



**Federal Democratic Republic of Ethiopia
Ministry of Health**

Guideline for Poison Information and Control Center

Emergency and Critical Care Directorate

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Foreword

Poisoning by chemicals is a significant risk in all countries where substantial quantities and increasing numbers of chemicals are being used in the development process. Similarly in Ethiopia, various types of pesticides and herbicides are being used for agriculture and other types of chemicals are also being used for household, industries and public health. However, most of them may contain hazardous substances and impurities that can harm human health and environment, if not properly managed. Cognizant of this fact, Federal Ministry of Health of Ethiopia has made the establishment of poison information and control centers and the promotion of harmonized systems for recording data as one of its priority initiatives.

Therefore, this guideline provides a policy and technical advice to those responsible for setting up poison information and control center and related facilities and gives recommended approaches for harmonized data recording and service provision throughout the country.

Finally, acknowledgment is made to the Poison Technical Working Group and participants of consultative workshops for their commitment and unreserved contribution to the effort of developing this guideline.

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Abbreviations

AAU-Addis Ababa University

BP – Blood Pressure

CEO- Chief Executive Officer

CPT- Center for poison treatment

CSF- Cerebrospinal fluid

CTU- Clinical Toxicology Unit

DALYs- Disability adjusted life years

ECG –Electrocardiogram

EEG- Electroencephalograph

EPHI- Ethiopian Public Health Institute

ER- Emergency Room

FMHACA- Ethiopian Food, Medicine & Healthcare Administration and Control Authority

FMOH- Federal Ministry of Health

HR- Heart Rate

ICU- Intensive care Unit

PIC- Poison Information Center

PICC- Poison Information and Control Center

PCC- Poison Control Center

PPE- Personal Protective Equipment

RHB- Regional Health Bureau

WHO- World Health Organization

Operational Definition

For the purpose of this document, the word Poison Information and Control Center is used to refer a center that has both an information providing capacity and medical center to provide treatment for patients. However, each region can establish either Poison Information Center (PIC) or Poison Control Center (PCC).

Summary

This guideline will provide the purpose and function of poison information and control center. The primary mission of a poison information and control center has always been optimizing poisoned patients' care and poison prevention. It offers real-time and continuous data needed for preparation and response during emergencies related to chemicals and also offers a means to report health concerns. Furthermore, it can be the marker of risk factors or identifier of vulnerable population. In an era of an evidence-based medicine and research, toxicovigilance based on the millions of cases registered by poison information centers everyday acquires more and more importance. Some of the functions of PICC are listed below and will be discussed in detail in this document.

- Providing an all hour toxicology consultation service to health care professionals (at all levels), industry, and the lay public.
- Providing comprehensive toxicological information and advice to health care providers & the general public at large through different Medias (printed materials, mass media, website, telephone).
- Development, implementation, and evaluation of measures for toxicovigilance activities.
- Maintaining databases, including toxicological databases, databases of product formulations & databases of poisoning enquiries to the center in the country.
- Supporting management of poisoning cases at the scene, pre-hospital and in facilities.
- Supporting laboratory analytical services for poison management and research.
- Conducting research activities in relation to different types of poisoning.
- Providing training and education to health care professionals and the community.
- Responding to chemical disasters, adverse effects of drugs, prevention and harm reduction of chemical disasters and substance abuse.
- Collaborate with similar organizations and other institutions concerned with prevention and management poisoning.

1. Introduction

Poisoning occurs when any substance interferes with normal body functions after it is swallowed, inhaled, injected, or absorbed. It is a significant public health problem. Tens of thousands of man-made chemicals are currently in common use throughout the world; a similar situation exists in the rapidly industrializing developing countries. Even in the least developed countries, there is a growing use of agrochemicals such as pesticides and fertilizers of basic industrial chemicals, particularly in small-scale rural cottage industries, household and other commercial products, as well as pharmaceuticals.

The global incidence of poisoning is not known. It may be speculated that up to half a million people die each year as a result of various kinds of poisoning, including poisoning by natural toxins. WHO estimates that the incidence of pesticide poisoning, which is high in developing countries, has doubled during the past 10 years. However, the numbers of cases that occur each year throughout the world, and the severity of cases that are reported, are unknown.

The rapidly growing role of chemicals in the economies of many countries in Africa, coupled with weak regulatory infrastructure, increases the likelihood of adverse health impacts. According to WHO estimates in 2012, there were 16,500 deaths from unintentional poisoning in 16 African countries. In addition, unintentional poisoning caused the loss of 1,128 cases 500 years of healthy life (DALYs, disability adjusted life years) in these 16 countries. It has been estimated that 7,800 deaths due to intentional ingestion of pesticides per year in Africa and between 1,400 and 10,000 deaths from snake bite in eastern sub-Saharan Africa.

Ethiopia is widely using various chemicals in industries, and herbicides and pesticides for agriculture; most of them contain hazardous substances and impurities that can harm human health and environment if not properly managed. It is also very difficult to obtain accurate figures for the number of poisoning cases since cases are often poorly recorded. Report from Health Management Information System (HMIS) of Federal Ministry of Health of Ethiopia (FMOH), the last four Fiscal Years 2001 to 2004 (July 1, 2008 to June 30, 2012) indicated an increased morbidity and mortality due to poisoning with more cases in

under 14 years of age. On the other hand, a study done in North-west Ethiopia, 0.45% of all emergency admissions were due to poisoning.

A poison information and control center is a specialized unit that advises and assists with the prevention, diagnosis and management of poisoning cases, provision of laboratory analytical services, toxicovigilance activities, research, education and training in the prevention and treatment of poisoning. As part of its role in toxicovigilance, the center advises and actively involved in the development, implementation and evaluation of measures for the prevention of poisoning. In association with other responsible bodies, it also plays an important role in developing contingency plans for responding to chemical disasters, monitoring the adverse effects of drugs and in handling problems of substance abuse. The structure and function of poisons centers vary around the world, however, at a minimum, a poison information and control center provides poison information services. Some poisons centers may also include a toxicology laboratory and/or a clinical treatment unit.

The first poison centers were instituted in North America and Europe during the 1950s. Since then, numerous others have been created, principally in industrialized countries. Most developed countries have well-established facilities for poison control, which is rare in developing countries. Many countries in Africa have limited ability to detect and manage the effect of chemicals on health, due to lack of understanding toxicology.

1.1. Objectives of the Guideline

1.1.1 General Objective

- The overall objective of this document is to guide the establishment and running of Poison information and control centers in Ethiopia.

1.1.2 Specific Objectives

- To serve as reference document for developing poison information and control center (PICC) at different levels of the country.

- To promote poison control research, training and community services at different levels of the country.
- To promote evidence-based and cost-effective management of poisoning.
- To promote the development of national treatment protocol, training manual and standard operating procedures for PCC.
- To strengthen awareness on poisoning, its prevention and management among health professionals and in the general community.
- To enable conduction of regular monitoring and evaluation of PCC at national and regional levels.
- To give direction for PCC at different levels of the country.

1.2. Rationale

The primary mission of a poison information and control center has always been optimizing poisoned patients' care and poison prevention. This center offers real-time and continuous data needed for preparation and response during emergencies related to chemicals and also offers a means to report health concerns. Furthermore, it can be the marker of risk factors or identifier of vulnerable population. In an era of an evidence-based medicine and research, toxicovigilance based on the millions of cases registered by poison information centers everyday acquires more and more importance. The data routinely collected by these centers could contribute to risk assessment documentation and to define priorities for risk assessment of the harmful chemicals.

Many health facilities are multifunctional and provide poison treatment service. However, the main challenges in developing countries are recognition and prevention, availability of treatment information, lack of formal training, equipped laboratory services, accessibility and availability of antidotes. In addition to these, new challenges emerge with globalization and introduction of new biochemical into the country. Therefore, the need for poison information center in our country is well demonstrated.

In addition, in 2015, the International Chemical Management project for improving the availability of poisons center in eastern Africa recommended the establishment of poison center in all the countries. Furthermore, WHO recommends that guidelines be prepared for

poison control and particularly on the role of poison information centers. However, such a guideline for the establishment and proper management of poison information and control centers in this country is not yet developed.

Considering the growing problem of poisoning for public health, the United Nations Conference on Environment and Development (UNCED) called upon all countries to promote the establishment and strengthening of poison information and control centers to ensure prompt and adequate diagnosis and treatment of poisoning, including networks of centers for a chemical emergency response. Therefore, the Federal Ministry of Health (FMOH) has developed this guideline for the establishment and running of poison information and control centers (PICC) in Ethiopia.

1.3. Scope

This guideline is to be used by policy makers, public and private leaders, all health care providers as well as teaching institutes in the country.

1.4. Purpose/Function of poison information and control center

- To provide comprehensive toxicological information and advice to health care providers & the general public at large through different medias (printed materials, mass media, website, telephone ...).
- Development, implementation, and evaluation of measures for toxicovigilance activities.
- Maintaining databases, including toxicological databases, databases of product formulations & databases of poisoning enquiries to the center in the country.
- Supporting management of poisoning cases at the scene, pre-hospital and in facilities
- Providing an all hour toxicology consultation service to health care professionals (at all levels), industry, and the lay public.
- Supporting laboratory analytical services for poison management and research.
- Conducting research activities in relation to different types of poisoning.
- Providing training and education to health care professionals and the community.

- Responding to chemical disasters, adverse effects of drugs, prevention and harm reduction of chemical disasters and substance abuse.
- Collaborate with similar organizations and other institutions concerned with prevention and management poisoning.

2. Establishment of Poison Information Center

A poison information service should be available at national and regional level. Ideally there will be one national poison information center with a series of regional satellite centers. Generally speaking, a regional poison information center should serve a population of 5-10 million and close collaboration between them. Depending on the availability of other services that provide information on pesticides and chemical exposure, a poison information center may provide advice on a wide range of problems. Besides, its associated toxicological laboratory service will be multifunctional.

Establishing a national poison center requires political and financial support, technical input and material resources. Political and financial support is needed from the relevant ministries, particularly health, agriculture and environment. In addition, the poison center must have the support of the main professional groups of users such as nurses, physicians and pharmacists. Sustained financial support is essential for the proper functioning of the poison information and control center.

A poison information center needs certain minimum facilities and resources to function optimally, but a modest establishment that can be expanded in the future is preferable to no service at all. The national poison information and control center should have all the required facilities. However, the regional poison information and control center can begin the service by establishing a poison information center in leading hospitals with emergency and critical care services.

Internet-based and/or offline poison information databases shall be developed and such databases can be used throughout the country. It provides poison information with a focus on our country products and natural toxins. This database shall be distributed on CD-ROM to hospitals throughout the country.

2.1. Location

Ideally, the center should be located or affiliated at a leading hospital with emergency and intensive care services, as well as a medical library and a laboratory facility. It should be linked directly with a hospital emergency department where poisoned patients are treated.

The laboratory facilities of such institution can usually be expanded to allow toxicological analysis to be undertaken and appropriate quality control to be exercised. The center should operate 24 hours a day all year round.

2.2. Staff

A poison information center needs a team of poison information specialists¹. The center should be headed by a director who is trained and experienced with toxicology and have sufficient personnel to perform the duties of the center on a 24/7 basis. The director will be fully responsible for the operation of the center and should be employed on a full time basis. A poison information specialist helps to prepare and provide expert information and advice on preventing and dealing with poisoning.

The team will include fulltime and part time emergency physicians, nurses, health officers, clinical pharmacists/pharmacists, pharmacologists and IT personnel. When necessary the center will consult other scientists. Additionally, the team should have experiences in emergency and critical care, trainings in applied/clinical toxicology. Additional advantage will be training in health informatics.

When there are staff shortages, part-time staff members can work with the above trainings and experiences. The center will operate 24 hours a day for receiving calls and other clinical providers will be consulted as needed. When there is a need, the center should have access to expert psychiatric advice, psychiatrist and mental health professionals will be consulted.

Numbers of staff in the various categories must be sufficient to provide an adequate, continuous service at all times. While the enquiry load may vary according to the time of day, it would be desirable to have a minimum of four poison information specialists at national poison information centers to manage activities and regional satellite poison information centers can adjust according to their number of population. Those who answer

¹The term "poison information specialist" is used in this guideline to include all personnel at poison information centers who are involved in providing the poison information service.

enquiries must have adequate knowledge of toxicology and related scientific disciplines and should also be in regular contact with analytical and treatment facilities.

2.3. Equipment and facilities

If a poison information and control center is to function effectively, certain basic equipment is essential, including suitable office furniture and facilities for the storage of confidential data. Internet connection for web browsing and email service is important. There should be a collection of information resources in the area of toxicology and poisoning including textbooks, handbooks, guidelines, protocols and offline databases. Standard operating procedures shall be developed to the centers. Optimum area shall be set out by the facility considering area for answering telephone enquiries, desk space for computers, preparation of documents, staff meetings and administrative work. Optimum office chairs with table, shelf(s) for reference material storage, lockable file cabinets, printers, copier, and telephone are necessary for running the service.

2.4. Governance

The national and regional poison information centers will be under Federal Ministry of Health and Regional Health Bureau respectively that will be headed by experienced and dedicated poison information and control center director. The Federal Ministry of health or Regional Health Bureaus may delegate hospitals to oversee the poison information and control center.

2.5. Human Resource

Pharmacist or clinical pharmacist or same level of other health professional can work as a poison information specialist. Other staff members include:

- Emergency physician or general practitioner with toxicology specialty or any other health professional with toxicology advanced degree
- Pharmacologist
- Nurses
- Health officers

- Other support staffs

2.6. Collaboration with different institutions

Twinning arrangements between centers can be very valuable permitting exchanges of information, documentation including case data on unusual types of poisoning, and staff. As a means of technical cooperation, twinning should also be encouraged between new and established centers within the country and abroad. Cooperation at the international level between poison information centers, their national and regional associations, relevant professional bodies, governments, and international organizations could do much to improve the prevention and control of poisoning in the following areas:

- Training and education through staff exchange
- Conducting research
- Service improvement activities
- Information and documentation exchange
- Provision of antidotes

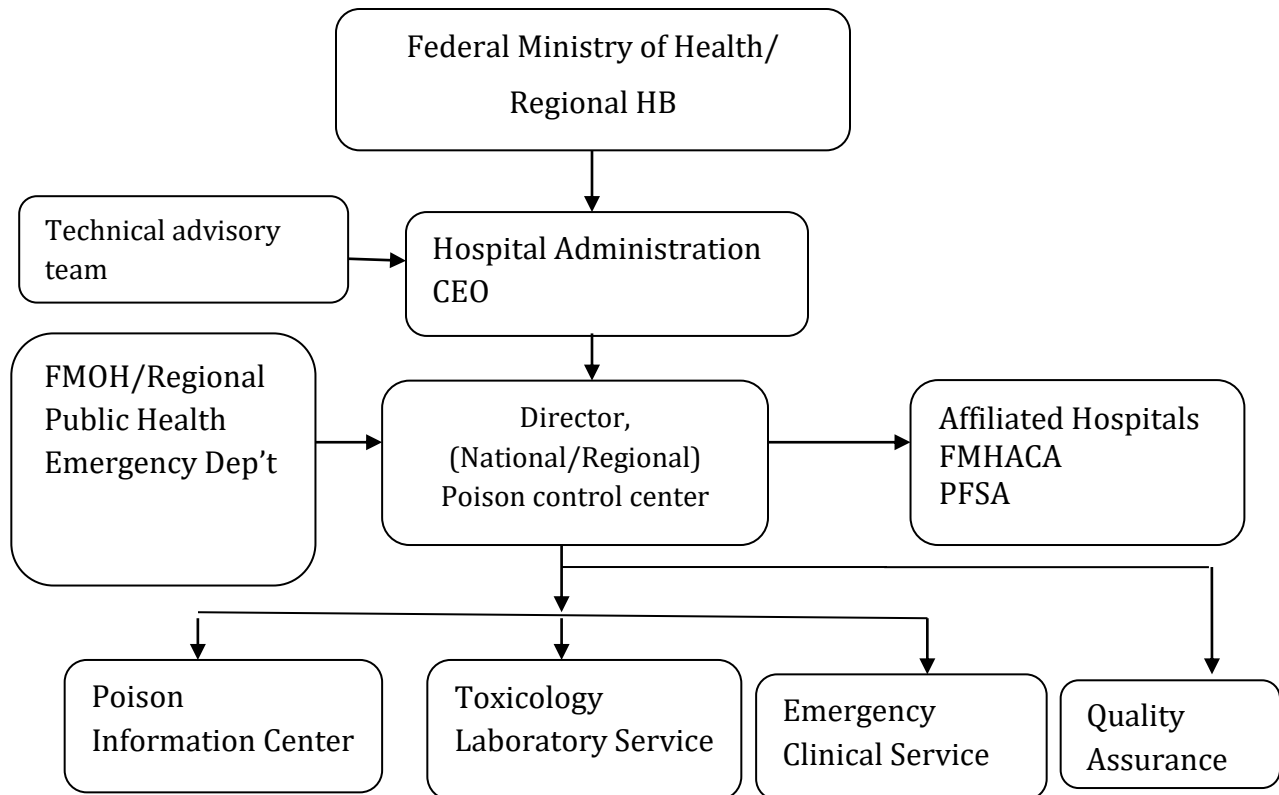
2.7. Organization

2.7.1 At National level

Strategy, guideline, manuals, treatment protocols or handbooks will be prepared by FMOH/Emergency and critical care directorate in consultation with national advising task force. National advisory task force will be established by technical personnel. The poison information and control center will be affiliated with a hospital selected appropriate for toxicological services based on the following criteria:

- Institutional arrangement
- Commitment of the hospital management
- Availability of trained staffs in toxicology
- Availability of staff trained in emergency and critical care
- 24/7 service emergency services
- Ambulance service

- Geographical access to patients
- Annual number of emergency patients
- Fulfill appropriate equipment, supplies and antidotes



2.7.2 At Regional level

PIC will be organized under the appropriate department based on the structural organization of the RHB. The national PIC, FMOH and RHB will provide the technical support to one of the leading hospitals appropriate to the affiliation.

2.8. Tasks of the Poison Information Center

1. *Developing and distribution of Educational and informational materials, poison management algorithms and training:*

- It shall prepare, publish and distribute poison information bulletins, newsletters, brochures, and posters targeting the general public and health professionals.

- It shall provide education and training on poison prevention and management to health professionals and consumers through in-service training and workshops.
 - It shall provide education on poison prevention and management to consumers through mass media.
 - It shall prepare national or regional formularies for relevant antidotes, handbooks and other reference materials in collaboration with appropriate stakeholders.
 - It shall train poison information officers and specialists.
2. *Conduct Research and/or participate in poison studies:*
- It shall conduct on its own or in collaboration with others in carrying out poison information service studies.
 - The center conducts epidemiological studies, outcomes of interventions, morbidity and mortality rate and trends, audit and evaluates the quality of service.
3. *Supporting and Supervising:*
- The national PIC will support regional poison information centers.
 - It shall conduct supportive monitoring and evaluation on other PICs.
4. *Quality Assurance*
- The center should maintain and provide a high standard quality of poison information services.
 - The center shall adhere to quality assurance program, to the following:
 - Assessment and identification of problems
 - Timely implementation of solution and response to inquiry
 - Monitoring and evaluation of solutions
 - Documentation and dissemination of results
 - Maintaining data confidentiality
 - Extent and quality of services provided
 - Collaborations and communications made
 - Researches/assessments conducted
5. *Ethical Provision of Poison information:*
- The information provided should not compromise patient's confidential information.

- Shall provide poison information for medico-legal cases to the right body.
- The center shall provide independent information in the provision of poison information.
- The center shall provide evidence-based and reliable information in a sustainable manner, which should be supported by references/literature.
- The legal status of a center should enable it to maintain the confidentiality of the data it handles and, Information should be provided free of charge to enquirers, particularly in emergencies and for research.

6. *Collaboration with regional, institutional and international centers*

- The national PIC shall coordinate information resources and cooperate with regional and health institutions to avoid unnecessary duplication and to provide extensive coverage of the literature.
- The national PIC shall make all the necessary efforts to keep contacts between regional, health institutions and potential international centers to exchange information materials and antidotes.
- The PIC shall make efforts to exchange experiences on the provision of poison information between regional, health institutions and international centers.
- The national PIC should collaborate with pre-hospital caregivers and FMOH public health emergency department for special cases.

7. *Answering enquires*

- The center shall answer poison-related enquiries coming from health professionals and the general public.
- Answers given to public enquiries should be handled carefully (in conjunction with treating physician, if any) and results should be followed up by the center.

8. *Monitoring and evaluation*

- It shall monitor and evaluate the status of poison information services of the centers at RHBS & federal health institution level. The points mentioned under quality assurance shall be monitored and evaluated.

3. Toxicovigilance and prevention of poisoning

Toxicovigilance is the active process of identifying and evaluating the toxic risks existing in a community, and evaluating the measures taken to reduce or eliminate them. It involves the analysis of poisons center enquiries to identify whether there are specific circumstances or agents giving rise to poisoning, or certain populations suffering a higher incidence of poisoning. Toxicovigilance can also reveal whether there is an emerging toxicological problem resulting from, for example, the reformulation of a product or a change to its packaging or labeling, the availability of a new drug of abuse, or an environmental contamination.

This program should be expanded to different parts of the country based on the demand and data drawn from the poison information and control center which may be qualitative and quantitative information on cases of poisoning and be used for the evaluation of preventive activities. The decision should depend on good basic information about each local situation, including details of:

- Acute and chronic poisoning cases
- Problems of environmental contamination
- Industrial and agricultural poisoning
- Food poisoning
- Biological hazard exposure
- Drug abuse
- Circumstances in which there is a high risk of exposure

3.1. Data sources and documentation

- Updated textbooks, guidelines, treatment manuals, scientific publications
- Analyzed data on enquires received by poison information center
- Reports of surveys and monitoring carried out by other poison information centers
- Reports from emergency departments, toxicological laboratories

For effective toxicovigilance and prevention of poisoning, comprehensive data on all chemical substances and natural toxins found in the country should be collected, analyzed

and documented. Therefore, adequate resources should be availed to the person(s) in charge of toxicovigilance activities including:

- Statistical and epidemiological tools and data
- Online toxicological information sources
- Communication facilities
- Access to computerized databases and computers to store/retrieve data
- Adequate space and facilities for office, data storage, and staff administration

Staffing for toxicovigilance and prevention of poisoning

- Staff with toxicological training and experience should be familiar with the legislation and regulations concerning the safety of chemical products and be aware of local toxicological problems related to the environment. They should also be taught how to deal with the public and professionals from other fields.
- The person in charge of toxicovigilance and preventive activities should have the following responsibilities, skills and knowledge:
 - Have knowledge of other disciplines relevant to toxicovigilance and the prevention of poisoning
 - Have the ability to supervise the analysis of data and promote epidemiological research;
 - Ensure that periodic (at least annual) assessment is made of the trend of poisoning problems in the country or region concerned and inform the relevant authorities about preventive measures;
 - Utilize available data to alert on toxicological problems when necessary, enlist the cooperation of relevant partners, and plan effective action;
 - Ensure that adequate educational material on the prevention of poisoning is prepared for both health care professionals and the public, including material for use in pediatric outpatient clinics, by teachers and children at school, and by healthcare professionals in rural hospitals;

- Identify sources of funding for preventive activities (e.g. for the publication of colorful, easily understood brochures or posters, and for financing campaigns and educational courses).

Besides the staff of poison information centers, other specialists who might involve in toxicovigilance and prevention include health educators, health extension workers, psychiatrists, social workers and experimental toxicologists to perform their respective tasks:

4. The role of poison information centers in chemical incidents

A poison information center often has the advantage of being the only center of its kind in a country or a region providing a 24-hours-a-day service and may therefore play a central role in chemical incident and disaster preparedness and response activities.

The fire and emergency rescue services, together with the police, are usually the first to notice and report to the center during chemical incidents (or events). By providing appropriate information, poison information centers play an important role in ensuring appropriate response to major incidents involving chemicals. A clinical toxicology services may also be involved in the treatment of victims. The staff of the poison information center;

- Should be able to provide specific instructions on how to act in the case of a chemical disaster.
- Should be prepared to provide relevant information on the chemicals involved to those responsible for handling the emergency or alert procedures, as well as to decision-makers and the mass media.
- Should know how to recognize the magnitude or level of the incident (whether it is operational, local, regional, or international) and should alert the center's director, other staff, and health and other authorities, according to established procedures.
- Must be trained to address the general public, either directly or, preferably, through the mass media.
- Should be instructed on how to release information that is factual and build resilience and understanding in responding to disasters and, while providing reassurance and a clear message.

Centers should take an active part in contingency planning, education, and training for chemical incidents. They should also initiate research and follow-up studies when appropriate as described below:

4.1. Information

The poison information center may act as the focal point for action in case of chemical incident and should be prepared to provide adequate information rapidly in the acute phases. It is important to have information on:

- toxic chemicals and their effects
- high-risk areas and processes and/or activities involving risk
- which chemical(s) might be released, in what forms and quantities
- possible protective and remedial measures.

The exact location, capabilities, and capacities of treatment and toxicological analytical services and of facilities for emergency transport must be known. Centers must also be aware of the responsibilities and roles of all bodies involved in contingency planning, and establish close communication links with rescue services and the police.

In the event of a major chemical incident poison information centers may expect a flood of telephone calls. They should be prepared to deal with this type of situation, avoiding panic and providing advice rapidly to all concerned parties.

4.2. Contingency planning

Poison information centers should cooperate with other agencies in contingency planning for chemical incident. If contingency plans have already been established, a poison information center may become an emergency control center in the event of a chemical disaster. The regional information centers should therefore have the foresight to consider what chemical disasters could occur within their region and be prepared to provide fast, accurate advice and orientation.

Emergency medical plans must be extended to cover chemical incident, and close collaboration should be established between the planners and the poison information

center. The center should provide the planners with guidelines on: measures for risk assessment; decontamination *in situ* and within hospitals; first-aid measures; general and specific therapy; and measures to ensure the availability of antidotes. At the medical level, poison information centers should also be aware of the facilities available for dealing with large numbers of victims in terms of number of beds, pharmaceutical Supplies, and availability of specific antidotes.

Staff at clinical toxicology services may be involved in the treatment of victims of chemical incidents or disasters. They need to provide guidance to the medical rescue teams in regards to the triaging of poisoned patients, necessary protocols for decontamination and pre-hospital care. Any hospital that treats patients may need to provide decontamination facilities outside its emergency admission area in order to prevent contamination of the hospital by toxic chemicals.

4.3. Education and training

Poison information centers should play an active role in the education and training of all members of rescue teams and health professionals for their role in the event of chemical incident. This education and training should be geared to the educational level of each group being trained (e.g. fire and emergency, polices, supervisors, health professionals). Training should cover decontamination techniques and protective measures for medical staff treating contaminated patients, as well as triage techniques.

4.4. Follow-up studies

Close follow-up studies of both major and minor chemical incidents may yield much valuable information on their handling. In the event of a major incident involving chemicals, poison information centers should be ready to mobilize one or more competent personnel to assist.

A staff member from the center may need to go to the scene of the incident, or to the place where the patients are being treated, in order to take an active part in evaluation and risk assessment, coordinate advice to health care personnel on site, and organize analytical

tests. This would also provide an opportunity to collect human toxicological data, valuable for advice on future occasions and for further planning in respect of chemical incident.

5. Clinical Toxicological Services

Cases of poisoning may be treated in many places, e.g. at the scene of the incidents, during transport and in a health facility such as a hospital. The type of care that can be given will depend on whom ever makes the initial contact with the patient and under what circumstances. Basic trainings should be given to first responders, E.g. school teachers, pre-hospital personnel, police and fire and emergency prevention and control Authority etc... and also to increase the public`s awareness about the PIC.

Most cases of poisoning, however, will be treated at any health facilities, usually at a hospital, far from a poison information center and without access to a specialized clinical toxicology unit. Poisoned patients might be treated in facilities with emergency medical services including primary, general or referral hospitals. However, without compromising the referral service to the appropriate level, any health facility shall prepare itself to treat poisoned patients.

Ideally, with wide range of medical facilities including ICU or some may use a specialized treatment services for the management of poisoned patients. However, most cases will be treated at the health facilities of a general hospital without access to a specialized clinical toxicology unit and far from a poison information center, still with access and communication with the PIC.

At a general hospital level, treatment of acute poisoning can be given at:

- ER (pediatrics& adult): high number of patients
- ICU, (pediatrics& adult); critically ill patients
- General medical unit, (Pedi& adult). After stabilization
- Specialized services: GI nephrology, cardiology etc... with specific organ injury

To be able to treat poisoned patients optimally, a general hospital needs equipment for:

- Decontamination of the GI, skin and ocular

E.g.: equipment for gastric lavage, specific decontamination area in the ER with Shower heads.

- Immediate and often longer term life support
E.g.: endotracheal intubation assisted and controlled ventilation, and defibrillator
- Continuous monitoring
E.g.: ECG, BP, pulseoximetry, HR, Temperature
- Diagnostic equipments E.g. : X-ray
- General biomedical lab analysis E.g. Serum electrolyte, blood glucose, liver and kidney function tests, coagulation profile, acid base balance, blood gas analysis
- Specific toxicology analysis of body fluid such as blood, urine
- Enhanced elimination (Hemodialysis, Peritoneal dialysis)
- Administration of appropriate Antidotes

5.1. Clinical Toxicology Unit

A center for poison treatment (CPT) offers comprehensive care for victims of severe or unusual poisonings. All activities of the CPT shall be under the control and supervision of a qualified center director.

5.1.1 Roles and functions of Clinical toxicology units (CTU)

CTU deals exclusively with the management of poisoning. Ideally, a specialized clinical toxicology unit should be part of federal or regional health facilities for the management and treatment of poisoning. Highly reliable communication between the unit and the information service and laboratory are essential in order to establish a partnership between them in the diagnosis and management of poisoning.

It provides:

- Provide optimal treatment of poisoned patients
- Identification of the effects of chemicals and natural toxins on health
- Evaluation of the cause-effect relationship in a case of poisoning
- Assessment of new development in clinical and analytical methods of diagnosis and treatment

- Appropriate follow up and surveillance of cases for identification and assessment of sequelae and
- Study the circumstance of the poisoning and predisposing factors

5.1.2 Location and Facilities of CTU

The minimum requirements for setting up a clinical unit for the treatment of acute poisoning are:

- Availability of methods, equipment, and areas for the resuscitation, decontamination, and initial management of poisoning cases.
- Good communication links with a poison information centre
- Well established protocols for the treatment of the most common cases of acute poisoning
- Availability of antidotes in quantities appropriate to the frequency of the main forms poisoning
- Laboratory facilities for standard biological analyses and for toxicological screening
- Availability of emergency transport for patients
- An emergency plan for dealing with disasters and major chemical incident.
- To function to the best advantage, a CTU service should be located as a separate unit within an advanced multifunctional hospital and within or next to the PICC.
- It should have full facilities for prolonged life support, stabilization of vital signs, and correction of acid-base and fluid and electrolyte abnormalities, equipment for decontamination & elimination of poisons including dialysis and hemoperfusion.

5.1.3 Staff (S) for CTU

- Initially, the staff may consist of ER physicians, pediatricians, anesthetists, intensive care staff to look after severely poisoned patients
- A well-qualified or adequately trained staff has an important role to play in the initial evaluation, transfer and referral of cases.

Ideally, therefore, the staff of a CTU should consist of:

Medical director of CTU

- Organize the care of poisoned patients both directly and through consultation
- Implement, review, and update protocols for the evaluation and treatment of cases
- Supervise staff performance
- Promote toxicology research
- Identify those programs or agencies that might provide funding for research or further development of the service.

Staff of the CTU:

- Trained specialist(s) in clinical toxicology
- Physicians(s) with competency in case of critically ill patients or emergency
- Psychiatrist(s)
- Clinical pharmacists or pharmacologists
- Social workers
- Supporting paramedical staff
- Administrative staff and record keepers
- Forensic staff

5.1.4 Research

The CTU shall conduct and publish research findings relating to clinical toxicology.

5.1.5 Data collection and reporting

The CTU shall record and report a database of all patients and reports of all cases to the poison control information center.

5.1.6 Training

- Staff should be trained in toxicology
- The objective being to obtain experience of every aspect of the work of a center
- In addition, they should attend seminars, courses, lectures, and conferences, meetings in and outside the center.

Academic institutions should be encouraged to develop toxicology as a discipline

5.1.7 Facilities for Clinical Toxicology Unit

Minimum facility requirements	Optimal Facility requirements
LOCATION <ul style="list-style-type: none"> • Emergency department • Internal medicine ward; or • Intensive care unit 	LOCATION <ul style="list-style-type: none"> • Separate specialized unit within a multifunctional hospital
Resuscitation Equipment <ul style="list-style-type: none"> ▪ Suction; ▪ Airway protection; and ▪ IV administration 	Resuscitation Equipment <ul style="list-style-type: none"> • Additionally: <ul style="list-style-type: none"> ▪ Mechanical ventilator; ▪ ECG; ▪ Defibrillator ▪ Pacemakers ▪ Hemodynamic monitoring equipment
Decontamination <ul style="list-style-type: none"> • Shower • Separate area for decontamination, • Gastric lavage equipment , • Shower, and • Facilities for skin and eye washing 	Decontamination <ul style="list-style-type: none"> • Additionally : <ul style="list-style-type: none"> ▪ facilities for dialysis and haemoperfusion
Diagnosis and prognosis	Diagnosis and prognosis <ul style="list-style-type: none"> ▪ EEG ▪ Fibroscope Devices e.g. oesophagoscope, bronchoscope
LABORATORY <ul style="list-style-type: none"> • Biological: Blood typing ;cross-matching ;blood gas; pH;electrolytes ;standard urine analysis ;CSF analysis • Toxicology screening test equipment for thin layer chromatography or RIA 	LABORATORY <ul style="list-style-type: none"> • Comprehensive analysis of blood ,urine , and other body fluids ;functional studies • Toxicology equipment for specific quantative and qualitative analysis for research and toxicokinetic studies
ANTIDOTE AND OTHER AGENTS <ul style="list-style-type: none"> • Selection made from the list 	ANTIDOTE AND OTHER AGENTS <ul style="list-style-type: none"> • Full selection including agents under development
OTHER FACILITIES <ul style="list-style-type: none"> • Normal facilities for transport of patients 	OTHER FACILITIES <ul style="list-style-type: none"> • Transport facilities (E.g : ambulances) Equipped with lifesaving system • Access to specialized center E.g : for psychiatric and rehabilitation

<p>PERSONNEL</p> <ul style="list-style-type: none"> • Emergency room physicians and intensive care physicians, available 24 hours a day • Nurses, clinical pharmacists, laboratory personnel 	<p>PERSONNEL</p> <ul style="list-style-type: none"> • Clinical toxicologists; • Anesthetist; • Pediatrician; • Psychiatrist; • Social worker
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5.2 The role of clinical services in chemical disaster

Staff at clinical toxicology services may be involved in the treatment of victims of chemical incidents or disasters. They need to provide guidance to the medical rescue teams on the triage of poisoned patients, on their initial treatment procedures before they reach a hospital, and on decontamination at the site of the incident. Any hospital that treats patients may need to provide decontamination facilities outside its emergency admission area in order to prevent contamination of the hospital by toxic chemicals.

6 Analytical toxicology and other laboratory services

Laboratory services are an essential component of a poison control system. They should be capable of undertaking toxicological analyses of both biological and chemical exposures as well as relevant biomedical analyses, on an emergency basis. Each laboratory service should develop its analytical capabilities in partnership with the clinical service and poison information center. Furthermore, treatment of poisoning requires cooperation between laboratory services and those who interpret the analytical data. Laboratory services also have an important role in the surveillance of populations exposed to toxic substances.

Analytical toxicology and other laboratory services may be provided within a general hospital laboratory or university laboratories that also conducts routine biomedical analyses but should preferably have their own specific equipment and support. A specialized analytical toxicology laboratory may also be established at national and regional level which would normally be associated with a multifunctional poison information and control center and could also provide further services to the community, such as forensic toxicology, monitoring drugs of abuse and therapeutic drugs, and biological monitoring of occupational and environmental chemical exposure.

6.1 Functions of analytical toxicology service

The main functions of an analytical toxicology service are to provide:

- Emergency qualitative and/or quantitative assays for certain common poisons, especially where knowledge of the amount of poison absorbed may influence treatment (a 24-hours-a-day service may be essential for such assays);
- More complex analyses, such as "unknown" screening for cases where the cause of illness is unknown but may involve a poison; these analyses should be available, even if not provided on an emergency basis;
- Analyses to monitor the efficacy of certain treatment or elimination techniques (e.g. haemoperfusion, haemodialysis); or Analyses for the biological monitoring of populations exposed to chemicals occupationally or environmentally;
- Advice on the collection, storage, and transport of specimens, and on the interpretation of results of analyses;
- Research into toxicokinetics and mechanisms of toxicity, in collaboration with clinical services and poison information centers.
- In case of suspecting drug overdose, analyze serum drug level and report.

6.2 Location

The ideal location for an analytical toxicology laboratory is within, or close to, clinical services where poisoned patients are treated. This may facilitate the rapid transport of samples and consultation on specific cases between clinicians and analysts.

6.3 Equipment

The availability of basic equipment, including balances, centrifuges, vortex mixer, water-bath, refrigerator, freezer, and fume cupboard, is assumed. Although the analytical equipment available will inevitably depend on local requirements and circumstances, certain basic equipment for techniques such as calorimetry, spectrophotometry, high-

performance liquid chromatography and thin-layer chromatography will normally be available, even if only at the local hospital laboratory.

The use of more sophisticated analytical techniques such as Immunoassay, Gas chromatography, Mass spectrometry, High-performance liquid chromatography, and Atomic absorption spectrophotometry requires specialized back-up facilities (servicing and consumables). A high degree of operator expertise in both the use and maintenance of such equipment is also essential. Necessary equipment and consumables should be purchased.

6.4 Reference Materials

The availability of pure reference compounds is essential for any analytical toxicology service. These can be purchased or provided with commercial kits. In some instances, reference solutions may be obtained from other laboratories, locally or internationally.

6.5 Reagents and consumables

Special chemicals are required to perform many colorimetric assays and to prepare reagents for thin-layer chromatography. Particular attention should be given to ensuring a reliable supply of such chemicals. Availability of consumables for chromatographic and other techniques must be guaranteed if equipment is to be used to full advantage.

6.6 Staff

The staff required by a laboratory service will depend on the volume and type of toxicological and other tests to be performed, which in turn will depend on local circumstances. Every toxicological laboratory must have at least one experienced toxicological analyst and one laboratory assistant. Laboratory assistants should have been educated in one or more science subjects and has practical analytical experience. The number employed will depend upon local circumstances and particular situations, such as the need to provide an emergency service. Rotation of these personnel with, for example, the staff of a local hospital laboratory could help in establishing a pool of experience.

An analytical toxicologist should possess a university degree, or the equivalent, in chemistry, biochemistry, experimental toxicology, laboratory, pharmacy, or pharmacology,

and have a good understanding of analytical chemistry. A further qualification, such as MSc or PhD, plus relevant experience that includes a high standard of practical analytical work, would be an advantage for the head of an analytical toxicology laboratory. Wider knowledge of aspects of toxicology other than analytical toxicology is also desirable.

For the analyst, in addition to gaining practical on-the-job experience, continuing education, such as participation in research and development projects, case presentations, and attendance at international meetings, should be encouraged. Membership of national and international toxicological and pharmacological societies should also be encouraged. Analytical staff may be at risk both from the toxic effects of chemicals with which they work and from diseases associated with biological samples (particularly viral hepatitis and HIV infection). Appropriate educational and safety measures are essential. In addition, analysts should be made aware of and encouraged to adopt principles of good laboratory practice.

6.7 Quality Assurance (QA)

The analytical data provided by laboratory services must be reliable, and this can be best assured by employing basic QA procedures including *Internal and External quality control*.

7 Antidotes and their availability

Antidotes play an important role in the treatment of poisoning. While good supportive care and elimination techniques will, in many cases, restore a poisoned patient to good health and stabilize his or her body functions, the appropriate use of antidotes and other agents may greatly enhance elimination and counteract the toxic actions of the poison. General principles of poisoning management shall be continued even in the absence of specific antidotes for the case. In areas remote from good hospital services, and particularly in developing countries that lack adequate facilities for supportive care, antidotes may be even more essential in the treatment of poisoning.

In deciding which type and quantity of antidotes should be stocked, a number of factors should be taken into consideration, notably the following: The density of the population being served, the incidence of poisoning cases that require specific antidotes and social & economic activities of region that may be associated with risk of poisoning

Poison information centers are in the unique position of having an overall perspective of local poisoning incidents that will enable them to identify the need for specific antidotes in the country as a whole, as well as in particular areas. It is, therefore, a primary task of these centers to draw attention to the need for making appropriate antidotes available. In addition, information provision/training should be arranged in order to familiarize clinical personnel with the proper use of antidotes.

PICs should also stimulate the creation of a national network for the supply of antidotes, which will require their close collaboration with FMHACA, PFSA and hospital pharmacies. FMOH should also encourage the manufacture, import and distribution of antidotes not yet available on the local market. Availability of antidote list could be used to improve availability and also as an assessment tool to describe the current status of antidote availability in the country. However, Ethiopia lacks a specific guideline and formulary for the rational use of antidotes. Even though far from being considered a guideline, FMHACA of Ethiopia has listed antidotes in its national medicine list and formulary to be used for management of poisoning in the country. Hence, it is important to prepare a standardized list and antidote formulary in health facilities using the following list as an initial reference.

Table 1: Antidote recommendations for stocking at health facilities that accept emergency patients (*Adapted from Dart et al., 2009 and FMHACA, 2014*).

S. No.	Antidote	Poisoning indication	Remark
1.	Acetylcysteineinjection, 200mg/ml in 10ml ampoule	Acetaminophen	
2.	Activated charcoal <i>Powder for reconstitution, 15gm/120ml, 25gm</i>	Many Ingestions	
3.	Anti Venom	Snake bite of unknown snake type	
4.	Atropine Sulfate Injection, 1mg/ml in 1 ml ampoule	Organophosphorus and N-methyl Carbamates	
5.	Caffeine	Propranolol	
6.	Calcium chloride <i>Injection, 10% (100mg/ml)</i>	Fluoride, CalciumChannel blockers	
7.	Calcium gluconate <i>Injection, 10% in 10ml ampoule</i>	Calcium Channel blockers; Beta Blockers; Magnesium sulfate;; Fluoride,	
8.	Calcium disodium EDTA	Lead	
9.	Calcium trisodiumpentetate (CaDTPA)	Plutonium, Americium or Curium	
10.	Cyanide Antidote Kit / HydroxycobalamineHCl	Cyanide	
11.	Deferoxaminemesylate	Iron	
12.	Dextrose 40% injection	Insulin, oral hypoglycemic agents	
13.	Digoxin Immune Fab (Ovine) Digoxin specific, antibody fragments Powder for injection, 40mg	Cardioactive Steroids	
14.	Ethanol	Methanol or Ethylene glycol	
15.	Flumazenil	Benzodiazepine	

	<i>Injection, 0.1 mg/ml in 5 ml ampoule</i>		
16.	Glucagon HCl	B-blocker, Calcium channel blockers	
17.	Methylene blue	Methemoglobinemia	
18.	Naloxone HCl Injection, 0.02mg/ml in 2ml ampoule, 0.4mg/ml in 1ml and 10ml ampoule, 1mg/ml	Opioid and Clonidine	
19.	Octereotide acetate	Sulphonylurea	
20.	Penicillamine	Lead, copper, mercury,	
21.	Physostigmine salicylate Injection, 1mg/ml in 1ml and 2ml ampoule	Anticholinergic syndrome	
22.	Phytomenadione (Vitamin K inj.)	Warfarin, Rodent poisons	
23.	Pralidoxime chloride Powder for injection, 1g/vial	Organophosphates and N-methyl Carbamate insecticides	
24.	Protamine Sulphate Inj.	Heparin	
25.	Pyridoxine hydrochloride <i>Injection, 50mg/ml in 2ml ampoule, 150mg/ml</i>	Isoniazid, Hydrazine	
26.	Sodium bicarbonate Injection	Sodium channel blockers	
27.	Sodium Polystyrene Sulphonate Powder	Hyperkalemia	
28.	Thiamine	Alcohol intoxication, alcoholic or starvation ketoacidosis	
29.	Trimethoprim, methotrexate,	Leucovorin(Folinic acid)	

8 Monitoring and Evaluation for poison information and control center

A countrywide reporting and the use of one central information center database to obtain a national overview of poisoning are essential. The collection of data will be more successful in number and quality if reporting is organized regionally. When regional centers are used, good collaboration and data-exchange with the national center need to be ensured.

Underreporting is a common phenomenon in our country. Correcting for under-reporting is difficult, however, because its extent is unknown and very variable. Underreporting may delay signal detection and cause underestimation of the size of a problem. However, in signal detection not only the quantity but also the relevance of case reports and the quality of data are important.

8.1 Call Review

Peer review of calls is a valuable way to monitor the quality and consistency of information, risk assessment and advice provided by PICs.

8.2 Quality Assurance

The activities of the poison information center should be carefully documented. Standard forms or electronic databases can facilitate recording of enquiries. An effective retrieval system is essential to locate previous enquiries, monitor workload and categorize the types of enquiries received. It can also facilitate quality assurance programs based on analysis of selected enquiries. The recording process should provide secure, long-term storage and the confidentiality of enquiries should be respected.

PIC has the responsibility to provide the highest possible standard of service. This will include an assessment of staff, regular review of calls taken and answers provided, and periodic review of resources and procedures. The process should continuously identify potential improvements and document progress towards implementation. Direct output can be monitored through peer-review of enquiries. It may include comments from one or more external experts.

8.3 Reports

Centers are encouraged to prepare annual reports of their activities, again using a standardized reporting format. The annual reports compiled by poisons centers, describing enquiries to the centers, it will provide information on the poisoning trends in a country. The more 'mature' the poisons center, the larger the body of data that the center will have amassed that can be used for early warning and trend analysis. An important use for poisons center data is to identify the current and future toxic risks in a community, including emerging risks. This is an activity known as toxicovigilance. These data can be used to inform priority setting for the prevention of poisoning as well as to provide evidence of the effectiveness of such measures.

An annual report should include the following indicator results:

1. Information service provided:

- Number of queries received and responded via phone ,or email per year
- Number of poisoning management algorithm prepared and disseminated
- Number of the public awareness creation activities through radio, television, etc per year

2. Toxicovigilance activities:

- Demography of poisoning by age, gender, geography, occupation per year
 - Trend in poisoning cases such as emerging poisoning cases, new drugs,
3. Research activities per year
 4. Education and trainings sessions provided per year for health professionals
 5. Public satisfaction survey conducted
 6. Professional satisfaction survey conducted
 7. Antidote availability (percentage of available antidotes per list)
 8. Documentation report (registration, query received and responded)
 9. Toxicology and drug monitoring laboratory request and performed
 10. Number of poisoned patients admitted and managed in the affiliated hospital
 11. Clinical service outcome for poisoned patients

8.4 Key Performance Indicators

Key Performance Indicators (KPI) can be used to monitor any trends in service quality and to make benchmark comparisons. If KPI reveals any decline in service quality, corrective action should be taken and documented to complete the quality improvement cycle. KPI may include:

- Annual number of compliments and complaints received about the service;
- Percentage of annual calls where inappropriate or incomplete advice was given;
- Percentage of calls with incomplete data records
- Call response times
- Client survey findings
- Laboratory service performance
- Clinical service outcome

9 Annexes

Annex 1: Sample budget sheet template for a poison information service-1

	Year 1		Year 2		Year 3	
	No.	Cost	No.	Cost	No.	Cost
Recurring Cost						
Staff - As Whole Time Equivalents						
Center Director						
Poisons information specialist(s)						
Poisons information Center staffs						
Librarian/ Document list						
Support staff (secretarial)						
Other costs						
Electricity						
Water						
Consumables (paper, printer ink, pens etc.)						
Telephone call costs (fixed line)						
Cell phone call costs						
Toll-free number(s) - will vary with volume						
Internet access						
Subscriptions to on-line sources						
Subscription to a database management system						
Staff training						
Antidotes						
SUB TOTAL						
TOTAL						

Annex 2: Sample budget sheet template for a poison information service-2

	Year 1		Year 2		Year 3	
	No.	Cost	No.	Cost	No.	Cost
Capital Expenditure						
Equipment						
Telephone						
Mobile phone						
Fax machine						
Computer (networked)						
Laptop computer						
Computer back-up media and device						
Printer (networked)						
Scanner						
Photocopier						
Office bookshelf e.g. 5 shelf						
Lockable 4 drawer filing cabinet						
Desk						
Table						
Chair						
Information resources						
Textbooks						
Antidote storage						
Refrigerator						
Lockable cabinet						
Education and training						
Data projector						
Projector screen						
SUB TOTAL						

Annex 3: Poison Information center service feedback form

Hospital/Health Center _____ Region _____

Enquirer: _____ Enquiry Reference No. _____

1. Was the service/information received in time?
Yes No
2. Was the presentation of the information satisfactory?
Yes No
3. Did the information provided meet your requirements?
Yes No
4. Was the information used?
Yes No
5. If your answer to Q No. 4 is yes, what was the outcome? _____
6. If your answer to QNo. 4 is No, please describe the reason why the information was not used _____

Annex 4:Poison Information center services quality assurance evaluation form

_____ Hospital/Health Center Region _____

Review period _____ Date of request _____ Primary Responder _____

Quality assurance milestones	Satisfactory	Unsatisfactory	Comment
Queries are well documented and completed			
Query response are well described, documented and referenced			
Response was provided timely			
Follow-up communications were clearly documented			
Training provided			
Any materials prepared and disseminated to support the clinical services			
Research conducted including survey satisfaction, quality assurance activities			
Overall evaluation (circle choice):	Excellent 5	Acceptable 3	Unacceptable 2
Reviewer's Recommendations:			

Annex 5:Telephone Protocol for Handling Poison Calls

S.N	Telephone Protocol for Handling Poison Calls
I.	<p>Initial assessment</p> <ul style="list-style-type: none"> ▪ Substance involved ▪ Primary assessment (ABC) ▪ What has been done? ▪ Are symptoms present?
II.	<p>History</p> <ul style="list-style-type: none"> ▪ Basic information ▪ Substance ▪ Amount ▪ Symptoms
III	<p>Assessment</p> <ul style="list-style-type: none"> ▪ Toxicity of the substance ▪ Circumstances of exposure ▪ Competency of the caller
IV	<p>Treatment plan (one of the following)</p> <ul style="list-style-type: none"> ▪ No treatment ▪ First aid and observe at home ▪ Refer to MD, ER,etc.
V	<p>Follow up made at 0.5 hr,2-4hrs,12hrsor 24hrs</p> <ul style="list-style-type: none"> ▪ Has the victim remained asymptomatic ▪ Were instructions followed ▪ Was treatment effective ▪ Poison prevention teaching ▪ Referral

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