MASS MEASLES IMMUNIZATION CAMPAIGNS:

REPORTING AND INVESTIGATING ADVERSE EVENTS FOLLOWING IMMUNIZATION

(Revision May 2002)

Immunization programme managers and immunization campaign coordinators are encouraged to field test these draft guidelines for AEFI surveillance during measles campaigns and to send any comments to the Immunization Safety Priority Project, Vaccine Assessment and Monitoring, Vaccines and Biologicals, WHO Geneva (Email: immunizationsafety@who.int)

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1. PURPOSE

This document provides summary guidelines for the surveillance of adverse events following immunization (AEFI) during mass measles immunization campaigns. More detailed information is available in World Health Organization technical documents on vaccine safety and surveillance of AEFI [1-3], and in the publication *Immunization Safety Surveillance*[4] by the Regional Office of the Western Pacific. Those documents are also available online at: http://www.who.int/vaccines-surveillance/ISPP/CDRom/english/p2eng.htm

2. ADVERSE EVENTS FOLLOWING MEASLES IMMUNIZATION

An adverse event following immunization (AEFI) is any adverse event that follows immunization that is believed to be caused by the immunization. AEFI are classified into five categories (Table 1). Immunization can cause adverse events from the inherent properties of the vaccine (**vaccine reaction**), or some error in the immunization process (**programme error**). The event may be unrelated to the immunization, but have a temporal association (**coincidental event**). Anxiety-related reactions can arise from the fear or pain of the **injection** rather than the vaccine. In some cases the cause of the AEFI remains **unknown**.

Table 1. Classification of adverse events following immunization (AEFI)

Vaccine reaction:	event caused or precipitated by the vaccine when given correctly, caused by the inherent properties of the vaccine.
Programme error:	event caused by an error in vaccine preparation, handling, or administration.
Coincidental:	event that happens *after* immunization but **not** caused by the vaccine - a chance association.
Injection reaction:	event from anxiety about, or pain from the injection itself rather than the vaccine
Unknown:	event's cause cannot be determined.

2.1 Vaccine reactions

Live attenuated measles vaccine, used since 1963, has an excellent safety record. It does commonly cause minor reactions, and rarely more serious reactions (Table 2). Most reactions result from vaccine virus infection, 6-12 days after immunization. Generally, these vaccine reactions (except local reactions and anaphylaxis) do not occur if the child is already immune. Therefore, in campaigns, where many vaccinees are already immune, fewer vaccine reactions are to be expected. Measles vaccine virus infection causes fever, rash and/or conjunctivitis, and affects 5-15% of non-immune vaccinees. It is very mild compared to 'wild' measles infection, but for severely immunocompromised individuals, it can be severe, even fatal. The fever can be high enough to trigger a seizure in those predisposed to febrile seizures. Thromboctyopaenia (low platelet count) is a reaction that can happen following any viral infection. It shows up by bruising, and is usually mild and self-limiting. Although encephalopathy is included as a rare reaction to measles vaccine, a causal link with the vaccine is not proven and in most cases it is more likely to be a coincidental event rather than a true vaccine reaction.

Measles vaccine can also cause a local reaction at the injection site, and acute allergic reactions that can rarely be very severe (anaphylaxis). Anaphylaxis, while potentially fatal, is

treatable without leaving any long term effects.

Table 2. Measles vaccine reactions, onset interval, and rates

Reaction*	Onset interval	Number of doses per reaction	Reactions (percent) 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 10	(~5%)
Febrile seizures**	6-12 days	1 in 3,000	330
Thrombocytopaenia (low platelet count)	15-35 days	1 in 30,000	30
Anaphylactic reaction (severe hypersensitivity reaction)	0-2 hours	~1 in 100,000	~10
Anaphylaxis	0-1 hour	~1 in 1,000,000	~1
Encephalopathy	6-12 days	<1 in 1,000,000	<1

* Reactions (except local reaction and anaphylaxis) do not occur if already immune (~90% of those receiving a second dose).

** Seizure risk is age-dependent, and lower for older children; children over six years are unlikely to have febrile seizures.

2.1.1 Prevention and treatment of vaccine reactions

Parents should be given advance notice of the chance of 'mild measles' 6-12 days after immunization. This should include advice on how to manage the common minor reactions and instructions to return to a health facility if there are more serious symptoms. This will help to reassure parents about immunization and prepare them for these common reactions.

Paracetamol, at a dose of up to 15mg/kg every four hours with a maximum of four doses in 24 hours, is useful for the common minor reactions. It eases pain and reduces fever. A feverish child can be cooled with a tepid sponge or bath, and by wearing cool clothing. Extra fluids need to be given to children with fever. For a local reaction, a cold cloth applied to the site may ease the pain.

Current WHO advice is to immunize all children with measles vaccine, regardless of HIV status, and there is no need to screen for HIV status. Indeed, children with immune deficiency are at increased risk from measles infection. However, a child who is seriously ill (from HIV or any other cause) should not be vaccinated.

2.2 Programme errors

Programme errors result from errors and accidents in vaccine preparation, handling, or administration (see Table 3 below). They are preventable and detract from the overall benefit of the immunization programme. The identification and correction of these errors are of great importance.

A programme error may lead to a cluster of events associated with immunization. These clusters are usually associated with a particular provider, or health facility, or even a single vial of vaccine that has been inappropriately prepared or contaminated.

Table 3. Programme errors leading to adverse events

Programme errors	Adverse event
Non-sterile injection: • reuse of disposable syringe or needle • improperly sterilised syringe or needle • contaminated vaccine or diluent • reuse of *reconstituted* vaccine at subsequent session..	⇒ Infection (e.g., local suppuration at injection site, abscess, cellulitis, systemic infection, sepsis, toxic shock syndrome, transmission of blood borne virus (e.g., HIV, hepatitis B or hepatitis C)).
Vaccine prepared incorrectly:	
• vaccine reconstituted with incorrect diluent	⇒ Local reaction or abscess from inadequate shaking.
• drugs substituted for vaccine or diluent.	⇒ Effect of drug (e.g., muscle relaxant, insulin).
Contraindication ignored.	⇒ Avoidable severe vaccine reaction.

The most common programme error is an infection as a result of non-sterile injection. The infection can manifest as a local reaction (e.g., suppuration, abscess), systemic effect (e.g., sepsis or toxic shock syndrome), or blood-borne virus infection (e.g., HIV, hepatitis B or hepatitis C).

The symptoms arising from a programme error may help to identify the likely cause. For example, children immunized with contaminated vaccine (usually the bacterium *Staphylococcus aureus*) become sick within a few hours; local tenderness and tissue infiltration, vomiting, diarrhoea, cyanosis and high temperature are the most frequent symptoms. Bacteriological examination of the vial, if still available, can confirm the source of the infection.

To avoid programme errors:

- vaccines must only be reconstituted with the diluent supplied by the manufacturer
- **reconstituted vaccines must be discarded at the end of each immunization session and never kept longer than 6 hours.**
- no other drugs or substances should be stored in the refrigerator of the immunization centre
- immunization workers must be adequately trained and closely supervised to ensure that proper procedures are being followed
- careful epidemiological investigation of an AEFI is needed to pinpoint the cause and to correct immunization practices.

2.3 Coincidental events

An event may occur coincidentally with immunization and at times may be falsely attributed to the vaccine. In other words a chance temporal association (i.e., event happens *after* immunization) is falsely considered to be *caused* by immunization. These purely temporal associations are inevitable given the large number of vaccine doses administered, especially in a mass campaign.

The number of coincidental events to be expected depends upon the size of the population and the incidence of disease or death in the community. Knowledge of these background rates of disease and deaths allows estimation of the expected numbers of coincidental events.

For example, assume that one million children aged 1-15 years are immunized in a mass campaign and the background mortality rate for this population is 3 per 1,000 per year. Then, 250 deaths can be expected in the month after immunization and 8 deaths on the day of the immunization, simply by coincidence. These deaths will be temporally associated with the immunization, even though they are entirely unrelated.

2.4 Injection reactions

Individuals and groups can react in anticipation to and as a result of an injection of any kind. This reaction is unrelated to the content of the vaccine. Fainting is relatively common, but usually only affects children aged over five years. Fainting does not require any management beyond placing the patient in a recumbent position.

Hyperventilation as a result of anxiety about the immunization leads to specific symptoms (light-headedness, dizziness, tingling around the mouth and in the hands). An anxiety reaction to injection can include convulsions in some case.

These reactions are not related to the vaccine, but to the injection. Some individuals may be needle-phobic, aggravating such reactions. In a group situation, mass hysteria is possible, especially if a vaccinee is seen to faint or have some other reaction. Clear explanations about the immunization and calm, confident delivery will decrease the level of anxiety about the injections, and thus reduce the likelihood of an occurrence.

3. AEFI SURVEILLANCE DURING MASS MEASLES CAMPAIGNS

A campaign involves a **large number of doses** given over a **short period of time** leading to more vaccine reactions and coincidental events. The **rate** of these events remains **unchanged**, but the **increased number** of events are readily apparent to both staff and the public, particularly when injectable vaccines are used and especially at a time of intensive social mobilisation. A real increase in programme errors may also occur during campaigns.

Box 1

Common events in campaigns:

- a **real increase in programme errors** is possible with staff who are unfamiliar with a given vaccine or situation and under pressure from a lot of children needing vaccine quickly; staff may not observe normal safe injection practice
- a wider age group (usually older) is immunized than routinely and staff have less experience in dealing with adverse events to be expected in this older group (e.g., fainting)
- antagonism from some sectors, for a variety of reasons, can add fuel to any concerns about AEFI during the campaign or criticism of the campaign
- rumours spread rapidly and damage the campaign before there is a chance to counter them.

Even if a national programme has not yet developed a functioning adverse events surveillance system, some form of adverse event monitoring is essential in mass campaigns. Without this, the public is likely to hear of an adverse event before the programme manager, and the situation becomes very difficult to control. The surveillance should be simple, flexible and

rapid.

Decide **who** will have overall responsibility and who should be the focal point and the spokesperson (e.g. EPI manager, person in charge of surveillance at national level, National Regulatory Authority (NRA)). This is particularly important if surveillance of adverse events is done by a surveillance structure other than EPI, or if an NRA exists or if there is a common monitoring scheme for drugs and vaccines. Decide **what** to report, how to report and who should receive reports. Don't make the reporting list complicated. A list of reportable events is suggested in Table 4; countries with limited reporting capacity should decide which of these events should be reported during a campaign. Establish case definitions for reportable events (see Annex A). A sample reporting form is provided in Annex B.

Table 4. List of reportable AEFI (see Annex A for case definitions)

Occurring within 24 hours of immunization	• Anaphylactic reaction (acute hypersensitivity reaction) • Anaphylaxis • Toxic shock syndrome (TSS)
Occurring within 5 days of immunization	• Severe local reaction • Sepsis • Injection site abscess (bacterial/sterile)
Occurring 6-12 days after immunization	• Seizures, including febrile seizures • Encephalopathy
Occurring 15-35 days after immunization	• Thrombocytopaenia

Train staff about what common adverse events to expect and how to manage them.

Develop **rapid** reporting channels from the field to the person in charge of adverse events monitoring (telephone or fax).

Analyse data quickly (this does not necessarily mean sophisticated analysis), and take appropriate action quickly. A serious report must not sit on someone's desk without attention.

Provide **feed back** on a weekly basis to reassure staff and the community that there are no problems.

Consider creating an expert **committee** to review causality of events reported (this could include, for example, a neurologist, paediatrician, immunologist), to be convened on an *ad hoc* basis. It is advantageous for the committee members to officially represent key professional associations.

Track the number of doses of each vaccine and each vaccine lot distributed, and to where they are distributed.

Anticipate concerns by preparing in advance "**Qs and As**" about adverse events. Share the Qs and As with all district programme managers, and with the media if appropriate. Appoint a **spokesperson** for media contact.

Be aware of the local perceptions and information about previous adverse events and any **allegations** about vaccine safety that need to be responded to with correct information.

4. RESPONDING TO AEFI

Health workers need to know how to recognize, treat, and report AEFI – immediately, if serious. The treatment of AEFI that may occur following measles immunization is outlined in Annex A. More detailed guidelines for the treatment of anaphylaxis are provided in Annex C.

4.1 Investigating AEFI

Depending on the nature of the event(s), the number of people affected, and community perceptions, an investigation may be conducted. Decide **what** to investigate (i.e., establish criteria on the types of event that will require investigation) and **who** will be involved with an investigation (at each level) if needed. In general, an investigation will be directed by district or provincial level staff. In some cases, regional and/or national staff may need to be involved with the investigation. In all cases, the district/provincial staff in charge of the investigation should advise staff at the higher level(s) when embarking on an investigation, and provide updates throughout the investigation.

Box 2

The reported AEFI must be investigated if it:

- may have been caused by programme error
- is a serious event requiring hospitalization or resulting in death
- is a serious event of unexplained cause
- is causing significant parental or community concern

Certain events (toxic shock syndrome, sepsis, and abscess) are likely to arise from programme errors (and may result in clusters) and must always be investigated so the appropriate corrective action can be taken.

When an investigation is deemed necessary, it is important to initiate it urgently so that the cause may be determined (where possible) and additional cases prevented, in order to avoid compromising the rest of the campaign as a result of ongoing community concern.

Gather information about the suspected reaction as well as from the patient/parent, health workers and supervisors, and community members. The information collected (and conclusions) should be recorded on an AEFI Investigation Form (see Annex D).

Identify system problems rather than finding individuals to blame. Remember, while an individual may have been at fault, it is more effective to concentrate on changing the system/procedures to avoid such errors than to blame or punish any individuals. Programme errors are the most likely cause of adverse events during campaigns. Therefore, the investigator should examine the evidence for any errors in the storage, handling, or administration of the vaccine. Programme errors may also be identified during the investigation, even when not the primary cause of the AEFI.

A working hypothesis should be established as soon as there is sufficient information. The working hypothesis may change during the course of the investigation. The focus of the investigation should then be to seek to confirm the working hypothesis. No action should be taken based on the hypothesis, until it is confirmed with reasonable certainty.

Laboratory testing may sometimes confirm or rule out the suspected cause: the vaccine and diluent may be tested for sterility and chemical composition; and the needles and syringe for sterility. **Testing should be requested on a *clear suspicion* and not as routine, and *never* before the working hypothesis has been formulated.**

Appropriate actions to protect the community should be taken throughout the investigation (Table 5). Upon completion of the investigation, the cause of the event(s) needs to be communicated to the community. This must include information about the steps being taken to remedy the situation and to prevent a recurrence, if such steps are needed.

Table 5. Actions to safeguard the community during an investigation

Stage of investigation	Actions
Incident detected	• Assess and investigate with appropriate degree of urgency • Possibly withhold suspect vaccine(s) from use till further information available
Investigation starts	• Ensure that investigator has adequate resources, provide more if needed • Increase surveillance to identify similar cases in and out of area • Define any suspect vaccine
Investigator develops working hypothesis	• Do not communicate working hypothesis until confirmed • If working hypothesis indicates programme errors, correct them • If vaccine problem suspected, withhold the suspect vaccine(s) from use
Investigator confirms working hypothesis	• Advise community of cause, and of planned response

When communicating about AEFI, remember that trust is a key component of the exchange of information at every level, and overconfidence about risk estimates that are later shown to be incorrect contributes to a breakdown of trust. **Admit uncertainty, investigate fully, and keep the community informed**. Avoid making a premature statement about the cause of the event before the investigation is complete. If the cause is identified as a programme error, it is vital not to lay personal blame on anyone, but to focus on system-related problems which resulted in the programme error(s) and steps being taken to correct the problem. In communicating with the community, it is useful to develop links with community leaders and peripheral health workers so that information can be rapidly disseminated. Maintaining lines of communication with the community is important throughout the investigation.

It is never appropriate to discontinue the immunization programme while awaiting the completion of the investigation.

Box 3

Case study

In Japan in 1975, pertussis immunization was discontinued during the investigation of two deaths that closely followed DTP vaccine. The investigation exonerated the vaccine, but as a result of the subsequent drop in immunization coverage there were 113 pertussis deaths in the four years after 1975 compared to 10 pertussis deaths in the four years before.

Box 4

When there is a high level of concern about a vaccine, communication with the community (and the media, if appropriate) can emphasize:

- the known benefits of immunization in preventing serious disease compared to the uncertainty if the adverse event(s) are truly caused by the vaccine (presenting data on disease risks versus risks of vaccine reactions and vaccine effectiveness may be useful)
- a remediable programme error or coincidental illness are much more likely since serious vaccine reactions are very rare
- that the appropriate action is being taken to safeguard the public (see Table 5).

4.2 Communicating with the media

The media (newspaper, radio, and television) play an important role in public perception. Understanding what the media want from a story will assist in preparing communication messages (see Annex F).

In certain situations, media coverage is likely to raise public concern about immunization. In these situations, it is important to communicate with professional organizations, health professionals and workers before talking with the media. The communication should include preparation on how to deal with the public concern on this issue. It is also useful to have other groups and individuals that have public respect and authority make public comments to endorse and strengthen key messages. In some settings, private professional organizations and other interested parties may have greater credibility than the government.

Designating spokesperson(s) to communicate with the media limits the possibility of conflicting messages coming from different sources. The spokesperson(s) should have some training on media relations, and be designated and trained **before** any vaccine safety issues arise; this will help the spokesperson(s) to develop a good relation with reporters.

4.2.1 Understanding the media perspective

The media are most interested in stories that will attract attention and boost their sales/audience. One technique is to dramatise and personalise events, including events which are either unrelated to immunization (coincidental) or a localised programme error without wider implications. In addition, the media tend to report on numbers of events, ignoring the context of the small rate of occurrence. If given inappropriate material, the media can present the health service or officials responsible for immunization as being uncaring, impersonal, incompetent, or even dangerous.

The media can also be helpful allies in communicating public health messages such as reminding the public of the importance of immunization and the risks of the diseases. Building a personal relation with key health reporters will help them to understand the public health perspective.

The response of the health service to the concern about immunization safety must be seen to be compassionate, with careful and expert investigation of the problem. Off-hand and disparaging remarks should be avoided. Always emphasize the proven benefits of

immunization. Where possible use the term 'immunization safety' or 'vaccine safety' rather than 'adverse event', as the focus is on safety.

4.2.2 Holding a media conference

A media conference, media statements and dissemination of information through a range of channels are all useful tools for responding to public concern. A media conference gives all the reporters equal access to the information (i.e., no exclusive coverage). Thus, they may be less likely to 'sensationalise' the events. Media interest is usually greatest initially when relatively little is known. It is wise to call a media conference early, even if there is only very limited information to give. This will prevent the circulation of rumours and build the relationship with the reporters.

A media conference also provides an opportunity for all stakeholders, including professional organisations and other non-governmental partners, to voice their support for immunization and the approach being taken to investigate the problem. They must show a unified face in public.

Media conferences need to be used judiciously, as there are also dangers, especially if inadequately prepared and facing a hostile pack. They require careful preparation and management, especially if different stakeholders will be present. Prepare:

- the key messages to be communicated (see Annex F)
- the spokesperson(s) (identify one, if not already identified)
- a media kit for all reporters and other community leaders that includes:
  - a concise press release with all the essential information
  - supplementary background information (e.g., on the benefits of immunization)
  - 'Questions and Answers' that includes questions that have been or are likely to be asked by the public.

At the end of the press conference, advise on the time and location for further conferences. Regular contact with the media about the progress of the investigation, and at the end on the conclusion of the investigation is advisable.

All the information to be conveyed in a media conference should be prepared in advance and included in a **press statement**.

Box 5

The press statement needs to include:

- a complete account of events (in terms that will be understood by people not familiar with health services or immunization) framed in their appropriate context (e.g., an isolated event, a coincidental event) so that it limits the concern about the event from spreading to the immunization programme, in general
- whether the event is ongoing or not – depending on the event, it may be possible to state the chances of new cases occurring
- an outline of actions taken or planned (depending on the stage, this will range from a **plan of action** to a completed **investigation**)
- the cause of the event (when identified with reasonable certainty)
- the corrective action that has been, or will be, taken.

5. EVALUATING THE SURVEILLANCE OF AEFI DURING THE CAMPAIGN

The AEFI surveillance system should be evaluated at the end of the campaign to determine its effectiveness. The criteria for this evaluation should include:

- **timeliness, completeness and accuracy of AEFI reporting** (monitor information from reports and from supervisory visits)
- **timeliness and completeness of investigation** (check reports to ensure that those meeting the investigation criteria were investigated; that investigation was begun within the defined time criteria (e.g., 24 hours after report receipt); confirm the adequacy of the investigation and the soundness of the conclusion reached, and corrective action recommended)
- **audit of corrective action** (review by regional/national staff to check that corrective action recommended has been taken, and adequacy of change in practice to prevent further programme error).

In a newly introduced surveillance system, if no AEFI cases are reported (e.g., in a particular district), efforts should be made through interviews with supervisory staff to identify possible obstacles to reporting. Such obstacles may include poor training and knowledge of reportable events and methods of notification, lack of reporting forms, lack of motivation, and staff anxiety about implications of programmatic errors.

The AEFI data should be analysed and included in the campaign report. **Make the report available to health staff to encourage them and provide feedback for future campaigns.**

The report should include:

- the total number of AEFI reports (including zero reporting) received during the campaign and within a specified interval (e.g., four weeks) after the campaign; these numbers may need to be updated at a later date to account for reporting delays
- number of AEFI reports, categorized by type of adverse event
- rate of each adverse event by (overall and by lot number) nationally and by region
- unusual or unusually severe events or large clusters
- summary of investigations conducted and conclusions (e.g., number concluded as programme error, coincidental events etc.)

References

1. WHO (1993). Surveillance of adverse events following immunization – Field guide for managers of immunization programmes. WHO/EPI/TRAM/93.02 REV.1. (Also available at http://www.who.int/vaccines-surveillance/ISPP/CDRom/english/p3aefiseng.htm)
2. WHO (2000). Supplementary information on vaccine safety. Part 1: Field issues. WHO/V&B/00.24. (Also available at http://www.who.int/vaccines-surveillance/ISPP/CDRom/english/p3aefiseng.htm)
3. WHO (2000). Supplementary information on vaccine safety. Part 2: Background rates of adverse events following immunization. WHO/V&B/00.36. (Also available at http://www.who.int/vaccines-surveillance/ISPP/CDRom/english/p3aefiseng.htm)
4. WHO Regional Office of the Western Pacific (1999). Immunization safety surveillance – Guidelines for managers of immunization programmes on reporting and investigating adverse events following immunization. WPRO/EPI/99.01.

ANNEX A: AEFI CASE DEFINITIONS AND TREATMENTS

Adverse event	Case definition	Treatment
Anaphylactic reaction (Acute hypersensitivity reaction)	Exaggerated acute allergic reaction, occurring within 2 hours after immunization, characterised by one or more of the following: • wheezing and shortness of breath due to bronchospasm • laryngospasm/laryngeal oedema • one or more skin manifestations, e.g. hives, facial oedema, or generalised oedema. **Less severe allergic reactions do not need to be reported.**	Self-limiting; anti-histamines may be helpful.
Anaphylaxis	Severe immediate (within 1 hour) allergic reaction leading to circulatory failure with or without bronchospasm and/or laryngospasm/laryngeal oedema (See Annex B).	Adrenaline injection (See Annex B)
Encephalopathy	Acute onset of major illness characterised by any two of the following three conditions: • seizures • severe alteration in level of consciousness lasting for one day or more • distinct change in behaviour lasting one day or more. Needs to occur within 48 hours of DTP vaccine or from 7 to 12 days after measles or MMR vaccine, to be related to immunization.	No specific treatment available; supportive care.
Fever	The fever can be classified (based on rectal temperature) as mild (38 to 38.9°C), high (39 to 40.4°C) and extreme (40.5°C or higher). Fever on its own does not need to be reported.	Symptomatic; paracetamol.
Injection site abscess	Fluctuant or draining fluid-filled lesion at the site of injection. **Bacterial** if evidence of infection (e.g., purulent, inflammatory signs, fever, culture), **sterile** abscess if not.	Incise and drain; antibiotics if bacterial.
Seizures	Occurrence of generalised convulsions that are not accompanied by focal neurological signs or symptoms. **Febrile seizures**: if temperature elevated >38°C (rectal) **Afebrile seizures**: if temperature normal	Self-limiting; supportive care; paracetamol and cooling if febrile; rarely anticonvulsants.
Sepsis	Acute onset of severe generalised illness due to bacterial infection and confirmed (if possible) by positive blood culture. Needs to be reported as possible indicator of programme error.	Critical to recognise and treat early. Urgent transfer to hospital for parenteral antibiotics and fluids.
Severe local reaction	Redness and/or swelling centred at the site of injection and one or more of the following: • swelling beyond the nearest joint • pain, redness, and swelling of more than 3 days duration • requires hospitalisation. **Local reactions of lesser intensity occur commonly and are trivial and do not need to be reported.**	Settles spontaneously within a few days to a week. Symptomatic treatment with analgesics. Antibiotics are inappropriate.
Thrombocytopaenia	Serum platelet count of less than 50,000/ml leading to bruising and/or bleeding	Usually mild and self-limiting; occasionally may need steroids or platelet transfusion.
Toxic shock syndrome (TSS)	Abrupt onset of fever, vomiting and watery diarrhoea within a few hours of immunization. Often leading to death within 24 to 48 hours. Needs to be reported as possible indicator of programme error.	Critical to recognise and treat early. Urgent transfer to hospital for parenteral antibiotics and fluids.

ANNEX B: SAMPLE AEFI REPORT FORM

Demographic details

Family name:	**First name:**	**Date of birth (dd/mm/yy):** / /	**Unique ID:**
Address:		**Sex:** Male/Female	**Ethnicity:**
District:		**Province:**	
Health facility:		**Reporter (health worker):**	

Vaccine(s) given*	Route	Site	Lot number**	Manufacturer**	Expiry date**

**name and dose number e.g., measles1, DPT-2, OPV-2*
*** include information for diluent if a reconstituted vaccine*

Date immunized	Date AEFI started	Onset interval	Date of report

Tick box(es) and describe event:	**Past medical history (including history of similar reaction or other allergies) and any other relevant information(e.g., other cases):**
❑ Severe local reaction: >3 days❑, beyond nearest joint❑, or hospitalised❑ ❑ Abscess: sterile❑ or bacterial❑ ❑ Sepsis ❑ Toxic shock syndrome ❑ Anaphylactic (acute hypersensitivity) reaction ❑ Anaphylaxis ❑ Seizures, including febrile seizures ❑ Encephalopathy ❑ Thrombocytopenia ❑ Other AEFI (state):	
Recovered: Yes / No / ? **Hospitalised:** Yes / No / ? **Died:** Yes / No / ?	

Province (or District) Level Office to complete:

Date report received: (dd/mm/yy) / /	**Checked by:**
Investigation needed: Yes / No / ?	**If yes, date investigation started:** (dd/mm/yy) / /
Investigator:	**AEFI investigation ID:**
Causality assessment:	**Certainty:**

ANNEX C: RECOGNITION AND TREATMENT OF ANAPHYLAXIS

Anaphylaxis is a very rare (estimated as once every million doses of vaccine given) but severe and potentially fatal allergic reaction. **When anaphylaxis does occur, the patient must be diagnosed properly, treated and managed urgently by trained staff and transferred to a hospital setting.**

There is a high risk that health workers who lack training will misdiagnose faints (vasovagal syncope) and dizziness following immunization for the onset on anaphylaxis. Most episodes of feeling ill or faint, or actual fainting that occur immediately after immunization, are ***not*** due to the onset of anaphylaxis. The administration of adrenaline in faints is not only contraindicated, it is very dangerous.

Programme managers must take these aspects into consideration before deciding at which level of the health system treatment for anaphylaxis will be provided during the campaign. Once a decision is made, the appropriate staff should receive training and equipment for the management of anaphylaxis. Vaccinators should be able to distinguish anaphylaxis from fainting, anxiety and breath-holding spells, which are common benign reactions.

During **fainting**, the individual suddenly becomes pale, loses consciousness and collapses to the ground (unless supported). Fainting is sometimes accompanied by brief clonic seizure activity (i.e., rhythmic jerking of the limbs), but this requires no specific treatment or investigation. Fainting is relatively common after immunization of adults and adolescents, but very rare in young children. It is managed by simply placing the patient in a recumbent position. Recovery of consciousness occurs within a minute or two, but patients may take some more time to recover fully.

An **anxiety spell** can lead to a pale, fearful appearance and symptoms of hyperventilation (light-headed, dizziness, tingling in the hands and around the mouth). **Breath holding** occurs in young children and will lead to facial flushing and cyanosis. It can end in unconsciousness, during which breathing resumes.

Recognition of anaphylaxis

Anaphylaxis is a severe reaction of rapid onset (usually 5-30 minutes after the injection) characterized by circulatory collapse. The early signs of anaphylaxis are generalized erythema and urticaria with upper and/or lower respiratory tract obstruction. In more severe cases, limpness, pallor, loss of consciousness and hypotension become evident in addition. Vaccinators should be able to recognize the signs and symptoms of anaphylaxis in the box below. In general, the more severe the reaction, the more rapid the onset. Most life-threatening reactions begin within 10 minutes of immunization. **Keep the recipient under observation for at least 20 minutes after the injection.**

Unconsciousness is rarely the sole manifestation of anaphylaxis - it only occurs as a late event

in severe cases. A strong central pulse (e.g. carotid) is maintained during a faint, but not in anaphylaxis. Anaphylaxis usually involves multiple body systems. However, symptoms limited to only one body system (e.g., skin itching) can occur, leading to delay in diagnosis. Occasional reports have described reactions where symptoms recur 8 to 12 hours after onset of the original attack and prolonged attacks lasting up to 48 hours.

Clinical Progression	Signs and symptoms of anaphylaxis
Mild, early warning signs	Itching of the skin, rash and swelling around injection site. Dizziness, general feeling of warmth
	Painless swelling in part of the body e.g., face or mouth. Flushed, itching skin, nasal congestion, sneezing, tears.
	Hoarseness, nausea, vomiting
	Swelling in the throat, difficulty breathing, abdominal pain
Late, life-threatening symptoms	Wheezing, noisy, difficulty breathing, collapse, low blood pressure, irregular weak pulse

Treatment of anaphylaxis

Once the diagnosis is made, **consider the patient as being in a potentially fatal condition, regardless of the severity of the current symptoms.** Begin treatment immediately and, at the same time, make plans to transfer the patient swiftly to hospital (if not already in a hospital setting). Adrenaline (epinephrine) stimulates the heart and reverses the spasm in the lung passages, and reduces oedema and urticaria, thus countering the anaphylaxis. But this very potent agent can cause irregular heartbeat, heart failure, severe hypertension, and tissue necrosis if used in inappropriate doses.

Each vaccinator who is trained in the treatment of anaphylaxis should have rapid access to an emergency kit with adrenaline, and be familiar with its dosage and administration. The expiry date of the adrenaline should be written on the outside of the emergency kit and the whole kit should be checked three or four times a year. Adrenaline that has a brown tinge must be discarded.

Steps in initial management

- If already unconscious, place the patient in the recovery position and ensure the airway is clear.
- Assess heart rate and respiratory rate (if the patient has a strong carotid pulse, he/she is probably not suffering from anaphylaxis).
- If appropriate, begin cardiopulmonary resuscitation.
- *Give 1:1000 adrenaline* (see below for correct dose for age or weight) *by deep intramuscular injection* into the opposite limb to that in which the vaccine was given. (Subcutaneous administration is acceptable in mild cases).

- **And** *give an additional half dose around the injection site* (to delay antigen absorption).
- *If the patient is conscious after the adrenaline is given, place his/her head lower than the feet and keep the patient warm.*
- Give *oxygen* by face mask, if available.
- Call for professional assistance but never leave the patient alone. Call an ambulance (or arrange other means of transport) and a medical practitioner if necessary, ***after*** the first injection of adrenaline, or sooner if there are sufficient people available to help you.
- If there is no improvement in the patient's condition within 10-20 minutes, of the first injection, *repeat* the dose of adrenaline up to a maximum of three doses in total. Recovery from anaphylactic shock is usually rapid after adrenaline.
- Record, or get someone to record, vital signs (pulse rate, respiratory rate and blood pressure), as well as time and exact dose of any medication given. Make sure the details accompany the patient when he is transferred. Mark the immunization card clearly so the individual **never** gets a repeat dose of the offending vaccine. At a suitable moment, explain to parents or relatives the importance of avoiding the vaccine in the future.
- Report the occurrence of anaphylaxis to the appropriate officer in the ministry of health by fax or phone when the clinical situation is dealt with.

Adrenaline dosage: 1:1000 adrenaline (epinephrine) at a dose of 0.01ml/kg up to a maximum of 0.5 ml injected intramuscularly (or subcutaneously in very mild cases)

If the weight of the patient is unknown, an approximate guide is:

Less than 2 years	0.0625 ml ($1/16^{th}$ of a ml)
2-5 years	0.125 ml ($1/8^{th}$ of a ml)
6-11 years	0.25 ml (1/4 of a ml)
11+ years	0.5 ml (1/2 of a ml)

ANNEX D: SAMPLE AEFI INVESTIGATION FORM

Complete this summary page at the end of the investigation; file with field report and AEFI report forms

Investigation ID:	**AEFI report ID:**	**Date investigation started:** / /

Describe trigger event:

Diagnosis/ case definition of event:

Community investigation: Yes/No/? If yes, number of cases immunized with suspect vaccine in specified time window*, and number not immunized:

immunized:_____ not immunized:____

Clinic investigation carried out: Yes/No/? If yes, key finding(s):

Laboratory investigation(s) : Yes/No/? If yes, key result(s):

Assessment

Conclusion about cause of AEFI: tick categories and rank if more than one cause.

Tick categories and rank if more than one cause.

❑ **Programme error**	❑ **Vaccine reaction**	❑ **Coincidental**	❑ **Unknown**
❑ Non-sterile injection	❑ Vaccine lot problem	❑ Similar event in unimmunized	
❑ Vaccine prepared incorrectly	❑ Known vaccine reaction at expected rate	❑ Other:	
❑ Improper administration technique/site	❑ Other:		
❑ Improper vaccine transportation/ storage			
❑ Other:			

Confidence about conclusion on main cause of AEFI: ❑certain ❑probable ❑possible

Reason(s) for conclusion:

Corrective action taken: Yes/No/? If yes, specify

Further actions recommended: Yes/No/? If yes, specify

Investigator: Signature: Date: / /

* This will usually correspond to the time since onset of the campaign, or the full duration of the immunization campaign. For the investigation of AEFI occurring in routine immunization programmes, an appropriate time window will have to be specified.

ANNEX E: SAMPLE AEFI LINE LISTING

A line listing form may be used at province level to identify trends and clusters of AEFI and as a means of sending AEFI data to regional/national level.

Name/ID	District	Date of birth (dd/mm/yy)	Date of immunisation (dd/mm/yy)	Reaction type (code)	Outcome (**R**ecovered/**D**ied/**?**)	Suspect vaccine (name and dose, eg DPT-2)	Batch number	Onset time (**h**ours, **d**ays, **w**eeks)	Date of report (dd/mm/yy)	Investigated? (If yes, date)	Cause (code)	Confidence (code)

Establishing codes for area, reaction type, cause of AEFI, and certainty of cause will facilitate recording, data entry and analysis. Because of the potential for coding errors, the code should be double-checked.

An example of coding for cause of AEFI is shown here:

1. Programme error
A) Non-sterile injection
B) Vaccine prepared incorrectly
C) Improper administration technique/site
D) Improper vaccine transportation/ storage
E) Other:

2. Vaccine reaction
A) Vaccine manufacturer error
B) Known vaccine reaction at expected rate
C) Other:

3. Coincidental
A) Similar event in unimmunized
B) Other:

4. Unknown

Thus: Code '1A' would be for programme error [non-sterile injection]
Code '2B' would be vaccine reaction [known vaccine reaction at expected rate], etc.

Coding for confidence could be: certain = 1 probable = 2 possible = 3.

ANNEX F: COMMUNICATING WITH THE MEDIA

The guiding principle with dealing with the media must be one of honesty and building up trust. The effectiveness of communication is largely determined by whether the audiences perceive the source of the message to be trustworthy and believable. Trust and credibility are difficult to achieve; if lost, they are even more difficult to regain. Public assessment of how much we can be trusted and believed is based upon four factors:

- empathy and caring
- competence and expertise
- honesty and openness
- dedication and commitment.

It is vital to **prepare** before any media contact with:

- key messages
- answers for the likely and awkward questions
- identifying which issues not to respond to (e.g., blaming an individual or speculating on the cause before the investigation is complete).

Messages need to be as simple as possible. Use simple words and short sentences. It is helpful to tell a story, when possible - create a 'word picture' to get the message across. The **key messages** should be kept to a minimum and are likely to include some of these facts:

- that the benefit of immunization in preventing disease is well proven
- it is very risky not to immunize (risk of disease and complications)
- vaccine-preventable diseases caused millions of death and/or disability before the introduction of vaccines, and that situation would return without continued use of vaccines
- vaccines do cause reactions, but these are rarely serious and most common reactions do not cause long term problems (use Table 2 to outline the known risks of the measles vaccine
- immunization safety is of paramount importance, and any suspicion of a problem is investigated (advantage of well established immunization safety surveillance)
- the AEFI is currently being investigated and the immunization programme must continue to keep the population safe from disease
- action is being taken.

It is essential to present information to the media in a way that will generate a sense of credibility and confidence by being:

- **honest -** never lie; if you do not know, say so, but promise to find out (e.g. "We don't know at this time, but we have taken steps to answer that question") a lie or cover-up can become a bigger news story than the initial event
- **caring** - create a strong, compassionate, competent image for yourself and the immunization programme
- **clear -** avoid jargon; use simple phrases and give examples to clarify meaning
- **serious** – jokes can disastrous and the subject is rarely amusing anyway

- **aware** of body language - it is of critical importance in perceptions
- **responsible** - don't be defensive (e.g. "We will see if there is any truth in the report."), but accept responsibility appropriate to your position and avoid blaming someone else
- **responsive** - hold a daily press conference if that is what is needed to meet the needs of the public and media; regular contact helps build a trusting relationship with the media.
- **positive** - reframe the situation in positive terms; use terms such as *vaccine safety* (which has a positive connotation) rather than *adverse event*

When facing a hostile interviewer, prepare these techniques:

- **block** - respond to a negative question with a positive answer (e.g., when asked, "How many children have died from immunization?", answer: "Immunization saves lives. Since our immunization programme began X children have been immunized, and of them Y% might have died from one of these diseases. That is the context in which we must consider the tragic, but thankfully rare adverse events which follow immunization.")
- **bridge** - having answered a difficult question, move quickly to something linked but positive (see example below)
- **correct what is wrong** - immediately correct information from the interviewer that is wrong. Be assertive, not aggressive and state the facts simply, factually and in a friendly way
- **stay cool** - no matter how bad it gets, don't get angry or defensive; stay friendly, polite and warm
- **be assertive** - means stating what you want to say in a clear way without getting aggressive; take time to think about the response and don't be rushed or forced

Example of bridge technique

Question: Does vaccination cause abscesses?

Answer: (Face the element of truth) We know that vaccination can rarely cause abscesses. (here comes the first bridge….) That is why we train staff to avoid them by using a sterile needle and syringe for every child. (Now comes the second bridge) When this policy is combined with purchasing only the highest quality vaccines approved by WHO and UNICEF, we are able to assure parents that we have one of the safest vaccine programmes in the world.