

COVID-19 Resource Desk

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New Research

*note, **PREPRINTS** have not undergone formal peer review

COVID-19 related publications by Providence caregivers – see [Digital Commons](#)

Clinical Syndrome

1. **Oro-facial mucocutaneous manifestations of Coronavirus Disease-2019 (COVID-19): A systematic review.** Fakhruddin KS, et al. *PLoS One*. 2022 Jun 1;17(6):e0265531. doi: 10.1371/journal.pone.0265531. eCollection 2022.
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0265531>

In total, 169 cases (75 females; 94 males) from 15 countries with a spectrum of COVID-19 severities were reviewed. Gustatory perturbations were prevalent in over 70%. Mucocutaneous manifestations were reported predominantly on the tongue, palate, buccal mucosa, gingivae, and lips and included ulcers, blisters, erosions, papillary hyperplasia, macules, glossitis, and mucositis. Ulcerative lesions, present in over 50 percent, were the most common oral manifestation. Lesions resembling candidal infections, with burning mouth, were prevalent in 19%. Petechiae and angina bullosa were generally seen, subsequent to COVID-19 therapies, in 11%. Ulcerated, necrotic gingivae were documented in severely ill with poor oral hygiene. These manifestations, present across the COVID-19 disease spectrum, were commonly associated with the immunosuppressed state and/ or the concurrent antimicrobial/steroidal therapies. In summary, a wide variety of orofacial mucocutaneous lesions manifest in COVID-19. They are likely to be secondary to the disease-associated immune impairment and/or pharmaco-therapy rather than a direct result of SARS-CoV-2 infection per se.

Epidemiology & Public Health

2. **COVID-19 Cases, Hospitalizations, and Deaths Among American Indian or Alaska Native Persons - Alaska, 2020-2021.** Ward LA, et al. *MMWR Morb Mortal Wkly Rep*. 2022 Jun 3;71(22):730-733. doi: 10.15585/mmwr.mm7122a2.
https://www.cdc.gov/mmwr/volumes/71/wr/mm7122a2.htm?s_cid=mm7122a2_w

To examine the extent of COVID-19-associated disparities among AI/AN persons living in Alaska, a retrospective analysis of COVID-19 cases reported to the Alaska Department of Health and Social Services (AKDHSS) during March 12, 2020–December 31, 2021, was conducted. The age-adjusted COVID-19 incidence among AI/AN persons was 26,583 per 100,000 standard population, approximately twice the rate among White persons living in Alaska (11,935). The age-adjusted COVID-19-associated hospitalization rate among AI/AN persons was 742 per 100,000, nearly three times the rate among

White persons (273). The age-adjusted COVID-19-related mortality rate among AI/AN persons was 297 per 100,000, approximately three times that among White persons (104). Culturally competent public health efforts that are designed in collaboration with AI/AN persons and communities, including support for vaccination and other proven COVID-19 prevention strategies, are critical to reducing COVID-19-associated disparities among AI/AN persons in Alaska.

Healthcare Delivery & Healthcare Workers

3. **Racial and Ethnic Discrepancy in Pulse Oximetry and Delayed Identification of Treatment Eligibility Among Patients With COVID-19.** Fawzy A et al. *JAMA Internal Medicine*. 2022 May 31. doi:10.1001/jamainternmed.2022.1906

<https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2792653>

The results of this cohort study suggest that racial and ethnic biases in pulse oximetry accuracy were associated with greater occult hypoxemia in Asian, Black, and non-Black Hispanic patients with COVID-19, which was associated with significantly delayed or unrecognized eligibility for COVID-19 therapies among Black and Hispanic patients. This disparity may contribute to worse outcomes among Black and Hispanic patients with COVID-19.

Prognosis

4. **Predicting progression to severe COVID-19 using the PAINT score.** Wang M, et al. *BMC Infect Dis*. 2022 May 26;22(1):498. doi: 10.1186/s12879-022-07466-4.

<https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-022-07466-4>

Among the 239 patients, 216 (90.38%) patients had mild/moderate disease, and 23 (9.62%) progressed to severe disease. After adjusting for multiple confounding factors, pulmonary disease, age > 75, IgM, CD16+/CD56+ NK cells and aspartate aminotransferase were independent predictors of progression to severe COVID-19. Based on these five factors, a new predictive score (the 'PAINT score') was established and showed a high predictive value. The PAINT score was validated using a nomogram, bootstrap analysis, calibration curves, decision curves and clinical impact curves, all of which confirmed its high predictive value. The PAINT score for progression from mild/moderate to severe COVID-19 may be helpful in identifying patients at high risk of progression.

5. **TRAIL, IP-10, and CRP in predicting the progression of SARS-CoV-2 infection: A prospective, cohort study.** Tegethoff SA et al. *Int J Infect Dis*. 2022 May 25:S1201-9712(22)00315-0. doi: 10.1016/j.ijid.2022.05.051.

<https://www.sciencedirect.com/science/article/pii/S1201971222003150>

We demonstrated a correlation between COVID-19 severity and TRAIL, IP-10, and CRP. Multivariate regression showed a role for IP-10 in predicting unfavourable outcome, i.e. in-ICU mortality.

Survivorship & Rehabilitation

6. **Care of Patients with New, Continuing, or Recurring Symptoms After Acute SARS-CoV-2 Infection.** Laine C, Cotton D. *Ann Intern Med*. 2022 May 27. doi: 10.7326/M22-1636.

<https://www.acpjournals.org/doi/10.7326/M22-1636>

As the pandemic of acute SARS-CoV-2 infection continues, there is another pandemic that shadows it—the growing population of people who have new, continuing, or recurring symptoms long after initial infection. Many refer to this condition as “long COVID,” and the National Institutes of Health's (NIH) official name for the condition is postacute sequelae of SARS-CoV-2 (PASC). Whatever we call it, the current limited understanding of the pathophysiology, epidemiology, and course of this condition makes caring for these patients a vexing challenge.

7. **Risk of incident diabetes post-COVID-19: A systematic review and meta-analysis.** Banerjee M, Pal R, Dutta S. *Prim Care Diabetes*. 2022 May 30:S1751-9918(22)00100-0. doi: 10.1016/j.pcd.2022.05.009.

<https://www.sciencedirect.com/science/article/pii/S1751991822001000>

Pooled analysis of 5787,027 subjects from four observational studies showed 59 % higher risk of developing incident diabetes in post-acute COVID-19 phase versus healthy controls. The high degree of heterogeneity in pooled estimate can be attributed to difference in demographic characteristics, hospitalization rates or disease severity between study subjects. Pooling data from three studies, higher risk of incident diabetes was also observed following COVID-19 versus severity matched non-COVID-19 respiratory tract infections. Majority of studies had median follow-up period of around 4 months. In view of several limitations due to retrospective design of these studies, prospective studies with long term follow-up are warranted.

Therapeutics

8. **Effectiveness of Paxlovid in Reducing Severe COVID-19 and Mortality in High Risk Patients.** Najjar-Debbiny R, et al. *Clin Infect Dis*. 2022 Jun 2:ciac443. doi: 10.1093/cid/ciac443.

<https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciac443/6599020>

Overall, 180,351 eligible were included, of them only 4,737 (2.6%) were treated with Paxlovid, and 135,482 (75.1%) had adequate COVID-19 vaccination status. Both Paxlovid and adequate COVID-19 vaccination status were associated with significant decrease in the rate of severe COVID-19 or mortality with adjusted HR 0.54 and 0.20, respectively. Paxlovid appears to be more effective in older patients, immunosuppressed patients, and patients with underlying neurological or cardiovascular disease (interaction p-value <0.05 for all). No significant interaction was detected between Paxlovid treatment and COVID-19 vaccination status. This study suggests that in the era of omicron and in real life setting Paxlovid is highly effective in reducing the risk of severe COVID-19 or mortality.

Transmission / Infection Control

9. **Mask wearing in community settings reduces SARS-CoV-2 transmission.** Leech G et al. *Proc Natl Acad Sci U S A*. 2022 Jun 7;119(23):e2119266119. doi: 10.1073/pnas.2119266119.

<https://www.pnas.org/doi/full/10.1073/pnas.2119266119>

We resolve conflicting results regarding mask wearing against COVID-19. Most previous work focused on mask mandates; we study the effect of mask wearing directly. We find that population mask wearing notably reduced SARS-CoV-2 transmission (mean mask-wearing levels corresponding to a 19% decrease in R). We use the largest wearing survey (n = 20 million) and obtain our estimates from regions across six continents. We account for nonpharmaceutical interventions and time spent in

public and quantify our uncertainty. Factors additional to mask mandates influenced the worldwide early uptake of mask wearing. Our analysis goes further than past work in the quality of wearing data-100 times the size with random sampling-geographical scope, a semi-mechanistic infection model, and the validation of our results.

Vaccines / Immunology

- 10. Effectiveness of heterologous and homologous covid-19 vaccine regimens: living systematic review with network meta-analysis.** Au WY, Cheung PP. *BMJ*. 2022 May 31;377:e069989. doi: 10.1136/bmj-2022-069989. <https://www.bmj.com/content/377/bmj-2022-069989>

An mRNA booster is recommended to supplement any primary vaccine course. Heterologous and homologous three dose regimens work comparably well in preventing covid-19 infections, even against different variants. The effectiveness of three dose vaccine regimens against covid-19 related death remains uncertain. READERS' NOTE: This article is a living systematic review that will be updated to reflect emerging evidence. Updates may occur for up to two years from the date of original publication.

- 11. Adverse events and overall health and well-being after COVID-19 vaccination: interim results from the VAC4COVID cohort safety study.** Rogers A, et al. *BMJ Open*. 2022 Jun 1;12(6):e060583. doi: 10.1136/bmjopen-2021-060583. <https://bmjopen.bmj.com/content/12/6/e060583>

The study provides reassuring data on low rates of AEs after COVID-19 vaccination. Differences in reactogenicity-type AE profiles between ChAdOx1 and BNT162b2 and between first and second doses of these vaccines were observed.

- 12. Safety and immunogenicity of a live-attenuated influenza virus vector-based intranasal SARS-CoV-2 vaccine in adults: randomised, double-blind, placebo-controlled, phase 1 and 2 trials.** Zhu F et al. *Lancet Respir Med*. 2022 May 26:S2213-2600(22)00131-X. doi: 10.1016/S2213-2600(22)00131-X. <https://www.sciencedirect.com/science/article/pii/S221326002200131X>

dns1-RBD was well tolerated in adults. Weak T-cell immunity in peripheral blood, as well as weak humoral and mucosal immune responses against SARS-CoV-2, were detected in vaccine recipients. Further studies are warranted to verify the safety and efficacy of intranasal vaccines as a potential supplement to current intramuscular SARS-CoV-2 vaccine pools. Steps should be taken in future studies to reduce the potential for cross-contamination caused by the vaccine strain aerosol during administration.

- 13. Duration of mRNA vaccine protection against SARS-CoV-2 Omicron BA.1 and BA.2 subvariants in Qatar.** Chemaitelly H et al. *Nat Commun*. 2022 Jun 2;13(1):3082. doi: 10.1038/s41467-022-30895-3. <https://www.nature.com/articles/s41467-022-30895-3>

SARS-CoV-2 Omicron BA.1 and BA.2 subvariants are genetically divergent. We conducted a matched, test-negative, case-control study to estimate duration of protection of the second and third/booster doses of mRNA COVID-19 vaccines against BA.1 and BA.2 infections in Qatar. BNT162b2 effectiveness was highest at 46.6% (95% CI: 33.4-57.2%) against symptomatic BA.1 and at 51.7% (95% CI: 43.2-58.9%) against symptomatic BA.2 infections in the first three months after the second dose, but

declined to ~10% or below thereafter. Effectiveness rebounded to 59.9% (95% CI: 51.2-67.0%) and 43.7% (95% CI: 36.5-50.0%), respectively, in the first month after the booster dose, before declining again. Effectiveness against COVID-19 hospitalization and death was 70-80% after the second dose and >90% after the booster dose. mRNA-1273 vaccine protection showed similar patterns. mRNA vaccines provide comparable, moderate, and short-lived protection against symptomatic BA.1 and BA.2 Omicron infections, but strong and durable protection against COVID-19 hospitalization and death.

14. Association Between COVID-19 Booster Vaccination and Omicron Infection in a Highly Vaccinated Cohort of Players and Staff in the National Basketball Association. Tai CG, et al. *JAMA*. 2022 Jun 2. doi: 10.1001/jama.2022.9479.

<https://jamanetwork.com/journals/jama/fullarticle/2793169>

Evaluation of COVID-19 vaccine booster effectiveness is essential as new variants of SARS-CoV-2 emerge. Data support the effectiveness of booster doses in preventing severe disease and hospitalization; however, the association with reducing incident SARS-CoV-2 infections is not clear. We compared the incidence of SARS-CoV-2 infection in players and staff of the National Basketball Association (NBA) who did vs those who did not receive a booster dose.

15. Hyper inflammatory syndrome following COVID-19 mRNA vaccine in children: A national post-authorization pharmacovigilance study. Ouldali N et al. *Lancet Reg Health Eur*. 2022 Apr 29;100393. doi: 10.1016/j.lanepe.2022.100393.

<https://www.sciencedirect.com/science/article/pii/S1751991822001000>

Very few cases of hyper-inflammatory syndrome with multi-organ involvement occurred following COVID-19 mRNA vaccine in 12-17-year-old children. The low reporting rate of this syndrome, compared to the rate of post-SARS-CoV-2 MIS-C in the same age-group, largely supports the vaccination in a context of an important circulation of SARS-CoV-2.

Women & Children

16. Update to living systematic review on covid-19 in pregnancy. *BMJ*. 2022 May 30;377:o1205. doi: 10.1136/bmj.o1205. <https://www.bmj.com/content/377/bmj.o1205>

This second update includes 435 studies (293 152 pregnant and recently pregnant women with covid-19), of which 244 were new additions to the review. The prevalence of covid-19 in pregnant and recently pregnant women remain consistent with our original review and first update of the living systematic review. Pregnant women continue to be at increased risk of severe covid-19. In addition to high body mass index, advancing maternal age, and non-white ethnic origin, evidence suggests that pre-existing comorbidities, and pregnancy specific conditions such as pre-eclampsia and gestational diabetes are risk factors for severe disease. More data are needed to robustly assess the association between pregnancy specific conditions and covid-19 related outcomes.

17. Cross-reactive immunity against the SARS-CoV-2 Omicron variant is low in pediatric patients with prior COVID-19 or MIS-C. Tang J et al. *Nat Commun*. 2022 May 27;13(1):2979. doi: 10.1038/s41467-022-30649-1. <https://www.bmj.com/content/377/bmj.o1205>

We evaluated virus-neutralizing capacity against SARS-CoV-2 Alpha, Beta, Gamma, Delta and Omicron variants by age-stratified analyses in 177 pediatric patients hospitalized with severe acute COVID-19,

acute MIS-C, and in convalescent samples of outpatients with mild COVID-19 during 2020 and early 2021. Across all patients, less than 10% show neutralizing antibody titers against Omicron. Children <5 years of age hospitalized with severe acute COVID-19 have lower neutralizing antibodies to SARS-CoV-2 variants compared with patients >5 years of age. As expected, convalescent pediatric COVID-19 and MIS-C cohorts demonstrate higher neutralization titers than hospitalized acute COVID-19 patients. Overall, children and adolescents show some loss of cross-neutralization against all variants, with the most pronounced loss against Omicron. In contrast to SARS-CoV-2 infection, children vaccinated twice demonstrated higher titers against Alpha, Beta, Gamma, Delta and Omicron. These findings can influence transmission, re-infection and the clinical disease outcome from emerging SARS-CoV-2 variants and supports the need for vaccination in children.

18. Association of COVID-19 Vaccination During Pregnancy with Incidence of SARS-CoV-2 Infection in Infants. Carlsen EØ, et al. *JAMA Intern Med.* 2022 Jun 1. doi: 10.1001/jamainternmed.2022.2442.

<https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2793109>

The results of this Norwegian population-based cohort study suggested a lower risk of a positive test for SARS-CoV-2 during the first 4 months of life among infants born to mothers who were vaccinated during pregnancy. Maternal COVID-19 vaccination may provide passive protection to young infants, for whom COVID-19 vaccines are currently not available.

19. Ongoing Dizziness Following Acute COVID-19 Infection: A Single Center Pediatric Case Series. Drogalis-Kim D, et al. *Pediatrics.* 2022 Jun 1. doi: 10.1542/peds.2022-056860. <https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2022-056860/188138/Ongoing-Dizziness-Following-Acute-COVID-19>

In this series, we describe 9 pediatric patients with Post-Acute Sequelae of SARS-CoV-2 (PASC) who presented with persistent, debilitating dizziness for weeks to months after their acute infection. Among the 9 patients, median age was 14 years (range: 11-17), 6 were female, and 8 had not received any SARS-CoV-2 vaccines. Five patients met diagnostic criteria for postural orthostatic tachycardia syndrome (POTS) by active standing testing and benefited from a combination of non-pharmacologic therapy (NPT) and medication. NPT alone did not improve symptoms in any patients. Patients who did not meet conventional criteria for POTS, but continued to have symptoms despite NPT compliance, also demonstrated subjective improvement in dizziness when medications were initiated. The majority of patients experienced improvement in dizziness and quality of life, including returning to sports teams and a regular school schedule. A review of the PACS literature demonstrates increasing recognition of a subset of patients who develop autonomic dysfunction, including POTS, although the etiology and prognosis are not completely understood. Our case series aims to highlight the phenomenon of dysautonomia after acute SARS-CoV-2 infection and its response to therapy.

20. Multisystem Inflammatory Syndrome after Breakthrough SARS-CoV-2 Infection in 2 Immunized Adolescents, United States. Cole LD, et al. *Emerg Infect Dis.* 2022 May 31;28(7). doi: 10.3201/eid2807.220560. https://wwwnc.cdc.gov/eid/article/28/7/22-0560_article

Eight weeks after having laboratory-confirmed SARS-CoV-2 breakthrough infections, 2 otherwise healthy, fully immunized adolescent patients in the United States who were experiencing related signs and symptoms were diagnosed with multisystem inflammatory syndrome in children. Our findings

indicate that COVID-19 vaccination does not completely protect adolescents against multisystem inflammatory syndrome.

FDA / CDC / NIH / WHO Updates

CDC - [Pediatric COVID-19 Vaccination Operational Planning Guide](#), updated 6-2-22

[FDA flags risk of heart inflammation after Novavax COVID vaccine](#)

NIH – [Covid-19 Treatment Guidelines, Critical Care for Children](#), updated 5-31-22

News

[Youngest Children Could Get Covid Shots in Late June, White House Says](#)

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