

IMPROVING THE QUALITY OF PAEDIATRIC CARE

# Operational guide for facility-based audit and review of paediatric mortality



World Health  
Organization



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# Executive summary

Substantial global progress has been made in reducing the number of child deaths since 1990; however, many preventable deaths still occur because of poor quality of care, particularly in low-resource settings. In order to reduce the number further, the quality of child health care and the factors that contribute to the deaths should be examined. Understanding the circumstances and the spectrum of factors that lead to a child's death or disease can prevent other deaths, poor health outcomes or disability. Auditing and reviewing child deaths and morbidity is important for improving the quality of care in hospitals and other health facilities that provide care for children. Death auditing and review are also essential for identifying life-saving public health interventions and reforms at local, state and national levels.

All health facilities that care for children, especially hospitals, should have an effective system for death reviews. Review of and response to maternal and perinatal deaths are functioning successfully in many low- and middle-income countries. This involves collecting accurate information from routine clinical data and recording and reporting maternal and perinatal deaths, where they occur, why and what could be done differently to prevent similar deaths. Child deaths are, however, rarely audited and reviewed, and there has been no guidance.

Audits and reviews provide an accurate history that can indicate how a similar death or adverse outcome could be

avoided in the future. Not all deaths are preventable, but an audit fulfils the obligation of health professions to learn and improve the quality of care continuously. Auditing also shows bereaved families that their child's life was important, the death is being taken seriously and health professionals are committed to learning and improving their practice.

This document provides guidance for establishing and conducting child death reviews as part of overall quality improvement. The guidance describes the key components of national, subnational and facility mortality and morbidity audit and review systems. It outlines the principles for conducting meetings on child death audits in hospitals in such a way that staff are engaged and supported. The six steps in the audit cycle are: (i) identifying cases, (ii) collecting information, (iii) identifying the causes of death and potentially modifiable factors, (iv) recommending solutions or actions, (v) implementing an action plan and making changes and (vi) monitoring and evaluating the process and the outcomes and refining practice as necessary.

The annexes provide simplified International Classification Disease (ICD) 11 codes for child death audits and reviews and standard reporting forms, which could be adapted to local and national contexts.

# INTRODUCTION AND DEFINITIONS





The success of universal health coverage depends on all people having access to evidence-based care that is safe, effective and people-centered. However, in low-income resource settings, evidence is emerging that expanding health care coverage does not necessarily result in better outcomes, even for conditions highly amenable to medical care. Globally, it is estimated that hospitalizations in low and middle income countries lead to 134 million adverse events each year, and these adverse events contribute to more than 2.5 million deaths annually while about 5 million people who use the health system receive poor-quality health care (1). Addressing quality of care is paramount in reducing these preventable deaths that occur as a result of lack of availability or poor quality of medicines and other resources, poor compliance with evidence-based clinical interventions and practices, inadequate or unhygienic infrastructure, lack of competent, motivated staff, and poor documentation and use of information.

When a child dies, it is a tragedy for the parents, the extended family and the community and is also sad for the health care workers who cared for the child over a long or shorter period. We must learn lessons from child deaths if we can, to prevent further deaths. Death review or mortality audit is a means of documenting the causes of a death and the factors that contributed to it, identifying factors that could be modified and actions that could prevent future deaths, putting the actions into place and reviewing the outcomes. While information and guidance on maternal and perinatal mortality auditing exists (2–5), much less attention has been paid to child death review and its

potential to improve the quality of care and save lives in low- and middle-income countries.

Child death review began in the USA in the 1970s. Although review of child deaths is now routine practice in some high-income countries such as England and New Zealand (5–8), most low- and middle-income countries are just starting to review maternal and perinatal deaths. Published descriptions of the processes and examples of information from child death reviews in hospitals are therefore mainly from high-income countries (9). The few published experiences in other countries are use of systematic mortality reviews to improve care in paediatric hospitals in Papua New Guinea, Solomon Islands and South Africa (10–15). In 2018, WHO published standards for improving the quality of care of children and young adolescents in health care facilities (16), which include death audits.

Auditing helps to identify patterns of morbidity, mortality, modifiable factors and interventions to improve the quality of care and outcomes in hospitals and other health care facilities. Audit and feedback to health workers improve health care practices. The aims of audit or review of child deaths in hospitals and health services are to:

- ensure that all deaths are identified and discussed and confidentiality is maintained;
- assign a cause or causes to each death;
- determine whether the care given was consistent with evidence-based clinical practice, standards of care or the care desired by professionals;

- determine the social, environmental and nutritional risk factors for any death;
- determine possible modifiable factors in the care of each child who dies;
- change modifiable factors to improve the quality of care and avoid similar deaths in the future;
- improve the quality and completeness of patient documentation;
- provide an opportunity for reflection and support to health care workers; and
- let families know that their child's life was valued, the death is being taken seriously and health care workers are committed to learning and improving their practice.

The ultimate purpose is to improve the quality of care, to prevent other children from dying and to reduce complications. The purpose is never the audit itself or the production of numbers or reports.

Clinical audits other than death reviews include clinical case reviews, adverse event reviews and reviews of near misses. In clinical case reviews, the medical records of children who were recently managed for a common condition, such as pneumonia, diarrhoea or fever, are reviewed for accuracy of triage categorization, history-taking, examination, diagnosis, adequacy of treatment, supportive care, monitoring and follow-up. Adverse event reviews involve identification of the event (such as hospital-acquired infections or intravenous access complications) and discussion during an audit meeting. Reviews of near misses apply to serious cases or patient deterioration in which the child's life was saved, with positive discussions about how deaths can be

prevented, which can motivate staff. Like death reviews, the aim is to improve the quality of care provided by identifying weaknesses and opportunities, good practices and agreement on changes. In many hospitals, there is time only to review deaths, but occasional reviews of other clinical outcomes are also valuable.

This guide describes the processes and steps in setting up a national and a health facility system for reviewing or auditing child deaths, near misses, cases and adverse events in health facilities. The guide outlines the conduct of child deaths audits and reviews in order to improve the quality of care and prevent future deaths by systematic, critical analysis of the quality of care received in a "no-blame", multidisciplinary setting. The guide provides examples of tools that can be used or adapted for collecting data for death reviews, analysis and response to the results of audits. The information on individual cases and aggregated results may indicate patterns and common modifiable factors. The guide also provides guidance for establishing and conducting child death audits for policy-makers at national and subnational levels, clinicians, nurses, local health administrators, mortality and morbidity review committees and quality improvement teams in hospitals.

For still-births and perinatal deaths, the reader is also referred to "Making every baby count – audit and review of stillbirths and neonatal deaths" (5).

## 1.1 Mortality and morbidity audit

Mortality and morbidity auditing is a means for improving the quality of patient care and outcomes by systematic review of clinical management and comparing outcomes against criteria or accepted standards of care. This allows identification of gaps in quality of care and changes to be made. The objective is to determine whether patient care is consistent with best practices. This guideline addresses auditing of deaths; adverse events, near-misses and clinical cases can also be audited. The criteria should be based on evidence, national or WHO clinical practice guidelines and/or agreed standards of care.

In a mortality audit, data are collected on deaths, and a qualitative and quantitative review is conducted. Such audits are also called “mortality reviews”, “death audits” or “death reviews”. In some settings, it is advisable to use the word “review” rather than “audit”, which may have a punitive connotation. In this guide, the two terms are used interchangeably.

In an audit, the actual care received is compared with national or WHO standards of care (16), which include the stages of management of all sick children: triage, emergency treatment, history-taking, examination, laboratory investigations, diagnosis and differential diagnoses, treatment, monitoring, supportive care, planning discharge, and follow-up (17). Other sources of audit standards include national and WHO standards for equipment, essential medicines (18, 19) and clinical management protocols.

## 1.2 Causes of death and coding

Mortality review includes systematic assigning of causes to each death. The International Classification of Diseases (ICD) in its most current, 11th, revision (ICD-11) is recommended by WHO as a uniform classification of diseases and causes of death, which are thus comparable across settings. ICD contains over 60 000 diagnostic codes (20); and so in countries where full compliance with precise, accurate ICD coding may be limited by lack of resources or lack of diagnostic capacity, a selection of codes of the most common conditions may be required. Tools consistent with ICD-11 coding are available for recording common diagnoses and causes of death (21) found in the WHO Pocket book of hospital care for children (17), the Guidelines for integrated management of childhood illnesses (22) and other WHO publications. Using codes linked to these common diagnoses is not as complex as the full ICD-11 diagnostic list, and cover the majority of paediatric and neonatal illnesses that can be diagnosed clinically and with limited diagnostic tests in low- and middle-income settings (Annex 1).

It is often misleading to record only one cause of death, as children may have one acute illness, one or more underlying or associated conditions or comorbid conditions and adverse social or environmental circumstances that are partial causes of the child’s death. A useful classification of deaths is:

- immediate cause of death (the acute illness leading to death);
- underlying chronic or comorbid conditions; and
- associated diagnoses and social and environmental risk factors (see below).

Use of this three-tiered approach covers the complex causal pathway to the deaths of many children and newborns. While some deaths, due for example to an overwhelming infection in a previously well child or a death from road trauma, may have only one cause, many have a more complex causal pathway. If this is not recognized, change to address the root causes of many child deaths cannot be implemented or advocated for.

### 1.3 Documentation and record-keeping

Patient registers, clinical records, charts, forms and electronic medical records are critical for documenting the process of care to ensure that is appropriate, to detect complications early and for accurate handover. A patient's record is an essential means of communication among health care professionals and strengthens multidisciplinary teamwork.

All vital information must be accurately recorded and registered to ensure high-quality health care. Accurate documentation and record-keeping are professional and legal requirements, and good record-keeping allows systematic analysis of the process of care during case review. Hospitals should therefore invest in improving the quality of patient data, with standardized registers, clinical care records (e.g. patient charts, investigations records, medicine administration charts, referral notes), critical pathways and clinical audit forms.

Structured record forms and patient charts improve the completeness of patient data, allowing retrospective data analysis (21, 23). Structured paediatric clinical record charts should contain information on the child's main problem or complaint, the history of the presenting illness, vaccination status, medical history, gestational and birth history for infants and young children, developmental history, feeding history or dietary habits in older children, family and social history, findings of general examination, provisional and final diagnoses and discharge summary. Standardized, structured recording forms and programs are available that can be adapted to improve documentation of clinical care and patient records.<sup>1</sup>

Standardized patient care registers and medical records that are accurate, complete and legible should be available for documentation and record-keeping at all points of care, in outpatient departments and clinics, on admission and on the wards. All patient records should have accurate patient identification and biomedical data; and all entries should be clear, legible, dated, with the events in chronological order, and signed by the care provider, with his or her name and job title.

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1 e.g. sample patient records and charts: sick child recording form for outpatient care ([http://www.who.int/maternal\\_child\\_adolescent/documents/IMCI\\_chartbooklet/en/](http://www.who.int/maternal_child_adolescent/documents/IMCI_chartbooklet/en/), pp. 60–7) and sample electronic patient recording programs: paediatric hospital reporting program (<http://www.hospitalcareforchildren.org/audit>) and child healthcare problem identification program (ChIP) (<http://www.kznhealth.gov.za/chrp/CHIP.htm>).

## 1.4 Modifiable factors

A modifiable factor is one that could have prevented the death if a different course of action had been taken. Once the cause(s) of death has been established, modifiable factors should be sought and documented. Use of the term “modifiable” rather than “avoidable” or “substandard” limits the opportunities for blame and indicates the potential for positive change. An opportunity to modify or correct a situation might have been missed. Modifiable factors that are recognized and addressed can result in positive change.

Discussion and documentation of potentially modifiable factors in each death are priorities at mortality review meetings, because they provide an opportunity for learning and changing behaviour and systems. Although a death may initially appear to have a single biological cause, further analysis usually reveals a number of contributing factors or causes. Potential solutions and strategies arise once events are examined and the root causes of death and modifiable factors are better understood.

Modifiable factors can be classified simply or with more analytical, complex methods. This guide proposes a simple approach based on modifiable factors in the home or community, the primary care or referral system and hospitals (see section 6 for details and cases). Identification of the level at which system failure may have occurred indicates potential action to prevent deaths due to a similar problem. Possible modifiable factors should be identified at each level, e.g. at home or community due to delay in recognizing the problem, use of harmful practices or delayed or poor access to facilities and at facility level, it could be administrative, systemic or provider problems during care at facility level.

# ESTABLISHING A NATIONAL SYSTEM FOR CHILD MORTALITY REVIEW



Establishing a mortality audit or review system requires leadership and ownership by health workers and national programmes. It is important to understand the structures, systems, regulations and policies in place and the scalable, sustainable best practices in the national health system. Where perinatal or maternal mortality reviews and audits are already being conducted or some form of child mortality audit was conducted previously, it is easy to build on the system.

The approach will vary in each country. The system may be initiated nationally or sub-nationally as a “top–down” or “bottom–up” process by scaling up best practices or a combination of the two. Bottom–up processes are usually more successful, as they are based on local experience and best practice that are easily scalable. Health care workers who are already conducting child mortality audits or maternal perinatal death surveillance review are likely to be able influence other health workers and the ministry of health to establish such a system.

Child mortality audits can be introduced either in phases, starting with individual hospitals, or all at once across a health service area. Establishing child death auditing in district hospitals or in district health services is important, as they may reach more children and prevent more deaths than audits conducted only in tertiary health facilities.

## 2.1 Support

Facilities should have champions and the support of the hospital administration and the local or national government for introducing child mortality auditing. High-level support will ensure that findings and recommendations that require action beyond what health professionals can provide are acted upon. The ministry of health and the local government should assume ownership to ensure sustainability and acceptance of the process in facilities.

Support can be obtained by advocacy on the benefits of child mortality audits and by involving relevant stakeholders in all stages of planning and implementation. Targeted orientation and training may be required to build the capacity of the personnel involved. Child mortality reviews in health facilities are a means for improving the quality of care, introducing a culture of supportive “no-blame” and “speaking up” and training staff in improving clinical quality of care. Local initiatives to conduct audits are valuable, and collaboration with local government programmes will increase the probability that public policy will be changed to avert deaths.

## 2.2 National and local tools and guidance

National guidance may be required for conducting child death reviews, which may be adapted from this publication on setting up a national system and conducting death audits in facilities. Tools in the annexes to this guide can be adapted by countries.

National child mortality audit guidance may include:

- a clear national structure and system for supporting mortality audit and reviews;
- measures to ensure that no legal implications or actions are taken with information from the audits;
- standard operating procedures;
- standardization of clinical records;
- standard clinical guidelines and protocols;
- routine data collection and reporting on causes of child admissions and deaths, patient registers and a child death register (Annex 2); and
- tools for mortality audit and review: a form for death reviews (Annex 3), a list of diagnoses (Annex 1) and a form for an action plan (Annex 4).

Reviews of child deaths should be based on accepted guidelines and standards of health care for children in health facilities. These should be based on WHO guidelines on Hospital care for children (17) and WHO Standards of care for children and young adolescents in health facilities (16), which should be adapted and used as standard references by the team leaders and health workers.

The main sources of data are patient and death registers, charts and clinical notes. The method of data collection depends on what is locally feasible but need not be complicated. The data collected should be accurate and of good quality to facilitate identification of solutions. For simplicity, a case review form can be used to collect data on the deaths of children of different ages: infants, children and adolescents (Annex 2). Child mortality review forms should

be straightforward and short and elicit quantitative data but with sufficient space for qualitative information: a narrative or story and recommendations.

Standard operating procedures should be available for the main data sources and the data to be collected for a child death review, e.g. demographics, the social context, findings from clinical records of ward admissions registers, the child's medical records, the opinions and experience of the staff who looked after the child, laboratory results, autopsy results if available, and sometimes an interview with parents.

## 2.3 National and sub-national child death review committees

It can be helpful to establish a sub-national or district committee to review reports from catchment health facilities at regular meetings. The committee should be made up of senior staff, such as a paediatrician, a public health or disease control officer, a district nursing officer, a district medical officer, a district pharmacist, a nutritionist and other members of the district health management team. The committee may also include community leaders involved in child services outside the health sector, such as a teacher or church official.

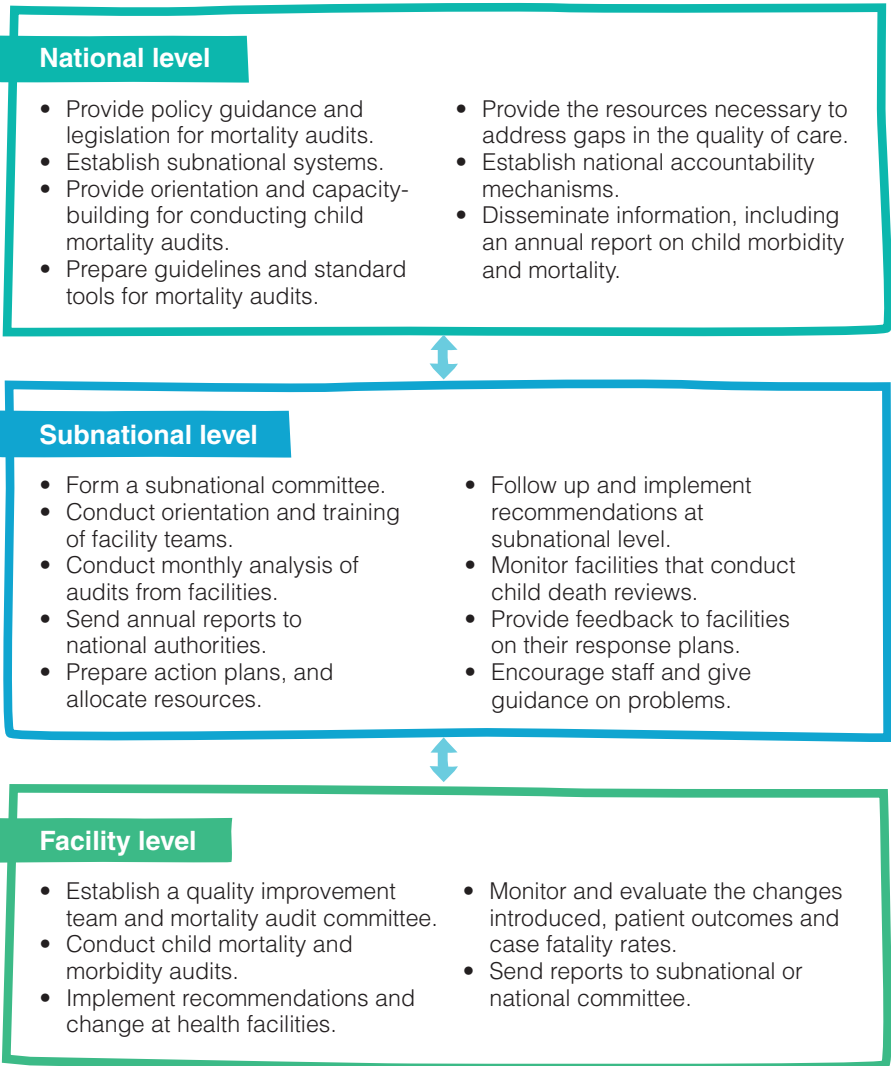
A coordinator should lead the committee, set the timetable for meetings and delegate duties to members. The responsibilities of the committee are to provide guidance, feedback and encouragement to health facilities, identify emerging trends in child deaths, initiate changes in public health in the district or region and liaise with national



officials. The committee should be able to provide resources for addressing problems in health facilities. The ministry of health should provide resources

for implementation and address gaps identified at subnational level. The roles and responsibilities at each level are outlined in Fig. 1.

**Fig. 1. Roles of facilities and at subnational and national levels**



# ESTABLISHING AUDITING IN A HEALTH FACILITY



Auditing can be initiated by committed clinicians in facilities, whether a tertiary academic hospital, a provincial referral hospital, a district hospital or a health centre or clinic. Auditing should be embedded in overall efforts to improve the quality of care and services. The first step is to sensitize staff about the purpose of child mortality and morbidity reviews and the principles for conducting audits. The second step is to establish a committee or team for mortality and morbidity audits and quality improvement.

### **3.1 Team or committee for mortality audit and quality improvement**

A committee or team is essential for auditing and quality improvement, as one person could not make all the changes necessary to improve quality. The size and composition of the committee or team will depend on the size and staffing of the health facility. The team may consist simply of the head doctor or paediatrician, a clinician and one or two nurses. It may be useful to include representatives from the pharmacy, nutrition, medical records, laboratory and radiology services and infection control to instil a system approach to understanding problems and the roles of all departments in ensuring the quality of care.

The committee is responsible for:

- identifying and preparing cases for discussion;
- selecting cases in an agreed system;
- undertaking an initial analysis of cases to be used in mortality and morbidity reviews;

- organizing and steering regular meetings to review child mortality and morbidity;
- keeping a record of solutions and recommendations from the review meetings;
- providing feedback to staff and the administration; and
- following up implementation of the recommendations.

The committee should be supported by the facility management to ensure adequate resources, time and training for mortality and morbidity case reviews. Implementation of some of the recommendations may require the full support of facility or hospital decision-makers, who should be involved in the discussions.

### **3.2 Training staff to conduct audits and lead meetings**

The staff on the mortality audit and quality improvement committee should be oriented and trained in the principles of improving the quality of care and conducting mortality and morbidity reviews (see sections 4 and 5 and annexes). The process should be properly explained to other health care staff during each audit meeting.

In addition, the team should be aware of the principles underlying the delivery of high-quality care:

- the interactions and relations among different elements of the care system and how they combine to contribute to an incident;
- the systems approach, including “human and system factors”;

- the theory and methods of quality improvement, such as measurement, change management, criterion-based audit, “plan, do, study, act” cycles and models for improvement;
- systems-based analysis of patient safety incidents; and
- evidence on patient safety in health care.

An external facilitator or reviewer may provide a fresh, wider perspective, which may increase the confidence of health workers to give insights and make constructive suggestions during meetings.

Several members of staff should be trained to conduct and lead audit meetings, so that those who are absent or on leave can be replaced, ensuring that the process is sustained.

### 3.3 Protocol for a child mortality and morbidity audit

A simple protocol can be prepared for an orderly, replicable audit, which defines the review process and roles and responsibilities. The review can therefore be conducted systematically according to principles such as those outlined above and can be used as a reference if questions arise. A simple protocol can be modified as the process develops. It should include:

- standard principles for conducting an audit;
- child death audit data forms that are standardized, ideally throughout the country;
- a list of terms for filling in the forms, including diagnoses and causes of death (see annexes) and modifiable factors (see section 6).
- focal people responsible for arranging meetings and analysing child mortality statistics;
- a file to keep forms secure and confidential;
- the frequency and timing of meetings (weekly, fortnightly, monthly);
- guidance on the conduct of review meetings; for example:
  - presentation, or at least mention, of each death;
  - pre-filling in some areas of forms and propose modifiable factors by the review coordinator;
  - how to present cases
  - how to identify causes of death or poor outcomes;
  - how to identify modifiable factors;
  - how to make recommendations and design an action plan;
  - how to put an action plan in place and follow up;
- reporting back at the next meeting.

### 3.4 Roster for child mortality and morbidity audit meetings

Depending on the caseload, meetings should be held regularly on set days and at set times so that cases are discussed in a timely manner. The frequency of meetings will depend on the volume of cases. They may be held weekly or fortnightly in hospitals with a large number of deaths or monthly in small hospitals with smaller caseloads.

Mortality and morbidity review meetings:

- are held regularly and routinely on set days and at times that maximize attendance;
- are held in a dedicated meeting room that is accessible to and large enough for all participants and, when feasible, is equipped with audio-visual equipment and other educational tools;
- are planned in advance and widely promoted, with regular reminders, and a quarterly summary report of the outcomes of previous meetings is made available; and
- are conducted in the context of wider quality improvement in order to ensure change and good system governance.

# CONDUCTING AND MANAGING MORTALITY AND MORBIDITY MEETINGS



The timeframe from an event to its discussion in a mortality and morbidity meeting should not exceed 6 weeks, where feasible. This will ensure that lessons are learnt as close as possible to the event, and appropriate actions are taken promptly to prevent future events.

Mortality and morbidity meetings are highly relevant for improving the quality of care, and participation is an integral part of continuing medical education and learning for clinicians, nurses and other health care staff. Attendance should be part of job descriptions and performance appraisal for staff with enough time set aside for each case once it has been selected for audit.

## 4.1 Participants

The meeting should be inclusive, multidisciplinary and reflect how frontline patient care is delivered and supported in the health facility. If multidisciplinary attendance is not possible, the meeting should include the clinical team and other health care professionals who provided clinical services to the patient and also people who were not involved in care of the patient to ensure an unbiased opinion. Participation of a diverse group of people in audit meetings will provide different viewpoints and opinions.

The participants should include:

- specialists, doctors, trainees and medical students;
- nursing and/or midwifery staff and students; and
- other relevant staff, as appropriate, such as allied health professionals, pharmacists, management representatives and support staff such as secretaries and ward clerks.

It might be useful to invite peripheral health staff to participate in audit meetings, such as district managers or provincial or state administrators, to provide their perspectives on resolution of problems.

## 4.2 Chairing of meetings

The chair should have the necessary knowledge, skills and attributes to manage discussions on mortality and morbidity cases effectively, while ensuring that lessons are learnt and actions for improvement agreed. The chair should have a strong interest in patient safety and improving the quality of care, in mortality and morbidity meetings and in continuing medical education.

The role of the chair is to create and encourage openness, honesty and transparency in all participants, to engender a learning culture that encourages collaboration and collegiality and contributes to improving the quality of care. The role includes:

- overseeing the preparation and organization of meetings;
- facilitating meetings, keeping to time, encouraging participants to be involved and summarizing lessons and actions;
- managing any conflict diplomatically and sensitively; and
- facilitating consensus on any decision and ensuring that actions for improvement are decided and implemented.

The chair may be a senior clinician or a senior nursing officer. A deputy may be appointed to replace the chair if he or she is unavailable or for succession planning.

### 4.3 Managing the meeting

The chair should be able to manage situations decisively, diplomatically and sensitively. Staff who fear blame, judgement or negative consequences may be reluctant to engage in mortality and morbidity review and be likely to withhold information about events, which would reduce the effectiveness of the process.

The meeting may be conducted as follows.

- Establish ground rules at the beginning of the meeting to encourage inclusive participation. The session should be open, honest but blame-free. Remind participants to refrain from attributing personal blame or criticism of colleagues. Feedback should be fair, constructive, sensitively delivered and practically useful.
- Recognize that the personnel involved might have been affected emotionally by the event, although this may not be immediately obvious.
- Neither the chair nor participants should tolerate bullying or overbearing behaviour.
- Monitor the team dynamics and interactions to ensure wide participation.
- Recognize emotion in the discussion, acknowledge it, and allow appropriate expression within the group.
- Remain objective, and avoid giving unwarranted opinions or colluding with individuals during discussions.
- Summarize and share contributions, and facilitate respectful challenge by all participants of arguments, assumptions and behaviour that cause conflict.

### 4.4 Factors for successful meetings

Meetings should take a systematic approach to the review of patient deaths or complications of care, to improve patient care and professional learning. When meetings are effectively run, with analyses of mortality, near-misses and adverse events, they contribute to improving the quality of care, patient safety, reduced mortality and professional development.

Successful review meetings are based on the following principles (24):

- regular meetings at the same time every week or month, their sustainability depending on staff commitment;
- a blame-free, non-threatening culture for a professionally accountable forum based on sound educational principles, which encourages openness, honesty and transparency;
- confidentiality, by encouraging open discussion inside the meeting but no specific discussion of cases outside;
- welcoming to all staff for active participation, even if attendance is voluntary, with open encouragement of attendance by all clinical (doctors and nurses), relevant technical staff and administrators;
- a strong educational aspect, with teaching on subjects that are relevant to the quality of care;
- acknowledgement that severely ill children may die despite accurate recognition of danger signs, appropriate emergency treatment, correct diagnoses, treatment and supportive care;
- a team and systems approach to discussions and analysis of case presentations at all times to ensure good understanding, effective learning, identification of problems,



appropriate actions for improvement and recommendations;

- respect and acknowledgement of all staff efforts and understanding of their feelings;
- learning and improvement of systems and processes of care and not of individual performance, thus moving from specific cases to general issues;
- emphasis on identification of common patterns of avoidable events, not single rare mistake or events;
- no singling out individuals for blame, rather a focus on team work and emphasizing how things could be done better, with modifiable factors viewed as opportunities for improvement for the benefit of all staff, patients and the facility;
- emphasis on the entire health system in trying to understand modifiable factors, from the community, reception, triage, initial evaluation, treatment and support, referral system and at every service delivery point not just clinical care in the facility;
- recording of the outcomes of mortality and morbidity review meetings and integration into safety and quality improvement initiatives in the facility to maximize collective learning; and
- feedback to and involvement of all staff, especially those involved in the process of care.

Poor participation may be due to poor feedback on previous reviews, poor communication among department heads and staff, shortage of staff and fear of incrimination and embarrassment. Some staff may not attend because they do not understand the importance of review or consider that the issues raised do not concern them or are not actionable. Audit meetings should be an important part of learning for all staff and students (21).

## 4.5 Presentation of cases

Each case should be presented, or at least mentioned. If time is limited, it is better to discuss two or three cases in which changes can be made to practice rather than to discuss many cases superficially. A standard format should be used to present cases, based on the information collected on forms (Annex 3). The “situation, background, assessment, recommendation” approach provides a framework for communication among members of the health care team about a case, ensuring a consistent approach, better quality presentations, lessons for participants and a focus on actions for improvement.

Presentation of cases should therefore follow this standard framework:

- situation: the problem, including the admission diagnosis, procedure or details of the adverse event or outcome;
- background: clinical information pertinent to the case, including patient history, clinical findings, procedural details, investigations, hospital course, how and when the death or event occurred or was recognized;
- assessment and analysis: evaluation of the sequence of events leading to the adverse outcome and why it occurred, with contributory factors and their interaction throughout the system; and
- recommendations: the findings and discussion of the evidence relevant to the adverse outcome or event and recommendations on how the complication or event could have been prevented or better managed, lessons from the case and priority actions to prevent or minimize recurrence.

# STEPS IN THE AUDIT CYCLE



Once the basics are in place, meetings can start, rather than waiting to create a perfect system. The process can be improved as experience is gained. Death audit is based on a six-step cycle: (1) identify cases; (2) collect information; (3) analyse the information; (4) identify and recommend solutions; (5) implement solutions and make changes; and (6) monitor and evaluate the process and the outcomes, with revision as necessary (Fig. 2).

### Step 1: Identify cases

Child deaths during the period of review are identified from wards or emergency departments. The data sources include referral notes, ward admissions and individual clinical records, outpatient and inpatient department registers and

discharge and death registers. Strategies should be in place to ensure that all deaths are recorded in the routine health information system and in the child and neonatal death register (Annex 2). A death should be notified within 24 h and the focal person on the committee notified. The focal person is responsible for ensuring detailed data collection, either by doing it or by delegating the task to other members of the team. Information in the register should be used to complete the child and neonatal death review form (annexes 1 and 2).

All deaths should be described briefly at the mortality and morbidity meeting, with a few reviewed in detail. The deaths to be reviewed in depth are selected by the local coordinator or the committee. Criteria that might be used are listed below.

Fig. 2. Facility audit and review cycle



- The death was unexpected.
  - The death appears to have been due to a common treatable illness (such as pneumonia, diarrhoea, malaria, severe acute malnutrition or neonatal sepsis).
  - The death occurred after complications.
  - The death occurred after surgery or another procedure.
  - Staff or the family have raised concern about the death.
  - There is uncertainty about the events leading up to the death.
  - The case was complicated and required many decisions.
  - Several similar deaths have occurred (such as neonatal infections or cases of tuberculosis).
  - The case illustrates a possible deficit in case management or health care provision.
- demographic details of the child who died, including social and environmental context;
  - referral details;
  - triage category, including condition on presentation;
  - history and findings of examinations;
  - investigations, laboratory tests;
  - diagnosis at time of admission and at death;
  - treatment, supportive care, surgery or anaesthesia;
  - monitoring;
  - events surrounding the death; and
  - autopsy results if available.

In most cases, sufficient data can be abstracted from the patient's medical records and gaps filled in after more detailed discussions at the audit meeting. The availability of structured admission records and a data collection system helps to ensure that admitting staff capture adequate data and facilitate data analysis (21, 23).

## Step 2. Collect information

The tools for collecting data for the audit should be standardized and should capture only relevant data. Busy staff will be discouraged if they have to collect highly detailed information with no apparent purpose. A clear understanding of the plan for analysing the data will help in making these decisions.

Fill in the standard data collection forms (see examples in annexes 2 and 3). The person who organizes the meeting should extract data from ward records. They should include:

During planning of an audit meeting, relevant information may also be collected by interviewing health care workers and family members, if available. The interviewer should obtain consent and assure respondents that the confidentiality and privacy of the families and health care workers will be maintained at all times. Training in interviewing techniques may be helpful, including obtaining information in a sensitive manner without biasing the responses and helping respondents to recall dates and other important data. Interviewers should learn how to minimize distress in people being interviewed and the responses to give to questions or requests for information.

### Step 3. Identify causes of death and modifiable factors

During the meeting, the committee reviews the data collected to ascertain the causes of death and identify modifiable factors. This can be done by:

- using standard diagnostic criteria to identify the cause of death,
- discussing the event and coming to a consensus,
- establishing a timeline, including modifiable events, or
- conducting a root-cause analysis of the events.

At the mortality review meeting, all the events leading up to the death are reviewed to identify the immediate and underlying causes of death. Causes of deaths may be classified as:

- *immediate*: the acute illness that led to death, such as pneumonia, diarrhoea, malaria, poisoning, acute leukaemia or accidental trauma; or a more specific diagnosis, such as “pneumonia due to *Streptococcus pneumoniae*”, or “*falciparum* malaria”,
- *underlying*: any other chronic or comorbid condition, such as malnutrition, anaemia, cerebral palsy, epilepsy or congenital heart disease. For a child with congenital heart disease who died of secondary pneumonia, the immediate cause

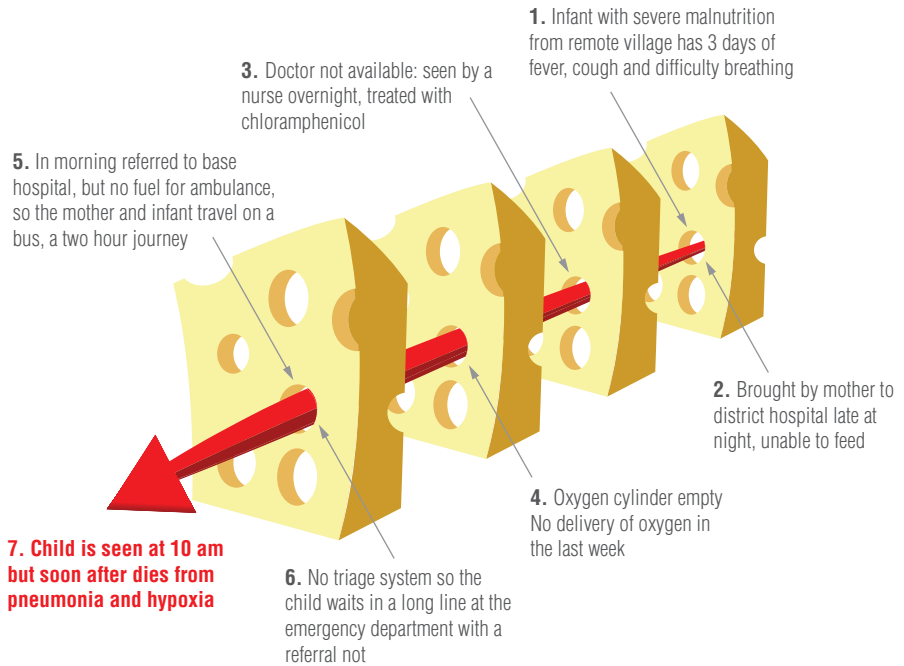
is pneumonia, and the underlying condition is congenital heart disease. For a child with congenital heart disease who died of heart failure, congenital heart disease is the immediate cause.

- associated diagnoses and social and environmental risk factors (see below)

Once the medical cause of death has been established, the meeting examines the information collected and identifies potentially modifiable factors. For each case discussed and analysed, an attempt is made to understand the interactions and relations among different elements of the care system and how they combined to contribute to the incident. Medical and non-medical modifiable factors are determined and documented during open committee discussions; some might be suggested by the person who filled in the death review form.

Many children die after a sequence of events or circumstances that might not be fatal in isolation but become so when each occurs one after the other, with no safety net or reserve. This situation has been called the “holes in the Swiss cheese” (see Fig. 3). Patients are at greatest risk when all the holes are lined up. The image illustrates the benefit of breaking down events and patient encounters into small tasks so that the team can identify modifying factors.

**Fig. 3. “Holes in the Swiss cheese”**



It is the story that matters. A timeline is useful in establishing the sequence of events in the story. Key modifiable events are highlighted on the timeline, giving rise to questions such as:

- What circumstances caused a delay in the mother seeking care?
- Was an opportunity to recognize malnutrition missed at the primary health clinic?
- Did the child die because no one realized how sick he or she was or because the hospital was too far away?
- Were the appropriate assessment, investigations and treatment provided for the condition?
- What were the gaps in the process of care in the hospital?

The review committee should identify priorities for action by going through the story with a timeline and identifying modifiable events. This is a root cause analysis for identifying the causes of problems.

Section 6 gives a more detailed description of the system approach to identifying modifiable factors in the home and community, in primary care or referral systems and in hospitals, with three case studies.

## Step 4. Identifying and recommending solutions

The function of a mortality and morbidity meeting is to learn from events and improve patient care. The next stage is to formulate appropriate recommendations. During the audit, patterns of problems become evident. Moving from problems to solutions requires careful thought and creativity but is integral to preventing similar deaths. The team proposes solutions and recommendations to avoid future deaths, and these are documented (see Annex 4).

The solutions can be classified as short-, medium- and long-term actions, with specific timeframes. The recommendations may refer to a single action or continuing activity, and they may have to balance burden and feasibility. The review committee should determine which mixture of strategies best suits local circumstances. The solutions should be feasible and relevant and within the resources available or those that can be easily mobilized. Some changes are basic, and the team should identify what can be changed with the available resources. This will ensure that changes are visible, thus building a case for more resources. They should nevertheless be evidence-based so that they are acceptable and can be implemented.

The causal factor may appear to be purely human error and not related to the system. Human error cannot be eliminated entirely, but the system should reduce it as much as possible, by ensuring adherence to standard protocols or guidelines or improving the skills of health workers.

The tasks involved in the solution and the individuals responsible should be agreed, with a timeline for implementation and review. Decision-makers in facilities should be involved in this process to ensure that they are aware of the required changes and of actions that will require resources. The recommendations are communicated to all staff members and departments that were not present at the meeting (see Annex 4). The lessons learnt should be formally documented, recorded and shared with relevant staff and specialists.

Collation of data on several cases can reveal trends, common modifiable factors and underlying systemic problems. Identification by an audit team of the same modifiable factors over and over again may imply that possible solutions have been overlooked. Modifiable factors may recur because the audit cycle is failing, for example, to identify the root causes and solutions, actions, implementation or monitoring and evaluation.

## Step 5. Implementing an action plan and making changes

The purpose of reviewing child deaths is to improve the quality of care and prevent further deaths, which requires support by all staff who care for children. A death review without subsequent action will not improve the quality of care or reduce the number of deaths. If the recommendations made are not implemented, staff will be frustrated and demoralized and may refuse to participate in reviews.

Recommendations arising from the review meetings are assigned to team members for follow-up. It may be more effective to first focus on the recommendations that can be implemented by health workers and to use success in those activities to advocate for further action or resources for recommendations to be implemented by the administration.

A multifaceted approach is required to turn recommendations into sustained changes. These include:

- integration of data on mortality and morbidity into wider initiatives to improve quality and safety in the health facility;
- completion and follow-up of agreed actions and implementation and monitoring of any changes to the care system;
- involvement of senior staff and opinion leaders to champion reviews and identify modifiable factors and actions for change;
- strengthening the capacity of health professionals by training and continuing professional development;
- circulation of periodic reports on progress and the contribution of mortality and morbidity reviews to improving quality, with examples; and
- periodic celebration of progress and successful changes.

Periodic reports or a newsletter on quality improvement could be used to disseminate findings, recommendations and progress in quality improvement. The report should be written in simple language and may include standard sections such as actions, data trends, successes, challenges and modifiable factors, as well as recommendations and solutions found.

## Step 6. Monitoring and evaluating the process and outcome

The final step in the audit and review cycle is determining what worked – in the audit itself, in the changes made and in patient outcomes – and what did not, in order to adapt approaches for quality improvement. The committee should act on feedback from participants and use indicators to determine improvements in the quality and safety of patient care, facility performance and professional learning. More detailed periodic evaluations are made if the indicators demonstrate that outcomes are not improving, despite action being taken or if mortality rates, and particularly preventable deaths, are not decreasing. Nevertheless, trends in rates are not always the best measure of improvement in care, as many factors influence patient mortality rates.

Feedback on the audit process can be collected from staff, managers, patients and their carers by open discussion and questioning, use of evaluation forms at the end of meetings or informal and formal focus groups discussions with selected participants or different staff groups. Some of the questions that could be used in evaluation are:

- Are the goals of the mortality and morbidity audit being achieved consistently?
- Are the staff participating actively?
- Have all the planned meetings been held during the period?
- What is going well and what not well?
- Are the meetings effective in improving patient care, reducing mortality and informing professionals?



- Do the meeting discussions adhere to the principles of a successful mortality and morbidity review meeting? (see section 3.2)
- Are the meetings contributing to building teamwork and a culture of open dialogue in the facility?

The cycle should also be evaluated to determine how successful it was in identifying deaths, collecting, reviewing and analysing information and identifying the problems that contributed to child deaths.

Progress is followed up and feedback disseminated by the committee to all staff to ensure that they are aware of what is happening and the lessons are learnt. Periodic reports on the progress and contribution of the mortality and morbidity process can be circulated, with examples of successes and any relevant challenges. The health facility may send monthly reports to a sub-national committee, which should also monitor the death review process in different facilities.

# MODIFIABLE FACTORS IN CHILD DEATHS



For deaths that occur on the wards, it may not be possible to modify some social or environmental factors, the evaluation may focus on gaps in the quality of clinical care. Factors in the home and the community are nevertheless important in the causal pathway of many deaths, with some overlap between modifiable factors in the community and those in primary care.

The reasons for modifiable factors, the “root causes”, should be explored so that corrective action can be suggested. Some problems identified in a mortality audit will be general across the health system. Deaths are often sentinel events that indicate gaps common to other health facilities. In many examples, a single death led to reforms in health care that have greatly improved services for other children.

## 6.1 In homes and communities

Some modifiable factors occur in the home or community, before the child reaches hospital, and include delay in seeking care or as a result of environmental or social risk factors. Although some aspects of pre-hospital care are beyond the control of hospital workers, knowing the full circumstances through a detailed history provides an opportunity to tell parents or caregivers about the importance of disease prevention, timely care-seeking when the child first becomes unwell, maternal care during pregnancy, child nutrition and full vaccination.

### 6.1.1 Delay in seeking or reaching care

Delay in seeking care may be a result of several factors. Parents or caregivers may not recognize signs and symptoms

of illness or danger signs, or they might first seek care from traditional medicine practitioners. They may be reluctant to seek care at health facilities because they perceive poor quality of care (e.g. long waiting times, unpredictable opening hours, regular stock-outs of medicines or rude health workers). Other factors are poor access due to distance, lack or cost of transport and poor roads.

Other reasons might be delayed referral to a higher level from a first-level health facility or delay in transfer to receive effective care, or seeking care in facilities with no capacity for emergency treatment or no staff with expertise in the management of severe acute illnesses. Parents or caregivers might be reluctant to return to a health care facility if they have been seen and reassured on an initial visit for the same illness.

### 6.1.2 Social and environmental risk factors

Sometimes the child's environment is inadequate for health and development. It is important to recognize social and environmental modifiable factors when reviewing child deaths. These may include the death of the mother or both parents; an unsafe home environment, with poor household sanitation or unsafe household water supply; or loss to medical follow-up, low health literacy or poor adherence to medication. The child may suffer from neglect, with lack of adequate adult supervision, or the family may be homeless or live in extreme poverty. There may be domestic violence in the family, parental drug or alcohol abuse, with previous notification to child protection services or social welfare services.

The death of a child under the latter circumstances may require the involvement of social welfare services to support the family in providing a better home environment for other children in their care. Other sectors might have to be alerted to any environmental factors associated with a child's death, such as community services to improve sanitation or water supplies or teachers or education services to include health messages. New legislation or enforcement of existing legislation might be required to ensure safe environments or product safety.

## 6.2 In primary care and referral systems

Some modifiable factors in child deaths are delays or problems in primary health services or referral systems. Improvements might have to be made, for example, in ensuring reliable drug supplies, avoiding delayed referrals, increasing the competence of health workers and ensuring the safety and speed of transfer of sick patients.

Potentially modifiable factors in pre-hospital care include:

- closure or lack of peripheral health facilities;
- lack of essential medicines or medical supplies such as oxygen at peripheral health centre;
- delays in referring severely ill children or in escalating care;
- lack of transport or inadequate care during referral;
- referral of a severely ill child without an accompanying health worker; or
- incorrect advice or treatment by a primary health worker.

It is important to explore these reasons, such as the knowledge and skills of health workers for assessing sick children, use of standard care guidelines or referral protocols or lack of appropriate supplies and equipment.

## 6.3 In hospitals

### 6.3.1 Lack of triage or delayed emergency treatment

There are often delays in immediate assessment and initial treatment of severely ill children who present to hospital emergency or outpatient clinics. In busy emergency departments, a young infant may die because the mother does not know that he or she is very ill, and it is too late by the time she is seen. Health workers must be understanding of parents' concerns when they show them and be vigilant for severe illness in the children of quiet mothers.

Emergency treatment may be delayed in very busy emergency or outpatient clinics that do not have a system for identifying severely ill children and triaging them to urgent or immediate care. There may be insufficient clinical staff for the number of patients or staff absences. In some facilities, there are no clear directions or signs in outpatient or emergency departments indicating where and how parents should take their children for immediate care. The area of the facility in which children first present may lack emergency life-saving medicines, supplies and equipment, or there may be a lack of competent health workers to assess, resuscitate and provide emergency care.

### **6.3.2 Problems in clinical assessment, diagnosis and treatment**

A correct or working differential diagnosis is important for appropriate care of children. It involves taking a good history, conducting an examination and laboratory tests and sometimes seeking a second opinion from a more experienced health worker. The diagnosis should be as specific as possible from the presenting clinical symptoms and signs; for example, a diagnosis of pneumonia without specifying its severity or the presence of complications (such as an empyema) will result in under-treatment.

It is often not possible to be absolutely sure of a diagnosis; however, treatment should be given on the basis of the most likely diagnosis or problem. If they are uncertain, health workers should seek a second opinion, and reassess the patient. An incorrect diagnosis may be made because the health worker lacks knowledge, skills and experience or because the condition is rare. Children often have several conditions (for example, pneumonia plus severe anaemia) that will be fatal if undiagnosed, and health workers should be vigilant for multiple diagnoses in any very sick child.

### **6.3.3 Problems in monitoring and supportive care**

The clinical progress of every sick child must be monitored after admission to hospital to identify changes in their condition or early clinical deterioration in order to protect them from harm or errors. Routine monitoring of vital signs (temperature, pulse, blood pressure, respiratory rate and oxygen saturation, and, in the most critically ill patients, convulsions, pain, level of consciousness,

blood glucose, nasogastric tube feeds, intravenous infusions and urine output) and dosages and frequency of administration of medicine are usually recorded on a chart. Health workers use the charts to respond to changes in monitoring variables by starting or changing supportive care, taking appropriate action and seeking additional or more experienced help.

Potentially avoidable factors in monitoring and supportive care are:

- lack of a monitoring chart or one without age-appropriate ranges;
- no regular documentation of vital signs, clinical findings or drug administration;
- lack of continuous monitoring when needed;
- lack of monitoring of administration of intravenous fluids, blood glucose or feeding (nasogastric or intravenous) for patients who are unable to drink;
- errors in blood transfusion (delay or incorrect volume);
- administration of incorrect dosage and frequency of medications;
- lack of appropriate response to a deteriorating clinical condition as indicated by changes in vital signs; and
- not seeking a second opinion, not reassessing and not escalating care for a deteriorating child.

### **6.3.4 Hospital-acquired infections**

Some children die not from the disease they had when they came to hospital but from complications of being in hospital, including nosocomial infections, intravenous access complications and progressive malnutrition. Some

complications are not obvious, so, when a child dies unexpectedly, the circumstances surrounding the death should be reviewed.

Hospital-acquired infections should be suspected if a hospitalized child has a new fever or symptoms after beginning to recover from the original illness. Such infections are a common cause of death, representing 20–50% of deaths in some newborn nurseries and children's wards. The most common types of hospital-acquired infections are urinary tract infections, surgical site infections, gastroenteritis, meningitis and pneumonia.

Bacterial infections are the cause of about 90% of all hospital-acquired infections. Some are resistant to several antibiotics, and others are fungal or viral infections. The infections are spread by health workers, contact with contaminated material (such as body secretions, clothes, stool or pus) or equipment (e.g. stethoscopes) or spread of droplets from coughing or sneezing.

The risk factors for hospital-acquired infections include:

- poor hand hygiene practices;
- lack of running water or alcohol for cleaning hands and poor antiseptic practices;
- overcrowding and close contact;
- contaminated instruments or equipment;
- prolonged intravenous cannulation or urinary catheterization;
- prolonged hospitalization and prolonged use of antibiotics; and
- immunocompromised patients

### **6.3.5 Medical errors**

A medical error is defined as an unintended act (of omission or commission) or one that does not achieve its intended outcome, failure of a planned action to be completed as intended (error of execution) or deviation from the process of care that may or may not harm the patient. Harm due to a medical error can be caused by an individual or by the system. While many errors are inconsequential, they can end the life of a child or accelerate imminent death. The taxonomy of errors is being extended to better categorize preventable factors and events, which, regrettably, occur in every busy hospital ward.

### **6.3.6 Time of death**

In some hospitals, a disproportionate number of deaths occur at night, when there are fewer staff to monitor patients and respond to deterioration of a child's condition. Audit of the death of a child who died unexpectedly should always include whether the appropriate staff were available to care for the child.

### **6.3.7 Progressive malnutrition in hospital**

Progressive malnutrition can occur during a prolonged hospital stay for treatment of a complicated acute or chronic illness. This can be prevented by identifying children at risk by weighing them regularly and ensuring appropriate feeding and nutrition. A child who is not acutely malnourished at admission but loses 10% or more of his or her weight during the hospital stay has an adverse complication of hospitalization, which will increase the risk of dying.

Three examples of modifiable factors in child deaths in hospital and remedial actions taken are given below.

## Example 1

### Case summary

Nicholas was a 4-year-old boy with moderate cerebral palsy who died from pneumonia. He had seizures that were difficult to control, and the pharmacy had run out of sodium valproate, the only anticonvulsant drug that had been effective in this child. He had a brief seizure when he presented to hospital but was not recognized as having pneumonia until 24 h later, when he was lethargic and febrile, and pulse oximetry identified hypoxaemia. He was also moderately malnourished. His mother said that he had not been his usual active self for 2 days.

### Causes of death

1. Immediate cause of death: pneumonia
2. Underlying chronic or comorbid conditions: cerebral palsy
3. Other associated diagnoses: malnutrition, epilepsy

### Modifiable factors

1. Recognition of clinical deterioration of children with chronic illness by listening to the parents, who know the child best
2. Adequate clinical assessment for identification of all illnesses
3. Adequate supplies of essential anti-epileptic drugs, including sodium valproate, carbamazepine and phenytoin
4. Improved access to nutritional support for children with chronic neurodevelopmental problems

### Action plan

1. Emphasize to all health workers the importance of listening to parents, asking them how their children are normally and now, when sick. Are they normally playful and interactive? Do they run and talk? How different are they now?
2. Ensure that pulse oximetry is part of the triage and assessment of any sick child.
3. Emphasize that very sick children may have more than one illness. A good clinical assessment should be conducted to rule out common serious illnesses. Structured inpatient admission forms help to improve the completeness of patient assessment.
4. Consult the pharmacy to ensure continuous supplies of essential anti-epileptic drugs.
5. As part of a multidisciplinary approach for children with neurodevelopmental problems, include regular assessment of nutritional status, including anthropometrics, diet and the effect of the chronic condition on the child's growth and ability to feed.

## Example 2.

### Case summary

*Aidah died on day 2 of life from neonatal sepsis and prematurity. Her mother, Saba, and her father, Shazad, live in village 2 h by road from the main hospital. This was Saba's second pregnancy; her first baby, 2 years previously, was stillborn. A nurse at the health clinic in the village provides antenatal care. Saba registered for antenatal care at 16 weeks' gestation and was seen again at 20 and 24 weeks, when she was well.*

*At 28 weeks' gestation, Saba was feverish, had lower abdominal pain and dysuria and was vomiting. A urinary tract infection was diagnosed, and she received a course of cotrimoxazole. She became afebrile, the abdominal pain improved, and the vomiting ceased. Three days later, Saba's membranes ruptured, and she attended the clinic, was checked and discharged. After another 2 days, she was again feverish and had abdominal pain and was referred to hospital. Aidah was born soon after Saba arrived at the hospital, weighing 1.4 kg and with severe respiratory distress and intermittent apnoea. Aidah was admitted to the special care nursery, given oxygen, ampicillin, gentamicin and aminophylline for apnoea. Her hypoxaemia persisted, and a chest X-ray confirmed severe pneumonia. Despite continuous positive airway pressure, she died on day 2. After the delivery, Saba received intravenous antibiotics for chorioamnionitis and recovered during the next week.*

### Causes of death

1. *Immediate cause of death: pneumonia and neonatal sepsis*
2. *Underlying chronic or comorbid conditions: prematurity and very low birth weight*
3. *Other associated diagnoses: prolonged ruptured membranes*

### Modifiable factor:

1. *Mothers with pre-term rupture of membranes should be referred immediately for parenteral antibiotics and obstetric care.*

### Action plan:

1. *Ensure that health workers in clinics who provide antenatal care recognize pregnant women at high risk, and put in place clear maternal referral and transfer guidelines. The criteria for "high-risk mothers" could be written on a poster pinned near the admissions desk.*
2. *Ensure that staff have access to guidelines for the management of very-low-birth-weight babies and the complications that may arise; and ensure that staff know how to use the guidelines.*



### Example 3.

#### Case summary

*Veronica was a 9-year-old girl with HIV infection who died from pneumonia. Her mother had died soon after Veronica's birth, and she was cared for by her grandmother in a one-bedroom house in a settlement with a pit toilet and a communal water supply. She did not go to school. Veronica was on antiretroviral therapy and cotrimoxazole prophylaxis, but her adherence was sometimes poor. She was fully vaccinated. She missed several clinic appointments. She presented at the hospital after 5 days of cough, fever and worsening respiratory distress over 24 h. On presentation, she looked very unwell, with cyanosis, severe hypoxaemia (SpO<sub>2</sub> 82%), chest recession, diffuse chest crepitations, finger clubbing, a heart rate of 170/min and cool peripheries. She weighed 24 kg, and her height was 124 cm. She was started on ceftriaxone, flucloxacillin, cotrimoxazole and prednisolone. Despite treatment, she deteriorated further and died within 24 h of admission.*

#### Causes of death

1. *Immediate cause of death: pneumonia*
2. *Underlying chronic or comorbid conditions: HIV infection, malnutrition*
3. *Social risk factors: mother dead, poor household sanitation, unsafe water supply, poor adherence to medication, lost to follow-up*

#### Modifiable factor

1. *Better follow-up for chronically ill children in vulnerable families*

#### Action plan:

1. *Determine whether it would be possible to provide nurse or medical outreach services for all children seen at an HIV clinic and for children who are chronically ill and live in vulnerable families. Support could include monitoring adherence, nutritional support and economic support. A model of nurse outreach to such patients, with active follow-up, could be developed.*
2. *Ensure that all children with a chronic illness have a personalized treatment plan, which is shared with the family and health clinic.*
3. *Liase with schools about chronically ill children.*

# CREATING AN ENVIRONMENT FOR CHANGE



Evidence from countries with functioning mortality audit systems shows the importance of an enabling environment at all levels. Support from the ministry of health and facility administrators is essential, and supportive health professionals can make the difference between success and failure. Active involvement and participation of professional associations (paediatricians, other clinicians and nurses) and other stakeholders (hospital administrators, social scientists, epidemiologists, health system information specialists, health planners, monitoring and evaluation personnel, civil society representatives) is also important. The roles and responsibilities of departments in the ministry of health, professional associations, the private sector and other stakeholders should be defined.

## 7.1 Policy and guidelines

A clear supportive policy and an enabling legal framework are pre-requisites for success in mortality audits and might have to be in place before the process begins. Fear of participating in audits can be removed by ensuring confidentiality, providing a supportive environment for quality improvement and affording legal protection.

National guidelines on setting up an audit committee and conducting meetings, clear guidance on information flow and standardized tools are also helpful. Clear norms and practice standards may ensure objective assessments of the modifiable factors associated with each death.

## 7.2 Legal and ethical issues

### 7.2.1 Legal protection

To ensure that mortality audits are conducted in an environment in which staff feel free to discuss openly, the legal and ethical issues relevant to investigating child deaths should be considered. The laws and customs of a country or culture can play a significant role, by helping or hindering access to information, the involvement of families and health care professionals, the conduct of mortality reviews and the ways the findings are used. In countries where malpractice litigation is common, fear of lawsuits can limit mortality audits, even though the aim is to improve quality.

While the ethics of mortality audits are universal, legal aspects vary from one country to another, and it may be beneficial to understand possible legal implications early in the establishment of a mortality audit to ensure the protection of staff and patients. A supportive health policy framework for maternal or other death reviews can be used as a model for child death reviews.

It is essential that there be separate processes for handling legal misconduct and professional discipline, which is distinct and separate from quality improvement through mortality audits.

### 7.2.2 Confidentiality: protection of patients and health workers

At all audit meetings, the chair should remind staff that confidentiality must be maintained at all times. All attendees at a child death review meeting should be instructed not to disclose any confidential information about the cases outside the

group. They might be asked to sign an attendance record at each meeting, with a simple agreement to confidentiality.

Patients' names may be cited on the initial report forms in order to identify and locate cases and avoid duplication; however, they should be replaced by case numbers as soon as possible, in order to protect the confidentiality of the patient and the staff involved. Local data collectors or the review coordinator should ensure that the minutes of meetings do not allow linkage of specific cases with actions taken. Any possibility identifying information should be removed from all records, notes and reports before they are sent to other individuals or groups for further review or completion. Staff must maintain confidentiality and ensure that all hard copies are kept in locked cabinets or offices and electronic data in password-protected files.

### **7.2.3 Use of results**

The goal of each of the approaches presented in this guide is to identify why child deaths occur and to make the necessary changes to mitigate modifiable factors. The purpose is not to cast blame. Once the data have been collected, it is unnecessary to know the identities of the patients or health workers involved. Mortality audits should not be used to blame or punish individuals, groups or institutions; they are not designed to discipline care providers.

Care providers are unlikely to cooperate willingly in reviews that seek to attribute blame for an adverse event. Health workers must be accountable for their actions; however, accountability can be encouraged by education and support.

## **7.3 Training and supervision**

National and district administrative staff, health workers and others may require orientation and training in auditing. Training could be conducted by the ministry of health or by professional associations. Those involved at each level of the review process should understand why each piece of information must be collected and for what purpose, so that data are collected in order to improve quality. Training should also include an overview of death review meetings and guidance on appropriate conduct, including confidentiality. Depending on the level of engagement, training may also include coding of causes of death and continuing medical education on the management of common conditions.

Quality improvement workshops could be conducted annually to communicate further recommendations, action plans and outcomes. These might be held during annual professional association meetings. They allow staff to discuss their experience in child mortality auditing.



# SCALING-UP CHILD MORTALITY AUDITING



Mortality auditing may be started initially in only a few facilities to understand the local context. Once best practices and the benefits of mortality audit have been seen, they could be extended to other facilities and districts or nationally. If additional resources are available to coordinate a standardized system, data can be collated, tracked and disseminated centrally.

For a national quality improvement programme, a phased approach might be used to answer important questions:

- *Who will lead the programme?* Will it be coordinated by national or subnational committees or both? Will it be governed exclusively by the ministry of health, health professional associations or a group that includes partners, civil society, community representatives and others?
- *Where will deaths be identified?* Will the system cover only public sector facilities or all facilities? Will deaths in the community be included? If so, how will information on those deaths be collected? How will the mortality audit system be linked with a health management information system?
- *What will the scope of implementation be?* Will single facilities conduct their own reviews, within practice groupings or districts or both? Will the audits be mandatory or voluntary?
- *How extensive will the audit be?* Will the committee review selected cases or all deaths? How will the committee decide which cases to review, and how often will it meet?

An annual report on child morbidity and mortality could be published, with detailed information, trends and the initiatives taken to improve quality. The report should be fully de-identified and contain only summary data, recommendations for policy and practice and examples of good practice or progress. The readership of such a report would be governments, health care workers, policy-makers, parents and community leaders (21, 28).

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# Annex 1. List of common diagnoses, causes of death and International Classification of Diseases codes

Category	Diagnosis or cause of death	ICD code
Respiratory	Pneumonia	J18
	Bronchiectasis	J47
	Lung abscess	J85
	Pneumothorax	J93
	Whooping cough	A37
	Croup	J05.0
	Epiglottitis	J05.1
	Bronchiolitis	J21
	Asthma	J45
	Severe acute asthma or status asthmaticus	J46
	Acute otitis media	H66.9
	Chronic serous otitis media	H66.3
	Respiratory, other (specify)	J98.9
Gastrointestinal	Acute watery diarrhoea	A09.9
	Persistent diarrhoea	
	Dysentery (Shigella)	A03
	Dysentery (Amoebiasis)	A06.0
	Cholera	A00
	Hepatitis	K75.9
	Hepatitis (Chronic)	K73
	Hepatitis (A)	B15
	Hepatitis (B)	B16
	Hepatitis (other acute viral)	B17
	Typhoid	A01.0
	Gastrointestinal other	K92.9
Nutritional	Severe acute malnutrition	E43
	Marasmus	E41
	Kwashiorkor	E40
	Vitamin A deficiency	E55
	Beri beri (thiamine deficiency)	E51

Category	Diagnosis or cause of death	ICD code
	Iron deficiency	D50
	Other nutritional disorder (specify)	E46
Malaria	Malaria, uncomplicated (falciparum)	B50.9
	Malaria, uncomplicated (clinical)	B54
	Malaria, severe (with complications)	B50.8
	Cerebral malaria	B50.0
Chronic neurological	Epilepsy	G40
	Hydrocephalus	G91
	Cerebral palsy	G80
	Developmental delay	R62.0
	Neurological other	R29.8
Acute neurological	Meningitis, <i>Haemophilus influenzae</i>	G00.0
	Meningitis, <i>Streptococcus pneumoniae</i>	G00.2
	Meningitis, <i>Neisseria meningitides</i>	A39.0
	Meningitis, <i>Cryptococcus</i>	B45.1
	Meningitis, no cause identified or aseptic	G03.9
	Acute convulsions	R56
	Encephalitis, Japanese encephalitis	A83.0
	Encephalitis, other	G04.9
Tuberculosis	Pulmonary tuberculosis	A15
	Unconfirmed pulmonary tuberculosis	A16
	Tuberculosis meningitis	A17.0
	Lymph node tuberculosis	A18.2
	Confirmed intrathoracic lymph node tuberculosis	A15.4
	Bone and joint tuberculosis (including Potts disease of spine)	A18.0
	Tuberculosis of spine (Potts disease)	A18.0
	Tuberculous arthritis	A18.0
	Abdominal tuberculosis	A18.3
	Miliary tuberculosis	A19
	Tuberculosis, pericardial effusion	A18.8
	Disseminated tuberculosis (including miliary tuberculosis )	A19.1
	Multi-drug-resistant tuberculosis	U84.3

<b>Category</b>	<b>Diagnosis or cause of death</b>	<b>ICD code</b>
Acute rash and fever / infection	Sepsis (including bacteraemia)	A41.9
	Measles	B05
	Rubella	B06
	Varicella, chickenpox	B01
	Hepatitis	B17.9
	Dengue fever	A97
	Dengue shock syndrome	A97.2
	Dengue haemorrhagic fever	A97.1
	Cellulitis (skin sepsis)	L03
	Osteomyelitis (bone infection)	M86
	Septic arthritis (joint infection)	M00
Pyomyositis (muscle infection or abscess)	M60.0	
HIV infection	HIV/AIDS	B24
	Pneumocystis pneumonia	B59
	HIV-related persistent diarrhoea	
	HIV-related chronic lung disease	
Emergency, surgical	Appendicitis	K35
	Bowel obstruction, surgical	K56.6
	Burns	T29
	Drowning	W74
	Poisoning	T65.9
	Snakebite	T63.0
	Trauma	T07
	Tetanus	A35
	Surgical, other	Y83.9
	Accident, transport related	V99
Renal	Urinary tract infection	N39.0
	Glomerulonephritis	N08
	Acute renal failure	N17
	Chronic renal disease	N18
	Renal, other	N28.9

<b>Category</b>	<b>Diagnosis or cause of death</b>	<b>ICD code</b>
Endocrine	Type 1 diabetes	E10
	Type 2 diabetes	E11
	Hypoglycaemia	E161
	Thyroid disease	E07.9
	Endocrine, other	E34.9
Haematological	Severe anaemia	
	Aneamia (aplastic)	D61
	Sickle-cell anaemia	D57
	Aneamia (acquired haemolytic)	D59
	Bleeding disorder	D68.9
	Thalassaemia	D56
	Haematological, other specify	
Heart disease	Heart disease, congenital	Q24.9
	Heart disease, rheumatic	I01
	Heart disease, other	I51.9
Cancer	Wilms tumour	C64
	Leukaemia	C95.9
	Lymphoma (Hodgkins)	C81
	Lymphoma (non-Hodgkins)	C85
	Retinoblastoma	C69.2
	Central nervous system tumour	C72.9
	Neuroblastoma (adrenal gland)	C74.9
	Cancer, other (specify)	D48.9
Child protection	Physical abuse	Y07
	Sexual abuse	Y07
	Neglect	Y06
	Homicide	Y09
	Suicide	X84

<b>Category</b>	<b>Diagnosis or cause of death</b>	<b>ICD code</b>
<b>Neonatal</b>		
Low birth weight (g)	1500–2500	P07.1
	1000–1499	P07.1
	< 1000	P07.0
Prematurity (< 37 weeks)		P07
Neonatal infection	Pneumonia	P23
	Meningitis	G03.9
	Sepsis, neonatal	P36
	Cord sepsis	P38
	Skin sepsis	P39.4
	Congenital syphilis	A50
	Congenital malaria	P37
	Congenital rubella syndrome	P35.0
	Neonatal tetanus	A33
	Diarrhoea	P78.3
Neonatal infection, other	P39.9	
Perinatal conditions	Birth asphyxia	P21
	Meconium aspiration	P24
	Respiratory distress syndrome	P22
	Jaundice	P59
	Bowel obstruction	P76
	Necrotizing enterocolitis	P77
	Neonatal, other	P96.9
Congenital malformations	Congenital heart disease	Q24.9
	Imperforate anus	Q42.3
	Hirschsprung disease	Q43.1
	Malrotation	Q43.3
	Gastrointestinal malformation: omphalocele, gastroschisis	Q79.2 / Q79.3
	Multiple	Q89.9

# Annex 2. Child and neonatal death register

Hospital: \_\_\_\_\_ Ward: \_\_\_\_\_ Month: \_\_\_\_\_ Year: \_\_\_\_\_

Refer to the standard operating procedures (page 52) as a guide to filling in this death register.

Death notification register No.	Surname or initials	Medical record number	Age	Date of admission	Date of death	Primary cause of death	Underlying chronic or comorbid condition	Death review completed (Yes/No) (date)	Entered into computer (Yes/No)	Death certificate completed (Yes/No)

## Standard operating procedure for filling in the child and neonatal death register

- *Death register No.:* Enter the reference number on the death notification form.
- *Surname or initials*
- *Medical record number:* Enter the inpatient number. If the death occurred before admission, enter the outpatient number.
- *Age:* For children < 1 month, enter age in days. For patients aged 1–59 months, enter age in months. For children > 5 years, enter age in years.
- *Date of admission:* Enter date of admission for inpatient care in this hospital during this admission.
- *Date of death:* Enter the date of death indicated in death certification or death notification form.
- *Primary cause of death:* Immediate cause of death, i.e. the acute illness that led to death, such as pneumonia, diarrhoea, malaria or poisoning. Sometimes a more specific diagnosis is possible, such as “pneumonia due to *Streptococcus pneumoniae*”, or “*falciparum* malaria”, but, depending on the diagnostic tests available, only a clinical diagnosis is often possible. Other examples of immediate causes of death are “acute leukaemia” if the child died directly of the consequences of the cancer or its treatment, or “accidental trauma”.
- *Underlying chronic or comorbid condition:* Any other condition that the child had, such as malnutrition, anaemia or a chronic condition such as cerebral palsy, epilepsy or congenital heart disease. If a child with congenital heart disease died of secondary pneumonia, the immediate cause is pneumonia, and the underlying condition is congenital heart disease. If a child with congenital heart disease died of heart failure, congenital heart disease is the immediate cause.
- *Death review completed:* Indicate Yes or No.
- *Entered into a computer:* Check whether the data are stored in soft copy. Enter Yes or No.
- *Autopsy done:* Check whether there is a copy of an autopsy report in the medical records. Enter Yes or No.



# Annex 3. Child and neonatal death review form

Please complete both sides of this form when a child or newborn dies in the health centre or hospital.

Use the standard operating procedure (pg 56-57) as a guide to completing this form.

Name of child who died:		Date of birth: __/__/20__	Age: __ __ years __ __ months __ __ days (days only for age <1 month)
<input type="checkbox"/> <sub>1</sub> Male <input type="checkbox"/> <sub>2</sub> Female	Weight: __ __ . __ kg	Date of death: __/__/20__	Time of death: __ __. __ __ a.m./p.m.
Province:	District:		Village / town:
Name of health facility reporting the death:			
1. Place of death: <input type="checkbox"/> <sub>1</sub> Hospital <input type="checkbox"/> <sub>2</sub> Health centre <input type="checkbox"/> <sub>3</sub> Home / village <input type="checkbox"/> <sub>4</sub> In transit to health facility		2. No. of days child was sick before presentation: __ __ days 3. Date of hospital admission: __/__/20__	
4. Describe how the child's illness started and progressed.			
5. Distance and time to reach the health facility: __ __ km __ __ h			
6. Mode of transport			
7. Was the child referred from another health facility? <input type="checkbox"/> <sub>0</sub> No <input type="checkbox"/> <sub>1</sub> Yes (which one) _____		8. Delay in transport or referral <input type="checkbox"/> <sub>0</sub> No <input type="checkbox"/> <sub>1</sub> Yes (why) _____	

<p>9. Had the child been an inpatient in the past 3 months?  <input type="checkbox"/> No  <input type="checkbox"/> Yes (if Yes, how many days/months ago was the child discharged) _____</p>	
<p>10. Neonatal death  (age 0–28 days)  <input type="checkbox"/> No (<i>go to Question 17</i>)  <input type="checkbox"/> Yes</p>	<p>11. Mother attended antenatal care: _____ times  Gestation at first visit: ___ months</p>
<p>12. Premature onset of labour  (before gestation of 37  completed weeks)  <input type="checkbox"/> No  <input type="checkbox"/> Yes  <input type="checkbox"/> Unknown</p>	<p>13. For how long were the membranes ruptured  before the baby was born: ___ h  14. Duration of labour: ___ h</p>
<p>15. Place of birth:  <input type="checkbox"/> Hospital  <input type="checkbox"/> Health centre / clinic  <input type="checkbox"/> Home / village  <input type="checkbox"/> Unknown</p>	<p>16. Apgar score  at 1 min ___  at 5 min ___  If unknown, did the child cry immediately after  delivery <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> unknown</p>
<p>17. Vaccination status  <input type="checkbox"/> Vaccines up to date for age  <input type="checkbox"/> Some vaccines received but  not complete for age  <input type="checkbox"/> No vaccines ever received</p>	<p>18. Nutritional status  <input type="checkbox"/> Normal nutrition  <input type="checkbox"/> Moderate acute malnutrition  <input type="checkbox"/> Severe acute malnutrition  <input type="checkbox"/> No information</p>
<p>19. Investigations done and key results:</p>	
<p>20. List the diagnoses made:</p>	
<p>*Primary diagnosis that led to death</p>	
<p>Underlying chronic or comorbid  condition</p>	<p>Other associated diagnoses</p>

<p>21. What environmental or social factors were involved in the child's death? Choose the most appropriate as listed in the standard operating procedure, and provide details.</p>
<p>22. What treatment did the child receive? (List all the treatments given and the date prescribed.)</p>
<p>23. Were there any complications of treatment? (Specify)</p>
<p>24. Were any necessary treatments <i>not</i> available at the time the child presented?</p> <p><input type="checkbox"/> No <input type="checkbox"/> Yes (please specify)</p>
<p>25. Were there modifiable factors in this child's death? (see section 6)</p> <p><input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>(If Yes, please write full details and what action should be taken to avoid similar deaths)</p> <p>Home or community:</p>          <p>Primary care or referral system:</p>          <p>Hospital:</p>          

Name and address of person reporting the death (to provide feedback)

Name\_\_\_\_\_

Signature\_\_\_\_\_

Address\_\_\_\_\_

## Standard operating procedures for filling in the child and neonatal death review form

- *Place of death:* Tick the most appropriate. “Hospital” is applicable for both outpatient and inpatient departments.
- *Days child was sick before presentation:* Fill in the number of days the child was sick with the illness that led to this admission.
- *Date of hospital admission:* Fill in date of admission to this hospital for this admission.
- *Describe how the child’s illness started and progressed.* Extract information from the medical records and perhaps ask the caregiver for more information.
- *Distance and time travelled to reach the health facility:* \_\_\_ km \_\_\_ hours. Interview the caregiver to establish the time they took from the point of origin before arriving at the hospital (from the referring facility or from home if applicable)
- *Mode of transport:* Transport from home or referring facility, e.g. ambulance, bicycle, taxi, public transport
- *Was the child referred from another health facility?* Write Yes if the child was referred for this admission episode.
- *Delay in transport or referral:* From the caregiver’s perception. Check the medical notes and/or interview the caregiver. If YES ask the caregiver the reason for delay.

- *Had the child been an inpatient in the past 3 months?* Refers to inpatient care in any health facility. If Yes, indicate how many days ago if < 1 month or how many months if > 1 month ago.

### Answer questions 10–16 ONLY if the patient was aged < 1 month. If the patient was older than 28 days, skip these questions and proceed to question 17.

- *Neonatal death* (age 0–28 days): Write Yes if the child was 0–28 days old.
- *Mother attended antenatal care:* Check medical notes or antenatal care profile; if not available, interview the mother. Write 0 if the mother did not attend; otherwise, write the number of attendances. If no information is available, write No information. If antenatal care was attended, indicate gestation age in months at first visit. Check medical notes or profile; if not available, interview the mother.
- *Premature onset of labour:* Check medical notes; if not indicated, interview the mother. If no information is available, write No information.
- *For how long were the membranes ruptured before the baby was born:* \_\_\_\_\_h. Check medical notes; if not indicated, interview the mother. If no information is available, write No information.
- *Duration of labour:* \_\_\_\_\_h: Check medical notes; if not indicated, interview the mother. If no information is available, write No information.
- *Place of birth:* Check medical notes; if not indicated, interview the mother.

- *Apgar score*: Check medical notes. If unknown, check the medical notes to determine whether the child cried immediately after delivery. If not indicated, interview the mother.
- *Vaccination status*: Check the medical notes. If not indicated, check the “well-baby” booklet, if available. Compare vaccines given with the recommended national vaccination schedule.
- *Nutritional status*: Check recordings of mid–upper arm circumference or weight–height Z score. If both are missing, check recorded weight. Enter nutritional status as classified in the medical notes. If not classified, refer to the WHO growth charts to classify nutritional status: normal nutrition ( $> -2$  Z scores weight for age or weight for length or mid–upper arm circumference  $\geq 12.5$  cm for age 6–59 months); moderate malnutrition ( $-2$  to  $-3$  Z scores or mid–upper arm circumference 11.5–12.4 cm for age 6–59 months); severe malnutrition ( $< -3$  Z scores, mid–upper arm circumference  $< 11.5$  cm for age 6–59 months or kwashiorkor);
- *Investigations done*: Check medical records and laboratory order forms. Tick the box if test done, and indicate results in the space given. If no results are available, indicate No results. List any other tests done under “Others”.

- *List the diagnoses made*:

*Primary cause of death*: The immediate cause of death, which is the acute illness that led to death, such as pneumonia, diarrhoea, malaria or poisoning. Sometimes a more specific diagnosis is possible, such as “pneumonia due to *Streptococcus pneumoniae*” or “falciparum malaria”, but, depending on diagnostic tests available, often only a clinical diagnosis can be made. Other immediate causes of death include “acute leukaemia” if the child died directly from the consequences of the cancer or its treatment, or “accidental trauma”.

*Underlying chronic or comorbid condition*: Any other condition that the child had, such as malnutrition or anaemia or a chronic condition such as cerebral palsy, epilepsy or congenital heart disease. If a child with congenital heart disease died of secondary pneumonia, the immediate cause is pneumonia, and the underlying condition is congenital heart disease. If a child with congenital heart disease died of heart failure, congenital heart disease is the immediate cause.

*Associated diagnoses*: These include all other conditions not directly related to the primary diagnosis.

- *What environmental or social factors were involved in the child's death?* Extract information from the medical records, and perhaps ask the caregiver for more information. Possible environmental and social factors are:

- Mother or both parents dead
- Unsafe home environment
- Poor household sanitation
- Unsafe household water supply
- Informal adoption
- Lost to medical follow-up
- Poor adherence to medication
- Delayed presentation
- Not vaccinated
- Unsafe home environment
- Possible neglect
- Lack of adequate adult supervision
- Family is homeless
- Family lives in extreme poverty
- Domestic violence in family
- Parental drug or alcohol abuse
- Previous sibling death
- Previously reported to child protection or social welfare services
- Low health literacy and adherence

- *What treatment did the child receive?* Extract the treatment prescribed during this admission episode from the treatment chart.
- *Were there any complications of treatment?* Check the medical and nursing notes; perhaps ask nurses and clinicians for more information.

- *Were any necessary treatments **not** available at the time the child presented?* Check the treatment charts, medical and nursing notes; perhaps ask nurses and clinicians for more information.
- ***Were there modifiable factors in the child's death?*** This, the core task of the audit, will be discussed further during the audit meeting. A modifiable factor is something that might have prevented the death if a different course of action had been taken. When modifiable factors are recognized and addressed, there is potential for positive change.

The person who collects the above information, including interviewing staff and caregivers, will have greater insight into the processes of care than other people and should fill in preliminary responses that can be discussed further by the audit team.

**Home or community:** Explore what was done at this level and what could have been done differently to improve the health outcomes. Compare the care that was given with accepted guidelines for care in the home or the community, e.g. delayed care-seeking or reaching care and social and environmental risk factors.

**Primary care or referral system:**

Determine factors in child deaths that involve delays or problems in primary health care or the referral system, such as:

- closure of peripheral health facilities,
- lack of essential medicines at the peripheral health centre,

- lack of oxygen at the peripheral health centre,
- referral of a severely ill child without an accompanying health worker,
- referral of a hypoxaemic child without oxygen,
- lack of transport from the peripheral health centre,
- delays in escalating care for a deteriorating child,
- incorrect advice or treatment given by a primary health worker,
- incomplete vaccination and
- lack of growth monitoring.

**Hospital:** Evidence-based care is described in national and WHO guidelines and standards of care. Most of the guidelines for common, serious childhood diseases are summarized in the WHO Pocket book of hospital care for children ([http://www.who.int/maternal\\_child\\_adolescent/documents/child\\_hospital\\_care/en/](http://www.who.int/maternal_child_adolescent/documents/child_hospital_care/en/)).

For rare conditions, refer to evidence-based clinical practical guidelines accepted in your country. If no guidelines exist, check the practices preferred by local experts.

Check whether the care given is consistent with your facility's accepted standards of care. Examples of modifiable factors are:

- care that is inconsistent with the accepted standards, e.g.
  - no triage or delayed emergency treatment;
  - inadequate or incorrect clinical assessment, diagnosis and treatment;
  - Inadequate monitoring and supportive care;
  - Inappropriate location of nursing; and
  - failure of prevention at the hospital.
- specific complications of treatment or hospitalization, e.g.
  - hospital-acquired infections,
  - complications of intravenous drips,
  - complications of intramuscular injections,
  - progressive malnutrition while in hospital and
  - medication and medical procedural errors.
- staffing at the time of death: were the appropriate staff available to care for the child?

*Name and address of the person reporting the death* (for purpose of providing feedback). Please provide your name and signature. Address: please indicate the department, section or ward in which you work.

# Annex 4. Action plan summary form

Name of hospital _____ Date of mortality audit meeting _____					Review action at follow-up
Practice to be improved	Action to be taken	Level at which action is required	Deadline	Person responsible for making change	Action taken and outcome
Name: Signature:					











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