Public Health Ontario | Santé publique Ontario

EVIDENCE BRIEF

(ARCHIVED) COVID-19: Severity of the Delta (B.1.617.2) Variant in Children

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Key Messages

- An increase in the absolute number of Coronavirus Disease 2019 (COVID-19) pediatric hospitalizations has recently been reported in the United States (US). Possible contributing factors include higher overall transmissibility of the Delta variant (B.1.617.2, first identified in India), high rates of community infection, and the possibility that the Delta variant causes more severe disease in the pediatric population than other severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) strains.
- While the Delta variant has been documented to result in increased severity of disease in adults, it is currently unclear if the Delta variant causes more severe COVID-19 in the pediatric population compared to previous non-Delta variants. A crude analysis comparing pediatric hospitalization rates between the current Delta-dominant wave in the US and previous non-Delta waves in the US, selecting time points based on weeks with a similar case count, suggests an increased risk of pediatric hospitalizations during a Delta wave compared to previous non-Delta waves, but this needs to be confirmed with appropriately designed studies.
- COVID-19-related hospitalizations and deaths among children remain low in comparison to the COVID-19-related clinical severity and deaths in adults.
- At the time of writing, there was no evidence of increased pediatric hospitalizations for COVID-19 in Ontario. It is possible that the relatively lower case numbers, higher vaccine coverage in the eligible population in Ontario, and maintaining public health measures that were lifted in the US (e.g., masking in indoor public settings) may be contributing to protection of the pediatric population.
- With the relaxation of community-based public health measures and return to in-person schooling, a resurgence of non-COVID-19 respiratory viruses (e.g., respiratory syncytial virus

(RSV)) is expected, which will need to be considered for health system capacity planning. However, the magnitude of the surge remains uncertain if public health measures are maintained in schools and other settings.

- Policies which increase vaccination rates of children's contacts (i.e. teachers and parents) will have impacts in reducing pediatric cases.

Issue and Research Question

As of June 30, 2021, children (defined as those under the age of 18) account for 12.9% of the 545,398 confirmed Coronavirus Disease 2019 (COVID-19) cases reported in Ontario.[1] Among children, case rates were highest (3,367.6 per 100,000) in 14 to 17 years olds.[1] Among these cases, 401 were hospitalized, 39 were in the intensive care unit (ICU) and two children died.[1]

Based on evidence from non-Delta variants, children and adolescents with COVID-19 tend to have less severe acute illness; however, post-COVID-19 multisystem inflammatory syndrome in children [MIS-C] has been reported in over 4,000 children in the United States (US).[2] The US Centers for Disease Control and Prevention's (CDC) reporting on cases of MIS-C from May 2020 to present demonstrates that peaks of confirmed COVID-19 cases across the country are followed by a peak of confirmed MIS-C cases.[3] Additionally, the unknown risk of "long COVID" in children warrants further study, especially given the significant impacts the pandemic has had on children.[4,5] Data from the United Kingdom (UK) suggest that "long COVID" after SARS-CoV-2 infection in school-aged children is uncommon; around 2% of children experience symptoms at eight weeks post-infection.[6]

In recent weeks, the most commonly identified severe acute respiratory syndrome (SARS-CoV-2) variant of concern (VOC) in Ontario has been Delta (B.1.617.2, first identified in India).[1] Emerging data suggests that the Delta variant has increased transmissibility and possible higher risk of hospitalization compared to other VOCs.[7] Studies from the UK and Scotland reported an increased risk of hospitalization from Delta infections compared to Alpha infections.[7] There is evidence of reduced vaccine effectiveness for symptomatic disease after one dose of a COVID-19 vaccine, meaning two-doses (i.e. full vaccination) is important in the context of Delta.[7]

An increase in the absolute number of COVID-19 pediatric hospitalizations has recently been reported in parts of the US.[8-10] Similar surges have not yet been observed in Canadian hospitals, although case incidence in Canada has been increasing more recently and hospitalizations are a lagging indicator.[11] However, with children set to return to in-person learning in September 2021 (and with those under age 12 ineligible to receive the vaccine), it is important to understand the risk of the Delta variant to children. The objective of this brief was to review reports and evidence on the severity of the Delta variant among children (including hospitalizations, ICU admissions and deaths) to determine and prepare for and ensure capacity for similar surges in Ontario.

Methods

From January 17 to August 13, 2021, Public Health Ontario (PHO) Library Services conducted daily searches of primary and preprint literature using the MEDLINE database (search strategies available upon request). In addition, grey literature searches were performed daily using news feeds in the Shared Library Services Partnership. English language peer-reviewed and non-peer-reviewed (preprint) records that described COVID-19 variants were included.

An additional search was also conducted in MEDLINE and preprint servers (NIH COVID-19 Portfolio) on August 13, 2021. Search terms included but were not limited to COVID-19/SARS-CoV-2, variants of

concern, B.1.617/Delta, adolescent/child/infant etc. No additional relevant results were identified through this search.

Targeted searches of government and agency websites for epidemiological reports on hospitalization rates, deaths due to COVID-19, vaccination coverage, and prevalence of Delta for select jurisdictions were also conducted.

Main Findings

The targeted search of government and agency websites revealed that the US CDC provided the most comprehensive surveillance data on the variables of interest. Most of the reports of high pediatric COVID-19-related hospital and ICU admissions were also from the US. This report therefore focuses on Delta and non-Delta waves of the COVID-19 pandemic in the US pediatric population.

COVID-19 Severity in the US Pediatric Population in the Pre-Delta era

- A weekly Morbidity and Mortality Weekly Report (MMWR) report examined data from March 1 to July 25, 2020 (from 14 states) looking at US COVID-19 hospitalization rates among children less than 18 years of age.[12]
    - Although the cumulative rate of COVID-19–associated hospitalization among children was low (8.0 per 100,000 population) compared with that in adults (164.5 per 100,000 population), one in three hospitalized children was admitted to an ICU. Hospitalization rates were highest among children ages <2 years (24.8 per 100,000 population), compared to children ages 2–4 years (4.2 per 100,000 population) and 5–17 years (6.4 per 100,000 population).[12]
    - Between March 1 to July 25, 2020, 576 children were hospitalized with COVID-19. Infants less than 1 year accounted for 27.3%, while 5.4% were 1 to <2 years old, 8.7% were ages 2 to 4, 16.8% were ages 5 to 11, and 41.8% were ages 12-17.[12] Among children with information on underlying medical conditions, 37.8% reported obesity.
    - Of the 208 (36.1%) hospitalized children who had complete medical reviews, 69/208 (33.2%) were admitted to an ICU and 12/207 (5.8%) required invasive mechanical ventilation, and one patient (0.5%) died during hospitalization. Approximately 10% received a diagnosis of MIS-C (9/83 evaluated for MIS-C). The median duration of hospitalization among these patients was 2.5 days (IQR = 1–5 days).[12] It is important to note that this study did not evaluate whether the reason for admission was due to COVID-19 or from another health issue and was incidentally identified from admission testing.
- On July 30, 2021, the CDC reported a cumulative case total of 4,404 cases of MIS-C across the US, with 37 of these children meeting the case definition of death due to MIS-C. However, it is unclear what proportion of these cases occurred while Delta was the prevalent SARS-CoV-2 variant in the US.[3]
- A joint report from the American Academy of Pediatrics and the Children's Hospital Association from August 5, 2021, noted that in the US, there were 4,292,120 child COVID-19 cases reported and children represented 14.3% (4,292,120/30,025,995) of all cases.[13] Note: the age ranges reported for children varied by state (i.e., 0 to 14, 0 to 17, 0 to 18, 0 to 19, and 0 to 20 years).
    - **Pediatric Hospitalization**s**:** According to data from 23 states and New York City (*only New York City reported age distribution of cases), children represented 1.5% to 3.5% of total

reported hospitalizations, and between 0.1 to 1.9% of all child COVID-19 cases resulted in hospitalization.[13]

- **Pediatric Deaths**: According to data from 43 states, New York City, Puerto Rico and Guam, children represented 0.00% to 0.26% of all COVID-19 deaths, and seven states reported zero child deaths. In states that reported data on deaths, cumulatively, 0.00 to 0.03% of all child COVID-19 cases resulted in death.[13]

US Pediatric Hospitalizations during the Summer 2021 Delta Wave Compared to a Previous, Non-Delta Wave

Below is a crude analysis that allows for comparison of case counts and hospitalization rates between the current Delta-dominant wave in the US, and previous non-Delta waves in the US, selecting time points based on weeks with a similar case count.[14,15] There are several limitations to comparing between COVID-19 pandemic waves, including: differences in testing rate, vaccine coverage, public health measures/policies in place and level of adherence to the measures, time of year, and vaccine effectiveness. As well, the hospitalization rates for 0-4, 5-11, and 12-17 year old age bands is quite variable week to week due to low numbers. To address the week to week variability in rates, firstly weeks with similar case counts were selected, and then the hospitalization rate from the next closest reporting date was selected (range was 6-10 days after case count reporting date). Case counts were taken from the CDC COVID Data Tracker, and hospitalization rates were taken from the CDC Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET), which is a network of over 250 acute-care hospitals in 14 states.[14,15]

WHEN DELTA WAS DOMINANT:

- The 7-day moving average cases on August 1, 2021 was 87,409
- The week ending August 7, 2021, hospitalization rates per 100,000 were:
  - <18 years: 1.0
  - 0-4 years: 1.6
  - 5-11 years: 0.7
  - 12-17 years: 1.0

WHEN NON-DELTA SARS-COV-2 STRAINS WERE DOMINANT:

- The 7-day moving average cases on February 14, 2021 was 87,092
- The week ending February 20, 2021, hospitalization rates per 100,000 were:
  - <18 years: 0.9
  - 0-4 years: 1.0
  - 5-11 years: 0.6
  - 12-17 years: 1.1
- The 7-day moving average cases on November 2, 2020 was 88,042

- The week ending October 24, 2020, hospitalization rates per 100,000 were:
    - <18 years: 0.5
    - 0-4 years: 0.5
    - 5-11 years: 0.1
    - 12-17 years: 0.9

US Summer 2021 Pediatric COVID-19 Trends

During August 2021, the US media began reporting high numbers of pediatric COVID-19-related hospitalizations and ICU admissions.[8-10] The national rise in pediatric hospitalizations has been driven largely by four states (Florida, Texas, Georgia and Alabama), with Florida reporting the highest daily increase in pediatric COVID-19-related hospitalizations.[16] Below is a summary of the recent COVID-19 trends in the US pediatric population, followed by trends for select US states. Each summary includes a description of the COVID-19 vaccinations, the prevalence of the Delta variant, followed by pediatric hospitalizations and deaths.

- Note: When reported cases could not be specifically attributed to the Delta variant, the prevalence of the Delta variant during the time the data was collected is provided for context. In most jurisdictions, the Delta variant was the predominant strain. It is important to note that hospitalization and mortality data may not always take into account whether SARS-CoV-2 was the cause of the pediatric hospital or ICU admission, or whether the child tested positive as a result of a routine or screening test.

US NATIONAL LEVEL DATA

- **Vaccination Rates:** As of August 16, 2021, 59% of the US population was partially vaccinated and 51% was fully vaccinated.[17] As of August 12, 2021, children ages 12 to 15 represented 3.6% of those who had at least one vaccine dose and 3.1% of those who were fully vaccinated. Children ages 16 to 17, represented 2.2% of those who had at least one dose and 2.1% of those who were fully vaccinated.[18]

- **Prevalence of Delta:** On March 22, 2021, the prevalence on the Delta variant in the US was 0.1% and remained low until May 17, 2021, when it represented 2.4% of sequenced cases. Since then the prevalence steadily and significantly increased to 94% as of July 26, 2021, and as of August 9, 2021, the Delta variant accounted for 96.5% of COVID-19 cases in the US.[19]

- **Pediatric Hospitalizations:**
    - Between August 1 and 10, 2021, there were 46,832 hospital admissions among children ages 0 to 17.[20] The seven day average of hospital admissions between August 4 to August 10, 2021 was 246 (up from 193 between July 28 to August 3, 2021).
        - Between June 26, 2021 and August 7, 2021, weekly rates of COVID-19-related hospitalizations among children nearly tripled from 0.3 to 1.0 per 100,000 population.[21,22] In the week ending on June 26, 2021, the weekly rate of COVID-19 hospitalization among children under the age of 18 was 0.3 per 100,000 (ages 0-4 was 0.2; ages 5-11 was 0.3, ages 12-17 was 0.4).[21]

- In the week ending August 7, 2021, the weekly rate of COVID-19 hospitalization among children under the age of 18 was 1.0 per 100,000 (ages 0-4 was 1.6; ages 5-11 was 0.7, ages 12-17 was 1.0).[21]

- A weekly Morbidity and Mortality Weekly Report (MMWR) report from August 14, 2021 examined data from March 1 to July 25, 2020 (from 14 states) looking at COVID-19 hospitalization rates among children less than 18 years of age.[12] Overall weekly hospitalization rates among children increased steadily during the surveillance period ($p<0.001$).[12] This suggests that as the prevalence of the Delta variant increased, so did the weekly hospitalization rate among children, suggesting greater disease severity from the Delta variant among children compared to previous SARS-CoV-2 strains.

- **Deaths:** As of August 12, 2021, the cumulative number of cases and deaths among children ages 0-4 years was 2.2% of total cases (with a total 141 deaths), 5-11 year olds represented 4.2% of total cases (93 deaths), 12-15 years olds represented 3.8% of total cases (123 deaths), and 16-17 year olds represented 2.6% of total cases (100 deaths).[23]

ARKANSAS

- **Vaccination Rates:** As of August 16, 2021, 51% of the population had received at least one dose and 39% had been fully vaccinated against COVID-19.[24,25] Vaccination data specific to children was not available.

- **Prevalence of Delta:** As of August 7, 2021, the Delta variant accounted for 66% of the cumulative COVID-19 cases since the beginning of the pandemic and 90% of COVID-19 cases in the last 60 days.[26]

- **Pediatric Hospitalizations:** On August 13, 2021 (when the 7-day average of new cases in Arkansas was 2,271),[14] the CDC reported that the rate of new hospitalizations for individuals ages 0 to 17 years in Arkansas with confirmed COVID-19 was 0.39 per 100,000, which is down from a peak of 0.63 per 100,000 on August 6, 2021 (when the 7-day average of new cases was 2,166).[20] Hospitalization rates due to COVID-19 among children ages 0 to 17 have been rising steadily in the state since July 1, 2021, when the rate was 0.1 per 100,000[20] (and the 7-day average case count in Arkansas was 447).[14]

    - As a comparison to a pre-Delta wave with similar case counts, on January 18, 2021 (when the 7-day average case counts in Arkansas was 2,274),[14] the rate of new hospitalizations for individuals ages 0 to 17 years was 0.29 per 100,000.[20]

    - Regarding COVID-19 clinical severity among children in Arkansas, the CDC reported a cumulative case range of 25 to 49 cases of MIS-C in Arkansas as of July 30, 2021. However, it is unclear what proportion of these cases occurred while Delta was the dominant SARS-CoV-2 variant in the state.[3]

- **Pediatric Deaths:** According to state-level data accessed on August 16, 2021, there have been three deaths with COVID-19 in Arkansas among those 0 to 17 years old.[27]

FLORIDA

- **Vaccination Rate:** As of August 16, 2021, 61% of Florida's population had received at least one dose and 50% were fully vaccinated.[28] As of August 5, 2021, 41% of children and youth ages 12 to 19 years had been vaccinated against COVID-19.[29]

- **Prevalence of Delta:** During the four week period ending on July 17, 2021, 69% of confirmed COVID-19 cases in Florida were confirmed to be caused by the Delta variant.[30]

- **Pediatric Hospitalizations**: On August 10, 2021 (when the 7-day average case count in Florida was 21,205),[14] the CDC reported that the rate of new hospitalizations for individuals ages 0 to 17 years in Florida with confirmed COVID-19 was 1.32 per 100,000, increased from 0.25 per 100,000 a month prior on July 10, 2021 (when the 7-day average case count in Florida was 4,068).[20]

    - As a comparison to a pre-Delta wave with similar case counts, on March 16, 2021 (when the 7-day average case counts in Florida was 4,446),[14] the rate of new hospitalizations for individuals ages 0 to 17 years was 0.25 per 100,000.[20]

    - Florida has been reporting the highest daily increase in hospitalizations for COVID-19 among children in US states. As of August 16, 2021, Florida reported 54 new pediatric hospitalizations per day over a seven-day period.[16]

    - Media reporting on August 12, 2021 indicates that within children's hospitals in Central Florida, there are approximately 30 children hospitalized with COVID-19, including six in the ICU.[31]

    - Regarding COVID-19 clinical severity among children in Florida, the CDC reported a cumulative case range (since May 2020) of 150 to 199 cases of MIS-C in Florida up to July 30, 2021. However, it is unclear what proportion of these cases occurred while Delta was the dominant SARS-CoV-2 variant in the state.[3]

- **Pediatric Deaths:** As of August 5, 2021, there has been a cumulative total of eight deaths with COVID-19 among children under the age of 16 in Florida, which represents a mortality rate of 0.2 per 100,000. It is unclear what proportion of deaths occurred while Delta was the dominant SARS-CoV-2 variant in the state.[29]

    - On August 13, 2021, Tallahassee Memorial HealthCare in Florida reported that a patient who was five years old had died from COVID-19, marking the hospital's first COVID-19 child death.[32]

LOUISIANA

- **Vaccination Rates:** As of August 16, 2021, 46% of the population had received at least one dose and 38% were fully vaccinated.[33] According to state-level cumulative data reported on August 13, 2021, 6.9% (55,155) of children ages 5 to 17 have been fully vaccinated and an additional 5.7% (45,673) of children ages 5 to 17 have been partially vaccinated.[34]

- **Prevalence of Delta:** During the four week period ending on July 17, 2021, 62.6% of confirmed COVID-19 cases in Louisiana were confirmed to be caused by the Delta variant.[30]

- **Pediatric Hospitalizations:** On August 11, 2021 (when the 7-day average of new cases in Louisiana was 5,660),[14] the CDC reported that the rate of new hospitalizations for individuals

ages 0 to 17 years in Louisiana with confirmed COVID-19 was 0.95 per 100,000, this is up from 0.17 per 100,000[20] a month prior on July 11, 2021 (when the 7-day average of new cases in Louisiana was 798).[14]

- As a comparison to a pre-Delta wave with similar case counts, on March 2, 2020 (when the 7-day average of new cases was 746),[20] the rate of new hospitalizations for individuals ages 0 to 17 years in Louisiana with confirmed COVID-19 was 0.33 per 100,000.[20]

- Media reports indicate that pediatric hospitals are seeing an increase in hospitalizations for COVID-19. For example, media reporting on August 5, 2021, indicated that Our Lady of the Lake Children's Hospital in Baton Rouge, Louisiana has admitted 27 children to the hospital's emergency room due to COVID-19 over the first four days of August, which is more than the total child hospitalizations the hospital observed in the entire month of June.[35] This recent increase in hospitalizations began in mid-July and brought the hospital's monthly total to 75 cases, the highest number of COVID-19 hospitalizations during the entire pandemic.[35]

- Regarding COVID-19 clinical severity among children in Louisiana, the CDC reported that as of July 30, 2021, there had been a cumulative case range of 100 to 149 cases of MIS-C in Louisiana. However, it is unclear what proportion of these cases occurred while Delta was the prevalent SARS-CoV-2 variant in the state.[3]

- **Pediatric Deaths:** According to cumulative state-level reporting on August 13, 2021, there have been ten deaths among individuals under the age of 18 in Louisiana. It is unclear what proportion of these deaths occurred when the Delta variant was dominant. [34]

TENNESSEE

- **Vaccination Rates:** As of August 16, 2021, 47% of the population had received at least one dose and 40% were fully vaccinated.[36] As of August 15, 2021, 3% of individuals ages 12 to 15 years had been vaccinated against COVID-19, and 4.9% of individuals ages 16 to 20 years had been vaccinated against COVID-19.[37]

- **Prevalence of Delta:** During the four week period ending on July 17, 2021, 56.3% of confirmed COVID-19 cases in Tennessee were confirmed to be caused by the Delta variant.[30]

On August 1, 2021, 21% of all COVID-19 cases in the state of Tennessee were among children and youth ages 0 to 18, with a majority of these among 14 to 18 year olds.[38] It is not clear what proportion of these cases were due to the Delta variant.

- **Pediatric Hospitalizations:** On August 13, 2021 (when the 7-day average case count in Tennessee was 3,243),[14] the CDC reported that the rate of new hospitalizations for individuals ages 0 to 17 years in Tennessee with confirmed COVID-19 was 0.46 per 100,000, which is up from 0.09 per 100,000 a month prior on July 12, 2021 (when the 7-day average case count in Tennessee was 446).[20]

- As a comparison to a pre-Delta wave with similar case counts, on January 23, 2021 (when the 7-day average case count in Tennessee was 3,260),[14] the hospitalization rate for 0 to 17 year olds was 0.15 per 100,000.[20]

- On August 15, 2021, the Tennessee Department of Health reported that there were 43 pediatric (ages 0 to 17 years) inpatients with confirmed COVID-19 across the state, 16

individuals ages 0 to 17 years with confirmed COVID-19 in the ICU, and 8 individuals ages 0 to 17 years with confirmed COVID-19 who required ventilation.[39]

- On August 6, 2021, the Tennessee Department of Health projected all of the state's children's hospitals will be at capacity by August 13, 2021.[40]

- Regarding COVID-19 clinical severity among children in Tennessee, the CDC reported a cumulative case range of 150 to 199 cases of MIS-C in Tennessee as of July 30, 2021. However, it is unclear what proportion of these cases occurred while Delta was the prevalent SARS-CoV-2 variant in the state.[3]

- **Pediatric Deaths:** As of August 13, 2021, the Tennessee Department of Health reported a cumulative total of six deaths due to COVID-19 among those ages 0 to 10, and an additional seven deaths due to COVID-19 among those ages 11 to 20 years.[41]

TEXAS

- **Vaccination Rate:** As of August 16, 2021, 54% of the population had received at least one dose and 45% were fully vaccinated.[42] As of August 13, 2021, a total of 464,747 individuals ages 12 to 15 years had been vaccinated against COVID-19.[43]

- **Prevalence of Delta:** During the four week period ending on July 17, 2021, 62.7% of confirmed COVID-19 cases in Texas were confirmed to be caused by the Delta variant.[30]

- **Pediatric Hospitalizations:** On August 11, 2021 (when the 7-day average case count in Texas was 12,663), the rate of new hospitalizations of individuals ages 0 to 17 years in Texas with confirmed COVID-19 was 0.57 per 100,000, this is up from 0.12 per 100,000 a month prior on July 11, 2021.[20]

    - As a comparison to a pre-Delta wave with similar case counts, on February 9, 2021 (when the 7-day average case count in Texas was 12,723),[14] the hospitalization rate for 0 to 17 year olds was 0.35 per 100,000.[20]

    - Media reports indicate that pediatric hospitals in Texas have experienced an increase in ICU admissions from COVID-19 and RSV.[44,45] As of August 12, 2021, there were 73 confirmed COVID-19 pediatric patients hospitalized and no pediatric beds available in the North Texas region according to the President/CEO of Dallas-Fort Worth Hospital Council.[44] In the Children's Hospital of San Antonio, an increasing number of children are being admitted with severe COVID-19 symptoms, and many arriving with unrelated illnesses are also testing positive for the virus, hospital officials said.[45] In the past week, Children's Hospital of San Antonio officials reported that two teenage COVID-19 patients who had underlying health conditions died.

    - Regarding COVID-19 clinical severity among children, the CDC reported that as of July 30, 2021, there had been a cumulative total of 50-99 cases of MIS-C in Texas. However, it is unclear what proportion of these cases occurred while Delta was the dominant SARS-CoV-2 variant in the state.[3]

- **Pediatric Deaths:** According to cumulative state-level reporting on August 13, 2021, there have been eight deaths among children under the age of one, 14 deaths among children one to nine years of age, and 37 deaths among children and youth age 10 to 19 years of age. It is unclear what proportion of deaths occurred in the context of the Delta variant.[46]

Discussion and Conclusions

- In recent weeks, the most commonly identified VOC among children in Ontario has been Delta.[1] Emerging evidence suggests that compared to previous VOCs (e.g. Alpha), the Delta variant is more transmissible, reduces the effectiveness of a single dose of current vaccines, and may cause more severe disease.[7]

- Reports from the US demonstrate that there have been increases in COVID-19-related pediatric hospitalizations in recent weeks (corresponding to a time when the Delta variant was the dominant variant and/or increasing). Although hospitalization rates among children are increasing in the US jurisdictions summarized above, COVID-19-related hospitalizations and deaths among children remain low in comparison to the COVID-19-related clinical severity and deaths among adults. Some hospitals and regions have reported higher absolute numbers of pediatric COVID-19 cases in hospital. At the time of writing, it is unclear if the Delta variant causes more severe COVID-19 disease in the pediatric population. A crude analysis comparing pediatric hospitalization rates between Delta-dominant and non-Delta waves with similar case counts suggests a possible increase in hospitalization from COVID-19 caused by the Delta variant. The increase in the absolute number of pediatric hospitalizations in the US may be the result of the higher overall transmissibility of the Delta variant and high rates of community infection, resulting in more pediatric cases and therefore more pediatric hospitalizations.

- In the US, only 51% of the population is fully vaccinated,[17] and rates range from 38%[33] to 50%[28] among the selected states reported above. These lower rates of fully-vaccinated individuals may contribute to the high rates of pediatric COVID-19 infections (and ultimately higher rates of hospitalizations). In comparison to the US, Israel has also experienced a Delta variant wave and had begun to widely ease public health measures, but as of August 17, 2021, 65% of the Israeli population had received at least one dose of a COVID-19 vaccine and 60% were fully vaccinated (compared to 60% and 51% respectively for the US).[17] The absolute number of hospitalized pediatric COVID-19 cases caused by the Delta variant wave in Israel is lower than in the US. For example, although not specific to children, the overall the weekly new hospital admissions for COVID-19 per million people on August 15, 2021 was 243 in the US, compared to 132 in Israel.[47] It will be important to monitor pediatric disease severity from Delta as more data emerges from other jurisdictions relevant to Ontario.

- In addition to examining severity in terms of hospitalization and deaths, the prevalence of MIS-C among children should also be considered in the context of the Delta variant's prevalence. Data from the CDC demonstrates that throughout the pandemic cases of MIS-C have increased shortly after rises in the cases.[3] Due to the time before development of MIS-C and reporting delays, data on MIS-C in the context of Delta is unavailable at the time of writing.

Implications for Practice

- When considering the Ontario health system capacity for surges in pediatric hospitalizations and ICU occupancy, other pediatric health conditions that may require hospitalization need to be considered. For example, rates of RSV have been increasing in the US at a higher rate than usual for this time of year.[48] It is anticipated that RSV and other respiratory viruses will have a resurgence as public health measures are lifted, in-class learning resumes, and more activities move indoors.[49] The magnitude of the surge is uncertain if public health measures (i.e. masking, distancing) are maintained in schools.

- There is evidence of reduced vaccine effectiveness for symptomatic disease caused by the SARS-CoV-2 Delta variant after one dose of a COVID-19 vaccine, meaning two-dose vaccination is important for protection against the Delta variant.[7] The level of vaccine coverage needed for 'herd immunity' if Delta is the dominant circulating strain is estimated to be at least 90% of the population, and over 100% of the vaccine-eligible population.[50] Since the current vaccines have not been authorized for use in children under 12 years old, it is not currently possible to achieve herd immunity through immunization alone. Prevention of pediatric COVID-19 cases can be achieved through a combination of high rates of adult vaccination and public health measures.

- Unlike in certain jurisdictions in the US, at the time of writing, media reports suggest there is no evidence yet of increased pediatric hospitalizations for COVID-19 in Ontario.[11] Higher vaccination rate in Ontario, maintaining public health measures that were lifted in the US (e.g., masking in indoor public settings) and more recent onset of the Delta surge may be contributing. Policies which increase vaccination coverage in the contacts of children (e.g., teachers and parents) is likely to have important protective effects for children.

- Children under the age of 12 years will not be fully vaccinated when they return to in-person learning in September 2021; this may facilitate the spread of COVID-19 (particularly the dominant Delta variant) among this unvaccinated population. It would not be unexpected for children under 12 years old to represent an increasing proportion of the positive COVID-19 cases.

- Additional evidence is needed to better understand the risk of post-COVID-19 conditions (i.e. "long COVID") in children infected with the Delta variant.[6]

- It is challenging to try to compare the severity of COVID-19 disease caused by different variants due to the differences in transmissibility between strains, as well as variables such as testing practices, time of year when different variants peaked, public health measures in place, adherence to public health measures at different times over the course of the pandemic, and changing vaccine coverage and effectiveness.

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