GUIDELINES FOR SURVEILLANCE ON ADVERSE EVENTS FOLLOWING IMMUNIZATION IN GHANA

SECOND EDITION
December 2023

Second Edition
December 2023

Table of Contents

Acknowledgement

This document, Surveillance of Adverse Events Following Immunization (AEFI) in Ghana, is the result of collaborative work between staff of the Food and Drugs Authority (FDA) and the Expanded Programme on Immunization (EPI) of the Ghana Health Service (GHS) who are committed to improving safety of immunization services throughout the country.

Staff of the FDA and EPI who contributed to drafting the chapters in the guidelines are:

- Dr. Naziru Tanko Mohammed (EPI)
- Mr. George Sabblah (FDA)
- Ms. Abena Asamoa-Amoakohene (FDA)
- Mrs. Adela Ashie (FDA)
- Mr. Jeremiah Ewudzie-Sampson (FDA)
- Ms. Irene Koramah Frempong (FDA)

The list of individuals who reviewed and commented on the draft guidelines are.

- Dr. Kwame Amponsa-Achiano (Programme Manager, EPI)
- Mrs. Delese Mimi Darko (Chief Executive Officer, FDA)
- Dr. Patrick Kuma-Aboagye (Director-General, Ghana Health Service)
- Dr. Franklin Asiedu-Bekoe (Director, Public Health, Ghana Health Service)
- Mr. Seth Kwaku Seaneke (Deputy Chief Executive, Health Products and Technologies Division, FDA)
- Dr. Edwin Nkansah (Director, Vigilance, Vaccines and Clinical Trials Directorate)

The contributions from AEFI Focal Persons (from GHS and FDA) at regional and district levels are acknowledged.

The US Centres for Disease Control and Prevention and the World Health Organization (WHO) provided funding and technical supports respectively for development and printing the guideline.

Foreword

Ghana`s Expanded Programme on Immunization in collaboration with the Food and Drugs Authority, the authorized regulatory agency established to ensure adequate and effective standards for all medicines and biological products including vaccines (both of the Ministry of Health) have successfully established a national system for post-marketing surveillance of vaccines used in routine immunization or campaigns.

Vaccines used in national immunization programmes are safe and effective because rigorous procedures are followed before registration and sale but there is no such thing as a “perfect” vaccine which has no adverse events. Vaccination Programmes are usually complex in nature and in spite of all precautions taken, some people may be affected by adverse events following immunization (AEFI) caused by vaccine product(s) and or composition or by an error in its administration or in most cases, such events may not be related to vaccines or vaccination.

Although careful testing and clinical trials are done before vaccines are approved, safety data are based on relatively small numbers and restricted populations studied. Therefore, it is critical for national immunization programmes to have in place a strong post-marketing surveillance system to detect less common adverse events not recognized in pre-registration trials and also to check on ongoing safety of the programme itself in order to assure continued public safety.

The development of the Guidelines for Surveillance of Adverse Events Following Immunization in Ghana is a collaborative effort between the EPI and the FDA. It is intended to consolidate efforts by the Ministry of Health and the Government of Ghana in providing safe vaccination as well as enable the health system to effectively respond to vaccine safety challenges through clearly assigned roles and responsibilities of health staff. The Guidelines also provides the tools for both public health and clinical staff at all levels to enable them respond appropriately to adverse events in a timely manner as well as help prevent immunization-error related AEFIs.

This document is expected to further strengthen the AEFI surveillance and response system in the country and help build public confidence in the national immunization programme since an immunization programme can only perform better if it has the full confidence of the general public.

(Minister of Health, Hon. Kwaku Agyemang-Manu)

Acronyms and Abbreviations

AEFI	Adverse Events Following Immunization
BCG	Bacille Calmette Guerin vaccine
DCD	Disease Control Department
DFP	District Focal Person
DPT Hep B Hib	Diphtheria- Pertussis-Tetanus Hepatitis B Haemophilis influenza type b vaccine
DHIMS 2	District Health Information Management System 2
EPI	Expanded Programme on Immunization
FDA	Food and Drugs Authority
GHS	Ghana Health Service
Hep B	Hepatitis B vaccine
Hib	Haemophilus Influenza type B vaccine
NGO(s)	Non-Governmental Organization(s)
OPV	Oral Polio vaccine
PCV	Pneumococcal Conjugate vaccine
Rota	Rotavirus vaccine
SMD	Safety Monitoring Department
TAC-VBP	Technical Advisory Committee on Safety of Vaccines and Biological Products
UNICEF	United Nations Children's Education Fund
WHO	World Health Organization
YF	Yellow Fever vaccine

Glossary

Active Surveillance: The type of surveillance system that monitors events reported by health care providers and clients e.g., vaccinees, which actively seeks out and collects data or measure outcomes using protocols.

Adverse event following immunization (AEFI): An Adverse Event Following Immunization is any untoward medical occurrence which follows immunization and which does not necessarily have a causal relationship with the usage of the vaccine. The adverse event may be any unfavourable or unintended sign, abnormal laboratory finding, symptom or disease.

Cluster: Two or more cases of the same adverse events following immunization related in time, place, or the vaccine administered.

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

Immunization anxiety-related reaction: An AEFI arising from anxiety about the immunization. E.g.: Vasovagal syncope or fainting in an adolescent during/following vaccination.

Immunization error-related reaction: An AEFI that is caused by inappropriate vaccine handling, prescribing or administration and thus by its nature is preventable. E.g., transmission of infection by contaminated multi-dose vial.

Immunization: The process by which a person or animal becomes protected against a disease. This term is often used interchangeably with vaccination or inoculation.

Non-serious AEFI: Includes minor and moderate temporary adverse events following immunization that are not classified as serious.

Passive Surveillance: The type of surveillance system that monitors events reported by health care providers and clients e.g., vaccinees and do not actively seek out and collect data or measure outcomes using study protocols.

Pharmacovigilance: The science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug-related problems.

Primary reporter: Person who first reports an AEFI to the surveillance or health system.

Serious AEFI: Any unpleasant medical occurrence after immunization that results in death, is life-threatening, requires in-patient hospitalization or prolongation of existing hospitalization, results in persistent or significant disability/ incapacity, or is a congenital anomaly/birth defect. Any medical event that requires intervention to prevent one of the outcomes above may also be considered as serious.

Severe event: Severe is used to describe the intensity of a specific event (as in mild, moderate or severe); the event itself, however, may be of relatively minor medical significance (e.g., Fever is a common relatively minor medical event, but according to its severity it can be graded as mild fever or moderate fever).

Trigger event: A medical incident that stimulates a response, usually a case investigation.

Vaccination: Introduction of a killed or weakened infectious organism or its product into the body in order to prevent diseases.

Vaccine pharmacovigilance: The science and activities relating to the detection, assessment, understanding and communication of adverse events following immunization and other vaccine- or immunization-related issues, and to the prevention of untoward effects of the vaccine or immunization.

Vaccine product-related reaction: An AEFI that is caused or precipitated by a vaccine due to one or more of the inherent properties of the vaccine product. E.g.: Extensive limb swelling following DTP vaccination.

Vaccine quality defect-related reaction: An AEFI that is caused or precipitated by a vaccine that is due to one or more quality defects of the vaccine product including its administration device as provided by the manufacturer. E.g.: Failure by the manufacturer to completely inactivate a lot of inactivated polio vaccine leads to cases of paralytic polio.

V*accinee (Vaccine Recipient):* A person receiving a vaccine.

Chapter 1: Introduction

The objective of the Expanded Programme on Immunization (EPI) in Ghana is to protect all persons especially children and pregnant women living in Ghana against vaccine preventable diseases. At the moment, the Programme vaccinates against 13 childhood vaccine-preventable diseases in its routine immunization schedules. These diseases include are tuberculosis, poliomyelitis, diphtheria, neonatal tetanus, whooping cough, hepatitis B, Haemophilus influenza type B infections, measles, yellow fever, rotavirus diarrhoea, pneumococcal diseases, Rubella and Neisseria meningitidis. Additionally, the programme routinely offers tetanus toxoid (TT) for pregnant women and also conducts mass immunization preventive or reactive campaigns against specific diseases like meningitis, yellow fever and pandemic influenza. Table 1 shows the schedule for immunization and Vitamin A Supplementation in children.

Table 1: National Immunization and Vitamin A Supplementation Schedule

AGE	VACCINES	DOSES	ROUTE AND SITE OF INJECTION
At birth	BCG	0.05ml	Intra-dermal, right upper arm
	OPV0	2 drops	Oral
6 weeks	DPT -HepB -Hib1	0.5ml	Intra-muscular, lateral aspect of left thigh
	OPV1	2drops	Oral
	Pneumo 1	0.5 ml	Intra-muscular, lateral aspect of right thigh
	Rota 1	1.5 ml vial	Oral
10 weeks	DPT -HepB -Hib2	0.5ml	Intra-muscular, lateral aspect of left thigh
	OPV2	2drops	Oral
	Pneumo 2	0.5 ml	Intra-muscular, lateral aspect of right thigh
	Rota 2	1.5 ml vial	Oral
14 weeks	DPT -HepB -Hib3	0.5ml	Intra-muscular, lateral aspect of left thigh
	OPV3	2drops	Oral
	Pneumo 3	0.5 ml	Intra-muscular, lateral aspect of right thigh
	Rota 3	1.5 ml vial	Oral
	IPV	0.5 ml	Intra-muscular, lateral aspect of right thigh
6 months	Vitamin A	100,000 IU	Oral
	RTS,S 1	0.5 ml	Intra-muscular, lateral aspect of left thigh
7 months	RTS,S 2	0.5 ml	Intra-muscular, lateral aspect of left thigh
9 months	Measles-Rubella 1	0.5 ml	Subcutaneous, left upper arm
	Yellow Fever	0.5 ml	Subcutaneous, right upper arm
	RTS,S 3	0.5 ml	Intra-muscular, lateral aspect of left thigh
12 months	Vitamin A	200,000 IU	Oral
18 months	Measles-Rubella 2	0.5 ml	Subcutaneous, left upper arm
	Men A	0.5 ml	Intramuscular, right upper arm
	RTS,S 4	0.5 ml	Intra-muscular, lateral aspect of left thigh
	Vitamin A	200,000 IU	Oral
After 18 months, Vitamin A is given every 6 months till child is 5 years old			
18 months – Give Long lasting Insecticide Treated Nets (LLINs) to the child			

Although all vaccines used in the immunization programme are safe, no vaccine is entirely without risk. Some people experience events after immunization ranging from mild adverse events to life- threatening and even death. In some cases, these events are caused by the vaccine; in others, they are caused by an error in the administration of the vaccine; and in the majority of cases, there is no relationship.

An increase in vaccine use (e.g., mass immunization campaigns) will lead to more vaccine reactions as well

as more coincidental events. Immunization-error related events (previously known as “programme errors”) may also increase. Reporting and investigating Adverse Events Following Immunization (AEFI) can be used to identify and correct immunization-error related reactions and may help to distinguish a coincidental event from a vaccine-related AEFI.

An Adverse Event Following Immunization (AEFI) is any untoward medical occurrence which follows immunization and which does not necessarily have a causal relationship with the usage of the vaccine. The adverse event may be any unfavorable or unintended sign, abnormal laboratory finding, symptom or disease. Reported adverse events can either be a result of the vaccine or immunization process, or coincidental events that are not due to the vaccine or immunization process but are temporally associated with immunization.

Surveillance of AEFIs is an effective means of monitoring immunization safety. While contributing to the credibility of the immunization programme, it allows for proper management of AEFIs and avoids inappropriate responses to reports of AEFIs that can create a sense of crisis in the absence of safety surveillance.

In Ghana, the AEFI surveillance system is a collaborative effort between the Expanded Programme on Immunization and the Food and Drugs Authority. This system has worked efficiently in ensuring vaccine safety in the country. As several new vaccines become available and get introduced into the routine immunization programme, pharmacovigilance of these vaccines is imperative for a number of reasons:

- Vaccines as opposed to medicines are for prevention in healthy, larger population. Therefore, there is lower tolerance to risk
- Vaccines are biological products, therefore are more prone to lot/batch variation and instability. Cold chain is often critical in immunization
- For vaccines unlike medicines, there are relatively limited number of products. With single dose, there is a greater potential for temporal “coincidence” adverse events. Vaccines are prone to “programme error” (techniques, skills, appropriate logistics etc. often required)
- Vaccines are mostly injectables and are more likely to have injection “reaction”. Vaccines are commonly administered in mass campaigns: many doses in short time in defined population, therefore, more prone to many “reactions” in a short time
- Vaccines are associated with politics of access/safety

Most importantly, some vaccines are developed for the prevention of diseases specific to sub- Sahara Africa (e.g. Meningococcal A meningitis and malaria). Monitoring is crucial in identifying new safety issues that were not identified during clinical studies.

Vaccine pharmacovigilance therefore, requires better collaboration between Public Health departments, National Immunization Programmes, National Regulatory Authorities, manufacturers and other stakeholders.

Chapter 2: Purpose, goal, and objectives of the guideline

The purpose of this guideline is to make readily available comprehensive, simple, and standardized information for health workers and other stakeholders on surveillance of Adverse Events Following Immunization in Ghana. The overall goal is ensuring public safety and assuring confidence in the immunization programme.

The objectives of the guidelines are to;

1. Safeguard an effective system for AEFI surveillance
2. Provides standard for detection, management, and treatment of AEFIs
3. Provide standards for effective communication with the public, including crises communication and measures to combat rumors that jeopardize vaccination activities
4. Standardize investigations into AEFIs
5. Provide clear roles and responsibilities for the key stakeholders and players in the AEFI surveillance system

Chapter 3: Basic concepts of vaccines and adverse events following immunization

3.1 Vaccines

A vaccine is a suspension of live-attenuated or inactivated (killed) pathogens, genetic material, or fractions/ subunits thereof (i.e., purified protein subunits, polysaccharides, or split virions) which can be administered by various routes (IM, SC, ID, Oral, Nasal, etc.) to induce specific long-term immunity (i.e., protection) and prevent disease caused by a specific pathogen against which it has been developed. These pathogens can be viruses, bacteria, fungi, or parasites.

3.1.1 Primary components of vaccines

Vaccines can be classified as either monovalent or multivalent (polyvalent). A monovalent vaccine contains a single strain of a single antigen/immunogen (e.g., BCG vaccine), whereas a polyvalent vaccine contains two or more strains/serotypes of the same antigen/immunogen (e.g., t OPV and IPV each of which contain three polio virus types).

Combination (or combined) vaccines contain two or more different antigens (e.g., DTwP, DTPa-HepB-Hib). Combination vaccines offers several advantages which may include reduction in the cost, and difficulty of shipping, storing and administering multiple vaccines. The avoidance of multiple injections, reducing the cost of extra health-care visits, improving timeliness of vaccination, and facilitating the addition of new vaccines into immunization programmes are more benefits that Combined vaccines offer.

3.1.2 Vaccine constituents

a. Active material(s)

Antigens are molecules that react with specific receptors on T and B cells and activate these cells to induce antigen-specific T and B immune responses.

b. Inactive materials

- **Adjuvants** (eg. aluminium salts, mono-phosphoryl lipid A or MPL, etc,) enhance immune responses of vaccine antigens
- **Preservatives** (eg. phenoxyethanol, formaldehyde, thiomersal / thimerosal, or antibiotics) prevent bacterial growth especially in multi-dose vaccines
- **Stabilizers** (proteins or other organic compounds) extend the shelf-life of the vaccine
- **Salts and acidic solutions** (eg. sodium hydroxide, sodium chloride, sodium borate and acetic acid) helps maintain pH
- **Solvents** such as calcium carbonate, xanthan gum and sterile water
- **Diluents** for reconstituting lyophilised or freeze-dried vaccines

3.1.3 Classification of vaccines

There are several different types of vaccines. These include Inactivated vaccines, Live-attenuated vaccines, Messenger RNA (mRNA) vaccines, subunit/ recombinant/ polysaccharide/ conjugate vaccines, Toxoid vaccines and Viral vector vaccines. Each type is designed to prime the immune system to fight off certain kinds of germs/ infectious agents and hence the serious diseases they cause. The characteristics of these vaccines differ, and the characteristics determine how the vaccine works.

a. Inactivated vaccines

Inactivated vaccines use the killed version of the germ that causes a disease. Inactivated vaccines usually don't provide immunity (protection) that's as strong as live vaccines. So you may need several doses over time (booster shots) in order to get ongoing immunity against the disease.

b. Live-attenuated vaccines

Live vaccines use a weakened (or attenuated) form of the germ that causes a disease. Because these vaccines are very similar to the natural infection that they help prevent, they create a strong and long-lasting immune response. Just a dose or 2 of most live vaccines can give you a lifetime of protection against a germ and the disease it causes.

c. Subunit, recombinant, polysaccharide, and conjugate vaccines

Subunit, recombinant, polysaccharide, and conjugate vaccines use specific pieces of the germ—like its protein, sugar, or capsid (a casing around the germ). Because these vaccines use only specific pieces of the germ, they give a very strong immune response that's targeted to key parts of the germ. They can also be used on almost everyone who needs them, including people with weakened immune systems and long-term health problems.

d. Toxoid vaccines

Toxoid vaccines use a toxin (harmful product) made by the germ that causes a disease. They create immunity to the parts of the germ that cause a disease instead of the germ itself. That means the immune response is targeted to the toxin instead of the whole germ.

e. Viral vector vaccines

Viral vector vaccines use a modified version of a different virus as a vector to deliver protection. Several different viruses have been used as vectors, including influenza, measles virus, and adenovirus, which causes the common cold. Adenovirus is one of the viral vectors used in some COVID-19 vaccines such Covishield/ AstraZeneca vaccine, COVID-19 vaccine Janssen, etc.

Table 2: Examples of different types of vaccines

S/No	Live Attenuated Vaccine (LAV)	Inactivated (Killed)	Subunits (Purified antigen)	Toxoid (Inactivated Toxins)	Viral Vector Vaccine	Messenger RNA vaccines
1	Tuberculosis (BCG)	Whole Cell Pertussis (wP)	Haemophilus influenza type b	Tetanus toxoid (TT)	Covishield/ AstraZeneca COVID-19 vaccine	Pfizer/ Comirnaty vaccine
2	Oral Polio Vaccine (OPV)	Inactivated Polio Vaccine	Hepatitis B (HepB)	Diphtheria Toxoid	COVID-19 Vaccine Janssen	Moderna vaccine
3	Rotavirus	Rabies	Pneumococcal (PCV-13)			
4	Measles-Rubella		Conjugate Meningococcal A (MenAfriVac)			
5	Yellow fever		Human Papilloma Virus (HPV)			

3.1.4 Contraindications and precautions to vaccination

Contraindications: A contraindication to vaccination is a rare condition in a recipient that increases the risk for a serious adverse reaction. Ignoring contraindications can lead to avoidable vaccine reaction risks. Most contraindications are temporary, and the vaccination can be administered later.

Precautions: These are events or conditions to be considered in determining if the benefits of the vaccine outweigh the risks. Precautions stated in product labelling can sometimes be inappropriately used as absolute contraindications, resulting in missed opportunities to vaccinate.

Note: Precautions are not contraindications.

The only contraindication applicable to all vaccines is a history of a severe allergic reaction after a prior dose of vaccine or to a vaccine component.

3.2 Adverse Events Following Immunization (AEFI)

An adverse event following immunization is any untoward medical occurrence (unfavourable or unintended sign, abnormal laboratory finding, symptom or disease) which follows immunization, and which does not necessarily have a causal relationship with the usage of the vaccine. Reported adverse events can either be true adverse events - i.e., resulting from the vaccine or immunization process - or coincidental events that are not due to the vaccine or immunization process but are temporally associated with immunization.

3.2.1 AEFI classification

All vaccines used in Ghana's EPI are approved, safe and effective but no vaccine is completely risk-free and adverse events will occasionally result after an immunization. There are two main AEFI classification systems namely cause-specific classification and regulatory classification.

3.2.2 Cause specific classification

Based on specific causes, AEFI is categorized into 5 broad areas in line with international literature (CIOMS/ WHO 2012) as follows:

- Vaccine product-related reaction
- Vaccine quality defect-related reaction
- Immunization (Programme) error-related reaction
- Immunization anxiety-related reaction
- Coincidental event

a. Vaccine product-related reaction

A vaccine reaction is an individual's response to the inherent properties of the vaccine, even when the vaccine has been prepared, handled and administered correctly. Examples of some common, minor vaccine reactions are given in Table 2 below:

Table 3: Common, minor vaccine reactions and treatment.

Vaccine	Local reactions	Systemic reactions	
	Pain, swelling, redness	Fever > 38^{0}C	Irritability, malaise and systemic symptoms
BCG	90% - 95%	-	-
Hepatitis B	Adults up to 15% Children up to 5%	1 - 6%	-
Hib	5 - 15%	2% - 10%	
Measles/MR/ MMR	-10%	5% - 15%	5% (Rash)
OPV	None	Less than 1%	Less than 1%
Pertussis (DTwP)	up to 50%	up to 50%	up to 55%
Pneumococcal conjugatee	20%	20%	20%
Tetanus/ DT/aTd	10%d	10%	25%

Treatment	Cold cloth at injection site Paracetamol	Give extra oral fluids Wear cool clothing Tepid sponge or bath Paracetamol	Give extra oral fluids

b. Vaccine quality defect-related reaction:

This is a due to a defect in a vaccine (or its administration device) that occurred during the manufacturing process. Such a defect may have an impact on an individual's response and thus increase the risk of adverse

vaccine reactions. Insufficient inactivation of wild-type vaccine agent (e.g., wild polio virus) during the manufacturing process or contamination introduced during the manufacturing process could cause the vaccine quality defect-related reactions.

From the five cause - specific of AEFIs, vaccine reactions comprise vaccine product- related reactions and vaccine quality defect-related reactions. This can be minor or severe. Severe reactions need urgent action and reporting.

Table 4: Selected childhood vaccines and associated severe reactions

Vaccine	Reaction	Onset interval	Frequency per doses given
BCG	Fatal dissemination of BCG infection	1-12 months	0.2-1.6/1,000,000
	BCG Osteitis	-	Very rare
OPV	VAPP	4-30 days	2-4/1,000,000
DTwP	Prolonged crying and seizures	0-24 hours	<1/100
	HHE	0-24 hours	<1/1,000-2/1,000
Hib	None known	-	-
	Febrile seizures	6-12 days	1/3,000
Measles	Thrombocytopenia	15-35 days	1/30,000
	Anaphylaxis (Hypersensitivity)	0-few hours	1/100,000
	Encephalitis	4-9 /Months	1/3,000,000
Rotavirus	None reported to WHO	-	-
PCV -13	None known yet	-	-
Yellow Fever	Anaphylaxis (Hypersensitivity)	0-few hours	Very rare
	Acute Neurotropic Disease (YEL-AND)	Up to 30 days	Very rare
	Acute Viscerotropic Disease (YEL - AVD)	Up to 10 days	1-40/100,000
Hep B	Anaphylaxis (Hypersensitivity)	0-few hours	Very rare

c. Immunization error-related reaction

Immunization errors (formerly referred to as programme errors) often constitute the greatest proportion of preventable AEFIs. They result from errors in vaccine preparation, handling, storage or administration. e.g., deaths associated with the reconstitution of vaccines with an incorrect diluent or a drug (e.g., insulin). They are preventable and can negate the benefits of the immunization programme.

Double vaccination especially during vaccination campaigns are regarded as immunization error- related and must be reported as such. The identification and correction of these incorrect immunization practices are of great importance.

Table 5: Examples of immunization-error related AEFIs

Immunization error	Possible AEFI
Non-sterile injection Reuse of disposable syringe or needle leading to contamination of the vial, especially in multi-dose vials. Improperly sterilized syringe or needle, Contaminated vaccine or diluent.	Local injection site reactions (e.g., abscess, swelling, cellulitis, induration), Sepsis, Toxic shock syndrome, Blood-borne transmission of disease, e.g., Hepatitis B, HIV, Death
Reconstitution error: Inadequate shaking of vaccine, Reconstitution with incorrect diluent, drug substituted for vaccine or diluent, Reuse of reconstituted vaccine at subsequent session.	Local abscess, Vaccine ineffective Effect of drug, e.g., insulin, oxytocin, muscle relaxants, Toxic shock syndrome, Death.
Injection at incorrrect site BCG given subcutaneously, DTP/DT/TT too superficial, Injection into buttocks.	Local reaction or abscess or other local reaction, Sciatic nerve damage.
Vaccine transported/stored incorrectly	Increased local reaction from frozen vaccine, Ineffective vaccine
Contraindication ignored	Avoidable severe reaction

d. Immunization Anxiety-related

Individuals can react in anticipation to and as a result of an injection of any kind. These reactions are not related to the vaccine, but to fear of the injection. There are four reactions which may be encountered: Fainting or syncope which is common and usually occur in older children above 5 years; vomiting and rarely, convulsion in younger children; and hyperventilation. Fainting does not require any management beyond placing the patient in a recumbent position. The likelihood of faints can be anticipated when immunizing older children e.g., mass vaccination in schools. Fainting can be reduced by minimizing stress in those awaiting injection, through short waiting times, comfortable room temperatures, preparation of vaccine out of recipient's view, and privacy during the procedure. Convulsion as a result of anxiety only needs reassurance after it has been aborted with an anticonvulsant e.g., diazepam.

e. Coincidental events

Coincidental events occur after a vaccination has been given but are not caused by the vaccine or its administration. Vaccinations are normally scheduled in infancy and early childhood when illnesses are common and congenital or early neurological conditions become apparent. Coincidental events are inevitable when vaccinating children in these age groups, especially during a mass campaign. Applying the normal

incidence of disease and death in these age groups along with the coverage and timing of immunizations allows estimation of the expected numbers of coincidental events after immunization.

3.2.3 Regulatory Classification

a. Serious AEFI

An AEFI is considered serious if it:

- Results in death, or
- Is life-threatening, or
- Requires in-patient hospitalization or prolongation of existing hospitalization, or
- Results in persistent or significant disability/incapacity, or
- Is a congenital anomaly/birth defect

ALL serious AEFI should be reported, investigated and the causality assessed.

It is important to note that the term “serious” is not synonymous with “severe”. A serious adverse event is a regulatory term defined above whereas a severe adverse event is a broader term used to describe the intensity of a specific event (as in mild, moderate or severe) which may include serious events which do not necessarily lead to long term problems.

b. Non-serious AEFI

An AEFI is considered non-serious if the event does not pose a potential risk to the health of the recipient. This includes mild and moderate temporary adverse events following immunization. Non- serious AEFI should also be carefully monitored because they may signal a potentially larger problem with the vaccine or vaccination or may have an impact on the acceptability of immunization in general.

3.3 Prevention and management of AEFI

Absolute contraindication to vaccines is very rare but is very important to check for them to avoid serious reactions. For example, a vaccine is contraindicated if there is a history of anaphylaxis to a given vaccine or its components in previous vaccinations.

Managing AEFIs is critical in the any immunization programme. Non-serious AEFIs should be managed at the local level. Any injection may result in local pain, redness and swelling of one or two days. A cold, wet cloth will help to relieve this (see Table 7). Sometimes, a small, hard lump may persist for some weeks or more. This is no cause for concern. If reactions are persistent or severe, the immediate supervisor should be informed for investigation.

NB: Application of herbs, chemicals, disinfectants, detergents and alcohol to the injection site, should be avoided as these may damage vaccines.

Trained clinicians should manage serious AEFIs. However, the first worker who sees the patient should give ‘first aid’ as needed. Table 7 shows some known AEFIs and their management or treatment.

According to the policy of the Ghana Health Service, treatment of all AEFIs in government facilities is free.

Table 6: Some known AEFIs, case definitions and treatment

Adverse event	Case definition	Treatment
Anaphylactoid reaction (acute hypersensitivity reaction)	Exaggerated acute allergic reaction, occurring within 2 hours after immunization, characterized by one or more of the following: wheezing and shortness of breath due to bronchospasm, Laryngospasm/laryngeal edema. One or more skin manifestations, e.g., hives, facial edema, or generalized edema.	Self-limiting; anti-histamines and steroids may be helpful but should be given by a trained person
Anaphylaxis	Severe immediate (within 1 hour) allergic reaction leading to circulatory failure with or without bronchospasm and/or laryngospasm/laryngeal edema	Adrenaline injection 1: 1000 formulation 0.01ml/kg; Up to 0.5ml to be given by a trained person
Arthralgia	Joint pain usually including the small peripheral joints. Persistent if lasting longer than 10 days, transient: if lasting up to 10 days.	Self -limiting; Paracetamol up to 15mg/kg every 4 hours
Diarrhea	3 or more loose or watery stools in 24 hours	Give extra fluids ORS
Fever	The fever can be classified (based on rectal temperature) as mild (38 to 38.90C), high (39 to 40.40C) and extreme (40.50C or higher). Fever on its own does not need to be reported except for new vaccines.	Tepid sponge or bath Paracetamol Up to 15mg/kg every 4 hours; Wear cool clothing
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.	(Refer to hospital). Incision and drainage; antibiotics if bacteria
Persistent inconsolable screaming	Inconsolable continuous crying lasting 3hours or longer accompanied by high-pitched screaming.	Settles within a day or so; paracetamol may help.
Seizures (Fits)	Occurrence of generalized convulsions that are not accompanied by focal neurological signs or symptoms. Febrile seizures: if temperature elevated >380C (rectal) Afebrile seizures: if temperature normal	Self -limiting; supportive care; paracetamol and cooling if febrile; rarely anticonvulsants. Always refer to hospital for further evaluation
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 requiring hospitalization. Local reactions of lesser intensity occur commonly and are trivial and do not need to be reported if clients do not report.	Settles spontaneously within a few days to a week. Symptomatic treatment with analgesics. Antibiotics are inappropriate. Cold compress at injection site; Give adequate hydration.

Anaphylaxis is a life-threatening condition that needs prompt treatment to avoid fatality. Adequate preparation to provide emergency treatment for anaphylaxis is therefore very critical at all vaccination centres. All immunization providers need to be trained and develop competence in recognizing and managing anaphylaxis and have epinephrine (adrenaline) available.

The use of local remedies for any serious vaccine reaction can risk the health and life of the vaccinee and is strongly discouraged. Early medical care by a qualified clinician will minimize any unwanted outcome and ensure early recovery, and may also save lives.

3.3.1 Management of anaphylaxis after vaccination

Anaphylaxis is a life-threatening allergic reaction characterized by sudden onset, rapid progression of signs and symptoms AND involving 2 or more organ systems. It may occur after any injection including vaccination. Anaphylaxis must be distinguished from fainting (vasovagal episode or syncope or fainting), anxiety, breath-holding episodes and idiopathic urticaria or angioedema. The Table 7 below shows features which may assist differentiating fainting (vasovagal episode) from anaphylaxis.

Table 7: Signs and Symptoms to differentiate vasovagal and anaphylaxis

		Vasovagal episode	Anaphylaxis
Onset		Immediate	Usually within 5 minutes but can be delayed for hours
Signs/ Symptoms	Skin	Generalized pallor; cold and clammy skin	Itch, generalized erythema, urticaria or angioedema (localized swelling of face, mouth, tongue, larynx, etc.)
	Respiratory	Breathing is normal or shallow, no breathing difficulty	Cough, wheeze, stridor, fast and difficulty in breathing, cyanosis (blue lips, tongue, etc.)
	Cardiovascular	slow heart rate but strong carotid pulse Low BP corrected when lying	Fast heart rate, weak/absent pulse. Sustained low BP unless specific treatment is given
	Neurological	Light-headed, possible loss of consciousness, improves on lying down	Severe anxiety and distress, loss of consciousness

Once anaphylaxis is recognized;

1. Immediately lay the client on down on left lateral (semi-flat) position preferably with the legs raised and call for assistance immediately.
2. Set up an intravenous line if available.
3. Check breathing and pulse or heartbeat.
4. If the patient is not breathing, clear the airway and ventilate (mouth-to-mouth or with an Ambu-bag). Give Intranasal oxygen if available.
5. If there is no heartbeat, do Cardio-Pulmonary Resuscitation (CPR)
6. Give Adrenaline 1:1000 concentration (1mg/ml) according to the age
7. Give IV Hydrocortisone slowly according to the age
8. Give 0.9 Saline (Normal Saline) or Ringers Lactate at 20 drops per kg body weight (if available)
9. Arrange to transfer client to a higher referral facility if necessary.
10. Explain and reassure the caregiver and/or community.

Table 8: Dosage of adrenaline and hydrocortisone in different age groups

Drug	Age	Dosage	Route of administration
Adrenaline 1:1000	</= 3 years	0.1 ml	I.M or SC
	4 - 5 years	0.2 ml	
	6 – 11 years	0.3 ml	
	12 years and above	0.5 ml	
Hydrocortisone	< 1 year	100mg	I.V (preferred) or I.M
	1 – 3 years	200mg	
	> 3 years	300mg	

3.4 Prevention and management immunization error-related reactions

Immunization error-related AEFIs are preventable and hence prompt identification and correction of these errors are very important since we have control over them. The most common immunization error is an infection as a result of a non-sterile injection because of contamination of the vaccine or diluent vial or the injecting device (syringe and/or needle). The infection could manifest as a local reaction (e.g., suppuration, bacterial abscess) or a severe systemic reaction (e.g., sepsis, toxic shock syndrome).

Sterile abscesses, while rare (~1 per 100 000 doses) are local reactions from aluminium-containing vaccines, especially DTP. They, along with other local reactions, are more likely to occur if there is inadequate swirling of the vaccine before use, superficial injection and use of vaccine that had been frozen. For BCG vaccine, injection abscess can result from improper technique of injection (subcutaneous rather than intradermal injection).

Guidelines to avoid/ minimize immunization errors

To avoid/minimize immunization error, the following should be observed.

• It is both important and necessary to maintain the cold chain at all levels.

• Vaccines must be reconstituted only with the diluents supplied by the manufacturer.

• Reconstituted vaccine should be maintained in the recommended cold chain and used within six hours after reconstitution; it must be discarded at the end of each immunization session and should never be retained.

• Other than vaccines, no other drugs or substances should be stored in the vaccine refrigerator.

• Immunization workers must be adequately trained and closely supervised to ensure that proper procedures are followed.

• Prior to immunization, adequate attention must be given to contraindications.

Chapter 4: The AEFI Surveillance System in Ghana

Routine AEFI reporting in Ghana started with the establishment of the Expanded Programme on Immunization in 1978. Reporting became more structured with the establishment of a National Pharmacovigilance Centre in 2001, situated at the Food and Drugs Authority, which serves as a focal point and resource center for pharmacovigilance activities in Ghana. The system ensures channels for reporting AEFI during both routine immunization and mass vaccination campaigns.

4.1 Goal and Objectives of the AEFI Surveillance System

The overall goal of the surveillance system is to promptly detect and manage AEFIs, real or perceived. Specifically, the surveillance system is to

- Detect, correct and prevent immunization error-related AEFIs caused by errors in vaccine preparation, handling, storage or administration
- Identify problems with vaccine lots or brands leading to vaccine reactions caused by the inherent properties of a vaccine.
- Prevent false blame arising from coincidental adverse events following immunization, which may have a known or unknown cause unrelated to immunization,
- Maintain confidence by properly responding to parent/community concerns, while increasing awareness (public and professional) about vaccine risks
- Generate new hypotheses about vaccine reactions specific to defined populations in Ghana Estimate rates of occurrence of AEFIs in the local Ghanaian population compared with clinical trial and international data, particularly for newly introduced vaccines.

Surveillance for Adverse Events Following Immunization (AEFI) is an integral part of the Expanded Programme on Immunization and reinforces the safe use of all vaccines in the country while also helping to maintain public confidence in its immunization program. As shown in Figure 1, this is done systematically.

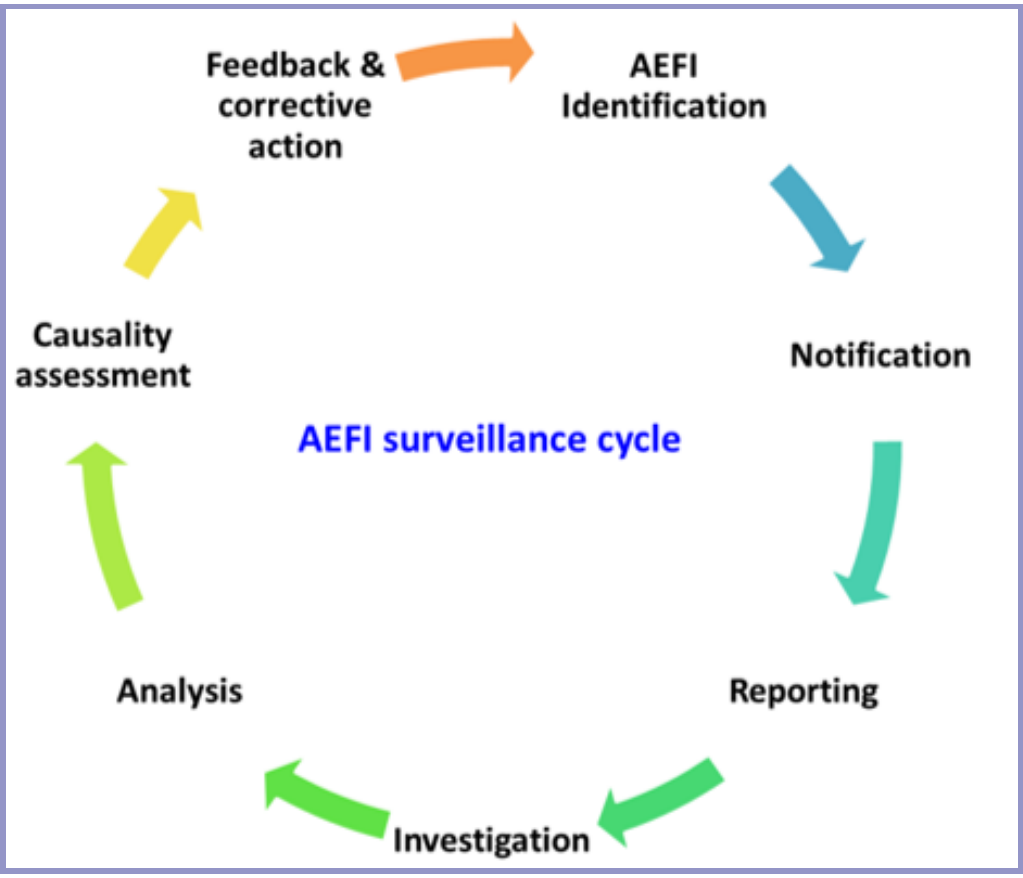

Fig 1: AEFI Surveillance cycle

4.2 Stakeholders in the surveillance system

The AEFI surveillance system in Ghana is a collaborative effort among the Expanded Programme on Immunization (Ghana Health Service), the Food and Drugs Authority, the World Health Organization, and UNICEF. Other stakeholders include recipients of vaccines, parents and caregivers (if vaccinees are children), community members, Civil Society, Private (for-profit and non-for-profit) Health Providers, the media and the general public (Figure 1).

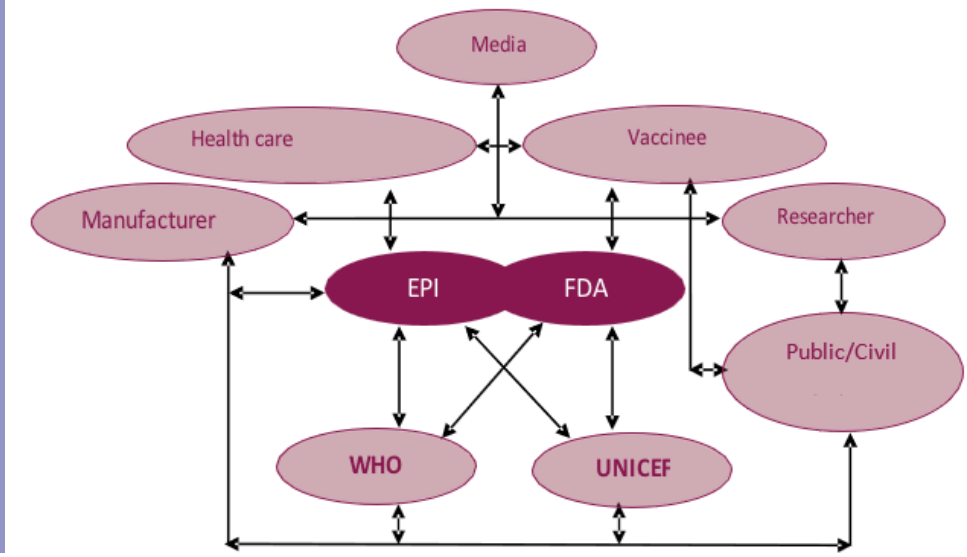

Fig 2: Stakeholders in AEFI Surveillance, Ghana

4.3 Information Flow

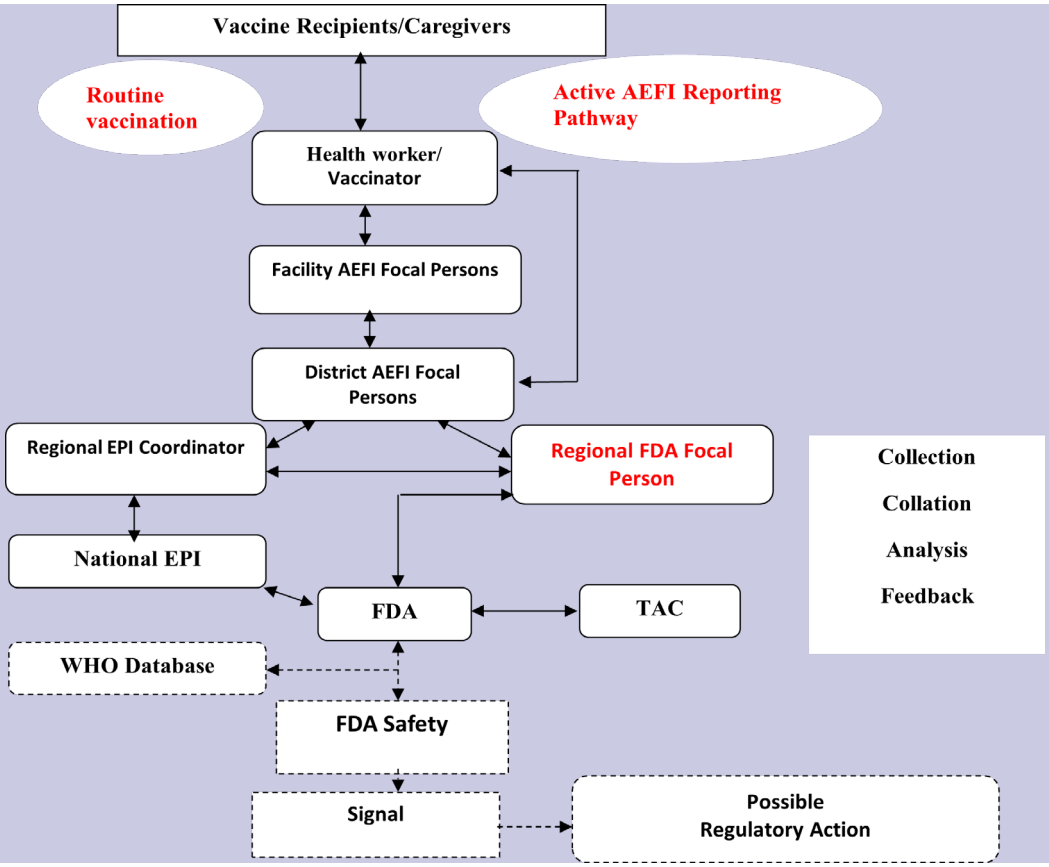

Figure 3: Flow chart for AEFI Surveillance in Ghana

4.3 Requirements for reporting and Reporting Levels

4.3.1 Reporters and General Requirements

Case detection is the first and most important step in AEFI surveillance. The primary reporter may be a public health worker, vaccinator, clinic or hospital staff, volunteer or caregiver (parent) or any other person who detects the AEFI. A suspicion alone is sufficient for reporting. Following receipt of complains from vaccinees or their caregivers; or following linkage of complains to vaccination, the health worker completes and submits an AEFI form (Annex 1) to the Facility or District AEFI Focal Person or the District EPI Coordinator. The report is submitted to the Regional EPI Focal point and then in turn to the National EPI or FDA depending on whether it is routine or campaign immunization (Figure 3).

4.3.2 Reporting during Routine Vaccination and Mass Campaign

During mass immunization campaigns, four levels of communication are identified namely, health worker, district, regional and national levels while for routine immunization, AEFI reporting goes through the Ghana Health Service reporting system: health worker, district EPI Coordinator, regional EPI coordinators, National EPI Vaccine Safety coordinator and then to FDA with copies to relevant levels as necessary (Figure 3).

4.3.3 Timelines of Reporting

Reporters are not expected to assess causality which is implied when considering the cause-specific definitions of AEFIs. However, rapid detection and evaluation of vaccine link is essential to ensure the continued safety of vaccines. Thus, in case of suspicion, a report must be submitted on a timely basis rather than waiting for all aspects of an investigation to be completed. This is particularly true for reports which meet the criteria to be considered serious AEFIs, AEFI clusters and trigger events. The reports are evaluated and endorsed at each level and eventually, by FDA for causality assessment and feedback provided to all levels.

4.3.4 Training for Peripheral Actors

To improve the detection capacity, a good knowledge of the primary reporter on AEFI, its types, and purpose of AEFI surveillance is necessary. Regular training and awareness programmes are necessary to update knowledge and sustain interest among all reporters. Therefore, FDA and EPI regularly provide training for peripheral health workers on AEFI reporting.

4.4 The Technical Advisory Committee on Safety of Vaccines and Biological Products (TAC-VBP) and Causality Assessment

Reports received from health workers and parents/vaccine recipients are presented to Technical Advisory Committee on Safety of Vaccines and Biological Products (TAC-VBP) for review and causality assessment if necessary. This Committee constituted by the Food and Drugs Authority has expertise which includes but not limited to pediatrics, general medical practice, clinical pharmacy, epidemiology, pathology, internal medicine (gastroenterology and neurology) and consumer representative. The Committee additionally makes recommendations for action by the FDA and GHS/EPI relating to the safety of vaccines used in the immunization programme.

4.5 .1 AEFI Reporting Tools

Tools for AEFI surveillance, investigation and reporting are made available to actors in the country to help promote AEFI reporting. These include:

- AEFI Reporting Form

- AEFI Investigation Form
- Med Safety App
- SafetyWatch System
- Phone/ Call centres

4.5.2 Reporting AEFIs

The primary reporter (i.e., the one who first reports an AEFI) may be a field health worker, clinic or hospital staff, a volunteer, parent or any other person who detects the AEFI. Suspicion alone is sufficient for reporting, and the primary reporter is not expected to assess causality. Rapid detection and evaluation of a possible link to vaccines is essential to ensure the continued safety of vaccines.

When an AEFI is identified, the ultimate responsibility of the health system is to manage the patient. Communicate with the client and/or parents and/or the community to explain what is being done and reassure them, thereby addressing rumours and fear. Improve or correct service delivery procedures if the AEFI was caused by immunization- related error. Identify and if needed suspend any implicated vaccine

Reporting of AEFIs is important but should lead to prompt case investigation (within 24-48 hours of receipt of report) where necessary for further actions. The ultimate goal is protection of the community and guaranteeing the health of Ghanaians.

4.5.3 What events to report

All serious AEFIs, AEFI clusters, any unusual event should be reported as well as any event about which a client makes a complaint. Generally, all untoward medical events that occur within a period of 28 days after receiving a vaccine following immunization is an AEFI and must be reported. Trigger events must be reported. Examples of trigger events with their periods of occurrence are listed in Table 5.

Table 9: Examples of trigger events with their periods of occurrence

Occuring within 24 hours of immunization	Anaphylactic shock/Anaphylaxis/Anaphylactic oidreaction
	Inconsolable screaming
	Hypotonic hypo-responsive episode (HHE)
	Toxic shock syndrome
Occuring withon 5 days of immunization	Severe local reaction
	sepsis
	Injection site abcess (bacterial/sterile)
Occuring withon 15 days of immunization	Seizure, icluding febrileseizures (6-12 days for measles/MMR)
	Encephalopathy (6-12days for measles/MMR 0-2days for DPT)
Occuring withon 3 months of immunization	Acute flaccid paralysis (4-30days for OPV recipient)
	Brachial neuritis-inflamed nerves in neck & shoulder region
	Thrombocytopaenia-low platelets(15-35days after measles/MMR)
Occuring between 1 and 12 months after BOG immunization no time limit	Lymphadenitis
	Disseminated BOG infection;
	Ostetis/Osteomyelitis
	Any death, hospitalization, or other severe or unusual events that the health workers or the public suspect to be related to immunization

4.5.4 Reporting AEFI during immunization campaigns

In Ghana, all adverse events resulting from both campaign and routine vaccination must be reported. A campaign is an opportunity to strengthen or establish immunization safety surveillance. It involves a large number of doses given over a short period of time. Hence, it may lead to more vaccine reactions and coincidental events. The rate of events usually remains unchanged, but the increased number of events becomes more apparent as staff and the public notice high numbers as a result of heightened awareness. This is particularly so when injectable vaccines are used.

On the other hand, a real increase in immunization error-related events is possible because field staff may be unfamiliar with a new vaccine or feel the pressure of crowding in vaccination centres particularly where there is no crowd control. Therefore, safe injection practices may be compromised. Additionally, campaigns usually target older children than during routine vaccination. Even experienced vaccinators may have less experience in dealing with immunization-anxiety related adverse events e.g., syncope (fainting). Anti-vaccine lobbyists and other antagonists may also exaggerate any concerns about AEFI during the campaign in order to justify criticism of the campaign.

Also, during special campaigns, a new vaccine may be introduced with no prior experience or with little information on adverse events. There is a possibility of detection of signals through strengthening surveillance during such special immunization programmes. Unless an event is properly investigated or analyzed, it can cause concern among the public and also may affect the campaign and the entire immunization programme. Proper planning to reduce immunization error-related reactions, monitor and respond to AEFI can minimize adverse events and their effects during a campaign. Careful planning will limit the potential for negative publicity from an AEFI.

4.5.5 Who Should Report

The reporting pathway is as shown in Figure 3. The primary reporter may be a public health worker, vaccinator, clinic or hospital staff, volunteer or caregiver (parent) or any other person who detects the AEFI. The District AEFI Focal Point is the link person between the primary reporter and higher levels of the reporting pathway. During mass vaccination campaigns, the FDA may receive reports directly from the community in which case recording and follow-up is made through relay of information to Regional and District Focal persons.

4.5.6 When to Report

AEFIs are to be reported immediately or within 24 hours to the next level when the reporter gets to know of the event. However, all serious AEFIs should receive immediate attention and reported immediately to the next level upon detection or notification. Trigger events such as abscesses, lymphadenitis etc. should be reported immediately as they may cause community concern. Immediate reports may be made by telephone to the Food and Drugs Authority. All AEFIs, including those reported immediately during the week, should be counted in routine, monthly AEFI surveillance reports.

4.5.7 How to Report

Reports should be made using the standard Reporting Form for Adverse Events Following Immunization (Annex1). In incidents with many cases or a high level of community concern, an urgent phone call should be made to the Focal Person at the District or directly to the FDA for further action to be taken. The Med Safety App, Safety Watch System, etc. are all platforms/ channels one can report AEFI

4.5.8 Information to be provided on the Reporting Form

The minimum package of information to be collected for every case of AEFI has been standardized for Surveillance (refer REPORTING FORM Annex 1) and the following five (5) broad areas are covered:

- Source of information (including details of the reporter),
- Information on vaccinee/patient,

- Details of the vaccine/ immunization,
- Details of the adverse event and
- Reporter details

4.5.9 Confidentiality of AEFI reports

Ensuring confidentiality of reports is paramount in any surveillance systems. Individual AEFI reports should be kept confidential just as a patient's clinic information is kept unless otherwise required by a court of law. It is unethical to divulge patient information without their consent. Therefore, data analysis and reports on aggregate level should be unlinked to individual client's identifiers to preserve anonymity.

4.6 Roles and responsibilities of stakeholders

4.6.1 Vaccine Recipients and Caregivers (Parents)

Vaccine recipients and caregivers should preferably, report all AEFIs to their health care providers. However, reports may also be made directly to the Food and Drugs Authority. Reports so received are documented as for any other report received from health workers.

4.6.2 Health workers/ Vaccinators

This is the lowest administrative level in the AEFI surveillance system which provides immunization services to the public. During provision of immunization services health workers and vaccinators are responsible for the following:

- Reducing avoidable immunization-related (programme) errors: inappropriate vaccine handling, prescribing or administration.
- Communicating possible adverse events to vaccinees and/or caregivers before vaccination.
- Counseling vaccinees and caregivers on how to manage mild and common vaccine reactions
- Detecting, managing and reporting AEFI cases as per the AEFI guideline

Information about the immunization(s) should be provided well ahead of the clinic day or the day of visit. This affords parents the time to understand the information well and empowers them to ask questions that will increase their trust.

4.6.3 Facility AEFI Focal Person

These are health workers based in clinics and hospitals who have received training from the Food and Drugs Authority and the Expanded Programme on Immunization. They are responsible for the following:

- Sensitizing all health workers at the health facility to detect, manage and report AEFI cases.
- Conducting clinical investigations and reporting AEFI cases
- Compiling weekly AEFI reports and forwarding to the District AEFI Focal Person (including Zero reporting- when no AEFI cases are detected) ·

4.6.4 District AEFI Focal Person

These are mostly surveillance officers (or other health workers) who are designated by the District Health Authorities as Focal persons for AEFI and have received training from FDA and EPI. They are responsible for the following:

- Organizing training and/or orientation programme for facility AEFI focal persons and other health workers in the district.
- Ensuring availability of tools (AEFI reporting forms and guidelines) at all facilities in the district. Validating

AEFI reports, completing ALL details in the AEFI reporting form and assigning codes (unique patient identifiers) to the AEFI reports
- Supporting e investigations into AEFI cases which fulfill case definitions with support from the District Health Management Team
- Facilitating the referral of suspected serious AEFI cases to the reference hospital during campaigns in conjunction with the District Director of Health Services and team.
- Taking corrective action based on the findings from investigations, in conjunction with the District Director of Health Services and team.
- Maintaining AEFI database at the district level in conjunction with the District Director of Health Service, District Health Information Officer and Team
- Analyzing AEFI data to determine distribution and patterns of AEFI occurrence
- Compiling AEFI reports from community and health facilities and submitting same to the Regional EPI Coordinator and/or FDA Regional Focal person.
- Submiting daily AEFI line-listing to the FDA Regional Focal person with copies to the Regional Health Directorate and relevant levels during vaccination campaigns
- Supervising AEFI surveillance activities in the district

4.6.5 District Director of Health Services

The District Director of Health Services is the 'owner' of the AEFI surveillance system at the District level just as she/he does for all other health issues. The responsibility includes but not limited to:

- Ensuring free treatment of all AEFI cases
- Supporting referral of serious AEFIs when necessary
- Supporting District and Facility Focal Persons in their roles
- Ensure data availability and use at the district level
- Communicate findings to the community with support from the District and Facility AEFI Focal Person.

4.6.6 Regional EPI Coordinator and Deputy Director Public Health

Together with the Deputy Director of Public Health at the Regional level, the Regional EPI Coordinator performs the following:
- Organizing training/orientation for District and Facility Focal Persons and other health workers Supporting AEFI investigation (including epidemiological and clinical investigations) at the District level
- Assisting the District Director of Health Services and District Focal Person in referral of suspected serious AEFI cases to reference hospitals
- Taking corrective action based on findings from investigations
- Supervising AEFI surveillance activities throughout the region
- Maintaining a regional database of AEFI
- Analyzing Regional AEFI data to determine distribution and patterns of AEFI occurrence
- Compiling monthly AEFI reports from districts and submitting same to national EPI
- Leading public communication on AEFI for the Region
- Assisting FDA Regional Focal person in collation of AEFI reports during mass vaccination campaigns

4.6.7 FDA Regional Focal Person

These are FDA staff in the regional offices and are responsible for the following activities during mass immunization campaigns:

- Assisting in training of District AEFI focal persons and other health workers
- Ensuring availability of tools (e.g. AEFI Reporting Form) and guidelines at all levels of the area covered in the Region, particularly during campaigns

- Collecting, validating and ensuring reports from reference hospitals are completed
- Gathering and qualifying reports from district focal persons
- Forwarding all reports to national FDA (Central Team)
- Facilitating referral of suspected serious cases to reference hospital and monitor the quality of the case documentation
- Ensuring compliance with Standard Operating Procedures for AEFI Reporting

4.6.8 Expanded Program on Immunization/Ghana Health Service (EPI/GHS)

In the National AEFI surveillance system, EPI/GHS is responsible for:

- Designing, establishing, maintaining, and evaluating AEFI surveillance system in the country in conjunction with FDA
- Revising and updating AEFI surveillance reporting tools and guidelines
- Ensuring accessibility of tools (AEFI reporting form; Guidelines etc.) to the Regional Health Directorate
- Training peripheral level health staff on AEFI activities
- Maintaining a database at the National EPI Office
- Analyzing AEFI data and providing feedback to peripheral levels
- Providing support to District and Region on AEFI reporting and investigations as needed
- Submitting AEFI reports received from routine immunization to Food and Drugs Authority on timely basis
- Communicating AEFI and immunization safety at the National level
- Responding to Rumors and managing crises as necessary Providing data on vaccine performance on regular basis to the FDA

4.6.9 Food and Drugs Authority

The Food and Drugs Authority has the legal mandate to ensure adequate and effective standards for all medicines and biological products including vaccines used in Ghana are of good quality, effective, and safe. The FDA is responsible for the following:

- Assisting the EPI/GHS in continuous development and/or revision of tools and guidelines for AEFI surveillance
- Constituting an Expert Committee to evaluate AEFI reports and assess causality
- Analyzing AEFI reports and providing feedback to EPI, healthcare professionals, caregivers and other stakeholders
- Monitoring the effectiveness of the AEFI surveillance system
- Conducting supportive supervision of AEFI surveillance activities
- Assisting in the training of personnel involved in AEFI surveillance
- Sharing information with international agencies (WHO, UNICEF) and manufacturers
- Carrying out risk benefit analysis of vaccine used in the immunization programme and taking necessary regulatory action
- Registration of vaccines and devices used in Ghana

4.7 Investigating AEFI

Certain AEFI reports will require additional investigation. The purpose of conducting the investigation is to:

a) Confirm the diagnosis (or propose other diagnoses) and determine the outcome of the medical incident(s)

b) Identify specifications of implicated vaccine(s) used to immunize patient(s)

c) Examine operational aspects of the immunization programme, which may have led to immunization

errors or aggravation of severity of events possibly due to other causes

d) To determine whether a reported event was a single incident or one of a cluster and justify the search for other AEFI cases

e) To determine whether unimmunized people are experiencing the same medical incident(s)

4.7.1 Events to be investigated

The following AEFIs need further clinical and/or epidemiological investigation:

- it is serious
- it is part of a cluster
- it is part of a suspected signal
- it is a suspected immunization error
- it appears on the list of events defined for AEFI investigation or
- it causes significant parental or public concern

4.7.2 Who should investigate

Investigating an AEFI is team work primarily conducted by the Regional AEFI Investigation Team headed by Deputy Director of Public Health. The initial step is a preliminary investigation by the health worker who first detects the event. If no further investigation is required, the health worker will complete an AEFI Reporting Form (Annex 1) and report to a supervisor, preferably the Facility or District Focal Person. The composition of the investigation team will depend on the type of AEFI suspected.

Serious AEFIs should be investigated by trained clinicians, laboratory staff, surveillance officers, Deputy Director Public Health at the regional level with the support of District and Facility officers. Regional Pharmacovigilance officers from FDA should be part of the investigation team. For epidemiological investigations the team should include Immunization Programme Officers, Clinicians, Laboratory staff, Vaccinators and other Public Health Staff.

An epidemiologist(s)/Public health specialist(s), laboratory staff and clinicians from the national level (who are members of the Central AEFI team) will provide support for investigation missions in collaboration with the regional and district health authorities as required.

4.7.3 Data to be collected

The following data should be the minimum to be collected

A. Data on each patient

- Demographic data about patient, including a unique case number
- History of patient's present illness - symptoms, when they appeared and their duration, treatment, outcome; diagnosis
- History of patient's past illnesses - reactions to previous doses, drug allergies, pre-existing neurological disorders, current medications
- Immunization history - vaccine, number of doses received, date, and place of last Immunization or immunizations, site of injection
- Laboratory results about blood, stool, or other samples, if appropriate

B. Data about the vaccine administered to the patient

- Lot or batch number, Expiry date, Manufacturer, etc.
- When was the vaccine received
- From where the vaccine was received
- Laboratory results about vaccine, if appropriate

C. Program-related data

Common practices in storing and handling vaccines (cold chain temperature, other items stored with vaccine), and vaccine administration in the health center in which the suspected immunization was given. This may help identify products mistakenly used instead of vaccine or diluent

D. Data on other people in the area or community

Establish if cases have been reported from elsewhere and actively look for additional cases among other vaccinees and in the community.

E. Information on Health worker who gave the immunization

All of these data should be included in an AEFI investigation report

4.7.4 Steps in epidemiological investigation of AEFI

The following steps (Table 10) should guide the investigation. Although attempts should be made to proceed systematically in order not to miss crucial steps, there should be flexibility in the order.

Table 10: Steps in epidemiological investigation of AEFI

STEP	KEY AREAS TO EXAMINE
1. Prepare for field work	Administrative arrangements; personal and family considerations; logistics for field, work e.g., transport, fuel, digital camera; laptop computer or 'smart' phone etc.; clarify roles of team members; who relates with media?
2. Confirm AEFI	Confirmation of immunization (Immunization records)
3. Verify the diagnosis	Patient history, physical examination; laboratory tests
4. Define and look for additional cases	Use of field guide; internet resources; levels of case definition; use of community structures, hospital records for more cases
5. Do descriptive analysis	Who are the cases? Where are they from? When did event occur?
6. Develop hypothesis	Possible cause(s) of event(s): ask patients, health workers, community; observe; Do not communicate working hypothesis until confirmed; If working hypothesis indicates immunization -related errors, correct them; If vaccine problem suspected, withhold the suspect vaccine(s) from use
7. Test hypothesis	Does descriptive analysis, other investigations support hypothesis?

8. Refine hypothesis and do additional studies	Alternative explanation or causes; Additional clinical laboratory; vaccine testing (Central level only)
9. Implement control/ remedial measures	Treatment; Removal of suspected vaccine; cold chain maintenance; staff training; further corrective action
10. Communicate findings	Completion of AEFI Reporting forms; report writing; media communication

The steps listed in Table 6 are presented in conceptual order; in practice, however, several steps may be done at the same time, or the circumstances of the event may dictate that a different order be followed. For example, the order of the first three listed steps is highly variable. For e.g., remedial measures may start soon after identifying the event or may be part of developing the hypothesis.

4.7.5 Handling Cases of Death

For any death suspected to be immunization-related, an autopsy (post mortem) is mandatory as required by law. The focal person and the AEFI central team must be alerted immediately (through District and Regional Health Authorities). The need for autopsy must be explained to relevant relatives and their corporation solicited (in conjunction with Regional Health Authorities)

The pathologist will be immediately alerted by the Regional Health Authorities or the Central AEFI team as needed. Post mortem must be conducted as early as possible and is free (i.e., paid for by GHS. Under circumstances where an autopsy is not possible, an organ biopsy may be taken.

NB: Formalin SHOULD not be USED before post mortem specimen collection

4.7.6 Investigating AEFI clusters

A cluster of AEFI is defined as two or more cases of the same adverse event related in time, place or vaccine administration. Apart from checking on these three factors, the investigator should look for AEFI occurring in similar age groups and populations with genetic predisposition or disease.

Cluster investigation begins by establishing a case definition for the AEFI and related circumstances and by identifying all cases that meet the case definition. The investigator should demarcate the cluster and identify common exposure factors within the cluster. Cluster identification (i.e., cases with common characteristics) is done by gathering details (when and where) of vaccines administered. This can be achieved by collecting and recording;

- detailed data on each patient;
- programme-related data (storage and handling, etc.); and
- immunization practices and the relevant health workers' practices.

Common exposures among the cases can be identified by reviewing:

- all data on vaccine(s) used (name, lot number, etc.);
- data on other people in the area (also non-exposed); and
- any potentially coincident factors in the community.

In an event of an AEFI cluster, the cause-specific definitions provide a framework for investigation and causality assessment. A major consideration will be to investigate the possibility of an immunization error vaccine or a quality defect. The possibility of immunization error must be considered when events cluster in one setting without a similar change in frequency in other settings using the same vaccine. On the other hand, if an increased frequency of events is reported from multiple settings the possibility of a quality defect must be considered more strongly. Clusters of fainting after immunization are well-recognized immunization anxiety-related reactions during immunization programmes targeting adolescent girls.

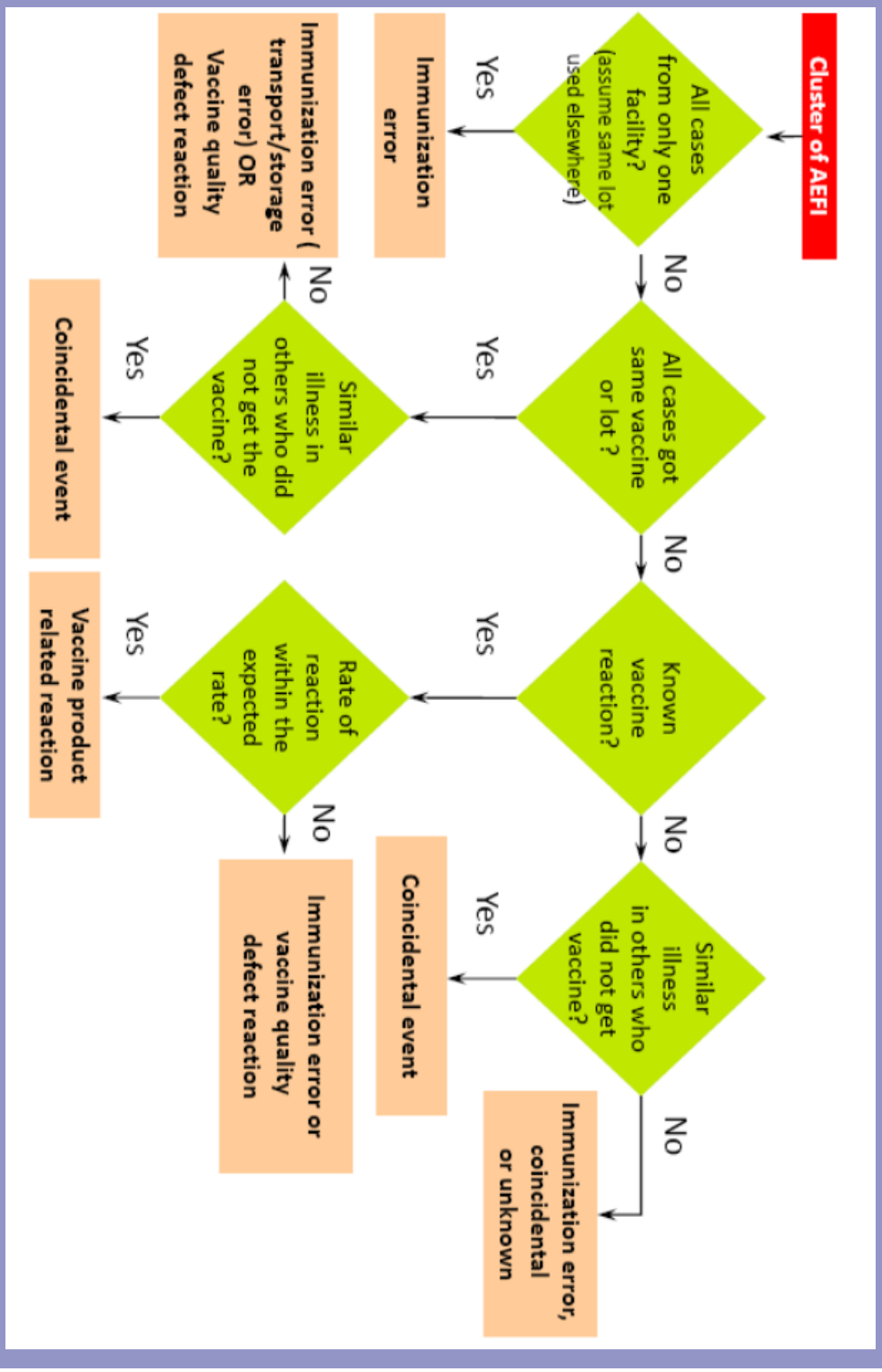

Fig 4: Identifying cause of AEFI cluster

For new vaccines or established vaccines used in new target populations, a cluster may represent a previously unrecognized vaccine product-related reaction. Knowledge of the background incidence of events which may occur in causal relationship with a vaccine is therefore essential for assessing a cluster in terms of the strength of the signal it may provide.

Chapter 5: Laboratory testing of specimens

"laboratory testing of vaccines and logistics are at times required to confirm or rule out the suspected cause"

Laboratories have an important role in AEFI case diagnosis and case management. They also have a key role in testing the quality of the samples of vaccines and the logistics used. Laboratory tests for the purpose of AEFI case diagnosis and case management conducted on the patient (e.g., blood, urine, radiology, ECG, other body fluids, etc.) are based on the provisional case diagnosis and recommendations of the treating physician. These tests are considered "routine" and should be performed in clinical laboratories. The results of these tests are important to confirm the case diagnosis and arrive at the "valid diagnosis" for assessing causality as described in section xxx.

Laboratory testing of samples of vaccines and logistics are rarely necessary. It is not mandatory following an AEFI, particularly if the cause is evident such as a coincidental event or a program error. However, they laboratory testing of vaccines and logistics are at times required to confirm or rule out the suspected cause. For example, vaccines and diluents may be analyzed for sterility and chemical composition whiles syringes and needles are assessed for sterility.

Testing of vaccines and logistics should be requested on a clear suspicion. Determining which samples to send for testing (if any) depends on the working hypothesis for the cause of the event(s). If the used vial of suspect vaccine is available, it should be separately labelled and sent along with unused vials of the same lot.

Chapter 6: Data and performance analysis

6.1 Sources and types of AEFI data

There are several sources of AEFI data. Information on vaccine safety and the possible occurrence of AEFIs can be obtained from:

- Clinical examinations,
- Interviews of health workers,
- Parents and community leaders,
- Review of registers (ANC, OPD and Immunization),
- Vaccine and Injection logbooks,
- Observation of immunization administration,
- Vaccine handling and storage and laboratory reports.

However, three basic types of data are collected:

- Data collected routinely via the AEFI surveillance system
- Data obtained and collected from all investigations carried out into a specific AEFI and
- Data from investigations of AEFI clusters.

Analysis of data on AEFIs consists of reviewing data from the following sources

- Data collated into a linelist
- Case investigation forms for each reported AEFI case,
- Laboratory information (Human and vaccine related)
- Records about similar events in the community
- Records of the implicated vaccine

6.2 Data Input

Data input is expected to occur at facility, district, regional and central levels for AEFIs detected during routine immunization. A common electronic database template developed at the central level should be used at all levels. Electronic line listing database has been developed for common use and to facilitate immediate reporting from facility and district levels through the regional level to the central level via e-mail or WhatsApp. AEFI line lists should be merged at each stage of the reporting pathway. For GHS, data input should be the responsibility of the Focal Persons with support from the various information officers. Data must be available in DHIMS2 data platform as required by the service. During campaigns, overall data input may be performed on completion of surveillance, investigation and post-campaign survey activities. All reporting forms and other data-collection tools completed during the investigations and surveys must be submitted to the Central level with copies kept at various levels.

6.3 Analysis of AEFI reports

Supervisors must monitor AEFI reports for completeness, timeliness, and accuracy and recognize and correct programme-related errors before they lead to problems that may derail the objectives of the immunization programme. At the aggregate level, data analysis should give the following indicators:

- Total number of AEFI, broken down into non-serious and serious
- Reporting rate of AEFI (non-serious/serious) among the population vaccinated per 1,000 or 10,000 or 100,000 doses of vaccine administered
- Distribution of reported cases by specific AEFI (e.g. septicaemia, anaphylaxis);
- Distribution of AEFI by person, time, and place

- Outcome of AEFI cases (death, recovered fully, recovered with sequelae); and

Health institutions where AEFIs are not reported by checking on "zero reporting" and determine whether it is due to failure of reporting or whether there are no AEFIs to be reported.

- Data analysis could also involve:
- Comparison of the reporting data and the data from post-campaign AEFI surveys if available.
- Distribution of AEFI by cause (vaccine reaction, immunization-error related or coincidental) which. This is usually done at the central level only.

A meeting of the Expert Committee for Vaccines and Related Biological Products should discuss or, carry out causality assessment of the serious AEFI cases and validate the results, draw conclusions and make recommendations to improve the immunization programme and promote the safety of vaccinees.

6.4. Who should be involved in data analysis

Data analysis should be performed at each level including hospital, sub-district, district, etc. This Data analysis will be performed by;

- AEFI Focal Persons,
- EPI Coordinators,
- District Directors and
- Deputy Directors of Health Services. epidemiologist(s) and/or Public Health Specialists or

Other members of staff qualified to produce the results needed from the data analysis at each level (Section 6.3) at the central level with the assistance of the other members. Data analysis should be performed at every level. May also be involved.

At the District level, the District Health Management Team (DHMT) is responsible while at the regional level, a team from both Regional Health Directorate Public Health Unit and FDA, led by the Deputy Director Public Health will be responsible.

6.5 Process of data analysis

Before analysis of the line list at the national level, it is important to re-check the case definitions used by the reporting sources. The case should fit into a case definition such as the Brighton collaboration case definitions (www.brightoncollaboration.org) or any definition selected by the National AEFI Committee.

Line lists should be used to sort data by place, person, and time. Analysis should be done by antigens and by type of reported adverse events (e.g., high fever, abscess) after stratifying data. Number of doses administered for each antigen is the best denominator for calculating reported AEFI rates for each antigen in a given period (by month, quarter or year).

6.6 Interpretation of data

Comparison of background rates with reported rates of AEFI will guide to a possible hypothesis of a coincidental event. For example, febrile seizures with bacterial or viral infection aetiologies are common among young children and may also occur following some vaccines such as Pentavalent vaccine. Therefore, it is important to know the rate of febrile seizures due to other reasons and expected rates following a given antigen.

If the values exceed the expected background rates, then one should consider true increase or coincidence due to ongoing other diseases.

6.7 Monitoring and Evaluating the performance of the AEFI surveillance system

The AEFI surveillance system performance needs to be regularly reviewed at all levels to ensure that the system is sensitive enough to identify and respond to AEFI rapidly. The "standard overall" indicator proposed to determine the quality of AEFI surveillance is, "AEFI reporting ratio in surviving infants from a sub-national area/country per year". This is calculated as

$$\text{AEFI reporting ratio per 100,000 surviving infants per year} = \frac{\text{Number of AEFI cases reported from a sub-national area/ country per year}}{\text{Total number of surviving infants in the same sub-national area/ country per year}} \times 100{,}000$$

Notes: The target proposed is at least 10 reports per 100,000 surviving infants per year.

Some of the other key indicators that help to monitor the performance of the system include:

Chapter 7. Brief overview of AEFI causality assessment

Causality assessment is the systematic evaluation of the information obtained about an AEFI to determine the likelihood that the event might have been caused by the vaccine/s received. Causality assessment does not necessarily establish whether or not a definite relationship exists, but generally ascertains a degree of association between the reported adverse events and the vaccine/vaccination. Nevertheless, causality assessment is a critical part of AEFI monitoring and enhances confidence in the national immunization programme. Causality assessment is important for:

- identification of vaccine-related problems;
- identification of immunization error-related problems;
- excluding coincidental events;
- detection of signals for potential follow-up, testing of hypothesis and research; and
- validation of pre-licensure safety data with comparison of post-marketing surveillance safety data.

7.1 Case selection for causality assessment

The cases for which causality is ascertained include

- Serious AEFI
- Clusters & events above expected rate/ severity
- Evaluation of suspected Signals

Other AEFI (if required) as decided by reviewing team / committee including:

- If immunization error is suspected
- Significant events of unexplained cause within 30 days of vaccination
- Events causing significant parental or community concern (e.g., Hypotonic Hyporesponsive Episode (HHE), febrile seizures etc.)

7.2 Preparation for causality assessment

Prior to causality assessment, the following should have been done;

- Completed AEFI case investigation.
- Completed case report form, case investigation form completed clinical case record, lab reports, autopsy report and , details of field investigations etc.
- There must be a “valid diagnosis”.

With inadequate or incomplete case information, an adequate causality assessment cannot be performed or if attempted, the AEFI may be deemed unclassifiable or not assessable due to lack of information.

7.3 Causality Assessment Committee

Causality assessment in Ghana is done by a national reviewing team/ committee that is

- Independent
- Free of real or perceived government, industry conflicts of interest
- Has broad range of expertise in the areas of ‘infectious diseases, epidemiology, microbiology, pathology, immunology, neurology, vaccine program.

The committee has written terms of reference (ToR).

Chapter 8: Communication

Vaccine safety communication is an essential component of immunization services and programmes. Even before a vaccine safety issue occurs, immunization programme managers, national regulatory authorities and other stakeholders involved in safety communication must be ready to engage effectively with all concerned groups (parents and guardians, communities, media, etc.) through strategic communication. Implementing a well-planned communication strategy will help to maintain the public's confidence in vaccines and in the national immunization programme. An effective communication strategy can also contribute to sustaining high national immunization coverage and prevent a resurgence of vaccine-preventable diseases.

Communication makes stakeholders aware of the process at each stage of the Investigation. The identification of particular interest groups and their representatives should comprise a part of an overall communication strategy. Decisions including what, whom and how, should be part of an overall communication strategy.

8.1 Importance of Communication

Communication helps build and maintain public trust in vaccines and immunization, but this is not a one -time effort; it is a continuous well-planned endeavour. Any vaccine rumour or misinformation or poorly managed AEFI, whether true or perceived, can have a long-term impact on Ghana's immunization efforts. A proactive approach to communication makes it possible to mitigate potential negative impact of rumours and misinformation on immunization. There is therefore, a need to listen to what the public is saying and try to understand their concerns and the underlying reasons: this includes understanding the local perception of diseases, perception of injections and perception of the vaccine.

Effective communication amongst others helps ensures provision of:

- Information on the decline of childhood infections and deaths from VPDs
- Updated information during the introduction of new vaccines, mass campaigns and Supplemental Immunizations Activities (SIAs)
- Transparency and accountability

8.2 Communicating around AEFIs

If an AEFI occurs, information must get out as quickly as possible. The public needs to know that their concerns are shared; that the situation is being investigated and that they will be kept informed. All partners must give out the same message. Explicit communication messages must be tailored to the specific situation. Technical/academic terms and long words or sentences must be avoided when explaining issues on vaccines and vaccinations to the public. Media is the gateway to public opinion so, the media and the public must be informed about all issues pertaining to immunization The needs of the media should be identified and met. It is useful to differentiate between the public and the medical community and their respective information needs.

8.3 Communication with clients, parents or guardian and community

Communication with clients, parents or guardian, members of the community and media is an ongoing effort. They should be kept informed about the investigation, results and action taken already or going to be taken in case of an AEFI. It is crucial to highlight the benefits of immunization while communicating on AEFI with the public and stakeholders.

Key points to consider when communicating with the vaccine recipient (patient or client) or parents and guardians of the patient, community and health staff are;

- Listen to the client, parents or guardian and their concerns empathetically.
- Reassure and support the client, parent or guardian but do not make false promises.
- Assist the client, parents and guardian for hospitalization if necessary.
- Frequent communication with the client, parents or guardian regarding the progress of the patient.

- Prepare a fact sheet on adverse event for the client, parents or guardian, community, health staff and media.
- Build up and maintain relationship among health staff, community and media.
- Inform the individual client, parent or guardian about possible common adverse events and how to handle them.
- Continuously communicate with the client, parent or guardian and community during the investigation period to assure understanding the risk-benefit of vaccination.

8.4 Role of health care worker in community communication on AEFI

AEFI can have repercussions on immunization programmes. Where medical interventions are necessary, they should be carried out as rapidly as possible. Suppressing reports of AEFI or slow reaction can cause considerable damage to the immunization programme in the long-term. Messages relating to adverse events must be disseminated rapidly to prevent rumours spreading.

Once an AEFI has occurred, responses should include the following communication elements:

- Communicate or report immediately to the next level.
- Provide the parents with factual information. Remember that some parents may seek information elsewhere and you may lose credibility if you do not provide a trustworthy and technically sound response. The public and the other stakeholders have a right to know exactly what happened.
- Reassure parents, caregivers and adults that necessary measures are being taken so that the members of the community and caregivers are informed of what is happening.
- Communicate the results of the investigation to the programme managers and to the EPI officers at all levels.
- If the AEFI was caused by immunization error, tell the public what steps are being taken to prevent similar events in the future.
- Broadcast an official statement about the event on radio and television and publish a statement in newspapers.
- Repeat the message to dispel all fears.
- Constantly reassure the public of the safety of vaccines.

8.5 Communication with health care staff

- Communicate among all level of health care staff involved.
- Reinforce their knowledge, ability, skills and performances.
- Update them on investigation process, progress and findings.
- Reassure the staff of ongoing confidence in the immunization programme; quality of the vaccine and their services provided
- Do not blame health care worker, instead focus on the correction and quality of the EPI program.

8.6 Communicating with other stakeholders

Vaccine safety information needs to be shared with all stakeholders to ensure dissemination of correct information and thereby ensuring the smooth functioning of the immunization programme. Depending on the need, stakeholders mentioned below will be given preliminary information at initial stage and final report after completion of investigation and causality assessment at a later stage.

- Expert Committees
- Politicians
- Professional associations
- Universities and academia
- International agencies and development partners

8.7 Communicating with media

The media is an important gateway to inform the public and shapes their view and attitudes towards vaccines and immunization, especially including the occasional mass vaccination campaigns. In the long-term, building partnerships

with the media is key to keep the public regularly informed about immunization, its benefits and to motivate families and communities to make use of immunization services. For detailed steps and persons responsible for communicating with the media refer to the EPI Communication Strategy and Vaccine Related Events Response Plan, Ghana.

8.8 Risk and Crises Communication

Risk communication involves communicating with families and communities about the benefits of vaccination as well as potential risks from Vaccine Related Events (VREs) before and during a vaccination programme as a preparation for possible VRE.

Risk Communication help stakeholders appreciate each stage of the immunization process. The identification of interest groups and their representatives and communicating with them effectively should comprise a part of an overall communication strategy. Decisions including what, whom and how, should be part of an overall communication strategy.

A crisis related to a vaccine is an unexpected series of events that may happen after a vaccine has been administered to a population group. A crisis may arise when something goes wrong, for example because of genuine vaccine reactions or due to immunization-related errors that cause caregivers to withhold immunization of their children. A crisis may be caused by media publicity about an AEFI incident, even if it may have no basis or is triggered by unfounded rumours.

Crisis communication involves communicating with families, communities and the public about vaccine safety and benefits of immunization after a VRE has triggered a negative outcome. In crises, when the population of the entire area concerned by the immunization programme is reluctant to be vaccinated, a careful analysis of the situation must be made as quickly as possible. A broader communication effort may be warranted involving, for example, a press conference and TV or radio interviews to be broadcast nationwide. To improve the credibility of information, the Minister of Health or his/her representative will lead the communication process and appeal to the population concerned. A contribution from WHO and UNICEF and other partners (e.g. Rotary International) may also help to convince the population.

The Ministry of Health has trained spokespersons within its various agencies mandated to speak to the public or media in times of crises at all levels of the healthcare delivery system. These include the Regional Directors of Health Services, Director General of GHS, CEO of FDA, Public Relation Officer of GHS, Programme Manager of EPI, or their representatives.

If rumours or information that compromise immunization is circulating in a precisely defined area, the local press and radio might be a means of solving the problem without alarming neighbouring populations. In such cases, the director of health in the area concerned (or their representative) and the relevant health authority should be involved in the public relations effort.

Crisis communication is a combined effort by health and immunization programme managers, the regulatory authority, and local leaders to communicate with the public using all appropriate channels. Messages should assure the public that a vaccine safety issue is being investigated and will be resolved.

8.9 Managing Rumours

In the context of immunization, rumour is defined as an unverifiable assertion that is circulating, or a statement without facts to confirm its truth. Rumours and misinformation about immunization are amongst the most serious threats to the success of any immunization programme. Once rumours start, they can be very hard to stop.

Unless the rumour can very easily be contained and addressed you must refer the matter to your supervisors as quickly as possible. You will need to work under their direction. Action may even need to be taken at the national level. The consequences of rumours can be serious and, if unchecked, they can travel quickly beyond your local area.

Common causes of Rumours

- Inadequate information sharing by health care providers or
- Failure to communicate correct information about vaccine effects and schedules,
- Failure to check whether caregivers know and understand information,
- Failure to give clients opportunities to ask questions
- Parents/caregivers' negative attitudes about immunization services
- Inadequate/inaccurate knowledge

- Mistrust of the government
- Past untoward or negative experiences with vaccines;
- Poor treatment by health workers
- Ulterior motives (greed)
- Desire for publicity
- Coincidental events, etc.

8.9.1 Who starts rumours?

People who may have contradicting vested interests are those that may start rumours.: They could be the health workers themselves, traditional healers, medical practitioners, the press, politicians/political groups, anti-vaccine lobbyists, religious/cultural objectors.

Examples of rumours are:

“Polio vaccine is a contraceptive to control a population to limit a certain ethnic group”;

“Oral Polio Vaccine is contaminated by the AIDS virus or mad-cow disease”;

“The vaccine has expired”, etc.

8.9.2 What fuels rumours?

Among the factors that favour generation and spread of rumours are;

- Inadequate/inaccurate knowledge.
- mistrust of the government.
- past untoward or negative experiences with vaccines.
- poor treatment by health workers.
- ulterior motives (greed).
- desire for publicity.
- coincidental events, etc.

Below are some guidelines for management of rumours

A. Analyze the situation:

Move quickly to respond to rumours; but first, clarify the extent of the rumour or misinformation (type of messages, circulating, source, persons, or organizations spreading the rumour); determine the motivation behind the rumour (lack of information, questioning of authority, religious opposition etc.)

B. Turn the rumour around:

Go to the source. Ask the source what the concern and acknowledge shortcomings if necessary. Offer the source the chance to be part of the solution.

C: Embark on advocacy:

Advocacy is an integral part of rumour management which should include the following steps among others:

1. Target key opinion leaders for meetings (politicians, traditional/religious leaders, community leaders, health workers).

2. Launch a corrective campaign at the highest level, e.g., the Minister of Health, Regional Ministers, District Chief Executives, etc.

3. Meet with local leaders at sites where the individuals/groups are comfortable and can feel at ease to ask questions and have peers present.

During such engagements, provide the right information supported by facts or data. Free flow of information even

before the rumor develops is one of the surest ways to contain them even when it arises

D. Strengthen Alliances:

1. Involve all immunization partners through social mobilization committees, Inter-Agency Coordinating Committee (ICC), etc.

2. Alert and collaborate with relevant ministries and NGOs.

3. Encourage onward briefings (i.e., cascade effect).

E. Use of effective channels of communication

The use of appropriate communication channels when responding to rumours should be given careful consideration. The use of community durbars has a role in our traditional or rural societies. The positive and far-reaching impact of the media (social and traditional), however, remains critical in this modern era of technological advancement.

F. Conduct trainings:

Train volunteers and health workers to handle rumours and disseminate tailored information on common misconceptions and guidelines on response. It is also important to promote positive key messages during such trainings

9. References

1. Ghana Health Service/Ministry of Health Ghana. Manual for Training Health Workers on Pneumococcal and Rotavirus Vaccines. March 2012.
2. Ministry of Health Sri Lanka-Epidemiology Unit. National Guidelines on Immunization Surveillance: Surveillance of Adverse Events Following Immunization. 2012.
3. WHO. AEFI Investigations: Aide Memoire. Available at. www.who.int/immunization_safety/en.
4. WHO. Mass Measles Immunization Campaigns: Reporting and Investigating Adverse Events Following Immunization. Geneva(Revision May 2002).
5. Ministry of Health Uganda. National AEFI Surveillance Guidelines. December 2012.
6. Food, Medicine and Healthcare Administration and Control Authority Ethiopia. Guide for AEFI Surveillance in Ethiopia. August 2011
7. Mehta, U., Milstien, J. B., et al. Developing a national system for dealing with adverse events following immunization. Bulletin of World Health Organization 2000, 78(2)
8. WHO. Surveillance of Adverse Events Following Immunization: Field Guide for Managers of Immunization Programmes. Global Programme for Vaccines and Immunization, Expanded Programme on Immunization. WHO, Geneva 1997.
9. WHO. Vaccine Safety Basics Learning Manual. World Health Organization, 2013
10. World Health Organization Western Pacific Region. Immunization Safety Surveillance: Guidelines for immunization programme managers on surveillance of adverse events following immunization. World Health Organization, 2013
11. WHO. Yellow Fever. Surveillance of adverse events following immunization against yellow fever: Field Guide for staff at the central, intermediate and peripheral level. World Health Organization, 2010
12. CDC. Principles of Epidemiology in Public Health Practice: An Introduction to Applied Epidemiology and Biostatistics. Self-Study Course SS1978, 3rd Edition May 2010.
13. Ministry of Health Ghana. Sub-National Mass Vaccination Campaign against Yellow Fever 2012: Short Guide for AEFI Monitoring. October, 2012.
14. Ministry of Health Ghana. MenAfriVac Vaccination Campaign-October 2012: Guidelines for Monitoring Adverse Events Following Immunization (AEFI). October, 2012

ANNEXES

Annex 1: Reporting Form

REPORTING FORM FOR ADVERSE EVENTS FOLLOWING IMMUNISATION (AEFI)-GHANA

Reporting➔ Sub-District: District: Region:

AEFI Reporting ID Number
Region Code ☐☐☐ District Code ☐☐☐ Year ☐☐ Serial Number ☐☐☐

Vaccination Card/Booklet ☐Yes ☐ No

If no, state other source of information:

A. PATIENT DETAILS

*Name:

Sex: ☐ M ☐ F

If Female: Pregnant: ☐ Lactating: ☐

Contact Phone No:

Vaccination centre:

Community:

*Date of birth (DD/MM/YYYY): _ _/_ _/_ _ _ _

OR Age at onset: ☐☐Years ☐☐ Months ☐☐☐ Days

OR Age Group: ☐< 1 Year ☐ 1 to 5 Years ☐ > 5-18 Years ☐ >18-60 Years ☐ > 60 Years

*Address (landmarks and other contact information):

***B. DESCRIPTION OF AEFI**

☐ Severe local reaction ☐ >3 days ☐ beyond nearest joint
☐ Seizures ☐ febrile ☐ afebrile
☐ Abscess
☐ Sepsis
☐ Encephalopathy
☐ Toxic shock syndrome
☐ Thrombocytopenia
☐ Anaphylaxis
☐ Fever≥38°C
☐ Other (specify).....

Date AEFI started (DD/MM/YYYY): __ __ / __ __ / __ __ __ __

Time AEFI started ☐☐ Hr ☐☐Min

AEFI (Signs and symptoms- please give a summary of the case):

Indicate treatment given for the AEFI:

Past medical history (including history of similar reaction or other allergies), concomitant medication and dates of administration (exclude those used to treat reaction) other relevant information (e. g. other cases). Use additional sheet if needed: …….
……..

***C. OUTCOME OF AEFI**

***Serious¶:** ☐ **Yes** ☐ **No;** ➔ If Yes ☐ Death ☐ Life threatening ☐ Disability ☐ Hospitalization ☐ Congenital anomaly

☐ Other important medical event (Specify))

***Outcome:** ☐ Recovering ☐ Recovered ☐ Recovered with sequelae ☐ Not Recovered ☐ Unknown

☐ Died If died, date of death (DD/MM/YYYY): / / Autopsy done: ☐Yes ☐No ☐Unknown

D. DETAILS OF ALL VACCINE (S) ADMINISTERED

VACCINE(S)							DILUENT (if applicable)				
*Name of Vaccine (Generic/Brand)	*Date and time of Vaccination		*Route (if injection indicate L/R site)	*Lot / Batch No.	Dose (e.g. 1st, 2nd, etc.)	Expiry Date	Manufacturer	*Lot / Batch No.	Expiry Date	Date and time of reconstitution	
	Date	Time								Date	Time

E. REPORTER DETAILS

*Name: Profession/Designation: Tel No.:

Name of Institution: Today's Date: _ _ /_ _ /_ _ _ _ Signature:

For District Level Office

Date Report Received: _ _ /_ _ /_ _ _ _	Checked by:	Designation:
Investigation needed ☐ Y ☐ F	If yes, date started: _ _ /_ _ /_ _ _ _	

For National/Central Level Office

Date Report Received: ___ /___ /_____	Checked by:	Designation:
Comments (include results of Causality Assessment):		

¶All serious AEFIs & AEFI clusters (two or more cases of the same adverse event related in time, place or vaccine administered) should be investigated.

*Mandatory fields

Vaccine Safety/AEFI Surveillance **Ministry of Health/Ghana Health Service/Food and Drugs Authority February 2021**

GUIDELINES FOR COMPLETING FORM

Reporting: Complete the Sub-district, District and Region as appropriate e.g.:

SUB-DIstrict: Sekyedumasi District: Ejura-Sekyedumasi Region: Ashanti

ID: This is a unique identifier to be given or completed by the District EPI coordinator or the District AEFI focal person. The ID is made up of a three-letter Regional Code, a three-letter District Code and the last two digits of the year followed by the serial number of the AEFI case. E.g., ASH-EJS-12-006 represents the 6th AEFI case reported from Ejura-Sekyedumasi in the Ashanti Region.

Assignment of serial numbers follows that for routine case-based surveillance. If in doubt, consult the District Disease Control Officer

Vaccination Card/Booklet: Indicate as appropriate (Tick YES if seen; No if not seen-in appropriate boxes). A proof of vaccination is required for AEFI detection; in the absence of a card, a documentary proof of vaccination is required.

A. PATIENT DETAILS

Tick appropriate boxes or complete appropriate spaces provided.

B. DESCRIPTION OF AEFI

Tick appropriate boxes. Multiple selections are allowed. Indicate the date and time the AEFI started. For case definitions, see accompanying guidelines/ Standard Operating Procedures (SOPs). Give a short and brief summary of the case including any prior disease/condition and indicate treatment given for the AEFI.

C. SERIOUSNESS AND OUTCOME OF AEFI

Indicate the SERIOUSNESS of AEFI using the following guide: A SERIOUS AEFI is one that is life threatening or leads to hospitalization or prolongation of hospitalization (if the person is already hospitalized before being vaccinated) or causes disability for > 24 hours or leads to death; otherwise, it is NON-SERIOUS. Indicate outcome of the AEFI. A person is said to be recovering when s/he is still on admission in a hospital setting and improving or has improved but not fully recovered in hospital or at home. A person who has not recovered has not observed any improvement in his condition. A person has sequelae when there is a residual complication that is not likely to resolve. If there is death, provide date patient died and autopsy report if performed.

D. DETAILS OF ALL VACCINES ADMINISTERED

Give details of ALL VACCINES and where applicable, DILUENTS given prior to the AEFI. Provide details of vaccinations given, including the date and time of vaccination as well as the route of administration. The date and time of reconstitution of the vaccine should also be provided if applicable.

E. REPORTER DETAILS

The officer completing the form completes this section with the information needed.

For District Level Office; For National/Central Level Office: These sections are to be completed by respective levels.

PLEASE SUBMIT completed form through the District and Regional Levels to the EPI and FDA OFFICES. NB: COPIES MUST be kept at all levels.

AEFI INVESTIGATION FORM

MINISTRY OF HEALTH-GHANA HEALTH SERVICE/FOOD AND DRUGS AUTHORITY

(Only for Serious Adverse Event Following Immunization – Death / Disability / Hospitalization / Cluster)

Section A Basic details

Region **District** **Case ID**

Place of vaccination (✓): ☐ Govt. health facility ☐ Private health facility ☐Other (specify) _____
Vaccination in (✓): ☐ Campaign ☐ Routine ☐ Other (specify) _____

Address of vaccination site:

Name of Reporting Officer:

Date of investigation: __ __ / __ __ / __ __ __ __
Date of filling this form: __ __ / __ __ / __ __ __ __

Designation / Position:

This report is: ☐ *First* ☐ *Interim* ☐ *Final*

Telephone # landline (with code): Mobile: e-mail:

Patient Name: Sex: ☐M ☐F

(use a separate form for each case in a cluster)

Date of birth (DD/MM/YYYY): __ __ / __ __ / __ __ __ __

OR *Age at onset:* __ __ *years* __ __ *months* __ __ __ *days* ***OR*** *Age group:* ☐ *< 1 year* ☐ *1–5 years* ☐ *> 5 years-18 Years* ☐ *>18-60 Years* ☐ *>60 Years*

Patient's full address with landmarks *(Street name, house number, locality, phone number etc.)*:

Name of vaccines/diluent received by patient	Date of vaccination	Time of vaccination	Dose (e.g. 1st, 2nd, etc.)	Batch/Lot number	Expiry date
				Vaccine	Vaccine
				Diluent	Diluent
				Vaccine	Vaccine
				Diluent	Diluent
				Vaccine	Vaccine
				Diluent	Diluent
				Vaccine	Vaccine
				Diluent	Diluent
				Vaccine	Vaccine
				Diluent	Diluent

Type of site (✓) ☐ Fixed ☐ Mobile ☐ Outreach ☐ Other _____

Date of first/key symptom *(DD/MM/YYYY)*: __ __ / __ __ / __ __ __ __ Time of first symptom *(hh/mm)*: __ __ / __ __
Date of hospitalization *(DD/MM/YYYY)*: __ __ / __ __ / __ __ __ __
Date first reported to the health authority *(DD/MM/YYYY)*: __ __ / __ __ / __ __ __ __

Status on the date of investigation (✓): ☐ Died ☐ Disabled ☐ Recovering ☐ Recovered completely ☐Unknown

If died, date and time of death *(DD/MM/YYYY)*: __ __ / __ __ / __ __ __ __ *(hh/mm)*: __ __ / __ __
Autopsy done? (✓) ☐ Yes (date)_____ ☐ No ☐ Planned on (date)_____ Time_____
Attach report (if available)

Section B Relevant patient information prior to immunization

Criteria	Finding	Remarks (If yes provide details)
Past history of similar event	Yes / No / Unkn	
Adverse event after previous vaccination(s)	Yes / No / Unkn	
History of allergy to vaccine, drug or food	Yes / No / Unkn	
Pre-existing comorbidity/ congenital disorder?	Yes / No / Unkn	
Pre-existing acute illness (30 days) prior to vaccination?	Yes / No / Unkn	
Has the patient tested Covid19 positive prior to vaccination?	Yes / No / Unkn	
Pre-existing illness (30 days) / congenital disorder	Yes / No / Unkn	
History of hospitalization in last 30 days, with cause	Yes / No / Unkn	
Was the patient receiving any concomitant medication? (If yes, name the drug, indication, doses & treatment dates)	Yes / No / Unkn	
Patient currently on concomitant medication? (If yes, name the drug, indication, doses & treatment dates)	Yes / No / Unkn	
Family history of any disease (relevant to AEFI) or allergy	Yes / No / Unkn	
For adult women • Currently pregnant? Yes (weeks) _____ / No / Unknown		

Name **Case ID Number** AEFI Investigation Page 2/5

- Currently breastfeeding? Yes / No

For infants

The birth was ☐ full-term ☐ pre-term ☐ post-term. Birth weight:

Delivery procedure was ☐ Normal ☐ Caesarean ☐ Assisted (forceps, vacuum etc.) ☐ with complication (specify)

Section C Details of first examination** of serious AEFI case

Source of information (✓ *all that apply*): ☐ **Examination by the investigator** ☐ **Documents** ☐ **Verbal autopsy** ☐ **Other**_____ *If from verbal autopsy, please mention source* _____

Name of the person who first examined/treated the patient:_____

Name of other persons treating the patient: _____

Other sources who provided information (specify): _____

Signs and symptoms in chronological order from the time of vaccination:

Name and contact information of person completing these clinical details:	Designation:	Date/time

****Instructions – Attach copies of ALL available documents (including case sheet, discharge summary, case notes, laboratory reports and autopsy reports, prescriptions for concomitant medication) and then complete additional information NOT AVAILABLE in existing documents, i.e.**

- ***If patient has received medical care*** – attach copies of all available documents (including case sheet, discharge summary, laboratory reports and autopsy reports, if available) and write only the information that is not available in the attached documents below
- ***If patient has not received medical care*** – obtain history, examine the patient and write down your findings below (add additional sheets if necessary)

Name **Case ID Number** AEFI Investigation Page 3/5

Provisional / Final diagnosis:

Section D	**Details of vaccines provided at the site linked to AEFI on the corresponding day**									
Number immunized for each antigen at session site. Attach record if available.	Vaccine name									
	Number of doses									

a)	When was the patient immunized? (✓ the ☐ below and respond to ALL questions)	
	☐ Within the first vaccinations of the session ☐ Within the last vaccinations of the session ☐ Unknown	
	In case of multidose vials, was the vaccine given ☐ within the first few doses of the vial administered? ☐ within the last doses of the vial administered? ☐ unknown?	
b)	Was there an error in prescribing or non-adherence to recommendations for use of this vaccine?	Yes* / No
c)	Based on your investigation, do you feel that the vaccine (ingredients) administered could have been unsterile?	Yes* / No / Unable to assess
d)	Based on your investigation, do you feel that the vaccine's physical condition (e.g. colour, turbidity, foreign substances etc.) was abnormal at the time of administration?	Yes* / No / Unable to assess
e)	Based on your investigation, do you feel that there was an error in vaccine reconstitution/preparation by the vaccinator (e.g. wrong product, wrong diluent, improper mixing, improper syringe filling etc.)?	Yes* / No / Unable to assess
f)	Based on your investigation, do you feel that there was an error in vaccine handling (e.g. break in cold chain during transport, storage and/or immunization session etc.)?	Yes* / No / Unable to assess
g)	Based on your investigation, do you feel that the vaccine was administered incorrectly (e.g. wrong dose, site or route of administration, wrong needle size, not following good injection practice etc.)?	Yes* / No / Unable to assess
h)	Number immunized from the concerned vaccine vial/ampoule	
i)	Number immunized with the concerned vaccine in the same session	
j)	Number immunized with the concerned vaccine having the same batch number in other locations. Specify locations: _____	
k)	Is this case a part of a cluster?	Yes* / No / Unkn
i.	If yes, how many other cases have been detected in the cluster?	
a.	Did all the cases in the cluster receive vaccine from the same vial?	Yes* / No / Unkn
b.	If no, number of vials used in the cluster (enter details separately)	

It is compulsory for you to provide explanations for these answers separately

Section E Immunization practices at the place(s) where concerned vaccine was used

(Complete this section by asking and/or observing practice)

Syringes and needles used:

• Are AD syringes used for immunization?	Yes / No / Unkn

If no, specify the type of syringes used: ☐ Glass ☐ Disposable ☐ Recycled disposable ☐ Other _____

Specific key findings/additional observations and comments:

Reconstitution: (complete only if applicable, ✓ NA if not applicable)

• Reconstitution procedure (✓)	Status		
Same reconstitution syringe used for multiple vials of same vaccine?	Yes	No	NA
Same reconstitution syringe used for reconstituting different vaccines?	Yes	No	NA
Separate reconstitution syringe for each vaccine vial?	Yes	No	NA
Separate reconstitution syringe for each vaccination?	Yes	No	NA

Name **Case ID Number** AEFI Investigation Page 4/5

• Are the vaccines and diluents used the same as those recommended by the manufacturer?	Yes	No	NA
Specific key findings/additional observations and comments:			

Section F **Cold chain and transport** *(Complete this section by asking and/or observing practice)*	
Last vaccine storage point:	
• Is the temperature of the vaccine storage refrigerator monitored?	Yes / No
○ If "yes", was there any deviation outside of 2–8° C after the vaccine was placed inside?	Yes / No
○ If "yes", provide details of monitoring separately.	
• Was the correct procedure for storing vaccines, diluents and syringes followed?	Yes / No / Unkn
• Was any other item (other than EPI vaccines and diluents) in the refrigerator or freezer?	Yes / No / Unkn
• Were any partially used reconstituted vaccines in the refrigerator?	Yes / No / Unkn
• Were any unusable vaccines (expired, no label, VVM at stages 3 or 4, frozen) in the refrigerator?	Yes / No / Unkn
• Were any unusable diluents (expired, manufacturer not matched, cracked, dirty ampoule) in the store?	Yes / No / Unkn
Specific key findings/additional observations and comments:	
Vaccine transportation:	
• Type of vaccine carrier used	
• Was the vaccine carrier sent to the site on the same day as vaccination?	Yes / No / Unkn
• Was the vaccine carrier returned from the site on the same day as vaccination?	Yes / No / Unkn
• Was a conditioned ice-pack used?	Yes / No / Unkn
Specific key findings/additional observations and comments:	

Section G Community investigation (Please visit locality and interview parents/others)

Were any similar events reported within a time period similar to when the adverse event occurred and in the same locality?
Yes / No / Unknown If yes, describe:

If yes, how many events/episodes?

Of those effected, how many are
- Vaccinated:_____
- Not vaccinated:_____
- Unknown:_____

Other comments:

Section H Other findings/observations/comments

Annex 3: AEFI Linelist form

Annex 4: Guidelines for epidemiological investigations of AEFIs

Checklist for EPIDEMIOLOGICAL INVESTIGATION of AEFIs

This checklist is to be used for epidemiological investigation of serious AEFIs, AEFI clusters, Trigger Events; community deaths or other events of special interest where epidemiologic investigation is required. Investigations should be started within 24-48 hours of notification of the event.

Purpose of Investigation is to gather data:

- To quickly identify and address immunization - related error
- For causality assessment
- For program decision-making
- To raise research questions
- As basis for communication

Who should be involved in the Investigation?

Immunization Programme Officers, Clinicians, Laboratory staff, Vaccinators / other Public Health Staff

Investigate and collect data

- Ask about the patient
- Ask about the vaccine and other drugs potentially received
- Ask about other vaccinees
- Ask about immunization services
- Observe the service in action if appropriate
- Ask about cases in unvaccinated persons
- Establish a more specific case definition if needed
- Formulate a hypothesis as to what caused the AEFI
- Test formulated hypothesis

Collect Specimens if appropriate

From the patient the vaccine and diluent the syringes and needles

Key data to be collected

1. Data on each patient Demographic data about patient, including a unique case number/id, age, sex, place of residence, family history History of patient's present illness - symptoms and when each appeared and its duration, treatment, outcome, diagnosis, History of patient's past illnesses e.g., reactions to TT or other vaccines, drug allergies;

Pre-existing disorders, current medications; Immunization history - vaccine, number of doses received, date and place of immunization or immunization(s), mode and site of administration; Laboratory results about blood, stool, or other samples, if appropriate and available Full autopsy report with toxicological screening and histopathological analysis (in case of death) Look for common environmental exposures between patients

2. Date about the vaccine and diluent administered to the ` patient

- Lot/batch number, Expiry date, Manufacturer
- Vaccine Storage (Cold chain, other items store with vaccine)
- Identity where the vaccines were distributed to
- Whether other clients were immunized with same lot/batch at same session and elsewhere
- Results of procedures to control vaccine quality
- Laboratory test results about vaccine, if appropriate (applicable only at central level

3. Programme - related data

- Common practices in storing and handling vaccines, giving immunization, etc. in the health centre or session in which the suspected immunization(s) were given:
- Practices followed by health workers in storing vaccines e.g., is PENTA or TT frozen? Are expire vaccines used? Handing vaccines during sessions, e.g., are all open vials discarded after sessions?
- Practices in reconstituting vaccines and giving immunizations
- Are the right diluents used? Are diluents used sterile? Are the correct doses given? Are vaccines injected by the right route and in the right place?
- Is there pre-filling of syringes? Availability of needles and syringes
- Are Auto-Disable syringes used for each injection? Are mixing syringes used appropriately Infection prevention practices e.g., sterilizing equipment

4. Background data

- Number of people who received immunizations with vaccine from the same lot/batch or in the same immunization session, or both, and the number of these who fell ill and \ their symptoms (A separate AEFI Case Report Form should be completed for each person)
- Number of unimmunized people or people immunized with other lots/batch (from the same or a different manufacture) who fell ill with similar symptoms

5. Vaccinator(s) Details

- Details of person(s) who gave the immunization(s)
- Name; category of health staff, designation; rank; number of years in service etc.

Annex 5: Case definitions

Abscess (injection Site): Fluctuant or draining fluid-filled lesion/swelling at the site of injection. Bacterial if evidence of infection (e.g., purulent/pus, inflammatory signs, fever, culture); sterile abscess if not.

Anaphylactic reaction (Acute hypersensitivity reaction): Exaggerated acute allergic reaction, occurring within 2 hours after immunization, characterized by one or more of the following: wheezing and shortness of breath due to bronchospasm laryngospasm/laryngeal edema one or more skin manifestations, e.g. hives, facial edema, or generalized edema.

Anaphylaxis: Severe immediate (within 1 hour) allergic reaction leading to circulatory failure with or without bronchospasm and/or laryngospasm/laryngeal edema. Symptoms of anaphylaxis may include breathing difficulties, loss of consciousness, and a drop in blood pressure (anaphylactic shock). This condition can be fatal and requires immediate medical attention.

Anorexia: A complain of poor appetite that interferes with individual's normal eating habits Arthralgia: Reported generalized joint pains that interferes with individual's function Asthenia: (See fatigue)

Brachial neuritis: Inflamed nerves in neck & shoulder region

Bronchospasm: Clinical syndrome characterized by bilateral wheeze (noisy breathing-out) and difficulty in breathing ± Cough ± dyspnea (shortness of breath).

Convulsions (generalized): Witnessed sudden loss of consciousness and generalized tonic, clonic, tonic-clonic or atonic motor movements: Same as seizures.

Diarrhea: An increase in frequency of bowel movements (above normal or baseline) occurring within a 24-h period with a runny or liquid consistency of these stools.

Dizziness: Complain of difficulty in spatial perception and stability.

Eczema: History or present evidence of presence of itchy skin conditions with scales and loss of epithelial integrity (cracks in skin)

Encephalitis: Refers to an encephalopathy caused by an inflammatory response in the brain. This is usually manifested with systemic constitutional symptoms, particularly fever and pleocytosis (increased cells) of the cerebrospinal fluid. However, the terms encephalopathy and encephalitis have been used imprecisely and even interchangeably in the literature.

Encephalopathy: Acute onset of major illness characterized by any two of the following three conditions:

seizures severe alteration in level of consciousness lasting for one day or more distinct change in behavior lasting one day or more

Fatigue: Complain of tiredness (or a synonym) that is the primary complaint and is not relieved by rest and interferes with an individual's function. Synonyms for fatigue may include asthenia, run down, lassitude, tiredness, exhausted, loss or lack of energy, lethargy. Synonyms are also culture- and language-specific and can be adjusted accordingly.

Febrile: Relating to fever; feverish. A febrile seizure is a seizure or convulsion that occurs during a high fever

Fever: Raised body temperature > 37.50C. Fever can be classified (based on axillary temperature) as mild (37.5 to 38.50C), high (38.5 to 40.4OC) and extreme (40.5OC or higher).

Flaccid Paralysis: Sudden onset of muscle weakness and low tone (hypotonic muscles).

Headache: A new complain of pains in the head region that is severe enough to interfere with individual's function.

Hives: (see urticaria)

Hypotonia: Low muscle tone (the amount of tension or resistance to movement in a muscle). May or may not be associated with paralysis.

Hypotonic hypo-responsive episode (HHE): A recognized serious reaction to immunization, especially pertussis-containing vaccine. It is defined as an acute loss in sensory awareness or loss of consciousness accompanied by pallor and muscle hypotonicity. No long-term sequelae have been identified in the small number of children who have had long term follow-up. HHE is not a contraindication for further doses of pertussis vaccine.

Insomnia (Sleeplessness): is an individual's reported sleeping difficulties (reduction in sleep).

Local Reaction: Redness and/or swelling centered 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 hospitalization.

Laryngeal edema: Swelling of the throat characterized by stridor (noisy breathing-in) and difficulty breathing

Lethargy: (see fatigue)

Lymphadenitis/Lymphadenopathy: Inflammation and/or enlargement of one or more lymph nodes. Most cases indicate an immune response in the lymph node to local infection or antigen stimulation, for example in a vaccine. Generalized lymphadenitis is a widespread inflammation of the lymph nodes due to systemic (circulating) infection.

Meningitis Syndrome: Fever and stiff neck or other signs of meningism ±headache, vomiting, photophobia and high cell count in CSF determined as: >5 leukocytes/mm ±microorganism on Gram stain of CSF ± positive bacterial or CSF culture.

Myalgia: Reported generalized muscle pain that interferes with individual's function NAUSEA: a complain of subjective feeling of sensation to vomit ± vomiting

Persistent (uncontrollable) crying: The presence of crying which is continuous and likely to be unaltered for >3 h or unaltered for >3 h and likely to be continuous.

Persistent Nodule: The presence of a discrete or well-demarcated soft tissue mass or lump that is firm and is at the injection site in the absence of abscess formation and erythema and warmth.

Pruritus (itchiness): Itchiness without objective rash/skin or mucosal change.

Purpura: condition characterized by mucosal bleeding and bleeding into the skin in the form of multiple petechiae (small purplish spots), most often evident on the limbs, and scattered small bruises at sites of minor trauma.

Rash: Any skin or mucosal change (either new or a worsening of a previous condition) localized or generalized.

Seizure (SEE Convulsions): Occurrence of generalized convulsions that are not accompanied by focal neurological signs or symptoms. Febrile seizures: if temperature elevated >380C (rectal) or 37.50C axillary. Afebrile seizures: if temperature normal.

Sepsis (ALSO known as "blood Stream infection"): Acute onset of severe generalized illness due to bacterial infection and confirmed (if possible) by positive blood culture. Needs to be reported as possible indicator of immunization-related error.

Somnolence (Excessive Sleeping): is an individual's reported excessive sleeping that is unexpected or not due to sleep drugs.

Syncope: Fainting attacks as result of vaso-vagal reaction

Thrombocytopaenia: Serum platelet count of less than 50,000/ml leading to bruising and/or bleeding.

Toxic Shock Syndrome: Abrupt onset of fever, vomiting and watery diarrhea within a few hours of immunization; often leading to death within 24 to 48 hours; needs to be reported as possible indicator of immunization-related error. It is a life-threatening illness that is caused by toxins (poisons) that circulate in the bloodstream. Bacteria that have infected some part of the body release these toxins. People with toxic shock syndrome develop high fever, rash, low blood pressure, and failure of multiple organ systems in the body. It is a rare serious adverse event resulting from improper vaccine preparation and injection practices.

Toxidermia: Fever PLUS rash (any generalized skin or mucosal change--either new or worsening of a previous condition).

Urticaria (hives): The eruption of reddened marks on the skin that are usually accompanied by itching. This condition can be caused by an allergy (e.g., food, vaccine, drugs), stress, infection, or physical agents (e.g., heat, cold).

Vomiting: Reported forceful expulsion of the contents of one's stomach through the mouth and sometimes the nose. Synonyms: emesis, throwing up