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# IMMUNIZATION ERRORS LEADING TO ADVERSE EFFECTS BY MMR VACCINE DUE TO PARA MEDICAL STAFF IDENTIFIED BY PHARM-D DOCTOR AND RESEARCHER

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**ABSTRACT**

India is committed to the goal for prevention and control of measles, mumps, rubella/ CRS (congenital rubella syndrome) by 2020. For that to achieve this goal, Measles Rubella (MR) awerness camps is being launched in the country covering all children of 9 months to below 15 years of age group. By conducting this awerness camps about 41 crore children will be covered under this campaign, The rubella vaccine, which is being introduced for the first time in India as mumps Measles-Rubella, thus, with introduction on of MR vaccine we will be protecting, MR vaccine will be introduced in all states through a wide age range MMR VACCINATION campaign targets children in the age group of 9 months to <15 years; and it replacing the current two doses of measles vaccine in the naonal immunizaon schedule for all children between 9 –12 months and 16–24 months of age immediately to MMR vaccines the future generation on of the country too. The MR campaign marks the end of several months of careful planning by the Immunization, This practical guide will enable program managers and medical to plan and implement high quality measles rubella vaccination campaigns with safety including simultaneous switch form measles to measles-rubella vaccine. Immunizaon against measles contributes to reducing under mortality and morbidity; vaccine e ecv eness of one dose of measles vaccine at 9 months of age is around 85%. vaccine e ecv eness goes up to 95% and above when given at >12 months of age; it has set the goal for MMR vaccines control by 2020, Aluminium, a common adjuvant in vaccines, is necessary to stimulate and strengthen the immunological power of vaccination, but may cause unwanted side effects, like long-lasting itching and allergies in children., Vaccination scene in India has been at crossroads as newer vaccines are being regularly licensed in the country but public sector catering to vast number of beneficiaries is extremely slow to absorb it. Many vaccination policies are openly criticized by the media and handful of disbelievers able to block the propagation of newer vaccines. This is despite clear benefits of vaccination in eradication of MMR and significant reduction of many diseases including measles-related deaths through vaccination. Main reasons for this situation are lack of awareness and demand for vaccines from the within, absence of hard-core evidence, inability to present the Further there is exaggeration of adverse events associated with new vaccines in the lay media and each serious event is blamed to the vaccine. Immunization is a proven tool for controlling and even eradicating disease. An immunization campaign, carried out by the World A successful immunization program is of particular relevance to India, as the country contributes to one fifth of global under five mortality with a significant number of deaths attributable to vaccine preventable diseases, resulting in prevention of several diseases.

**KEYWORDS**

Mmr Vaccines Immunization Program's, Itching, Allergies, Aluminum, Mortality and Morbidity.

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## INTRODUCTION

Childhood vaccines are one of the great triumphs of modern medicine. They are undoubtedly the most cost-effective healthcare interventions. We often fail to realize that rupees spent on a childhood vaccination not only helps save a life, but also greatly reduces spending on future healthcare. The success of measles, mumps and rubella eradication and. IAP has always accorded highest priority to

vaccines and vaccination issues. Recommendations on childhood vaccines and dealing with other issues pertaining to pediatric immunization. According to new born babies immunization schedule tells that at birth we(Doctors of pediatrics with help of Para medical staffs giving up to 6months, like BCG, HEP B-1,2,3, AND OPV, AND DTP - 1, 2, 3, AND IPV 1, 2, 3, AND HIB - 1, 2, 3, AND ROTAVIRUS 1, 2, 3, AND PCV 1, 2, 3, AND OPC 1, NEXT 9th Month Para medical staffs Are Giving MMR 1vaccine getting adrs to the patients now a days so to prevent that give awerness to the people and medical field related persons so due to improper knowledge and delaying the storage conditions and not proper awerness about that vaccination, to the Para medical staffs so when administered of particular MMR vaccine getting adverse drug reactions, to the new borns.

**Vaccine**

A safe, effective and reasonably inexpensive vaccine is available against measles for the past 5 decades. All currently used vaccines are live attenuated vaccines. Most of the currently used live attenuated measles vaccine strains originate from the original Edmonston strain and include Schwarz, Edmonston Zagreb, Moraten and Edmonston-B strains. Indian vaccines are usually formulated from the Edmonston Zagreb strain grown on human diploid cells or purified chick embryo cells. Each dose contains at least 1000 infective units and has no preservative. It is supplied freeze-dried in single dose or multidose vials with distilled water as a diluent.

**Adverse effects due to measles and rubella components**

Five percent of children can get fever more than 39°C 7–12 days following vaccination and febrile seizures may occur. Aseptic meningitis can rarely occur 2–3 weeks following vaccination but is usually mild. Transient parotitis may occur. The virus does not spread from vaccine to contacts. There is now incontrovertible evidence that there is no causal relationship between MMR vaccine and autism, inflammatory. Bowel disease, GBS and many other neurological complications. MMR is contraindicated in patients with severe immunodeficiency, pregnancy and those with history of serious allergy to vaccine or its components. The vaccine should be given with caution after weighing risks versus benefits in patients with history of thrombocytopenic purpura and should be preferably avoided in those were thrombocytopenia followed not be given to those with history of thrombocytopenic purpura following previous vaccination with measles/ MMR. The vaccine may be safely given in those with history of egg allergy.

**Measles, mumps, and rubella (MMR) vaccine**

**Routine vaccination**

- Minimum age: 12 months
- Administer the first dose of MMR vaccine at age 12 through 18 months, and
- The second dose may be administered before age 4 years, provided at least 4 weeks have elapsed since the first dose. Catch-up vaccination
- Ensure that all school-aged children and adolescents have had 2 doses of MMR vaccine; the minimum interval between the 2 doses is 4 weeks.
- One dose if previously vaccinated with one dose.

**STRATEGIC PLAN 2014–2020 GOAL**

**Eliminate of measles and control rubella / CRS by 2020**

To achieve and maintain at least 95% population immunity with two doses against measles and rubella within each district of each country in the Region through roune and / or supplementary immunizaon.

To develop and sustain a sensive and mely case-based measles, rubella and CRS surveillance system in each country in the Region that fulls recommended surveillance performance indicators; Develop and maintain an accredited measles and rubella laboratory network that supports every country or area in the Region; • strengthen support and linkages to achieve the above three strategic objecves.

**INDIA**

As per specified strategies in terms of operationalization, India has to ensure the following: • high coverage with MR vaccine are 1st dose in routine immunizaon (to reach >95% population immunity); it has high coverage with MR vaccine second dose through either or both of the following: routes second dose vaccination with MR vaccine (to reach >95% population immunity); supplementary immunization activity (through campaign) with MR vaccine (>95% coverage); • case management with vitamin A, anbiotics and referral services integrated with outbreak response;, It is my research and studies to guide country strategies towards the elimination goal and develop linkages with other child health interventions.

**DISCUSSION FOR PREVENTION OF ADVERSE DRUG REACTIONS TO MMR VACCINES**

Measles is a highly infecous disease that connues to kill many of our infants and young children. Rubella Infecon in pregnant women disables a child for life with congenital rubella syndrome (CRS) that may result in deafness, blindness and heart defects. Based on recommendations from expert committees, the mumps, measles-rubella vaccine is being introduced in our country through a phased MMR vaccinaon campaign in all the states covering 9 month to <15 year old children and simultaneous introducon of MR vaccine in the naonal immunizaon schedule,. A massive public health inia v e, the MR vaccinaon campaign will target over 400 million children in 36 states in Andhra pradesh and telangana in next two years. MMR vaccination campaign guidelines have been developed to assist naonal, state and district level programme managers to successfully plan and implement the MMR vaccinaon campaigns. The guidelines are extremely practical and have listed in detail the tasks and responsibilies to be completed by functionaries at all levels during the different stages of the MMR vaccination campaigns.

The Mumps Measles-Rubella campaign is one of the massive public health undertakings targeng nearly 41 crore children across the country over a period of two to three years. The vaccinaon will be provided through sites at schools and outreach session sites. This will be a major step towards reducing measles mortality burden in the country and reducing disabilies among children due to (CRS) congenital rubella syndrome. These guidelines have been developed to help naonal, state, district and block level programme managers to successfully implement the planned measles-rubella vaccination campaigns followed by immediate switching to measles-rubella vaccine in their routine immunizaon program so that a high population coverage is achieved to eliminate mumps measles and rubella virus transmission in the country.

**Complications**

Most measles-related deaths are caused by serious complicaons including blindness, encephalis, severe diarrhoea and related dehydraon, ear infecons, or severe respiratory infecons such as pneumonia. In addion, rubella transmission is highly prevalent across the country, which can a ect suscepble pregnant mothers in communies and may lead to CRS in children. CRS is a complex of congenital anomalies that can a ect mulple organ systems, causing spontaneous aborons and sll-births as well as lifelong disabilies in a child. Although there is no specic treatment for both measles and rubella, these diseases can be very well prevented by immunizaon with the available highly ec acious and cost-e ecv e MR vaccine.

**++ADVERSE REACTIONS TO MR VACCINE RESULTS**

Adverse reacons following MR vaccination ar e generally mild and transient and can be as follows: • slight pain and tenderness at the site of injection may occur within 24 h, somemes followed by mild fever;, about 7–12 days a er VACCINATION, up to 5% of measles vaccine recipients may experience fever of at least 39.4°C for 1–2 days. The fever may occasionally (1 / 3000) induce febrile seizures; • a transient rash may occur in about 2% of vaccinated children; thrombocytopenic purpura occurs in

approximately 1 in 30 000 vaccinated individuals; • one serious but extremely rare adverse e ect is anaphylaxis due to measles vaccine. The risk is as low as to 1 in 1 million children vaccinated; • arthralgia / joint pain can also occur when given in adolescent children or adults; • adverse events, with the excepon of anaphylacc reacons, are less likely to occur a er receipt of a second dose of MR containing vaccine.

- There is no evidence of an increased risk of encephalis, permanent neurological sequelae or Guillain–Barre syndrome following MR vaccinaon.

The virtual disappearance of sub-acute sclerosing pan encephalis (SSPE) and CRS in countries where measles and rubella have been eliminated strongly suggests that the vaccine protects against SSPE by prevenng measles in fecon and CR S by prevenng rubella in fecon during pregnancy

**Injection safety, AEFI surveillance and waste management are cric al components**

Based on the experiences from the last measles catch-up campaign, safety and waste management needs serious a enon as it is cric al to implement standardized vaccination waste management protocols. Also important is an acv e AEFI surveillance and management network with trained medical ocer s (MOs) from both government and private sectors, equipped with standardized AEFI management kits having injection adrenaline and hydrocorsone, for uniform pracce. This helps in prevenng any death from serious anaphylaxis as was successfully demonstrated in the earlier measles catch-up campaigns across many states. This must be replicated for the M MR campaigns as one of the crucial posive lessons from past campaigns.

## RECOMMENDATIONS

Focus during training for MR campaign must be on cold chain and vaccine management, safe immunizaon / injecon pracces, waste management and management of AEFI and must be pracc ed through hands-on exercises and role-plays; •standardized AEFI management kits must be procured by the district health teams in advance for distribuon to all the AEFI treatment centres before the start of the campaign, as per the micro-pla.

**Micro-planning process at the district level**

The district micro-plans must be developed using a boom-up approach and should take into account the ground realies in different blocks and urban areas. The step is to collect and compile the following background information

MR vaccine dosage, formula on and administration

- MR vaccine is lyophilized and reconstuted with diluent (provided by the manufacturer) immediately prior to administraon by injecon; •diluent should be kept at 2–8°C at least 24 h before use and thus should be carried to session site at the same temperature as the vaccine (Inside vaccine carrier); •each ampoule of diluent for 10-dose vials of MR vaccine contains more than 5ml diluent that is used to dilute a single vial of MR vaccine. The enre amount of diluent in each ampoule provided by the manufacturer should be used to reconstute the vaccine; •each MR dose is 0.5 ml and should be administered subcutaneously in the right upper arm. The site is important for standardizaon and survey purposes.

## MEASLES

Measles elimination contributes significantly in achieving Millennium Development Goal 4 (MDG-4). "One of the three indicators for monitoring progress towards achieving MDG 4 is the "proportion of 1-year-old children immunized against measles". (1)

With the help of measles vaccination, globally number of measles deaths have dropped considerably to the tune of about 74%, between the years of 2000 and 2011.The number of measles deaths during this period have reduced from 542,000 to 158,000 and number of reported new cases have dropped by 58% to 355,000. (2)

Reduction in measles-related deaths have contributed to overall decline of 23% of under 5 mortality between 1990 and 2008. (3)

However, measles death is still unacceptably high at about 450 deaths everyday or 18 deaths every hour. All 194 WHO member countries have committed to reduce measles deaths by 95% by year 2017.

**Individual use**

Measles vaccine given at 9 months is an epidemiological compulsion and has almost 20% primary vaccine failure due to maternal antibodies. Therefore at least 2 or 3 measles containing vaccines are required for protection and in spite of this 5–8% may remain susceptible. Thus additional doses of measles vaccine preferably as MMR vaccine at the age of 15 months and again between 4.5 years and 5 years give durable and possibly lifelong protection against measles.

**MMR VACCINE**

Globally, most countries use MMR vaccine instead of monovalent vaccines. ACVIP feels that the combined MMR vaccine is a better option than an MR vaccine because of the following reasons: Mumps carries as much significance in terms of morbidity as rubella; complications of mumps are also many and can be profound-aseptic meningitis, encephalitis, orchitis, oophoritis, pancreatitis, deafness, transverse myelitis, facial palsy, ascending polyradiculitis and cerebellar ataxia; like rubella, mumps in a pregnant woman can also give rise to fetal damage in the form of aqueductal stenosis leading to congenital hydrocephalus.(20) The epidemiology of mumps has not been investigated in India but it is suggested that outbreaks occur every 5 to 10 years. (21) The burden of mumps has been reduced in developed countries following use of MMR vaccines. Like rubella, indiscriminate use of mumps vaccine can result in shift of epidemiology to the right and an increase in infection rates in adolescents and adults with greater complications. We support the suggestion that at least 80% coverage must be achieved to offset any presumed epidemiological shift of rubella (and mumps) and consequently higher incidence of congenital complications.

We think the MR/MMR vaccine should be given early to have much higher coverage than introducing it late at the time of 2nd booster of DTP. According to available evidence, both these vaccines (MR/MMR) can be given safely at different ages including at 9 months of age. Most important thing is to achieve minimum 80% coverage of childhood vaccination which will not allow virus to circulate freely and infect women of child bearing age, thus avoiding any inadvertent epidemiological shift.

**Measles**

**Routine vaccination**

Minimum age: 9 months or 270 completed days.

**Catch-up vaccination**

Catch-up vaccination beyond 12 months should be MMR.

Measles vaccine can be administered to infants aged 6 through 11 months during outbreaks. These children should be revaccinated with 2 doses of measles containing vaccines, the first at ages 12 through 15 months and at least 4 weeks after the previous dose, and the second at ages 4 through 6 years.

**RUBELLA VACCINE**

Rubella per se a mild exanthematous illness but if acquired in the first trimester of pregnancy can lead to disastrous consequences in the fetus/ new born such as abortion, still birth, mental retardation, congenital heart disease, blindness and cataract. Hence the objective of vaccination against rubella is protection against congenital rubella syndrome (CRS). Developed countries have remarkably reduced the burden of CRS by universal immunization against rubella. It is essential that when immunization against rubella is instituted, more than 80% coverage is achieved. Indiscriminate use of rubella vaccine (monovalent or as a constituent of MMR) in young children through public health measure with sub-optimal coverage of the target population may be counterproductive as it may shift the epidemiology of rubella to the right with more clinical cases occurring in young adults leading to paradoxical increase in cases of CRS. This has been shown to occur using mathematical models. Direct evidence

from some Latin American countries and Greece also corroborates these concerns.

**Adverse reactions**

Vaccine adverse reactions are classified as a) local, b) systemic, or c) allergic.a) Local reactions: Most parenteral vaccines induce some degree of local reactions including pain, erythema and induration. a) Local reactions are more with whole cell pertussis vaccines and aluminium adjuvanted (DTPw, DTaP, DT, Td, Tdap, TT, hepatitis B, hepatitis A, inactivated combination vaccines, HPV and PCV) vaccines. Most studies show the frequency of local reactions to increase with subsequent doses and frequently administered doses (TT). .b) Allergic: Severe allergy or anaphylaxis or anaphylaxis like reactions including generalized urticaria or hives, wheezing, swelling of the mouth and throat, difficulty breathing, hypotension, and shock occur rarely at a frequency of 1 per 10,00,000 vaccinees. These reactions are rarely due to the vaccine antigen; they are usually due to other vaccine constituents including residual animal protein (e.g. egg), stabilizers or preservatives (e.g thiomersol). As a precautionary measure, the vaccine should be questioned for any immediate type of hypersensitivity to any of the vaccine constituents. Patients with history of serious allergy to any of the vaccine constituents should not receive the vaccine (exception-children with egg allergy can safely receive measles and MMR vaccines). Since occurrence of anaphylaxis cannot be predicted in most vaccines, all vaccines should be observed for 15 minutes

**Causality assessment of adverse events**

Causality is the relationship between two events (the cause and the effect), where the second event is a consequence of the first. The assessment of causality in an AEFI can occur at the population level or at the individual level. Manual on assessment of causality. The process should be systematic, and needs to be meticulous and detailed. 1) Is there evidence in literature that this vaccine(s) may cause the reported event even if administered correctly? 2) Did the event occur within an appropriate time window after vaccine administration? Following investigation, causality may be classified as: i) Definitely ii) Probably iii) Possiblyiv) Unlikely to be related to the vaccine.

**FACTORS THAT EFFECT NEW VACCINE IN NATIONAL IMMUNIZATION PROGRAM**

Factors that affect the inclusion of a new vaccine in the national immunization program, they are 1.Disease (burden, severity, mortality, national security, risk of importation, competing priorities), 2.Recipient (age, cohort size, politics) 3.Vaccine (local production, availability, cost, efficacy, safety, other vaccines).

**Different types of AEFIs**

Vaccine reaction Programme error Injection reaction Coincidental Unknown. Event caused by the vaccine, e.g., VAPP following OPV; or precipitated by the vaccine when given correctly, e.g. febrile seizure following vaccination in a predisposed child.

Event caused by an error in vaccine preparation, handling, or administration, e.g. deaths following measles vaccination due to toxic shock syndrome resulting from improper reconstitution and storage of measles vaccine is the most recent example., Event from anxiety about, or pain from, the injection itself rather than the vaccine. Examples include syncope due to pain of vaccination, injection site abscesses, sciatic nerve damage due to gluteal injection. Event that happens after immunization but not caused by the vaccine-a chance association. Example is the association between immunization and Sudden Infant Death Syndrome (SIDS or cot death), as the incidence of SIDS peaks around the age when infant immunizations are delivered. The cause of the event cannot be determined

**Time limits for using vaccines after reconstitution**

- Ÿ Varicella: 30 min (and protect from light)
- Ÿ MMRV: 30 min (and protect from light)
- Ÿ Yellow fever: 1 hour
- Ÿ Measles/MMR: 4 to 6 hours
- Ÿ Meningococcal polysaccharide vaccine single dose vial: 30 min

- Ÿ DTaP/Hib combination: 30 min

This risk of AEFI with vaccination is always weighed against the risk of not immunizing a child. It is only when the benefit outweighs the risk, that a vaccine is considered safe. However, even at a relatively low rate, because of the high absolute number of beneficiaries, there is risk of a few serious adverse events in the vaccinated children., These events may be recognized during clinical trials or during post-marketing surveillance (e.g. intussusceptions following human rhesus rotavirus vaccine. Tolerance to vaccine associated adverse events is generally lower as these are administered to healthy children unlike other pharmaceutical products used in morbid populations. Vaccine associated adverse events are more likely to be noticed and communicated and can often significantly impact immunization programs as noticed with MMR and pertussis vaccines.

An AEFI that is caused by something other than the vaccine product, immunization error or immunization anxiety, Example: A fever occurs at the time of the vaccination (temporal association) but is in fact caused by malaria. Coincidental events re?ect the natural occurrence of health problems in the community with common problems being frequently reported.

**Rates of adverse vaccine reactions**

**Part of the work of health professionals and regulatory officials in immunization programmes is to**

- Anticipate and/or evaluate AEFIs associated with speci?c vaccines,
- Compare reported AEFIs in their own jurisdictions with 'expected' adverse events in vaccinated and unvaccinated individuals,
- Facilitate the investigation and response to serious AEFIs.

**Comparing observed with "expected" rates of adverse events**

If the background rate of a particular adverse event is not known in a community you will be Expected rates of AEFIs following some childhood vaccines

**Vaccine-1 in 1,000 to 1 in 50,000 doses**

**BCG-1 in 2 – 3 million doses (or 1 in 750,000 doses for the? rst dose) 1 in 1 million doses 1 in 750,000 doses especially**

**OPV (oral polio vaccine) Measles DTP**

Although a vaccine may have the same antigens, different manufacturers may produce vaccines (or 'lots' of the same vaccine) that substantially in their com Vaccines position, including the presence of an adjuvant or other components. result in vaccines with different reactogenicity (the ability to cause vaccine reactions). For example, MMR vaccine given to infants may cause febrile convulsions. It is symptom does, however, not occur in adolescents who are given the same vaccine

**How do vaccines work?**

Early protective efficacy of currently available vaccines is primarily conferred by the induction of antigen-specific antibodies that are capable of binding specifically to a toxin or a pathogen. The role of cell-mediated immunity in currently used vaccines (that have T cell dependent antigens) is mainly by supporting antibody production. Other important mechanisms by which cell-mediated immunity works is by cytotoxic CD8+ T lymphocytes (CTL) that may limit the spread of infectious agents by recognizing and killing infected cells or secreting specific antiviral cytokines. T cell independent antigens (e.g. polysaccharides) do not stimulate cell mediated immunity and therefore do not produce long lasting immunity. T cell independent antigens can be converted to T cell dependent antigens by conjugating them with proteins.

**First step after immunization**

Following injection, the vaccine antigens attract local and systemic dendritic cells, monocytes and neutrophils. Innate immune responses activate these cells by changing their surface receptors and migrate along lymphatic vessels, to the draining lymph nodes where the activation of T and B lymphocytes takes place.

**Vaccination schedule**

Interval between doses: The immune response improves with proper spacing of vaccine doses.

Traditionally, '0-1-6' month schedule (prime and boost) is considered as a more immunogenic schedule than 6-10-14 week or 2-3-5 month or 2-4-6 month schedules for non-live T-cell dependent vaccines like hepatitis-B vaccine. This is mainly due to adequate time interval between first few doses which act by inducing immune responses and last dose that works as boosters. Since, affinity maturation of B-cells in GCs and formation of memory-B cells take at least 4–6 months, this schedule quite well fulfills these requirements.

**GENERAL APPROACHES TO FOLLOW WHEN GIVING VACCINE**

- Vaccination at birth means as early as possible within 24 to 72 hours after birth or at least not later than one week after birth.
- Whenever multiple vaccinations are to be given simultaneously, they should be given within 24 hours if simultaneous administration is not feasible due to some reasons.
- The recommended age in weeks/months/years mean completed weeks/months/years.
- Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible.
- The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. When two or more live parenteral/intranasal vaccines are not administered on the same day, they should be given at least 28 days (4 weeks) apart; this rule does not apply to live oral vaccines.
- If given <4 weeks apart, the vaccine given 2nd should be repeated.
- The minimum interval between 2 doses of inactivated vaccines is usually 4 weeks (exception rabies).
- Vaccine doses administered up to 4 days before the minimum interval or age can be counted as valid (exception rabies). If the vaccine is administered > 5 days before minimum period, it is counted as invalid dose.
- Any number of antigens can be given on the same day.
- Changing needles between drawing vaccine into the syringe and injecting it into the child is not necessary.
- Different vaccines should not be mixed in the same syringe unless specifically licensed and labeled for such use.
- Patients should be observed for an allergic reaction for 15 to 20 minutes after receiving immunization(s).
- When necessary, 2 vaccines can be given in the same limb at a single visit.
- The anterolateral aspect of the thigh is the preferred site for 2 simultaneous IM injections because of its greater muscle mass.
- The distance separating the 2 injections is arbitrary but should be at least 1 inch so that local reactions are unlikely to overlap.
- Although most experts recommend "aspiration" by gently pulling back on the syringe before the injection is given, there are no data to document the necessity for this procedure. If blood appears after negative pressure, the needle should be withdrawn and another site should be selected using a new needle.

**IMPORTANT STEPS TO FOLLOW FOR PREVENTION OF VACCINATION**

The following measures are recommended to maintain appropriate temperatures and ensure vaccine potency in domestic refrigerators.

**TEMPERATURE**

Temperatures should be recorded at least twice a day and a temperature log maintained regardless of temperature alarm, a chart recorder thermometer, or a digital data logger. Fast action should be taken in case of out of range temperatures. The log helps to identify recurring problems and loss of function in

ageing units. Temperatures should be monitored twice a day for a week prior to using a new/ repaired refrigerator for vaccine storage.

**VACCINE REFERIGERATOR**

The vaccine refrigerator should not be used for any other purpose including storage of food, beverages, pathology specimens and other medications. This will minimize the opening of the door. It is recognized that opening of the door can increase temperatures much as 2 to 5°C for as long as 2 to 8 minutes. The door should have a warning sticker in order to discourage unnecessary door opening. Ice packs and jars/ bottles of non drinkable water should be kept in the freezer and the door of the main compartment and the lowest part (baffle tray) respectively. This increases the cool mass of the refrigerator and helps maintain temperature during power failures and cuts for at least 3 to 4 hours, and minimizes temperature fluctuations during door opening. The thermostat should be reset according to the ambient temperatures; e.g. to coolest during summers. The refrigerator should be kept at least 10 cm away from the floor and the walls so as to allow good air circulation.

**Storage of Vaccines**

All vaccines currently available in India are safe at temperatures between 2 and 80C. At a temperature of 2 to 8oC, most of these vaccines have a shelf life of 24 months. BCG, OPV, measles and MMR vaccines should be preferably kept frozen for long term storage (shelf life of 2 years). Even these vaccines, however, can be kept at 2 to 80C for shorter periods, e.g. 6 to 12 months for OPV and 18 to 24 months for measles. Reconstituted lyophilized vaccines (BCG, measles, MMR, Hib, rabies, rotavirus) whether single dose/ multi dose must be stored at 2 to 80C, protected from light and used within 4 to 6 hours. Multi- dose vials of inactivated liquid vaccines once opened may be used till the expiry date on the container. OPV can be subjected to 10 cycles of freeze-thaw provided that the thawed material is kept refrigerated and the total cumulative duration of the thaw is not more than 24 hours. OPV would lose viability if kept at 22 to 25oC for more than a day. Opened vials of OPV, however, may be used in subsequent sessions at a given health facility if it has been preserved at 2 to 8oC. OPV vials used in the field setting or an outreach facility or during a pulse immunization session must be discarded at the end of the day. Vaccine vials should not be taken out to the field more than 3 times, after that these are best discarded irrespective of whether these have been opened or not. Vaccines should be transported only in cold boxes or vaccine carriers-vacuum flasks should never be used for this purpose. During shipment and transportation, temperature and time sensitive monitor marks are used to check the cold chain.

**AEFIs that can occur after MR vaccination**

| Reaction* | Onset interval | Adverse reactions: case to dose ratio | Adverse reactions: incidence (%) or per million doses |
|---|---|---|---|
| Local reaction at injection site | 0–2 days | 1 in10 | (10%) |
| Fever | 6–12 days | 1 in 6 to 1 in 20 | (5–15%) |
| Rash | 6–12 days | 1 in 20 | (5%) |
| Febrile seizures ** | 6–12 days | 1 in 3000 | 330 |
| Thrombocytopaenia (low platelet count) | 15–35 days | 1 in 30 000 | 30 |
| Anaphylactic reaction (severe hypersensitivity reaction) | 0–2 h | 1 in 100 000 | 10 |
| Anaphylaxis | 0–1 h | 1 in 1 000 000 | 1 |
| Encephalopathy | 6–12 days | <1 in 1 000 000 | <1 |

## Risk of Natural disease & due to vaccination

| Complications | Risk after natural disease # (events / nb. of cases) | Risk after vaccination (events / nb. of doses) |
|---|---|---|
| Otitis media (middle ear infection) | 7–9% of cases | 0 |
| Pneumonia | 1–6% | 0 |
| Diarrhoea | 6% | 0 |
| Post-infectious encephalomyelitis | 0.5–1 / 1000 cases | 1 / 1 000 000 doses |
| SSPE | 1 / 100 000 | 0 |

**Immunisation errors leading to adverse effects**

| Immunization errors | Adverse event |
|---|---|
| **Vaccine prepared incorrectly** | |
| Vaccine reconstituted with incorrect diluent or with drugs substituted for vaccine or diluent, e.g. muscle relaxant, insulin | Effect of drug, e.g. muscle relaxant, insulin can even result in death |
| **Non-sterile injection** | |
| Improperly sterilized syringe or needle Contaminated vaccine or diluent | Infection, e.g. local suppuration at injection site, abscess, cellulitis, transmission of blood borne virus—HIV, hepatitis B or hepatitis C |
| Reuse of reconstituted vaccine at subsequent session | Systemic infection, sepsis, TSS |

## CONCLUSION

An immunization campaign, carried out by the world a successful immunization program is of particular relevance to India, as the country contributes to one fifth of global under five mortality with a significant number of deaths attributable to vaccine preventable diseases, resulting in prevention of several diseases. Now a days so to prevent that give awerness to the people and medical field related persons so due to improper knowledge and delaying the storage conditions and not proper awerness about that vaccination, to the Para medical staffs so when administered of particular MMR vaccine getting adverse drug reactions, to the new borns.

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## CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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