Saskatchewan Health Authority

University of Saskatchewan

COVID-19 Evidence Support Team
RAPID REVIEW REPORT

Is there evidence that children under 18 should receive the booster to increase their immunity?

Review Code: EOC220102 RR **Review Date:** February 4, 2022
Version: 1 **Review History:**

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Full author statement available at the end of report.

Key Findings

- The CDC has released a recommendation that all adolescents 12-17 be offered booster vaccines using only the Pfizer COVID-19 vaccine, at least 5 months following the primary series
- The CDC guidelines follow the review of unpublished Israeli data of 12-15 year olds vaccinated 5-6 months prior showing an equivalent infection rate to unvaccinated, and that those who receive boosters are at about 1/3 of the risk
- Health Canada has not yet approved booster doses for general use in 12-17 year olds, however NACI has recommended that boosters, at least 6 months following the primary series, should be considered for the following groups within that age group
    - Those with an underlying medical condition at high risk of severe illness due to COVID-19 (including those who are immunocompromised and received a 3-dose primary series)
    - Those who are residents in congregate settings (e.g. shelters, group homes, quarters for migrant workers, correctional facilities)
    - Those who belong to racialized and/or marginalized communities disproportionately affected by COVID-19

Limitations

- In many jurisdictions, the vaccination campaign including 12-17 year olds is still underway to provide the primary 2-dose series and determining waning of immunity is not yet applicable

Strength of Evidence

☐Mature evidence ☐Emerging Supportive evidence
☐Mixed evidence ☒Weak evidence

Quality of Evidence Assessment

1. **Adequacy of primary studies**:

The only published primary study from Israel demonstrates the impact of a 3rd booster dose in those 16-29 years of age. Unpublished preliminary data from Israel of booster efficacy in 12-15 year olds has been released through the CDC but is not yet independently published.

2. **Methodological limitations**:

Large-scale population data of booster dose efficacy in the general 12-17 year old population is only available from Israel – context needs to be considered.

3. **Relevance to review question**:

To date, there are is no published data to support the recommendation from the CDC to provide booster doses to the general 12-17 year old population.

4. **Generalizability of findings**:

Current recommendations are based on analysis of preliminary, unpublished data from Israel of booster doses administered to the general 12-17 year old population, and extrapolated from data of booster doses given to adults in Israel and the US.

Background/Context

1. **Clinical Context**

Following the emergence and worldwide spread of Omicron, many jurisdictions have been administering 3rd/booster doses to their citizens in an attempt to curb the vaccine-evading rapid transmission of this variant. With high rates of transmission among 12-17 year olds, the question of the efficacy/safety of a 3rd/booster dose given to this population is now being considered in many jurisdictions.

2. Purpose

To determine if there is any evidence that children 12-17 years old should/can safely receive a 3rd/booster dose of an mRNA COVID-19 vaccine.

2. **Review Question(s)**

- Is there evidence that children under 18 should receive the booster to increase their immunity?

Method

For each Rapid Review, the initial question is posed by a decision-maker in the health care system seeking the evidence base for a specific policy decision. According to the subject of the question, the

COVID Evidence Support Team (CEST) Intake Committee allocates the question to the appropriate Working Group. Each Working Group may be comprised of a librarian, researcher, 1-2 clinicians, 1-2 subject matter experts, and a group leader. A reference interview is conducted to establish the parameters of the question to ensure it is articulated in a clear, searchable manner. The librarians assigned to the team then conduct a thorough search of the indexed literature, grey literature, news sources, or other sources as agreed upon. Some reference lists for especially pertinent articles are also reviewed. An Evidence Search Report is thereby created. See Appendix for more details on the search strategy. A Rapid Review of the identified literature is then performed by the researcher using the approach of a systematic review, but without a double review, formal assessment of quality of reported study, or meta-analysis. Importantly, the review is completed in a time-sensitive manner. Relevant evidence is summarized in both tabular and narrative form, key findings and limitations articulated, and the quality of the body of evidence evaluated using a four-point grading system that assesses the methodologies, adequacy of the included studies, the direct relevance to the question and the generalizability of the findings related to the question. The draft Rapid Review Report is reviewed and edited by the Working Group clinicians, experts, and leader. Once revisions are complete, the Rapid Review is submitted to the requesting decision-maker and placed in the COVID-19 repository and database. For certain topics with rapidly changing evidence, after a period of time an updated evidence search is performed, the review process repeated, and an updated Rapid Review released.

Summary of Evidence

Following an announcement by the US FDA to expand the use of the Pfizer mRNA COVID-19 vaccine to include booster doses for 12-17 year olds on January 3rd, 2022[1], the CDC released guidelines on January 4th, 2022 recommending booster doses for all 12-17 year olds at least 5 months following the completion of the primary vaccination series[2]. In the UK, only those 16-18 considered at risk are eligible for a booster vaccination with the Pfizer or partial dose Moderna COVID-19 vaccines at least 3 months following their last dose[3]. As of the writing of this report, Health Canada has not yet approved any COVID-19 vaccine for the use as a booster dose in the 12-17 year old population. However, NACI[4] has recommended that the following groups in the 12-17 year old category be considered for booster doses at least 6 months following their last dose: a) those who have an underlying medical condition that puts them at high risk of severe illness due to COVID-19 (including those who are immunocompromised and received a 3-dose primary series); b) those who are residents in congregate settings (e.g. shelters, group homes, quarters for migrant workers, correctional facilities); or c) who belong to racialized and/or marginalized communities disproportionately affected by COVID-19. At this time, NACI does not recommend booster doses for the general adolescent population 12-17 years of age.

These recommendations have been based largely on preliminary, unpublished data from Israel[5] indicating that during the Omicron wave, 12-15 year olds vaccinated 5-6 months prior were at equal risk of confirmed infection as those who were unvaccinated, and that the administration of a booster reduced that risk to about one third. Prior data from Israel that has been published demonstrated that those 16-29 years old who had received a booster dose were 17.2 fold less likely to become infected than the non-booster group during the Delta wave. In addition, during the Delta wave, observed vaccine effectiveness in 12-16 year olds in Israel was found to drop from 85% against documented COVID infection 14-89 days following the second dose to 58% 150-180 days following the second dose[4].

Conclusions

To date, the only evidence for the use of booster doses in the 12-17 year old general population is unpublished preliminary data indicating that 12-17 year olds vaccinated prior to the Omicron wave were at equal risk to those who were unvaccinated for confirmed infection, and that the administration of a booster decreased that risk to about 1/3. Based on this very preliminary data and extrapolation from adult data indicating the potential benefit of a booster dose, the US CDC has recommended that all 12-17 year olds be offered a booster at least 5 months following their last dose. However, in Canada, NACI has limited that recommendation to only include populations at highest risk such as those with immune compromising conditions or living in settings with higher risk of transmission should be offered the booster at least 6 months following their last dose. These recommendations are based on preliminary, unpublished data from Israel of booster doses administered to 12-15 year olds during the Omicron wave following surveillance data during the Delta wave that indicated a decrease in vaccine effectiveness to 58% after 150-180 days following the primary two-dose series.

Table 1: Summary of Evidence

Consult the Summary of Evidence table using the following link:

- https://covid19evidencereviews.saskhealthauthority.ca/en/permalink/coviddoc436

This link provides access to the database where it is possible to view the spreadsheet for review.

Reference List

1. FDA. Coronavirus (COVID-19) Update: FDA Takes Multiple Actions to Expand Use of Pfizer-BioNTech COVID-19 Vaccine. 3 January 2022. https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-takes-multiple-actions-expand-use-pfizer-biontech-covid-19-vaccine
2. CDC. Booster Dose. https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html#booster-dose
3. UK Health Security Agency. COVID-19 Vaccination: A Guide to Booster Vaccination for Individuals Aged 18 Years and Over and Those Aged 16 Years and Over Who Are at Risk. Updated 11 December 2021. https://www.gov.uk/government/publications/covid-19-vaccination-booster-dose-resources/covid-19-vaccination-a-guide-to-booster-vaccination-for-individuals-aged-18-years-and-over
4. NACI. Rapid response. Guidance on the use of booster COVID-19 vaccine doses in adolescents 12-17 years of age. January 28, 2022. https://www.canada.ca/content/dam/phac-aspc/documents/services/immunization/national-advisory-committee-on-immunization-naci/guidance-use-booster-covid-19-vaccines-adolescents-12-17-years-age.pdf
5. Alroy-Preis, S. 12-15 y/o Booster Vaccination Data from Israel [video recording containing slides presented at Advisory Committee on Immunization Practices (ACIP) meeting January 5, 2022; from 32:00] [Internet]. Atlanta (GA): Centers for Disease Control and Prevention (CDC); 2022 Jan 5 [cited 2022 Feb 2]. Available from: https://www.cdc.gov/vaccines/videos/lowres/ACIPJan2022/ACIP-1_Welcome-Covid-19Vaccines_01-05-2022_LowRes.mp4
6. Bar-On YM, Goldberg Y, Mandel M, et al. Protection against Covid-19 by BNT162b2 Booster across Age Groups. New England Journal of Medicine. 2021;385(26):2421-30.

Appendix 1: Evidence Search Details

Note: To view full search strategy details, please consult the associated Evidence Search Report.

Filters, Limits & Exclusions:	English only 1 January 2021 - Current
Sources Searched:	• ANZCTR • CBC News • CIDRAP • ClinicalTrials.Gov • Clinical Trials Database (Health Canada) • COVID-End • COVID-NMA • Embase (Ovid) • European Centre for Disease Prevention and Control (ECDC) • EU Clinical Trials Register • Google • Google Scholar • Irish Health Library • Israel Ministry of Health • LitCovid • McMaster • MEDLINE (Ovid) • New South Wales Health • WHO Global Coronavirus Research Database • WHO website • BMJ Best Practice • Canadian provincial health organizations • Cochrane Library • DynaMed • Health Canada / PHAC • medRxiv • NCCID • PAHO • Pango Lineages • Public Health England • Public Health Ontario • Trip Pro • UK Health Agency • USA CDC • USA FDA • WHO Global Lit. on coronavirus disease
Librarian(s):	Michelle Dalidowicz, Clinical Librarian, Saskatchewan Health Authority Catherine Young, Clinical Librarian, Saskatchewan Health Authority

Appendix 2: Evidence Search Strategies

Database: Ovid MEDLINE(R) ALL <1946 to January 10, 2022>

Search Strategy:

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1 COVID-19/ or exp COVID-19 Testing/ or COVID-19 Vaccines/ or SARS-CoV-2/ (132887)

2 (coronavirus/ or betacoronavirus/ or coronavirus infections/) and (disease outbreaks/ or epidemics/ or pandemics/) (40110)

3 (nCoV* or 2019nCoV or 19nCoV or COVID19* or COVID or SARS-COV-2 or SARSCOV-2 or SARS-COV2 or SARSCOV2 or SARS coronavirus 2 or Severe Acute Respiratory Syndrome Coronavirus 2 or Severe Acute Respiratory Syndrome Corona Virus 2).ti,ab,kf,nm,ot,ox,rx,px. (207893)

4 ((new or novel or "19" or "2019" or Wuhan or Hubei or China or Chinese) adj3 (coronavirus* or corona virus* or betacoronavirus* or CoV or HCoV)).ti,ab,kf,ot. (60962)

5 (longCOVID* or postCOVID* or postcoronavirus* or postSARS*).ti,ab,kf,ot. (24)

6 ((coronavirus* or corona virus* or betacoronavirus*) adj3 (pandemic* or epidemic* or outbreak* or crisis)).ti,ab,kf,ot. (10995)

7 ((Wuhan or Hubei) adj5 pneumonia).ti,ab,kf,ot. (380)
8 or/1-7 (218179)
9 limit 8 to yr="2019 -Current" (216694)
10 ("20I/S:501Y.V1" or "20I/501Y.V1" or "B.1.1.7" or "B117" or "501YV1" or "GR/501Y.V1" or "GRY" or (alpha adj2 variant?)).ti,kf. or ("20I/S:501Y.V1" or "20I/501Y.V1" or "B.1.1.7" or "B117" or "501YV1" or "GR/501Y.V1" or "GRY" or (alpha adj2 variant?)).ab. /freq=2 [WHO Alpha] (1265)
11 ("B.1.351" or "B1351" or "20H/501Y.V2" or "GH/501Y.V2" or "20H/S:501Y.V2" or "501YV2" or (beta adj2 variant?)).ti,kf. or ("B.1.351" or "B1351" or "20H/501Y.V2" or "GH/501Y.V2" or "20H/S:501Y.V2" or "501YV2" or (beta adj2 variant?)).ab. /freq=2 [WHO Beta] (924)
12 ("P.1" or "P1" or "20J/501Y.V3" or "501YV3" or "GR/501Y.V3" or "20J/S:501Y.V3" or (gamma adj2 variant?)).ti,kf. or ("P.1" or "P1" or "20J/501Y.V3" or "501YV3" or "GR/501Y.V3" or "20J/S:501Y.V3" or (gamma adj2 variant?)).ab. /freq=2 [WHO Gamma] (16334)
13 ("B.1.617.2" or "B16172" or "G/452R.V3" or "G/452RV3" or "G452RV3" or "G452R.V3" or "21A/S:478K" or (delta adj2 variant?)).ti,kf. or ("B.1.617.2" or "B16172" or "G/452R.V3" or "G/452RV3" or "G452RV3" or "G452R.V3" or "21A/S:478K" or (delta adj2 variant?)).ab. /freq=2 [WHO Delta] (550)
14 ("B.1.1.529" or "B11529" or "GR/484A" or (omicron adj3 variant?)).tw,kf. [WHO Omicron] (112)
15 or/9-14 (234142)
16 exp Pediatrics/ or exp Infant/ or exp Child/ or Adolescent/ (3809972)
17 (child? or children or childhood or p?ediatric* or baby or babies or newborn? or new-born? or neonat* or perinat* or infant? or infantile or infancy or toddler? or preschooler? or pre-schooler* or boy? or girl? or adolescen* or teen* or youth? or juvenile? or pre-menarch* or pre-adolescen* or pre-teen or pre-pubert* or pre-pubesc* or premenarch* or preadolescen* or preteen or prepubert* or prepubesc* or school-aged or schoolchildren or kindergartener? or kindergardener?).tw,kf,kw. (2667922)
18 ((one or two or three or four or five or six or seven or eight or nine or ten or eleven or twelve or thirteen or fourteen or fifteen or sixteen or seventeen or eighteen) adj1 (year?-old or age?)).tw,kf,kw. (66765)
19 or/16-18 (4613503)
20 (booster? or ((3rd or third) adj2 (dos* or shot? or vaccin*))).tw,kf,kw. (16211)
21 15 and 19 and 20 (62)

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Database: Embase <1974 to 2022 January 07>
Search Strategy:
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1 sars-related coronavirus/ (485)
2 (coronavirinae/ or betacoronavirus/ or coronavirus infection/) and (epidemic/ or pandemic/) (10678)
3 (nCoV* or 2019nCoV or 19nCoV or COVID19* or COVID or SARS-COV-2 or SARSCOV-2 or SARS-COV2 or SARSCOV2 or SARS coronavirus 2 or Severe Acute Respiratory Syndrome Coronavirus 2 or Severe Acute Respiratory Syndrome Corona Virus 2).ti,ab,kw,hw,ot. (211009)
4 ((new or novel or "19" or "2019" or Wuhan or Hubei or China or Chinese) adj3 (coronavirus* or corona virus* or betacoronavirus* or CoV or HCoV)).ti,ab,kw,hw,ot. (186183)
5 (longCOVID* or postCOVID* or postcoronavirus* or postSARS*).ti,ab,kw,hw,ot. (59)
6 ((coronavirus* or corona virus* or betacoronavirus*) adj3 (pandemic* or epidemic* or outbreak* or crisis)).ti,ab,kw,ot. (12510)
7 ((Wuhan or Hubei) adj5 pneumonia).ti,ab,kw,ot. (429)

8 ("20I/S:501Y.V1" or "20I/501Y.V1" or "B.1.1.7" or "B117" or "501YV1" or "GR/501Y.V1" or "GRY" or (alpha adj2 variant?)).ti,kf. or ("20I/S:501Y.V1" or "20I/501Y.V1" or "B.1.1.7" or "B117" or "501YV1" or "GR/501Y.V1" or "GRY" or (alpha adj2 variant?)).ab. /freq=2 [WHO Alpha] (1149)
9 ("B.1.351" or "B1351" or "20H/501Y.V2" or "GH/501Y.V2" or "20H/S:501Y.V2" or "501YV2" or (beta adj2 variant?)).ti,kf. or ("B.1.351" or "B1351" or "20H/501Y.V2" or "GH/501Y.V2" or "20H/S:501Y.V2" or "501YV2" or (beta adj2 variant?)).ab. /freq=2 [WHO Beta] (907)
10 ("P.1" or "P1" or "20J/501Y.V3" or "501YV3" or "GR/501Y.V3" or "20J/S:501Y.V3" or (gamma adj2 variant?)).ti,kf. or ("P.1" or "P1" or "20J/501Y.V3" or "501YV3" or "GR/501Y.V3" or "20J/S:501Y.V3" or (gamma adj2 variant?)).ab. /freq=2 [WHO Gamma] (21624)
11 ("B.1.617.2" or "B16172" or "G/452R.V3" or "G/452RV3" or "G452RV3" or "G452R.V3" or "21A/S:478K" or (delta adj2 variant?)).ti,kf. or ("B.1.617.2" or "B16172" or "G/452R.V3" or "G/452RV3" or "G452RV3" or "G452R.V3" or "21A/S:478K" or (delta adj2 variant?)).ab. /freq=2 [WHO Delta] (452)
12 ("B.1.1.529" or "B11529" or "GR/484A" or (omicron adj3 variant?)).tw,kf. [WHO Omicron] (31)
13 or/1-12 (252213)
14 exp pediatrics/ or exp child/ or exp adolescent/ (3672989)
15 (child? or children or childhood or p?ediatric* or baby or babies or newborn? or new-born? or neonat* or perinat* or infant? or infantile or infancy or toddler? or preschooler? or pre-schooler* or boy? or girl? or adolescen* or teen* or youth? or juvenile? or pre-menarch* or pre-adolescen* or pre-teen or pre-pubert* or pre-pubesc* or premenarch* or preadolescen* or preteen or prepubert* or prepubesc* or school-aged or schoolchildren or kindergartener? or kindergardener?).tw,kf,kw. (3245737)
16 ((one or two or three or four or five or six or seven or eight or nine or ten or eleven or twelve or thirteen or fourteen or fifteen or sixteen or seventeen or eighteen) adj1 (year?-old or age?)).tw,kf,kw. (89771)
17 or/14-16 (4633269)
18 (booster? or ((3rd or third) adj2 (dos* or shot? or vaccin*))).tw,kf,kw. (20887)
19 13 and 17 and 18 (69)
20 from 19 keep 3-4,27,30,32,34-35,43,56 (9)

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