-CoV2 (prolonged viral shedding)
2. Reported viral shedding and its source in convalescent patients
3. Included patient data regardless of age, gender, or location
4. Full text, peer-reviewed articles
5. Articles in English

Articles that did not contain patient data or studies pertaining to SARS-CoV-1 and MERS were excluded. In doing so, we had 19 articles for the final review (Table 1). Each paper was reviewed by both the authors independently, and disagreements were discussed and resolved via a consensus.

Prolonged viral shedding was defined as persistently testing positive for SARS-CoV2 RNA despite resolution of clinical symptoms and radiological findings, i.e. viral shedding for more than the expected number of days. The virus may be found in nasopharyngeal and/or oropharyngeal swabs or other routes of viral shedding like faeces, urine, saliva, semen, and tears. Convalescent patients were defined as patients testing negative for presence of virus on nasopharyngeal and/or oropharyngeal swabs, yet virus shedding was reported from other sources. Various sources of viral shedding are summarized in Fig. 2.

**Results**

Of the 313 manuscripts retrieved from our search, 19 studies were found eligible and considered for data extraction (Fig. 1). Studies reporting duration of virus shedding and its source(s) in patients with resolved symptoms and/or in convalescent patients were included and reviewed (Table 1). Patients shedding virus after being free from symptoms were said to have prolonged virus shedding. Convalescent patients were defined as patients testing negative for presence of virus on nasopharyngeal and/or oropharyngeal swabs, yet virus shedding was reported from other sources. Various sources of viral shedding are summarized in Fig. 2.

The number of days of viral shedding varied among the included studies and among the included patients. Thus, the studies reported the duration as either total number of days or median or mean number of days of virus shedding from the onset of illness to testing negative (conversion time) (Table 2). Maximum duration of conversion time among the included studies was reported by Li et al., which was 60 days [12]. Followed by 44 days of conversion time reported by Fu et al. Interestingly, the least duration of conversion time noted was 3 days [13].

Samples from nasopharynx and/or oropharynx are commonly considered for testing SARS-CoV-2 RNA, while a few studies also reported shedding of virus from sources other than nasopharynx and oropharynx, for example, stools, urine, saliva, semen, and tears (Table 3). More number of studies described virus shedding from gastrointestinal tract (mainly in stools), while a least number of cases tested positive for the virus in tears.

Few studies reported probable risk factors that may favour delayed clearance of the virus. Qi et al. demonstrated that the time from symptom onset to admission and the length of hospital stay may be risk factors for prolonged virus shedding [10]. Fu et al. studied clearance in patients with coronary heart disease (CHD) and reported that decreased albumin levels and delayed antiviral therapy may delay clearance of virus [13]. Patients with albumin $\geq 35$ g/L had a shorter duration of viral RNA shedding compared with those with albumin $< 35$ g/L, and the median times were 18 days and 20 days, respectively. Campioli et al. and Decker et al. suggested that the
| Author         | Country | Study design          | Number of included patients | Source of viral shedding studied | Results/Conclusion of the study                                                                                                                                 |
|---------------|---------|-----------------------|-----------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Qi et al.     | China   | Retrospective cohort  | 147                         | Nasopharynx                     | The time from symptom onset to admission (OR* 1.740; 95% CI 1.29; p < 0.001) and the hospital length of stay (OR 1.604; 95% CI* 1.26; p = 0.001) were found to be risk factors for a prolonged duration of viral shedding of more than 17 days |
| Campioli et al.| USA     | Retrospective cohort  | 251                         | Nasopharynx                     | Risk factors for delayed cessation of virus shedding included asthma and immunosuppression. The cumulative cessation of virus shedding rate at 2 weeks from symptom onset was 13.5%, and increased to 43.8% at 3 weeks, suggesting that testing after 3 weeks of symptoms might have a greater rate of cessation of virus shedding |
| Li et al.     | China   | Case report           | 1                           | Nasopharynx and oropharynx      | Viral shedding seen for 60 days from illness onset. Persistent viral shedding was noted for 36 days after resolution of symptoms                                                                                       |
| Fu et al.     | China   | Prospective cohort    | 410                         | Oropharynx                      | Risk factors for delayed clearance of SARS-CoV-2 RNA included patients with CHD*, decreased albumin levels, and delayed antiviral therapy. Patients with albumin ≤ 35 g/L had prolonged viral shedding with a median of 20 days                                                |
| Decker et al. | Germany | Case report           | 1                           | Oropharynx                      | 20 days after initial presentation, the patient was asymptomatic, but virus culture of throat swabs on days 18, 21, and 35 had viral copy numbers similar to the onset of infection Immunosuppressive therapy may contribute to delayed clearance of virus                                    |
| Ling et al.   | China   | Retrospective cohort  | 66                          | Oropharynx, stools, urine       | Clearance of viral RNA from patients’ stools was delayed compared with that from oropharyngeal swabs by 2 days. Mean number of days of clearance of virus from pharynx was 9.5 days, while from stools was 11 days. Viral nucleic acid was also found in urine |
| Zhang et al.  | China   | Case Series           | 23                          | Nasopharynx, stools, urine      | A longer virus shedding period was found in the faecal samples (median 22.0 days) compared with the upper respiratory samples (median 10.0 days). However, the viral RNA in the latter were generally detectable earlier than in the former. Urine samples of two critically ill patients were positive for viral RNA |
| Lo et al.     | China   | Prospective cohort    | 10                          | Nasopharynx and stools          | Average viral RNA conversion time (in days) for nasopharyngeal swab was 18.2, while for faeces was 19.3                                                                                                                                 |
| Xing et al.   | China   | Prospective cohort    | 3                           | Stools                          | SARS-CoV-2 may exist in the gastrointestinal tract for a longer time than the respiratory tract with a greater load in cases                                                                                                                                 |
| Hosoda et al. | Japan   | Case Report           | 1                           | Stools                          | Patient even after recovering from acute enterocolitis due to SARS-CoV-2 continued to excrete the virus in stools for weeks                                                                                                                                                  |
| Zhao et al.   | China   | Retrospective cohort  | 401                         | Rectal swab                     | Prolonged viral shedding in faeces with higher positive rate and higher viral load than the paired respiratory samples. The longest duration observed was 43 days                                                                 |
| Wu et al.     | China   | Prospective cohort    | 74                          | Stools                          | Average viral RNA conversion time (in days) for nasopharyngeal swab was 16.7 while for faeces was 27.9. Possibility of prolonged viral shedding in faeces, for nearly 5 weeks after the patients’ respiratory samples tested negative for SARS-CoV-2 RNA |
| Xu et al.     | China   | Prospective cohort    | 8                           | Rectal swab                     | Viral shedding from the digestive system might be greater and last longer than that from the respiratory tract                                                                                                                                                          |
| Huang et al.  | China   | Case Series           | 1                           | Oropharynx and anal swabs       | The SARS-CoV-2 nucleic acid became negative in throat swab samples, while the anal swab samples continued to be positive for at least 9 days                                                                                                                                 |
| Ren et al.    | China   | Case Report           | 1                           | Urine                           | The urine of asymptomatic patients was tested positive, while RT-PCR of throat swab was negative                                                                                                                                                                           |
| Azzi et al.   | Italy   | Prospective cohort    | 25                          | Nasopharynx and saliva          | Initially, all 25 cases tested positive for viral RNA in saliva and nasopharyngeal swab. Later, saliva was tested positive in 2 patients, while nasopharyngeal swab tested negative                                                                                                                                 |
| Li et al.     | China   | Prospective cohort    | 6                           | Semen                           | Six cases tested positive. Four patients (26.7%) were in the acute stage of infection, and 2 patients (8.7%) were recovering                                                                                                                                          |
| Valente et al.| Italy   | Prospective cohort    | 8                           | Tears                           |                                                                                                                                                                                                                                                                              |
immunosuppressive therapy may contribute to delayed clearance of virus [11, 14]. In addition, Campioli et al. suggested that asthma may be a cause of delayed recovery.

The qualitative assessment of the included studies was performed. The NIH Quality Assessment Tool was used to assess the quality of case series/case reports (Table 4) [29]. The New Castle-Ottawa Quality Assessment Scale was used for assessing the quality of cohort studies and was rated as good, fair, or poor (Table 5) [30].

Discussion

In the interim guidance for the clinical management of COVID-19, the World Health Organization (WHO) outlined the discharge criteria by taking prolonged viral shedding and its implication in infectivity and community transmission into consideration [31]. Two negative RT-PCR results on sequential samples taken at least 24 h apart and clinical recovery are no longer required to meet the criteria for discharge from a healthcare
facility or isolation [31, 32]. Factoring insufficient testing capacity, economic strain, access to healthcare, and variable test results based on prolonged viral shedding, the WHO revised its criteria for discontinuing transmission-based precautions without requiring retesting [33]. As per the updated recommendations, symptomatic patients can be discharged 10 days after the first day of symptom onset, plus a minimum of 3 days without symptoms. Asymptomatic patients can be released from isolation measures 10 days after the first positive test for SARS-CoV-2 [31].

Our review identified the nasopharynx and oropharynx as the most commonly tested sources for detecting viral shedding. Other sources included stool/anal swab/rectal swab, saliva, urine, tears, and semen. Interestingly, in 69 patients from 10 of our included studies, SARS-CoV-2 was detected in an alternative source, while the most common sources such as oropharyngeal or nasopharyngeal swabs were negative [15–19, 21–25].

In our review, immunosuppressive therapy was identified as a possible contributing factor for delayed clearance of the virus [11, 14]. Similarly, Zhu et al. reported prolonged detection of viral RNA in immunosuppressed renal transplant patients [34]. However, this study used RT-PCR of throat swabs as its mode of virus detection, a mode that does not necessarily translate to viral replication. In our study, Decker et al. identified that 20 days after initial presentation, viral culture of throat swabs on days 18, 21, and 35 had viral copy numbers similar to the onset of infection despite clinical recovery [14]. Of note, viral culture can serve as an identifier of infectivity as it detects the ability of the virus to replicate and, thus, produce disease upon community transmission. Although RT-PCR does not provide information about the virus’ ability to replicate, it is more sensitive than viral culture, and studies have reported viable virus in asymptomatic patients who tested positive by this methodology [31, 35–37]. In high-risk

Table 2: Studies reporting duration of virus shedding

| Study          | Source of virus shedding | Duration of virus shedding reported                                                                 |
|----------------|--------------------------|-----------------------------------------------------------------------------------------------------|
| Qi et al.      | Nasopharynx              | Median days of viral shedding: 17 days (IQR*, 12–21)                                                |
|                |                          | Shortest duration: 6 days                                                                             |
|                |                          | Longest duration: 47 days                                                                            |
| Li et al.      | Nasopharynx and/or oropharynx | Total number of days: 60 days                                                                      |
|                |                          | After resolution of symptoms: 36 days                                                               |
| Fu et al.      | Oropharynx               | Median days of viral shedding: 19 days (IQR, 16–23)                                                 |
|                |                          | Shortest duration: 3 days                                                                            |
|                |                          | Longest duration: 44 days                                                                            |
| Decker et al.  | Oropharynx               | After resolution of symptoms: 15 days                                                               |
| Ling et al.    | Oropharynx               | Mean number of days: 9.5 days                                                                       |
|                | Stools                   | Mean number of days: 11 days                                                                         |
| Zhang et al.   | Nasopharynx              | Median days of viral shedding: 10.0 days (IQR, 8.0–17.0).                                           |
|                | Stools                   | Median days of viral shedding: 22.0 days (IQR, 15.5–23.5).                                          |
| Lo et al.      | Nasopharynx              | Mean number of days: 18.2 days                                                                      |
|                | Stools                   | Mean number of days: 19.3 days                                                                       |
| Xing et al.    | Stools                   | Mean number of days: 16 days                                                                         |
| Hosoda et al.  | Stools                   | Mean number of days: 16 days                                                                         |
| Wu et al.      | Nasopharynx              | Total number of days: 15 days                                                                        |
|                | Stools                   | Mean number of days: 16.7 days                                                                       |
|                |                          | Mean number of days: 27.9 days                                                                       |

*IQR interquartile range [10, 12–19, 21]*
populations such as immunocompromised patients or patients interacting with vulnerable groups, the WHO encourages laboratory testing guided discharge and/or discontinuation of isolation procedures [31].

In several of our included studies, viral shedding was detected from the gastrointestinal tract for a longer duration and at a greater viral load than from the respiratory tract [16–18, 20–23]. Similar results were reported in a study of 73 COVID-19 patients from China, whereby > 20% of infected patients tested positive for the virus in the faeces even after clearance of the virus from their respiratory tracts [38]. In a meta-analysis of 4805 COVID-19 patients, Parasa et al. concluded that feco-oral route of transmission is possible due to the presence of Viral RNA in stool [39]. Therefore, gastrointestinal tract can possibly serve as an important source of community transmission of SARS-CoV2. Further studies to determine the

| Study          | Other source of viral shedding | NPS/OPS* positive + other source (s) positive | NPS/OPS negative but other source(s) was still positive |
|----------------|-------------------------------|-----------------------------------------------|------------------------------------------------------|
| Ling et al.    | Stools                        | 66                                            | 11                                                   |
|                | Urine                         | 4                                             | 3                                                    |
| Zhang et al.   | Stools                        | 10                                            | 3                                                    |
|                | Urine                         | 2                                             | 2                                                    |
| Lo et al.      | Stools                        | 10                                            | 5                                                    |
| Xing et al.    | Stools                        | 3                                             | 2                                                    |
| Hosoda et al.  | Stools                        | –                                             | 1                                                    |
| Wu et al.      | Stools                        | 41                                            | 32                                                   |
| Xu et al.      | Rectal swab                   | 8                                             | 8                                                    |
| Huang et al.   | Anal swab                     | 1                                             | 1                                                    |
| Ren et al.     | Urine                         | –                                             | 1                                                    |
| Azzi et al.    | Saliva                        | 25                                            | 2                                                    |
| Li et al.      | Semen                         | 6                                             | –                                                    |
| Valente et al. | Tears                         | 3                                             | –                                                    |
| Güemes-Villahoz et al. | Tears | 1 | – |

*NPS nasopharyngeal swab, OPS oropharyngeal swab [15–19, 21–28]

Table 4 NIH quality assessment tool for case series/case reports

| Author         | Was the study question or objective clearly stated? | Was the study population clearly and fully described, including a case definition? | Were the cases consecutive? | Were the subjects comparable? | Was the intervention clearly described? | Were the outcome measures clearly defined, valid, reliable, and implemented consistently across all study participants? | Was the length of follow-up adequate? | Were the statistical methods well described? | Were the results well described? | Quality rating (good, fair, poor) |
|----------------|----------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------|-------------------------------|---------------------------------------|---------------------------------------------------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|--------------------------|
| Li et al.      | Yes                                                | Yes                                                                              | N/A*                        | N/A                           | Yes                                  | Yes                                                                             | Yes                              | N/R*                              | Yes                               | Good                     |
| Decker et al.  | Yes                                                | Yes                                                                              | N/A                         | N/A                           | Yes                                  | Yes                                                                             | Yes                              | N/R                              | Yes                               | Fair                     |
| Zhang et al.   | Yes                                                | Yes                                                                              | Yes                         | Yes                           | Yes                                  | Yes                                                                             | Yes                              | Yes                              | Yes                               | Good                     |
| Hosoda et al.  | Yes                                                | Yes                                                                              | N/A                         | N/A                           | Yes                                  | Yes                                                                             | Yes                              | N/R                              | Yes                               | Good                     |
| Huang et al.   | Yes                                                | Yes                                                                              | Yes                         | Yes                           | Yes                                  | Yes                                                                             | Yes                              | N/R                              | Yes                               | Good                     |
| Ren et al.     | Yes                                                | Yes                                                                              | N/A                         | N/A                           | Yes                                  | Yes                                                                             | Yes                              | N/R                              | Yes                               | Good                     |

*N/A not applicable, N/R not reported [12, 14, 16, 19, 23, 24]
| Study       | Representativeness of the exposed cohort | Selection of the non-exposed cohort | Ascertainment of exposure | Demonstration that outcome of interest was not present at start of study | Comparability of cohorts on the basis of the design or analysis | Assessment of outcome | Was follow-up long enough for outcomes to occur | Adequacy of follow-up of cohorts | Quality rating |
|------------|-----------------------------------------|-------------------------------------|---------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------|------------------------------------------|-----------------------------------|----------------------|
| Qi et al.  | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical          | Yes                                      | Complete                          | Good                 |
| Campioli et al. | Somewhat representative of patients     | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical          | Yes                                      | Complete                          | Good                 |
| Fu et al.  | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Complete                          | Good                 |
| Ling et al. | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Complete                          | Good                 |
| Lo et al.  | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Complete                          | Good                 |
| Xing et al. | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Complete                          | Fair                 |
| Zhao et al. | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Complete                          | Good                 |
| Wu et al.  | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Complete                          | Good                 |
| Xu et al.  | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Adequate follow-up: >90% cases accounted for | Good                 |
| Azzi et al. | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Adequate follow-up: >90% cases accounted for | Good                 |
| Li et al.  | Somewhat representative of patients      | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Adequate follow-up: >90% cases accounted for | Fair                 |
| Valente et al. | Somewhat representative of patients     | Drawn from the same community as the exposed cohort | Prescription, medical records | Yes                                                                        | Unadjusted                                                     | Clinical and microbiological | Yes                                      | Adequate follow-up: >90% cases accounted for | Fair                 |
infectivity of the detected virus from the gastrointestinal tract would be needed to confirm the clinical implications of community transmission.

Detection of SARS-CoV-2 in the semen has raised concerns about transmissibility and sperm cryobanking as a possible propagator during the pandemic [40]. Li et al. identified 6 patients with detectable virus in the semen whereby 2 of these patients were in the clinical recovery phase [26]. Angiotensin-converting enzyme 2 (ACE2) receptor is expressed in large quantities in the testes and may explain the entry of the SARS-CoV-2 into the cells and subsequent detection in the semen [41].

In a prospective cohort study of 410 patients, albumin ≤ 35 g/L was identified as a risk factor for prolonged viral shedding [13]. Aziz et al. found a statistically significant association between low albumin levels and severe COVID-19 in their meta-analysis of 910 patients [42]. Several studies have reported the trend of detectable Viral RNA for a longer period of time in the more severely ill patients of COVID-19 [10, 35, 43]. Hence, severity of disease can possibly be an effect modifier that modifies the effect of a low albumin level on the duration of viral shedding.

One of the key reasons for the WHO updating the discharge qualifying criteria of SARS-CoV-2 patients was detectable prolonged viral shedding, whereby the negative results were followed by the positive results [31]. This uncertainty in clinical decision-making can also result from sourced-based discrepancy in viral RNA detection. The study conducted by Azzi et al. on 25 patients who initially tested positive for viral RNA in saliva and nasopharyngeal swab alike, was followed by saliva testing that was positive in 2 patients, while nasopharyngeal swabs tested negative [25].

Strengths

Our review includes studies from across the world and takes epidemiological factors into account. It covers an extensive range of sources that have tested positive for SARS-CoV-2 and carry the possibility of risk of transmission. We have compared the more uncommon sources with the most commonly tested ones to outline the differences in timeline and guide clinical decision-making such as discharge and discontinuation of isolation procedures. Also, patient heterogeneity and patient-related factors such as comorbidities have been taken into consideration while analysing the duration of viral shedding.

Limitations

We recognize the limitations of our review. Despite performing a comprehensive literature search in well-established databases, independently conducted by two reviewers, and careful cross-referencing, the possibility of
having missed a relevant study cannot be excluded. In addition, we acknowledge the limitations of the review methodology, such as search, selection, and publication biases.

**Conclusion**

Prolonged viral shedding is important to consider while discontinuing isolation procedures and/or discharging SARS-CoV-2 patients. Despite the lack of symptoms or resolution of the same, the risk of transmission persists due to viral shedding and cannot be easily disregarded. This risk varies in magnitude and depends on the infectivity of the virus, and also the patient population involved. Therefore, clinical-decision making should be governed by clinical scenario, guidelines, detectable viral load, source of detectable virus, infectivity, and patient-related factors.

**Authors’ Contribution** RK conceived of the idea. RK reviewed the literature and collected the data with the help of SN. RK formulated the tables. RK and SN discussed the results and wrote the main draft of the manuscript.

**Compliance with Ethical Standards**

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Ethics Approval** Not applicable.

**Consent to Participate** All authors had access to the data and equal role in writing the manuscript.

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