GUIDANCE ON ELIGIBILITY FOR mRNA COVID-19 (BNT162b2) VACCINE FOR CHILDREN AGE 5 TO 11 YEARS

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Health Policies and Standards Department

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INTRODUCTION

Health Regulation Sector (HRS) forms an integral part of Dubai Health Authority (DHA) and is mandated by DHA Law No. (6) of 2018 to undertake several functions including but not limited to:

- Developing regulation, policy, standards, guidelines to improve quality and patient safety and promote the growth and development of the health sector.
- Licensure and inspection of health facilities as well as healthcare professionals and ensuring compliance to best practice.
- Managing patient complaints and assuring patient and physician rights are upheld.
- Governing the use of Narcotics, Controlled and Semi-controlled medications.
- Strengthening health tourism and assuring ongoing growth.
- Assuring management of health informatics, e-health and promoting innovation.

The Guidance on Eligibility for mRNA COVID-19 (BNT162b2) Vaccine for Children Age 5 to 11 years aims to fulfil the following overarching DHA Strategic Priorities (2022-2026):

- Pioneering Human-centered health system to promote trust, safety, quality and care for patients and their families.
- Make Dubai a lighthouse for healthcare governance, integration and regulation.
- Leading global efforts to combat epidemics and infectious diseases and prepare for disasters.
- Pioneering prevention efforts against non-communicable diseases.
- Foster healthcare education, research and innovation.

ACKNOWLEDGMENT

This document is developed by the Subject Matter Experts panel under the COVID-19 Command and Control Centre in collaboration with Health Policy and Standards Department (HPSD). HPSD would like to acknowledge and thank the panel members for their dedication towards improving quality and safety of healthcare services in the Emirate of Dubai.

Health Regulation Sector

Dubai Health Authority

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EXECUTIVE SUMMARY

DHA is committed to ensuring the safety and protection to Dubai's population through providing access to COVID-19 Vaccines. After the development of Guidelines for mRNA COVID-19 Vaccine for adults and adolescents, the team of experts at the COVID-19 Command and Control Centre have developed this guidance based on available evidence for the eligibility for the vaccine for children aged 5-11 years.

Conducted clinical trials with about 3,000 children, and the Food and Drug Administration (FDA) have determined that the Pfizer-BioNTech COVID-19 Vaccine has met the safety and efficacy standards for authorization in children ages 5 through 11 years old. The safety of COVID-19 vaccines continues to be monitored.

DEFINITIONS

Adverse reaction: Any unintended and unwanted effect or presentation that appears on the user of the medical product within the doses documented in the internal leaflet and the authorized uses within the marketing approval that occurs as a result of separate effects from those essential effects of the medical product.

Health Facility: Any facility, owned and managed by natural or corporate body, provides medical services for individuals, including preventive, therapeutic and convalescent care services.

Healthcare Professional: a natural person who is authorized and licensed by the DHA to practice any of the healthcare professions in the Emirate.

Immediate allergic reaction: a reaction within 4 hours of being vaccinated, including symptoms such as hives, swelling, or wheezing (respiratory distress).

ABBREVIATIONS

AA	:	Aplastic Anemia
ALL	:	Acute lymphoblastic leukemia
AML	:	Acute Myeloid Leukemia
ATG/CSA	:	Anti-thymocyte globulin/cyclosporin
ADRs	:	Adverse Drug Reactions
AFI	:	Acute febrile illness
APL	:	Acute Promyelocytic Leukemia
BMI	:	Body Mass Index
BP	:	Blood pressure

cGVHD	:	Chronic Graft Versus Host Disease
CML	:	Chronic Myelocytic Leukemia
COVID	:	Corona Virus Disease
DHA	:	Dubai Health Authority
FDA	:	Food and Drug Administration
HPSD	:	Health Policies and Standards Department
HRS	:	Health Regulation Sector
HSCT	:	Hematopoietic Stem Cell Transplant
HTN	:	Hypertension
ITP	:	Immune Thrombocytopenic Purpura
IVIG	:	Intravenous Immune Globulin
MDS	:	Children with Myelodysplastic Syndrome
MIS-C	:	Multisystem Inflammatory Syndrome in Children
MODY	:	Maturity Onset Diabetes of the Young
MPN	:	Myeloproliferative Neoplasm
PEG	:	Polyethylene Glycol
RMDs	:	Rheumatological and musculoskeletal disease
WHO	:	World Health Organization

1. BACKGROUND

Children 5-11 years infected with SARS-CoV-2 are much less likely to develop severe illness compared with adults. However, they are nevertheless at risk of developing severe illness and late sequelae from infection. Hospitalization rates in children appear to be increasing, particularly with omicron variant, and data from the United States found that a third of children admitted with Covid-19 require intensive care. Of the children who develop severe illness, most have underlying medical conditions. Current evidence suggests that children with medical complexity, with genetic, neurologic, metabolic conditions or congenital heart disease are at increased risk for severe illness. Children are at risk of developing multisystem inflammatory syndrome in children (MIS-C), which is a serious though uncommon condition associated with recent SARS-CoV-2 infection. MIS-C is estimated to affect between 0.5% and 3.1% of all children diagnosed with SARS-CoV-2 infection, and between 0.9% and 7.6% of hospitalized paediatric COVID-19 patients. In Canada, 272 cases of MIS-C in individuals 0 to 19 years of age had been reported as of October 16, 2021. Their median age was 6 years, with 40% of cases occurring in children aged 5 to 11 years old. Most MIS-C cases recover fully.

On October 29, 2021, the U.S. Food and Drug Administration (FDA) issued an Emergency Use Authorization (EUA) to permit the emergency use of the unapproved product, Pfizer-BioNTech COVID-19 Vaccine, for active immunization to prevent COVID-19 in individuals 5 years of age and older. The authorization was based on the FDA's thorough and transparent evaluation of the data that included input from independent advisory committee experts. Key points were effectiveness; the vaccine was found to be 90.7% effective in preventing COVID-19 in children 5

through 11, and safety; the vaccine's safety was studied in approximately 3,100 children age 5 through 11 who received the vaccine and no serious side effects have been detected in the ongoing study. Canada followed on November 19, 2021, with authorization for the same age group.

This document aims to support healthcare professionals in providing advice on mRNA COVID-19 vaccine for children aged 5 to 11 years.

2. SCOPE

2.1. Providing advice on mRNA COVID-19 vaccine for children aged 5 to 11 years.

3. PURPOSE

3.1. Ensure public and patient health protection.

3.2. Provision of mRNA COVID-19 vaccine for children 5 to 11 years of age.

4. APPLICABILITY

4.1. Health facilities and healthcare professionals licensed under DHA's jurisdiction.

4.2. Health facilities approved to provide mRNA COVID-19 vaccine for children.

5. **RECOMMENDATION ONE:** PATIENT ELIGIBILITY AND EXCLUSIONS

5.1. Inclusion Criteria are:

5.1.1. Healthy children aged 5-11 years

5.1.2. Without active COVID-19 infection

5.1.3. Chronic illnesses: asthma, chronic lung diseases, heart failure, chronic renal diseases, chronic liver diseases, diabetes mellitus, hypertension, cardiac disease (including hypertension and congenital heart disease)

5.1.4. Genetic, Neurologic or Metabolic disorders

5.1.5. Haematological disorders such as sickle cell disease or thalassemia

5.1.6. Immunosuppressive disorders and those on immunosuppressive therapy

5.1.7. Obesity (BMI-for-age ≥ 95th percentile)

5.1.8. HIV and controlled infection on anti-retroviral therapy and CD4 >200 cells/ul

5.1.9. Low immunity, if they have no contraindications to vaccination.

5.1.10. After completion of 10 days from the first positive SARS-CoV-2 RT-PCR test with no symptoms for the last 3 days without anti-pyretic.

a. Same applies for second vaccine dose.

5.2. Exclusion Criteria, children aged 5-11years with:

5.2.1. Active COVID-19 infection

5.2.2. Severe or immediate allergic reaction of any severity to a previous mRNA vaccine dose.

5.2.3. Previous immediate allergic reaction of any severity to a component of the vaccine [polyethylene glycol (PEG) or polysorbate] (**Appendix 1**).

6. **RECOMMENDATION TWO:** VACCINE DOSE SCHEDULE

6.1. It is recommended that the second dose of the vaccine be administered 21 days after the first dose.

6.1.1. If for any reason there is a delay, the second dose can be given up to 42 days (6 weeks) after the first dose.

6.2. If for any reason the child presents beyond 42 days for the second dose, this dose may be given as a second dose; the vaccination schedule does not need be repeated.

7. **RECOMMENDATION THREE:** CO-ADMINISTRATION WITH OTHER VACCINES

7.1. COVID-19 vaccine and other vaccines may be administered together.

7.1.1. This includes administration of COVID-19 vaccines and other vaccines on the same day, as well as co-administration within 14 days.

7.2. When deciding whether to co-administer other vaccine(s) with COVID-19 vaccine, providers have consider:

7.2.1. Whether the child is behind, or at risk of becoming behind, on recommended vaccines.

7.2.2. Their risk of vaccine-preventable diseases (e.g. during an outbreak or occupational exposure).

7.2.3. The reactogenicity profile of the vaccines.

8. **RECOMMENDATION FOUR:** PRECAUTIONS

8.1. An immediate allergic reaction to any other vaccine or injectable medication is considered a precaution and not a contraindication.

8.2. Post-transplant recipient patients: within 3 months post transplantation.

8.3. Children with acute febrile illness (AFI) at the time of vaccination.

8.4. Children on immunosuppressant medication or systemic corticosteroid.

8.5. Patients treated with rituximab; it is recommended that patients are vaccinated prior to initiation of therapy (e.g. both doses completed ≥ 2 weeks prior to initiation of B- cell directed therapy), when feasible. If it is not feasible to delay Rituximab based therapy, it is still reasonable to consider vaccination during times of high community transmission given that vaccination can generate T-cell memory responses even in the absence of humoral immunity.

8.6. Children on high dose steroids must be cautioned on the inadequate response to the vaccine.

8.6.1. It is recommended that patients treated with corticosteroids are vaccinated prior to therapy, if feasible.

8.6.2. Although these groups are among the high-risk group, it is considered better to vaccinate in order to get some protection if the drug cannot be stopped.

8.7. Children with bleeding disorders or on anti-coagulation with documented uncontrolled INR (please refer to the section on bleeding disorders and anticoagulation below).

8.8. Individuals with a reaction to the first dose of vaccine must not be given an anti-histamine prior to the second dose.

8.9. Serology testing to determine level of immunity in vaccine decision-making is not recommended.

8.10. In a patient with lymphoedema of the arm of any cause, the vaccine can be given in the opposite arm. If both arms are affected, then it can be given in the thigh or buttock.

8.11. It is recommended that vaccination providers have appropriate medications and equipment - such as epinephrine, antihistamines, stethoscopes, blood pressure cuffs, and timing devices to check the pulse - at all COVID-19 vaccination centres.

8.12. Reporting of suspected adverse drug reactions should be followed by all the healthcare providers and professionals in the Emirate of Dubai as set out in the Adverse Drug Reaction Reporting for COVID-19 Vaccine Policy.

9. **RECOMMENDATION FIVE:** CLINICAL CONSIDERATIONS

9.1. Multisystem Inflammatory Syndrome in Children (MIS-C):

9.1.1. The mechanisms of MIS-C are not well understood but include a dysregulated immune response to SARS-Cov-2. Children with MIS-C have high antibody titers to SARS-Cov-2, it is unknown if this correlates with protection against reinfection and for how long protective antibody levels persist. It is unclear if people with a history of MIS-C are at risk for recurrence of the same dysregulated immune response following reinfection with SARS-Cov-2 or in response to a COVID-19 vaccination.

9.1.2. The guardian/parent of children with a history of MIS-C may choose to proceed with vaccination.

9.1.3. Current evidence suggests that risk of SARS-Cov-2 reinfection is low in the months after initial infection but may increase with time due to waning immunity. Thus, children with a history of MIS-C may consider delaying vaccination until they have recovered from illness for at least 90 days after the date of the diagnosis of

MIS-C, recognizing that the risk of reinfection and, therefore, the benefit from vaccination, might increase with time following initial infection.

9.1.4. Young children may be vaccinated after 90 days of diagnosis of MIS-C following consultation with their treating physician where the following considerations:

a. Clinical recovery from MIS-C, including return to normal cardiac function.

b. Personal risk of severe acute COVID-19 (e.g. underlying conditions)

c. Level of COVID-19 community transmission and personal risk of reinfection

d. Availability of safety data of COVID-19 vaccination following illness.

e. Timing of any immunomodulatory therapies.

9.2. Haematological Disorders & Malignancies:

9.2.1. Bleeding Disorders and Thrombosis:

a. Heritable bleeding disorders do not increase the risk of acquiring COVID-19. Hence, patients with such conditions may be vaccinated according to the published schedule. The vaccine itself does not present any additional safety concerns for these patients but the intra-muscular route of administration may increase the risk of bleeding at the injection site.

- Patients with severe haemophilia on prophylaxis with factor concentrate can have their normal prophylactic dose prior to the injection.

b. Patients with mild bleeding disorders can generally have an intra-muscular injection without any haemostatic treatment. If there is any uncertainty, advice must be sought from the patient's haematologist/haemophilia centre.

c. Those on Emicizumab can have the vaccination without any additional treatment if they are at steady state because it is similar to mild haemophilia.

d. Patients receiving regular platelet transfusions must have their vaccine after a platelet transfusion.

e. Other patients not falling into these categories must be managed on an individual basis.

9.2.2. Anticoagulation or anti-platelet therapy:

a. Patients with bleeding disorders may have a slightly increased risk of bleeding due to the intramuscular route of administration.

b. Patients on standard intensity anticoagulation with warfarin (target INR 2.0–3.0) can receive intramuscular injections as long as the most recent INR is 3.0. There is no need for an extra INR check prior to vaccination. It is recommended to apply pressure on vaccine site for 5 minutes.

c. Patients on maintenance therapy with direct oral anticoagulants, therapeutic low-molecular weight heparin or fondaparinux can delay the dose on the day of vaccination until after the intramuscular injection but do not need to miss any doses.

d. Patients on single agent anti-platelet therapy (e.g. aspirin or clopidogrel) can continue these medications without any adjustment.

e. It is recommended that patients with higher intensity anti-thrombotic treatment, for example warfarin with a target INR > 3.0 or dual antithrombotic

medications are managed on an individual basis. For patients with higher ranges, recommendation is to ensure that the INR is <3. The risk of hematoma formation may be reduced by application of pressure at the injection site for at least 5 minutes afterwards (without rubbing the injection site).

9.2.3. Auto-immune haematological conditions on immunosuppression (Autoimmune haemolytic anaemia and immune thrombocytopenic purpura - ITP):

a. Children and adolescents who are receiving immunosuppressive agents including but not restricted to rituximab, cyclophosphamide, mycophenolate or steroids (equivalent of prednisolone >0.5 mg/kg for more than a week, or equivalent) are deemed as clinically extremely vulnerable and it is recommended to encourage them to receive the vaccine, though it is recommended that the decision on vaccine safety and efficacy be made by the managing physician.

b. Patients with ITP on thrombopoetin stimulating agent (eltrombopag/romiplastim) can receive vaccination if platelet is ≥ 30,000.

9.2.4. Hemoglobinopathies and Rare Inherited Anaemias:

a. Patients with hemoglobinopathy are deemed “clinically extremely vulnerable” and are recommended to be offered the vaccine. This includes all children with sickle cell disease and some patients with thalassemia and inherited rare anaemias who have severe iron overload. Patient with G6PD deficiency can receive Covid-19 vaccine.

b. It is recommended that patients aged 5-11 years with underlying health conditions be offered vaccination.

c. This group includes children who receive the flu vaccine every year because they have problems with their spleen or have had their spleen removed. This group include sickle cell disease, thalassemia and rare inherited anaemia patients who have had their spleen removed.

9.2.5. Acute Leukaemia (AML, APL and ALL):

a. Patients with acute leukaemia who are receiving active treatment are not recommended to receive the vaccine until they complete their treatment and recover their blood counts.

b. Patients with ALL who are planned for maintenance therapy can delay the maintenance therapy for 2 weeks after the second dose of the COVID-19 vaccine.

9.2.6. Blood and Marrow Transplantation & Cellular Therapy:

a. Allogeneic:

i. Consider vaccination from 3-6 months following allogeneic hematopoietic stem cell transplant (HSCT), except if patient remains on immunosuppression (cyclosporine, tacrolimus etc.).

ii. It is recommended to prioritize Covid-19 vaccination over the regular vaccination schedules. If the patient has received other post-transplant vaccination. Consider vaccination of patients with mild chronic graft versus

host disease (cGVHD) and/or receiving 0.5mg/kg prednisolone (or equivalent).

iii. For patients with moderate/severe cGVHD or on more intensive immunosuppressive therapy (high dose steroids >0.5mg/kg) assess the potential benefits of COVID-19 vaccination on a case-by-case basis

iv. For patients receiving T-cell depleted HSCT, vaccination may be initiated around 6 months post HCT with confirmed presence of B-cells > 50 using CD19 as a biomarker and $CD4^+$ T-cells >100.

b. Autologous:

i. Consider vaccination from 2-3 months following autologous HSCT.

c. CART cell therapy :

i. Vaccination may be initiated as early as 3 months if demonstrated IVIG independent and B cell count ≥50.

d. Reasonable Criteria to postpone vaccination with our current knowledge are:

i. Severe uncontrolled acute GVHD grade 3-4.

ii. Recipients who have received anti-CD20 antibodies during the last 6 months with absolute B cell count <50.

iii. CART cell patients with B cell aplasia (absolute B cell count <50)

iv. Recent therapy with ATG or alemtuzumab.

9.2.7. Lymphoma:

a. Patients with lymphoma may be immunosuppressed to a varying extent depending on the lymphoma diagnosis and treatment history. This has implications for overall vaccination strategy and treatment decisions, safety and efficacy of COVID-19 vaccines in immunocompromised patients. There are no data regarding the safety or efficacy of currently available COVID-19 vaccines in immunosuppressed patients.

b. There is no evidence that replication-deficient vaccines are unsafe in this setting. Regarding clinical efficacy, it is reasonable to assume that patients with B-cell depletion/dysfunction are likely to have an impaired humoral response to vaccination, while those with T-cell depletion/dysfunction are likely to have an impaired cellular response and possibly also an impaired humoral response due to loss of T helper function.

i. Overall COVID-19 vaccination strategy:

- Based on current safety/benefit considerations and in the absence of data or guidance to the contrary, it is recommended that all patients with lymphoma receive a non-replicating COVID-19 vaccine (unless explicitly contraindicated), accepting that this might not achieve full protection if there are pre-existing defects in humoral and/or cellular immunity. For these patients, vaccination of close contacts may at least be as important.

ii. Implications for lymphoma treatment:

- The predicted effects of specific lymphoma treatments on cellular and humoral responses to COVID-19 vaccination must be considered and discussed with parents in a balanced way alongside other treatment considerations, e.g., the desire to maximize progression-free survival and minimize overall treatment-related toxicity. This is particularly relevant for drugs, which deplete T and B cells, but may also improve long-term disease control.

iii. Timing of COVID-19 vaccine

- It is recommended to time COVID-19 vaccination with the aim of achieving optimal protection at the earliest opportunity without compromising lymphoma outcome. Where possible, completion of vaccination at least 2 weeks before any immunosuppressive treatment is given. For patients who have already received immunosuppressive treatment, the advantages and disadvantages of interrupting therapy or delaying vaccination to allow immune recovery requires careful consideration and discussion bearing in mind that short interruptions in treatment may not be sufficient for any meaningful improvement of immune function.
- For patients that have received lymphocyte depleting therapy, i.e. Rituximab, blinatumomab, and anti-thymocyte globulin, alemtuzumab, etc. It is reasonable to consider deferring vaccination until 6 months after completion of therapy or until there is evidence of lymphocyte

reconstitution ALC ≥1 (normal range 1.3 to 4 x 103 or B cell count of more than 50 cells per microliter lymph by flow cytometry. This is because patients with B cell aplasia will in all likelihood not mount a humoral immune response. However, given that COVID vaccination generate T-cell memory that may offer at least partial protection, it is reasonable to offer vaccination during times of high community transmission even to patients unlikely to mount a B-cell response.

9.2.8. Myelodysplasia:

a. Children with myelodysplastic syndrome (MDS) is amongst the highest risk groups for COVID19 and as the Pfizer/BioNTech vaccine is not a 'live' vaccine, it is safe for blood cancer patients, including MDS patients. The consensus is that generally, for patients with blood cancer, the benefits of the vaccine far outweigh any potential side effects of the vaccine and the risks associated with having COVID-19 infection. Therefore, vaccination is recommended, except in people with a history of severe allergic reactions.

b. This includes all MDS subtypes:

   i. MDS patients on observation or on active therapy with hypomethylating agent now or those who have received treatment in the past

   ii. MDS patients in clinical trial

c. Patients who have a low platelet count may bleed or bruise at the injection site. To reduce this risk, it is recommended that the platelet count is 30 x 109/l or above

and that prolonged pressure at the injection site applied for 5 minutes. Those receiving regular platelet transfusions may have their vaccine after a platelet transfusion. If the platelet count is less than 30 x 109/l and the patient is not receiving regular platelet transfusions, it is recommended to discuss this with their haematologist.

d. Patients receiving PRBC transfusion can safely receive the Covid-19 vaccine.

9.2.9. Myeloproliferative Neoplasm (MPN):

a. Having an MPN and any MPN treatment (ruxolitinib, pegasys, etc) is not a contraindication to receiving the vaccine. If the patient is taking an anticoagulant, e.g., warfarin, rivaroxaban, apixaban etc. can follow the same recommendation as mentioned in the "anticoagulation section.

9.2.10. Chronic Myeloid Leukemia (CML):

a. Patients receiving TKIs such as imatinib, dasatinib, nivolumab, ponatinib, bosutinib (with or without remission) can be considered for vaccination.

9.2.11. Aplastic Anemia (AA):

a. There are case reports of AA developing post-vaccination with other vaccines, and of recovered AA patients relapsing following vaccine administration. The evidence is limited and based also on an appreciation that a viral insult is likely to be an important trigger in the pathogenesis of AA.

b. In the setting of the COVID-19 pandemic, current American Society of Hematology COVID-19 and AA guidance is that the risk versus benefit would favor

vaccine administration, particularly in those with additional risks for severe COVID-19 disease (age, obesity, other comorbidities associated with increased risk).

c. No data on efficacy in immunosuppressed patients has been made available to date for any of the SARS-CoV-2 vaccines in development. Those patients within 6 months of anti-thymocyte globulin/cyclosporin (ATG/CSA) initiation are unlikely to mount an appropriate immune response to a vaccine. Those patients with AA remaining on CSA for more than 6-12 months post-ATG treatment may respond to a vaccine. Vaccinations may be given after thoroughly considering and balancing risk versus benefit. Post-transplantation patients with AA can follow standard post-transplantation guidelines for vaccine administration. These will be updated regarding SARS-CoV-2 vaccines when they become available, extrapolating from recommendations for other vaccines.

9.2.12. Therapy Specific Recommendations:

a. Steroids: Patients treated with corticosteroids may have diminished responses to vaccination. Corticosteroids are detrimental to patients with mild Covid-19 yet appear beneficial to patients with severe Covid-19. It is recommended that patients treated with corticosteroids are vaccinated prior to therapy if possible but, if this not be clinically feasible, concomitant administration is acceptable.

b. IVIG: Covid-19 vaccines may be administered to patients receiving plasma therapy not specific to Covid-19 (eg: IVIG), as these are unlikely to substantially impair development of protective antibody responses.

c. Rituximab: Patients treated with rituximab clearly have diminished humoral responses to vaccination. Patients treated with rituximab and naturally infected with SARS-CoV2 appeared to be one of the highest risk groups for Covid-19 morbidity and mortality. It is recommended that patients are vaccinated prior to initiation of therapy (e.g. both doses completed ≥ 2 weeks prior to initiation of B-cell directed therapy). If it is not feasible to delay rituximab based therapy, it is still reasonable to consider vaccination during times of high community transmission given that vaccination can generate T-cell memory responses even in the absence of humoral immunity.

9.2.13. Patients with solid tumors receiving chemotherapy, checkpoint inhibitors (pembrolizumab, nivolumab, ipilimumab) etc.

a. Patients with solid tumor cancers can be offered the vaccine if the component of the vaccine are not contraindicated. The rationale for Covid-19 vaccine in patients with solid tumor malignancies is to reduce the risk of Covid-19 morbidity and mortality. Covid-19 vaccination will also enable ongoing receipt of disease-specific therapy and avoid delays in cancer care.

b. Patients with active cancer have a high risk of morbidity and mortality from Covid-19.

c. Data from other vaccine preventable illnesses such as influenza, pneumococcal disease and herpes zoster suggest a protective effect of vaccination in cancer patients.

d. Antibody responses to vaccines are generally lower in patients received cytotoxic chemotherapy compared with healthy individuals or cancer patients who are not actively receiving treatment.

e. Given the paucity of data, optimal timing of vaccination in relation to cytotoxic chemotherapy or other cancer directed therapy has not been established.

   i. If feasible for patients completing cytotoxic therapy, time first dose of vaccine to be given after therapy complete and nadir period resolved.

9.3. Renal conditions

9.3.1. Eligibility for mRNA vaccination:

a. Chronic kidney disease, including patients with chronic glomerular disease, end-stage renal disease on hemodialysis or peritoneal dialysis. The patients on hemodialysis with tendency to easy bleeding/bruising would need to check with their nephrologist regarding the timing of the vaccine with regards to the hemodialysis session.

b. Chronic, mild and stable electrolyte and acid-base imbalances.

c. Stable renal transplant patients.

d. Congenital anomalies of the kidneys and urinary tract.

e. Asymptomatic nephrolithiasis.

f. Immunosuppressed patients (on immunosuppressive treatment for renal transplant, glomerular diseases, interstitial nephritis or immunocompromised conditions such as chronic kidney disease).

g. It is recommended to delay treatment with rituximab for at least 4 weeks after the vaccination course is completed.

9.3.2. Caution:

a. Consider postponing vaccination for children with acute moderate to severe illness such as the following conditions, until the clinical condition returns to baseline or is controlled with treatment:

i. Acute kidney injury.

ii. Acute urinary tract infection, except maybe mild cystitis.

iii. Acute rejection of renal transplant.

iv. Recent renal transplant recipients.

v. Acute and significant electrolyte imbalances.

vi. Hypertensive crisis/accelerated hypertension, provided that they are asymptomatic **(Appendix 2)**.

9.4. Endocrine disorders

9.4.1. There are no absolute contraindications for any endocrine conditions.

9.4.2. Poor glycaemic control itself puts the patient at high risk and patients should be vaccinated regardless of his/her blood glucose levels. There is no contraindication or cut-off for blood glucose level to vaccinate but the patient should be advised to seek urgent appointment with his/her physician to improve glycaemia as vaccination might further elevate blood glucose levels.

9.4.3. Children with the following endocrine conditions are eligible for vaccination:

a. Obesity BMI for age ≥ 95th percentile.

b. Type 1 diabetes.

c. Type 2 diabetes.

d. Hypoadrenalism/patients on long term steroids.

e. Pituitary disease on hormone replacement.

f. Diabetes insipidus with pituitary disease.

g. Hyperthyroidism on anti-thyroid drugs.

h. Other types of Diabetes – MODY.

i. Cushing's disease.

j. Pituitary adenoma/previous pituitary surgery on hormone replacement.

9.5. Rheumatological and musculoskeletal disease (RMDs) conditions

9.5.1. mRNA vaccines can safely be given to patients with RMDs and in patients treated with drugs that influence the immune system, with the following precautions:

a. Avoid vaccination during active disease phase.

b. Vaccinate before planned immunosuppression, if possible.

c. Patients on rituximab should stop the drug and re-start 4 weeks after the vaccination course is complete, if possible.

d. The vaccine can be given to patients with autoimmune diseases provided they do not have any contraindications to vaccines.

9.6. Psychiatry disorders

9.6.1. No contraindications for patients with psychiatric disorders and those on psychiatric medications

9.7. Epilepsy

9.7.1. Children with epilepsy can be given the vaccine. There is no evidence for its contraindication, either related to the disease or medications.

9.8. Allergic conditions

9.8.1. Known allergy to one of the inactive ingredients of the mRNA vaccine – polyethylene glycol (PEG) or polysorbate– is a contraindication to getting the vaccine **(Appendix1)**.

9.8.2. Allery to food, drugs, pets, insect bites etc is not a contraindication to mRNA vaccine.

9.8.3. Patients with previous immediate allergic reaction to any other vaccine or those with severe allergies should be observed for at least 30 minutes following vaccine administration, rather than the usual 15 minutes.

9.8.4. Children with a severe allergic reaction or an immediate allergic reaction of any severity to the first dose should not receive the second dose.

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APPENDICIES

APPENDIX 1 - Common parenteral medications containing potential PEG and/or polysorbate

Formulary Medications (parenteral routes only)	Polysorbate 80 (PS80)	Polysorbate 20 (PS20)	Polyethylene Glycol (PEG)
Ado-trastuzumabemtansine		X	
ALEMTUZUmab	X		
Alteplase	X		
Atezolizumab		X	
Avelumab		X	
Bamlaniuimab	X		
BEVACIZUmab		X	
Blinatumomab	X		
Brentuximab	X		
Cemiplimab	X		
Cyclophosphamide			X
Daratumumab		X	
Depomedrol			X
Depoprovera			X
Dinutuximab		X	
Docetaxel	X		
Durvalumab	X		
Elotuzumab	X		
Etoposide (inj. solution)	X		
Fam-trastuzumab	X		
Fosaprepitant	X		
Fulvestrant	X		

Gemcitabine			X
Herceptin			X
Infliximab	X		
Ipilimumab	X		
Isatuximab-irfc	X		
Lorazepam			X
Mogamulizumab	X		
Neulasta			X
Nivolumab	X		
Ofatumumab	X		
PEGaspargase			X
Pembrolizumab	X		
Pertuzumab		X	
Phytonadione	X		
Polatuzumab		X	
Ramucirumab	X		
Rituximab	X		
SacituzumabGovitecan	X		
Temozolomide	X		
Trastuzumab		X	
Ustekinumab	X		
Vancomycin			X

APPENDIX 2 - Definitions of BP Categories and Stages

Stage	For Children Aged 1–13 Y	For Children Aged ≥ 13 Y
Normal BP	< 90th percentile	< 120/< 80 mm Hg
Elevated BP	≥ 90th percentile to < 95th percentile or 120/80 mm Hg to < 95th percentile (whichever is lower)	120/< 80 to 129/< 80 mm Hg
Stage I HTN	≥ 95th percentile to < 95th percentile + 12 mm Hg, or 130/80 to 139/89 mm Hg (whichever is lower)	130/80 to 139/89 mm Hg
Stage II HTN	≥ 95th percentile + 12 mm Hg, or ≥ 140/90 mm Hg (whichever is lower)	≥ 140/90 mm Hg

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